Rural Sustainability in Sarawak
(The role of adat and indigenous knowledge in promoting sustainable sago production in the coastal areas of Sarawak)

being a Thesis submitted for the Degree of

Doctor of Philosophy

in the University of Hull

by

Salfarina Abdul Gapor,
BA (Hons) University of Sheffield,
MA University of Sussex.

Abstract

Conventional development, a northern-inspired modernisation programme, is no longer seen as the only solution to rural development problems. It has been criticised for neglecting environmental issues and has failed to improve the lives of the rural poor. Accordingly, there has been a search for more 'appropriate' approaches to development. One option is to incorporate indigenous knowledge in development. Such a recognition is believed to empower people, to enhance their self-esteem and consequently to allow them to participate in decision-making; and thus to meet their own needs and aspirations.

The study area consists of three districts (Dalat, Oya and Mukh) in the coastal area of Sarawak. The Melanau are the dominant ethnic group, depending on sago cultivation for their livelihood. The study looks at the role of the Melanau's indigenous knowledge in sago production and compares it to 'modern' techniques (the subsidy scheme and plantation) as introduced by the government. Sago cultivation is unique, as it not only provides the means of material production but also influences the Melanau's socio-cultural system and environmental perceptions. Indigenous knowledge is encoded in Melanau culture through the customary law, the adat.

The findings show that current agricultural policies not only fail to reach their socio-economic objectives but are also insensitive to socio-cultural needs and the local environment. The contribution of indigenous knowledge is overlooked and undermined, despite its potential contribution to developmental programmes. Although there are signs of acculturation, indigenous techniques still play an important role, and are often combined with modern elements, implying a dynamic process of innovation among the farmers. The findings expose the myth that deploying indigenous knowledge is synonymous with economic decline. In contrast, indigenous knowledge contributes to socio-economic well-being by minimising risk, providing food self-sufficiency, enabling low cost farming and legitimising a redistributive system.
Acknowledgement

I am deeply grateful to Phil Bradley for his guidance, support and understanding while supervising me. I am also grateful to David Taylor and Mike Parnwell for their early assistance during the initial stage of the research.

I would also like to thank all the DOA and LCDA staffs involved and especially to the people in Dalat, Oya and Mukah for their co-operation. Being a victim of acculturation myself, the study is important for me to trace back my 'roots'. Most of all, I would like to thank my husband and children for their perseverance and support at all times. This thesis is dedicated to them - Haris, Hana, Yasmin and Maryam.
## CONTENTS

Abstract ........................................................................................................................................ i  
Acknowledgements................................................................................................................... ii  
Contents......................................................................................................................................... iii  
List of figures.................................................................................................................................. vi  
List of tables................................................................................................................................... ix  

<table>
<thead>
<tr>
<th>Chapter One</th>
<th>Introduction</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The research problem</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>A brief background to the case study area</td>
<td>3</td>
</tr>
<tr>
<td>1.3</td>
<td>Aims and objectives of the research</td>
<td>6</td>
</tr>
<tr>
<td>1.4</td>
<td>Structure of the thesis</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter Two</th>
<th>Indigenous Knowledge, a potential contributor to sustainable development in developing countries</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Society and nature relationship – an indigenous perspective</td>
<td>10</td>
</tr>
<tr>
<td>2.1.1</td>
<td>Sustainable development</td>
<td>13</td>
</tr>
<tr>
<td>2.1.2</td>
<td>The concept of indigenous knowledge</td>
<td>15</td>
</tr>
<tr>
<td>2.2</td>
<td>Why indigenous knowledge?</td>
<td>17</td>
</tr>
<tr>
<td>2.2.1</td>
<td>“Conventional” development</td>
<td>17</td>
</tr>
<tr>
<td>2.2.2</td>
<td>The socio-cultural implications of modernism</td>
<td>20</td>
</tr>
<tr>
<td>2.2.3</td>
<td>The socio-economic implications of modernism</td>
<td>27</td>
</tr>
<tr>
<td>2.2.4</td>
<td>The environmental effects of modernism</td>
<td>31</td>
</tr>
<tr>
<td>2.3</td>
<td>The contributions of indigenous knowledge toward sustainable agricultural development</td>
<td>34</td>
</tr>
<tr>
<td>2.3.1</td>
<td>The socio-cultural contributions of indigenous knowledge</td>
<td>36</td>
</tr>
<tr>
<td>2.3.2</td>
<td>The socio-economic contributions of indigenous knowledge</td>
<td>39</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Indigenous knowledge and the environment</td>
<td>40</td>
</tr>
<tr>
<td>2.4</td>
<td>Implementing indigenous knowledge in development programmes</td>
<td>44</td>
</tr>
<tr>
<td>2.5</td>
<td>Conclusion</td>
<td>46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter Three</th>
<th>Malaysia – background information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Malaysia – history, government and development</td>
<td>49</td>
</tr>
<tr>
<td>3.2</td>
<td>Development planning in Malaysia – an agricultural perspective</td>
<td>50</td>
</tr>
<tr>
<td>3.2.1</td>
<td>Colonial period</td>
<td>51</td>
</tr>
<tr>
<td>3.2.2</td>
<td>Late Colonial period (1955-1965)</td>
<td>52</td>
</tr>
<tr>
<td>3.2.3</td>
<td>After independence (1966-1975)</td>
<td>53</td>
</tr>
<tr>
<td>3.2.4</td>
<td>The period “After Mahathir”</td>
<td>55</td>
</tr>
</tbody>
</table>
### Chapter Four  Sarawak – study area and study community

4.1 The geography of Sarawak
4.1.1 Society and economy in Sarawak
4.1.2 Sarawak – Land tenure system
4.2 The study area - Dalat, Oya and Mukah districts
4.3.1 The role of *adat* in the Melanaus' life
4.3.2 The impact of historical and current “development” on the study area
4.3 Conclusion

### Chapter Five  Research methodology

5.1 Research questions
5.2 Research hypotheses
5.3 The survey
5.4 Quantitative survey
5.4.1 Sampling selection
5.4.2 The questionnaire
5.4.3 The fieldwork
5.5 Qualitative survey
5.5.1 Individual in-depth interviews
5.5.2 Group interviews
5.5.3 Participant observation
5.5.4 The design of the Guides for in-depth interviews and group discussions
5.5.5 The fieldwork
5.6 Methods of analysis
5.6.1 Quantitative data analysis
5.6.2 Comparing means between variables
5.6.3 Classifying farmers along a modern-traditional axis
5.6.4 Finding association between variables
5.7 Conclusion

### Chapter Six  Sago production and processing industries

6.1 Geographical background of the study area
6.1.1 The sago palm (*Metroxylon sagu*)
6.1.2 Historical background of the sago production and processing industries
6.2 Traditional methods of cultivating sago 147
6.3 Modern methods 163
6.4 Effects of the LCDA sago plantations to sago smallholders 172
6.5 Sago processing industries 180
6.5.1 Cottage industries 180
6.5.2 Sago miller 185
6.6 Conclusion 195

Chapter Seven  The Melanau belief system
7.1 Concept of the Melanau’s *adat* 197
7.1.1 The role of *palei* in the Melanau community 199
7.1.2 The transmission of *palei* and traditional knowledge to the younger generation 204
7.1.3 Socio-cultural roles of the sago palm to the Melanau community 207
7.2 The Sample households 209
7.2.1 The socio-economic characteristics of the sample households 210
7.2.2 Income and employment of the respondents 213
7.2.3 Cost of farming expenditure 218
7.2.4 Working condition of the respondents 219
7.2.5 Methods of sago cultivation 227
7.2.6 The decline in the practice of *palei* and *pedok* 232
7.3 Conclusion 239

Chapter Eight  Acculturation – implications to the Melanau and the sago production
8.1 Impacts of acculturation on sago production 244
8.1.1 The contribution of *palei* in sustaining sago production 244
8.1.2 The contribution of the traditional techniques in sustaining sago production 249
8.1.3 The socio-cultural values of sago and its impact on sago production 255
8.1.4 The sago palm as an asset 257
8.2 The implication of acculturation to the Melanau community 258
8.2.1 The decline of *palei* and *pedok* practice amongst the Melanau and its implication 258
8.2.2 The contributions of other *palei* and traditional medicines to the Melanau community 263
8.3 The realities - the Melanaus’ coping strategies against external influences 265
8.4 Conclusion 276

Chapter Nine  Conclusion
9.1 Summary of the findings 277
9.1.1 Indigenous knowledge and sago production 277
9.1.2 The Subsidy Planting Scheme (SPS) 279
9.1.3 The relationship between the sago millers and smallholders 282
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5</td>
<td>The study area</td>
</tr>
<tr>
<td>4.6</td>
<td>Relationship showing adat in relation to the Melanaus' environment, material production and social reproduction</td>
</tr>
<tr>
<td>5.1</td>
<td>Location of the selected villages in relation to rural centres and sago plantation</td>
</tr>
<tr>
<td>5.2</td>
<td>Key stakeholders and their connectivity</td>
</tr>
<tr>
<td>5.3</td>
<td>Stages and selection of government and agency officers interviewed</td>
</tr>
<tr>
<td>5.4</td>
<td>The selection of quota sampling for smallholders</td>
</tr>
<tr>
<td>5.5</td>
<td>Selection of women group for individual in-depth interviews</td>
</tr>
<tr>
<td>5.6</td>
<td>Determining the category of cultivating methods</td>
</tr>
<tr>
<td>5.7</td>
<td>The formation of umbrogenous peat swamp</td>
</tr>
<tr>
<td>5.8</td>
<td>The peat swamp forest</td>
</tr>
<tr>
<td>5.9</td>
<td>The sago palm</td>
</tr>
<tr>
<td>5.10</td>
<td>A group of sago palms at inflorescence stage</td>
</tr>
<tr>
<td>5.11</td>
<td>The sago palms surrounded by their “suckers”</td>
</tr>
<tr>
<td>5.12</td>
<td>The sago palm and its “suckers”</td>
</tr>
<tr>
<td>5.13</td>
<td>Sago production in tonne from 1940 to 1994</td>
</tr>
<tr>
<td>5.14</td>
<td>Sago production in value from 1940 until 1994</td>
</tr>
<tr>
<td>5.15</td>
<td>The correct position to start a fire during burning, for clearing process</td>
</tr>
<tr>
<td>5.16</td>
<td>A smallholder of Kampung Sesok in his cleared site</td>
</tr>
<tr>
<td>5.17</td>
<td>The planted sago suckers</td>
</tr>
<tr>
<td>5.18</td>
<td>Other crop grown in the sago farm</td>
</tr>
<tr>
<td>5.19</td>
<td>The traditional floating nursery</td>
</tr>
<tr>
<td>5.20</td>
<td>A traditional sago palm nursery</td>
</tr>
<tr>
<td>5.21</td>
<td>Traditional technique of selecting sago suckers from the “mother” palm for propagation purpose</td>
</tr>
<tr>
<td>5.22</td>
<td>Pathway providing platform for rolling sago sections</td>
</tr>
<tr>
<td>5.23</td>
<td>The “dayung”</td>
</tr>
</tbody>
</table>

vii
6.18 Sago sections being transported away to the mill ......................... 161
6.19 Sago sections floated down the rivers in raft formation ............... 161
6.20 The “Straight lining system” introduced under the SPS ................ 168
6.21 Triangular style of planting ......................................................... 173
6.22 Relationship between sago smallholders and the processing industries ...... 180
6.23 A privately owned traditional belangak .................................... 181
6.24 The griddle, a large oven for baking saguk and tebaloi ................. 182
6.25 A woman and her child processing the saguk ............................. 183
6.26 The “gulut” process, transforming the dough into sago pellets .......... 184
6.27 Simon Ubom’s sago mill ................................................................. 185
6.28 Sago sections floated in the river outside a mill, waiting to be processed .... 186
6.29 Sago processed traditionally on trampling platform, termed locally as “injak” ................................................................. 189
6.30 Barks collected at one place and burnt ......................................... 193
7.1 The influence of the Melanau belief system in the creation of their adat through palei as a means of enforcement ......................... 200
7.2 The possible process of acculturation ............................................ 205
7.3 The Rabuong ................................................................................ 207
7.4 The various images of the dakan or bilum effigies ........................ 208
7.5 The serahang, a place of presentation for the gifts to the “ipok laut” (Spirit of the sea) ................................................................. 209
7.6 Age structure .............................................................................. 210
7.7 Education level ........................................................................... 210
7.8 Religion of the respondents ......................................................... 210
7.9 Number of family members ........................................................ 210
7.10 Monthly spending ...................................................................... 211
7.11 Net income distribution of the sample households ....................... 213
7.12 Alternative employment to cultivating sago ................................. 214
7.13 The monthly cost of farming expenditure per household ........................................ 218
7.14 Farm size (hectares) .................................................................................................. 220
7.15 Time ....................................................................................................................... 220
7.16 Number of days/week spent working on the farm ............................................. 220
7.17 Labour time (hour) ............................................................................................... 220
7.18 The farmers' period of cultivating sago .............................................................. 223
7.19 Types of labour working in the sago farms ........................................................ 223
7.20 Factors affecting the decision to harvest ............................................................ 225
7.21 Number of sago palms cut annually .................................................................... 226
7.22 Rate of exploitation .............................................................................................. 226
7.23 Knowledge of palei .............................................................................................. 232
7.24 Practice of palei .................................................................................................... 232
7.25 The practice of pedok ........................................................................................... 233
8.1 The traditional role of the sago palm in the Melanau community .................... 274
8.2 Factors that sustained sago production in the study area .................................. 274

List of tables

2.1 Indigenous ways of controlling pest by indigenous farmers throughout the world ................................................................. 41
3.1 The percentage contribution of agricultural and forestry sector to the GDP, employment and export ........................................................................................................ 58
3.2 Purposes of expenditure for agricultural and rural development, 1966 – 1990 .............................................................................. 59
3.3 Incidence of poverty in the rural areas from 1970 to 1990 .............................................................................................. 68
5.1 Required sample sizes depending on population homogeneity and desired accuracy ........................................................................ 103
5.2 Total Sampling Number ....................................................................................... 104
5.3 Number of respondents and non-respondents ......................................................................................................................... 108
5.4 Types of qualitative survey used in relation to the different categorical groups interviewed ............................................................................. 110
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5</td>
<td>Selection of respondents for group discussions</td>
<td>115</td>
</tr>
<tr>
<td>5.6</td>
<td>Details of the participant observation survey</td>
<td>116</td>
</tr>
<tr>
<td>5.7</td>
<td>Guides for interviewing government/institution officers</td>
<td>117</td>
</tr>
<tr>
<td>5.8</td>
<td>Guide for interviewing the sago smallholders, the LCDA contractors/workers and the extension workers</td>
<td>119</td>
</tr>
<tr>
<td>5.9</td>
<td>Guide for interviewing the sago millers/exporters</td>
<td>119</td>
</tr>
<tr>
<td>5.10</td>
<td>Guide for interviewing the teenagers and influential people from the community</td>
<td>120</td>
</tr>
<tr>
<td>5.11</td>
<td>Guide for interviewing the women group who are involved in the cottage industry</td>
<td>120</td>
</tr>
<tr>
<td>5.12</td>
<td>Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about communal spirit</td>
<td>125</td>
</tr>
<tr>
<td>5.13</td>
<td>Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about the importance of cultivating sago</td>
<td>125</td>
</tr>
<tr>
<td>5.14</td>
<td>Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about the effect of the plantation on the farmer’s income</td>
<td>126</td>
</tr>
<tr>
<td>5.15</td>
<td>Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about the present condition of the local rivers compared to the past</td>
<td>126</td>
</tr>
<tr>
<td>5.16</td>
<td>Scoring system to categorise the cultivation methods</td>
<td>127</td>
</tr>
<tr>
<td>5.17</td>
<td>Test value of strength for the different type of variables</td>
<td>129</td>
</tr>
<tr>
<td>5.18</td>
<td>Finding the relationship between the method of cultivating sago and the spatial location of the farm</td>
<td>129</td>
</tr>
<tr>
<td>5.19</td>
<td>Finding the relationship between the method of cultivating sago and the social factors of the household</td>
<td>130</td>
</tr>
<tr>
<td>5.20</td>
<td>Finding association between the dependent variable, method and the economic variables at the household level factors</td>
<td>131</td>
</tr>
<tr>
<td>5.21</td>
<td>Finding the association between the dependent variable method and the characteristics of the sago farm</td>
<td>131</td>
</tr>
<tr>
<td>5.22</td>
<td>Crosstabulation between the dependent variable (method) and the personal factors variables</td>
<td>132</td>
</tr>
<tr>
<td>5.23</td>
<td>Finding the association between the method of cultivating sago and the effects of the sago plantation</td>
<td>132</td>
</tr>
</tbody>
</table>
5.24 Finding association between the method of cultivating sago and the opinions concerning the local environment

6.1 Changes affecting sago industry in the study area

6.2 Social sanctions (palei) before going to the farm

6.3 Palei during planting

6.4 Palei during harvesting

6.5 Crosstabulation between the dependent variable "pedok" and "persago"

6.6 Relationship between the period of cultivating sago and the practise of pedok

6.7 The different tools used in traditional and modern methods (number of respondents)

6.8 Reasons for adopting modern method

6.9 The breakdown of subsidy entitlement for SPS

6.10 Crosstabulation between the dependent variable "subsidy" and all significant results related to personal factors

6.11 Relationship between obtaining subsidy and gender

6.12 Relationship between obtaining subsidy and the number of family members in the households

6.13 The total land area proposed under the LCDA sago plantations

6.14 Crosstabulation between the dependent variable "offerjob" and independent variables ("age", "educate" and "replace")

6.15 Relationship between willingness to work in the LCDA plantation and age of the respondents

6.16 Relationship between willingness to work in the LCDA plantation and education level of the respondents

6.17 Relationship between willingness to work in the LCDA plantation and willingness to replace sago with other crops

6.18 Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about the effect of the plantations to smallholder’s income

6.19 Buyers of sago sections

6.20 Efficiencies of starch extraction for four types of sago processing in relation to their starch tables or trough
6.21 Losses of starch during processing operations ........................................ 191

7.1 Traditional medicines derived from the environmental elements .......... 201

7.2 Other palei related to the environment ................................................. 203

7.3 Crosstabulation between the dependent variable “educate” and the significant result related to personal factors ................................................. 211

7.4 The relationship between education and gender ................................... 212

7.5 Relationship between education and income from other family members .................................................. 212

7.6 Relationship between education and alternative employment .............. 212

7.7 Relationship between education and age ............................................. 212

7.8 Crosstabulation between the dependent variable “income” with the independent variables related to personal and conditions of farming factors .... 215

7.9 Relationship between monthly income and alternative employment ....... 216

7.10 Relationship between monthly income and other source of income ....... 216

7.11 Relationship between monthly income and income from sago production 216

7.12 Relationship between monthly income and the number of palms annually harvested .......................................................... 217

7.13 Relationship between monthly income and annual rate of exploitation .... 217

7.14 Relationship between monthly income and labour time (hour) ............. 217

7.15 Relationship between monthly income and monthly spending ............. 217

7.16 The guideline for calculating the cost of farming expenditure .............. 219

7.17 Crosstabulation between the dependent variable ‘sizesago’ with the independent variables related to economics and conditions of farming factors ................................................. 220

7.18 Relationship between the size of sago farm with the period of cultivating sago .......................................................... 221

7.19 Relationship between the size of sago farm with the availability of planting other crop .......................................................... 221

7.20 Relationship between the size of sago farm with labour time ............... 221

7.21 Relationship between the size of sago farm and the availability of a subsidy .......................................................... 222

7.22 Relationship between the size of sago farm and the effects from the LCDA plantation .......................................................... 222
7.23 Relationship between period of cultivating sago and the age of the respondents
223
7.24 Relationship between the number of sago palm harvested and income derived from selling sago
226
7.25 Relationship between the number of sago fell and the frequency of cutting sago in a year
226
7.26 Crosstabulation between the dependent variable “distance” with the independent variables related to the conditions of farming factors
227
7.27 Crosstabulation between the dependent variable “method” and the personal factors variables
227
7.28 Relationship between methods of cultivating sago and gender
228
7.29 Crosstabulation between the dependent variable “method” and the characteristics and conditions of farming
228
7.30 Crosstabulation between the dependent variable “method” and the independent variables related to spatial locations of the farmers
229
7.31 Crosstabulation between the dependent variable “method” of cultivating sago and the social factors of the household
229
7.32 Relationship between methods of cultivating sago and the practise of palei...
230
7.33 Relationship between methods of cultivating sago and the practise of communal work
230
7.34 Crosstabulation between the dependent variable “method” and the independent variables related to the economic factors of the households
230
7.35 Summarised breakdown of the other factors (with no association with the methods of farming)
231
7.36 Crosstabulation between the dependent variable “pantang” and significant personal factors
233
7.37 Relationship between the knowledge of palei and the practise of pedok
234
7.38 Relationship between the knowledge of palei and religion of the households
234
7.39 Crosstabulation between the dependent variable “praadat” and the independent variable religion
234
7.40 Relationship between the practise of palei and religion of the households
235
7.41 Kruskal-Wallis one way Anova test, the influence of personal factors and spatial location to the knowledge of palei
235
xiii
7.42 Kruskal-Wallis one way Anova test, showing the influence of personal factors and spatial locations with whether the respondent practise *adat* or not.
Chapter One  Introduction

The first section of this chapter addresses the central research problem, followed by a brief account of the study area. The aims and objectives of the thesis are stated before a concluding section.

Section 1.1  The research problem

In one way or another most developing countries have followed a northern-inspired modernisation programme, here referred to as conventional development. Modernisation theory, first advanced in the 1950s (Rostowian theory) (Wallerstein, 1980; Toye, 1987; Hunt, 1989; Dallmayr, 1992; Booth, 1994) posits the developing world as mimicking the economic development history of the developed world in the North. It was criticised in the 1960s and thereafter, by Marxist and neo-Marxist thinkers, of what was to become known as the dependency school (Frank, 1969; Amin, 1976) – later evolving into a World Systems approach (Wallerstein, 1976; 1980).

The main argument of this study is to reveal how the adoption of conventional development has not benefited all the people in Malaysia, especially the rural poor. Indeed, this problem is not only foreseen and acknowledged by the advocates of conventional development, but also regarded as a prerequisite to achieve high economic growth and developed status (Drakakis-Smith in Dwyer and Drakakis-Smith, 1996). In adopting conventional development, ‘problems’ with the traditional sector are expected, as it is regarded as an ‘impediment’ to economic growth and development. The traditional sector must undergo a ‘painful’ transition period, before being fully transformed as “modern” and “urbanised”. The elimination of the traditional sector is foreseen and intentional. There are reasons for pursuing conventional development, despite knowing the adverse effects to the traditional sector. The colonial era embedded modernisation within state culture which is to followed by the ex-colonist (Brohman, 1996, Parnwell and Bryant, 1996). The promotion of conventional development also emerges from the developed countries’ ethnocentric views of the developing countries, as poor and backward. Developing countries reciprocate by dreaming of high economic growth and prosperity, as portrayed by the modernised, urbanised lifestyle of the developed world. Furthermore, conventional development is pursued by most ruling elites of the developing countries to protect and maintain their status and ‘rent-seeking’ behaviour (Krueger, 1981). These ruling elites, who are mainly Western educated and belong to the middle-class have
absorbed a colonial mentality, and also view the rural population as inferior, illiterate and backward. Once they are in power, the other "good" ones will have no say.

Although modernisation have in some aspects contributes positively to the developing countries, its side effects can be as devastated, especially to the poor and powerless. Conflicts between modern and traditional sectors often arise through inappropriate developmental programme with undesirable consequences such as, the disruption of social and cultural networks and deteriorating social and economic conditions. These include the loss of food security, a disrupted income base and environmental degradation. Identities and cultures are lost, along with an indigenous knowledge system which has sustained both the community and the natural environment (Eder, 1987; Bodley, 1988; 1990; 1994; Mc Caskill and Kampe, 1997; Scott, 1999). Direct resistance by the rural communities may take the form of political rebellion, but more often indirect resistance adopts new social networks and coping strategies (Hettne, 1990; Parajuli, 1991; Watts, 1993; Hettne in Dwyer and Drakakis-Smith, 1996; Scott, 1999). Despite the claim of a ‘trickle-down’ effect, developing countries experience an increased gap between rich and poor, as a result of unequal distribution of income and wealth (Shiva, 1989; Kothari, 1995; Said, 1995; Scott 1999). There has been widespread environmental degradation, because of the injudicious extraction of natural resources, either for agro-export, as cash crops or as raw materials for the manufacturing industries (Huntington, 1965; Pieterse, 1991). The environment is also used as a dump for industrial wastes and by-products.

There have been efforts to incorporate socio-economic and environmental issues into mainstream development. In the 1970s and 1980s, developmental programmes favoured basic needs and equity. In the late 1980s, ‘sustainable development’ has been popular, as fears of environmental disasters increased. The 1992 Earth Summit diffused the concept of sustainable development, resulting to the manifesto of the Agenda 21, Climate Change (including the unsettled Kyoto treaty), Convention on Biological Diversity and the Declaration of Principles on Forests.

In the context of this thesis, sustainable development incorporates not only the environment but also the social and economic domains. (See Chapter 2 for further discussion on sustainable development). Within the problematic of the rural poor in the developing world, this thesis considers the potential contribution of indigenous knowledge to sustainable
development. Indigenous knowledge is part and parcel of a rural community's practice and heritage, yet it is still conceived by the developed and ruling elites as 'inferior' and 'superstitious'. It is also a complex system of representation that underpins rural society in its material production, in its relationship with the environment and in its social practice. It also sustains cultural diversity, including a respect for belief systems, empowers people and recognises the role of women (DuBois, 1991; Manzo, 1991; Hobart, 1993; Moralez-Gomez, 1993; Schuurman, 1993; Smith et al., 1994; Posey, 2000). The incorporation of indigenous knowledge in development promotes self-sufficiency, assures food security and promotes income generation process (Daly and Cobb, 1989; Conway and Barbier, 1990; DuBois, 1991; Brohman, 1996). Moreover, a culture that is embedded in indigenous knowledge has its own way of redistributing food, wealth and income. In terms of the environment, indigenous knowledge contributes to the sustainability of the local environment through providing a low input and appropriate agricultural technology, suitable for the local ecosystem and especially valuable for poor farmers working on marginal land. Indigenous knowledge has emerged through decades of experimentation, trial and error and in this sense local technology helps to maintain biodiversity (Quiroz, 1996). Indigenous knowledge can also serve as the basis for new initiatives, by providing inputs into technology development (La Londe, 1993).

The recognition of indigenous knowledge does not mean a complete retreat to traditional technologies, nor a complete withdrawal from Western scientific expertise. Indigenous knowledge can be seen as a 'corrective' to conventional development (Hettne in Dwyer and Drakakis-Smith, 1996). A combination of carefully selected and modified Western science and indigenous knowledge can play a crucial role in maintaining the long term security of food supplies and the maintenance and enhancement of rural life.

Section 1.2 The study area

The study area is located in the districts of Mukah, Dalat and Oya, located in the Third Division administrative region of Sarawak, East Malaysia. The area has a tropical climate, hot and wet throughout the year with seasonal monsoon rain. The natural vegetation is a coastal peat swamp forest; a fragile ecosystem, with limited prospects for either extensive or intensive farming. The high acidity of the soil, the presence of too much water and the cover of loosely bound, semi-decomposed matter inhibits agriculture (Stanton, 1972; Bennett, 1997). Because of its high acidity, the soil is unsuitable for agricultural development, with the
exception of certain plants which have evolved in situ and are thus well adapted. The sago palm is a good example. Any attempts to mitigate soil acidity, or to drain the swamp are expensive and may produce negative environmental effects, such as subsidence, the oxidation of peat and forest fires (Bennett et al., 1996).

The dominant people of the study area are the Melanau, one of the ethnic groups in Sarawak, who inhabit coastal areas. They constitute a close-knit community with its own distinct language and culture. Although originally animist, the Melanau have been largely converted to Muslim and Christian beliefs through contacts with outsiders, who came as merchants (the Brunei Pengirans and Kuching Malays) or via colonisation (the Brooke rule and British Protectorate).

Sago is the main crop grown by the Melanau, who have cultivated and managed their sago agro-ecosystems for centuries, and have focused on sustaining yields over the long term. Sago not only provides them with food and income, but is also a focal point for their social system and their culture. The intricate relationship between their representation of the environment and their knowledge of sago production has shaped their tradition and culture. The Melanau know the peat swamp forest well. Their knowledge has provided them with the skills to manage their sago farms and the peat swamp forest for centuries. Indigenous knowledge is encoded in their culture through the customary law, the adat. The adat provides them with a guide to a successful and balanced way of life. The adat is still upheld today despite several exogenous forces, intervening with their material production and socio-cultural systems.

Historically, it was sago that attracted outsiders to the study area. Sago was originally produced as a subsistence crop: the Melanau’s staple food. The crop changed to a 'surplus crop' under the control of the Brunei Sultanate, paid as tribute to the Sultan. The Sultan obtained revenue from sago by exporting the wet sago starch to the Singapore mills, where it was furthered processed into flour (Morris, 1991).

The beginning of the colonial period in Sarawak during the mid-Nineteenth Century led to an opening up of the once, self-reliant communities and a greater penetration of the world market forces. From this period on, sago became a cash crop, up on which the Melanau relied solely for their main income. Brooke also introduced outsiders into the study area, the Chinese sago millers. The mechanisation of the Chinese sago mills in the late 1940s had undermined the Melanau’s traditional labour intensive system. While the men cultivated the sago, the women
were the processors, making wet starch which was then sold on to the sago mills. The mechanisation of the mills displaced the women. These mills processed their own wet starch. By the end of 1940s, the Melanau were only able to sell the sago logs to the mills, which considerably reduced their income.

The declining value of sago flour after the Second World war, began to affect the Melanau economy, reducing their livelihoods and leaving them as one of the poorest ethnic groups in Sarawak. As a way of coping with the slump of the 50s, most men migrated to urban areas and logging camps, in search of alternative employment. However, the income derived from alternative employment, especially from the logging camps, was much less than they formerly obtained from sago (Morris, 1991). Throughout all of this time, sago was cultivated traditionally in accordance with *adat*.

In the 1970s, the state government introduced a subsidy scheme, through the Department of Agriculture (DOA), to improve the socio-economic well-being of the Melanau. It was also designed to meet the increase demand for sago from Japan. The subsidy schemes brought inorganic chemicals to sago production, (such as pesticides) and introduced a new planting scheme, in accordance with the results of DOA research. The return of some men from the logging industries also introduced a new instrument of harvesting sago in the area, the chain saw. By that time sago cultivation methods had changed, and the use of *adat* as guidance in sago production gradually faded. Despite these new tools and methods, in relation to area cultivated sago production did not increase considerably. Expanded production only came with the establishment of commercial plantations in the late 1980s by the Land Consolidated Development Authority (LCDA), a statutory body of the state government.

These changes were imposed on the Melanau without prior consultation or participation. They failed to take note of the Melanau's indigenous knowledge and skills relating to production. This local expertise was not built in to the development programmes, which were guided solely by macroeconomic considerations. Neither the social welfare of the Melanau, nor the fragility of the peat swamp forest seems to have been considered.
Section 1.3  Aims and objectives of the research

The main aim of this study is to investigate the effects of the government's sago development programmes on the Melanau community in the study area. Within this general goal, specific objectives of the study are to investigate;

- the relative profitability and sustainability of traditional, modern and plantation-based sago production,
- the socio-economic and environmental impacts of plantation-based sago cultivation, including the effect on intra-community structure and relationships;
- the role of government subsidies and legislation in rural development in the study area and;
- the potential and actual contributions of the Melanau's indigenous knowledge and the practice of adat in sago cultivation towards "sustainable agriculture".

A secondary purpose is to assess the significance and appropriateness of current government policies directed at modernisation. In relation to this, the main objectives are to identify; conflicting views regarding 'development' in the study area, forms of resistance from the Melanau against state programmes.

Section 1.4  Structure of the thesis

The thesis is divided into nine chapters. This chapter (number 1) introduces the study; and literature review is followed by, Chapter 2. Chapter 2 considers the relationship between 'man' and nature in the context of indigenous knowledge. It also includes a discussion of the main characteristics of and comparisons between indigenous and 'Western' knowledge. Conventional development is critically reviewed from the perspectives of culture, economy and environment. Alternative development models are also considered, particularly in so far as they may accommodate indigenous knowledge. In accommodating indigenous knowledge, development can empower local people. It can recognise cultural beliefs and local needs (including those of women), contributes to self-sufficiency and may support existing modes of redistributing wealth and income in the community. Under these conditions sustainable environmental outcomes are more likely, particularly in marginal areas. This is possible because the use of indigenous knowledge in agriculture minimises the disruptions to the local environment, and may lead to more appropriate technologies, which in turn promote biodiversity at the farm level and in the immediate environment. This chapter also discusses
the constraints and potentials of deploying indigenous knowledge and emphasises the use of both indigenous and western technology in development.

Chapter 3 explores the origins and forms of development programmes in Malaysia, Sarawak and the study area. This chapter shows how Malaysia, like other developing countries, adopted the capitalist form of conventional development, a legacy from the British colonial era. Development in Malaysia can be divided into two distinct eras; the period before Mahathir\(^1\) (colonial and early post-colonial years) and the period after Mahathir. Before Mahathir development planning shows an emphasis on socio-economic improvement, particularly poverty reduction amongst the \textit{Bumiputera}\(^2\). It was characterised by a positive discrimination policy to help the \textit{Bumiputera}, especially in comparison to the Chinese. Since the majority of the \textit{Bumiputera} live in rural areas and are engaged in agriculture, development policies at that time focused on helping the rural farmers through subsidy schemes and resettlement programmes like the Federal Land Development Authority (FELDA) and Federal Land Consolidation and Rehabilitation Authority (FELCRA). The period after Mahathir signifies a more ambitious and dramatic approach to development, with the main aim of attaining the status of a “developed” country by the year 2020. Mahathir’s political ideology is deeply imbued with modernisation - as a way of reaching “developed” status. Modernisation is associated with industrialisation and urbanisation. Therefore, development has focussed on “mega” projects to industrialise and urbanise the country, (e.g. the national car project, the Perwira Steel project, the tallest building project, Kuala Lumpur International Airport, the Formula One circuit, the Bakun dam project and so on). With such a heavy emphasis on industrialisation and urbanisation, it is not surprising that attitudes toward rural and agricultural development are indifferent at best. This is partly due to the fact that the success of a development programme is always evaluated quantitatively (using government statistics productivity, the acreage of land developed, the amount of subsidies granted and so on). Similarly, poverty is defined by monthly income alone. According to the Seventh Malaysian Plan poverty evaluation, most of the poor are situated in the rural areas. They are mainly traditional farmers. In the government’s interest in reducing the numbers of poor people, one way is to absorb or literally “abolish” the rural traditional agricultural system, so that poverty figure can be eliminated. Apart from the ways to evaluate the success

\(^1\) Mahathir Muhammad is the most prominent Prime Minister of Malaysia, elected since 1981 and introduced many radical and controversial changes during his rule.

\(^2\) The \textit{Bumiputera} is the term to classify the Malays and the indigenous tribes in Sabah and Sarawak. Other racial groups in Malaysia include the Chinese and the Indians.
system, so that poverty figure can be eliminated. Apart from the ways to evaluate the success of development, the development strategy in Malaysia is also driven and maintained by two other main elements – the effective control of people through the setting up of complex bureaucratic networks and, the authoritative, “Top-down approaches” adopted towards development programmes implementation. A singular concern with high rates of economic growth and the attainment of “developed” status usually means that socio-cultural and environmental aspects are ignored in development planning. The State government and other lower levels bureaucratic counterparts also share the same ideology. The chapter shows the tension between “old” and “new” values and reveals how the government, in the disguise of development, intervenes to promote economic growth and makes sure that the status of the ruling elite and it cronies is maintained.

Chapter 4 describes the study area and Melanau society, mainly focusing on their traditional values of life and the effects of historical and current development process imposed upon them, especially in relation to their future.

Chapter 5 is the methodology chapter. It begins with a discussion of the research questions. Two broads methods of collecting data - the quantitative and qualitative surveys are examined - sample selection, the design of the questionnaires, the fieldwork (preliminary study, pilot and real survey and the verification process) and also the problems of using the methodology. The review of qualitative methods includes the selection of people or groups to be interviewed, the design of the qualitative survey guides, the fieldwork (group discussions, observation, observation-participant and in-depth interviews) and also the problems associated with this methodology. The chapter ends with a discussion of how the data are analysed.

Chapters 6 and 7 present the findings and analyses. Chapter 6 examines the sago production system in the study area. It begins with an account of the environmental base: the peat swamp forest and is followed by a consideration of sago palm agronomy. The second part of the chapter reviews historical accounts of sago production in the study area, which is followed by a descriptive account of the three methods of sago cultivation - traditional, modern and plantation. Traditional techniques are considered mainly from the perspective of
indigenous knowledge, as encoded in the Melanau adat. The section on modern methods assesses the effectiveness of the subsidy scheme implemented by the Department of Agriculture, followed by the effects of the LCDA sago plantation on the sago smallholders. The last part of the chapter discusses the role of the sago processing industries in relation to the smallholders. This includes a discussion of the domination of the traditional cottage industry by the local women, in contrast with the large and commercialised sago mills, operated by the Chinese.

Chapter 7 starts with a discussion of the Melanau belief system, which provides the structure and configuration of adat. This is followed by a discussion of the socio-cultural significance of the sago palm to the Melanau, (in addition to its role as a food source). This section also discusses the findings from the fieldwork concerning the characteristics of the sample households and, in particularly the process of acculturation (particularly amongst the younger generation and its impact). Chapter 7 concludes with a consideration of the various factors that influence the practice of adat and the methods of sago cultivation.

These last two chapters are followed by an interpretation of the results, in Chapter 7. The main theme is acculturation and its effects on the sustainability of sago production and the Melanau community.

Chapter 9 concludes the thesis. It summarises the main findings and attempts to answer the research questions. It also makes recommendations which emerge from these results. Finally there is a reflection on the whole research process, with some suggestions for further work.

---

3The traditional customary law, but known more as the ‘idea of order’ by the Melanau. Refer to Chapter 7 for a detail discussion of adat.
Section 2.1 Society and nature – an indigenous perspective

Although indigenous knowledge exists globally, it is comparatively stronger manifested in the developing countries, with the implication of urgently revealing its potentials to derive a more appropriate policy. Despite an inexorable societal transformation, driven by both exogenous and endogenous forces, indigenous knowledge still plays an important role in "guiding" and influencing decisions in rural communities. The cultural clash between modernisation and indigenous knowledge system often leads to conflicts between the rural people and the aspirations of the ruling state, especially in the context and meaning of development. These conflicts of interests to different epistemological outlooks, different modes and forms of representation, influence whole networks of decision-making for material production, and underpin social reproduction and the exploitation of the environment. Refer to Figure 2.1.

![Diagram of the components that influence human/nature relationship](image)

Figure 2.1 The components that influence human/nature relationship

The epistemological basis of indigenous knowledge is influenced by the relationship between human and nature as perceived by the rural communities in the developing world. This is influenced by three factors – material production, social reproduction and their natural environment. Material production is mainly concerned with the maintenance of livelihood, in accordance with the potentials and constraints of the immediate environment, (including the technology to appropriate resources, crop selection, agricultural output, etc.)
(Klee, 1980; Marten, 1986; Altieri, 1995; Warren et al., 1995). For example, most rural people are engaged in agricultural and livestock activities, tuned to what environment can offer. However, the future availability of these natural resources is not necessarily fundamentally altered or exploited. In most cases, there is a tendency to sustain the productivity of the ecosystem by imitating natural processes. For example, paddy farmers in Indonesia cultivate wet rice and often combine them with aquaculture. In other words, they imitate the natural ecological processes of the underlying, swampy areas (Rambo and Sajise, 1984). Homegardens in Java and shifting cultivation in Southeast Asia imitate the structure and composition of the tropical rainforest ecosystem (Rambo and Sajise, 1984; Thandee, 1986; Cobb, 1988).

Material production includes cultivation techniques, house buildings and so on. In contrast to Western society, rural societies in developing countries approach material production from a broader perspective than mere economic rationality, profit maximisation and production. Their concept of production is mediated by what Arnon (1981) calls “non-economic forces”. Here, “non-economic forces” include behaviour that is not solely constrained by economic rationality. It includes cultural values, aspect of social organisation and psychological attributes (Arnon, 1981). “Non-economic forces” also exist in Western societies but has greater significance in rural societies, because of their “subsistence” orientation and closeness to nature. Cultural values include the concept of right and wrong; beliefs and rules of behaviour and attitudes to agriculture and the environment. Indigenous knowledge is part of these “non-economic forces”. Simmons (1993) described the “non-economic forces” as the “non-utilitarian values” (cultural and ethical values). (See Section 2.1.2 for a detail example of indigenous economic decision-making).

Social reproduction includes the social formation of the rural community, as a family-based unit (kinship) or as a community organisation. The function of such social formation is to manage and organise their socio-political networks, that are related to their livelihood maintenance and their natural ecosystem, such as the social organisation of food production, distribution and consumption (Arnon, 1981; Ellen, 1991). Indigenous knowledge also influences the mechanism of social reproduction, such as taboos and customary law, which tie and regulate individual and social relationships within and between communities. It is important because it provides a strong sense of group solidarity that unifies individuals from diverse backgrounds, ages and economic interests into a larger and cohesive unit, thus affecting social conformity (Mc Caskill and Kampe, 1997; Posey, 2000). Social
reproduction also includes educational functions that maintain and sustain the society for
generations, again, encouraging certain behavioural types and expression (Mc Caskill and
Kampe, 1997).

Nature is not valued only for its contribution to human welfare or material production.
Human action towards nature is determined by human consciousness and the constructions
which that makes (Godelier, 1986; Simmons, 1993; Descola and Palson, 1996; Raynaut et
al., 1997; Teich et al., 1997). In other words, the value of nature is derived from nature-in-
itself (inherent value). This concept influenced human ethical attitude towards nature and
the myriad variety of natural entities (Elliot and Gare, 1983). Thus, nature is perceived as
enspirited, which is felt, perceived, deliberated and responded to voluntarily by people.
Interaction between man and nature are bounded by cultural values, exercised through
behavioural restraints, rules of conduct, good manners and ethics. Some examples of the
ethical imperatives that respect nature include land and tribal ethics, which aim at
maintaining harmony between human and nature. Thus, Klee (1980; p.2) asserts that:
‘.....traditional people treated their ecosystem gently, trying not to violate their ecological
rule. Local constraints in the form of taboos, hunting bans, marine preserves and so on were
established so as not to disturb the delicate balances between humanity and nature’.

The importance of cultural taboos is not only limited to controlling environmental
exploitation, but also contributes psychologically, in explaining unknown phenomena,
reducing anxiety about the future, providing support in times of stress and boosting self-
confidence (Geertz, 1975). These issues are discussed at greater length in Chapter 7. These
internal representations of nature bear down on visions of development. According to the
modernist theory of development, nature is to be dominated and captured. One way of
attaining developed status is by maximising the exploitation of natural resources in material
production. Modernist values environment often result in overexploitation of natural
resources and may eventually lead to irreversible environmental degradation, such as soil
erosion (Blaikie, 1985; Blaikie and Brookfield, 1987; Millington in Mannion and Bowlby,
1992; Goudie and Viles, 1997) and deforestation (Caulfield, 1982; Poore, 1988; Hurst,
1990; Rush, 1991; Aiken and Leigh, 1992; Park, 1992; Grainger, 1993). The impacts of
development are not only limited to their effects on the natural resource base as production,
but also includes the use of the environment for waste-disposal; the dumping of by-products
of consumption and production processes (Adams, 1990; Parry, 1990; Kirkby et al. 1995),
causing pollution (Rutheenberg, 1980; Conway and Barbier, 1990; Conway and Pretty, 1991;
Mannion, 1995) and global warming (Parry, 1990; Agarwal and Narain, 1991; Meadows et
al., 1992; IPCC, 1995; 1997; 2000). These are discussed further in Section 2.2.4.
Until recently, indigenous knowledge was regarded as "superstition" by most outsiders (Grenier, 1998). This earlier conception of indigenous knowledge was connected with rurality, backwardness, primitiveness, a lack of dynamism, inefficiency and inferiority (Pearse, 1980; Thrupp in Warren et al., 1989; Chambers and Richardson in Warren et al., 1995). Traditional knowledge has been considered as backward because it has evolved through trial and error, is not scientifically proven developed, in fact, outside the mainstream of scientific research and agricultural extension programs. The stereotypic image of indigenous rural people, especially small-scale farmers, is one of ignorance, laziness and conservatism (Rajasekaran, 1993). Whereas, the conventional perception for the causes of rural poverty in the developing countries are high population growth and low agricultural yields.

Ironically, outsiders have used indigenous knowledge for the purpose of exploitation. For example, the European whalers relied on the Inuit knowledge to direct them to new Arctic whaling grounds (Doubleday in Inglis, 1993). Similarly, academics and pharmaceutical manufacturers have used indigenous knowledge to extract medicinal plants with attendant inequality on the distribution of benefits and the application of laws designed to protect intellectual property. Because of environmental crises and prolonged poverty and food insecurity in the developing countries, the potentials of indigenous knowledge are being reconsidered - as one option that can contribute to sustainable development (Conway and Barbier, 1990; Tolba, 1992: Smith et al., 1994).

Section 2.1.1 Sustainable development

Much has been written on and around the subject of sustainable development (Redcliff, 1987; 1991; Adams, 1990; Pearce and Turner, 1990; Lele, 1991; Dovers and Handmer, 1992; Manning, 1992; Pearce, 1995; Drummond, 1996; Moffatt, 1996; Rao, 1999; Prugh et al., 1999; Cavalcanti, 2000; Lee et al., 2000). Precise definitions are elusive; its strength perhaps lying in its all embracing openness. As an abstract concept, sustainable development is often deployed as a mantra to support a range of political positions and policy formulations, amongst which many contentiousness development programmes can be included. Sustainability began to emerge in the late 1960s until mid 1970s, whereby, simultaneously conventional development was questioned of its credibility and validity, not only in terms of adversely affecting socio-cultural and environment, but also in its failure to meet socio-economic needs. (See Section 2.2.2 to 2.2.4 for further details). By the 80s, the word sustainability was often used to obscure the normal conventional development, as a
means of 'greenwashing' or 'buzzwords'. Sustainable development is increasingly seen as rhetoric, (Chatterjee and Finger 1994; Moore and Schmitz 1995). Despite the arguments on the definition of sustainable development, most people accept sustainable development as something "benign", an alternative to the conventional development.

'Sustainability appears as the post modern substitute for progress, a less boastful and confident goal, but one that is equally ephemeral and contested. To seek sustainability in this sense is to follow one's bliss. It is to presume forms of rationality and moral justification where more can be discerned, and to act upon this presumption with both confidence and awareness that it is blind faith on which that confidence rests' (Thompson, 1995, p.168).

In the context of this thesis, sustainable development is a development process that addresses three main dimensions of life – social, economic and environmental aspects. In the social domain, this means development should benefit not only an urban minority but also the wide range of rural communities with different socio-cultural aspects and beliefs, with the rural poor as a primary and urgent target. This will include the need to respect ideological and spiritual needs, to empower people, giving them access to natural resources and allowing them to participate in development programmes. Terms increasingly commonly associated with social development include “bottom-up” planning, actor-oriented, populism, entitlements, empowerment and social capital (Kitching, 1982; Chambers, 1986; Bhatt et al., 1987; Chambers, et al., 1989; Hettne, 1990; Chambers and Conway, 1992; Long and Long, 1992; Moore and Schmitz, 1995; Sachs, 1995; Long, 1997; Baron et al., 2000; Pretty and Ward, 2001).

Sustainable development should also ensure that the economic means of maintaining rural livelihoods have long-term durability. In other words, conflicts between maximising material production and maintaining social goals should be minimised. Furthermore, the productive capacity of the local environment, be it the nurtured farm which is the main source of material production or the immediate natural ecosystem, should be maintained. It's overexploitation would undermine long term economic production. For rural communities in the developing world, indigenous knowledge plays an important role in addressing these social, economic and environmental concerns, because it underpins "customary law", taboos, and mediate the interactions between people and nature. Redcliff (1991) addressed the importance of meeting human needs, maintaining economic growth and conserving natural capital as the multiple dimensions of sustainable development. Elliot (1994) defined sustainable development as a concept that encompasses the interdependent goals of development and environmental conservation. Pearce (1990) defined sustainable development as a list of attributes which societies seeks to achieve,
including an increase in real per capita income, improvements in health and nutritional status, educational achievement, access to resources, a "fairer" distribution of income, an increase in basic freedom, etc. The condition for sustainable development is therefore a constant natural capital stock of all environmental and natural resource assets.

Section 2.1.2 The concept of indigenous knowledge

The gradual recognition of indigenous knowledge has partly been due to the work of ethno-scientists and development researchers. From as early as the colonial time, Conklin (1957) observed the intricate and careful shifting pattern of cultivation and land, of the soil and animal classification systems of the Hanunoo. In the 1980's, the most noted protagonist of indigenous knowledge system were Brokensha et al. (1980), Richards (1985), Marten (1986), Warren et al. (1989) and Posey (2000), all of whom revealed the complexity and sophistication of indigenous knowledge in dealing with environmental hazards.

Geertz' (1993) provided an extensive account of the customary law and practices in Indonesia, known locally as adat. The main function of adat is to guide decision-making (Geertz, 1993; Ghai and Vivian, 1995). This includes all aspects of daily decision-making (economic and socio-cultural matters), such as the choice of cultivation techniques, the date of festivals and, social relationships within and between communities. As encoded in adat, decisions are usually made through rituals and religious activities. For example, the role of adat in regulating the environment is mainly to control excessive exploitation, through taboos and restrictions. Therefore, unlike modern regulatory system that needs enforcement, adat is predicated on beliefs, folk-wisdom, witchcraft and magic. Gell (1988) pointed out the importance of witchcraft and magic, as part of indigenous knowledge. He described three aspect of indigenous technologies - production; reproduction and; psychological manipulation or enchantment (magic). The third element is important in shaping indigenous knowledge, and yet difficult to understand or take into account by outsiders, especially policy-makers. The importance of witchcraft is also recognized by Geertz (1993), in his observation of adat in Indonesia. According to him, witchcraft does not celebrate an unseen order, it certifies a seen one, which is often confronted with anomalies or contradictions. Failure to abide by customary rules and practice, such as adat, is regarded as ignorance, stupidity or incompetence. He described the local people’s mind as possessing some sort of “cognitive relativism” and their adat as “conceptual incommensurability”. Thus, despite the complex concept of adat, the explanation of it lies on a simple word – common sense, a relatively organised body of thought due to:
‘...inherent characteristic of common-sense thought precisely to deny this and to affirm that, its tenets are immediate deliverances of experience, not deliberated reflections upon it’ (Geertz, 1993, p.75).

Examples of practices directly influence by adat are rukun (mutual adjustment), gotongroyong (joint bearing of burdens) and tolong-menolong (reciprocal assistance) (Geertz, 1993).

The concept of cosmovision introduced the system of “hierarchy” in the indigenous community (Haverkort in Warren et al., 1995). A hierarchical system creates a human resource to the local community in the form of specialists, like healers or soothsayers. Elders, sages, priests or soothsayers play prominent roles and prescribes the ways through which people develop technology and knowledge. Kinship groups and councils of elders not only guard indigenous knowledge, but also influence and organise the role, work, politics and personal relationships of the local people, mainly through sharing and exchanging workers (Geertz, 1993). Thus, the concept of cosmovision fulfil the “ontological needs” of the people by translating myths, ritual and religion into assumptions and values that explain reality (William and Ryan, 1995). ‘Ontological needs’ covered a broad range of cultural, moral and spiritual dimensions; love of others; commitment and responsibility to family, clan and community; self-worth; self dignity, honour and respect; sexuality and gender; work, as a means of sustenance and a creative act; beauty and joy, as expressed in dance, music, art, poetry and play; a sense of the sacred and the transcendental, spirituality and formal religion; the origin of nature, and its relationship to self; the unseen and; ancestors, life and death (William and Ryan, 1995). It is these ‘ontological needs’ that provide people with the point of departure for making identity, “the choice” that really determine the success of a development planning policy.

The role of customary law and culture are intermeshed with indigenous knowledge and so embedded in the social organisation of a community that modernity comes as a shock. If ‘ontological needs’ are not met, acculturation can unfold. The effects of acculturation range from losing identity; social crises or; even to the extent of lapsing into patterns of aggression, stagnation and alienation (William and Ryan, 1995). Bodley (1988; 1990; 1994) provided an extensive documentation of acculturation amongst indigenous peoples of the world. Section 2.2.2 provides a more detail discussion of acculturation.
Section 2.2  Why indigenous knowledge?

The problems in the developing countries are not entirely the North’s fault. Problems arise due to inability of development planners to select appropriate policy, often worsened by abuse or/and misuse of power by certain self-centred ruling elite. Inappropriate policy causes poverty, social inequality and environmental degradation of the rural community in the developing countries.

The discussion will begin with a description of conventional development. This is crucial because a major criticism of conventional development includes problems with the “conceptual” aspects of modernity. The criticisms will examine the role of the state and international market in affecting the socio-cultural, economic and environmental aspects of the rural communities of the developing countries. Since the literature concentrates on rural people, most of the discussion will focus on its agricultural context. Conventional development not only ignores the importance of the spiritual and the social reproduction system of the rural community, it effectively destroys (Brokensha et al., 1980; Boserup in Worster, 1988; Nandy, 1988; Ellen, 1991; Chambers, 1993; Hobart, 1993; Scott, 1999).

The issue under discussion includes the inappropriate and misuse of formal law by the state (Hong, 1987; Colchester, 1992; Chambers, 1993; Chatterjee, 1993; Davis, 1993; Parnwell and Bryant, 1996) causing conflicts in aspirations between the state and the people. This eventually causes resistance and in the extreme case, acculturation, by destroying the social reproduction system of the rural community (Amado, 1980; Eder, 1987; Bodley, 1988; Alvares, 1992; Colchester and Lohmann, 1993; M.Caskill and Kampe, 1997; Scott, 1999). On the one hand rural people are subject to the vulnerability of the market fluctuation, because they are assimilated into the international market by the state and through the promotion of globalisation by the developed countries (Redcliff, 1981; Addo et al., 1985; Goodman and Hettne, 1990; Elliot, 1994; Torraine, 1995; Scott, 1999). The state campaigns to assimilate rural farmers into the commercialised world trading system increases income inequality, especially when development projects are biased to the needs and ability of resource-rich farmers. The environmental issues include the loss of biodiversity, salinisation, increase risk of flooding, pollution and health problems, as illustrated by the classic example of the Green revolution in Asia.

Section 2.2.1  "Conventional" development

Conventional development emerges from two types of development model - the capitalist and the socialist models. The capitalist model is based on the Rostowian linear economic
growth and the neo-liberal export-led models. The socialist model is based on the neo-Marxist dependency theory.

Rostowian theory was popular and widely accepted in the 1950s and 1960s as a development model for most developing countries to follow. Rostowian theory is based on five stages of growth - the traditional society; the establishment of the preconditions for take off; take off; drive to maturity and; the age of high mass consumption (Wallerstein, 1980; Toye, 1987; Hunt, 1989; Dallmayr, 1992; Booth, 1994). Therefore the main elements in the theory is an evolution from traditional to modern society (Pieterse, 1991). The traditional sector is regarded as a 'stagnant' situation, related to agricultural production of a subsistence type, using unchanging production methods, with low or no entrepreneur aspiration, thus accumulating little savings and investment. However, in the developing countries, the co-existent between traditional and modern sector, particularly in agriculture is regarded as part of the normal stages in achieving progress. In due course, the differences between them were to disappear because of a national urge towards equilibrium (Dallmayr, 1992; Hettne in Dwyer and Drakakis-Smith, 1996).

The establishment of the preconditions for take off is the most important stages that will determine a successful outcome. This is the modernisation stage, whereby social, political and institutional changes are needed to conform to Western values of bureaucratisation, urbanisation and industrialisation (Inglehart, 1995; Moore and Schmitz, 1995). The changes in these non-economic factors are essential to yield a productive enterprise that will accumulate capital through international trade, which will then set the country ready for the next stage of economic growth, the take-off stage (Wallerstein, 1980). It is assumed that income per capita will increase during the take-off period, which will consequently increase the marginal propensity to save. An increase in domestic savings will stimulate productive investment. The cycle will thenceforth continue until the economy is matured and capable of self-sustaining growth. It is also assumed that there will be an uncomplicated progression to economic take-off (Toye, 1987).

According to neo-Marxist theory, capitalism is not the solution for the developing countries, because it promotes the unequal exchange of goods through international trade; which is ultimately designed to promote capital accumulation in the developed countries - to the disadvantages of the developing countries. In the 1960s, Neo-Marxists explained the continuous economic problems in the developing countries through the concept of underdevelopment. This was further elaborated in the 1970s through the concept of Frank
Amin dependency (Addo et al., 1985; Moore and Schmitz, 1995; Cowen and Shenton, 1996) based on the concept that unequal and dependent relationship exists between the developing and developed countries (Frank, 1969; Amin, 1976; Wallerstein, 1976; 1980). Developing countries are conceived to be unfairly treated in international trading, such as through the imposition of low wages to achieve low prices of export commodity and highly dependent on the developing countries for technology, finance and market. These dependent relationships are held to constrain development in the developing countries (Roxborough, 1982; Hunt, 1989). Development is distorted and controlled by the dominant domestic classes collaborating with the capitalist classes of the developed world. The socialist radical solution involves social and political reform, together with the promotion of economic autarky to retain surplus and promote economic independence, even in a comparatively inefficient environment of domestic production (Hettne in Dwyer and Drakakis-Smith, 1996). The inefficiency of autarkic economic policy, as promoted by the neo-Marxist groups, also fails to address the problems of economic stagnation in the developing countries. The result of the neo-Marxist development policy, based on 'heavy state interference' has created an inefficient and irrelevant bureaucratic network (Toye, 1987; Baker, 1993). The neo-Marxist policy of almost complete detachment from the international market has caused massive inefficiency in resource allocation, the main element that the neo-liberal is most concerned.

In the 1980s, the World Bank (WB) and the International Monetary Fund (IMF) interfered in the development planning of the developing countries by introducing the neo-liberal export-led model of development, known as the Structural Adjustment Programmes (SAPs) to the developing countries (Redcliff in Weston, 1986). This package is mainly accepted by the countries involved, usually in return for development aid programmes and loans. The provisions of aid and foreign loans are validated by the WB's and IMF's perceptions that the developing countries lack the entrepreneurship and technological skills to develop. Thus, financial aid received by the developing countries is essential to provide capital and expertise to employ a more sophisticated production technique (Toye, 1987). The neo-liberal export-led model aims to achieve economic growth through a market-led strategy which emphasises competition, increased savings and private investment, based on high profits, initially low wages and gradual industrialisation through innovation and diffusion of technology via global integration. This is supposed to benefit all classes in the developing countries through 'trickle down effects' (Redcliff in Weston, 1986; Toye, 1987; Dallmayr, 1992; Moore and Schmitz, 1995).
Socialist and capitalist advocates may deploy different arguments about the relative roles of the state and market, but they lead to the same end - a Western concept of modernity (Addo et al., 1985) with a common belief in material production development that recognises the need for a coherent and predictable pattern of socio-economic change (Southgate, 1996). According to Booth (1994) both the capitalist and socialist development theories emanate from a concentrated centre of power, through intervention by the state or international interests, signposted by the “stages of development” or by a succession of dominant modes of production. Both also ignore the intricate relationship between traditional society and nature, and the validity of indigenous knowledge. They lack specific context and both are inadequate at addressing issues of social equity, ecological balance and overall sustainability (Brohman, 1996). Conventional development promotes secularism, individualism and paternalism (Sahnoun in William and Ryan, 1995). Secularism is the state’s attempt to exclude and diminish all religions and spiritual values as irrational myths and superstitious. Individualism threatens family cohesion and diminishes the sense of belonging and of social solidarity. Paternalism is reflected in the domineering attitude of the state and its development agencies. There is no room for the poor to voice their opinion over environmental and societal impacts of development program. Most decisions are taken on the basis of government advice and statistics.

The crisis associated with conventional development is revealed in debt, falling commodity prices, falling per capita food production, growing poverty and socio-economic differentiation (Edwards, 1989; Adams, 1990; Manzo, 1991). Other environmental problems associated with conventional development include, desertification (Flueret, 1986; Gorse and Steeds, 1988; Adams, 1990; Binns, 1990; Fratkin and Roth, 1990; Grainger, 1993; Scoging, 1993), fuel wood shortage (Foley and Barnard, 1984; Leach and Mearns, 1988; Bradley and McNamara, 1993) and logging of tropical rainforest (Caulfield, 1982; Poore, 1988; Hurst, 1990; Rush, 1991; Aiken and Leigh, 1992; Park, 1992; Grainger, 1993). Environmental problems associated with modernisation and industrialisation include pollution, disposal of waste and by-products and acid rain (Adams, 1990; Parry, 1990; Agarwal and Narain, 1991; Meadows et al., 1992; Mannion, 1995).

Section 2.2.2 The socio-cultural implications of modernism

Modernisation is seen as an essential precondition for development. The concept assumes that traditional societies and all the values attached to them will be displaced by modern values through the process of development. Developing countries will only develop if the change to a ‘modern’ society is successful. Apart from the changes to the economy,
modernisation also involves the transformation of the social, cultural and institutional base. Thus, we can see the drive for a modern, homogenous society with a universal common belief, urbanisation and literacy, "rationality", ascriptive identity and achievement motivation (Toye, 1987; Mc Caskill and Kampe, 1997). Thus, conventional development strategies:

'tend to ignore, often underestimate, and sometimes undermine cultural values or the cultural environment which are essential to healthy human development. After all, security, sustainability, and relative stability often depend on a system of value which has taken centuries to develop within a specific society. This system of value has more often than not taken into account the evolution of the environment, relationships with other societies, and the gradual introduction of new values dictated by new technology or adaptation of old values' (Sahnoun in William and Ryan, 1995, p.29).

Historically, the changes are facilitated by colonialism and, during the post-colonial period, by the formation of the state bureaucracy (Smith et al., 1994; Hettne in Dwyer and Drakakis-Smith, 1996; Parnwell and Bryant, 1996). The state promotes modernism through formal education and development programmes, with the main implication of the people losing their political autonomy (Booth, 1994; McNeely, 1995; Scott, 1999) and hence the lack of participation by the people in decision-making over their future (Prugh et al., 1999). The lack of participation means that there is lack of understanding between the state and its people. The gap between development planners and the people is expanded, stirring further antagonisms between both parties. Other implications include inefficient allocation of resources and manpower; inappropriate planning strategies; the perpetuation of rural poverty and, the breakdown of rural cohesion through dispossession and acculturation (Eder, 1987; Bodley, 1988; Chambers, 1993; Rajasekaran, 1993; McNeely, 1995; Scott, 1999).

The state writes the law and commands the resources of the country, which can result in coercion and the imposition of unwanted development policies. State legislation directly affects the rural political autonomy in two ways. Firstly, state legislation conflicts with the peoples' traditional customary law (Moniaga in Sutlive, 1993; Parnwell and Bryant, 1996). For example in the Southeast Asean countries, the traditional customary law known locally as "adat" is still applied and obeyed, simultaneously with the state legislation. This situation causes confusion and different views about the meaning of justice, between the people and the government. Rules and regulation are negotiated rather than applied (Rush, 1991). Rural people are in a disadvantage position due to common cultural traits, such as the deference to class superiors and obligation to pay debts of gratitude. Moniaga in Sutlive (1993) asserts:

'Written laws, ex-colonial laws, national legislation, international law are complicated and easily manipulated especially with resources at disposal, industrialists and government
officials are able to take advantage of gaps and overlaps in the legal systems and choose laws suit them best' (Moniaga in Sutlive, 1993, p.121).

Of course, not all aspects of adat are positive. A negative example includes the traditional hierarchical system of various Kalimantan tribes with slaves at the bottom.

Secondly, state legislation affects the people through the introduction of new land tenure systems, displacing traditional regimes and leading to competition for natural resources between the local rural people and the state (Maybury-Lewis in Bodley, 1988). Parnwell and Bryant (1996), describe this situation as "the colonial functionalist approach", a post-colonialist state govt that controls people and resources by two means - through external territoriality and internal territoriality. Smith et al. (1994) described the same phenomena as "colonisation", "enclosures" and "legitimisation", while Hettne in Dwyer and Drakakis-Smith (1996) described it as "internal colonialism". The concept of external territoriality defines the state clearly and permanently in legal jurisdiction through a map (for example the introduction of forest reserves which deny the rights of common people to access resources and yet facilitates the government in increasing resource exploitation). On the other hand, internal territoriality functions by developing a national profile or inventory of all people and resources in the form of census and the introduction of taxes within a given nation, to promote economic activity and provide central economic control. (Refer to section 2.2.3 and 2.2.4, for more examples of the promotion of economic activities and their socio-economic and environmental effects).

Land is important to the well being and survival of indigenous peoples. Losing their rights and access to land is the most constant threat they have to face. When defined under national law, land ownership is unclear at the local scale, where bargaining powers lie with the powerful interests of the government and private developers. This situation is often worsened by the fact that it is not easy to register communal land holdings due to the State's view that the individual ownership of land will ease the modernisation process. The state has a strong interest in fragmenting communal land into individual holdings. The importance of land and the implication of losing it can be severe:

'Land is the key to the cultural and often even the physical survival of indigenous peoples. Tribal societies that have traditionally supplied their own wants from their own environment can be physically annihilated if forced off their land. Cast adrift, with no marketable skills, to fend for themselves in an alien society, whose language they do not speak and whose economy they do not understand, such peoples face a grim future or no future at all' (Maybury-Lewis in Bodley, 1988, p.381).
Conflicts arise not only because the state does not recognise traditional customary law and controls scarce resources but also because of uneven and inappropriate development. This can increase the gap between urban and rural populations. Similarly, major infrastructural, industrial or agricultural “mega” projects often impact on rural communities and their ecological base. The dislocation or displacement of indigenous people is a common feature. Resistance or non-co-operation is common (Hyden, 1985; Shiva, 1989; Adams, 1990; Said, 1993; Scott, 1999). In the extreme, modernisation may lead to the complete collapses of traditional society through the process of acculturation (Bodley, 1988; 1994; Parajuli, 1991; Mc Caskill and Kampe, 1997).

In most developing countries, a change from traditional to modernity is not a simple and natural process. The fight against the forces of modernisation often comes from the rural poor, who are regarded as the chief impediments to development. The proponents of Rostowian linear economic growth argue that the failure to adopt the theory, is not due to inherent weaknesses, but to bad government planning and the resistance of the people. In a similar way, this notion is supported by neo-Marxist underdevelopment theory in its criticisms of the Rostowian theory, i.e. the theory does not produce a successful result in the developing countries due to different historical periods and conditions during which development occurs. In contrast to the ‘industrial revolution’ of the West, the developing countries had no ‘marginal countries’ to produce the factors of production such as cheap raw materials and labour force to exploit. Apart from the different time and condition, developing countries have different kinds of people with different values and aspirations. The imposition of modernisation towards the people in the developing countries has resulted in the failure of the implementation of such economic policies, which is described by Toye as:

“In the Third World, development is contestable because of differences in values rather than problems of logic or observation” (Toye, 1987: p.10).

Resistance to modernisation has created a situation of ‘dualism’ in the developing countries’ economic structures (Corbridge, 1995). The economic production in a country is described as characterised by ‘dualism’, when the traditional sectors persist, despite the adaptation of ‘modernisation’ elements to displace them. The prevalence of the traditional sector is described by Furnivall and Boeke, from their observation of the colonial society of Indonesia as the ‘enclave economies’ (Wan Hashim, 1988). The ‘enclave economies’ is similar to Hyden’s ‘uncaptured elements’, in his observation of the peasantry in Africa. The traditional sectors are able to resist modernism and sustain their existence, by operating under the ‘economy of affection’. The ‘economy of affection’ is a form of social networks.
which promote basic survival, social maintenance and development (Hyden, 1985). The 'economy of affection' is described further by Hyden as:

".......a network of support, communications and interaction, among structurally defined groups connected by blood, kin, community or other affinities eg. religion" (Hyden, 1985: p.8).

In Vietnam, Scott (1985) had documented a similar pattern of resistance by the peasantry, the so called 'moral economy'. In Scott's finding, peasants are most likely to resist those who would exploit their labour values. Resistances are in the form of collective defiance, such as foot dragging, dissimulation, feigned ignorance, false compliance and so on. These type of resistance are subtle, requiring little or no formal co-ordination, only making use of implicit understandings and informal social networks, representing a form of individual self-help and yet avoiding any direct confrontation with the state. The rejection of new technologies is due to the different priorities and view of the subsistence-oriented peasants, who are more concerned with meeting human needs in a reliable and stable way rather than maximising profit.

Despite their resistance, peasants cannot escape these global forces. According to Jaspan (1976) who studied poverty trends in Southeast Asia, the state and commercialisation had disadvantaged the peasants. They were exposed to new market-based insecurities at the same time that their protective social networks were eroded. The introduction of modern agricultural technology reduces diversity and choice and in turn, destroys safety-valves that once existed.

Despite Bodley's acceptance of the theory of 'passive victims of development' (1994), he also recognised that resistance occurs especially during the implementation of a development process. Resistance is possible if the peasants are self-sufficient and have access to and control over their own resources. The mechanism of this resistance, like those of Hyden and Scott, is based on communally organised social networks, with the aim of excluding and limiting outsiders' acquisition of wealth and power. Social networks are maintained by redistributing income and resources among the community. The harvests are shared. In this way, economic inequality can be reduced. At the same time capital accumulation is inhibited by consuming surplus within the community. Other mechanisms include a preference to grow locally adapted domestic food crops over market crops and a rejection of foreign and expensive agricultural technologies. A risk-minimising strategy is a way to avoid debt and the loss of independence (Chambers, 1993).
Unlike Bodley, Chambers (1993) believed that the rural people can in fact cope with modernisation, describing three main broad strategies:

1. People may “exit” through migration or educating children in the hope that they will get well-paid employment elsewhere and sent money home to maintain the family. “Exit” is seldom the priority choice due to the risk and uncertainty involved by migrating to other places. Furthermore, the children sent away from home may not meet the original aim. Instead they may be come modernised and thereby alienated from domestic culture; introducing new ideologies and values that clash with traditions.

2. “Voice” is a coping strategy through the formation of organisations, protest actions, collective negotiation or in the extreme case, through force. Chambers sees, “voice” as a last resort, when peasants are pushed to the limit.

3. “Loyalty” is a form of coping strategies similar to Scott’s and Hyden’s resistances as explained above. This is a common strategy of maintaining a material production with a familiar subsistence and security.

For the proponents of the Rostowian model, ‘dualism’ would be eroded by the greater diffusion of modernisation elements, until the traditional sectors are completely absorbed and displaced. Such modernisation elements are diffused to the rural population in through formal education, health and infrastructural services, through new religions, the mass media, technology, the capitalist system of production and exchange, by migration to urban areas and the culture of mass consumption.

The slow erosion of the traditional sectors is known as acculturation (Bodley, 1988; 1994; Mc Caskill and Kampe, 1997). Rather than resistance, acculturation is the intended outcome of modernisation. Acculturation is a process whereby a traditional society’s socio-cultural system disintegrates, often as a result of contacts with the dominant group of outsiders and exposure to the ‘modernisation’ elements. Bodley (1994), defined acculturation as:

"...culture change brought about by contact between people with different cultures. Usually refers to the loss of traditional culture when the members of small-scale cultures adopt elements of global-scale cultures" (Bodley, 1994: p.5).

Acculturation occurs when resistance fails. Failure occurs because of the small size of the resistant group, a lack of coherent social networks, a lack of access to immediate environmental resources and a lack of political organisation. In this context peasant societies are vulnerable to outside intervention. The condition is further exacerbated by the success of the developed countries and state governments in imposing and embedding the
'self-perception' notion of inferiority complex within traditional society (Nandy, 1987; Parajuli, 1991; Wallerstein, 1991b; Slater, 1992). In promoting a negative image of the traditional sector as inferior, backward and poor, an inferiority complex emerges strongly propagandising modern scientific knowledge. Furthermore, it links to the wealth, power and prestige (Chambers, 1993).

'From rich-country professionals and urban-based professionals in Third world countries right down to the lowliest extension workers, it is a common assumption that the modern scientific knowledge of the centre is sophisticated, advanced and valid and, conversely, that whatever rural people may know will be unsystematic, imprecise, superficial and often plain wrong. Development then entails disseminating this modern, scientific, and sophisticated knowledge to inform and uplift the rural masses. Knowledge flows in one direction only—downwards from those who are strong, educated and enlightened, towards those who are weak, ignorant and in darkness' (Chambers, 1993, p.76).

Simultaneously, these forces undermine indigenous knowledge and emphasize modern science and eventually "oblige" the traditional community to accept the social stigma assigned to them. They are effectively forced to negotiate, compromise and surrender to the dominant urban ruling culture (Goodland in Bodley 1988; Parajuli, 1991). This situation is described as Grenier (1998) as:

'Some local people and communities have lost confidence in their ability to help themselves and have become dependent on external solutions to their local problems' (Grenier, 1998, p.4).

According to proponents of capitalism, modernisation is an essential process in the developing countries because, apart from the West, other cultures were incapable of 'advance' (Wallerstein, 1980). Thus, when development fails, the poor are blamed for being racially and culturally inferior. Furthermore, governments often justify their exploitative policies through wardship principle, that is, an obligation to develop the country through modernisation. This is illustrated by Bodley (1994), who affirms that:

"...the state is under the moral obligation to make all tribal peoples share in the benefits of civilisation, that is, in health, happiness and prosperity as defined primarily in terms of consumption" (Bodley, 1994: p.14).

Mc Caskill and Kampe (1997) have observed acculturation in South-east Asian countries and show that traditional society often prefers to surrender when it feels the need to compete with other groups for scarce resources. The only way to compete is by participating in the institutions of the dominant society. It is often the younger groups that will suffer most in the process of acculturation. For them, it is difficult to throw away their tribal identity and resist the temptation of the new culture. The negative implication is that they will devalue their tribal identity and take on the inferior identity attributed to them by the larger society, resulting in feelings of low self-esteem and identity confusion.
Amidst the process of acculturation, a “second order” form of resistance may appear, largely because of dissatisfaction with the results of modernisation. This dissatisfaction is not only in the form of increasing income inequalities, discrimination, lack of empowerment but particularly the loss of dignity and self-respect of the traditional society. The form of resistance or coping strategies can be classified as either through cultural revitalisation or ethnopolitics (Mc Caskill and Kampe, 1997), mechanisms in which traditional culture is reasserted pride, instead of being seen as an inferior asset. Cultural revitalisation is not a ‘backward’ process and neither is it a romanticised notion. It is a way in which traditional society asserts and revives practical and useful aspects of its culture and blends them with the conditions of contemporary (modernised) society. The revival of the indigenous knowledge in agriculture and resource management is an example of cultural revitalisation. (Refer to Section 2.3). On the other hand, ethnopolitics is the politicisation of culture, whereby traditional society forms an opposition force against the assimilationist pressures from the dominant group. Often, the aim of such political forces is to empower and to gain a wide range of rights, particularly those concerned with access to land and other resources.

Section 2.2.3 The socio-economic implications of modernism

Gross National Product (GNP) per capita is used to measure the success transition from tradition to modernity, which in turn determines the economic growth of a country (Woodhouse, 1972; Dallmayr, 1992). High economic growth indicates success: the appearance of developed status. Conventional development is thought to be the only possible one, exemplary and universal, and the developing countries are made to believe that they future lies in imitating the West’s development discourse (Nandy, 1987). High GNP is achieved through international trade.

The problem with international trading is that it promotes inequalities of two kinds - within the society in the developing countries and between the developed and developing countries. The basis of international trade is derived from the Ricardian law of comparative advantage, a belief that a nation will acquire maximum advantages through specialisation. A country specialises in a particular form of production and export of a certain commodity, by taking advantage of lowest production costs, in accordance with the availability of key factors of production (raw materials, land, labour, expertise and technology). Specialisation is perceived as ‘efficient’, as a way to obtain more goods at constant level of factor output, which will consequently increase production and consumption. In the long term, wage rates are envisaged to increase, as the developing country reaches the developed status.
The market-oriented economic growth does not reduce poverty but promotes income concentration (Cavanagh et al., 1994). The proponents of modernisation and capitalist theory argue that income concentration is necessary before the trickle-down effects benefit the working majority. Inequalities are an intended outcome of development, a necessary price for growth (Brohman, 1996).

Brohman (1996) argued that the "trickle-down effect" does not necessarily happen in developing countries due to their special conditions. Unlike the developed countries, the population in the developing countries is only partially integrated into the market. People do not respond to price signals because capitalist relations of market exchange are geographically concentrated in "enclaves", formed around agro-exports, while the majority of peasants operate according to traditional relations of social exchange, such as reciprocity and redistribution. Severe socio-economic polarisation in the developing countries is also caused by other factors, such as political repression.

International trade policies often have direct influences on the agricultural rural development policies of most developing countries. Most agricultural policy of the developing countries are based on the agro-export model with the common characteristics of planting cash crops, practising monoculture in commercial plantations and employing modern technological farming methods and tools. These agro-export models are mainly operated by the multi-national corporations (MNCs), often displacing or competing with traditional small-scale producers and peasants in the rural areas. There is no room for these small-scale operations in policies based on 'maximum utilisation and cost effectiveness of production' of the neo-liberalism. Neo-liberal proponents believe not only in total efficiency, but also in the mobility of capital (especially finance, expertise and technology). The rural population is perceived as lacking the entrepreneurship and technological skill. Thus, there is a need for foreign investment such as the setting up of a large multinational company, as a way of providing the capital and expertise needed to employ more sophisticated production techniques. The growth of large agribusinesses overwhelm small-scale farm production, by imposing price competition, often to the extend of displacing the small farm altogether (Altieri, 1995). According to the proponents of free market capitalist, the exploitation and inequalities of international trading is 'fair'. Economic rewards are apportioned differentially according to the intrinsic merit and ability of different groups. It is only fair for the developed nation to gain more because of its 'advanced' capability, compared to the developing countries that lack the skills and technologies.
'Technology is seen as holding the key to economic growth, but at the same time as encouraging even greater economic disparity between nations, and between individuals and organisations within nations. Its great power, in the form of weapons of mass destruction, threatens us all. The speed of technological change completely outpaces the response time of human affairs. With the penetration of almost all aspects of human affairs by technology, the complexity and interconnectedness of the problems which emerge appear to be beyond human ability to comprehend, let alone control (Johnston, 1984, p.97).

In the extreme, the "unfairness" of international trading is perceived as a "conspiracy" of the developed nations, to maintain their own status, an argument similar to the neo-Marxist proponents (Nandy, 1987; Du Bois, 1991; Croll and Parkin, 1992; Shiva, 1997). International institutions such as the WTO and IMF manipulate interest rates to trap the developing countries in prolonged indebtedness and through development aid serve the interests of the developed countries and prevent the rise of a more autonomous development projects (Brohman, 1996). Annually, there are $US 50 billion flows of aid from the developed to the developing countries, but the developing countries loses $US 500 billion yearly in interest payments on debts and from the loss of fair prices for commodities due to unequal terms of trade (Shiva, 1997). Instead of generating new economic activities, development aid often reinforces the existing production mix of the developing countries (Nandy, 1987; Croll and Parkin, 1992). The beneficiaries of "mega projects" initiated in the nature of development sponsored by loans from the WB and other international financial institutions are restricted to elite groups, whose interests are linked to transnational capitals. Poor indigenous people are excluded from decision-making and often bore the costs of these projects (Brohman, 1996). For example in India, the Narmada dam has displaced 1, 724 families, with 41,014 families to follow up (Gadgil and Guha, 1994). The latest development is continuous resistance by the affected groups, who are willing to be drowned rather than moved.

The introduction of Green Revolution provides a classic example of the socio-economic effects of conventional development (Rambo and Sajise, 1984; Repetto and Gillis, 1988; Barbier, 1993). The environmental effects of the Green Revolution will be discussed in the next subsection. The Green Revolution is an international campaign aimed at increasing the productivity of land by means of the introduction of a science-based technology in the form of high-yielding crop varieties (Pearse, 1980). In Southeast Asia, it changes the farming pattern from small-scale, traditional, subsistence agriculture to commercial cash crops planted in plantations (Marten, 1986). Farmers are incorporated into national and international market economies, directed toward the needs of the expanding urban populations and to maintain the countries' balance of trade.
The main undesirable socio-economic effect of the Green Revolution is increased inequality between the rich and the poor due to policy of giving competitive advantages to wealthier farmers (Richards, 1985; Thandee, 1986; Conway and Barbier, 1990; Hecht in Altieri, 1995). Wealthy farmers have expanded their operations at the expense of others, particularly the marginal poor. There is a growing competition for good quality land by entrepreneurial farms, increasing the number of landless labourers or poor farmers (Pearse, 1980). The Green Revolution also undermined many forms of access to communal practices, land and resources, such as share cropping, labour tenancies and communal access to water supplies and grazing lands. In this way, the diversity of subsistence strategies once available to the rural households is reduced, with the implications of heavy dependence on limited, marginal agricultural plot. Green Revolution technologies are not practical to use on land of marginal agricultural suitability or remote areas without infrastructure to provide optimal cropping conditions (Conway and Barbier, 1990). The socio-economic conditions of marginal farmers are aggravated by mechanisation, which reduces labour demand, and in turn disrupts traditional village welfare institutions (Rambo and Sajise, 1984). Furthermore, there has been an increase in the dependence on mechanised farm inputs such as petroleum, fertilisers and pesticides (Marten, 1986). For example, the global nitrogen consumption had increased from 2 to 75 million tonnes in the last 45 years, while pesticide consumption had increased by 10 to 30% during the 80s alone (Pretty, 1995). This implies an increase in the farmers' overhead costs, not only in terms of buying external resources and technologies, but also in terms of maintenance costs. From a macroeconomics perspective, the dependence on imported inputs strains the national balance of payment and exacerbates the debt situation with the consequences of negative social implication, especially to those with limited and complex access to land and credit (Hecht in Altieri, 1995). Moreover, in term of long run production, diminishing returns will set in from the intensive production of the High Yield Variety seed (Conway and Barbier, 1990).

International trading also increases the vulnerability of peasants to market fluctuations (Rambo and Sajise, 1984; McNeely, 1995). Market fluctuation is attributed to the elasticity of the export crop price. There is also competition from other developing countries producing the same products, which cause oversupply and reduce prices (Brohman, 1996). The commitment to free trade and specialisation of production for export often leads to food insecurity for rural people (Daly and Cobb, 1989). In replacing local food crops, cash crops leave the farmers less self-sufficient, perhaps leading even to malnutrition, underemployment and poverty (Goodman and Redcliff, 1991). The rural food crisis may
deteriorate into a broader environmental crisis because of the tendency to intensify pressures on marginal ecosystems to enhance export crop (Goodman and Redcliff, 1991).

'The global free-market paradigm is neither viable ecologically in the long term, nor adequate, in the short-term, to meet the basic needs of all peoples for human development' (William and Ryan, 1995, p.34).

Despite the conventional development aims of securing food and eliminating poverty, it still fails to achieve its goal. This is because malnourishment and starvation are due to the patterns of food distribution and low access to food rather than to agricultural limits or the type of technology in food production (Altieri, 1995).

Section 2.2.4 The environmental effects of modernism

Capitalist development theories, especially the neo-liberal export-led demand model, emphasise the free market system as one way to achieve development. However, the problem with the free market is that it tends to lead to uncontrolled and excessive extraction of natural resources (Altieri, 1995). The concept of efficient allocation of natural resources maximises the utilisation of natural resources, often leading to resource depletion and detrimental effects to the environment (Bodley, 1984; Nandy, 1987: Du Bois, 1991; Croll and Parkin, 1992). Environmental degradation is perceived as the opportunity costs that need to be forgone for the sake of development (Brohman, 1996).

Under conventional development, natural resources need to be developed, in a planned manner, to facilitate the generation of revenue and growth of capital. Nature has to be developed by humans, while humans have also to be developed from their primitive backward state of embeddedness in nature (Shiva, 1997). Nature is regarded as a resource to be controlled and dominated without intrinsic value; and often perceived either as hostile or at best neutral. Exploitation of the natural resources often causes resource depletion and irreversible damage. Thus, aid and technology transfer become the mobiliser of development that facilitates the exploitation of nature (Shiva, 1995).

Furthermore, environmental depreciation is rarely included in the calculation of GNP.

'National and international level planning to improve the well-being of human populations in the name of development has occurred predominantly on the “macro” level – employing massive resources and aggregative data with little systematic input from the metropolitan level of the society. This has led to widespread disjunctions that are costly to the rural populations and are barriers to successful implementation of many projects. These disjunctions also are damaging to the physical environment wherein so many of the natural resources are found (Hutterer et al., 1985, p.381)'

31
Environmental degradation in the developing countries is not only induced by international trading but also facilitated by the state. The state facilitates the exploitation of natural resources by controlling both people and resources through "the colonial functionalist approach" (Parnwell and Bryant, 1996). During the post-colonial period, the colonial state is replaced by crony capitalism, including political and economic elite, who are facilitated by the TNCs and industrialisation. Rush (1991) described the government's firm grip of the people and its resources in Asia, thus:

"Environmental degradation in Asia is an economic problem grounded in a desperate and unequal competition for access to natural resources; and political power is a key weapon in this competition" (Rush, 1991, p.27).

There are various ways in which the extraction of natural resources is accelerated. For example, the extension of agricultural production through subsidies and incentives can cause deteriorating soil condition and increasing levels of pollution, while timber and minerals production causes deforestation (Parnwell and Bryant, 1996). In Burma, the colonial government introduced a package of incentives to peasants to facilitate rice production. Peasants who undertook permanent cultivation were given tax "holidays" and legal title to the land.

Conventional development regards production as the sole means to evaluate agricultural development (Thompson, 1995). Accordingly, more spent on inputs will produce more output, but the inverse relationship between marginal cost and marginal production is ignored. Moreover, other "rational" decisions as conceived in conventional development are also questionable. These include the rationality of maximising the amount of commodity produced in an erodible patch of land; the rationality of intensifying production if there is no market for the extra produce and; the rationality to borrow money to buy equipment (Thompson, 1995).

Conway and Barbier (1990) warn of the danger of using inappropriate cultivation methods in marginal lands:

"Changes in marginal farming system such as the introduction of productivity increasing technology and crop specialisation – which are not adequately adapted to these conditions, may actually impose additional stresses that make the system even more vulnerable. This often means that, irrespective of whether the general productivity trend is upward or downward, its variability and the frequency and seriousness of crisis situations may increase and threatens overall sustainability of production (Conway and Barbier, 1990, p.90).

In the hilly areas of interior Sarawak, shifting cultivation is the only suitable form of farming system, due to the type of the soils, which cannot be treated with artificial
chemicals (Cobb, 1988). Furthermore, there is no need for permanent farming, since the
population density in that area is still very low.

The Green Revolution in Asia affects the environment by causing soil degradation, crop
losses due to pests and diseases (Altieri, 1995) and the loss of biodiversity (Richards, 1985).
Soil degradation can be in the form of salinisation in irrigated areas, depletion of soil
organic matters and micro-nutrients and soil erosion as a result of clearance and increase
tillage (Alexander, 1974; Dahlberg, 1979; Rambo and Sajise, 1984; Marten, 1986; Thandee,
1986; Pretty, 1995).

Pest problems occur as a result of the pests building up resistance to the pesticides (Rambo
and Sajise, 1984; Adams, 1990; Pretty, 1995). Pesticides can persist in the soil and impair
the ecosystem’s capacity to regenerate fertility in fallow periods. For example in Malaysia,
the brown plant hopper, a type of rice pest species, increased from 8 in 1965 to 14 species in
1975 after the introduction of pesticides and HYV seedlings from the Green Revolution
package (Adams, 1990). Hunter (1996) provided a comprehensive example of an indigenous
pest control methods in the Maldives. Farmers grow certain types of fruits, cereals,
vegetables and root crops in a traditional polycultural homegarden and shifting cultivation.
Pests include rats, fruit bats and birds. Traditionally the farmers use pest control methods
like barriers and wrapping, traps, scaring devices, handpicking and burning. However, the
government decides to introduce chemicals pesticides in the hope of increasing production.
The implications of such changes include the unintended poisoning of chickens and the
extermination of fruit bats and house crows that have roles in dispersing seeds and
pollinating both wild and cultivated plants. With the eradication of the house crow, there is
an appearance of a more serious and damaging pest problem, that is the longhorn beetle,
which attacks 70 percent of the island’s breadfruit trees, an important seasonal staple.
Excessive applications of pesticides increase pollution and health problems. Their
mishandling has led to chronic health problems or even death (Adams, 1990).

Another main environmental disadvantage associated with the Green revolution is the loss
of biodiversity caused by monocultural production (Richards, 1985). For example, India
used to have 30,000 varieties of rice, now reduced to only 15 covering 75 percent of the
country (Chatterjee and Finger, 1994). In the United States, 60 to 70 percent of the total
bean acreage is planted with only 2 to 3 bean varieties (Altieri, 1995). The danger with
genetic uniformity is associated with vulnerability of the species to pest and weed attacks.
This is illustrated by Altieri (1995) as:
'Most insect pest problems is increasingly linked to the expansion of crop monocultures at the expense of the natural vegetation, thereby decreasing local habitat diversity' (Altieri, 1995, p.369).

In Zambia, the destruction in the high-yielding maize hybrids in commercial plantations was initiated by mold attack. The mold destroys all commercial farms with HYV maize, except for the traditional maize varieties grown by villagers. In this case, food species variety is reduced, making food supply more vulnerable to a natural disaster. This often has social implication, the rural people’s quality of life will be reduced due to the poor quality of soil, water and food available as a result of pesticides and nitrate contamination. It also shows that rural societies have a deep awareness of plants, animals and soils and their interrelationship and ecology. The implications of less variety also means that the world’s poor have to depend on expensive, less robust and imported seeds. They will never be able to support themselves.

'Most of the planet’s scientifically stored genetic material is in the hands of Northern laboratories and that private companies are increasingly seeking propriety rights to improved seed varieties while ignoring the rights of the country they were imported from’ (Chatterjee and Finger, 1994, p.17).

Such an accelerated pace of development not only affect the modes of material production but also can dramatically affect the political, economic, and cultural foundation of an entire society (Nandy, 1987). The loss of biodiversity often displaces production for local diets that are worsened by an already high level of malnutrition. Monoculture is closely connected to the production of cash crops, subjected to international price fluctuations.

Section 2.3 The contributions of indigenous knowledge toward sustainable agricultural development

Like sustainable development, sustainable agriculture is difficult to define. According to Thompson (1995) in order to attain sustainable agricultural development, there is a need for change of philosophy, away from the conventional development mentality whose only concern is production and profitability. New paradigms of agricultural development include a shift from the “technical fix” to “holistic focus”, stressing the contextual specificity of environmental problems and include a “people-oriented” agenda based on the needs and rights of local people (Croll and Parkin, 1992; Brohman, 1996). Brohman (1996) referred to these as the “indigenisation of development”, a development based on the knowledge and needs of indigenous people rather than the “expertise” of outsiders. However, it does not necessarily preclude Western concepts and methods, but entails a more “realistic” view of them as reflecting a specific geographical and historical context. At the same time, it allows
new possibilities for multiple, polycentric development approaches, each informed and inspired by local traditions and popular creativity. The use of indigenous knowledge may make development programmes contribute to a sense of self-worth and collective self-esteem and should allow popular participation and empowerment.

Figure 2.2 The contributions of indigenous knowledge towards sustainable agricultural development
(Sources: Compilation of information from Altieri, 1995)

The contributions of indigenous knowledge in agricultural development are summarised in Figure 2.2. The importance of indigenous knowledge in agricultural development is also recognised by Conway and Barbier (1990). According to them, sustainable agricultural development should have a high, stable and efficient production, with low, inexpensive inputs, in particular making use of the techniques of organic farming and indigenous traditional knowledge. Sustainable agriculture should also meet the needs of food security and self-sufficiency, while at the same time preserving traditional values and the small family farm, helping the poorest and the disadvantaged, in particular those on marginal land,
the landless, women, children and tribal minorities. There should also be a high level of participation in development decisions by the farmers themselves.

'The requirements to develop a sustainable agriculture clearly are not just biological or technical, but also social, economic, and political, and illustrate the requirements needed to create a sustainable society. It is inconceivable to promote ecological change in the agricultural sector without advocating comparable changes in all other interrelated areas of society. The final requirement of an ecological agriculture is an evolved, conscious human being whose attitude toward nature is than of coexistence, not exploitation' (Altieri, 1995, p.379).

Moreover, developing countries need structural change to correct the inequities in the distribution of resources and governments also need to recognise rural people's knowledge as a major natural resource. There is a need to change research agendas, agrarian policies and, economic system, including fair markets and prices and government incentives. Altieri further states that a key to achieving sustainable agriculture is by restoring and/or conserving biodiversity and through diversifying crop productions. This proposition is not new to the peasants who take decision on the basis of minimising risk. Diversifying crop production will not give maximum yield but provides long term stabilisation. (Refer to 2.3.3 for a further discussion of the role of conserving biodiversity towards achieving a sustainable agroecosystem).

In this section, the contributions of indigenous knowledge will be discussed in three ways – its socio-cultural and socio-economic contributions, and its contributions to the conservation of the environment.

Section 2.3.1 The socio-cultural contribution of indigenous knowledge

The use of indigenous knowledge in development contributes to the preservation of local and cultural diversity, by respecting local cultural beliefs; and recognising the role of women, by valuing the special roles of women, as differentiated in indigenous knowledge (Du Bois, 1991; Manzo, 1991; Hobart, 1993; Moralez-Gomez, 1993; Schuurman, 1993; Smith et al., 1994; Hettne in Dwyer and Drakakis-Smith, 1996).

The use of indigenous knowledge in development preserves local and cultural diversity by recognising the "local and cultural specificity" needs of the people (Moralez-Gomez, 1993; Schuurman, 1993). Western technology packages does not recognise the needs of the small farmer (Klee, 1980; Rajasekaran, 1993).

'Most development theorists have been preconditioned to look for parallels between the development history of the West and the contemporary situation in the non-western societies. Typically, the rich and diversified development experiences of different societies
have been simplified and distorted by formal models and theoretical constructs which reduce development to a few universally valid factors and organising principles' (Brohman, 1996, p.325).

For technology development to be effective, it must be based on information from and about the intended utilisers, in order to ensure local wishes, conditions and practises are taken into account. Technology is intrinsically embedded in culture, i.e. technical practises and tools are culturally defined. Indigenous knowledge can provide an integrative concept that keeps the focus on the individual or group as it functions in the local setting. "Contextuality" of development is a product of a particular historical process, including the pluralisms of societies and geographical diversity. Hobart (1993) described the local context of indigenous knowledge as:

'Local knowledge is often total, by virtue of the very fact that it is local. By contrast, the more medicalized, scientific and so universalised psychiatry becomes, the less it is able to cope with context – because it applies to everywhere and nowhere, everybody and nobody' (Hobart, 1993, p.21).

Indigenous knowledge is part and parcel of the culture, the existence of indigenous people. It is embedded through their cultural values, spiritual beliefs and collective identities (Davis and Ebbe, 1995). Cultural belief is important because it has a significant contribution in shaping the patterns of human and environmental interaction (Jamieson and Lovelace in Hutterer et al., 1985). The concept of culture, in this respect is not only limited to arts and literature, but includes the distinctive material, non-material and emotional characteristics of a society or group, based on systems of knowledge, technology, values, traditions and beliefs (Chambers and Richards in Warren et al., 1995). A group's belief is shown to represent a way of life, ideally one adapted to their "holistic worldview" or "cosmology", taking into perspective not only the world, but also the totality of the cosmos (Haverkort in Warren et al., 1995). The worldview, consequently, is an image presented to accommodate the way of life. It supports those beliefs of the world by invoking deep moral sentiments as evidence for their truth. Therefore, cultural belief is a type of belief with the specific characteristics: personal conviction and disposition to retain and abandon actions taking into account values of one's own culture.

Cultural belief governs the relationship between human and nature. Belief systems provide indigenous people with meaning and explanations for those aspects of human experiences that are neither easily nor fully comprehended through normal experience and thought. Cultural belief also helps to reduce anxiety about the future and forms a source of support and hope in times of stress. Cultural belief provides a strong sense of group solidarity. By accommodating indigenous knowledge in development, the plural and yet distinctive codes
of behaviour and different values system can be recognised (Hettne in Dwyer and Drakakis-Smith, 1996). When beliefs, culture and the needs of people are recognised, the gap between the policy-makers and rural communities can be narrowed. In recognising cultural and local specificity people are effectively empowered, giving them greater control of their own destiny (Du Bois, 1991; Smith et al., 1994; Titilola and Marsden, in Warren et al., 1995).

According to Warren and Meehan in Brokensha et al. (1980) client orientation is important, in order to make sure that the development programme is compatible with the needs of its client. An acceptance of the value of indigenous knowledge can increase the developers’ sensitivity to local needs and facilitate meaningful dialogue. However, ‘modern, scientific knowledge is also needed to expand the farmers’ limited understanding of their local situation to a broader, critical awareness of the national and international political economic, and social structure which impinge upon their local situation’ (Warren and Meehan in Brokensha et al., 1980, p.319).

Accommodating indigenous knowledge in development consequently preserves cultural diversity, which in turn is important for the conservation of the environmental diversity, as illustrated by Shiva (1997):

‘At the social level, the values of biodiversity in different cultural contexts need to be recognised. Sacred groves, sacred seeds, and sacred species have been the cultural means for treating biodiversity as inviolable, and present us with the best examples of conservation. Community rights to biodiversity, and farmers’ and indigenous peoples’ contributions to the evolution and protection of biodiversity, also need to be recognised by treating their knowledge systems as futuristic, not primitive. In addition, we need to recognise that non-market values, such as providing meaning and sustenance, should not be treated as secondary to market values’ (Shiva, 1997, p.77).

The incorporation of indigenous knowledge in development may also increase awareness of gender issues (Titilola and Marsden in Warren et al., 1995). The role of women is reflected in the social differentiation of indigenous knowledge. Women are clearly different from men, in terms of their socio-economic position, their subculture, their networks, knowledge systems and gender specific interpretations of cosmologies (Haverkort in Warren et al., 1995). In Africa, women have a high degree of involvement in agricultural production and yet development projects have mainly been directed towards the needs of men (Moock, 1986). Women usually have a greater knowledge of food production, the quality of food and the interrelationship between food and health (Haverkort in Warren et al., 1995). For example, Kayapo women in the Brazilian Amazon not only breed new crop varieties but preserve representative samples in hillside genebanks (Smith, 1985).
Section 2.3.2 The socio-economic contributions of indigenous knowledge

It is generally recognised that indigenous knowledge promotes self-sufficiency, through food security and income generation (Daly and Cobb, 1989; Conway and Barbier, 1990; Du Bois, 1991; Brohman, 1996). It is also closely engaged with income redistribution. Annual rituals and feasts oblige the rich in the community to feed the poor. During harvesting, taboos and rituals redistribute the harvesting crops towards the poor. There is also a harvesting system that ensures participation of the landless in the sharing of the harvest.

Indigenous knowledge also saves costs (Howes and Chambers in Brokensha et al., 1980; Klee, 1980; Nandy, 1987; Gupta, 1988; Conway and Barbier, 1990) by economising on the use of scarce trained scientific human power, extending the range of observations upon which science can draw (Howes and Chambers in Brokensha et al., 1980) and facilitate communication between extension workers and farmers (Richards, 1985). For examples, the indigenous knowledge of the micro-environmental conditions could be used in the preparation of soil map. This can offer a relatively low-cost approach with potentially high benefits (Nandy, 1987). Indigenous knowledge soil classification system is subtle, sophisticated and useful. Dialla (1993) studied about the Mossi soil classification system of Burkina Faso, whereby soils are classified in terms of texture (lateritic, stony, gravelly, sandy and clay), colour (black, red and white), both texture and colour (red sandy), permeability/consistency (wet loamy clay), geographical location (mountainous, lowland), vegetal cover/fertility (black soil with a dense growth of bushes) and cropping potential (stony for millet, sandy for peanut, etc.). Indigenous knowledge soil classification system can provide insight for making appropriate use of land (Richards, 1985).

Indigenous knowledge can optimise production with low costing and at the same time maintain yield in the long term (Klee, 1980; Hecht in Altieri, 1995). For example, in rice production, the modern technology requires 375 times as much commercial energy per hectare as traditional, and uses 80 times as much energy per kg rice produced (Gupta, 1988). Indigenous knowledge uses “internal resources”, which are renewable (Conway and Barbier, 1990). Example of internal resources includes sun, water, nitrogen from air, biologically, culturally and mechanically derived nutrients, weeds and pest control, seed, machinery that are built and maintained on farm or in community, labour and capital management.
Section 2.3.3 Indigenous knowledge and the environment

There are several ways in which indigenous knowledge contributes to the sustainability of the local environment in the developing countries. The low input indigenous technology means that less fossil fuel are utilised. Such low input technology is practised in soil fertility management, pest and weed control, microclimate management and the prevention of soil erosion (Alcorn in Warren et al., 1995). These practices have been over decades or even centuries of experimentation, trial and error.

Reijntjes et al. (1992) have shown how a knowledge of vegetation and animal can indicate and maintain soil fertility. In the Southern Sudan and Zaire, farmers know that the sites of termite mounds are good for growing sorghum and cowpea. Plants and trees can also serve the same purposes. For example in Senegal, agrosilvopastoral practice takes advantage of the multiple benefits provided by Acacia albida. This tree ameliorates the microclimate of the area, by reducing temperature, wind velocity, evaporation and direct exposure to sunlight. The tree sheds its leaves at the onset of the wet season, permitting enough light to penetrate for the growth of sorghum and millet, yet still providing enough shade to reduce the effects of intense heat. In the dry season, the tree's long tap roots draw nutrients from beyond the reach of other plants; the nutrients are stored in the fruits and leaves. The tree also fixes nitrogen from the air, enriching the soil and improving crop yields. In the wet season, the fallen leaves provide mulch that enriches the topsoil, as well as providing a highly nutritious fodder. The soil is also enriched by the dung of livestock which feed on the acacia leaves and pods and the nearby residues of the cereal crops.

According to Alcorn in Warren et al. (1995), in the indigenous agricultural system, even weeds and wild plants can serve to improve and maintain soil fertility. Farmers manipulate wild plants as resources for the value of their products, the ecological services their mediate, or for the ecological services they provide directly. Weeds shade both the soil and young crops and keep moisture in the soil, and in doing so, maintain conditions for positive microbial processes in the soil. Weeds also play a role in recycling soil nutrients and reducing leaching.

Mixed cropping is a common practice that helps to regulate soil fertility by using different quantities of different nutrients, in different forms, from different resources and at different times (Brown and Marten, 1986). Mixed cropping reduces nutrient competition in two ways. Firstly, different crops mature at different times, and their nutrient demand reflect
this. Secondly, different rooting structures can help different depths in the soil. Leguminous weeds can trap atmospheric nitrogen.

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>PRACTICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical and physical control</td>
<td>Scarecrows, sound devices</td>
</tr>
<tr>
<td></td>
<td>Wrapping of fruits, pods</td>
</tr>
<tr>
<td></td>
<td>Painting stems, trunks with lime or other materials</td>
</tr>
<tr>
<td></td>
<td>Destroying ant nests</td>
</tr>
<tr>
<td></td>
<td>Digging out eggs/larvae</td>
</tr>
<tr>
<td></td>
<td>Hand picking</td>
</tr>
<tr>
<td></td>
<td>Removal of infested plants</td>
</tr>
<tr>
<td></td>
<td>Selective pruning</td>
</tr>
<tr>
<td></td>
<td>Application of materials (ash, smoke, salt, etc.)</td>
</tr>
<tr>
<td></td>
<td>Burning vegetation</td>
</tr>
<tr>
<td>Cultural practices</td>
<td>Intercropping</td>
</tr>
<tr>
<td></td>
<td>Overplanting or varying seeding rates</td>
</tr>
<tr>
<td></td>
<td>Changing planting dates</td>
</tr>
<tr>
<td></td>
<td>Crop rotation</td>
</tr>
<tr>
<td></td>
<td>Timing of harvest</td>
</tr>
<tr>
<td></td>
<td>Mixing crop varieties</td>
</tr>
<tr>
<td></td>
<td>Selective weeding</td>
</tr>
<tr>
<td></td>
<td>Use of resistant varieties</td>
</tr>
<tr>
<td></td>
<td>Fertiliser management</td>
</tr>
<tr>
<td></td>
<td>Water management</td>
</tr>
<tr>
<td></td>
<td>Plowing and cultivation techniques</td>
</tr>
<tr>
<td>Biological control</td>
<td>Use of geese and ducks</td>
</tr>
<tr>
<td></td>
<td>Transfer of ant colonies</td>
</tr>
<tr>
<td></td>
<td>Collecting and/or rearing predators and parasites for field release</td>
</tr>
<tr>
<td></td>
<td>Manipulation of crop diversity</td>
</tr>
<tr>
<td>Insecticidal control</td>
<td>Use of botanical insecticides</td>
</tr>
<tr>
<td></td>
<td>Use of plants or plant parts as repellents and/or attractants</td>
</tr>
<tr>
<td></td>
<td>Use of chemical pesticides</td>
</tr>
<tr>
<td>Religious/ritual practices</td>
<td>Addressing spirits or gods</td>
</tr>
<tr>
<td></td>
<td>Placement of crosses or other objects in the field</td>
</tr>
<tr>
<td></td>
<td>Prohibition of planting dates</td>
</tr>
</tbody>
</table>

Table 2.1 Indigenous ways of controlling pest by indigenous farmers throughout the world

(Source: Altieri, 1995)

There are many ways to control pests. These can be classified into mechanical and physical control; cultural practices; biological control, insecticidal control and; religious/ritual practices (Altieri, 1995). (See Table 2.1).

Hunter (1996) provides extensive accounts of mechanical and physical pest control in Maldives. Barriers and wrapping are used to protect coconut trees and maize from rats. Pest animals may be trapped or deterred by scaring devices. Other smaller pests can be picked
from plants. Oil lamps and human effigies are also placed in trees, while fishing nets are hung over trees to prevent access to the fruit. Burning is used in shifting cultivation. In heating the soil, it keeps down the number of nematodes and soil-borne pathogens, while simultaneously giving a nutrient boost. Burning is also used in homegarden systems, where smoke fires are constructed under fruit trees to drive off harmful insects.

Pests are also controlled by cultivation techniques and practices (Brown and Marten, 1986). These can be furthered subgrouped into three main strategies – the manipulation of cropping over time, across space and, the manipulation of other agroecosystem components. With a knowledge of pest phenology, control is effected through manipulating the timing of planting and harvest and through crop rotation. This last interrupts pest lifecycles (Brown and Marten, 1986). Richards (1985) provided a Ugandan example, whereby farmers vary the time of planting of cereals and peas to avoid stem borers and aphids. Farmers are aware that planting out of synchrony with neighbouring fields can result in heavy pest pressure and therefore use a kind of “pest satiation” to avoid extensive damage.

Spatial manipulation includes overplanting, a change in farm plot location, selective weeding and the manipulation of crop diversity (Altieri, 1995). It is common for farmers to overplant, in order to deals effectively with the pest. According to Brown and Marten (1986) farmers in Indonesia accept losses of up to 50 percent before implementing pest control measures. Indeed, they often regard animals as having a legitimate claim to some of the produce, as long as the animals do not destroy more than “their fair share”. Ecological research on the relationship between herbivores and food plants suggests that it is not always detrimental for a crop to be grazed. Benefits include increased water-use efficiency, accelerated nutrient cycling, the stimulation of growth and delayed plant senescence (Brown and Marten, 1986).

Selective weeding is also an efficient way of handling (Altieri, 1995). Bad weeds are removed, while the good weeds remain to control pests and regulate soil fertility. According to Brown and Marten (1986) weeds control pests by providing a habitat for beneficial insects or attracting harmful insects away from the crops. Weeds also create physical barriers that interfere with insect movement. Furthermore, they also help to create a crop microenvironment that is unsuitable for pest growth and development. At the same time weeds protect the soil from erosion, that is, acting as a ground cover. In the Phillipines, mulch left from weeds seem to control sugarcane parasites. Weeds have other uses, such as for food, medicine, fuel biomass and animal feeding.
According to accepted ecological principal, diversity enhances stability. Indigenous agricultural systems mirror this property, working with nature rather than replacing it with advanced (modern) technology and inputs. In indigenous agriculture, polyculture can maintain the diversity of plants which includes the cropping system based on farm-derived, renewable resources, such as crop rotation, weed control alternatives, conservation tillage and strip cropping and progressive biological sequencing (Francis and King, 1988). These various approaches work by devising a multiple-use farming system that emphasise on soil and crop protection through the integration of trees, animals and crops. The environmental advantage of such practice includes correcting the spatial and temporal assemblage of crops, trees, animals, soil and so on, which enhances the interactions and synergisms that sponsor yields and resource conservation (Altieri, 1995). The vegetative cover provided by no till practices, mulch farming, cover crops and so on, acts as an effective soil and water conserving measure. The agricultural biodiversity also provides regular supply of organic matter through the promotion of soil biotic activity.

Farmers maintain agricultural biodiversity because it promotes stability, security and ultimately their own survival. Similarly they breed their own improved varieties for the same reason. In this context, there is no distinction between conservation and development (The Crucible Group, 1994). Thus, another important contribution of agricultural biodiversity is to minimise risk. For example, West Africa’s Azande farmers increase both the number and the complexity of their crop experiments following poor harvests (AAS, 1989). Farmers in Niger intercrop with sesame to reduce striga infestation (The Crucible Group, 1994).

Nowadays it is widely recognised that rural people have a detailed knowledge of their environment (Chambers, 1993). This knowledge contributes to appropriate and sustainable way of exploiting resources. Indigenous knowledge can provide inputs into technology development, helping to prevent costly mistakes based on inadequate data (Compton in Warren et al., 1989). At the same time it can help indigenous peoples to adjust to modernisation. It can provide development agencies with more realistic evaluations of the environment, its natural resources and its associated production systems. Thus involving local people in the planning process improves the chance of successful development (Berkes in Inglis, 1993). Participation is thus important.
Section 2.4 Implementing indigenous knowledge in development programmes

Efforts have been made to incorporate indigenous knowledge in development programmes, mainly as a result of initiatives by indigenous knowledge resource centres and the Non-governmental organisations (NGOs).

Despite this more progressive current, indigenous knowledge is constantly under threat. Modernisation often destroys the means of encoding, regulating and transmitting agricultural practices due to demographic collapse (through slavery and colonialism, for example) (Hecht in Altieri, 1995). The hegemony of positivist science further erodes indigenous knowledge. Techniques and tools are modified or fall out of use under the axe of modernisation and cultural homogenisation. Rapid population growth, the intrusion of international markets, environmental degradation and educational systems all contribute to its decline (Chambers, 1993; Grenier, 1998).

'This historic neglect (regardless of its cause- racism, ethnocentrism, or modernism, with its complete faith in the scientific method) has contributed to the decline of indigenous knowledge systems, through lack of use and application. This legacy is still in evidence. Many professionals are still sceptical. Also, in some countries, official propaganda depicts indigenous cultures and methodologies as backward or out of date and simultaneously promotes one national culture and one language at the expense of minority cultures. Often, formal schooling reinforces this negative attitude' (Grenier, 1998, p.4).

According to Grenier (1998) relocation schemes often change the whole attitude of the people towards indigenous knowledge. As opportunities for short-term gain are selected over environmentally sound practices, less time and fewer resources are spent to sustain the dynamic nature of the indigenous knowledge system through local experimentation and innovation. Market-oriented agricultural and forestry practices focus on monocropping, undermining the value of indigenous knowledge through the loss of biodiversity and cultural diversity. For example, as a result of deforestation, the knowledge and culture associated with a certain medicinal plants declines as they disappear. Modern, formal, educational systems also play an important role in eroding indigenous knowledge. The direct implication of such changes is a disruption of traditional channels of oral communication as people acquire different values and lifestyles. Formal education tends to reinforce a negative attitude towards indigenous knowledge.

Conventional development still dominates. Development exists within the wider political economy and policy framework, which is still locked into export-oriented production and political processes that marginalise rural people. At the state institutional level, government
officers and leaders are unwilling to consider the value and validity of indigenous knowledge. Consequently, agricultural extension programs are still biased towards techniques and strategies which are capital-intensive (Chambers, 1993). Furthermore, the relationship between agricultural extension workers and local farmers through the “Top-down approach” of technology transfer is rigid. Indigenous knowledge is regarded as a challenge to the government political structure, as subversive in giving power or freedom to the poor. There is a limited capacity to absorb indigenous knowledge in development programmes. At the research level, there is in addition a communication problem and a lack of mutual respect between agricultural and ethno-scientists.

Farmers decisions are not only determined by local needs but also by external factors, be there political, economic or social (Conway and Barbier, 1990; Elliott, 1994). The World Bank has encouraged developing countries to reorientate economies away from the production of non-tradable goods and services to cash crops as export commodities, as a means to pay debts. Yet agricultural commodity prices have fallen since 1950 (Conway and Barbier, 1990), because of interventionist policies by developed countries (for example, trade and domestic subsidies, protectionism). Furthermore, there is heavy lobby from agrochemical and HYV companies to replace indigenous knowledge. These firms provide finance, supplies and expert advisors to agricultural Research and Development institutions. The determination of the agrochemicals and HYV companies to control the world’s agriculture is highlighted by Adams (1990) as:

‘The expansion of pesticide use in the Third world is an integral part of the development process. It is sanctioned and promoted by development agencies, and financed by First World loans. The industry is run from the industrialised world, and the expansion of pesticide use in the name of development is good business’ (Adams, 1990, p.122).

Research tends to concentrate on short-term problems and incremental modifications of the existing technology. Government are unwilling to invest in sustainable technology from which profit cannot be immediately captured (Altieri, 1995). There are more willing to invest in projects with higher immediate returns, such as the promotion of biotechnology, a new technological fix that is thought might circumvent low productivity. Although the benefits of biotechnology may eliminate the dependency on pesticides and fertilisers companies, this will only make the developing countries switch their dependency to seed companies.

According to Compton in Warren et al. (1989) constraints operate not only at the implementation level, but also in the collection and assessment of indigenous knowledge.
Negative attitudes by outsiders; the “mental conditioning” provided by a secular and formal education system based on ethnocentric mentality, perceives indigenous knowledge as irrelevant. Only Western “science” counts. Outsiders’ biases are reflected in the concentration in research publications, training and extension on what is exotic rather than indigenous, mechanical rather than human, inorganic rather that organic and, marketed rather than consumed (Chambers, 1993). It is not only the outsiders who look down on indigenous knowledge, but also some insiders, who suffer from an inferiority complex. People place profound faith in the powers of technology and the workings of the free market (Meadows et al., 1992; Pretty, 1995). There is also a desire to bring “modernity” to their own countries, a desire to use a knowledge of technology as a source of power to enhance or maintain status. Thus scientific knowledge is promoted to legitimise superior status. Indigenous knowledge is rejected and perceived as inferior (Chambers, 1993).

Despite these problems, there has been a development in methodological advances in studying and verifying indigenous knowledge (Grenier, 1998 and Rajasekaran, 1993). This has led to an increase in research on indigenous knowledge and an appreciation of the importance of understanding the knowledge systems and values of the different actors in the project community.

This has been followed by the establishment of indigenous knowledge resource centres that document and apply indigenous knowledge in development, such as the Centre for Indigenous Knowledge and Rural Development (CIKARD). Other examples include the Nigerian Institute for Social and Economic Research (NISER) and the International Institute of Rural Reconstruction (IRRR). NGOs promote indigenous knowledge through working with local mobilisers. For example, the T & V systems (Training and Visit systems) as conducted by the World bank and the Borgho and Mozzano Approach (small companies approach to agricultural development).

Section 2.5 Conclusion

Indigenous knowledge has been criticised on the grounds of “romanticism”, “stamp-collecting” and of representing a preservationist view (Thrupp in Warren et al., 1989; Moralez-Gomez, 1993). There is a danger of overvaluing indigenous knowledge in a desperate attempt to find quick solution to the present conventional development problems and limitations. This is possible if indigenous knowledge is perceived as an ancient pre-science that holds universal solutions to modern world problems, without much attempt to
grasp its holistic and cultural roots (Moralez-Gomez, 1993). There is also a danger that indigenous knowledge will eventually lose its value when “scientized” (Compton in Warren et al., 1989), when it is merely incorporated into the pre-existing positivism.

It must be emphasised that the poor and rural people do not always know best. Modern scientific knowledge has comparative advantages in some spheres. According to Grenier (1998) some indigenous people also mismanaged their environment, especially those who are not tied to any specific resource base. Shifting cultivation is an example of a practice that will become unsustainable when population density increase in relation to the acreage of land used in such practice. Indigenous knowledge can also be less efficient and accurate, incomplete or incorrect (Grenier, 1998).

‘...it is not sheer prejudice when outsider professionals see that rural people’s beliefs and practices are sometimes harmfully wrong. Both outsider’s knowledge and the knowledge of rural people can be wrong. The key is to know which is wrong when. It would be as foolish here to do a complete reversal in favour of rural people’s knowledge as it has been so often in the past to suppose that professional outsiders have a monopoly of insight’ (Chambers, 1993, p.97).

Moreover, Western science is also changing, including precepts like rationalism, objectivism, reductionism and positivism. There has been a strong attempt to introduce holistic concepts in Western science research (Grenier, 1998).

It must be stressed here that turning at indigenous knowledge does not mean a complete retreat to traditional technologies, nor a complete withdrawal of Western scientific expertise. Indigenous knowledge is a “corrective” to conventional development, and definitely not a complete reversal of this process (Hettne in Dwyer and Drakakis-Smith, 1996). A blend of Western science and indigenous knowledge can play a crucial role in maintaining a world that continues to be diverse, and in bringing about the universal acceptance of the principle of cultural relativity (McNeely, 1995). The developing countries can be carefully selecting and modifying, and otherwise adapting products and concepts of Western science to their own particular situation to develop an appropriate technology (Redcliff in Ghai and Vivian, 1995). Elliott (1994) emphasised on the combination of selected technologies, be it indigenous or Western knowledge. Indigenous knowledge and Western technologies can complement and mutually reinforce each other. For example, the extension workers can help farmers to adapt rather than to hand down technology from above. While Altieri (1995) emphasised on a combination of the two technologies to achieve a more affordable and sustainable agricultural production.
‘....the joint use of professional outsiders' and rural peoples' knowledge, skills and resources may be the best way forward, combining the precise observations, measurements and experiments of modern science over a narrower and briefer range with the local knowledge and more extensive and continuous observations of rural informants and experimenters. The two types of knowledge complement each other; and together they may achieve advances which neither could alone’ (Chambers, 1993, p.97).

Indigenous knowledge should be understood within the framework of the cultures of indigenous people (Davis and Ebbe, 1995). The long term security of a global food supply, and the basis for research and development program rest with the viability of small scale farmers and producers to maintain and enhance rural life. Indigenous and rural people have the “macrobiological” understanding of their microenvironment, while the public and private institutes of research (formal innovators) has a strong “microbiological” understanding of their macroenvironment (The Crucible Group, 1994). The task is to allow the two to cooperate without violating each other rights or capacities.
Malaysia is located in Southeast Asia. It consists of two regions separated by the South China Sea. The regions are Peninsular (also known as West Malaysia) and Sarawak and Sabah (also known as East Malaysia), on the northern part of the island of Borneo. Peninsular Malaysia borders on the north with Thailand. There are thirteen states in Malaysia, eleven on Peninsular and two on the island of Borneo. (Please, refer to Figure 3.1). The population of Malaysia was 21.6 million in 1997 (Ministry of Finance Malaysia, 1997), consisting of two main ethnic groupings - the Bumiputera and the Non-Bumiputera. The Bumiputera are those with cultural affinities indigenous to the region and to one another and are made up of Malays, aborigines (orang asli) and the various indigenous groups in East Malaysia. The Non-Bumiputera include the Chinese, Indians and other groups whose cultural affinities lie outside the region. Sixty two percent of the population is classified as Bumiputera, 27.3 percent Chinese; 7.7 percent Indian and 3.3 percent for the rest of the population (Seventh Malaysia Plan, 1996).

There is a distinct relationship between the different ethnic groups and their economic activities. This distinction was particularly obvious in the 70s. The Chinese live mainly in urban areas and are involved in commercial activities. The Bumiputera are rural and predominantly engaged in agriculture. Most Indians work and live in estate plantations. In 1970, the proportion of Bumiputera registered as professional was only 4.9 percent compared to 61 percent Chinese and 23.3 percent Indians (Jomo, 1989b). By 1995, the statistical breakdown had changed, but the relationship between race and employment was still prominent. In 1995, the proportion of Bumiputera registered as professional was 33.1
percent compared to 54.1 percent Chinese and 12.9 percent Indian (Seventh Malaysian Plan, 1996). To a large extend, the population structure and economic activities are influenced by historical factors, mainly from the British colonial policy of "divide and rule" (Jomo, 1990b; 1994). (See Section 3.2.1 for details of this policy).

Section 3.2 Development planning in Malaysia – an agricultural perspective

Since 1987, Malaysia had enjoyed a comfortable, even high economic growth, averaging 8 percent annually. Malaysia has experienced a dramatic growth in the manufacturing sector, especially due to investments in semi-conductors and electronic goods. The recovery from the recession of the early 1980s was strengthened by international currency realignments, effective and substantial depreciation of the Ringgit, cheaper production particularly due to low labour cost, deregulation and new investment incentives (Jomo, 1994). However, the economy was difficult to sustain indefinitely and vulnerable to external currency speculation and policies. In 1996, the vulnerability was proven when the economy was affected by the volatility in the financial markets triggered by the market development in Thailand (Ministry of Finance Malaysia, 1997). As a result of a fall in share prices and an increase in the foreign exchange rate in mid-1997, output growth moderated. However, the government still claimed that the fundamentals of the economy remained strong, for although the growth fell from a 1996 10 percent, it still managed 7.5 percent in 1997 (World Economic Outlook, 1999). However, in 1998, the economic growth fell sharply to -7.5 percent, the worst economic contraction since 1985. The economic crisis was attributed to the collapsed in both the currency and stock markets; and worsened by political crisis surrounding the sacking of the deputy Prime Minister. Despite this setback, growth recovered to 4.3 percent in 1999, mainly due to recovery in the regional market and government interference, through currency control and a fiscal stimulus. In short, Malaysia's trade policy is vulnerable to outside changes, due to its small market and heavy dependence on international market, (75 percent of total GNP consists of exports and imports activities). Moreover, the foundations of Malaysia’s economy are not balanced. Sources of growth are confined to exports from limited sectors, such as electronics and semi-conductors. The current resolve is to broaden the economy, by shifting from production "(P-economy)" to knowledge "(K-economy)" (Ministry of Finance, 2000). This includes the setting up of the Multimedia Super Corridor (MSC) to assist sophisticated computerised networks in public and private sectors, promoting household link to the internet system, investing in research and development associated with computer and biotechnology. In short, current investment
reveals the government's obsession with modernising the nation with all things “up-to-date” and “high-tech”.

Figure 3.2  Development Plans in Malaysia before and after independence

The development in Malaysia can be divided into two distinct eras, the period before Prime Minister Mahathir (colonial and early post-colonial years) and the period after. Mahathir Muhammad is Malaysia’s most prominent Prime Minister. He was initially elected in 1981 and has introduced several radical and controversial development policies. Figure 3.2 shows the Five year development plans, from colonial period until the Seventh Malaysian Plan (2000). Figure 3.2 also shows agricultural development in Malaysia, in relationship to the Five years development plans.

Section 3.2.1  Colonial period

The development before Mahathir emphasised socio-economic improvement and national unity (Cham, 1975; Hainsworth, 1979-1980), largely because of ethnic factionalism between the three main ethnic groups - a result of the British “divide and rule” policy, through which the different groups were kept apart and operated in different economic sectors. This colonial policy eventually led to imbalances in income and control over key resources. The Colonial government brought in immigrant labour from Southern India to
work in the rubber plantations, which were mainly owned by foreign expatriates, for example, Sime Darby. Other cash crops like sugar and coffee were also grown. Rubber has remained important due to its demand as a raw material for automobile tyres. From 1905 to 1930, more than 1200,000 hectares were developed and planted with rubber and other crops in Malaya (Senftleben, 1978). By the time Malaysia was granted independence, 340,000 hectares of new land were brought under commercial cultivation (Senftleben, 1978) and over 70 percent of the population was involved in agricultural activities (Siwar and Nik Mustapha, 1988). Tin mines were also opened, with Chinese brought in to work them. While the immigrants arrived, Malays remained in their rural areas practising traditional agriculture, particularly as paddy planters and fishermen. The Chinese and Indians contributed to economic expansion through producing export commodities, while the Malay community remained marginalised and poor. This process also resulted in uneven regional growth and a polarity between the East and West coasts of Peninsular Malaysia.

Section 3.2.2 Late Colonial period (1955-1965)

Rural/urban and ethnic disparities were first addressed by the Colonial government in the Malayan Plans. The First Malayan (1955 - 60) and Second Malayan Plans (1961-1965) emphasised rural modernisation, as a way to improve the livelihood of the Malays. They also increased investment in secondary activity (Aiken and Leigh, 1992). During this ten years period, agricultural development focused on commercialising agriculture through the introduction of export cash crops, large plantations, large resettlement schemes and modernisation of cultivation techniques.

This period was characterised by three main strategies - in situ development, large land development schemes and the rural industrialisation programme. In situ development was managed through the RED (Rural Economic Development) book as the basis of planning (Siwar and Nik Mustapha, 1988). The RED book was prepared by the District Officer, based on development activities in their districts, which were supposed to conform to national rural planning policies. It was used during the First and Second Malayan Plans, until 1971 (the starting period of the NEP). This in situ development included infrastructure programmes, the provision of assistance to smallholders, especially the introduction of "subsidy packages" for replanting, agricultural research and the provision of local marketing opportunities (Aiken and Leigh, 1992).

Land resettlement schemes cleared large expanses of virgin jungle in order to absorb part of the rural population and to create higher productivity and income (e.g. the Federal Land
Development Authority (FELDA)). FELDA developed plantations to be managed by selected people (supposedly the rural poor) who would own the lands after 15 years of settling and managing the plantations. The principal crops were oil palm and rubber. Rural industrialisation schemes were managed by the Rural Industrial Development Authority (RIDA) and assisted by MARA (the Council of Trust for Indigenous People) to facilitate training, education and other facilities (Abdul Rahman, 1988).

Despite these programmes, urban-rural and ethnic inequalities persisted. The problem of inequality had caused racial tension, leading to the racial riots of 13th May 1969. This incident spurred the government to rectify inequalities between the different ethnic groups, particularly through the reduction of poverty among the Bumiputera. A positive discrimination policy aimed to help the Bumiputera improve their socio-economic status, especially in comparison to the Chinese. The development plan which dealt directly with the 1969 riots was the New Economic Policy (NEP), initiated in the Second Malaysian Plan. This was designed to eradicate poverty and restructure the socio-economic imbalance between the different ethnic groups by eliminating identification of race with economic function. The NEP strategy aimed to increase access of the poor (essentially the Bumiputeras) to land, capital, training and other public amenities (Lim, 1983). In the 1960s, the average per capita income of Malays was half that of the Chinese (Young et al, 1980). Malays accounted for slightly more than half of the peninsular population, but almost 80 percent of them worked in rural areas, primarily in traditional agriculture (Young et al, 1980). Only half of the non-Malays worked in the rural areas. By contrast, in the urban areas, where one third of the employment was found, non-Malays shared more than 75 percent of jobs, particularly in high status employment (managerial, professional and supervisory occupations) (Young et al, 1980). The problem of imbalance also included the ownership of assets. When compared to Chinese land holdings, Malay agricultural land holdings were negligible. On average, Chinese land holdings were twice the size of the Malays’ (Young et al, 1980). In the corporate sector, the proportion of share capital of limited companies held by the Malays was only two percent, compared to one third by the Chinese, while the remainder was owned by foreigners (Young et al, 1980; Lim, 1974; Kanapathy et al, 1989; Atan in Ragupathy, 1992; Jomo, 1994).

Section 3.2.3 After independence (1966 to 1975)

The restructuring policy was intended to reduce the dependency of the Bumiputera groups on subsistence agriculture, while at the same time increasing their role in the modern rural and urban sectors of the economy. Targets were set in relation to employment structure and
the control of assets in the corporate sector. It was hoped that by the end of 1990, employment by sector should approximate the racial composition of the population - 54 percent Bumiputera, 35 percent Chinese, 10 percent Indian and 1 percent others (Lim, 1974). It was also hoped that by 1990, the Bumiputeras would at least control and manage 30 percent of the capital of the corporate sector compared to only 2.4 percent in 1970 (Young et al, 1980; Lim, 1974; Kanapathy et al, 1989; Atan in Ragupathy, 1992; Jomo, 1994). Therefore, the Second Malaysian Plan marked the starting point of a form of economic management which took the socio-economic structure of the population into account. The restructuring of society was to be achieved through growth rather than redistribution. It was believed that high economic growth would eventually benefit the poor through “trickle-down” effects.

The Integrated Agricultural Development Plan (IADP) was introduced to resolve rural problems (Siwar and Nik Mustapha, 1988) under the Integrated Rural Development agrarian reform strategy (IRD) (Ataul Huq, 1994). During this period, the used of the RED book was abolished because of its inadequacy in term of operating agricultural development programmes at a larger scale, which needed a larger and more efficient co-ordinating machinery. It was believed that the IADP would effectively link the Federal and the State government agencies. The IADP was an in situ development programme, intended to rehabilitate and revitalise the agricultural rural areas through two strategies:

1. integrated and concentrated effort of rapid rural and agricultural development to meet the needs of areas or regions ready for take-off and,
2. continuous programmes directed toward preparing other regions for accelerated rural and agricultural development (Siwar and Nik Mustapha, 1988).

The “packages” of the IADP included physical provisions such as irrigation and drainage facilities, modern inputs in the form of subsidied pesticides and weedicides and, agricultural support services such as extension, credit, marketing and other subsidies. These packages were more or less similar to the ones provided by the RED book system, but differed in being implemented by different departments, with clearly targeted recipients. The Department of Agriculture was responsible for implementing the programmes at district level, rather than the District Officer. There were 18 on-going IADPs with at least one in each of the 13 States. By the end of 1988, 6 IADPS were completed, 12 were in various stages of implementation and another 9 were still at the planning stage (Shari in Ariffin, 1994).
The IADP mainly targeted rubber smallholders and rice-farmers. For rice-farmers, production increased in the early 1970s, but also followed by an increase in production cost (Jomo, 1990b). In rice farming, the IADP had widened inequality gap between the rich and poor farmers. A study by Scott (1985) revealed that rice-farmers who were landowners and with large farm size had more income compared to landless farmers (tenants) and landowners with small farm size. The study also showed that large proportion of rice-farmers (54 percent) owned less than 1.2 hectares. Only 7 percent of them owned land of 3 hectares or more. The proportion of tenants or landless rice farmers was also high (27 percent). The large proportion of tenants and small farm farmers indicates that the IADP failed to solve the problem of poverty among rice-farmers due to land and other productive assets for rice farming, such as affordability to practice double-cropping and produce large marketable rice surplus.

The rubber smallholders also faced similar problems related to land ownership. In 1977 the average size of rubber smallholding was 2.65 hectares, of which 48.8 percent of all smallholders owned less than 2 hectares each (Jomo, 1990c). Gini coefficient of inequality was high, 0.412 for all rubber smallholders and a slightly higher figure of 0.424 for Bumiputeras (Jomo, 1990b). The IADP was considered a failure, as resources were wasted due to weak implementation capacity and substantial leakages, resulting in real benefits most often benefited the non-poor instead of the poor (Shari in Ariffin, 1994). As a result of IADP’s failure to solve poverty problem among the poor farmers, the NAP was introduced in the later years.

Section 3.2.4 The period “After Mahathir”

The Third Malaysian Plan witnessed the essence of “Mahathirism” in its development planning, through privatisation and corporatisation of government and services. During this period, the government favoured the private sector, exports and private investment. The period after Mahathir signifies more ambitious and drastic development programmes, with the main aim of attaining the status of a “developed” country by the year 2020. Mahathir’s political ideology is influenced by the concept of modernisation, as a way to attain that “developed” status. Development has focused on expensive, large, high technology projects that benefit the few, such as the Multimedia Super Corridor, the Petronas twin-tower, Bakun Dam, the Formula One racing circuit, the grand Kuala Lumpur International Airport (KLIA) and so on. Agriculture is no longer seen as important, because it is associated with poverty, non-profitable activities and “traditional people with traditional methods and aspirations” that impede development. In fact, just before the economic crisis in 1997, the 1992 National
Agricultural Policy (NAP) suggested that rural sectors would be gradually diminished through rural urbanisation and industrialisation programmes (Sivalingam, 1993; Abdul Rahman in Jomo, 1994; Seventh Malaysian Plan, 1996).

The Fourth Malaysian Plan marked the introduction of the NAP. The NAP was first introduced in 1984, mainly for political interests of gaining and maintaining electoral votes for the general election. The agricultural sector is important in its contribution to the sectoral, regional and ethnic balance and, socio-political stability. Clearly, the agricultural sector is important for food security, which explains the massive and almost irrational investment in rice cultivation in the Muda areas of North Peninsular Malaysia. Moreover, the agricultural sector (mainly cash crops) also provides the source of raw materials for industrialisation and a market for industrial products (Abdul Rahman in Jomo, 1994).

The aim of the 1984 NAP remained the same as the previous development programmes (emphasising productivity and modernisation), but stressed the importance of commercialisation of agricultural production as a way to improve the livelihood of the rural poor. The new land development, in-situ development and support services were improved with commercialisation in mind. However, despite this campaign to promote commercialisation and privatisation of the agricultural sector, the number of land development projects under joint venture/private sector was less after the 1984 NAP (57,100 hectares) than during the previous NEP phase, when 120,047 hectares were developed. This fell further during the Fifth Malaysian Plan, to only 17,500 hectares (Siwar and Nik Mustapha, 1988). The decline was partly due to the limited new land available for development and the private sector's reluctance to invest in the agriculture sector. The lack of response from the private sector was itself due to the perception of small profits that can be gained from the sector, as well as the volatility of global commodity prices.

During the Fifth Malaysian Plan, group farming systems were introduced to bring the benefits of the estate-type technology and management to smallholders, through the formation of large centrally-managed units of production (Shari in Ariffin, 1994). Alongside, village industries and rural urbanisation programmes were also introduced, while several programmes were directly targeted at the “hard-core” poor. Examples of these programmes were the “Hala Cara Baru” (New Approach) and “Projek Ikhtiar” (Self-improvement Project through Effort). The “Hala Cara Baru” programme cost RM 391 million (Shari in Ariffin, 1994).
The New Development Planning (NDP) replaced the NEP in 1991, but continued the aim of the NEP of growth with equity. The difference was that a broader concept of "balanced development" was introduced, including cross sectoral, cross regional and socio-economic balance. The NDP emphasised the development of human resources, the use of science and technology to attain development progress and, some indication of concern to the environment (Atan in Ragupathy, 1992). The sectoral balance was to be achieved across different ministerial departments through intersectoral linkages and increased mutual complementaries, so as to maximise growth opportunities while reducing external vulnerabilities (Seventh Malaysian Plan, 1996).

The regional balance referred to the urban-rural dichotomy, with emphasis also on the East and West coast of Malaysia; and between East and Peninsular Malaysia. This regional balance was to be achieved by promoting and strengthening national integration through the reduction of existing disparities in economic development and increasing physical linkages, the mobility of people and factors between regions and states and between rural and urban areas. The socio-economic balance targeted the gap between rich and poor and between material and spiritual gains.

In agricultural development, the 1992 NAP replaced the 1984 NAP. It aimed to reduce and eliminate social and economic inequalities and imbalances and to promote a fairer and more equitable sharing of the benefits of economic growth by all Malaysians (Sivalingam, 1993).

The result of the previous agricultural development strategies had been disappointing; rural incomes had failed to increase by much, despite a rise in output (Abdul Rahman in Jomo, 1994; Ataul Huq, 1994). Most of the small increase in income came from off-farm employment in the urban sectors (Sivalingam, 1993). Accordingly, the 1992 NAP's strategy was designed to create alternative employment opportunities in the rural areas besides agriculture, through rural urbanisation (Sivalingam, 1993; Abdul Rahman in Jomo, 1994; Seventh Malaysian Plan, 1996). The concept of rural urbanisation was based on commercialisation, industrialisation and the provision of all urban amenities in the rural areas. It was hoped that out-migration, especially among the young, would be reduced, and labour would be absorbed into the manufacturing sector. Thus, there was an emphasis on developing human resources directed at the training of the rural youth as skill workers for non-farming sectors or commercialised agricultural business. Traditional rural smallholders would be absorbed in larger agri-businesses.
The problem of uneconomic land was to be solved by grouping smallholdings into mini-estates, which would be run by the private sector (Abdul Rahman, 1988; Atan in Ragupathy, 1992; Sivalingam, 1993, Ataul Huq, 1994). Farmers would either be absorbed into urban areas as wage labourers, as would their children, or be compensated for their displacement, or work in the mini-estates as paid labour. This strategy conformed to the government decision to stop subsidising traditional smallholders because of the high cost (Abdul Rahman, 1988; Atan in Ragupathy, 1992, Sivalingam, 1993, Ataul Huq, 1994).

"It appears cheaper for new land development to be carried out by the private sector and more cost effective to alleviate rural poverty by employing the poor and near landless as wage labourers in private estates (Sivalingam, 1988; p.6)".

The government claimed that the problem of land tenancy went hand in hand with the failure of agricultural development. Multiple ownership of land and the land tenancy system (such as the Native Customary Land in Sarawak) impeded development, by constraining access to land for development by the private sector. A revision of tenancy legislation was seen to be necessary. The 1992 NAP stressed that privatisation would ensure clearly defined property rights. The protection of private property rights was essential to create a viable market, with attendant profits. The private sector would transform agriculture into a 'viable' agribusiness as a commercial undertaking; dynamic and competitive in the local and world markets (Seventh Malaysian Plan, 1996).

<table>
<thead>
<tr>
<th>Year</th>
<th>Agricultural and forestry percentage of share GDP</th>
<th>Total percentage of employment</th>
<th>Total percentage of exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>33.3</td>
<td>67.6</td>
<td>62.1</td>
</tr>
<tr>
<td>1970</td>
<td>29.0</td>
<td>53.5</td>
<td>55.9</td>
</tr>
<tr>
<td>1980</td>
<td>22.9</td>
<td>39.7</td>
<td>39.8</td>
</tr>
<tr>
<td>1990</td>
<td>18.7</td>
<td>27.8</td>
<td>18.9</td>
</tr>
<tr>
<td>1995</td>
<td>13.6</td>
<td>18.0</td>
<td>13.1</td>
</tr>
<tr>
<td>2000 (expected)</td>
<td>10.5</td>
<td>13.0</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Table 3.1 The percentage contribution of agricultural and forestry sector to the GDP, employment and export.

(Sources: Abdul Rahman in Jomo, 1994)

Ever since independence, the economic role of the agricultural sector had declined; the result of intense industrialisation and diversification programmes. This is illustrated by the declining percentage contribution of the agricultural sector to Gross Domestic Product (GDP), employment and export as shown in Table 3.1.

Despite the declining role of the agricultural sector, agricultural development projects are still expensively supported. (Refer to Table 3.2)
During the First Malayan Plan, expenditure on agricultural development was RM45 million, compared to 11.1 billion during the First Malaysian Plan, 17.9 billion during the start up of the NEP and 86.1 billion after the 1984 NAP was introduced during the Fourth Malaysian Plan (Senftleben, 1978; Siwar and Nik Mustapha, 1988). It can also be seen from Table 3.2 that during the First Malaysian Plan, most of the expenditure (54.6 %) was directed at assisting traditional farmers. However, this pattern changed in subsequent plans, up until 1985, when land development programmes were favoured. Land development schemes (FELDA) are extremely expensive. By 1981, 70,000 farmers had been settled, costing RM 3 billions (55,000 per settler) (Shari in Ariffin, 1994). The 1987 settler target was 403, 500, requiring RM 20 billions. Although the allocated amount for land development during the Fifth Malaysian Plan was only RM 10.5 billions, in fact, the actual amount spent for land development during that period was RM 44.2 billions (Table 3.2).

Under the NEP, RM 34 billions had been spent on poverty eradication programmes (Shari in Ariffin, 1994). (Figure 3.3). There had been an increase of 133 percent in expenditure for poverty eradication programmes during the Third Malaysian Plan (from RM 2.4 billion during the Second Malaysian Plan to RM 6.4 billion). However, in relative terms, the allocation for poverty eradication of the total Federal government development allocation declined by 32.4 percent. A further decline of 23.7 percent accompanied the Fourth Malaysian Plan. Only in the Fifth Malaysian Plan did it increase slightly by 27.7 percent from the continuous decline since the Second Malaysian Plan, compared to the total annual budget allocated for that particular year (Shari in Ariffin, 1994).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Assisting</td>
<td>RM 608.3 (827.6)</td>
<td>RM 460.13 (440.3)</td>
<td>RM 1,278.12 (980.9)</td>
<td>RM 3,033.59 (3341.0)</td>
<td>RM 6,367.8</td>
</tr>
<tr>
<td>Traditional Farmers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land Development</td>
<td>RM 363.6 (494.7)</td>
<td>RM 988.18 (945.6)</td>
<td>RM 2,744.65 (2106.4)</td>
<td>RM 3,979.37 (4382.6)</td>
<td>RM 4,419.0</td>
</tr>
<tr>
<td>Other Programmes</td>
<td>RM 142.2 (193.5)</td>
<td>RM 345.22 (330.4)</td>
<td>RM 589.7 (452.6)</td>
<td>RM 1,592.24 (1753.6)</td>
<td>RM 1,013.2</td>
</tr>
<tr>
<td>Total</td>
<td>RM 1,114.1 (1515.8)</td>
<td>RM 1,793.53 (1716.3)</td>
<td>RM 4,666.20 (3539.9)</td>
<td>RM 8,608.60 (9477.2)</td>
<td>RM 11,799.95</td>
</tr>
</tbody>
</table>

Note: Figures in brackets are based on 1990 constant price.

Table 3.2 Purposes of expenditure for agricultural and rural development, 1966 - 1990

(Source: Siwar and Nik Mustapha, 1988)
The Total Expenditure on Poverty Eradication Programmes during the NEP Period

Figure 3.3 The total expenditure on poverty eradication programmes during the NEP period

(Source: Shari in Ariffin, 1994)

The future for the rural and agricultural sector in Malaysia is likely to be bleak. This indicated by declining financial assistance from the government to rural development. The allocation for rural and agricultural sector continues to decline in “Budget 2000”. Of 78.03 billion allocated for the budget, only 2.45 billion is scheduled for the rural and agricultural sector (less than 10 percent) (Ministry of Finance, 2000).

Section 3.3 Development planning in Malaysia – political economy and political geography perspectives

The main characteristic of development in Malaysia is an absolute authoritarian control by the government at all stages of development process - from inception to implementation and evaluation. This absolute control is maintained by four main factors - the bureaucratic networks and legislation inherited from the Colonial government; a “top-down approach” in designing and implementing programmes; the way in which development policies are evaluated and; most importantly, the ability of the government to control both people and resources to facilitate the implementation of development programmes. In short, the government of Malaysia is powerful and has absolute say over development programmes.
The following sections look at the manner in which these four factors influence development planning in Malaysia.

Section 3.3.1 The Colonial legacy

Prior to British conquest, in fact since 1511 the Portuguese and the Dutch had already established bases in the coastal port of Malacca (Jomo, 1990b). The establishment of the British Colony followed the Anglo-Dutch Treaty of 1824 (Aiken et al, 1982). The British took over Malacca in Malaya while the Dutch controlled Batavia in Sumatra. Sabah was handed over to the North Borneo Chartered Company in the late 1870s (Young et al, 1980), while Sarawak was given to the Brooke family by the Sultan of Brunei in 1840 due to the problems of piracy and local rebellion (Grijpstra, 1976; Young et al, 1980). Sarawak became a British protectorate in 1888 and a Crown Colony in 1946 (Grijpstra, 1976).

Malaya gained independence in 1957. Sarawak and Sabah joined the confederation of Malaysia in 1963. One anti-colonial organisation was the armed Malayan Communist Party, which burdened the colonial government financially by increasing the military costs of containment (Jomo, 1990b). Malaya was handed over to the Three Alliance Party, representing all the main ethnic groups, the Barisan Nasional (BN) - the United Malay National Organisation (UMNO), the Malaysian Chinese Association (MCA) and the Malaysian Indian Congress (MIC).

Apart from the problems of ethnic factionalism, the Colonial government passed down a system of bureaucratic networks by which development policies were designed in accordance with the colonial format: the five years development plan. Following independence, these networks continued to develop into an increasingly powerful and complex system, beyond the comprehension of the rural poor, yet providing the government with weapons to legitimised its power, position and control.

Malaysia is a monarchy and the sovereign is the Yang di-Pertuan Agong (the King). The King is appointed for five-year terms in turn, rotating among the Sultans of each of the Peninsular Malaysia states, except Melaka and Pulau Pinang. The head of Malaysia is the Prime Minister, who is also elected for five-year. The government has been controlled by the Alliance Party (UMNO, MCA and MIC) since independence.

The Malaysian Parliament has three main roles- a legislative body; a controller of finance (tax, rates and expenditure) and; a provider of a “critical forum” to discuss public opinion.
The Malaysian Parliament is divided into two - the "Dewan Rakyat" (House of Representatives) and; the "Dewan Negara" (Senate). The Dewan Rakyat prepares the legislation, which is reviewed by the Dewan Negara and passed to the King for approval. The States also have their own State Legislative Assemblies, which have the power to pass laws on certain matters described and reserved in the Federal Constitution as "State List" (Sentfleben, 1978). The system seems to allow for revision or scrutiny of legislation or development programmes by other separate powers, but in reality this is not so. Despite these formal structures, the present government is able to conflate the powers of the executive (the Prime Minister and his Cabinet), the Legislature (Parliament and state assemblies) and the Judiciary. Final decisions rest with the Prime Minister, suggesting that "procedures" are mere formalities and protocols. The concentration of power at the top has been further enhanced by the removal of elected local government in the early 1970s, supposedly to prevent corruption and inefficiency. At the present time, the municipalities are already well constrained, administered by the federal state through the direct appointment of councillors and mayors.

Indirect rule characterised British colonial policy. Senior administrative control was exercised by the appointed British residents to deal with administration, law and taxation. However, the Sultans retained their power over decision-making with respect to state customs, religion and land matters. After independence, control over land was removed from the Sultans, and passed over to the State governments. The Federal government controls everything, but land and forests (Sentfleben, 1978; Muzaffar, 1986; Majid-Cooke, 1997). Although State governments have the right to control land and forest affairs, the effect of centralisation is overpowering. The Federal government is able to intervene in land and forestry matters by exercising leverage over the States through its financial powers, (control over development funds - including taxation and subsidy, party machinery and emergency powers) (Majid-Cooke, 1997). Furthermore, the Federal government is also able to influence the structure and system of agricultural land through public law, by modifying the constitution in both the Federal and State legislatures, in the form of legal notification and implementing regulations (Sentfleben, 1978). An example of this situation is shown by the transfer of land administration power through ministerial reform. During the colonial era, land administration was exclusively a Sultanate matter. After independence, the coordinating and advisory functions of land development were transferred to the Federal government through the National Land Council (NCL) and a Federal Commissioner of Lands. However, this did not apply to East Malaysia, because of its special land tenure system. The NCL had since become the Ministry of Land Development. The Federal
government is also able to control land development using financial and legislative power, by establishing bureaucratic power through government agencies, semi-governmental institutions and statutory bodies (such as FELDA, FELCRA, MARDI\(^1\) and RISDA\(^2\)) for implementing land development reforms.

Ministries compete with each other to impress the Prime Minister. As a result, there is often clash of interests between them. The tension is obvious between the Ministry of Agriculture and Ministry of Environment, over environmental management and efforts to increase agricultural productivity and efficiency. Despite the NDP emphasis at promoting intersectoral linkages across ministeries, there was plainly little linkage in the efforts to protect the environment.

".........most efforts to develop resources, to maintain the resource base and to protect the environment, are pursued separately with minimal intersectoral co-ordination. Sectoral demarcations obscure potential compatibilities among competing user groups and increase the difficulty of resolving conflicts. Also, because the institutions that manage resources are the products of history, law, the politics of special interest, and administrative convenience, they seldom accommodate the complexities of ecosystem function nor try to improve their understanding of the ecosystem" (Haji Hasan in Teh and Goh, 1992; p.429).

Like most other developing countries, the Malaysian bureaucratic networks is not only overbearing, but also too complicated and thus unapproachable for lay people; they are reluctant to pursue their cases, contemplating the hassles and delays associated with the protocols of such massive and complicated systems. There is thus a considerable gap between the people and the government.

Section 3.3.2 Implementation of development policies

Again, like most other developing countries, development implementation is essentially top-down. (Figure 3.1). As a result, the implementation of development programmes at State level depends heavily on the decision-making of the upper tier, particularly the Federal government. State governments rely heavily on the Federal government due to the concept and approach of the Malaysian development, which emphasises complex, expensive technology and industries that requires huge capital expenditure and are energy intensive (Muzaffar, 1986). Moreover, production is geared towards external markets, which explains the lack of recent effort to develop an indigenous and autonomous scientific base.

\(^1\) Malaysian Agriculture Research Development Institute
\(^2\) Rural Industrial Development Authority
Figure 3.4 The flow of responsibilities between the Federal to the State government in the Development Planning Structure
(Source: Siwar and Nik Mustapha, 1988)
As for the State governments, they are in no position to raise the sort of capital, organise the sort of resources or establish the sort of markets that the present approach to development requires. For example, in agricultural development, the 1992 NAP promotes authoritarianism in the push for expanded capitalism, with the effect of reducing the power of the States and most importantly of the people over their own growth and development. The 1992 NAP expanded the bureaucratic networks of the Federal government leaving authority in the hands of the few technocrats who are working with the private corporations.

Top-down approach to development implies that there is little or no public participation. The rural poor who are supposed to be the main recipient of development projects are not consulted. The policy-makers assumed that they know the needs of the rural poor, resulting in rural development strategies and policies which are based on technocracy (Shari in Ariffin, 1994). As a result a development project;

"sees the peasant as trapped in the vicious circle that can only be broken by programmes that integrate the peasants with markets through the introduction of modern agricultural inputs, credits and marketing facilities, as well as the construction and improvement of the infrastructure such as irrigation system and roads" (Shari in Ariffin, 1994: p. 26).

Under such a system, policy-makers may abuse their power, for instance through favouritism. There is no transparency and accountability in economic activity. Excessive power at the top means that the ruling elite can interpret policy according to its needs. For example the positive discrimination policy of the NEP was meant to redistribute income and wealth among the three ethnic groups. In contrast, in the attempt to change the structure of employment and the control of assets, there has been a strong emphasis in nurturing middle-class Malay businesses and entrepreneurs, which in turn has led to "money politics" or rent-seeking behaviour (Kanapathy et al., 1989). This "rent-seeking" behaviour is also associated with nepotism (Jomo, 1990c; Majid-Cooke, 1997). The problem of "money politics" lies in its emphasis on self-interest and profit and its approval of large subsidies to the middle-class, at the same time denying small subsidies to the "little person". The government changes the general administrative structure for implementation purposes, by increasing the dominance of "wakil rakyat" (Members of Parliament) over the decision-making process within the district bureaucracy, traditionally dominated by local bureaucrats (Shamsul, 1983-1984).

"This dominance is further enhanced by the fact that many local bureaucrats have become partisans who openly belong to the local ruling UMNO party organisation. Hence, they are under the control of the top local politicians, namely the wakil rakyat, not only within their local party organisation but also in the development committee itself. As a result, the
district development machinery, which controls and monitors every aspect of the implementation of all district development projects under the NEP, has now become an integral part of the local ruling party apparatus" (Shamsul, 1983-1984, p.473).

Funds for poverty eradication focus on basic amenity provisions, creating construction jobs that mainly benefit the politicians and their close associates.

“They have managed to turn the development projects initially aimed at eradicating poverty into an extremely rich personal financial resource by establishing their own businesses and awarding themselves lucrative government contracts” (Shamsul, 1983-1984, p. 474).

This form of such “ politicisation” also happened in rural developmental programmes, as illustrated by Shari in Ariffin (1994):

“Bureaucratization of the rural poverty strategy has also resulted in the politicisation of the rural development programmes at the grass-roots level. As a result not only is the distributional of farm subsidies and credits ultimately based on political connections and considerations, but also settler selections for FELDA and other similar schemes, housing allocations, jobs and scholarships” (Shari in Ariffin, 1994; p. 32).

Cramb (1988) criticised the model of “top-down” agricultural transformation, especially the setting up of the commercial plantations, as “ culturally insensitive” and often economically unviable. On the whole, farmers are still vulnerable to the world market. For example, the oil palm FELDA settlers’ income is not stable. In 1983 their average monthly income was RM 1000, but by 1985, this had declined to RM 375 (Shari in Ariffin, 1994). The world market not only dictated income but also the costs of production. Prices of imported raw materials (such as fertilisers and pesticides) and machinery (such as tractors) were high and continued to increase. The high costs of production affected net income, exacerbated by a prolonged dependence on maintenance and spare parts.

The top-down model implies that the needs and aspirations of the rural masses are not heard and ignored, thus creating tensions and conflicts between the government and the people. The system also allows full concentration of power in the hands of the few, thus enabling an abuse of power amongst the policy-makers.

Section 3.3.3 Evaluation of development programmes

The way current development ideology is designed and implemented is obviously linked to the different interpretations of development and ways of evaluating its success and failure. Success is usually measured quantitatively — through high economic growth, high productivity, high income, low inflationary rate, low unemployment, advanced infrastructural networks and so on. Socio-cultural and environmental aspects are often ignored.
Socio-cultural aspects (attachment to "adat" or religion) are perceived as constraints on development. This is illustrated in the Prime Minister's book, "The Malay Dilemma", which discussed the cause of Malay poverty and their relative backwardness in relation to other races. Mohamad (1989) claimed that the failure of the Malay to compete in economic activities was due to their attachment to a traditional value system (the "adat") and some values related to Islam. Malays are believed to lack entrepreneurial spirit, preferring land ownership to participating in the monetary system, especially commerce. This lack of competitive spirit is further enhanced by some Islamic values that encourage fatalistic attitudes - a disinclination to compete due to a preference for things spiritual over things material. Indeed, socio-cultural aspects are usually blamed for the failure of development programmes. For example, when the First and Second Malaysia Plan failed to address the socio-economic problems of rural people, the design and implementation of development programmes were not scrutinised. Instead, it was communities' attachment to cultural and religious values that was pinpointed as the cause of failure, including the fragmentation of land holdings created by the Islamic inheritance system, multiple ownership of land, lack of tenancy legislation to control the problem of illegal occupation, problems related to tenancy structure and the problem of landless peasants (Senftleben, 1978; Siwar and Nik Mustapha, 1988; Ataul Huq, 1994).

According to Brookfield et al., (1995) the Malaysian government was so preoccupied with economic growth and raising incomes that the environment was treated as "open access" surrounding private property, into which wastes of any kind might be disposed and into which downstream damages might be allowed to flow with impunity. Former traditional rules, like the "adat" were previously used to govern access to resources and had direct or indirect conservationist consequences. These were breached, as the conditions surrounding the resources had changed through the acquisition of commercial value. Environmental legislation and enforcement was weak or non-existence during the NEP period. Environmental awareness was low during that period, due to the centralisation of political and economic power, the absence of effective political opposition and, the concentration of interest groups in the capital cities and urban regions (Brookfield et al, 1995).

Although the government boasts of its socio-economic achievement - in terms of high income, low unemployment and low poverty rate - the reality is different. Table 3.2 shows the fall in the incidence of poverty in rural areas from 1970 to 1990, according to these official data. The 1990 figure shows an incident of poverty at 21.8% only just 0.2% more than the NEP targeted percentage of 21.6% by the end of the NEP period.
Nevertheless, this figure is still high; one in every 5 rural households remained poor. The poverty rate might have fallen but the inequality gap widened. The reality is that there is an increasing gap between the rich and the poor (Milne, 1976-1977; Jomo, 1990c). According to Jomo (1990c), income inequalities had worsened ever since independence. The Gini ratio was 0.41 in 1957, but increased to 0.49 in 1990. Despite the "positive discrimination" policy of the NEP, inter-ethnic differences persist, while intra-ethnic differences worsen, especially among the Bumiputera. Just after independence, intra-ethnic inequality was highest for the Chinese and lowest for the Bumiputera but by 1970s, this ranking was reversed. This is not surprising as the government had used large government organisations to create the "special class" — the ruling elite.

".........it is also widely recognised that government expenditure for poverty eradication, has been increasingly politicised over the years, encouraging and consolidating political nepotism and patronage in the process" (Jomo, 1990c, p.473).

As a result income is derived from title, position, privilege and corruption. Wealth had also been highly concentrated in the hands of small investors. For example, in 34 large corporations, 25 shareholders own more than 51 percent of the ordinary stock, despite the large number of shareholders in all companies (Shamsul, 1983-1984). The NEP also failed to solve the problems of regional imbalances between the East and West coasts of Peninsular Malaysia and also between East and Peninsular Malaysia (Sivafingam, 1993). Growth was not sufficient to combat poverty as the distribution effects were neutral. If any spatial spread did occur, it tended to be inequitable.

The extent of the hoped-for trickle-down effects to the poor is obscured in the statistical figures, which hide the realities of life in the rural areas. This is particularly serious among the hard-core poverty group like fishermen, rubber smallholders and paddy planters. In November 1974, there was social unrest in Baling, Kedah when the local rubber smallholders, together with some university students, organised a demonstration to show their dissatisfaction regarding the economic difficulties of the rubber smallholders (Milne, 1976-1977). Fatimah et al. (1989) and Scott (1985) have written about the social inequality

<table>
<thead>
<tr>
<th>Year</th>
<th>1970</th>
<th>1976</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>The percentage incidence of poverty</td>
<td>58.7</td>
<td>47.8</td>
<td>21.8</td>
</tr>
</tbody>
</table>

Table 3.3 Incidence of poverty in the rural areas from 1970 to 1990
(Source: Abdul Rahman in Jomo, 1994)
in the Malaysian rice community, revealing an increasing gap between the very poor and the very rich. The increasing gap between rich and poor is due to policy favouring the rich against the poor. For example when the government set a guaranteed minimum price scheme for paddy farmers, the rich and big farmers benefit, since they market more rice in comparison to the poor farmers (Jomo, 1990b).

The same applies to policies directed at improving the welfare of the fishermen. When the government withdrew the diesel price subsidy to help the fishermen in 1983, the richer fishermen benefited more from it. This is because most of the poor fishermen either used small engines or worked as labourers for richer boat and gear owner (Jomo, 1990b).

The latest policy that would put the poor in a disadvantage position is the introduction of the National Health Insurance (NHI). The poor would be denied medical facilities since they could not afford to pay for the insurance, while the elderly, disabled, those with heritable illnesses and the chronically ill, would have a higher premium.

Although current development planning claims a high success rate in combating poverty and improving the socio-economic conditions of the people, there is still evidence showing the opposite. Income and wealth disparities have widened between the rich and the poor, while policies continue to favour the rich. Socio-cultural, spiritual and religious aspects are considered as hindrances to development and are ignored in the design and implementation of projects. Environmental aspects are mentioned in the latest development plan (Seventh Malaysian Plan) either just to follow the “trend” or to satisfy criticisms from NGOs and other opposition parties, for what ever the rhetoric, implementation is weak or non-existent.

Section 3.3.4 Control of people and resources

There are several ways in which the government uses legislation to control people — the land tenure system, land development programmes, the electoral system or wardship system and other legislation, such as the draconian Internal Security Acts (ISA). A detail discussion of the above is presented in Chapter Four, under development in Sarawak, particularly related to the land tenure system.

Legislation is used to control people by creating wardship and constituencies. The Malaysian electoral system is another colonial legacy. It is based on single-member constituency representatives, which can posed the minority and marginalised group to be in a disadvantage position, especially in relation to their rights and power. Amendments of the
electoral system have resulted in rural bias in the delineation of constituencies, causing the number of rural as opposed to urban seats to be disproportionate to their respective populations. Such process of gerrymandering has allowed some ethnic minorities to be disproportionately represented while others have no effective representation at all. For example, the redelineation of electoral boundaries passed by the Sabah Assembly in May 1994 indirectly affected the 1999 Sabah elections, giving advantage to UMNO (the ruling party) as opposed to the opponents party, the PBS. As a result of the redelineation, the number of UMNO constituencies in the 48 member Assembly increased to 24, with the effect of reducing the PBS seats to 12, while the rest of the seats were 4 Chinese majority party and 8 “mixed”, without any particular community holding a majority (Loh, 1999). Thus, the present electoral system favours big parties or coalitions and neglects small minorities.

Section 3.4 Conclusion

Upon being granted independence from the British, Malaysia had undergone a rapid economic development. However, development only emphasised on tangible, material aspects, such as high economic growth and rapid infrastructural development, with little consideration for socio-cultural and environmental aspects. Such “profit-driven” emphasis of development was reflected in the five years development plans, including agricultural policies. Development can proceed despite little concern for socio-cultural and environmental aspects because of the absolute control of the government that is maintained by:

- historical factors, such as the colonial legacy of bureaucratic networks and legislation;
- absence of empowerment and consultation, as a result of a “top-down” approach of designing and implementing programmes;
- bias in evaluating the success of development programmes, usually only considering material gains and;
- the ability of the government to control both people and resources through legislation, such as, the land tenure system, land development programmes, the electoral system and other legislation such as the Internal security Acts (ISA).

The Federal government has a great influence over development at both state and district levels. The next chapter looks at development issues and planning at the state of Sarawak,

3 Parti Bersatu Sabah
the land tenure system, in order to facilitate land development programmes. The next chapter also looks at development issues and planning at local level (the study areas of Dalat, Oya and Mukah in Sarawak). The relationships between the local environment, the peat swamp forest and Melanau society are examined with a particular interest in the land tenure system, the socio-economic and cultural systems and the management of the environment.
Figure 4.1 The administrative divisions and districts of Sarawak
(Sources: http://www.sarawak.gov.my/sarawak_online/gen_info/graphic/maps2.gif)

Section 4.1 The geography of Sarawak

Sarawak is the largest State in the Federation of Malaysia, with an area of 124,450 square kilometres (Jabatan Pertanian Sarawak, 1995), covering 38 per cent of the total area of Malaysia (Grijpstra, 1976). Most of the land in Sarawak is covered with forest (67.2 per cent), while 32.5 per cent is cultivated as agricultural land. Only 2.9 per cent has been developed for settlement and associated non-agricultural activities (Jabatan Pertanian Sarawak, 1995). Sarawak has an equatorial climate, characterised by heavy rainfall (2,500 mm to 5,500 mm annually) and controlled by the two monsoons. The monsoonal pattern is modified by relief and land/sea breezes. Uniform high temperatures predominates (averaging 32 °C) along with high relative humidity (up to 87 per cent) (Jackson, 1968; Lee, 1970; Grijpstra, 1976; Cobb, 1988). Jackson (1968), classified the Sarawak climate into four seasons - the Landas season of the North-east monsoon (from early October until February), the short transitional season between late February and March or April, the less persistent South-west monsoon occurring from April to July or August) and a second short transitional season during most of August and September.
The topography can be divided into an alluvial coastal plain, a belt of undulating country land and a sharply rising mountainous interior (Lee, 1970). The coastal plain covers 20 per cent of Sarawak (Hatch, 1979) and is characteristically flat and low-lying, with heavy swamp vegetation and flat mud or sandy beaches (Lee, 1970). Hatch (1979) classified the coastal plain into three parts - coastal mangrove and nipah mudflats; recent alluvium in peat swamps and recent marine beach deposits and terraces. The coastal plain is made up of Pleistocene and recent deposits, with some marine and fluvial alluvium (Lee, 1970). Soils have been generally described as poor, infertile and unsuitable for agriculture (Jackson, 1968; Lee, 1970; Hatch, 1979). Cobb (1988) has documented a comprehensive account of soil types of Sarawak. Only 3,200 square kilometres are covered by fertile alluvial soils, which are intensively cultivated (Lee, 1970). The rest is based on deep peat swamp and sandy, excessively acidic, soil (Lee, 1970; Cobb, 1988).
### AGRO-ECOLOGICAL ZONES OF SARAWAK

**Coastal Plain**  
(Gley Soils and Thionic Soils with inclusions of Arenaceous Soils and Podzols on terrace remnants)

**Coastal and Inland Organic Swamps**  
(Organic Soils)

**Riverine Alluvial Plain**  
(Alluvial Soils and Gley Soils with minor inclusions of Organic Soils)

**Rocky Headlands**  
(Skeletal Soils with bouldery profiles and bare rocks)

**Lowland Hills and Dissected Hills**  
(R-Y Pod and G-W Pod Soils with minor inclusions of Podzols on terrace remnants)

**Dissected Hills and Mountains with sedimentary rocks**  
(R-Y Pod Soils, G-W Pod Soils and Skeletal Soils)

**Dissected Hills and Mountains with non-sedimentary rocks**  
(R-Y Pod Soils, Oxisols and Skeletal Soils)

**Dissected Hills and Mountains (150-600m asl)**  
(R-Y Pod Soils, G-W Pod Soils and Skeletal Soils)

**Mountainous Highlands (>600m asl)**  
(R-Y Pod Soils, G-W Pod Soils with minor inclusions of Alluvial Soils and Organic Soils in riverine alluvial plain and inland valleys)
The middle portion of Sarawak is a zone of undulating country, more rugged and steep towards the headwaters and interrupted by several mountain chains. This area occupies only 10 per cent of Sarawak and is characterised by rolling and moderately steep low hills (Lee, 1970). The mountainous interior is made up of broken ranges and mountains of upper Palaeozoic and Mesozoic rocks (Lee, 1970). This type of topography constitutes the largest portion of Sarawak (70 per cent) and is characterised by steep, dissected hills and mountainous country (Lee, 1970).

Soil characteristics are common to both interior areas, being based on a tertiary geosynclinal sediments (Lee, 1970). There are two main types of soils areas: skeletal soils and podsols (Cobb, 1988). Skeletal soils are thin, highly acidic, with a strong tendency to be leached and eroded away during heavy downpours (Jackson, 1968; Cobb, 1988). Podsolic soils are sandy and also excessively acidic (Cobb, 1988). Soils in both areas are not suitable for agriculture, except for specific cultivation like shifting cultivation. The vegetation in the undulating country (from the coast to an altitude of 457.5 metres) consists of lowland Dipterocarp forest with over 2,500 species of mainly hardwood trees (Jackson, 1968). Mountainous areas over 1,220 metres are covered by montane forest with a more limited number of species (Jackson, 1968).

**Section 4.1.1 Society and economy in Sarawak**

Sarawak’s economic growth rate has always been high following independence, averaging 7 per cent annually since 1960s (Ahmad, 1987; Taylor et al., 1994). Between 1975 to 1970, this increased to 7.9 per cent and to 11.4 per cent between 1970 to 1972 (Grijpstra, 1976). However, when compared to the rest of Malaysia, the growth is considered to be only moderate (Seventh Malaysian Plan, 1996). Sarawak’s economy depends heavily on primary products, particularly mining and timber. In 1995, the breakdown of Sarawak’s export contribution was - 44 per cent from petroleum and petroleum products; 22 per cent from timber; 4 per cent from agricultural products and 29 per cent from other goods (Jabatan Pertanian Sarawak, 1995). Industry has not played a major role in Sarawak due to the low population and thus small market, except wood for export. Although gas and oil comprise more than 60 per cent of the State’s foreign earning power, only 5 per cent of the total revenue is apportioned to the State’s finances, which implies that timber becomes the number one contributor to the State’s economy (Colchester, 1994). Sarawak’s economic future is at risk of being unsustainable, as economic activities are mainly derived from non-renewable resources like oil and gas. The situation is worsened by little economic diversification.
Despite its large size, Sarawak is one of the most sparsely populated states of Malaysia, with the latest figure of only 2.2 million in 2000. Seventy per cent are Bumiputera and 30 per cent Chinese (Chin, 1996; Majid-Cooke, 1997). Sarawak has the most diversified indigenous groups in Malaysia, with 23 ethnic groups and 10 subgroups (Majid-Cooke, 1997). Thirty per cent of the Bumiputera are Iban, 19 per cent Malay, 8 per cent Bidayuh, 6 per cent Melanau and 7 per cent other indigenous groups (Chin, 1996). Most of these people are employed in the primary sector (43.4 per cent) including fishing, hunting, agriculture and forestry (Jabatan Pertanian Sarawak, 1995). From this, 31.8 per cent of the population are involved in agricultural activities (Jabatan Pertanian Sarawak, 1995). Although petroleum and petroleum products are Sarawak’s major export (44 per cent of GDP), less than 0.7 per cent of the population is employed in the industry (Jabatan Pertanian Sarawak, 1995). This is because the petroleum industries are not only capital intensive, but most of their workers are from abroad. The secondary and tertiary sectors employ 14.7 per cent and 32.5 per cent of the population respectively (Jabatan Pertanian Sarawak, 1995). This relatively large tertiary sector is explained by the increasing importance of tourist and tourist-related industries in Sarawak. Manufacturing plays a very small role in Sarawak’s economy, which mainly meets the demand of the urban domestic market. Most industries are of agro-based and resource-based type, such as the hydro-carbon resource-based industries in Bintulu.

Twenty-five percent of the population is urban-based, with concentrated centres such as Kuching, Sibu, Miri and Bintulu. The remaining 75 percent are scattered in the rural areas (Walton in Parnwell and King, 1990). There seems to be a spatial pattern whereby the distribution of the different indigenous groups is related to occupation. There are 9 Divisions with 28 Districts in Sarawak. (See Figure 4.1). Malays are concentrated in the First and Second Divisions, engaging mainly in fishing and small-scale agricultural activities. The Melanaus are found in the coastal areas of the Third and Fourth Divisions, involved in fishing and sago cultivation. The Iban and the rest of the indigenous groups live in the upland interior region of Sarawak, still practising shifting cultivation and subsistence agriculture, mainly cultivating hill paddy rice. The Chinese are essentially urban, involved in commercial business. Rural Chinese are either involved in gold mining or practising intensive pepper and gambier cultivation.

Like Peninsular Malaysia, Sarawak is also characterised by unequal income and assets distribution between the Bumiputera and Chinese. This exists in terms of ethnicity, but is
further divided between urban and rural areas. Although over 75 percent of the people live in rural areas, they contribute less than 10 percent of GDP (Walton in Parnwell and King, 1990). Most rural people are considered poor and associated with low productivity and low incomes, particularly those engaged in agricultural activities such as shifting cultivation. The production of hill rice from shifting cultivation is about 750 kilogram per hectare, compares to 2000 kilogram per hectare for wet paddy (Walton in Parnwell and King, 1990). Ninety six per cent of poverty cases are found in rural households (Taylor et al., 1994). Poverty problems in the rural areas are due to the development funding bias to the urban areas (Cramb and Dixon in Reece and Cramb, 1988; King in Parnwell and King, 1990; Abdullah, 1991; Majid-Cooke, 1997). However, Solhee (1988) argues that, in fact, development has been directed at rural areas, but success has been constrained by socio-economic, physical and environmental problems.

Rural people are not only poor, but also deprived of their rights to lands. They are often displaced from their own lands, in the name of development. The next section look at issues related to land tenure system in Sarawak, and how it affects the rights of the rural indigenous groups.

Section 4.1.2 Sarawak – Land tenure system

The land tenure system is a most common way for the government to control people and resources. In Sarawak, land legislation was introduced during the Brooke period. Before Brooke came, land was inalienable, for the principle of land ownership was embedded in the “adat” law, encapsulated a unified legal, moral and religious construct. Under “adat” the community exercises rights to land and controls and regulates rights and claims among its own members. Hong (1987) described the role of “adat” with regard to ownership and rights to land as;

“Adat defined an individual’s right to land. When an individual works a piece of land, he is in effect creating a personal identity with the soil (establishes a legal relation to it and this is recognised by the community whose rights to it are diminished)” (Hong, 1987; p.37).

Traditionally, every tribal communities in Sarawak owned an extensive tract of communal land, which extended far beyond the areas actually used for agriculture, including areas of swamp and virgin forest used for hunting, for collecting wild produce, and as reserves for future swidden sites (Colchester, 1992). Traditional ownership rights thus extend across most of the island, which was divided into areas linked to specific tribes. Each household in the community established usufructuary rights to the lands that it clears for farming. This land can be inherited by other members of the family in accordance with their own adat system.
The government sees potential for land development in the vast amount of land (about 75 per cent) unexplored and untended in Sarawak (Ahmad, 1987). Land legislation was mainly aimed at controlling the land by the administrator, curtailing shifting cultivation and by the end of the Brooke reign, promoting settlement and commercial land development. The government wants to individualise land, register it and transform it into a commodity (King and Mohd Jali, 1992). It perceived the ownership of land by natives as an unprofitable enterprise and investment, because of its low value. In the 1970s, rural land were valued at only RM 375 to RM 1,500 per hectare (Ahmad, 1987). The government claimed that this low value would increase once some form of land development occurred. This would benefit the rural people. However, the rural people are more concerned with their ethnic
the land. For them, land legislation and development impede their access to and rights over the land.

The first four pieces of legislations (Land Regulations of 1863, Land Orders of 1920, 1931 and Land Settlement Orders of 1933) granted the state proprietorship over land (Hong, 1987; Cramb and Dixon in Reece and Cramb, 1988).

The 1953 Forest Ordinance of the colonial period, directly affected the rights of the tribal communities, whereby the forest was classified into Forest Reserves and Protected Forest. All previous activities were prohibited in the Forest Reserves. Cultivation was not allowed in the Protected Forest, but hunting, gathering and fishing were with a special permit from the Forestry Department. Following that, another more comprehensive land law was passed in 1958, to strengthen the government's grip on land and timber resources in Sarawak. The Land Code, 1958 was introduced of consolidating the various existing land laws; for more streamlined land administration and economic planning, and to ensure the smooth implementation of large scale rural development. The 1958 Land Code classified land into five categories - Mixed Zone Land (ownership unlimited, including the Chinese); Native Area Land (ownership limited only to the Bumiputeras, but Chinese could own with certain conditions, such as if non-native became native through marriage, with the Governor's permission, etc.); State owned land which was classified further into Reserved Land and Interior Area Land and; Native Customary Land (can be created in all categories of land except for Reserved Land). Native Customary Land is created when the tribal groups claimed rights to land that they inhabit or cultivate through Native Customary Rights (NCR). Most of the lands are classified as State-owned land. The breakdown of these classified land are - 8 per cent of Mixed Zone Land; 7.4 per cent of Native Area Land; 15.7 per cent of Reserved Land and; 69 per cent of Interior Area and State Land (Hong, 1987).

Although, Native Customary Rights regarding land were recognised, the government had the right to exercise compulsory acquisition of the Native Customary Land (NCL) just by a notification. In 1963, the government passed further legislation that allowed the Native Area Land to be converted to Mixed Zone Land. The 1963 amendment also replaced the native ownership of the NCL to a lease of 99 years. As a result, the acreage of land under NCL decreases throughout the years.

The legislation substantially weakened the natives' ability to resist land expropriation in later years, particularly when pressure on the interior intensified. Both amendments reduce
the rights of the native and the tribal groups, as land is more readily available for development. Most of the tribal communities in Sarawak who practised shifting cultivation and hunting live on State owned lands. Ever since the introduction of these laws, they have effectively become squatters in their own land. Although hunting, gathering or fishing is allowed in the Protected Forest, the difficulties of applying for a permit dissuades the tribal communities. Most continue to live in the forest without attaining any permits. This puts them at a disadvantage, when the government allocates land for development purposes.

The most common example is the extraction of timber by logging companies. Tensions between the tribal groups, particularly the Penans, and the Sarawak government peaked in 1987, when barricades made by the Penans were placed across the logging companies’ roads to stop logging (Colchester, 1992). Other tribal groups like the Kenyah, Kayan, Lumbawang and Kelabit followed the Penan’s example resulting in 16 logging camps being brought to a standstill. The conflicts ended when the government seized the Penan protestors and convicted them under the Internal Security Act (ISA). Apart from the ISA, a Forest Amendment Bill was introduced in 1987, which made those interfering with logging operations liable to a heavy fine and imprisonment, regardless of whether the operations were on claimed lands or not (Colchester, 1992).

The ISA was originally introduced by the Colonial government to curb communist propaganda and activities. Since independence, the ISA has been used to curb all socio-political hindrance, mainly in the form of resistance from part of the population and other vested interests. The government believes that in order to modernise, this constraint needs to be cured with “pain and force” (Kanapathy et al, 1989). ISA is part of the “pain and force” policy, which gives the government power to arrest and detain whoever is suspected of creating or spreading ideologies that lead to instability. Other legislation with the same purposes include the Official Secrets Acts, the Police Act and the Printing Presses and Publications Act. The introduction of such legislation eroded political and civil liberties, despite their guarantee under the Malaysian constitution, which includes freedom of speech, association, assembly and religion.

Other developments which also affect the tribal communities include the large Hydroelectric dams at Batang Ai and Bakun and land development programmes for cash crop cultivation by the Sarawak Land Development Board (SLDB) and the Sarawak Land Consolidation and Rehabilitation Authority (SALCRA) (Colchester, 1992). Land development programmes in Sarawak follows a similar pattern across the developed
countries in other parts of the world, a "villagisation" scheme aiming at regrouping scattered people together, in order to ease the provisions of infrastructural amenities and facilities. The villagisation scheme is intended to solve the problems associated with subsistence agriculture and extensive cultivation in Asia, Latin America and Africa (Todaro, 1992). For example in Tanzania, the government adopted a policy of compulsory "villagisation" of the entire rural population, by encouraging the peasants to amalgamate their small holdings into large communally owned farms (Barkan, 1984; Hyden, 1985).

In Sarawak, there are isolated groups of 20 to 100 families, scattered at a distance of 3 to 30 miles apart (Ahmad, 1987). This is considered a hindrance to economic development. Land development is seen as the best way to put bring scattered people together into a large community, as a way of attaining the "economies of scale" to operate the "modern" facilities and implements efficiently. In Sarawak, a powerful statutory authority, the Land Consolidation and Development Authority (LCDA) was created to implement all land development. The LCDA can develop land through its own capacity or by forming joint-ventures with private firms (Cramb and Dixon in Reece and Cramb, 1988). Formed in 1981, the LCDA is the main machinery established to overcome the problems of dispersed population and Land Code "difficulties" (Hong, 1987). The LCDA is a "land bank", identifying rural land and making its available for development. It has compulsory purchasing power for any land in Sarawak (Hong, 1987). At the same time, it also has the right to dispose of any developed land, by selling to other parties or transferring it back to the former owner provided that all costs have been paid.

In reality, the idea of collecting people together under a limited area not only seems to be a short-sighted (considering that the number of people will increase over time, which will create other chain-reaction problems) but also overlooks the problems of the socio-cultural differences between the different ethnics groups in Sarawak. The idea of putting people collectively under one place will only give more advantages to the State government, as it will facilitate the manipulation and control of the peoples' access and rights to their previous immediate environment, particularly to the land and rainforests of Sarawak. This is supported by the importance of timber trade, tourist and the hydro-electric power projects contribution to Sarawak GDP, which is only enjoyed by a small fraction of the people of the State. Land development programmes are good examples of how the State government dominates and controls the rural people through it wealth, power and knowledge. The economic rights of rural people to develop, do not include civil or political rights to decide
how to develop. The decision on how to develop is the State government’s prerogative (Majid-Cooke, 1997).

The conflict between the government and people over land often results in socio-cultural changes. Traditionally, there are close ties between the land and societies. For the shifting cultivators, shifting cultivation reflects customary law and an ancient, cohesive, communal society in which land has an economic, social, and religious significance. The Penan have an intimate association and detailed knowledge of their forest, which to them is,

“........a dense, intricate network of economically and culturally significant places, linking past, present and future generations. The Penan, quite literally walk in the footsteps of their ancestors, and are conscious that their descendants will one day want to walk in their footsteps, a sense of stewardship constantly informs the manner in which they exploit their environment” (Colchester, 1992, p.22).

The consequences of logging and land development include a change in the traditional value system, from collaboration, sharing, and mutual concern to individualism and commercialisation. According to Colchester (1992) in an Iban community, individual prestige and influence is no longer measured in terms of activities that would benefit the long house, but by “cash” as a dominant symbol of valuation to work. The breakdown of the traditional system also implies increasing inequalities in wealth, status, power, and influence. The culture of “money politics” exacerbates the gap and division between the rich, community leaders and its poor members. A principle factor is the way that decision-making suits the political and economic benefits of the community leader and ruling elite. Wealth was once recycled and redistributed locally through prestige-gaining feasts, the sharing of meat and rice wine and the resale of brass gongs and stoneware jars. Nowadays, heirlooms such as brass gongs and stoneware are sold outside the community for money. Making money is a necessity, as pressures mount on the community to own new, modern commodities such as chain saws, televisions, fridges, etc. The pressure to earn cash often leads to rural-urban migration, though the unskilled rural migrant would be at the bottom of the labour market. Earning little cash, most of these migrants settled in squatter camps on the fringes of the towns.

The environmental impacts of logging directly affect the material production of the hunter-gatherers. The heavy machinery used for logging accelerates soil erosion and increases run off, which produces heavy sediments that pollutes the river. The destruction of the forest destroys the fruit trees and other non-forest products like illipe nuts, rattan and bamboo. River pollution reduces the stocks of fish and the quality of water for cleaning and drinking.
It is not only the hunter-gatherers who are affected by the environmental impacts, but also settled tribes that still utilise the forest and rivers for food and extra income.

Section 4.2 The study area - Dalat, Oya and Mukah districts

![Map of the study area](image)

Figure 4.5 The study area
(Source: Morris, 1991)

The study area covers the district of Mukah, Oya and Dalat, located in the coastal zone of the Third Division in the State of Sarawak, Malaysia. (See Figure 4.5). In 1986, there were 87,000 Melanau in Sarawak. Mukah, Oya and Dalat cover 7,236 square km, with a population of 54,000 in the 1980 survey (Information from Mukah and Dalat District Office). (See Chapter 5, Figure 5.1 for the location map of the study area). The Melanau are considered the fifth largest ethnic group after the Iban, Chinese, Malay and the Bidayuh. Most (86%) live in the rural areas, and most are engaged as farmers, forestry workers, fishers, hunters and related workers (Sarawak Population and Housing Census, 1988).
The study area lies in the coastal plain of unconsolidated estuarine, marine and river sediments - of clay, silt, sand, gravel and extensive areas of peat. Wolfenden (1959) divided the soils of the study area into two types; terrace alluvium and peat swamp deposits. The terrace alluvium consists of acidic, infertile, sandy soils. The peat-swamp deposits can be found in the coastal plains between the main rivers and in the “islands” between their major tributaries. They are usually thicker towards the central parts reaching 15.25 metres in depth as in the Western swamps. The thickness of the peat formation is influenced by underlying topography, and consists of partly decomposed vegetable matter and solid undecomposed timber. The soil below the peat is invariably heavy, white to light-grey clay.

The study area is drained by two main rivers, the Oya and Mukah rivers. Morris (1991) described the geomorphological condition in the study area as;

'......the coast is flat and often swampy. The swamps are heavily forested, and slow rivers meander through them into the South China sea. The entrances to these rivers are often impeded by sand-bars; they are subject to erratic tides; and during the north-east monsoon many used to be in accessible to indigenous craft' (Morris, 1991, p.9).

See chapter 5 for more detail descriptions of the formation and condition of the peat swamp forest.

Section 4.2.1 The role of adat in the Melanaus' life

The peat swamp forest influences the Melanaus’ life in all aspects, from material production, social reproduction to the shaping of their knowledge and customary law (known as adat), - which, in turn, influences their environmental management.

Adat is interpreted as “the idea of order” by the Melanau (Morris, 1991). Adat ensures order in all aspects of life: individual, household, village, outsiders and the flora and fauna of the immediate environment. Adat is embodied in their indigenous knowledge and customs, which provides the Melanau with their identity, apart from their distinctive language. Knowledge, customs and dialects differ slightly even by area and at village levels. Adat is influenced by the Melanau belief system – whereby the world is not only inhabited by humans, animals and vegetation, but also spirits. Adat is needed to maintain harmony between spirits, human, animals and vegetation. (Refer to chapter 6 for a detail discussion of the Melanau belief system).
In social reproduction, *adat* reflects the Melanau's identity, in terms of space (zone and village they come from) and social structure (kinship and rank). Thus, *adat* define social relationships in the community.

A village is a territorial unit with a clear boundary, well recognised by its members and people from other villages. Traditionally, before the coming of Brooke, villages were administratively and politically independent, controlled by the aristocratic elders (Morris, 1991). However, Brooke introduced the "Native Officer" (similar to District Officer) to take over matters pertaining to land and "law and order". When Sarawak was under colonial rule, Rural Councils were introduced to control land and designate development in an area, while responsibility for law and order was taken over by the police. Such an administrative system is still followed today, with the addition of appointed and paid Headmen (*Ketua Kampung, Pemanca* and *Temenggong*). Despite such changes to the administrative and political system of the village, the elders are still prominent figures in the community.

---

**Figure 4.6** Relationship showing *adat* in relation to the Melanaus' environment, material production and social reproduction
maintaining the continuity of *adat*, especially with regards to ceremonials and rituals like marriage, death, birth and the annual *kaul* (cleansing of the village ceremony). However, the implications of interference from outsiders, such as the appointed Headmen by the government and the introduction of Rural Council and police undermine village independence. For example, Headmen are often obliged to make decisions in accordance with government policy.

The elders are descendants of the original aristocrats or founders of the village, currently consisting of the paid Headmen, shamans and Imam (in Muslim village). It must be noted that no single elder is superior to others, though each of them may have special knowledge or abilities for a particular task. Leadership and membership are not officially formalised into permanent or hereditary office. Thus, there is no such thing as a political chief who rules as a personal right. The political control of the elders include both internal (within the village community) and external matters (with other villagers). Internal matters include issues of rank, the regulation of marriage, inheritance, ritual and ceremonies, land tenure (still consulted sometimes, in addition to reference to the District Officer and the Land and Survey office) and hunting and gathering rights in the village territory. The elders also decide on the penalties for those who breach *adat*, mainly of secular punishment and ritual expropriation. External matters include the role of *adat* as a conflict-regulating mechanism, such as the resolution of disagreements between members of the village and people from other villages, whereby deals are mainly made between the respective elders from both villages.

Melanau social structure is traditionally hierarchical. One is born according to the parents’ rank, mainly descendant from the father. The Melanau ranking system is divided into three main categories – aristocrats, freemen and slaves. This system no longer exists, but the villagers can still identify their ranks. This is because the aristocrats have different manners, communication skills, are wealthier, especially in terms of sago production and usually are the kinship of the custodians of *adat*, the elders. The ranking system is no longer important to those who have converted to Christianity or Islam, but it is still important for the Pagan and still publicly manifested during birth, marriage and death. Marriage is the important occasion whereby rank is most visible because rank determines the wedding gifts. Marriage between rank was prohibited. Relationship between the ranks were formally governed by *adat*. When broken civil and supernatural penalties were incurred.
Kinship is another important social structure of the Melanau society. In a Melanau society, kinship is formed through birth and marriages and is a bilateral and cognatic one, whereby connections with blood relatives through father and mother are equally important in regulating social relations, in contrast with rank descendant only from the father. There are two main purposes of identifying kinship — to identify duties to relatives and to identify what to legitimately expect from their relatives. Examples of duties include the obligation to protect, maintain peace and good relationship, help during illnesses and, co-operate during harvesting, rituals and ceremonies. One is also expected to behave in a “respectful and proper” manner towards relatives, especially with regards to sexual relations and marriage. Ritual impropriety such as incest and disrespect to the elders are penalised under the adat law.

Through kinship, the household unit is important not only in relation to material production but also in the maintenance of social life. The continuity of order in society and the preservation of adat are maintained by educating children in the skills and knowledge of the society and arranging their marriages. Kinship is important in writing the community but not strong enough to support a permanent loyalty, so that a person can benefit from such corporate groups, described by Morris as,

‘The nature of a bilateral kinship system, too makes it easier to raise ad hoc temporary groups for particular tasks than to organise descent groups for long-term purposes. It also makes it difficult for an ambitious leader to use the moral and enduring attributes of a kinship relationship to help maintain groups to support him in his ambitions. In other words, kinship is not the major principle in organising the formal aspects of economic, political and religious life among the Melanau. And yet, the household, a group recruited mainly on principles of kinship, is the basis of everybody’s daily life; and, by reason of birth and marriage, everybody is ascribed a rank, and therefore a place in the hierarchy of power. The principles of kinship are pervasive and intricately involved with the principles of locality and rank in producing the actual situation of social life in which individuals manoeuvre and use connections of every kind to maintain or better their security and place in society’ (Morris, 1991, p.135).

Traditionally, land tenure is controlled by elders, but has been taken over by the District Officer and the Land and Survey department. The possession and management of land in a village’s territory is the most important aspect of adat, reflecting the village identity through giving it exclusive rights to land. The traditional land tenure system classified land ownership into three categories — a common land which is also known as village land (the nearby forest for hunting and gathering, the village graveyard and rivers or side-streams for fishing); land owned by two or more people (mainly rice land, marital property and land normally held individually but for special reasons held by co-heirs) and; individually owned land (orchard land and sago farms) (Morris, 1991). Today, common land is technically
classified as State Land by the government, mainly sub-classified under Reserved Land, and
the government has every right to develop the land. Nevertheless people still define land
ownership according to the traditional land tenure system. Even those lands inhabited by
the people but not registered with the land and survey department are also technically under
the State Land.

Sago production is the main source of income for the Melanau in the study area. The
Melanau formerly both cultivated and processed sago, but this changed when the Chinese
arrived and introduced mechanised processing mills in the area. Traditionally, there was a
division of labour between men and women in sago production. Men planted and tended the
farms, harvested and transported sago logs into the village. Women processed the sago logs
into wet starch and cooked the starch as sago pellets or biscuits. Sago is produced and
managed by a household that also handled and redistributed most of the property owned in
the village, through annual feast and ceremonial events.

Apart from producing sago, the Melanau are still involved in hunting, gathering and fishing,
both for subsistence and exchange. These activities distinguish them from sedentary
farmers whose subsistence seldom depended on forest products and whose habits of work
and land use differed significantly. Thus, the maintenance of their forest, rivers and streams
are crucial to sustain such activities. *Adat* plays an important role in conserving the
environment, through the prohibitions of certain things that might “anger the spirits
inhabiting the forest, rivers and streams”. (Refer to chapter 6 and 7 for a detail discussion of
*adat* in relation to the Melanaus’ environment).

There are three functions of *adat* in relation to material production – to ensure productivity,
as means of protection against danger and, as a redistributing mechanism for wealth and
produce. The next sub-section looks at the effects of exogenous forces on the Melanau
production system, especially focusing on sago production

**Section 4.2.2 The impact of historical and current "development" on
the study area**

The Melanau of Mukah, Oya and Dalat have been impacted by various external forces
which have shaped their socio-economic and environments. Before the Brooke era, the
Melanau were controlled by the “Pengiran” family, a Muslim Malay aristocrat descended
from the Royalty of Brunei. He assimilated with the Melanau and influenced them
religiously and culturally (Morris, 1991). The area under the “Pengiran” influence was the
coastal district of Oya and Igan. Most of those who live “up river” are still Pagan and some
have been converted to Catholicism during the Brooke period. The Melanaus were constantly under attack by the Ibans during the "Pirate Days", before Brooke arrived in Sarawak. The Ibans attacked them for goods, firearms and mainly for "heads" (from their head-hunting tradition). They lived in the interior hills. When Brooke came, he successfully controlled Iban raids and eventually peace was made between the Melanau and the Ibans. Since then, they have learnt to trade with each other, the Ibans exchanging hill rice and forest products for sago, salt, fish and nipa sugar from the Melanau.

In 1854, Brooke decided to develop the commercial production of sago to improve state revenue (Morris, 1991). Before 1854, sago was exported to Singapore by the Malay "Pengiran". When Brooke showed interest in sago, he called the Malay traders from Kuching to ship sago to Kuching to be processed by the Chinese there. There was a clash of interest between the "Pengiran" Malay of Brunei and the Malay of Kuching during this period. In 1870, the Chinese came to the study area to open sago mills in the area (Morris, 1991). Both the "Pengiran" Malays and the Kuching Malays were squeezed out of the sago trading business by the Chinese.

The Melanau had also depended too much on sago production and the world market demand for starch ever since the Brooke expansion period. As a result, during the 1950s, when the world demand for starch declined, the Melanau faced poverty. This situation was made even worse by the arrival of the Chinese, especially with the introduction of mechanised milling equipment in the 1960's, displacing the traditional processing of sago by Melanau women. During these "hard times" (1950s to 60s), Melanau men left their villages to work in the timber industry, which flourished during that time as a result of the introduction of mechanisation (chain saws and the building of roads to the even interior). However, the money from the timber industry was not sufficient to support families at home and during this period, out-migration to larger towns became common.

In the early 1970s, the government took an interest in sago cultivation. A subsidy package was introduced, organised by the Department of Agriculture (DOA) to help the farmers to expand and intensify production on their smallholdings. At the same time, research and development on the agronomic aspects of the plant continued, seeking higher yield varieties and techniques that would improve the production of sago. Training was also organised to increase the yield from the sago smallholdings, hopefully increasing the income of the farmers as well.
Research and development was also directed at the sago millers, both for the purpose of increasing production. Interest in rehabilitating sago cultivation and improving sago production was driven by the demand for sago starch in Japan, as well as being influenced by the NEP and NAP in their drive to eradicate poverty among the rural population. Farmers were to be shifted from “traditional” to “modern” methods of cultivation.

In the 1980s, State’s interest in sago production intensified. The LCDA sago plantations were implemented in phases by a wholly-owned subsidiary company, Estet Pelita Sendirian Berhad. The Districts of Mukah was chosen, whereby 16,000 hectares were alienated for the plantation, which was scheduled to be planted in 10 years. Phase I of Mukah Sago Plantation began in 1988 and was completed in 1991. It covered a total area of 1,832.9 hectares of State land near Kampung Teh (12 kilometres from Mukah town). Phase II started in 1989 and was completed in 1990, covered 6000 hectares of land to the West of Phase I. The plantations are all founded on deep peat soil.

Another plantation was also developed in 1993 in Dalat, near Oya. This covered 1,600 hectares and was expected to complete in 1996. Other areas that have been alienated by the State government for sago plantation are Matading, Sebakong and Matu-Daro (all along the coastal plains of the Third and Sixth Divisions with the Melanau as their main ethnic group). This plantation will be funded through the Fifth until Eight Malaysian Plan funds, at an estimated cost of RM 23.56 million (Information from the LCDA officers).

Section 4.3 Conclusion

Strong centralisation of the government, characterised by a heavy bureaucratic system and implemented by a “top-down” style, offers little or non-existence communication or consultation to the Melanau, with a direct consequence of them having no say concerning their future. Despite managing to cling with the traditional values of adat, after continuous exogenous forces imposed upon them, there is evidence of eroding political and administrative structure, which consequently affect the regulation of the material production aspects, particularly retrospect to sago production. Some of their leaders, the elders are now part of the government civil servants, are obliged to conform with government’s policies, as well as being promised and enticed with title, land, and comfortable livelihood, popularly known as “money politics”. There is a bleak chance that the Melanau can retain their “adat” if their leaders can be manipulated and “bought” by the State.
Moreover, the existing development planning concept does not value the role and importance of socio-cultural and religious value, such as *adat* in a community. As a matter of fact one of the prerequisite of development is to abandon "adat". The current land development policy is directed towards accelerated development of the agricultural sector, with particular emphasis on modern agriculture based on commercial plantation, such as the LCDA sago plantation. The State perceives that land in Sarawak are underutilised, and believe that usage of land should be optimised, especially in the coastal belts and other areas outside the more established regions, such as in the study area. With the development of the plantations, the Melanaus' livelihood as sago producers would certainly be affected.
Chapter Five  
Research methodology

This Chapter presents the framework of the research methodology used for the collection of the data, describes, explores and explains the causal phenomena of the sago production system. The research methodology includes both quantitative and qualitative methods. For the quantitative method, a household survey is used. A combination of in-depth interviews, group discussion and participant observation are employed to support the statistical data and fill the gaps that could not be answered by quantitative methods alone.

This Chapter is divided into four main sections:

- Section 5.1 examines the research questions;
- Section 5.2 discusses the research hypotheses;
- Section 5.3 considers the quantitative and qualitative survey methodologies, including the selection of the targeted population, the design of the questionnaires and/or survey guides, the fieldwork (preliminary study, pilot and full survey and the verification process) and also the problems and solutions of the methodology;
- In Section 5.4, analytical methods are addressed and statistical procedures (frequency test, the Kruskall-Wallis one way Anova test to compare means within the variables, the crosstabulation to find association between variables) are detailed.

There are four reasons for choosing the case study areas. Firstly, these areas have the highest concentration of sago cultivation (approximately 13,208 hectares out of the 22,700 hectares of the total area cultivated under sago in Sarawak). This means that these areas cover 63% of the total sago area in Sarawak. They produce the largest amount in tonnage and the highest quality of sago meal and starches, while monthly average prices of sago in these areas are constant and higher in comparison to the price in other region such as Kuching. Mukah, Oya and Dalat also benefit from the two major ports (Sibu and Tanjung Manis) for export as well as the sago refinery factory in Sibu.

Secondly, all types of sago cultivation, which include traditional methods, a combination of traditional and modern, modern and plantation are practised here. Thirdly, the majority of the population (76.8%) are Melanau. There seems to be such intricate relationship between the Melanau and sago. Sago is their staple food, although some have switched to rice because it is readily available in the shops now, is quicker and easier to cook. Nevertheless, sago is still
important in their daily diets. The Melanau are the only tribe in Sarawak that processes sago into pellets and biscuits. They have a more advanced technology for processing sago than other tribes, who may rely on sago as their staple food, such as the Penans. Almost all of them are involved in sago cultivation and sago farm is perceived as an important heirloom, symbol of dignity and wealth in the community. Sago is also important in religious rituals and ceremonial events, such as the "berbayoh", a healing process, via a sculptured sago trunk or leaves. In Sarawak, a mere mention of sago would remind oneself of the Melanau, like butter and bread.

Lastly, the case study areas are underlain by a deep peat soil with narrow bands of gley and alluvial soil along the coast; and the main rivers are ecologically sensitive. Their environments are susceptible to human manipulation and need sound resource management in order to maintain a delicate ecological balance. It is, therefore, important to examine how technological innovations and traditional resource management will affect the environment in these areas.

Section 5.1 Research questions

The central research question can be phrased as follows: "to what extent does the cultivation of sago provide a basis for the sustainable development of rural Melanau communities, particularly in the context of a contrast between traditional and modern production systems?"

The cultivation of sago involves the work done by the Melanau sago smallholders, from the stage of propagating, clearing the site, planting, maintaining the farm, to harvesting. There are three main methods used to cultivate sago – traditional (the used of adat and indigenous knowledge as guidance), the combination of traditional and modern, and modern (the used of modern machinery and implements which are obtained from the subsidy scheme or bought personally).

In addition, there is another type of sago cultivation introduced into the study area by the government – the LCDA sago plantation. Although the sago smallholders are not directly involved in the plantation, sago production and the Melanau community as a whole is likely to be affected by its presence. The plantation project has economic benefits for the Melanau. It provides employment and the “trickle-down effects” of infrastructure projects.
accompanying the development of the sago plantation. But the plantation project also has negative effects on the Melanau’s socio-cultural and immediate environmental system. The cultural values of the Melanau community are disrupted as a result of the introduction of a wage labour system, implying a loss of independence in the sago smallholder’s decision-making. The wage labour system also introduces different material values that are alien to traditional culture. This causes tensions between those who wish to “modernise” and the guardians of tradition, thereby undermining the “solidarity” of the community system.

The cultivation of sago is also directly linked to the processing industries – the modern and heavily mechanised Chinese sago mills (producing for the export market) and the traditional cottage processing (processed entirely by the local women for domestic use and the local market). The Melanau sago smallholders produce sago, in accordance with the demand for sago flour from both local and international markets. Sago millers have more bargaining power in the trade of sago logs than the Melanau sago smallholders. Thus, a situation of exploitation of the party with less bargaining power occurs in the process of sago logs trading.

In order to determine the extent of “sustainability” of the sago production system, three related issues are raised as “outcome questions” derived from the main and specific questions. The three related issues are concerned with the effects of the different sago cultivation system on social reproduction (symbolic role of sago), material security and the environment.

- Social reproduction: symbolic role of sago
The social impacts of cultivating sago by using each of the methods (traditional, modern and plantation methods) are addressed in terms of family reproduction and community organisation as social support (the quality of farmers life, families and communities), which sustains the economic viability of farm operations and enhances the quality for farms and society as a whole; the preservation of the role of children and women in the system of production and; the Melanau’s relationship with those from outside their communities. A sustainable production system should meet multiple needs and fit into the socio-cultural system of the Melanau. Can new methods of sago production replace the traditional existing practices completely whilst assuring minimal disruption or modification of society and culture. For example, can a sustainable production system be maintained by the existing sago smallholders and not undermine their existing adat (system of ownership, obligation and
authority)? A sustainable production system should be built and supported by sources that the villagers can trust, such as their families and next of kin, rather than by outsiders. It should take into consideration local preferences, such as tastes and beliefs about nutrition. In short, can a sustainable production system be culturally appropriate?

- **Material security**
  A sustainable production system should address farmer-identified problems and constraints, reducing risk and generating acceptable economic returns (in terms of economic viability and profitability which satisfies the Melanau’s needs). It should also be affordable for farmers, using locally available skills, tools and materials. Most importantly, a sustainable production system should have equitable effects on different groups of the village.

- **Environmental effects**
  The environmental aspects seek to answer questions related to the “sustainable” level of exploitation of the resource base, the current and possible future environmental capacity that underpins sago cultivation and the environmental impacts of each production method (traditional, modern and plantation). A sustainable sago production system should be suitable for the local physical environment without disrupting the peat swamp ecosystem, conserving resources in order to sustain livelihoods. This in turn, should enhance environmental quality and the natural resource base upon which the agricultural economy depends; making the most efficient use of non-renewable resources and on-farm resources and integrating, where appropriate, natural biological cycles and controls.

Within this complex of demands, the main socio-economic issue that needs to be addressed is to determine the degree of tension between economics (material production and reproduction) and society (social reproduction). Similarly, there is also a need to examine the conflict between maximising economic benefits and preserving the environment.
Section 5.2 Research hypotheses

The hypotheses of the research are designed according to the main key question of the study: “To what extent does the cultivation of sago provide a basis for the sustainable development of rural Melanau communities, particularly in the context of a contrast between traditional and modern production system”.

The main hypotheses are based on the theoretical effects of each methods of cultivating sago: traditional, state subsidy scheme (intensification) and plantation (extensification) methods.

Traditional methods of sago cultivation are derived from the Melanau’s indigenous knowledge of the sago palm and the peat swamp environment. These practices are culturally embedded through adat. In considering, continuous production for over 70 years, it is assumed that both indigenous knowledge and adat play important roles in sustaining sago production in the area, though the extent and significance of their contributions today are unknown. Following these uncertainties, there are possibilities that the role of indigenous knowledge and adat may have already declined or are in the process of disintegration.

The probable loss of indigenous knowledge and adat may have a direct impact on the Melanau’s socio-cultural system, and on the way they perceive their environment. This dynamic may in turn, affects the sustainability of sago production. In the past, adat and a shared representation of nature (indigenous knowledge) has promoted co-operation, has bound the community together and has given identity through communal work, such as pedok (communal harvesting), kaul (annual ritual celebration) and traditional healings process. This promotes environmental sustainability, as cultivation techniques utilise renewable and on farm resources which are energy-saving and environmentally friendly, such as the use of organic fertiliser and natural predator-pest control. The use of adat and indigenous knowledge also ensures that the surrounding areas outside the farm (rivers and forests) are preserved through palei (taboos or guidelines to protect the relationship between human and the environment), thus sustaining communal forest-products for community livelihoods by providing food and/or extra income. However, for some it is believed that adat and indigenous knowledge restrict the smallholders’ potential to exploit the production capacity of his/her farm, as his/her decision-making are guided by the restrictions of palei and rules embedded in indigenous knowledge and the utilisation of archaic and “slow” implements.
during harvesting, which consequently reduces the potential to maximise income and profit. This belief has led the state government to introduce the Sago Planting Scheme, providing farmers with subsidised inputs and advice.

The location of the smallholders is believed to influence their methods of cultivation. Those living near rural centres are more likely to adopt modern methods than those living in remote villages. This is not only due to the availability of modern tools in rural centres, but also to the fact that those living near rural centres are less conservative and more willing to ignore *adat*. The use of modern method is believed to affect the smallholders’ socio-economic aspirations; the whole perspective of the cost of production and profits changes (as cost of production increase, there is an urgent need to maximise income to ensure profit), which consequently influences the smallholders’ decision-making and indirectly promotes individualism and the pursuit of money. However, this new perspective may provide incentives for the smallholders to optimise material production and consequently increase income. The changes in decision-making, may also indirectly increase the tendency to extend farm size beyond the traditional norm, causing disruption to the local ecosystem as a result of increased forest clearance. Modern machinery and tools are either derived (such as chemical fertilizer, pesticides and weedicides) or powered (such as chainsaw and outboard motor boat) by non-renewable resources and have the potential side-effects of altering and/or poisoning the local ecosystem.

The Government of Sarawak believes that modernisation, via the subsidy scheme has failed to increase production, due to Melanau conservatism (lack of entrepreneurship and confinement to *adat*). During the boom in the 1990s, both sago millers and the government felt that sago production could not meet current and future demand. This belief has led to the establishment of the sago plantation.

The plantation is meant to benefit the villagers by providing employment and acting as a “catalyst” to develop the study area. The counter view argues that the plantation will disrupt existing sago production by placing smallholders at their weakest bargaining position vis-à-vis the sago millers, when the plantation’s production begins (surplus production will bring the price of sago down). Other worries include the reduction of Reserved State Land for future uses. It is believed that those living near to the plantation feel the implications (positive or negative) more than those living further away.
Two downstream processing industries may also contribute to the sustainability of sago production in the study area – the traditional cottage industry and the predominantly Chinese sago mills. In the past, the cottage industry has only processed sago for food, but more recently, as local market have developed and expanded, it is now also processes sago for trade. However, it is not fully known how important these industries are in sustaining sago production in the area.

The main questions to be asked are:

1. Is the cultivation of sago production in the study area sustainable (socio-culturally, economically and environmentally)?
2. Which methods offer the most sustainable mode of production – traditional, modern or plantation?
3. What is the contribution of indigenous knowledge and adat to the sustainability of sago production?
4. Is there a danger of a decay of indigenous knowledge and adat? If so, what is the implication of this and it is possible to revive it?
5. Are those living near to rural centres more openly accepting modernisation than those living in remote villages?
6. Why has modernisation, via the subsidy scheme, failed to reach its objective of increasing production?
7. Are there other ways of eliminating poverty among the rural Melanau sago smallholders?
8. What is the implication of the sago plantation to the community in the study area?
9. Are those smallholders living adjacent to the plantations affected more by its than those living far away?
10. In what ways, do the cottage industry and sago mill contribute to the sustainability of sago production in the study area?

From these questions, it is clear that the three methods of farming require detailed study. The information needed includes the characteristics of the different methods (importance, weaknesses and advantages, similarities, differences,) and their contributions to the socio-cultural system (identity, equality, justice, empowerment, etc.), to the economy (income, spending pattern, cost of inputs, etc.) and to the environment (extent of forest clearance, effects of farming activities to adjacent forest and river, health safety, etc.). There is also a
need to determine the extent of each practice and any problems (conflict of interest in either functions or goals) associated with them. Moreover, there is also a need to gather information about the two processing industries (cost of inputs, labour force, nature of work, profits, problems, help from government, future hopes and aspirations, etc.); to uncover the nature of relationships among millers, between millers and farmers and between millers and exporters.

Secondary data has been collected, including information from previous studies, DOA annual reports, LCDA reports and conference and seminar papers. Primary data is collected in various ways – personal interview, household interview, group discussion and participant observation. Information has been gathered at state, district and village levels. For example, in the case of traditional methods, this involves the government department dealing with native customary law (Majlis Adat Istiadat), public organisation (Melanau Association) and influential people, mainly the elders of various selected villages in the study area. For modern methods, government officers at state, division and district level have been interviewed, as well as extension workers in the villages. Information regarding the plantation also requires personal interviews with LCDA officers, contractors and workers. Household interviews have been undertaken, to reveal the relationship between their socio-economic structure and the different methods used in cultivating sago. Personal interviews and group discussions have also been undertaken, to establish the extent to which indigenous knowledge and adat are utilised and practised, according to age and position in the community. Personal interviews and group discussions with those responsible for processing sago in both the traditional cottage industry and modern sago mills have also been undertaken.

Section 5.3 The survey

The survey uses both quantitative and qualitative methods. Quantitative research produces information in the form of numbers that can be quantified and summarised objectively, thus having the advantage in terms of measurement (Babbie, 1992). Quantitative survey also has the advantage of being more representative of the population, as results are based on larger sample size than qualitative survey (Oppenheim, 1992). Quantitative survey is therefore used to elicit the socio-economic “insights” of the study area. This includes the general pattern of income, age structure, education, acreage of sago farm and so on. (Refer to Appendix I). However, the results provide less detail on behaviour, attitudes and motivation - cannot
measure social action, can only collect, self-reports of recalled past action or prospective or hypothetical action (Tesch, 1990; Babbie, 1992). In short, quantitative survey only manages to "scratch the surface", hence cannot answer more about human phenomena (Tesch, 1990). Quantitative survey is weak on validity but strong in reliability (Babbie, 1992).

Only a qualitative survey can get to grips with social discourse and action (Tesch, 1990; Mason, 1996). Human sciences need a different approach because of their complexity and the existence of a phenomenon unknown in the mechanical world - consciousness (Tesch, 1990). The main advantage of qualitative survey is its flexibility, in data collection. Data may be gathered using less structured research instruments, in the form of open-ended questions, facilitating the in-depth investigation. Thus, the research is more intensive and the result more detailed, particularly on aspects that cannot be captured fully by quantitative surveys, such as behaviour, attitudes and motivation. Qualitative research is used here to reveal the Melanau’s indigenous knowledge, particularly in relation to sago production. Qualitative research is also used to find out any relevant artefacts, rituals, relationships and decision-making, that is, the social basis of production.

Section 5.4 Quantitative survey

This section discusses the sampling methods employed, the design of the questionnaire, the procedures taken during the pilot and full surveys and also the problems and their solutions which emerged during the course of the fieldwork.

Household interviews are used to collect data in the quantitative survey. These have the advantage of securing an adequate response, since the interviewer makes an effort to visit the household in person, instead of merely sending questionnaires, as in a mail survey (Moser and Kalton, 1986). Household interviews also give a prepared explanation of the purpose of study more convincingly than the cover letter of a mail survey (Oppenheim, 1992). Household interviews are also more flexible compared to mail or telephone surveys, because there is an opportunity to probe beyond the given answer, to clarify ambiguity, to overcome the respondent's unwillingness to answer a particular question and to appraise the validity of what a respondent says (Moser and Kalton, 1986; Oppenheim, 1992). Moreover, household interviews ensure that the information obtained is from the target person, for example, the head of the household, whose view is not influenced by discussion with others, especially
when questions testing a person's knowledge is required. Household interviews provide an opportunity for the interviewer to supplement the respondent's answers by observational data.

In relation to the study area, household interviews were chosen to collect the information because the respondents might not be fully literate. For practical purposes telephone interviews were impossible. In relation to the study area, the advantages of the household survey were:

- more complex questions can be asked with control of the question order, by using open-ended questions.
- respondents were able to show their household or personal records as evidence, such as receipts from the sale of sago logs and tools used in sago cultivation.
- rapport built between the interviewers and the respondent during the survey enables respondents to co-operate more effectively, and thereby increasing accuracy.

Household interview also pose problems, such as "response errors", possibly derived from both the interviewer and/or the respondent (Moser and Kalton, 1986, de Vaus, 1993). Response errors occur if the interviewer misrecords information or is biased in some way, whether in terms of interpreting the answers or influencing the respondent's answer. Response errors occur when the respondent lacks the knowledge to answer the question, cannot remember, misunderstand the question or just consciously or unconsciously does not wish to give the correct answer. The problem with response errors is mainly dealt by training the team of enumerators. (Refer to Section 5.4.3).
Stratified random sampling is used to obtain a “good” proportionate representation from each village, by avoiding the chances that all households come from only a particular location, such as only from a remote area of the district. Thus, the stratified random sampling system
is chosen for representativity across a range of strata (in this case the different villages of the study area).

In this random sampling technique, the whole population is first divided into mutually exclusive strata (villages). Units (households) are then selected randomly from each stratum. The selection of villages is based on spatial locations of the villages:

- distance from the rural centre (equals remoteness of the village) - communities further from the rural centre are assumed to practise more traditional sago cultivation and would be less exposed to technological innovation,
- coastal riverine areas or interior, as the location will determine the constraints (such as the fertility of the soils, distance from the canals or rivers, distance from the sago mills, characteristics of the river tide, cost and time of travelling, etc.) involved in increasing sago production,
- distance from the plantation, as it is assumed that a community located near the LCDA sago plantation is influenced more than those living further away.

The different villages are also characterised by three different religions (Pagan, Christian and Islam).

<table>
<thead>
<tr>
<th>Acceptable sampling error*</th>
<th>Percent of population expected to give particular answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 or 95</td>
</tr>
<tr>
<td>1%</td>
<td>1900</td>
</tr>
<tr>
<td>2%</td>
<td>479</td>
</tr>
<tr>
<td>3%</td>
<td>211</td>
</tr>
<tr>
<td>4%</td>
<td>119</td>
</tr>
<tr>
<td>5%</td>
<td>76</td>
</tr>
<tr>
<td>6%</td>
<td>100</td>
</tr>
<tr>
<td>7%</td>
<td>73</td>
</tr>
<tr>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

Notes: * At the 95 percent level of confidence
b Samples smaller than this would normally be too small to allow meaningful analysis

Table 5.1 Required sample sizes depending on population homogeneity and desired accuracy

(Source: de Vaus, 1993)

According to de Vaus (1993) sample size should be determined on two factors – the degree of accuracy required for the sample and the extent to which there is variation in the population...
in regard to the key characteristics of the study. The degree of accuracy is determined by how much error can be tolerated. (See Table 5.1). The general rule is that in order to halve the sampling error, sample size should be quadrupled.

<table>
<thead>
<tr>
<th>Districts (Name of villages)</th>
<th>Population (N)</th>
<th>Sampling fraction (1/5)</th>
<th>Sample (ni)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalat (Medong)</td>
<td>359</td>
<td></td>
<td>72</td>
</tr>
<tr>
<td>Oya (Tanam)</td>
<td>313</td>
<td></td>
<td>63</td>
</tr>
<tr>
<td>Mukah (Jebungan)</td>
<td>141</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Mukah (Tegak)</td>
<td>100</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Mukah (Sesok)</td>
<td>105</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Mukah (The Labak)</td>
<td>50</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Mukah (Tellian Ulu)</td>
<td>205</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>Total Σ N</td>
<td>1273</td>
<td>Σ ni 255</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.2  Total sampling number

For the sample size of the study area, a uniform sampling fraction of 1/5 is chosen to produce a proportionate stratified sample. (See Table 5.2). The stratification factor of 1/5 means taking 1 in 5 household from the selected village, making the ideal total sample of 255, a reasonable number according to the rules of thumb (See Table 5.1). This sample is derived by taking a hypothetical stance that the population is heterogenous, that is, with 80 percent of the people answering in a particular way tolerating a sampling error of 5%, at 95% confidence level. (Refer to the bold figures in Table 5.1).

Section 5.4.2  The questionnaire

The main concern of the thesis is the sago smallholder. Thus a standardised questionnaire is used to find out a "general scenario" of the population, targeted at the smallholder (in terms of their socio-economic structure, nature of working, etc.) to provide a framework to develop further hypothetical stance at later stages - when conducting interviews using unstructured questionnaires. Standardised questionnaire is used to collect relevant data, for the purpose of association tests between the socio-economic structure and the methods of farming. For example, the questionnaire is designed so that it is possible to compare and specify patterns for subgroups (for example, to see whether age, gender, education, income, location and
religion influence the methods of farming). The questionnaire is also designed so that different aspects of the methods of farming can be elicited, such as sources of receiving knowledge, attitudes towards new methods and so on. The questionnaire is also designed to elicit abstract information, such as the existence of conflict between socio-cultural aspects (practise of adat and community work) and economic (income derived from sago). (See Appendixes I on the translation of the questionnaires used during the survey).

The main contents of the questionnaire include;

- **the socio-economic background of the farmers** (sources of income, expenditure and other socio-economics variables - age, gender and education, to see whether patterns differ in various subgroups);
- **information on the sago farm** (size, distance from home, labour, demand, etc.);
- **rate of exploitation** (harvesting rate, frequency of harvesting which provide a means to crosscheck the validity of information concerning income and offer some information environmental impacts);
- **self-sufficiency** (utilisation and maintenance of local environmental resources - from rivers and forests; for food or trade, as an income supplement);
- **impact of modern technology; the use of traditional method and; impacts of the sago plantations** (provides information to reveal abstract relationship, particularly in relation to the different methods of farming and their effects on socio-cultural and economics aspects).

The questionnaire was designed to optimise length, content and structure. Half an hour was considered an appropriate time for interviewing. Lengthy questions were avoided. Both open and close pre-coded questions were used. Likert and Semantic (Oppenheim, 1992) scaling is also used in the pre-coded questions, especially in opinion questions (such as the importance of sago farming and the conditions of the rivers), to assist coding (refer to Appendix I). In the pre-coded questions, a special space for an unexpected or open answer is included (for example the education level of the farmers, other jobs, those involved in the sago cultivation, to whom the sago logs are sold to and alternative crops if willing to switch to other crops).

Open questions were also used; particularly in relation to the nature, problems and costs of cultivating sago (See Appendix I, Section 3). Open questions are also chosen in this section
to allow the respondents freedom and opportunity to decide on the aspect, form, detail and length of their answer. For example, in the cost of farming, detailed responses are desirable. Open questions are also valuable for gauging opinions, such as, the problems of farming; problems of using the different methods of farming; problems from the plantations; reasons for involving in sago cultivation and; reasons for not working at the plantations.

Section 5.4.3 The fieldwork

The fieldwork consists of the pilot and full questionnaire surveys. Prior to the full survey, preliminary visits focused on the perceptions of administrators; of influential and knowledgeable people (regarding the Melanau and sago) in Kuching, Sibu, Mukah and Oya/Dalat districts; and of the villagers in the study area. Secondary sources were consulted on the study area, (demography, geography, problems, policies, etc.) The preliminary visit also included interviews with government officers from the Department of Agriculture, Land of Survey, District Office, State Planning Unit, Sarawak Museum, Majlis Adat Istiadat and other influential people from the Melanau Association. Detailed specification of the sample frame was also completed both for the quantitative and qualitative surveys.

A pilot survey was undertaken in two villages (Kampung Teh, Oya and Kampung Tellian Hilir, Mukah) to check the appropriateness of the questionnaire. A total of 10 households were interviewed for the pilot survey, 5 from each village. The questionnaire was modified following this pilot phase.

a) Full questionnaire survey

The Village Headman and the extension workers were notified prior to the implementation of the full survey in order to gain better co-operation from respondents. Further reassurances were given during the meeting with the respondent, in explaining the reasons of the survey, the importance of interviewing the household and the use of the data and confidentiality of the respondent's answers. Timing was also very important to ensure high respondent rate. A rainy day was preferable to a sunny one, because most of the farmers tend to be at home during rainy days. The full questionnaire survey was therefore conducted during the landas season, when most weeks have rainy days. If it was not raining, then the best time to go was after 16:00 hours. Certain days were avoided - Sunday (most of the Catholic Christians went to Church) and Friday (in the afternoon, when the Muslim went for their prayers).
The full questionnaire survey took six weeks to complete. The first phase was undertaken in the villages of Dalat and Oya, and then followed by those in Mukah. Ten enumerators were employed to assist me with the household survey. There were selected students from the Dalat Secondary School. The advantages of this are:

- Familiarity with local dialect;
- Inexpensive (low transport/accommodation costs);
- Familiarity with area and;
- Local acceptance.

However, the disadvantages of this are:

- The interviewers may be too “close” to the people, creating too much rapport with the danger of them playing the role of a personal friend and may cause unduly prolonged and difficult to terminate interviews and;
- Lack of scientific rigour because inexperienced and untrained which can introduce “interviewer bias” (Oppenheim, 1992). Interviewer or systematic bias is a serious problem of household survey. According to Oppenheim (1992) interviewer bias happens before and during the interview; before, when the interviewer gives poor impression by revealing personal values; and during, when poor rephrasing of attitude questions, altered factual questions, careless prompting, biased probes, etc. amount to poor management. Both of these problems can be controlled through training, coordination and control.

Enumerators were trained by briefing them general guidelines and procedures of the household survey and the questionnaire and; practising the interviews. Coordination and control were done through rigorous and continuous supervision, by following the students, in turn. After each interviewing session, the answers were always checked and verified either with the enumerators or respondents.

b) Problems and solutions

The main problems encountered during the surveys are – practical problems and non-respondents. Practical problems were mainly attributed to the remoteness of the villagers, with the implication of consuming more time and expenditure in relation to “getting around” the villages.
### Districts (Name of villages) | Original Sample (ni) | Number of Non-respondents | Number of invalid respondents* | Number of respondents | Number of analysed respondents
---|---|---|---|---|---
Dalat (Medong) | 72 | 6 | 6 | 66 | 60
Oya (Tanam) | 63 | 3 | 8 | 60 | 52
Mukah (Jebungan) | 28 | 0 | 4 | 28 | 24
Mukah (Tegak) | 20 | 0 | 4 | 20 | 16
Mukah (Sesok) | 21 | 3 | 0 | 18 | 18
Mukah (Teh Labak) | 10 | 2 | 0 | 8 | 8
Mukah (Tellian Ulu) | 41 | 1 | 6 | 40 | 34
**Total Σ N** | **Σ ni 255** | **15** | **28** | **240 (94%)** | **212 (83%)**

* Invalid respondents are due to questionnaire which seems to be inaccurate or wrong respondents (Chinese instead of Melanau).

Table 5.3 Number of respondents and non-respondents

The final analysed respondents are 212. The respondent rate is 240 (94 % respondent rate). Out of 240 respondents, 28 questionnaires are invalid due to unforeseen circumstances, such as, a Chinese respondent and inaccurate link of information (harvesting less amount of sago palm, but giving a substantial income derived from sago farming, etc.). Non-respondent occurred because there were no people in the house, considered as non-respondent after second visiting. Other cases of non-respondent include the selected household not being sago smallholders, deaf and senile respondents.

### Section 5.5 Qualitative survey

This section discusses preparation before the real survey was taken, which includes; the selection of the respondents; the design of guides for asking questions; the real survey (which includes observation, participant-observation, in-depth interviews and group discussions) and; problems and solutions encountered. The qualitative survey includes interviewing all categories of persons who are involved in the sago production system. Key stakeholders and their connectivity can be seen in Figure 5.2.
These include the government and agency’s officers, the sago smallholders, middle person, the sago millers, the sago exporters, the LCDA contractors\(^2\) and workers\(^3\), the women who work at the cottage industry producing sago products for the local markets, younger generations and influential people in the community. The qualitative survey was completed in 3\(\frac{3}{4}\) months. Table 4.5 gives the details.

The sample for the qualitative survey was selected through quota sampling. Quota sampling includes selecting units from the population that has been segmented into mutually exclusive sub-groups based on a specified proportion of sample units from each segment (Tesch, 1990; Mason, 1996).

\(^2\) The plantation is cleared and planted by contractual basis, that is, a contractor is employed by LCDA according to area, phases and duration of work.

\(^3\) The workers are employed by the contractors.
<table>
<thead>
<tr>
<th>Categories of people interviewed</th>
<th>Types of interviews</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government and agency officers</td>
<td>Individual in-depth interview</td>
<td>4 weeks</td>
</tr>
<tr>
<td>LCDA contractors</td>
<td>Individual in-depth interview</td>
<td></td>
</tr>
<tr>
<td>LCDA workers</td>
<td>Individual in-depth interview</td>
<td></td>
</tr>
<tr>
<td>Sago smallholders</td>
<td>Individual in-depth interview, Group interview, Participant observation</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Middle-person</td>
<td>Individual in-depth interview</td>
<td></td>
</tr>
<tr>
<td>Sago millers</td>
<td>Individual in-depth interview, Participant observation</td>
<td></td>
</tr>
<tr>
<td>Sago exporters</td>
<td>Individual in-depth interview</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Women involved in the cottage industry processing sago for local and domestic uses</td>
<td>Individual in-depth interview, Group interview, Participant observation</td>
<td></td>
</tr>
<tr>
<td>Young generations</td>
<td>Individual in-depth interview, Group interview</td>
<td></td>
</tr>
<tr>
<td>Influential people in the community (Custodians of adat)</td>
<td>Individual in-depth interview, Group interview</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.4  Types of qualitative survey used in relation to the different categorical groups interviewed

In quota sampling, the population is first divided into mutually exclusive sub-groups, just as in stratified sampling. Then judgement is used to select the subjects or units from each segment based on a specified proportion. The advantages of quota sampling are the speed with which information can be collected, the lower cost of doing so and the convenience it represents. This method enabled selection of any case that fits certain criteria (such as interviewing the head of the household only, housewife, children, the elderly, etc.).

Section 5.5.1  Individual in-depth interviews

a) Government staff in regional centres
The sample size of the qualitative survey depends on the purpose of the survey and the complexity of the subjects. The general guideline is between 20 to 30 (Moser and Kalton, 1986). The figure below shows that government and agency officers were chosen in relation to their departments, their area of work and their position. The number in the bracket shows how many were interviewed. In Kuching and Sibu, information on the government’s role in sago production and the presence of conflict between state legislation and adat was collected. (See Figure 5.2). Individual in-depth interviews at district level focused on;
- Effects of subsidy scheme,
- Effects of sago plantation,
- Relationship between Department of Agriculture and sago smallholders
- Relationship between LCDA and sago smallholders.

(See Table 5.8)

![Diagram showing stages and selection of government and agency officers interviewed](image)

**Figure 5.3** Stages and selection of government and agency officers interviewed
b) Sago smallholders

Twenty sago smallholders were chosen for in-depth interviews based on methods of farming, gender, age and spatial location in relation to rural centres and the plantations. (See Figure 5.3).

Figure 5.4  The selection of quota sampling for smallholders

Farmers were questioned on;

- Socio-cultural effects of each method of farming,
- Socio-economic effects of each method of farming,
- Environmental and health effects of each method of farming and
- Gender role in sago production.

(See Table 5.9 for further details).
c) Sago millers and middle person

Only two sago millers were willing to cooperate – a large mechanised mill from Kampung Tanam in Dalat, and a small one, only processing wet sago starch in Kampung Tellian Ulu. Information concerning the Sibu and SEDC\(^4\) mills was taken from the Department of Agriculture in Kuching and Sibu. Only two middle persons were willing to be interviewed – a Chinese from Kampung Medong, Dalat and a Melanau from Kampung Tanam. A meeting with a member of the Director’s Board of the sago exporters was held in Sibu. Somehow, in general results were disappointing; respondents were very cautious. (See Table 5.10)

---

Figure 5.5 Selection of women group for individual in-depth interviews

\(^4\) Sarawak Economic Development Corporation
Twenty women, working in the cottage industry, were selected for the interviews. The selection was based on seven factors – location of the cottage industry; purpose of the end-products (domestic use, marketed locally or both); the availability or non-availability of "help" (financial, building or equipment) from the government; private or communal ownership of buildings and equipment; age (young and old); education level (formal school and no formal school); and marital status. (See Figure 5.4 and Table 5.13)

d) Other stakeholders
A total of 30 influential people, such as the Temenggung, Pemanca, Penghulu, Ketua Kampung, the Melanau shaman, the imam, and the elders from different villages, all over the study area were selected especially in regards to the issues of adat. (See Table 5.11). Twenty younger people, mainly teenagers between 15 to 20 years old were also chosen to discuss parallel issues of adat. The selection of respondents was based on their role or position in the community and the area they come from. The areas chosen were:
- Kampung Teh in Oya,
- Kampung Tanam in Oya,
- Kampung Medong in Dalat,
- Kampung Jebungan in Mukah and
- Kampung Tellian Ulu in Mukah.

Section 5.5.2 Group interviews

The sample size for the group interviews was from 6 to 8 people. There were 4 categories involved in the group discussion -- smallholders (24 – 4 groups of 6); women group of the cottage industry (20 – 4 groups of 5); the younger age group (20 – 3 groups of 8) and; the "influential" group of the community (24 – 3 groups of 8). (See Table 5.6 for details). The group discussion was an "extended" version of the individual in-depth interviews' issues, but providing the opportunity to explore certain issues more deeply, taking into account perspectives from different people. This method saved time and cost, and could also aid in generating new ideas by getting a diversity of opinions, as discussion usually stimulated thought.

5 These are all head of the villagers, but of different ranks. The Temenggung is the highest, follows by the Pemanca, Penghulu and lastly the Ketua Kampung.
Section 5.5.3 Participant observation

Participant observation, focused on:

- the farming techniques,
- role of indigenous knowledge in sago production,
- indigenous knowledge transmission,
- role of sago in traditional healing practice,
- role of adat in sago production,
- ritual activities,
- role of sago millers in sago production,
- role of the cottage industry to sago production and,
- coping strategies, for example from the impacts of the LCDA plantation.

(See Table 5.7 for details).

---

Muslim leaders in the village

115
<table>
<thead>
<tr>
<th>Household / Location</th>
<th>Role in sago production</th>
<th>Data needed</th>
<th>Duration of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramon of Kampung Sesok, Mukah</td>
<td>Smallholder (traditional and modern methods)</td>
<td>• Methods of cultivation (clearing site, planting, maintenance) • Advantages / disadvantages of modern and traditional methods</td>
<td>2 days • Day 1 (8 a.m. – 4 p.m.) • Day 2 (8 a.m. – 4 p.m.)</td>
</tr>
<tr>
<td>Mura of Kampung Jebungan, Mukah</td>
<td>Smallholder (traditional and modern methods)</td>
<td>• Methods of cultivation (propagation, harvesting) • Relationship between extension worker and smallholder</td>
<td>1 day (8 a.m. – 4 p.m.)</td>
</tr>
<tr>
<td>Peteran of Kampung Tellian Ulu, Mukah</td>
<td>• Smallholder (traditional method) • Shaman (traditional healer)</td>
<td>• Role of adat in sago production • Role of sago in traditional healing • Transmission of indigenous knowledge</td>
<td>2 days • Day 1 (9 a.m. – 3 p.m.) • Day 2 (9 a.m. – 10 p.m.)</td>
</tr>
<tr>
<td>Henry Elli of Kampung Medong, Dalat</td>
<td>• Smallholder (traditional and modern methods) • Pemanca (one of the Heads of the village)</td>
<td>• Role of influential people in sago production and the Melanau community • Witnessing the kaul (cleansing of the village) ceremony</td>
<td>2 days • Day 1 (whole day and stay overnight) • Day 2 (8 a.m. – noon)</td>
</tr>
<tr>
<td>Simon Ubom of Kampung Tanam, Dalat</td>
<td>Sago miller</td>
<td>• Role of sago miller in sago production • Relationship between sago miller and smallholders</td>
<td>1 day (9 a.m. – 6 p.m.)</td>
</tr>
<tr>
<td>Mak Seraya of Kampung Teh, Oya</td>
<td>Processing sago in the cottage industry</td>
<td>• Processing of saguk and tebaloi • Management of the cottage industry</td>
<td>2 ½ days • Day 1 (3.30 p.m. and stay overnight) • Day 2 (5 a.m. – 10 p.m.) • Day 3 (5 a.m. – 5 p.m.)</td>
</tr>
</tbody>
</table>

Table 5.6 Details of the participant observation survey
### Research Questions

- What role can the government play to ensure sustainable production of sago?
- What is the Sarawak government development priorities, objectives and policies?

### Data sources and methods

- DOA\(^7\) Officers: interviews
- SPU\(^8\) officers: interviews
- District officers: interviews
- LCDA officers: interviews
- Reports, meeting agendas, seminar papers: documentary analysis

### Expected outcome

The interviews will reveal:

- the extend and nature of help that the government/institution offered to the sago farmers;
- the existent of any form of legislation to promote and control sago market and price respectively;
- about the LCDA sago plantation projects and;
- the relationship between the various government departments and LCDA after the setting up of the sago plantations

**Which category of land does the Melanau sago farms belong to?**

- Land and Survey officers: interviews
- Extension workers and DOA officers: interviews
- District offices officers: interviews
- The members of the Melanau Association: interviews

The interviews will reveal the pattern of the existing land tenure system and whether the system protects the interest of the Melanau sago smallholders

**Is there any conflict between customary law and state legislation?**

- Majlis Adat Istiadat\(^9\) Officers: interviews
- Sarawak Museum officers: interviews
- The members of the Melanau Association: interviews
- District Office officers: interviews
- Extension workers (DOA): interviews
- Influential figures in the various villagers of the study area

The interviews will reveal the significance and problem of adat as practised by the Melanau community, particularly in relation with the sago production system

---

Table 5.7  **Guides for interviewing government/institution officers**

\(^7\) the Department of Agriculture, Sarawak
\(^8\) the State Planning Unit, Sarawak
\(^9\) the government department that is responsible for upholding the matters with regards to the traditional customary laws and order

117
The general scenario of the case study was derived before the survey through library research and information received from responses to letters sent to the relevant government department agencies (the Department of Agriculture, Sarawak; LCDA and; MARDI\textsuperscript{10}). However, during the process of qualitative survey itself, the nature and scope of discussion changed according to the knowledge and perception of the respondents.

The design of the guides depended on the person or authority to be interviewed. Six different guides were designed for individual in-depth interviews and group discussions: government/institutions officers; sago smallholders; sago millers/exporters; women groups; teenagers and the LCDA sago contractors/workers.

The guide for interviewing the government/institution officers is focused on issues related to their role in ensuring the sustainable production of sago; legislation available for promoting sago production and increasing the standard of living of the sago smallholders; and; government development priorities, objectives and policies. This is summarised in Table 5.7.

The guide for interviewing the sago smallholders and the LCDA contractors/workers mainly focused on the socio-economic and environmental effects of each methods of farming (traditional, modern and plantation) and the role of the traditional knowledge to the sustainability of the sago production system. This is illustrated in Table 5.8.

The guide for the sago millers and exporters seek to comprehend the relationship between the sago millers/exporters and the sago smallholders. The guide also focused on the contributions of sago millers and exporters to the sustainability of the sago production system. This is illustrated in Table 5.9.

\textsuperscript{10} the Malaysian Agriculture Research and Development Institute
### Research Questions

<table>
<thead>
<tr>
<th>What is the socio-economic and environmental effects of cultivating sago using the traditional, modern and plantation methods?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data sources and methods</td>
</tr>
<tr>
<td>Sago smallholders: interviews, group discussion, participant observation</td>
</tr>
<tr>
<td>LCDA contractors: interviews</td>
</tr>
<tr>
<td>LCDA workers: interviews</td>
</tr>
<tr>
<td>Expected outcome</td>
</tr>
<tr>
<td>The interviews will reveal the advantages and disadvantages of the three different cultivation techniques, especially the contribution of each method to sago production, social organisation and the environment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What is the role of traditional knowledge to the sustainability of the sago production system?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data sources and methods</td>
</tr>
<tr>
<td>Sago smallholders: interviews, group discussion, participant observation</td>
</tr>
<tr>
<td>Extension workers: interviews</td>
</tr>
<tr>
<td>Expected outcome</td>
</tr>
<tr>
<td>The interviews will reveal;</td>
</tr>
<tr>
<td>• the indigenous knowledge of the Melanau, especially with regard to sago and their environment;</td>
</tr>
<tr>
<td>• the potential of adat as the regulatory mechanisms for natural resource management;</td>
</tr>
<tr>
<td>• the reasons behind the intricate relationship between the Melanau and sago</td>
</tr>
</tbody>
</table>

### Table 5.8 Guide for interviewing the sago smallholders, the LCDA contractors/workers and the extension workers

<table>
<thead>
<tr>
<th>Research Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the sago millers and exporters contribute to the sustainability of the sago production system?</td>
</tr>
<tr>
<td>Data sources and methods</td>
</tr>
<tr>
<td>Sago millers: interviews, participant observation</td>
</tr>
<tr>
<td>Sago exporters: interviews</td>
</tr>
<tr>
<td>Reports of Sago Pricing Index: documentary analysis</td>
</tr>
<tr>
<td>Expected outcome</td>
</tr>
<tr>
<td>The interviews will reveal the nature of the operation done by the sago millers/exporters especially with regards to;</td>
</tr>
<tr>
<td>• the factors which determined the pricing and demand of sago logs;</td>
</tr>
<tr>
<td>• the past and present condition of sago trading and;</td>
</tr>
<tr>
<td>• the relationship between the millers and inter relationship between the millers and other groups like the sago smallholders, the exporters and the government/institution officers</td>
</tr>
</tbody>
</table>

### Table 5.9 Guide for interviewing the sago millers/exporters
<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data source and method</th>
<th>Expected outcome</th>
</tr>
</thead>
</table>
| What is the potential role of traditional knowledge especially adat to the future sago production system? | • Younger generation: interviews, group discussion  
• Influential people: interviews, group discussion, participant observation | The interviews will reveal the aspirations of the older and younger generation with regards to the relevance of adat as a form of traditional resource management, which includes discussion on;  
• the existent of some form of “transmission system” to ensure the continuous heritage of the traditional knowledge from the older to the younger generation;  
• chances, if any for the “extinct” adat to be revived and promoted;  
• the extend of traditional knowledge that the younger generation possess |}

Table 5.10  Guide for interviewing the teenagers and influential people from the community

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data sources and methods</th>
<th>Expected outcome</th>
</tr>
</thead>
</table>
| How does activity at the cottage industry contributes to the sustainability of the sago production system? | The women who were involved in the cottage industry: interviews, group discussion, participant observation | The interviews will reveal:  
• the nature of work involved in the cottage industry, which include the condition of the local market;  
• changes and problems experienced by the women counterpart and;  
• the detail of the “transmission system” of operating the cottage industry to the younger generation to ensure the continuity of the cottage industry |}

Table 5.11  Guide for interviewing the women group who are involved in the cottage industry

The teenagers were also asked for their opinions and future aspirations on the role of traditional knowledge, especially adat to the future of the sago production system. This is summarised in Table 5.10.
The guide for interviewing the women's group who processed sago products into sago pellets (saguk) and sago crackers (tebaloi) via a cottage industry, aimed at revealing the nature of the work, including the problems and aspirations of the local processors. This guide aimed to highlight the significance of the cottage industry in relation to gender issues, such as women's independence of decision-making in relation to their household expenditure, the amount of money invested in farming inputs, the contribution of earnings derived from the activities of local processing and processing activity's socio-cultural effects. (See Table 5.11)

Section 5.5.5 The fieldwork

The selection of respondents was based on four main factors. Firstly, names and addresses were suggested by officers and members of the Sarawak Melanau Association during the preliminary survey in Kuching and Sibu. Secondly, respondents were selected as a result of acquaintances from the household survey. Thirdly, respondents were also selected from the rapport built during the observation and observation participant survey. Finally, the selection was made on an ad-hoc basis, as events, activities, issues and people cropped up, offering the opportunity to undertake casual interviews.

Appointments were made before each interview. Gifts, usually in the form of clothing and food, were presented to the respondents for spending several hours in the interviews. Venues ranged from office, house, farm, mill, coffee shop, market, the belanga (the cottage industry), wharves, airports, to public transport (in other words, whenever opportunity arose). Data was recorded in notebook or tape recorder. Casual interviews were not specifically noted down at the time. This has the advantage of making the interview informal. Notes were taken immediately following these informal contacts.

After each interview, a Contact Summary Form was completed, in which the main themes successfully or unsuccessfully collected; salient, interesting, illuminating point; a plan for new or/and remaining target questions to be asked in the next contact were noted. (Refer to Appendix II). Contact Summary Forms were subsequently used during the preliminary analysis of the data, especially in coding the data. A Documentary Form was also completed, as each document, agenda, report, etc. was collected. (Refer to Appendix III).

Several problems were encountered during the qualitative survey: non-respondent; lack of resources and time and; the remoteness and danger of the site and situation. Little cooperation was received from LCDA officers; some of the extension workers (especially in
Dalat; Chinese sago millers and exporters; and some government officers. To a certain extent, this lack of co-operation was solved by persistence, where no response was received, documents were collected concerning the non-respondent groups. In the case of the LCDA, prior information was received by post. This only allowed a "one-way" conversation, however. In the case of the lack of co-operation from LCDA officers, I was able to speak to contractors and workers employed by the plantation. I also managed to talk with several members of the family who worked with the LCDA. In the case of other groups, such as the sago millers, exporters, government officers and extension workers, the problems were usually solved by talking to other people of the same category group, who were willing to co-operate.

In spite of the non-respondent problems, a sufficient number of interviews were completed, enabling me unravel the nature and problems of the sago production system, as well as answers to the research questions. The qualitative survey was very important, not only as supplements to the data received from the household survey, but also important as a research method of its own. The next section will discuss the methods used to analyse the data collected from both the quantitative and qualitative surveys.

Section 5.6 Methods of analysis

The methods for analysing the data collected are divided into two parts - the quantitative and qualitative analyses. For the quantitative analysis, the main software used to assist the process was SPSS. Qualitative data was processed manually.

Section 5.6.1 Quantitative data analysis

There are 212 cases in the sample, consisting of both interval (continuous) and categorical (ordinal, nominal and binomial) variables. Only two continuous variables were involved - total income (totinc) and cost of inputs (costinpu). The rest of the variables are categorical.

There are three main tests involved in the analysis - the frequency test; the non-parametric test to compare the differences between the variables and; crosstabulation to find any association between the variables. The non-parametric test is chosen due to the nature of the variables, being categorical and of non-normal distribution. Furthermore, the sample is not large enough, when broken into smaller groups (such as into specific areas) and when taking account the missing values.
Single frequency variable analysis provides background information on the characteristics of the study areas, especially in relation to personal (age, education, religion, etc.) and household factors (income, household expenditure, etc). Measures of central tendency, range and distribution were used for continuous and categorical variable, as appropriate.

The interval data are totinc (income after subtracting the cost of inputs) and costinpu (the cost of farming expenditure). Both the values of income and cost of inputs are crude values. This is because it is very difficult to record the precise amount of values for theses variables, due to the lack of recorded receipts of total profits from selling the sago logs and buying farming tool and; the inconsistent frequency of harvesting the sago palms. However, I have attempted to take the most accurate values for total income, by taking into consideration the following factors:

- the amount of sago palms harvested in a year;
- whether the households obtain any subsidy or not. A subsidised farmer will be provided with cash for the planting materials, chemicals, tools and technical guidance. Under the subsidy scheme, all farmers should plant according to the directives as prescribed by the DOA, for the purpose of having a higher density of sago palms in an acre. The estimated amount of palms are at 205 planting points in 1 hectare, compare to only 150 palms in 1 hectare of a typical traditional farm. Consequently, for a household that receives a subsidy, the estimated harvested palms will be about 104 palms/ha, (assuming a 50% survival rate), while for a traditional farm, only about 50-60 palms/ha are expected to be harvested (information from the DOA, Sarawak);
- farm size (to counter check if the number of palms harvested are ridiculously overstated). For example, if a household has only 1 acre of garden, it is impossible for the farmer to harvest more than 300 palms in a year;
- the frequency of harvesting sago palms. This is particularly important if a household does not hire outside labour. This is because the maximum amount that an average farmer can harvest is only up to 20 palms in a day (using a chainsaw) and less if using an axe, unless outside labour is hired and;
- whether the household receive other income (for example, from other job or from other members of the family).

11 the directives for planting is what the extension worker calls as the "lining system", because all sago suckers should be planted in a straight line, at 33 ft between each planting points.
The cost of farming expenditure is calculated on the basis of the following:

• transportation (mainly by sampan (long boat), although for few cases, by bicycle and motorcycle).

• tools (the cost of the spraying tank, insecticides and herbicides are excluded if farmers received a subsidy to avoid double counting. However, the prices of other tools, such as parang (long large knife) are included because all interviewed households, still buy their own tools due to the poor quality of the ones provided by the subsidy scheme. (Refer to Chapter 7, Table 7.16).

The rest of the categorical data are shown in the next section on crosstabulation and comparing means tests.

Section 5.6.2 Comparing means between variables

The Kruskal-Wallis one way Anova test is used to compare the means between the variables. This test should show if opinions of the respondents in the sample are influenced by the personal characteristics or the spatial location of the respondents. Therefore the nominal variables are tested on all the ordinal variables (variables coded by the ratings of the respondent’s opinion on various matters, such as, on the importance of traditional practise, effects of the plantation on the farmer’s income, the farmers opinion of their environmental condition and the areas where they come from). The Kruskal-Wallis one way Anova compares the number of times a score from one of the samples is higher than a score from the other sample.

The test finds out if the personal factors (education, religion, age and income) and the spatial location (district and village) has any influence on opinions concerning; communal work (gotong); the present condition of the local rivers compare to the past (river); the importance of cultivating sago compared to other crops (sagoimpt) and; the effects of the sago plantations to the farmer’s income (effectin). (Refer to Table 5.12 – 5.15).
<table>
<thead>
<tr>
<th>Ordinal variables</th>
<th>Nominal variables</th>
<th>Description of variables</th>
<th>Hypothetical results</th>
</tr>
</thead>
<tbody>
<tr>
<td>gotong</td>
<td></td>
<td>Communal spirit. decline (1), no change (2), improve (3)</td>
<td></td>
</tr>
<tr>
<td>educate</td>
<td></td>
<td>Education level of the respondent. no formal education (1), primary school (2), secondary school (3), others (4)</td>
<td>yes</td>
</tr>
<tr>
<td>religion</td>
<td></td>
<td>Religion of the respondent. Muslim (1), Christian (2), Pagan (3)</td>
<td>yes</td>
</tr>
<tr>
<td>age</td>
<td></td>
<td>Age of the respondent. 10 - 29 years (1), 30 - 49 years (2), 50 - 69 years (3), more than 69 years (4)</td>
<td>yes</td>
</tr>
<tr>
<td>income</td>
<td></td>
<td>Net income of the respondent. less than RM 295 (1), RM 296 - 495 (2), RM 496 - RM 595 (3), more than 595.</td>
<td>yes</td>
</tr>
<tr>
<td>district</td>
<td></td>
<td>Mukah (1), Dalat (2), Oya (3)</td>
<td>yes</td>
</tr>
<tr>
<td>village</td>
<td></td>
<td>Medong (1), Tanam (2), Jebungan and Tegak (3), Teh Labak and Sesok (4), Tellian Ulu (5)</td>
<td>yes</td>
</tr>
</tbody>
</table>

Table 5.12 Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about communal spirit

<table>
<thead>
<tr>
<th>Ordinal variables</th>
<th>Nominal variables</th>
<th>Description of variables</th>
<th>Hypothetical results</th>
</tr>
</thead>
<tbody>
<tr>
<td>sagoimpt</td>
<td></td>
<td>The importance of cultivating sago compared to other crop. very important (1), important (2), as important as sago (3), quite important (4), not important (5)</td>
<td></td>
</tr>
<tr>
<td>educate</td>
<td></td>
<td>Education level of the respondent. no formal education (1), primary school (2), secondary school (3), others (4)</td>
<td>no</td>
</tr>
<tr>
<td>religion</td>
<td></td>
<td>Religion of the respondent. Muslim (1), Christian (2), Pagan (3)</td>
<td>no</td>
</tr>
<tr>
<td>age</td>
<td></td>
<td>Age of the respondent. 10 - 29 years (1), 30 - 49 years (2), 50 - 69 years (3), more than 69 years (4)</td>
<td>yes</td>
</tr>
<tr>
<td>income</td>
<td></td>
<td>Total income of the respondent. less than RM 295 (1), RM 296 - 495 (2), RM 496 - RM 595 (3), more than 595 (4).</td>
<td>yes</td>
</tr>
<tr>
<td>district</td>
<td></td>
<td>Mukah (1), Dalat (2), Oya (3)</td>
<td>no</td>
</tr>
<tr>
<td>village</td>
<td></td>
<td>Medong (1), Tanam (2), Jebungan and Tegak (3), Teh Labak and Sesok (4), Tellian Ulu (5)</td>
<td>no</td>
</tr>
</tbody>
</table>

Table 5.13 Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about the importance of cultivating sago

125
<table>
<thead>
<tr>
<th>Ordinal variables</th>
<th>Nominal variables</th>
<th>Description of variables</th>
<th>Hypothetical results</th>
</tr>
</thead>
<tbody>
<tr>
<td>effect</td>
<td></td>
<td>Effects of sago plantation to the farmer's income. increase (1), no change (2), decline (3)</td>
<td></td>
</tr>
<tr>
<td>educate</td>
<td></td>
<td>Education level of the respondent. no formal education (1), primary school (2), secondary school (3), others (4)</td>
<td>no</td>
</tr>
<tr>
<td>religion</td>
<td></td>
<td>Religion of the respondent. Muslim (1), Christian (2), Pagan (3)</td>
<td>no</td>
</tr>
<tr>
<td>age</td>
<td></td>
<td>Age of the respondent. 10 - 29 years (1), 30 - 49 years (2), 50 - 69 years (3), more than 69 years (4)</td>
<td>no</td>
</tr>
<tr>
<td>income</td>
<td></td>
<td>Total income of the respondent. less than RM 295 (1), RM 296 - 495 (2), RM 496 - RM 595 (3), more than 595.</td>
<td>no</td>
</tr>
<tr>
<td>district</td>
<td></td>
<td>Mukah (1), Dalat (2), Oya (3)</td>
<td>yes</td>
</tr>
<tr>
<td>village</td>
<td></td>
<td>Medong (1), Tanam (2), Jebungan and Tegak (3), Teh Labak and Sesok (4), Tellian Ulu (5)</td>
<td>yes</td>
</tr>
</tbody>
</table>

Table 5.14  Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about the effect of the plantation on the farmer's income

<table>
<thead>
<tr>
<th>Ordinal variables</th>
<th>Nominal variables</th>
<th>Description of variables</th>
<th>Hypothetical results</th>
</tr>
</thead>
<tbody>
<tr>
<td>river</td>
<td></td>
<td>The present condition of the local river compare to the past. cleaner than before (1), does not change (2), dirtier than before (3)</td>
<td></td>
</tr>
<tr>
<td>educate</td>
<td></td>
<td>Education level of the respondent. no formal education (1), primary school (2), secondary school (3), others (4)</td>
<td>yes</td>
</tr>
<tr>
<td>religion</td>
<td></td>
<td>Religion of the respondent. Muslim (1), Christian (2), Pagan (3)</td>
<td>no</td>
</tr>
<tr>
<td>age</td>
<td></td>
<td>Age of the respondent. 10 - 29 years (1), 30 - 49 years (2), 50 - 69 years (3), more than 69 years (4)</td>
<td>yes</td>
</tr>
<tr>
<td>income</td>
<td></td>
<td>Total income of the respondent. less than RM 295 (1), RM 296 - 495 (2), RM 496 - RM 595 (3), more than 595.</td>
<td>no</td>
</tr>
<tr>
<td>district</td>
<td></td>
<td>Mukah (1), Dalat (2), Oya (3)</td>
<td>yes</td>
</tr>
<tr>
<td>village</td>
<td></td>
<td>Medong (1), Tanam (2), Jebungan and Tegak (3), Teh Labak and Sesok (4), Tellian Ulu (5)</td>
<td>yes</td>
</tr>
</tbody>
</table>

Table 5.15  Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about the present condition of the local rivers compare to the past

126
Section 5.6.3 Classifying farmers along a modern-traditional axis

The dependent variable method is derived from a systematic scoring system to categorise each farmer. The scoring system is needed because most farmers adopt both traditional and modern methods of farming, whereas, there is a need to categorise them systematically, in order to analyse the relationship between the different methods and the socio-economic and environmental variables. The scoring system sets different scores for each traditional or modern tool and skill used by the farmers. This is illustrated in the Table 5.16 and Figure 5.6.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Tools and skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>subsidy</td>
</tr>
<tr>
<td>4</td>
<td>herbicide</td>
</tr>
<tr>
<td>3</td>
<td>pesticide</td>
</tr>
<tr>
<td>2</td>
<td>chainsaw</td>
</tr>
<tr>
<td>1</td>
<td>out board engine</td>
</tr>
<tr>
<td>-1</td>
<td>no subsidy</td>
</tr>
<tr>
<td>-2</td>
<td>organic fertiliser</td>
</tr>
<tr>
<td>-3</td>
<td>intercropping</td>
</tr>
<tr>
<td>-4</td>
<td>practising pedok\textsuperscript{12}</td>
</tr>
<tr>
<td>-5</td>
<td>practising \textit{adat}</td>
</tr>
</tbody>
</table>

Table 5.16 Scoring system to categorise the cultivation methods

![Figure 5.6 Determining the category of cultivating methods](image)

127
Those scoring above 6 are considered modern, while those with less than -5 as traditional. Intermediate scores are positioned between these two extremes. (See Figure 5.4). For example, if the farmer practices adat (following the taboos during cultivating sago) and is involved in communal work (especially in harvesting, termed by the local as pedok), but also uses the chainsaw for farm work, his score would be -7, which is categorised as using traditional methods.

The scale of the score are marked on the basis of how decision-making of adopting either methods are made, for example, subsidy has the highest score because subsidised smallholders tend to adopt both herbicide and pesticide, as well as modern cultivation instructions from the DOA. Weed is reported to be less a problem than pest, therefore those using herbicide is keener to adopt modern tool. Not all farmers used chainsaw, some only hire people who use them, during stages, such as harvesting. Out board engine is a common sight in the village and not necessarily associated with transportation to sago farm.

Practising adat and pedok ranked first and second highest in traditional method, because obviously, those who practised them implement most of the elements of indigenous knowledge. Intercropping has became rare now, thus it is listed higher than using organic farming (a common practice, even the plantation follow the same procedure). Not receiving subsidy is marked last because, that does not necessarily indicate that the smallholders are not using any modern methods, maybe he or she just finish the 12 years eligible period of receiving subsidy.

Section 5.6.4 Finding association between variables

Crosstabulation and contingency tables are used to find relationship between the two variables tested. This is determined by the significance of the chi-square value yielded. If there is any relationship, the strength of the association will be determined by looking at several test values, in accordance with the types of variables tested. (Refer to Table 5.17).

Often, variables are merged to increase the validity of the results by; creating a 2 x 2 cells and ensuring that expected value (E) is not less than 5. If E is less than 5, the percentage value of the cell should at least be 20% to be theoretically valid.

12 Pedok is an example of gotong-royong (voluntary communal work) carried out during the
Type of Variables | Test for Strength of Association Between the Variables
---|---
Nominal | • Goodman and Kruskal's lambda
2 × 2 table | • phi coefficient
2 × 2 table | • Cramer's V
Ordinal | • Kendall's Tau-b
| • Kendall's Tau-c

Table 5.17 Test value of strength for the different type of variables

The main role of the crosstabulation is to test the relationship between the dependent variable (the method of cultivating sago - traditional, a combination of traditional and modern, modern and the independent variables (socio-economic and environmental variables) at communal, household and personal level. The result of association between the variables will help to identify the "best" or most "sustainable" method of cultivation, taking into account the previous definition of "sustainable" in the context of its social, economic and environmental dimensions.

The dependent variable, method is crosstabulated against the communal factors, the variables, district and village, to find out whether there is any relationship between the spatial location and the methods used by the sago smallholders. This is to determine the existence of relationship between spatial location and methods of sago cultivation. (See Table 5.18).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Hypothetical relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dependent variable) method</td>
<td>The methods for cultivating sago. traditional (1), traditional and modern (2), modern (3)</td>
<td></td>
</tr>
<tr>
<td>(Independent variables):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>district</td>
<td>Mukah (1), Dalat (2), Oya (3)</td>
<td>no</td>
</tr>
<tr>
<td>village</td>
<td>Medong (1), Tanam (2), Jebungan and Tegak (3), Teh Labak and Sesok (4), Tellian Ulu (5)</td>
<td>yes</td>
</tr>
</tbody>
</table>

Table 5.18 Finding the relationship between the method of cultivating sago and the spatial location of the farm

harvesting of the sago palms.
The variable, method is also crosstabulated against household level factors to determine if there is tension between the social and economic roles of the sago production system. The household level factors consist of three main types of variables - social, economics and the characteristics of the sago farm (size of farm, distance from the farmer's house, etc.). The independent variables under the social factors are praadat (practise of adat), pedok (the practise of pedok), labour (people who are involved in cultivating sago) and family (the number of the household family members). The aim is to find out whether the method of cultivating sago has any relationship with the extent of practising adat, the structure of labour involved in cultivation and the number of members in the household. (Refer to Table 5.19).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Hypothetical relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dependent variable) method</td>
<td>The methods for cultivating sago. traditional (1), traditional and modern (2), modern (3)</td>
<td></td>
</tr>
<tr>
<td>(Independent variables):</td>
<td>praadat</td>
<td>The practise of adat. yes (1), no (2)</td>
</tr>
<tr>
<td></td>
<td>pedok</td>
<td>The practise of pedok. yes (1), no (2)</td>
</tr>
<tr>
<td></td>
<td>labour</td>
<td>People involved in sago cultivation. family (1), employ outsiders (2), family and outsiders (3)</td>
</tr>
<tr>
<td></td>
<td>family</td>
<td>The number of household members. less than 4 (1), 4 to 8 (2), more than 8 (3)</td>
</tr>
</tbody>
</table>

Table 5.19 Finding the relationship between the method of cultivating sago and the social factors of the household

Method is also crosstabulated against the economic independent variables of size sago (size of the sago farm), totinct (the total monthly income), sagoine (the annual sago income), costinpu (the total farming expenditure), subsidy (the availability of subsidy granted by the DOA), selfsuff (other sources of food, such from the local environment), otherjob (engaging in other job, besides cultivating sago) and otherinc (receiving other income, apart from sago). Again, the purpose is to determine whether there is any relationship between using certain method of cultivating sago and; farm size; income; cost; the effects of receiving subsidy; the utilisation of the local environment as a source of food; engaging in other types of job, besides cultivating sago and; receiving other forms of income. The hypothetical relationship is summarised in Table 5.20.
### Table 5.20 Finding association between the dependent variable, method and the economic variables at the household level factors

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Hypothetical relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dependent variable) method</td>
<td>The methods for cultivating sago. traditional (1), traditional and modern (2), modern (3)</td>
<td></td>
</tr>
<tr>
<td>(Independent variables):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sizesago</td>
<td>The size of sago farm, less than 0.8 hectares (1), 0.8 to 2 hectares (2), more than 2 hectares (3)</td>
<td>yes</td>
</tr>
<tr>
<td>income</td>
<td>Net monthly income of the respondent. less than RM 295 (1), RM 296 - 495 (2), RM 496 - RM 595 (3), more than 595 (4)</td>
<td>yes</td>
</tr>
<tr>
<td>sagoinc</td>
<td>Net annual income of sago. less than RM 500 (1), RM 500 to 1000 (2), more than RM 1000 (3)</td>
<td>yes</td>
</tr>
<tr>
<td>costinpu</td>
<td>The total cost of farming expenditure. less than RM 50 (1), RM 50 to 100 (2), more than RM 100 (4)</td>
<td>yes</td>
</tr>
<tr>
<td>subsidy</td>
<td>Receiving subsidy from the DOA. yes (1), no (2)</td>
<td>yes</td>
</tr>
<tr>
<td>selfsuff</td>
<td>Other sources of food, such as from the local environment. yes (1), no (2)</td>
<td>yes</td>
</tr>
<tr>
<td>otherjob</td>
<td>Engaging in other jobs besides cultivating sago. yes (1), no (2)</td>
<td>yes</td>
</tr>
<tr>
<td>otherinc</td>
<td>Income from other sources besides sago. less than RM 300 (1), RM 300 to 500 (2), more than RM 500 (3)</td>
<td>yes</td>
</tr>
</tbody>
</table>

Table 5.21 Finding the association between the dependent variable method and the characteristics of the sago farm

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Hypothetical relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dependent variable) method</td>
<td>The methods for cultivating sago. traditional (1), traditional and modern (2), modern (3)</td>
<td></td>
</tr>
<tr>
<td>(Independent variables):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>persago</td>
<td>Period of cultivating sago. less than 10 years (1), 10 to 20 years (2), more than 20 years (3)</td>
<td>yes</td>
</tr>
<tr>
<td>distance</td>
<td>Distance of farm from the household. more than 1 hour (1), 1 to 3 hours (2), more than 3 hours (3)</td>
<td>yes</td>
</tr>
<tr>
<td>harvest</td>
<td>Number of sago fell in a year. less than 150 palms (1), 150 to 300 palms (2), more than 150 palms (3)</td>
<td>yes</td>
</tr>
<tr>
<td>timefell</td>
<td>Rate of exploitation in a year. less than 2 times (1), 2 to 4 times (2), more than 4 times (3)</td>
<td>yes</td>
</tr>
<tr>
<td>hour</td>
<td>The average number of time spent working in the farm in a day. less than 5 hours (1), 6 to 10 hours (2), more than 10 hours (3)</td>
<td>yes</td>
</tr>
<tr>
<td>day</td>
<td>The average number of day spent working in the farm in a week. less than 2 days (1), 3 to 5 days (2), more than 5 days (3), not certain (4)</td>
<td>yes</td>
</tr>
<tr>
<td>sell</td>
<td>Buyer of sago logs. factory (1), middle person (2), factory and middle person (3)</td>
<td>no</td>
</tr>
<tr>
<td>pay</td>
<td>Form of payment received from the buyer. cash on delivery (1), paid by instalment (2), paid in advance (3), c.o.d. and instalment (4)</td>
<td>no</td>
</tr>
<tr>
<td>pplant</td>
<td>Problem of planting sago. yes (1), no (2)</td>
<td>yes</td>
</tr>
<tr>
<td>pcultiva</td>
<td>Problem of maintaining the sago farm. yes (1), no (2)</td>
<td>yes</td>
</tr>
<tr>
<td>pharvest</td>
<td>Problem of harvesting sago. yes (1), no (2)</td>
<td>yes</td>
</tr>
</tbody>
</table>
Possible associations between the methods used in cultivating sago and the characteristics of the sago farm are also tested. Method is crosstabulated against persago, distance, harvest, timefell, hour, day, pplant, pharvest, pcultiva, sell and pay, in order to determine the effects of the period of cultivating sago; distance to the farm from the household; frequency of harvesting; number of sago fell in a year; time spent in cultivating sago; method of selling sago logs and; all the problems at different stages of cultivating, including planting, maintaining and harvesting. This is illustrated in Table 5.21.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Hypothetical relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>method</td>
<td>The methods for cultivating sago. traditional (1), traditional and modern (2), modern (3)</td>
<td></td>
</tr>
<tr>
<td>gender</td>
<td>Gender of the respondent. male (1), female (2)</td>
<td>yes</td>
</tr>
<tr>
<td>age</td>
<td>Age of the respondent. 10 - 29 years old (1), 30 - 49 years old (2), 50 - 69 years old (3), more than 69 years old (4)</td>
<td>yes</td>
</tr>
<tr>
<td>education</td>
<td>Education level of the respondent. no formal education (1), primary school (2), secondary school (3), others (4)</td>
<td>yes</td>
</tr>
<tr>
<td>religion</td>
<td>Religion of the respondent. Muslim (1), Christian (2), Pagan (3)</td>
<td>yes</td>
</tr>
</tbody>
</table>

Table 5.22  Crosstabulation between the dependent variable (method) and the personal factors variables

The method of cultivating sago is also compared to variables, which are related to the personal characteristics of the farmers (opinions, values and aspirations on the effects of the sago plantation and the condition of the present environment compare to the past). Thus, method is crosstabulated with gender, age, education and religion (personal factors); effectin and effectgn (the effect of sago plantation) and; ease and river (the condition of the environment). The summarised hypothetical result is illustrated in Table 5.22 to 5.24.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Hypothetical relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>method</td>
<td>The methods for cultivating sago. traditional (1), traditional and modern (2), modern (3)</td>
<td></td>
</tr>
<tr>
<td>effectin</td>
<td>Effect of the sago plantation to the respondent income. increase (1), no change (2), decline (3)</td>
<td>no</td>
</tr>
<tr>
<td>effectgn</td>
<td>Effect of the sago plantation to the sago garden. yes (1), no (2)</td>
<td>no</td>
</tr>
</tbody>
</table>

Table 5.23  Finding the association between the method of cultivating sago and the effects of the sago plantation
Variables | Definition of the variables | Hypothetical relationship
--- | --- | ---
(Independent variables): ease | Condition of collecting food from the forest and river compare to the past. easier (1), unchanged (2), harder (3) | no
river | The present condition of the local river compare to the past. cleaner than before (1), does not change (2), dirtier than before (3) | no
(Independent variables) method | The methods for cultivating sago. traditional (1), traditional and modern (2), modern (3) | 

Table 5.24 Finding association between the method of cultivating sago and the opinions concerning the local environment

Where appropriate, other variables are also crosstabulated with each other. For example when certain hypothesis is rejected, other explanations are sought through different variable combinations.

Section 5.7 Conclusion

This chapter has detailed and justified the methods used to collect and analyse the data. Both qualitative and quantitative data are collected in order to supplement the latter with the former. Household interviews are used and various other qualitative surveys, such as, individual in-depth interview, group discussions and participant observation surveys.

The quantitative data are analysed through frequency test, the Kruskall-Wallis one way Anova to compare the means within the variables and; finding the association between the variables. The qualitative data is analysed by cognitive mapping method.

The next two chapters provide the presentation of the data analysed.
Chapter Six  Sago production and processing industries

This Chapter starts with a description of the environment in the study area, focusing on the position of sago (*Metroxylon sagu*), as the main crop cultivated by the Melanau.

The results presented in this chapter include the characteristics of three different methods of cultivating sago – traditional, modern (smallholdings), and the plantation and also shows the relationship between the sago growers and the processing industries, (traditional cottage industries and more modern mills). The effects of government policies including the Sago Subsidy Planting Scheme are examined.

Section 6.1  Geographical background of the study area

The study area is made up of peat swamp forest. Peat swamp forest exists where the soil contains more than 65 per cent organic matter, whatever its depth (50 centimetres to 20 metres or above) (Bennett, 1997). There are two types of peat forest - umbrogenous and topogenous (Bennett, 1997). Most of the peat forests in Sarawak are of the umbrogenous type, that is, forming on the inward edge of the mangrove forest. Topogenous swamp forests are not common in Sarawak, as they are formed in depressions subject to flooding, often in inland areas. Approximately one and a quarter million hectares of swamp forest exist in Sarawak (Jabatan Pertanian Sarawak, 1995).

Figure 6.1 shows the formation of the umbrogenous peat swamp forest. Mangrove forest develops from recently deposited silt along the coast, eventually advancing towards the sea in subsequent years. Peat swamp forest is formed behind and over previous mangrove forest, as it is protected from further tidal flooding. Peat formation in this area is also assisted by the absence of coastal decomposers (such as crabs) which have moved down slope towards the sea. As the sea ‘retreats’ and the mangroves die, they form a layer of poorly decomposed vegetation which becomes peat, accumulating until a dome has built up over the mangrove soil. This process of continual accumulation takes several thousand of years.
Stanton (1972) described the area as “young”, having developed some 5,800 years ago following the last Glacial period. The peat layer varies from 0.305 to 15.25 metres in depth and may overlie sand or clay. The area is regularly but not continuously flooded (Flach, 1984).

One of the main characteristics of peat swamp forest is its acidic soil. The pH ranges from 3.0 to 4.5 (Stanton, 1972; Bennett, 1997). It is therefore extremely acidic, and is unsuitable for agricultural development, except for certain plants like sago. This is because acidic soil causes minerals and compounds that can be toxic to plants (such as manganese, iron, aluminium, phenols and tannins) to dissolve more easily into the peat waters (Bennett, 1997). As a result, beneficial nutrients are scarce, while toxins inhibiting plant growth are common. Cash crops like oil palm and pineapple can thrive on peat swamp, but due to the lack of beneficial nutrients, fertilisers need to be added. Fertilisers have negative side effects to the areas, especially where inundation occurs. There is no point of applying fertilisers to the area, since they will be washed away by regular floods and may cause harmful side effects to downstream environment. Acid management is possible but very expensive and may increase the rate of peat oxidation and subsidence.

Figure 6.1 The formation of umbrogenous peat swamp

(Source: Compilation of information from Bennett, 1997)
Peat swamp is permanently saturated with water. The water retention capacity of peat swamp is enormous (about 500 to 1000 per cent of its own weight) (Bennett, 1997). This characteristic also hinders commercial development of agricultural crops, since most crops need the ground water levels to be well below the soil surface for the root system to function. In order for crops to grow, the system has to be drained. This is not only expensive but also has negative environmental side effects. Bennett (1997) described these as subsidence and the oxidation of the peat. When peat swamp dries up, there is a danger of fire, which is difficult to extinguish, because all the carbon compounds below the surface burn slowly. An example of this occurred in the peat swamp forest of Sumatra and Kalimantan, Indonesia in 1997, resulting in a smoke haze which blanketed the whole of South-east Asia (Gough, 1998).

According to Stanton (1972), in areas of silt and shallower peat, potassium, calcium, nitrogen, phosphorus, zinc and magnesium can be found. Magnesium is the most predominant mineral (4 to 500 parts per million) followed by zinc. This type of peat soil is termed a mineral soil and it is, where most of the cultivated sago palms are found.

Peat swamp also consists of semi-decomposed organic material like roots, branches and tree trunks loosely bounded together. This characteristic posed significant cultivation problems. The loosely bound material, make it difficult for unadapted plants to anchor or position themselves. Heavy machinery performs poorly in this environment and constraints, or makes expensive, the construction of a ‘modern’ agricultural development site.
According to Bennett (1997), there are four main special ecological functions of the peat swamps. Firstly, peat swamp acts as a “reservoir” (the ground water table) to the area, especially during droughts. In the rainy season, the swamp reduces floods by absorbing water and releasing it during drier periods. It also separates sea and fresh water and maintaining the quality of freshwater in agricultural lands. Lastly, peat acts as a “carbon sink” (storing and accumulating organic matter), whereby about a third of the global carbon is held in peat lands. If these organic matters are drained, carbon will oxidise and be released into the atmosphere, which may contribute further to the “greenhouse effect” and global warming. Peat swamp has its own particular ecology, maintaining a hydrological and chemical balance in both the swamp itself and the surrounding environment. If this ecological balance is disrupted or changed through development, destruction and side effects will occur.

Section 6.1.1 The sago palm (*Metroxylon sagu*)

![Image of sago palm](http://www.pacsoa.org.au/palms/Metroxylon/sagu.html)

Figure 6.3 The sago palm

(Sources: Rik Schuiling, [http://www.pacsoa.org.au/palms/Metroxylon/sagu.html](http://www.pacsoa.org.au/palms/Metroxylon/sagu.html))

Sago palm is one of the genus *Metroxylon* belonging to the *Lepidocaryoid* sub family of the *Arecales* (*Palmae*) (Flach, 1984). It is a huge tropical palm, accumulating food reserve in its trunk in the form of starch and sugars, which expand at the time of flowering. The tree matures at between 10 to 40 years, depending on the soil (Stanton, 1972). The sago palm
originated in the area extending from Moluccas of Indonesia to New Guinea and at present, is widely grown across Southeast Asia and Oceania.

The growing habit of the sago palm is characterised as: hapaxantix (flowering once in its lifetime), a monocotyledonous and soboliferous (Stanton, 1972 and Flach, 1984). The sago palm may be harvested all year round. It is propagated by using its tillering (soboliferous) suckers and through its seedlings. The breeding system is monoecious, that is the palm is bisexual, but the male flowers mature first, which therefore favours cross-pollination (Stanton, 1972).

Flach (1984), described the propagation of sago palm in the following manner:

"These sago palms are monoecious and monocarpic palms up to 10 metres in height with basal suckers which may be used for propagation. The leaves are large and pinnate. Each trunk of a clump of sucker produces at the end of its life cycle a vast terminal inflorescence and then dies. The flowers are borne spirally in pairs on the tertiary axis. Of each flowers, one is male and the other complete but only functionally female. The anthers shed their pollen before the female flowers are receptive, thus the palm should be considered as obligatory cross-pollinator" (Flach, 1984; p.11).

The main diseases and pests affecting the sago palm come from weevils, of which two types are important - the red stripe weevil (Rhynchophorus Schach OLIV) and the palm weevil (Rhynchophorus ferrugineus) (Flach, 1984). Sago palm can also be attacked by termites, wild boars and monkeys.

Figure 6.4 A group of sago palms at inflorescence stage
Flach (1984) described the growing stages of sago palms. The palm starts with the growth of a rosette of leaves. This is followed by an establishment period during which the trunk is formed with a very slow leaf formation until the third and fourth years of growth. Following the establishment period, the leaf area increases, until it reaches an optimum of about 18 leaves or fronds, each 6 to 7 meters long and with about 50 pairs of leaflets (60 to 180 centimetres long and approximately 5 centimetres wide). During this period, the trunk continues to thicken in accordance with the progress of leaf formation. At the same time, the palm also produces suckers, resulting in clumps or stools of plants. (Figure 6.7). The final growing stage is the flowering or terminal inflorescence stage, through which the palm dies as the leaves fade.

Sago grows above 700 to 1000 metres asl (Flach, 1984). It is tolerant of low pH, high aluminium, iron and manganese in the soil as well as heavy impervious clay (Tan, 1977), but it can grow in both peat and mineral soil, (though the latter is better). In Sarawak, sago not only grows in the swamp lowland silt, but may also grow in the moist upland areas. The study area focuses in the former environment. Within the swamp lowland silt, sago farm are found along the principal rivers of Igan, Oya and Mukah, usually within 600 metres of a watercourse, mainly for ecological, human settlement and transportation reasons. (Figure 5.1, showing the detail location of the villages in the study area). According to Stanton (1972), sago is best cultivated in shallow peat of (up to 1 metre thick) overlying clay, without saline inundation. Morris (1953), reported that sago is grown in deep peat (locally referred as tana'guun or the jungle soil), but would grow better in a mixed soil of alluvial sand, peat and clay at the promontories of the river.

Sago palm is the only crop that can be grown in peat swamp areas at minimum cost. This is because the environmental conditions of peat swamps only really suit the sago palm. Unlike other crops, there is no need to irrigate or drain the peat area. Moreover, as discussed in Section 6.1.1, draining the peat swamp forest causes negative side effects. Sago is able to produce almost indefinitely because of regular inundation, which brings in beneficial minerals from upstream. Regular flooding also reduces the pest and disease load of the palm, ensuring health and promoting growth. With controlled irrigation seasonal inundation will stop.
Cross-sectional view

1 the mother sago palm
2, 3, 4 and 5 are the suckers of the sago palms

Figure 6. 5 The sago palms surrounded by their "suckers"
(Source: Author's photograph)

Figure 6. 6 The sago palm and its "suckers"
(Source: Flach, 1984)
As well as its starch product, sago is also valued for agronomic reasons. It needs little maintenance, (weeding, fertilising and even minimal land preparation) during planting. A sago farm will continue to sustain production for up to 400 years (Stanton, 1974). Moreover, there is a flexibility over the harvesting period (any time up to 2 years before flowering) (Stanton, 1972). Harvesting can either be advanced or delayed, according to the choice and convenience of the sago smallholder. As the sago palm is a perennial, harvesting can take place at any time in the year. Bennett (1997), recognised the agronomic advantages of sago palm, but stressed that the mutual benefits between peat swamp and the cultivation of sago palm is restricted to traditional practice;

“The only crop which grows well in peat soils without liming and fertilisers is sago, but only under traditional, relatively low-yielding management. With commercial yield levels, fertilisers are needed” (Bennett, 1997: p.66).

Starch is conserved inside the resistant covering of the palm trunk. A maximum amount of energy is devoted to starch production. In the closed canopy of the peat swamp forest, it is essential that the growth feature of the plant that maximises the utilisation of solar energy is starch storage.

When processed, sago starch has several advantages over maize and tapioca starch. It has a lower viscosity at a given concentration than other pastes and is noted for its slow retrogradation, which means that the starch's viscosity stability is high when kept for a very long periods at near boiling point. Sago starch is also less inclined to gelate under cooling.

Section 6.1.2 Historical background of the sago production and processing industries

The Melanau originate from the endo-Bornean indigenous groups, locally termed as the “Orang Ulu”; mainly of the Kajang group which includes the hill tribes of Kejaman, Sekapan, Lahahan, Punan Ba, Sian and Buketan (Aseng, 1988). The origin of the Melanau origin is linked to the Kajang groups, based on shared characteristics (oral history, social organisation, customary practices, material culture and language).

The oral history of the Melanau suggests that part of the Kajang group moved down river, led by their legendary Chief, Tugau. The move to the coastal plain was caused by the expansion of Ibans into the Rejang Basin, resulting in the Melanau abandoning their longhouses in favour of their famous "tall houses"; a tactical protection from the Ibans. It was believed that Tugau first settled in Batang Retus, off Igan river. The rest of the Melanau then spread to
other parts of the coastal lowlands along the Rejang Estuary (Oya, Dalat, Mukah, Balingian and Matu-Daro areas) and as far North as Bintulu. They share some material cultural similarities with the Kajang, particularly in the architectural of their dwellings. The Melanau “tall house” is similar to the Kayan longhouse. Their dresses are also similar; black with beadings as beauty adornments (Morris, 1953 and Mooney, 1959).

Like the Kajang, Melanau social organisation is stratified hierarchically. This influences social relations (especially marriage) and the position of their dwellings. (See Chapter 4 for the Melanau’s hierarchical system). The Melanau and the Kajang also share similar customs. The most eminent being the practise of secondary burial (interning the bones after decomposition) (Banks, 1940). However, this practise died out when the Melanau converted to Islam and when Brooke ruled Sarawak, since it is against Islam and offended British sensitivity (Sandin, 1971). Clayre (1972) report linguistic similarities between the Melanau and Kajang.

On settling in the coastal swamp of the Rejang estuary, the Melanau adapted their lifestyle, socio-economic and culture to the peat swamp environment. Being river dwellers, the majority engaged in fishing and as sago growers. From the field survey, an elderly reported that the antecedent lived in the mountains upstream of Rejang river and used to harvest a palm similar to the sago (most probably *Eugeissona utilis*). This implies that the Melanau have a long experience and skill with palms. In the uphill region of Sarawak, most of the Kajang groups’ staple food is also sago, similar to the Melanau in the early days. However, sago is not directly cultivated. It is merely collected as part of forest products. The cultivation of sago is distinct from other crops because it is a transition crop between a pre-agricultural state of gathering wild foods and a full developed agriculture involving land clearance (Stanton, 1972).

Cultivating sago had been the major occupation of the Melanau, but it was, initially only grown for home consumption; a subsistence crop. Before the arrival of Brooke however, sago production had already changed from subsistence to a marketable crop, being exported to Singapore by the Brunei aristocracy. During this early period, sago was exported either in the form of sago pellets (processed locally in the cottage industry) or as wet starch. Sago wet starch was further processed into flour and meal in Singapore.
When Brooke started to take interest in sago, surplus production was further commercialised and in doing so, affect significantly Melanau’s livelihoods. At that time, the Brunei sago dealers faced competition from Kuching Malay. Brooke appointed a British firm (the British Borneo Company) to establish a mechanised mill in Kuching. Sago was brought from the study area to Kuching to be processed by Malay dealers. By 1872, the British sago mill had been moved to the study area itself because it needed a large number of palms in order to operate efficiently. Considered “modern” at that time, operating on steam engines with high overhead costs, it produced high quality sago flour. At the same time, the local Chinese came to the study area and set up sago mills of a very “crude” standard, with simple equipment. Most of them were funded by Singaporean Chinese millers who used to receive a constant supply of sago wet starch from the study area.

In contrast to the British mill which acquired sago logs from the Melanau, the Chinese millers bought wet sago starch from the local villagers and processed it into dry flour. This was one reason for the ultimate failure of the British mill, since the local Melanau prefer to pre-process their sago to get more cash, rather than sell the raw material to the British mill.

Morris (1991) described the method used by the Chinese millers as very crude. It;
“comprised a number of large tubs in which the crude flour, mixed with water, was stirred by hand. The mixture was then poured through filters of mat and cloth into a second tub, and the starch suspended in the filtrate, was allowed to settle. Any woody fibre that passed through was deposited as a thin layer above the finer grained starch, and was skimmed off. The washed flour was then dried and bagged for export. The finer quality of the flour needed, the more often washing was repeated” (Morris, 1991: p.243).

The Chinese millers’ method was slow and labour intensive (usually family members and dependent relatives, not the local Melanau). However, the equipment was cheap, simple and easily made locally, compared to the British mill. However the end product was of inferior quality. The British mill closed down due to its inability to compete with the Chinese mills. Brooke, however could not do anything and faced by dilemma of either to increase the quality of sago flour or to save the British Borneo Company. He was afraid that his actions would hinder export, from which his source of taxation revenue mainly came from.

Nevertheless, at a certain stage, Brooke tried to improve the quality of sago flour by introducing new rules to both the Melanau and the Chinese millers. Straining cloth was to be used, with a mat of a particular fine weave when trampling the wet pith. The Chinese millers
were ordered to use standard weights and measures. Brooke also attempted to curb some of the sharper trade practices of the middle men (mostly Chinese). All of these rules were disliked by both Melanau and Chinese. Attempts to improve the quality of sago flour were not successful because of the Melanau and Chinese attitudes of "not bothering with the quality as long as the flour can be sold at satisfactory prices". The low quality of sago produced in the study area remained the same until in the mid 1970s when the Department of Agriculture undertook several researches to improve the processing procedures and equipment of the Chinese millers.

1947 was the turning point of the sago processing industries, when a Chinese sago mill in Mukah began to mechanise. This was based on the construction of a power-driven wooden wheel, studded with nails for rasping sago logs, locally called parut. The parut was powered by an internal combustion engine and could shred 200 or more logs per day compared to only 4 to 5 logs when shredded manually. By 1949, 15 power-driven rasping mills were operating in Oya.

![Figure 6.7 Sago production in tonne from 1940 to 1994](Source: Compilation from DOA Report, 1940-1995)

Mechanised sago mills had huge effects on the Melanau. Traditional processing stopped completely. The Melanau suffered because they had become completely dependent on sago
production and processing as their main source of income. Following mechanisation Melanau's income was reduced to the selling of sago logs to the Chinese millers. With the change in processing, the Melanau were denied the value-added from processing wet starch. Economic conditions were further worsened by the slump in prices. The Melanau had to find other ways to adapt with the changes: work as lumberjacks or migrating to urban centres like Kuching and Sibu in search of alternative jobs.

The demand and the resulting price for sago flour fluctuates. Figure 6.7 shows the export of sago flour from Sarawak from 1940 to 1994. After 1940, production increased rapidly, due to surplus of matured sago palms which had not been harvested during the War. Production declined from 1949 until the mid 1950s, but thereafter increased, although the price declined, and reached a peak in 1963. This reflected a high dependency of sago as the Melanau's main source of income, with no other alternative source. Nevertheless, after 1963, production declined due to the availability of other jobs for men in nearby timber companies. In the 1970s, production remained more or less constant, with minor fluctuations. This was the period when the government introduced a subsidy scheme and started to do intensive research to improve methods of sago processing. Production increased rapidly again in the late 1980's until early 1990s.

Figure 6.8 Sago production in value from 1940 until 1994
(Source: Compilation from DOA report from 1940-1995)
Figure 6.8 shows the value of sago flour in exports, from 1940 until 1994. The value of sago started to decline after 1950. The worst period was between 1960 and 1966 but it then slowly increased, particularly after 1966 and again in 1990.

The price of sago improved in the 1990s, at an average of about RM 6 per section (about 1 metre) in Mukah, compare to only RM 0.65 in the 1960s. In 1995, the export value of sago was estimated to be RM 37,655,000, making it the fourth highest after oil palm, pepper and rubber (Jabatan Pertanian Sarawak, 1995). Most sago products are exported to Japan. In 1995, Sarawak produced 4818 tonne of sago flour and meal, of which 4784 tonne (99 per cent) went to Japan (Jabatan Pertanian Sarawak, 1995).

As a result of the favourable international price and the demand for sago, the government attempted to improve production of sago by setting up plantations. One of the reasons for setting up sago plantations was that the extraction of sago in the study area was under-utilised by Melanau sago smallholders.

<table>
<thead>
<tr>
<th>Year</th>
<th>World Market</th>
<th>Exporter</th>
<th>Processor(s)</th>
<th>Producer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1819-1860 (Brunei Reign)</td>
<td>Europe</td>
<td>Brunei Pengirans</td>
<td>Singapore Miller</td>
<td>Melanau Smallholders</td>
</tr>
<tr>
<td>1860-1890 (Brooke Rule)</td>
<td>Europe</td>
<td>Kuching Malays</td>
<td>Kuching Mill, British owned</td>
<td>Melanau Smallholders</td>
</tr>
<tr>
<td>After the Second World War, 1945-1960 (British Protectorate)</td>
<td>Europe</td>
<td>Chinese</td>
<td>Chinese Millers</td>
<td>Melanau Smallholders</td>
</tr>
<tr>
<td>1960s (British Protectorate until 1963, Malaysia)</td>
<td>Europe</td>
<td>Chinese</td>
<td>Chinese Millers</td>
<td>Melanau Smallholders</td>
</tr>
<tr>
<td>1970-1980s (Malaysia)</td>
<td>Japan</td>
<td>Chinese</td>
<td>• Chinese Millers</td>
<td>Melanau Smallholders</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• SEDC Mill</td>
<td></td>
</tr>
<tr>
<td>1990-1995 (Malaysia)</td>
<td>Japan</td>
<td>Chinese</td>
<td>• Chinese Millers</td>
<td>Melanau Smallholders</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• SEDC Mill</td>
<td>• LCDA Sago Plantation</td>
</tr>
</tbody>
</table>

Table 6.1 Changes affecting sago industry in the study area

Table 6.1 summarised historical changes in the sago industry, particularly changes in the role of actors involved in the industry. This table also indicates different internal and external
forces that had changed the structure of sago production and processing under different rules, from as early as 1819 until 1995.

Section 6.2 Traditional methods of cultivating sago

The Traditional method of cultivating sago is characterised by the use of old, almost ancient tools. Though ancient these techniques are rich in that they provide forms of environmental enforcement, mainly through social sanctions. This section describes traditional tools and techniques, used in each stages of cultivation process and the role of “adat” (in the form of “palet” - social sanctions) in sago cultivation.

There are four main stages in sago cultivation: the clearing of land, planting, maintenance and harvesting. Seed propagation and the transporting of harvested sago logs are also important, although the latter is now usually managed by sago millers.

The main tools that are used are the ‘kapak’ (axe); the ‘parang’ (long and large bush knife); the ‘cangkul’ (hoe); the ‘cangkuk’ (spade); the ‘dayung’ (a locally designed tool, built from wooden planks with nuts and washers, used to push sago logs, during transportation of sago logs from farms to nearby canals or rivers) and usually, the ‘perahu’ (long boat) for transportation.

Forest clearance follows the clearing ‘slash and burn’ method. Land that is cleared may be owned by smallholders (when registered with the Land and Survey Office in Sibu) or may remain as State land. However, in setting up the sago plantation, the government effectively reduced the acreage of State land available to the Melanau. (For detail discussion, refer to Section 6.5). It is very important that a smallholder who clears a piece of land does not clear other people’s property. There is a boundary marking system practised by the Melanau to prevent this. This is described by the group discussion of Kampung Medong as;

“In the old days, although we live together in one tall and long house, our farm are divided into individual ownership. If you were work hard, then you will own big farm. There was a system of marking the boundary of each land by planting vegetation that is unusual or prominent such as the ‘binjat’, ‘petai’ or ‘pinang’. Other people wanting to expand their

---

1 Mangifera caesia
2 Parkia jaranica
3 Areca catechu

147
farm must look at the sign of any of these vegetation, usually planted in rows on the boundary of each farm. If such sign existed, the person who wanting to expand his or her farm should search other plot. Harmony was ensured by this system. There had been no clash or conflict. The boundary was maintained and respected. We also organised voluntary programmes of cleaning rivers and making pathways for public use. The project usually comprised of 10 to 15 people who live or whose farm were located in the same area.”

<table>
<thead>
<tr>
<th>Palei (Cannot go to farm) when;</th>
<th>Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Conditions of Circumstances)</td>
</tr>
<tr>
<td>Hearing the sound of bird</td>
<td>• Type of birds are &quot;Putir&quot;, &quot;Bukang&quot; and &quot;Tepasek&quot;</td>
</tr>
<tr>
<td></td>
<td>• Sound must be once only</td>
</tr>
<tr>
<td></td>
<td>• Type of birds are &quot;Putir&quot;, &quot;Bukang&quot; and &quot;Tepasek&quot; (Tepasek most dangerous, should always be trusted)</td>
</tr>
<tr>
<td></td>
<td>• Sound must be once only</td>
</tr>
<tr>
<td></td>
<td>• Type of birds is &quot;Tekupong&quot; (greyish feather, a bit smaller than a sparrow)</td>
</tr>
<tr>
<td></td>
<td>• When the bird fly directly to the smallholder’s eyes</td>
</tr>
<tr>
<td></td>
<td>• If the sound is from the right side of the ears (if left, can proceed to farm)</td>
</tr>
<tr>
<td></td>
<td>• Sound must be only once only</td>
</tr>
<tr>
<td>Hearing the sound of lizard</td>
<td>• If the sound is from the front</td>
</tr>
<tr>
<td></td>
<td>• No matter how many time (more is dangerous than once)</td>
</tr>
<tr>
<td></td>
<td>• Sound must be three times only</td>
</tr>
<tr>
<td></td>
<td>• Not available</td>
</tr>
<tr>
<td></td>
<td>• If the sound is from the front</td>
</tr>
<tr>
<td></td>
<td>• No matter how many time (more is dangerous than once)</td>
</tr>
<tr>
<td>Bad dreams</td>
<td>• Applicable</td>
</tr>
<tr>
<td>Encounters with Chicken</td>
<td>• Not available</td>
</tr>
<tr>
<td></td>
<td>• When the chicken flies and passes across the boat</td>
</tr>
<tr>
<td>Encounters with snake</td>
<td>• Not available</td>
</tr>
<tr>
<td></td>
<td>• Not available</td>
</tr>
<tr>
<td></td>
<td>• Not available</td>
</tr>
<tr>
<td>Forbidden time of the year to go to the farm</td>
<td>• Three days cannot go to the farm when someone dies in the village</td>
</tr>
<tr>
<td></td>
<td>• Same as Tanam</td>
</tr>
<tr>
<td></td>
<td>• Three days cannot go to the farm after the “kaut” ceremony</td>
</tr>
<tr>
<td></td>
<td>• Same as Tanam</td>
</tr>
<tr>
<td></td>
<td>• Same as Tanam</td>
</tr>
<tr>
<td></td>
<td>• &quot;Bulan Pengejin&quot; (the first month in the Melanau calendar)</td>
</tr>
</tbody>
</table>

Table 6.2  Social sanctions (palei) before going to the farm

A smallholder is under social sanction as soon as he intends to clear a piece of land. This also applies to the smallholder whenever he wishes to make a journey to his farm, for whatever reasons, be it for planting, maintenance of the farm or for harvesting. According to the adat, a smallholder cannot continue his intention of going to the farm when he has bad dreams.
dreams the night before or when he hears the sound of certain birds and lizard or when he encounters a chicken or a snake. Table 6.2 shows the detail of the *palei*.

The information is derived from group discussions held in four villages - Kampung Tanam and Kampung Medong of Dalat and Kampung Jebungan and Kampung Tellian Ulu of Mukah. The discussion groups consist of elders, a shaman, village heads and the *Temenggung*. Bad signs (the sound of certain birds or lizards, bad dreams and an encounter with a chicken or a snake) will automatically become invalid, when it happens for more than 4 to 5 days. The Melanau believe that if the *palei* are not followed, accidents and hazards will occur (being bitten by a snake, crushed by a tree trunk or wounded by a *parang*). These accidents may cause prolonged illness, which may ultimately lead to death. The people of Kampung Medong are very conscious about the *palei* concerning the sound of birds. They believe that even when they have already reached the farm, if the sound of the bird "*Tepasik*" is heard even from behind, the farmer should return home at once in order to forestall hazardous accidents. Moreover, if the sound of the "*Tepasik*" was heard from the front, the bird is giving a signal that something bad is happening at home. The farmer should immediately go back home to check the safety of his or her family.

![Diagram of wind direction](image)

**Figure 6.9** The correct position to start a fire during burning, for clearing process

During land clearance, there are several precautions and techniques that need to be adhered to, so as to ensure successful plantings. Two things must be present at this stage - favourable
weather and ensuring that trees are cut at a similar height to assist burning. This was confirmed by Mura of Kampung Jebungan as below;

"Burning is important. You must be able to choose a good day to burn. The wind must be strong, hot and dry. Burn against the wind. Usually 80 per cent of what you plant will grow well, if taking more care it is possible that all 100 per cent will survive".

The importance of burning is further supported by Kampung Tanam’s Head village, Kab Satamong. Furthermore, he also stressed safety and the importance of cutting trees at a similar height to facilitate burning. His opinion is quoted as below;

"The most important stage is clearing. Trees must be cut at the same height to assist burning. Cut the grass first, small trees and then the big ones. When burning, look at the direction of the wind. Be careful with your own position, make sure that you are situated outside the targeted area. It is also important to ensure that the fire will not spread to other area by good controlling, that is, playing with the direction of the wind." (Figure 6.9)

Figure 6.10 A smallholder of Kampung Sesok in his cleared site
(Source: Author’s own photograph)

During the clearing period, it is important that smallholders adhere strictly to a controlled diet as prescribed by "palei". Certain food must not be eaten (particularly egg, prawn and shark), so as to avoid blistering or swollen hands (Kampung Tanam) and (Kampung Medong). Similarly there are controls about handling the axe and parang during clearing. After the site has been cleared and burnt, it is left to dry for three months before planting begins (Information from Ramon of Kampung Sesok).
Ramon of Kampung Sesok, Mukah is a retired civil servant but now a full-time sago smallholder. He provided most of the information on indigenous techniques during the planting stage. Ramon describes the planting process thus;

"After three months, most of the trunks and leftover trees have fallen to the ground and decomposed as ashes. This provides the new site with compost, acting as fertiliser to the site. After that, any new vegetation that grows should be cleared. After one week, make some signs by using leftover sticks (about “sedepak” - one fathom in height) from the clearing of the site. When shoots started to grow on the trees that have been felled before, then start planting the sago suckers. There is no need for bunds to be made. Sago sucker is planted in the ground up to its “collar”. It is important that the suckers are not planted too deep, otherwise it will die. Sago shoots will die if left to be in contact with water.”

Run, a smallholder from Kampung Telllian Ulu, also describes some traditional planting techniques in relation to the selection of a site for the planting hole;

“When you are planting sago suckers, make sure that there is no big tree trunk inside the ground, where the sucker is to be planted. If not, the root of the palm will not penetrate deep enough and the palm will be easily blown down by wind. Make sure that the tree trunk is about 1 to 1.2 metres deep below the desired planting point”.

There are also palei for the planting process. (Table 6.3)

<table>
<thead>
<tr>
<th>Palei during planting</th>
<th>Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Conditions of Circumstances)</td>
</tr>
<tr>
<td></td>
<td>Tanam</td>
</tr>
<tr>
<td>Position of a smallholder in relation to his or her shadow</td>
<td>• Do not plant against a shadow (shadow must not be inside planting point or hole) or else the smallholder’s soul will also be buried with the sago suckers and may result in death</td>
</tr>
<tr>
<td>“Penawar Balau” (“ailments of the sago palm”)</td>
<td>• “Penawar Balau” which consists of four types of local vegetation which the Melanau call “didek”, “tuba”, “akar binak” and “pinang” (betel nut), should be placed inside the first planting hole</td>
</tr>
</tbody>
</table>

151
around the sago sucker. The purpose of planting these vegetation is to deter away pest • “Tuba” will poison the pest, “pinang” and “akar binak” will produce a bitter taste and “kelidek” will make the pest itchy.

<table>
<thead>
<tr>
<th>Eating conduct (applied every time in the farm)</th>
<th>Not available</th>
<th>Do not eat and walk at the same time, or else animals in the forest, especially the palm’s pest will also imitate the smallholder’s action by eating the sago suckers/palms • Do not run, laugh or make fun inside the farm, otherwise the palm’s pest will disturb the sago suckers/palm by exactly the same way</th>
<th>Do not eat and walk at the same time, or else animals in the forest, especially the palm’s pest will also imitate the smallholder’s action by eating the sago suckers/palms • Same as Jebungan • During the process of planting, smallholders must restrain him/herself from eating the heart of a shark or else the sago palm will not grow well</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hear certain sound in the farm</td>
<td>Not available</td>
<td>When hearing the sound of the bird, “kenyalang” (Hornbill), planting will not be successful • Smallholders must return home using the same pathway as coming to the farm • Avoid from walking around the farm, or else all the sago palms will not grow well or die</td>
<td>Not available • When planting the third sago sucker, and hearing the sound of a fallen old trunk, stop and go home, otherwise the palm will not grow well</td>
</tr>
<tr>
<td>Releasing the sticks supporting the sago suckers</td>
<td>Not available</td>
<td>Not available • The sticks used to support the sago suckers must be released from the ground, otherwise the soul of the smallholder will be stamped into the ground with the consequence of getting ill or die</td>
<td>Not available</td>
</tr>
</tbody>
</table>

Table 6.3  
Palei during planting

During the first three to four years, smallholders need to protect the farm from pests and weeds. It is also important to prune excess branches and fronds from the growing sago palm. Weeding and pest controls are considered minimal jobs, if all techniques and palei during clearing and planting are followed. Ramon said that not much weeding is needed if the burning process during the clearing stage is successful.
"A good smallholder will be able to eliminate most grass during the burning process. A good smallholder is a smallholder who knows the right day to burn - sunny, dry and plenty of wind to assist the spread of fires."

Although weeding is regular, it is not "clear" weeding because pest (mainly insects) will then have other fodder choice. "Spot weeding" is the term used by the smallholder, which means weeding selectively only at a certain overgrown areas, considered competing for nutrients with the growing palms.

Most pests are deterred by the "Penawar balau" formula. (Table 6.3). In some cases, like Kampung Jebungan, some plantings are purposely reserved for pests (Table 6.3). The first sago suckers are thus to die. In some cases, a smallholder (an example is Rabiah from Kampung Teh of Dalat) purposely plants sago suckers at a higher density, and prunes less of those adjoined to the mother palm in order to feed pests. In this case, any losses from pests can be compensated.

Figure 6.11 The planted sago suckers
(Source: Author's own photograph)

The main pests are sago weevils, squirrels, wild boar, monkeys, snakes, rats and termites. Most are eaten by the smallholders (except for rats and termites). Sago weevils are traditional delicacies. When questioned about the problems of pests, Jenuri, a smallholder in Kampung Teh Labak said that;

"There are no more animals here. We can hardly even find a squirrel nowadays, ever since the villagers hunt using firearms. Nowadays, we culture sago weevils by covering some selected sago sections with sago leaves. Although the weevils are expensive nowadays, we'd rather not cultivate them, for they are too messy to handle. Other problems are termites and rats, but most of them are controlled when we burn the pruned sago branches and fronds."
However, you must always take care during burning, or else the fire can easily spread to other parts of the farm and destroy your sago palms.”

The pruning of excess trunks and fronds is important, in order to promote the vertical growth and establishment of the sago palm. Vertical growth is considered important by smallholders because sago millers calculate sago sections according to their length, not diameter. Taller palm means more sections and more money. However, smallholders need to maintain a reasonable diameter so as to maintain the rapport and trust between smallholders and millers. Old and dying trunks and fronds are carefully selected. They are left at various sites in the farm to dry for half a month before burning begins. The ashes from the burnt branches and leaves provide continuous nutrients to the sago palms. Sometime, the burnt trunks and fronds are used to deter termites.

![Figure 6.12 Other crop grown in the sago farm](Source: Author’s photograph)

Smallholders also plant other crops during the maintenance period, principally vegetables and fruit trees for their households’ needs and sometime to supplement income. They are grown all around the farm, depending on the soils that suit them. Smallholders practice intercropping, growing different crops in a vertical hierarchy, with vegetables (at ground level), bigger trees next and followed by sago palms. Most of the plants (especially vegetables) are quick to harvest (long beans, watermelon, cucumber, sweet potato, pineapple, tapioca, pumpkin and gourd). Fruit trees are mainly annual, such as rambutan (*Nephelium sp.*), and durian (*Durio spp.*). Others include banana (*Musa spp.*), mango (*Mangifera*
indica), guava (Psidium guajava), starfruit and papaya (Carica papaya). Smallholders exclusively concentrate on the sago palms, as they become ready for harvesting. For smallholders owning already established farms, extra crops are cultivated less intensively. However, the planting of annual crops such as rambutan and durian is common. Ramon of Kampung Sesok described the maintenance stage:

"There is also a need to burn sago leaves occasionally. This is particularly important during growing stage or what we call maintenance stage. However, fire must be supervised at all times. Well, our work in the growing stage is mainly burning excess leaves and planting some vegetables, such as cucumber and pumpkin. About 13 per cent of the garden is grown with vegetables. This is a good way to obtain side-income or for daily consumption while waiting for the harvest".

Figure 6.13 The traditional floating nursery

(Source: Author's photograph)

For smallholders owning an already established farm, the maintenance stage is also the time to propagate seedlings for future stocks and plantings. The first task is to cut sago suckers from their mother palms. In the process, several traditional techniques are followed, to prevent damage to the mother palm and to ensure that the sucker grow well. Run, a smallholder from Kampung Tellian Ulu described techniques for choosing sago suckers:

"It is a palei to take sago suckers away from a young mother plant, if the mother plant is less than 2 to 3 sections\textsuperscript{4}. This is because sago suckers cut from young mother plant tend to be eaten by sago worms\textsuperscript{5}. If the mother plant is too old, it is also not advisable to take the

\textsuperscript{4} about 2 to 3 metres long  
\textsuperscript{5} sago weevils
suckers, because by then, the suckers will be too hard. The sign of “angau” is when there are white spots at the tip of the palm, there is no more branching, and there is a formation of “prawn’s beard” on the palm”.

Mura of Kampung Jebungan, Mukah provided tips on how to choose sago suckers from the mother palm and explained how the traditional sago palm nursery was set up as below;

“Sago suckers are propagated by carefully selecting and cutting suckers from the mother palm regularly. Sago suckers that grow like “branching out” will be selected for cutting, but it is important not to cut too deep fearing that the mother palm will be damaged. Sago suckers trailing down the ground will be left to replace the mother palm. The collected suckers are placed into drains located along side the sago farm. A raft is constructed by using bamboo, tied together to hold the sago suckers in place. The sago suckers are left in a drain, in a floating position for about 3 to 4 months, before ready to be planted. This is done yearly to maintain the continuous supply of sago palms”.

Figure 6.14 A traditional sago palm nursery
(Source: Author’s own illustration)

---

6 inflorescence
7 Refer to Figure 6.15
8 Refer to Figure 6.14
According to these traditional propagation techniques, there are two main things to consider - the age of the mother palm and the position of sago suckers in relation to the mother palm. From group discussions, smallholders in all villages didn’t grow sago from seedlings but preferred to grow them from suckers. Failure rates are higher with seedlings. Seedlings would not produce a definitively smooth type of sago palm. Groups in Kampung Tellian Ulu
and Medong said that the seedlings will produce four types of vegetation - the “asam paya” (*Eleiodoxa.conferta*), rattan (*Genera Calamus*), the thorny type and the smooth type of sago palm. Therefore, growing sago palms from a seedling is not reliable, because of cross-fertilisation or a failure to determine the exact species of the seedling. Groups in Kampung Tanam and Jebungan also agreed, although they argued that a seedling could not possibly grow into a rattan.

![Image of the forest undergrowth with seedlings and young palms]

*Figure 6.16 Pathway providing platform for rolling sago sections*

(Source: Author’s photograph)

*Figure 6.17 The “dayung”*

(Source: Author’s photograph)
The palms are harvested at between 8 to 15 years, as they reach maturity. (See Section 6.1.2 for further details). The traditional method of harvesting is to fell the palm with an axe. This must be done carefully to avoid being crushed by the falling tree. Penghulu Henry of Kampung Medong provided some tips;

"If the palm is slightly slanted to the right, then position yourself on the left for the axing of the trunk".

A large parang is used to cut sago logs into sections of about 1 metre each. Locals call the sections "lompong" or "keral". Pathways are made in the farm with fallen branches. (Refer to Figure 6.16). These provide a platform for the sago sections to be rolled out. Sago branches provide cheap and easy ways to transport sago sections to the nearest drain or river. They are positioned in a way that resembles a rail-line. In the late 1980's, locals invented a tool for rolling sago sections called "dayung" to replace the manual method of rolling the sections. The "dayung" consists of a pair wooden planks, held in each hand and steer like paddling oars, linked to the two flat side of the sago sections. (Refer to Figure 6.17). The dayung is much easier to deploy than the manual method. Ramon of Kampung Sesok explained the advantages of the "dayung";

"The dayung is not only convenient but also cheap. Materials for making the dayung are readily available locally. It is easier to roll sago sections using the dayung compares to the manual method, as it improves your body posture and causing less backache and blistered hands."

Smallholder must follow palei at the harvest, the palei of bad omens from animals (rats, snakes and birds) and of donating the first harvested palms during each harvest, to other people, mainly neighbours and friends. (Table 6.4).

Another important characteristic of the traditional method is the practise of "pedok" during harvesting. Pedok is a form of communal work of friends, relatives or neighbours, especially evident at harvest time, it is the hardest part of sago cultivation and is, especially difficult when using tools like axe and parang. It is hard and slow work. Those who join the pedok share the harvest. This is usually calculated in the ratio of 1:3, that is, 2/3 of the yield belongs to the owner, while 1/3 to those who participate in the pedok.

From the survey, 46.7 per cent of the respondents practise pedok, as against 53.3 per cent who do not. Table 6.5 shows the relationship between the duration of cultivating sago with the practise of pedok.
### Palei during harvesting

<table>
<thead>
<tr>
<th>Villages</th>
<th>(Circumstances of condition)</th>
<th>Medong</th>
<th>Jebungan</th>
<th>Tellian Ulu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals (rat and snake) are bad omen. If a rat falls from a sago palm that is intended to be fell, stop harvesting and go home. Wait until 3 days, when there is no longer any sign of the rat or snake.</td>
<td>On the 4th day, if the snake or rat is still there, go to a different palm or burn that particular palm (burn just a small part of dying leaves) together with some incantation (jampi), to compromise with the bad spirit of the snake.</td>
<td>• Apply only to rat • Go home otherwise will face with hazardous accidents</td>
<td>• If the palm (where the snake or rat has fallen from) is fell, give it to other people (neighbours and friends perhaps) the snake or rat palei also applies to palm already cut into sections • The palei is no longer valid, if the snake or rat can be caught and killed because the snake or rat then will not be able to tell its parents and therefore will no longer bring bad omen</td>
<td></td>
</tr>
<tr>
<td>The first sago palm harvested must be given to neighbours or friends</td>
<td>• Not available</td>
<td>• Applicable</td>
<td>• Applicable</td>
<td></td>
</tr>
<tr>
<td>Hearing the sound of a bird (putit) is a bad omen (valid for 3 consecutive days)</td>
<td>• Harvesting should stop and the smallholder should go home</td>
<td>• Not available</td>
<td>• Not available</td>
<td></td>
</tr>
</tbody>
</table>

**Table 6.4 Palei during harvesting**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Significant Results (Chi square $\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dependent variable) pedok</td>
<td>The practise of pedok. yes (1), no (2)</td>
<td></td>
</tr>
<tr>
<td>(Independent variables): persago</td>
<td>Period of cultivating sago. less than 10 years (1), 10 to 20 years (2), more than 20 years (3)</td>
<td>yes $p = 0.00178$</td>
</tr>
</tbody>
</table>

**Table 6.5 Crosstabulation between the dependent variable “pedok” and “persago”**
Table 6.6  Relationship between the period of cultivating sago and the practice of pedok

<table>
<thead>
<tr>
<th>Period of cultivating sago</th>
<th>Practice of Communal work (Pedok)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>less than 10 years</td>
<td>10</td>
</tr>
<tr>
<td>10 to 20 years</td>
<td>24</td>
</tr>
<tr>
<td>more than 20 years</td>
<td>65</td>
</tr>
</tbody>
</table>

Those who have cultivated sago for more than 20 years (65) tend to practise pedok (communal work), compare to only 10 of those cultivating sago less than 10 years. (Table 6.6)

Figure 6.18  Sago sections being transported away to the mill
(Sources: http://region.letters.hokudai.ac.jp/miyauchi/yasi-photo)

Figure 6.19  Sago sections floated down the rivers in raft formation
(Sources: http://region.letters.hokudai.ac.jp/miyauchi/yasi-photo)
Seventeen per cent of the respondents use only traditional method in their cultivation, while 52.8 per cent combine traditional and modern methods. Smallholders continue to use traditional method because they are safer, cost less and because of a strong belief in adat and the inaccessibility or lack of information about the Sago Planting Scheme (SPS).

Lemia of Kampung Tanam, for example, refused to use a chainsaw for safety reasons: “I dare not use the chainsaw because I cannot handle it properly. I am worried that I might get hurt”.

Another smallholder, Jalak from Kampung Tegak, refused to use chemicals given by the DOA under the SPS, also for safety reason; “I have plenty of pesticides and herbicides stored under my house unused. I am not using them because they will poison wild mushrooms and other wild vegetables in the farm”.

On the other hand, Ikin from Kampung Medong, did not use modern method because he could not afford to pay for the cost; “I am not using the chainsaw because it is too expensive to buy. Furthermore, there are other hidden costs like benzene, chain, lubricant oil and so on. Even hiring one is also expensive”.

The continuation of traditional method has also been attributed to a strong adherence to adat. (Refer to Chapter 7). A strong belief in the adat system (in the form of social sanctions), ensures a harmonious relationship with nature, including custodianship of the sago palm as the principle natural resources for maintaining their livelihoods.

From a different perspective, strong belief is related to “safety”. Two aspects relate to palei. First, a smallholder adheres to the palei in order to avoid unwanted hazards, such as accidents or unwanted tragedies that harm smallholders and their families. Another aspect of “safety” is to ensure high productivity and reduce the risk of crop failure. In this case, the smallholder is playing safe. (Refer to Tables 6.2 and 6.3).

One of the main reasons that smallholders eschew modern methods is due to the lack of knowledge concerning the subsidy scheme. At least two smallholders reported that there were ignorant of the Sago Planting Scheme (SPS). Rosa of Kampung Jebungan and Teli of Kampung Teh Labak were both wary of joining the SPS, due to their lack of information concerning the schemes. Rosa of Kampung Jebungan dared not visit her local DOA because:
"I hear about the scheme but I am not aware that I am entitled to join. After all, I don’t know how to read and write, I am worried about the idea of filling in forms and answering the questions of government officers”.

Teli of Kampung Teh Labak was also reluctant to visit her local DOA;  
"I know about the scheme, but nobody from the government has approached me. If they offered me, I will be happy to join”.

Nevertheless, the main problems associated with traditional methods are that they are slow, involve hard work and low productivity. Despite these problems, more than half of the respondents continues to use traditional methods, but combine them with modern techniques.

Section 6.3 Modern methods

The modernisation of sago cultivation cannot be compared with other cash crops. Mechanisation is limited because of the geomorphological nature of the peat swamp, which hinders the use of large and heavy machinery. (Refer to Section 6.1.2). Mechanisation is also limited by the nature of the vegetation, the sago palm. (Refer to Section 6.1.3). Modern tools are limited to the chainsaw, the outboard engine, and chemicals (herbicides and pesticides, which are included in the Sago Planting Scheme package). No artificial fertiliser is applied. Table 6.7 shows the difference between the tools used when using traditional and modern methods.

<table>
<thead>
<tr>
<th>Stages in Cultivation</th>
<th>Tools</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traditional method</td>
<td>Modern method</td>
</tr>
<tr>
<td>Clearing</td>
<td>axe, parang,</td>
<td>chainsaw</td>
</tr>
<tr>
<td>Planting</td>
<td>palei</td>
<td>the “straight lining system”</td>
</tr>
<tr>
<td>Maintenance</td>
<td>parang</td>
<td>pesticides, herbicides</td>
</tr>
<tr>
<td>Harvesting</td>
<td>axe, parang, dayung</td>
<td>chainsaw</td>
</tr>
<tr>
<td>Transportation to farm</td>
<td>long boat (paddling manually), on foot</td>
<td>long boat powered by outboard engine, motorcycle, lorry</td>
</tr>
</tbody>
</table>

Table 6.7 The different tools used in traditional and modern methods

The chainsaw is used for clearing and harvesting. It replaces the axe for felling trees during forest clearance. Lumu of Kampung Sesok, Mukah, explained that it is faster to clear the site using a chainsaw than an axe;

“Before using the chainsaw it takes me as long as one month to clear the site of about 1.2 to 2 hectares, but now it can take me as little as 3 days to do the same job.”
During harvesting, the chainsaw also replaces the axe. Ramon of Kampung Sesok explained the advantages of the chainsaw:

"It is fast. A chainsaw can harvest 10 sago palms compared to only 1 palm when using an axe. If using an axe, the maximum number of palms that an average person can harvest at one time is up to 10 or 12 palms, but with the chainsaw, the numbers are huge."

Table 6.8 Reasons for adopting modern method (number of respondents)

Table 6.8 shows clearly that modern methods are adopted for reasons of speed and convenience, rather than because of the subsidy scheme and/or high productivity.

However, the main problem that smallholders experience with the chainsaw is the high cost of maintenance. The initial purchase price is also expensive (RM 1,650, depending on brand and power). Maintenance costs include chain replacement (RM 35), the blade (RM 100), spark plugs (RM 3), lubricant oil (at ¼ gallon per harvesting at about RM 6) and benzene as fuel (RM 6). (See Chapter 7, Table 7.16 for a detail account of the average annual cost of inputs).

An outboard engine is attached to the perahu (long boat) for transport. This engine costs approximately RM 3,500, whilst maintenance costs are incurred for spark plugs (RM 3), sealant (RM 25), lubricant oil (RM 10) and petroleum for fuel (RM 5 per gallon). (See Chapter 7 for details). An outboard engine shortens journey time to the farm, especially if far from the smallholder’s house. Movement by river or canal is the most common. However, the development of road networks in the study area has also facilitated other forms of transport (lorry and motorcycle), although this is still very limited.

The Sago Planting Scheme (SPS) was introduced in 1976 in a government effort to help sago smallholders. The objectives of the scheme are to rehabilitate the existing old sago holdings, as well as to increase the area under sago by new plantings. According to Tony Soong, the Head of the DOA department in Sibu;

"We help smallholders to modernise, hoping that their yield and consequently income will increase through the SPS."
In addition, there is the Sago Transportation Canal Scheme (STCS), which aims are to construct and improve canals, to facilitate the extraction and transport of sago logs. The rate of subsidy is RM 1,070 per hectare, for the Sago Rehabilitation and New Planting scheme (for the period of four years) and RM 5,000 per kilometre for the Sago Transportation canal Scheme.

Table 6.9 shows the breakdown of subsidy entitlement for the SPS over four years. An initial grant of RM 150 is given to the smallholders to buy the planting materials (sago suckers). Other inputs (herbicides, pesticides, parang, axe and spade) are provided by the DOA office. The rates shown in Table 6.9 are only guidelines. According to the DOA report, the scheme is flexible, and resources should be allocated according to the needs of participant, provided that the scheme does not exceed four years.

<table>
<thead>
<tr>
<th>Item</th>
<th>Scheme value per hectare in RM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st Year</td>
<td>2nd Year</td>
</tr>
<tr>
<td>Planting material</td>
<td>150</td>
<td>-</td>
</tr>
<tr>
<td>Miscellaneous (including farm tool, pesticides, etc.)</td>
<td>300</td>
<td>200</td>
</tr>
<tr>
<td>Subtotal</td>
<td>450</td>
<td>200</td>
</tr>
<tr>
<td>Operating cost</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>460</td>
<td>205</td>
</tr>
</tbody>
</table>

Table 6.9  The breakdown of subsidy entitlement for SPS
(Source: DOA Report, Mukah Office)

According to the DOA officer in Mukah, smallholders who are eligible to join the SPS must have a farm with a minimum of 1 hectare and a maximum of 5 hectares. Additional conditions also apply:

- the applicant must be a sago smallholder,
- the area must be in the main sago growing area,
- the applicant must be able to obtain planting material, from his own holding or through purchase,
- there must be sufficient family labour to work the garden,
• the applicant must be prepared to follow the instructions and advice of the Agricultural Extension Staff (AES),
• the applicant should preferably be within regular access to AES, to fully benefit from the scheme.

At the same time, Penghulu, Ketua Kampung (Head of village) and other significant figures (Pemanca and Temenggung), with the agreement of the AJKKK (Village Committee Development) committee members have power to recommend smallholders. According to Pemanca Henry Elli;

"The criteria that we are looking for are farm owners/smallholders, with a good reputation, especially in terms of their working effort to expand and maintain farms. We also look for neglected farms, in our effort to rehabilitate all farms in the village. The person will be given a chance of three consecutive times of the four years period, meaning that it is possible for smallholders under our recommendation with the agreement of the DOA officer to receive subsidy for 12 years. After 12 years, the chances are given to other smallholders who have never received any."

The selection of smallholders for the SPS depends on the discretionary of the Agricultural Officer in charge. Francis Chong, the Agricultural Officer (AO) in Mukah, is generous in selecting smallholders, as for nearly all sago smallholders in Mukah are now under the scheme. The requirements that he accepted are;

"Must have a sago farm. Willing to work hard. We are in fact accepting every application that we receive. We would like to help all smallholders."

SPS information is delivered through the agricultural extension officers (AEO) who visit the villages on a regular basis. Francis Chong did not experience any problems concerning the scheme and the participants.

On the other hand, Kederi Keli, the AO of Dalat, is stricter in accepting applicants. All participants should meet his requirement criteria;

"We choose those who are recommended by the AJKKK based on their ability, that is hard working and capable of success. We also choose those with proper land entitlement, that is those whose lands are registered with the Land and Survey in Sibu."

Kederi Keli complained of problems with the villagers in Dalat;

"I have a problem with people here who say “bad things” about the scheme. These are the “anti-development” people, who are not happy looking at other people’s wealth and success."
Variables | Definition of the variables | Significant Results (Chi-Square $\chi^2$)
--- | --- | ---
(Independent variables): | | |
**subsidy** | Receiving subsidy help from the DOA. yes (1), no (2) | |
**gender** | Gender of the respondent. male (1), female (2) | yes | ($p = 0.00536$)
**family** | The number of household members. less than 4 (1), 4 to 8 (2), more than 8 (3) | yes | ($p = 0.00496$)
**religion** | Religion of the respondent. Muslim (1), Christian (2), Pagan (3) | yes | ($p = 0.00922$)

| Table 6.10 | Crosstabulation between the dependent variable "subsidy" and all significant results related to personal factors |
--- | --- |
Between 1985 and 1995, the area of land expanded under the scheme in the study area to 4,716 hectares (Jabatan Pertanian Sarawak, 1995). About half of the respondents receive subsidies from their local Department of Agriculture (DOA) (54.2 per cent). Receiving a subsidy is related to gender, religion and number of family members. (Refer to Table 6.10)

Table 6.11 shows that more men receive subsidy than women. This is attributed to lack of information concerning the scheme and lack of mobility amongst women compared to men. (See Section 6.2 in Rosa’s case).

<table>
<thead>
<tr>
<th>Gender</th>
<th>Receiving subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Male</td>
<td>82</td>
</tr>
<tr>
<td>Female</td>
<td>33</td>
</tr>
</tbody>
</table>

| Table 6.11 | Relationship between receiving subsidy and gender |
--- | --- |

<table>
<thead>
<tr>
<th>Family members</th>
<th>Receiving subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Less than 4</td>
<td>20</td>
</tr>
<tr>
<td>4 to 8</td>
<td>60</td>
</tr>
<tr>
<td>More than 8</td>
<td>35</td>
</tr>
</tbody>
</table>

| Table 6.12 | Relationship between receiving subsidy and the number of family members in the households |
Table 6.12 shows the relationship between the availability of subsidy and the family size. More small families and large families receive subsidy than medium sized families.

Herbicides (gramoxone) and pesticides (insecticides and rat poison) are used during the maintenance stage. They are usually applied in the second or third years. However both chemicals are not applied indiscriminately as explained by extension worker, Haji from the Mukah DOA;

“We use the system of spot weeding, that is only weeding if necessary. This means that the use of herbicides is limited and not applied indiscriminately. The same goes for pesticides”.

Despite the extension workers’ advice, most smallholders apply chemicals according to their needs and judgement. For example, Ramon of Kampung Sesok applies herbicides at a much later stages of planting;

“During the first year of planting, no herbicides or pesticides are applied. Herbicides are only used to make a path for access. According to the advice of the extension worker, chemicals are supposed to be applied during the late second year of planting, but I only use them during the fourth year, applying them around the palms. This again depends on the amount of grass growing around the trees. If the weed problem is serious, only then will herbicides be used.”

Besides the difference in tools, another technical distinction between traditional and modern farming is the “straight lining system” which is done during the planting stage. Information concerning the “lining system” was given by the Mukah extension worker, Haji;

“The lining system” is the process of planting suckers in a straight line, at 7 metres intervals. The interval recommended by the DOA used to be 10 metres, but smallholders complain that they therefore grow fewer palms, so we have reduced the interval to 7 metres. In an acre, the number of planting points is about 208. The “lining system” is done by using sticks of about 0.6 metre and some strings. The advantages of the sticks are to help visualise the position of the sago suckers, which means easy weeding and chemical application. At the same time, the sticks also assist in counting.” (Refer to Figure 6.20).

Figure 6.20  The “Straight lining system” introduced under the SPS
(Source: Author’s own illustration)
Despite the DOA's willingness to compromise over the interval, some smallholders still think that the "lining system" cannot always be applied due to the "straight" nature of planting. Run of Kampung Tellian Ulu explained the problem:

"The main problem with the "lining system" is when choosing a suitable site for planting. This is because not every point on the straight line is suitable for planting, mainly due to poor soil. For example, a point on the straight line may have a tree trunk, too near the surface ground, giving little support to the growth of the palm and possibly causing rooting problems. It is very artificial to pin-point the exact distance of 7 metres, because the next planting point, which is 7 metres away from the starting point may not be suitable for planting."

Some smallholders are reluctant to follow the "lining system" because they think it is imposed on them and troublesome to follow. Mulu of Kampung Sesok, Mukah is not happy with the "lining system" for planting;

"The "lining system" causes lot of hassles. You have to prepare the sticks and strings and make sure that plantings are straight. It takes me longer time to assure that suckers are planted in straight rows. For me, what is important is not the straightness of the planting point but ensuring healthy palms."

The SPS does not replace traditional tools and the chainsaw is not included. Tools provided under the scheme are also of limited value to the smallholders. Rabis, from Kampung Jebungan complained that the tools provided by the scheme (parang, axe and spade) are of low quality;

"I still have to buy tools like parang and axe from the Chinese shopkeepers. Those provided by the scheme do not last long, you only have to use them once, and they are out."

Furthermore, there is no help with expensive modern items like outboard engines and chainsaws. Yet, most smallholders think that these were the two most crucial modern components for farming.

As for the Transportation Canal Scheme, participants must construct canals in accordance with the recommended width and depth (2 metres by 2 metres respectively). Canals should also be constructed at least 1.6 kilometres apart. Most smallholders are happy with the canal. However, some complained that it had caused some of their palm to die. For example, Mulok, from Kampung Medong observed that:

"The construction of canals has resulted in the draining out of water in my farm. As a result, some palms die, due to the drying up of the soil. I would rather choose a site near to a natural river for easy transportation instead of facing this problem again. It is difficult to expand your farm too far inland because the soil is not that fertile and transportation problems increase."
The disadvantages of using modern methods are not only related to high cost and maintenance but also to occupational hazards, such as exposure to chemicals (herbicides and pesticides) and benzene (fuel for chainsaw).

Field observations showed that very little precaution was taken by smallholders, such as using face mask or gloves when applying chemicals or refuelling the chainsaw. Smallholders are therefore exposed to hazardous chemicals. However, no empirical studies had been completed to show the effects of these chemicals. Nevertheless, some smallholders complained of illnesses, with symptoms related to exposure to these chemicals. Haji Tahir, from Kampung Medong complained of prolonged coughing and skin disorder;

“I have not been to the farm for about three years now, since my illness. I suspect that the coughing, soreness and itchiness of my skin are due to contacts with chemicals used in getting rid of weeds and pests. I have to employ other people to maintain and harvest my farm now.”

It is disturbing that benzene is used as fuel for the chainsaw, not only in sago cultivation but also at the timber companies in Sarawak. Benzene has been classified as carcinogenic and banned in most developed countries. The government officer did not realise the danger of benzene, and neither did those who use them. The price of benzene is more expensive (RM 6 per gallon) compare to petroleum (RM 5 per gallon). Smallholders use benzene because of its power and a recommendation from the technical specification of the chainsaws sold to them. Ramon of Kampung Sesok explained his reason for using benzene;

“Benzene is more powerful than petroleum. According to the dealers, the chainsaw that we use needs to be fuelled with benzene, otherwise, it will not work or last long”.

Smallholders are in danger of breathing air containing benzene. Benzene can harm tissues that form blood cells, especially with high exposure levels over the long term. Benzene also damages the immune system and increases the chance of infections.

Another smallholder, Mahli from Kampung Balan, Oya, suffered from bone marrow cancer. He was working with a timber company as a lumberjack. He continues to cultivate sago although most of his sons work in the urban areas, due to his need for money. According to his wife, he had always used a chainsaw, both in the timber company and when cultivating sago. I visited him twice. Unfortunately during the second visit, he died, from bone marrow cancer.
The chainsaw has dramatically reduced the smallholders’ burden, particularly in clearing and harvesting. The DOA does not see the use of benzene as an issue. There has been no research and development done to speed up this tedious and hardest part of cultivation. It is the smallholders’ own discovery and initiative that has led them to use the chainsaw, inspired by working experience in the timber companies. However, the chainsaw is not only dangerous because of benzene. It is, in fact, not really suitable for felling sago palms because of the plant’s acidity. The blade corrodes quickly, and forces the smallholders to change the blade regularly. In contrast to the extensive researcher in processing machinery at the sago mills, very little if any research, has been done to benefit sago smallholders - apart from some agronomic research, the results of which have been known for decades by local smallholders through their long experience in cultivating sago.

Another omission from the SPS is a loan or subsidy for buying an outboard engine. The SPS has expanded smallholders’ sago farm further inland - referred as tanah gu’un (forest swamp) by the villagers. Most of the new farms are far from their dwellings, resulting in long travelling distance. This is confirmed by Pemanca Henry Elli of Kampung Medong;

“The SPS doesn’t solve poverty problems among the villagers. Cost is still a main problem. Some of my villagers cannot even afford to buy daily food to bring as pack lunch to the farm, things you may take for granted. Most of them work at the timber companies to save money for the cost of farming. Another main problem is distant. Most sago farms are far from smallholders’ house, therefore lots of time and fuel are consumed.”

Even the extension workers agree that smallholders have intimate knowledge of their environment and of cultivating sago. These were confirmed by Haji, an extension workers from Mukah DOA;

“Most of the things are learned from smallholders. We learn from each other. It is important to learn from smallholders, as they are very experience and knowledgeable in sago cultivation. Some of the tests at the research station have little relevance to the real farm”.

Mutual agreement and good rapport between extension workers and smallholders depends on the extension workers. In Mukah, Haji is considered outstanding. He knows most smallholders in his area personally and visits them regularly. He also listens to smallholders and is flexible in giving advice. He is even known in Dalat and Oya, where he served, before moving to Mukah. In contrast, the extension worker in Dalat, Rumai has a different attitude. Smallholders under his area hardly see him. It was also difficult for me to meet him as most of his time was spent at the coffee shop.
The pros and cons of both traditional and modern methods mean that smallholders combine both (52.8 per cent of the sample population). Being exposed to both methods, they make decisions about which element to choose, according to their needs and the situation (See Chapter 7, Section 7.2.5 for factors influencing the decisions of choice in methods of farming).

Section 6.4 Effects of the LCDA sago plantations on sago smallholders

The LCDA sago plantation was planned in 1985. A feasibility study was undertaken by a group of officers from the DOA, Ministry of Agricultural and Community Development, Department of Irrigation and Drainage and LCDA. The Plantation was proposed under the Fifth Malaysian Plan (1985 - 1990).

According to a DOA officer in Kuching and correspondence with the LCDA officer, the rationale of the plantation was mainly founded on socio-economic factors. Findings from the feasibility study showed that the plantation was technically feasible, but incurred high investment costs and would undergo a long gestation period (due to the long growth cycle of the sago). Officers from various DOA and LCDA reports included the following reasons:

- shortage of raw material,
- in accordance with the NAP basic objective, income from agriculture was to be maximised through efficient utilisation of the country's resources and a revitalisation of the sector's contribution to overall economic development of the country,
- the plantation would stimulate the development of processing and agro-based industries and increase downstream activities, such as food and, livestock industries and the manufacture of industrial products like power alcohol,
- the export of sago would bring in foreign exchange,
- jobs would be created and with them, the establishment of settlements and improved social infrastructure, which in turn would create a growth centre for agricultural and agro-based industries in the study area (LCDA report, 1993).
Table 6.13  The total land area proposed under the LCDA sago plantations

(Source: LCDA Report, 1993)

Table 6.13 shows the total land area of 85,972 hectares planned for the project. The selected areas are in the coastal zones of the Third and Sixth Divisions of Sarawak, with a majority population of Melanau. Mukah and Dalat are the two pioneer areas. All of the lands allocated for the plantations are either State land or Forest reserve. Murang (1992) charted the progress of the plantation. Initial development was on four parcels of State land (7,750 ha), which are implemented in two phases. The first phase of 2,278 hectares of alienated land, was located 8 kilometres south of Mukah town, and situated on the western bank of Batang Mukah. (See Figure 5.1 of Chapter 5, showing location map of the plantations in the study area). This phase cost RM 17.9 million in constant 1986 terms, financed by the State Government, and loaned at an interest rate of 4 per cent per annum. The LCDA sago plantation is managed by Estet Pelita Sdn. Bhd., a wholly owned subsidiary of LCDA.

![Figure 6.21  Triangular style of planting](Source: Based on information from interviews with LCDA contractors and DOA officers)
The method of cultivating sago in the plantation is based on existing smallholders’ practices, and on the modern method, but at larger scales. However, the planting style is different from the “straight lining system”. Sago suckers are planted in a triangular pattern of 7.5 metres apart in order to get the maximum planting points of 215. (Refer to Figure 6.21) Unlike the smallholders who used rivers and canals for transportation, the plantation built a rail network which, it was argued, was cheaper to construct and maintain and more convenient to use. However, it is not really easy to handle due to the heavy carts.

Phase IA in Mukah was completed, 40 hectares by June, 1988 followed by another 40.9 hectares in May, 1989. Phase IB (405.3 hectares) was completed by February, 1989. Phase II was supposed to start in 1989 but was delayed because land had not yet been alienated because of a conflict with the Forest Department. Mukah Forest reserve could only be alienated after all logging operations in the area had been completed. Phase II was therefore delayed until 1992 (Murang, 1992). During the fieldwork in 1995, work in Phase II Mukah and Dalat was progressing. The Dalat sago plantation is located on the West bank of Batang Oya, near the road between Oya to Igan.

The plantation experienced several initial problems. Effective operation needed planters and experienced contractors. The plantation used a system of contracting workers, instead of employing them directly. Local workers are expensive, about RM 15 to 25 per man day. Experienced contractors are also scarce and inexperienced at working in a swamp environment. The LCDA prefers contractors who have experience in swamp timber logging. 60 per cent of the work, covering about 100 hectares is given to outside contractors, who employ workers, also from outside (Ibans and Indonesian immigrants). Only 40 per cent of the work, (50 hectares) is given to local contractors from the villages. These are recommended by the LCDA on the basis of “technological know who9”. Local contractors are supposed to employ workers from their villages. However, finding them is difficult, mainly because they demand high wages compared to outside workers, especially Indonesian immigrants. Smith, a contractor for the LCDA sago plantation in Mukah and from Kampung Tellian Ulu, complained of the difficulties in finding workers;

“I have no choice but to employ Ibans and Indonesians. Local people refuse to work because of two factors. They want higher wages, between RM 20 to 25 a day and they have they own

---

9 Recommendation are based on contacts, a person whose relative or friend working in LCDA will have higher chances of winning a tender, in other word, nepotism at a smaller scale.
farm to work. The Ibans and Indonesians are willing to accept very low wages, as low as RM 6 per day”.

Tuan Imam Jermain is a contractor from Kampung Teh, Oya, working with the LCDA plantation in Dalat. In contrast to Smith, Tuan Imam Jermain has no problem recruiting his villagers. This is because they are plenty of people willing to work in his village, especially among fishermen during “landas” season when the sea is not favourable for fishing. However, he also admits that there are plenty of Indonesian immigrants brought by other contractors working at the plantation. He also employs some Indonesian immigrants, but only if they have a proper working permit. He admits that there are more Indonesians in the study area since the opening of the plantations. According to him, most contractors prefers Indonesians because;

“The Indonesians cannot go back home when they face trouble or hard work at the plantation. Local people can always go home because their houses are near”.

However, Smith had to compensate for paying low wages to the outsiders with their “ill-mannered” behaviour;

“The Ibans and Indonesians are not working conscientiously. They are just working for the money. Unlike the Melanau, they don’t have intimate knowledge of the sago palm. Therefore, planting is often unsuccessful, slow and most of sago suckers die. The Ibans and Indonesians also like to quarrel and fight, to the extent that they harm each other with weapons like handguns. To make things worst, the plantation supervisor is very fussy. He wants all sago suckers to be planted in a straight line, otherwise planting will have to be repeated. However, payment comes very late. As a result, I cannot pay workers on time, which angers them. Being a contractor to the LCDA plantation is a great loss. I never want to deal with them again.”

Most of the respondents refuse to work at the plantation (66 per cent), while 34 per cent would like to work if offered. The main reasons for being unwilling to work on the plantation are: too old (50 per cent); self-employed (33 per cent); low wage (3.6 per cent) and; plantation far away from home (3.6 per cent). The reasons for not working (although willing to work) are: no offer (35.2 per cent); self employed (18.3 per cent); low wage (11.3 per cent) and; old (2.8 per cent).
**Table 6.14  Crosstabulation between the dependent variable “offerjob” and independent variables (“age”, “educate” and “replace”)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Significant Results (Chi-Square $\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>offerjob</strong> (Dependent variable)</td>
<td>Willingness of smallholders to work at the plantation. yes (1), no (2)</td>
<td></td>
</tr>
<tr>
<td><strong>age</strong> (Independent variables):</td>
<td>Age of the respondent. 10 to 29 years old (1), 30 to 49 years old (2), 50 to 69 years old (3), more than 69 years old (4)</td>
<td>yes ($p = 0.00194$)</td>
</tr>
<tr>
<td><strong>educate</strong></td>
<td>Education level of the respondent. no formal education (1), primary school (2), secondary school (3), others (4)</td>
<td>yes ($p = 0.00109$)</td>
</tr>
<tr>
<td><strong>replace</strong></td>
<td>Willingness to replace sago with other crops yes (1), no (2)</td>
<td>yes ($p = 0.00029$)</td>
</tr>
</tbody>
</table>

The crosstabulation shown in Table 6.14 established those factors affecting willingness to work at the plantation. The age of the smallholders, the level of education and, whether smallholders are willing to replace sago with other crop or not are the significant factors.

**Table 6.15  Relationship between willingness to work in the LCDA plantation and age of the respondents**

<table>
<thead>
<tr>
<th>Age</th>
<th>Willingness to work at the LCDA plantation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Less than 50 years old</td>
<td>34</td>
</tr>
<tr>
<td>More than 50 years old</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 6.15 shows that most respondents are unwilling to work on the plantations, but more old respondents than younger ones. This is probably due to the fact that young men are mobile and have more chances of finding other jobs, particularly outside the study area.

**Table 6.16  Relationship between willingness to work in the LCDA plantation and education level of the respondents**

<table>
<thead>
<tr>
<th>Education</th>
<th>Willingness to work at the LCDA plantation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>No formal education</td>
<td>29</td>
</tr>
<tr>
<td>With formal education</td>
<td>42</td>
</tr>
</tbody>
</table>

Table 6.16 shows that respondents with formal education are more willing to work on the plantation that those without, while Table 6.17 shows that those willing to replace sago with other crops are more willing to work on the plantation.
Table 6.17  Relationship between willingness to work in the LCDA plantation and willingness to replace sago with other crops

According to Tuan Imam Jermain, the work involved at the plantation included cutting grass, felling trees, burning and making marks for sago suckers to be planted. He also complained about the “fussiness” of the plantation supervisor in relation to planting;

“The plantation supervisor supervises the work now and then, to ensure that the marking system is correct. The supervisor is very particular about the straightness of the marking system. If the markings are incorrect, he will ask us to repeat the job. Planting on your own farm is easier. They only plant sago palm, but we also plant some pumpkins in the area where we work. At the moment, nobody complains about the pumpkins yet.”

Workers were transported by rail to the plantation, but Tuan Imam Jermain complained of problem with the system, because it was not completed on time, delaying the start of work. Work was also delayed by heavy rain and adapting to the structures of the plantation system. Furthermore most workers were not reliable; they came and went as they please. For an area of 50 hectares, the contractor was paid RM 50,000 when the planting job was completed. Tuan Imam Jermain also faced financial problems;

“The amount for overheads that I get is not much and this is further aggravated by late payment by the LCDA.”

Apart from problems of workers and contractors, the plantation also faced the problem of procuring planting materials. Originally, this was to be done by the contractors in charge. However, the plantation manager complained that planting materials were not delivered according to schedule and not in the number required. As a result, the manager himself (Estet Pelita Sdn. Bhd) took over the plantation, and managed to stabilise the cost of planting materials. The LCDA recognised that there had been a problem of theft of planting materials by the local villagers, because of the higher demand for sago suckers. These problems were particularly serious in Medong and Tellian Ulu. Most smallholders were concerned with the damage done to their sago palms by thieves, who took no precautions when stealing the suckers. Not only was the supply of sago suckers affected, but also the health of the mother palm. From the household survey, 34.9 per cent of respondents complained of negative effects, mainly sago suckers stolen or damaged and land taken by government to set up the plantation. Pemanca Henry Elli was particularly unhappy:
"Personally, I don't think the project benefits people in this village. Benefits are mainly gained by the plantations. In this village, we have agents buying sago suckers who sold them to the plantation people. This is a big problem here. Due to the existing of these agents, opportunist person steals sago suckers from the villagers' farm. This is because sometimes, profits from selling sago suckers can be more from selling sago sections. The problem is difficult to solve, because if you don't visit your farm for 2 to 3 months, how do you know whether your sago suckers are stolen or not. However, the problem is becoming less serious now because we have taken actions. These actions do not involve police, just resolve by ourselves in the village. The thief is forced to confess and pay some fine. In future, when the plantation produces sago palms, they will be surplus and the price of sago sections might fall again, to our disadvantages."

Pemanca Henry Elli also complained about the absence of public consultation prior the setting up of the plantation.

Some villages dealt with the problems of theft in a different way. The villagers of Kampung Jebungan, Mukah banned the plantation agent from entering their village. Mura of Kampung Jebungan explained their action;

"We have no longer experienced problems with theft of sago suckers in this village. The problems of theft in other village are caused by agents. We solve this problem by banning agents from entering our village. We have also advise the villagers not to deal with these agents."

Tuan Imam Jermain of Kampung Teh, Oya used similar tactics. As a contractor himself, he only buy sago suckers from the villagers of nearby Kampung Balan. Thus there is no theft problem in his village.

The plantation admitted to the problem of procuring sago suckers. It was only solved by finding alternative sources from other parts of Sarawak, mainly from Kuching and Saratok districts. According to the LCDA officer, local people refuse to sell their sago suckers due to the high price of logs and the real shortages in planting materials.

It emerged from the group discussion, that the loss of land to the plantation created a shortage for smallholders wishing to expand. At least two smallholders complained of dispossession, without compensation. Technically, they had not registered their holdings with the Land and Survey department in Sibu. Most villagers were also worried about the future, particularly the prospects of declining sago prices, especially when the plantations produce palms. However, only 8.5 per cent of the respondents claimed that the plantations had negative effects on their income, while 75.9 per cent stated that there was no effect on their income.
Table 6.18 shows the results of a Kruskal-Wallis one way Anova test, to find out whether there is any difference in the view of the effects of the plantation to smallholders' income, in relation to their personal factors and spatial location. The results show no difference between the opinions of the respondents in relation to personal factors (educate, religion, age and income) and spatial location (district, village).

These findings are also supported by the qualitative survey. Most villagers situated near the plantations, tend to make more stringent efforts to prevent the theft of planting materials, compared to those living further away. The people in Kampung Jebungan have completely banned agents from their village to prevent theft. In contrast, those living as far away as Kampung Medong still allow agents to deal with their villagers.

<table>
<thead>
<tr>
<th>Ordinal variable</th>
<th>Nominal variables</th>
<th>Description of variables</th>
<th>Significant Results (Chi-Square χ²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>effectin</td>
<td></td>
<td>Effects of sago plantation to smallholder's income. increase (1), no change (2), decline (3)</td>
<td>no (p = 0.703)</td>
</tr>
<tr>
<td>educate</td>
<td></td>
<td>Education level of the respondent. no formal education (1), primary school (2), secondary school (3), others (4)</td>
<td>no (p = 0.727)</td>
</tr>
<tr>
<td>religion</td>
<td></td>
<td>Religion of the respondent. Muslim (1), Christian (2), Pagan (3)</td>
<td>no (p = 0.998)</td>
</tr>
<tr>
<td>age</td>
<td></td>
<td>Age of the respondent. 10 - 29 years (1), 30 - 49 years (2), 50 - 69 years (3), more than 69 years (4)</td>
<td>no (p = 0.920)</td>
</tr>
<tr>
<td>income</td>
<td></td>
<td>Net income of the respondent. less than RM 295 (1), RM 296 - 495 (2), RM 496 - RM 595 (3), more than 595.</td>
<td>no (p = 0.624)</td>
</tr>
<tr>
<td>district</td>
<td></td>
<td>Mukah (1), Dalat (2), Oya (3)</td>
<td>no (p = 0.905)</td>
</tr>
<tr>
<td>village</td>
<td></td>
<td>Medong (1), Tanam (2), Jebungan and Tegak (3), Teh Labak and Sesok (4), Tellian Ulu (5)</td>
<td>no (p = 0.905)</td>
</tr>
</tbody>
</table>

Table 6.18  Kruskal-Wallis one way Anova: Finding the influence of personal characteristics and spatial locations on opinions about the effect of the plantations to smallholder's income

The positive effect of the plantation is a higher price for sago suckers, and this supplements smallholder income. The plantation also provides alternative employment. 15.6 per cent of respondents claimed that the plantations improve their income, through either the sale of suckers or through working at the plantation.
Section 6.5 Sago processing industries

There are two major sago-related activities closely linked to the livelihood of the smallholders. These are the cottage industries and the sago mills. Both produce end products for local and international markets respectively.

Figure 6.22 Relationship between sago smallholders and the processing industries

Figure 6.22 shows the relationship between the processing industries and sago smallholders. The processing industries’ main role is not only to process the palms into end-products (sago pellets and sago flour), but also to provide a link between the smallholders and both local and international markets.

Section 6.5.1 Cottage industries

The cottage industry is a major traditional economic activity related to sago. The sago flour is bought from the mills and processed into ‘saguk’ (pellets) and ‘tebaloi’ (crackers). Historically, saguk has been a staple food for the Melanau, eaten with fish as main course. Tebaloi is only a snack food. Of all the ethnic groups in Sarawak that eat sago as a staple, only the Melanau have the skills and technology to process it into a food which is sufficiently well preserved to last for years. Historically, the importance of saguk is linked to the
Melanaus' profession as sailors. *Saguk* was the main food brought on board, because of its long shelf life (about 5 years). *Saguk* has also been used as an emergency food (during Japanese Occupation in the Second World War or when climatic condition (monsoonal flooding) prevented ordinary economic activities from being pursued). The cottage industry is known locally as ‘*belangak*’.

![Figure 6.23 A privately owned traditional *belangak*](Source: Author’s photograph)

The number of *belangak* varies with villages' size (from 3 to as many as 34). Some are constructed with financial help from the government, mainly from the DOA and the Farmers' Organisation (FO). In Kampung Medong, Dalat, there are 34 *belangak*, of which 30 are privately owned, and 4 have been built with government help. In Kampung Teh, Oya, there are only 3 *belangak*, 1 privately owned and 2 built with government support. In Kampung Tellian Ulu, there are 10 privately owned *belangak*.

Unlike the cultivation of sago, processing is monopolised by women, through this cottage industry. In fact, it is almost necessary for every Melanau women to have the knowledge of processing *saguk* and *tebaloi*. Traditionally, this is one of the main criteria by which men choose their wives.

The *belangak* look like an ordinary small house from the outside, but inside, it is specifically designed to fit baking equipment for processing *saguk* and *tebaloi*. The baking equipment consists of a 2.1 x 1.4 metres clay griddle, about 2.5 centimetres thick. (Figure 6.24).
has been an unsuccessful government attempt to design a similar baking griddle, so that women can process *saguk* and *tebaloi* at home.

![Figure 6.24 The griddle, a large oven for baking *saguk* and *tebaloi*](http://region.letters.hokudai.ac.jp/miyauchi/yasi-photo)

Mak Seraya of Kampung Teh, Oya, a full-time *saguk* and *tebaloi* processor, explained the failure of the DOA design due to a lack of “flavour”;

“It is more convenient to bake at the *belangak*. Furthermore, the taste of baking at home using the DOA equipment is different. The products taste better when baked in the *belangak*”.

From the field survey, it is not only flavour that matters. Working in the *belangak* builds and strengthens community solidarity. Although the *belangak* is managed by an appointed warden, it is the responsibility of all users to maintain the *belangak* in a co-operative manner. The warden’s main task is to arrange a timetable.

The processing of *saguk* and *tebaloi* supplements income. The cost of processing *saguk* is RM 60 per process (with a set quality of ingredients), making as much as RM 100 to RM 130 profits per process. *Tebaloi* is less popular, with the cost of between RM 12 and 18 per process, with profits of between RM 35 and 40. (See Appendices IV and V for detailed information on the ingredients, costs, end products and profits of processing *saguk* and *tebaloi*). In most cases, women process *saguk* and *tebaloi* not only to supplement their family’s income but also to gain financial independence from their husbands.
Mak Seraya of Kampung Teh, Oya is optimistic about saguk and tebaloi markets. Her husband works at a timber company near Tanjung Mani and returns home only twice a month. Money from selling saguk and tebaloi is therefore important. Mak Seraya expressed her opinion about the prospect of processing and marketing saguk;

“The future of selling saguk is bright. The price of saguk used to be only RM 2 per tin. Now it is RM 30 or more per tin. Just imagine. The market has also widened - even non-Melanau eat saguk now. There are restaurants in Kuching selling saguk as part of their main dish served with the “ume”10. However, we have less money compared to the past, when we processed our own sago starch. Making saguk is important for our income. For some people, it is the main income. Most importantly, it means financial independence in not having to rely on my husband for money”.

The marketing of saguk and tebaloi depends on the aggressiveness of individuals in finding contacts. Mak Seraya of Kampung Teh, Oya, markets her saguk and tebaloi as far afield as Sibu and Kuching. While Mak Cik of Tellian Ulu, Mukah, only sells in villages around Mukah. Marketing can also be influenced by vicinity factors. Mak Zuraidah from Kampung Medong, Dalat sells her saguk and tebaloi in Dalat, Mukah, Matu, Igan and Sarikei (located in the eastern part of the study area, except for Mukah and Dalat).

**Figure 6.25** A woman and her child processing the saguk
(Sources: [http://region.letters.hokudai.ac.jp/miyauchi/vasi-photo](http://region.letters.hokudai.ac.jp/miyauchi/vasi-photo))

It is a tradition in the villages that children, especially young girls, help their mothers in the belangak. (See Figure 6.25). In this way, the knowledge is passed down to younger generations. Like sago cultivation, there are also palei related to processing, to ensure

---

10 fresh fish eaten raw, squeezed with lemon, chilli and shallots.
successful pellet formation. Mak Seraya’s palei is not to mention the names of dead people, otherwise the “gulut” process (pellet formation) will fail. (Figure 6.26).

![Image of people preparing sago pellets](http://region.letters.hokudai.ac.jp/miyauchi/yasi-photo)

**Figure 6.26** The “gulut” process, transforming the dough into sago pellets

(Sources: [http://region.letters.hokudai.ac.jp/miyauchi/yasi-photo](http://region.letters.hokudai.ac.jp/miyauchi/yasi-photo))

The main problem that women face is the difficulty of collecting wood fuel without help from men. Traditionally, it is the man’s job to collect wood fuel, unless and until he goes elsewhere for other employment. Mak Seraya of Kampung Teh, Oya described the amount of wood fuel used to process saguk and tebaloi and the problems of collecting it;

“We use wood fuel to cook saguk and tebaloi. It is collected by the men at the forest. When my husband returns from his work at the timber company, he will collect as much as possible. The problem is when my husband returns late. Then I’ll have to go and collect the wood myself, which is hard work. Sometimes, we just collect wood that floats down the river, which is dried in the sun before use. We prefer wood from the rubber tree because it burns better. The amount needed is about 25 pieces of 2 yards length”.

Because of the problem of wood fuel supply, Mak Zuraidah of Kampung Medong, Dalat, sometime buys the bark of sago palm from the mills;

“We sometime buy sago palm bark from the mills at about RM 3 to 4, which will last for 2 to 3 sessions of saguk and tebaloi processing. We usually collect wood fuel from the nearby forest or from the farm, which is hard work. It takes an hour to travel to the place and the boat is not big enough to carry all the wood fuels. I usually make 2 to 3 journeys to carry it all back home.”

The advantages of the cottage industry are not only limited to supplementing smallholders’ incomes and promoting village solidarity, but also providing flexibility. It is possible to enter
or leave the business at any time, under any circumstances. The most common case is family commitment. Women with small children tend to stop processing saguk and tebaloi, but may start again when their children grow up. This flexibility cannot be offered by either the mills or the LCDA plantation. Moreover, most belangak are situated near dwellings, which implies the absence of transport problem, apart from the issue of wood fuel.

Section 6.5.2 Sago miller

In contrast to the cottage industry, sago mills are big, commercialised and operate under heavy overhead costs to serve international market. All but two of the sago mills are owned by the Chinese. There are only two Melanau involved in the milling business. One operates a large-scale plant, fully equipped with modern, mechanised processing equipment, situated in Kampung Tanam, Oya. (See Figure 6.27). Another operates a smallersystems, processing only wet sago starch (lemantak). There is one other non-Chinese mill, owned by the SEDC (Sarawak Economic Development Corporation, a government statutory body) in Mukah. There is yet one new mill in Sibu co-owned by the SEDC and a Chinese businessman. The sago mills are mostly expanded family-type businesses. There are 92 mills in the study area (Sim, 1987).

Figure 6.27 Simon Ubom's sago mill
(Source: Author's photograph)
Millers obtain sago sections from the smallholders on an ad-hoc or contractual basis. It is therefore important for millers to build a rapport with smallholders to ensure a continuous supply of sections, since a mill needs between 800 to 1,200 sections per day (depending on the size of the mill) to work at an optimum capacity. In most cases, the supply of sections comes through an established business relationship. (Refer to Figure 6.28 showing sago sections waiting to be processed outside the mills).

Ramon of Kampung Sesok trusted the miller whom he regularly dealt with to collect the sections before paying for them;

"The sago sections are left in a nearby drain for the millers to choose from and collect. Most of the time, the miller will pay me c.o.d. or pay me later, especially when they are lots of sections and he doesn’t bring enough cash".

In the 1950s and 1960s, sago millers maintained a continuous supply through credit ties (Morris, 1991). Credit ties were created through exchange of benefits between the smallholders and the millers, whereby smallholders arranged for credit from the miller’s grocery shop, in return for supply sections.

By the 1990s, this practice was not so common because some of the Melanau now owned grocery shops and there was more choice in shopping compared to the 1960s, such as from the supermarket in Mukah. However, smallholders were under credit ties with millers in a
different way. Smith of Kampung Tellian Ulu, who owned a small sago mill processing wet sago starch, explained the new style of credit tie;

"The Melanau today are now slaves. They are at the mercy of the Chinese sago millers. Although the millers need 2000 sections a day, they still can control smallholders. The Melanau, especially the very poor, tend to pawn their farm when they need money. The miller will accept the pawn, especially land under "Mixed Zone" category. Another way is for the miller to buy young palms at lower prices, especially when smallholders are desperate for money. In the end, the smallholder loses out, left with little choice but to sell his farm."

Apart from selling directly to millers, there is also a middle person coming to villages looking for sections. From the qualitative survey, smallholders sell their sago sections straight to the mills, to a middle person or both to the mills and middle person. (Refer to Table 6.19).

<table>
<thead>
<tr>
<th>Sago sold to</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sago millers</td>
<td>96</td>
<td>45.3</td>
</tr>
<tr>
<td>Middle person</td>
<td>77</td>
<td>36.3</td>
</tr>
<tr>
<td>Millers and middle person</td>
<td>19</td>
<td>9.0</td>
</tr>
<tr>
<td>(Not ready to harvest)</td>
<td>20</td>
<td>9.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>212</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 6.19 Buyers of sago sections

Table 6.19 shows that most smallholders sell their sections directly to the millers (45.3 per cent) while 36.3 per cent use a middle person, and only 9 per cent sell both to a middle person and the millers.

The middle men are also Chinese, profiting by buying at a lower price and selling at a slightly higher price to the mills. Smallholders prefer to deal with a middle person due to an established business rapport. Amok of Kampung Medong prefers to sell his sections to the middle man because:

"My father sold his sago sections to the Ling family, so did my grand father and all of my other relatives. That is why I'm selling the sections to him. It is convenient because he will come once the sago sections are ready and I'll get my money".

There is no report of middle person exploiting smallholders. Most smallholders are satisfied with their selling deals.

Sago sections are collected and floated on the river to the mills. The sections are untied and rolled up the river bank. A large bush knife (*parang*) is used to strip off the bark, leaving only the piths. This is split into batons of manageable size, ready to be rasped with a rotary
nail studded disc mounted on a platform. The raspings are then sprayed through perforated pipes to produce pulp slurries which flow down into a “gutter”, to be sieved through a fine shaker into sedimentation tanks. Starch from the sieves then setting in the tanks. After a few days the water in the tank is drained off and the wet starch is transferred to the drying kiln. Finally, the dried flour is transferred to poly-prophylene bags of 84 katis (50 kilograms), 100 or 112 katis. (See Appendix VI for full details of sago processing).

Simon Ubom has been operating his mill for more than 20 years, following in the footsteps of his late father Ubom. He has successfully entered the business, despite being the only Melanau. He also has a fleet of “express boats”, daily carrying passengers from Dalat to Sibu. He also owns sago farms.

According to Simon, the price of sago sections is determined by international demand for sago flour, mainly Japan. When there is less demand, the price of flour falls and so does that of a sago section. Sales contracts are usually of 6 months duration, for total consignments of up to 300 tonnes and shipments of about 10 to 25 tonnes. Simon explained the pricing system:

“The price of each sago section is now RM 6.20\(^{11}\). For 6 to 7 months, the price will be the same. If the price of sago flour falls, then the price of sago section will also fall. We will give advance notice to villagers concerning the price of sago sections, after meetings have been held between sago millers”.

The millers have formed an association to fix a standard price for a sago section, so that there will be no price competition among them. Simon explained:

“Previously we had problems among each other, especially concerning the price of sago sections. Nowadays, we have to sign an agreement under our own regulations, that no millers are to change the price of sago sections without the consent of all other millers. This means that price competition is not allowed. If any changes in the price of sago sections are made, then the 5 major sago millers will hold a meeting. The relationship between sago millers is good since 1992. The price of sago sections in Oya, Dalat and Batang Igan is standardised.”

In contrast to the millers, local smallholders have no association to control the supply of sago sections. According to Penghulu Henry Elli of Kampung Medong, Dalat, it is impossible to set up an organisation for smallholders due to the attitude of the Melanau;

\(^{11}\) Price in late 1995.
“The Melanau will come for occasions like gotong-royong\textsuperscript{12}, but will not put up with a formal organisation. Things are done on an ad-hoc basis here, not according to plan. People are more comfortable when working that way.”

There is no help from the government in setting up the mills. Simon Ubom, the only Melanau operating a mill on a similar scale to the Chinese, obtained his loan from a private bank. According to a DOA officer, Chinese millers obtained loans from a sago exporter (persons who export sago flour abroad). This situation had created a “ladder of indebtedness”, not only upward between millers and exporters, but also downward to sago smallholders, especially for smallholders who had credit ties with the millers. The “ladder of indebtedness” had resulted in sago millers becoming complacent about the quality of sago flour. There was no incentive to upgrade the quality (through investment in better and more efficient processing equipment) because millers are more concerned with getting some profit, to settle their debt with the exporters. This situation had prompted the DOA to research improved processing equipment, that will produce a high quality sago flour.

Figure 6.29  Sago processed traditionally on trampling platform, termed locally as “injak”

(Source: http://region.letters.hokudai.ac.jp/mivauchi/vasi-photo)

A research programme to improve sago production and industries was introduced in 1976, with a total budget of RM 6 million. (Information from interviews with a DOA officer). A major proportion of the total budget was directed at improving processing equipment. This decision was influenced by a belief that the low international demand for sago was due to the

\textsuperscript{12} Village community work, working in co-operation with each other voluntarily.
poor quality of the sago flour produced by traditional method (trampling platform – "injak" - See Figure 6.29). A DOA officer criticised the traditional processing techniques as inefficient and unhygienic:

"The price of sago was not favourable during the 1960s and 1970s due to poor quality of sago flour processed by local people in Dalat and Mukah. During the drying process, the wet starch was placed on mats and dried in the sun. At the same time chickens, ducks and dogs also feed on the dried starch. As a result, a low quality of sago flour was produced".

However, the traditional trampling platform method is more efficient. A British Starch Technologist, J.E. Cecil was appointed by the DOA to investigate the performance of three different types of processing sago - large mill, small mill and the traditional trampling platform. (See Table 6.21 and 6.22).

Table 6.20 shows the efficiencies of starch extraction of the four processing methods, taking into account both tables and troughs. The large mills (F1 and F2) settle sago starch in a "table", while the trampling platform (F3) and the small mill (F4) used a trough. The results show that the trampling platform is 100 per cent efficient compared to only 80.6 per cent for F2, 89.5 per cent for F4 and 91.6 per cent for F1. However, the trampling platform (F3) cannot produce a large volume of sago flour compared to the mills, an essential requirement in meeting export demand.

<table>
<thead>
<tr>
<th>Type of processing</th>
<th>Percentage efficiency of starch extraction</th>
<th>Percentage efficiency of starch extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>starch extraction</td>
<td>table</td>
</tr>
<tr>
<td>F1 (large mills)</td>
<td>71.3</td>
<td>91.6</td>
</tr>
<tr>
<td>F2 (large mills)</td>
<td>72.3</td>
<td>80.6</td>
</tr>
<tr>
<td>F3 (trampling platform)</td>
<td>79.0</td>
<td>-</td>
</tr>
<tr>
<td>F4 (small mill)</td>
<td>70.4</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 6.20 Efficiencies of starch extraction for four types of sago processing in relation to their starch tables or trough

(Source: Lim, 1992)

Table 6.21 shows the amount of starch loss during processing. The trampling platform (F3) loses least (26.7%) and the overall result shows that both large mills (F1 and F2) lose a considerable amount (45.1%) and 47.7% respectively. This is followed by the small mill (F4) at 40.8%.
Medium by which starch is lost | Percentage starch loss based on raw sago log | Causes of loss
---|---|---
F1 (Large mill) | F2 (large mill) | F3 (trampling Platform) | F4 (small mill) | 
Bark | 15.1 | 10.1 | 6.9 | 15.0 | Variable thickness of starchy pith is stripped off with bark
Hampas (dross) | 24.9 | 25.1 | 18.2 | 19.5 | Poor rasping and poor extraction
Starch table overflow | 5.1 | 12.6 | - | - | Poor design of table
Trough overflow | - | - | 0.0 | 6.3 | Leaking trough
Other | - | - | 1.6 | - | Consumed by animal and etc.
Total losses | 45.1 | 47.7 | 26.7 | 40.8

Table 6.21 Losses of starch during processing operations

(Source: Lim, 1992)

The DOA officers in Kuching were convinced that an increase in the price of sago flour is due to their success in improving the processing equipment. However, it had been known that poor quality did not influence demand alone. Other factors such as competition from other starches, especially maize from the United States, also affected international demand. (Wee, 1978; Sim, 1987). Not only is sago unable to compete with other starches, but exports of sago flour had also been restricted by the introduction of trade regulations (tariff, import duties and devaluation of currencies).

DOA Annual reports between 1951 to 1962 (the period before independence), indicated that the decline of sago prices at that time was due to the poor quality of sago flour produced by Sarawak, especially in the study area; the result of poor enforcement by the Sago Advisory Committee, who were supposed to fix a good quality of sago flour by eliminating faulty production. However, the increase in freight rates to Europe in 1956 also contributed to the decline of sago prices at that time, which reduced the price received by primary producers by about 50 cents per picul (£1 sterling per ton).
The powers of the Sago Advisory Committee were finally repealed in 1959, after 11 years of unsuccessful enforcement. About 88 per cent of sago flour were exported to Europe in the 1950s, mainly to the UK. The colonial government tried to reverse the decline in sago production by removing the export duty in October, 1957, but with little effect. In 1958, the DOA reported that the poor quality of sago flour was due to the lack of clean water for processing. By 1961, poor quality was attributed to complacency amongst sago millers. Mechanisation in the sago mills was crude, reducing the cleaning process to a single washing and, lowering the quality of the final product.

The steep decline in international demand and price in the 1950s had reduced the area of sago cultivation in the study area. Moreover, there had been a change in gender role related to sago production. Women and the elderly were forced to do men's jobs, as the men themselves left for the flourishing timber industries (to compensate the declining incomes from sago production). By 1962, the total area of 60,000 hectares sago farms had declined to 36,000 hectares. Nevertheless, between 1955 to 1962, the export of sago flour continued to increase steadily, from 9,871 tonnes in 1955 to 31,614 tonnes in 1962. (Figure 6.7 and 6.8). This phenomenon mainly reflected the lack of alternative sources of export in the area. The Melanau were too dependent on sago.

Being a family business, most workers at the mill are family members themselves. Extra workers are also employed for certain jobs, such as stripping sago bark and operating some of the machinery. Simon, a sago miller from Kampung Tanam, Dalat, employs local people and pays them according to the jobs assigned;

"My workers are local people from Kampung Tanam, Balan and Medong. Their wages depend on the work they do. The wages range between RM 30, RM 20 to RM 8 per day.

According to a DOA officer, there is a problem with the supply of sago sections. Supply is inelastic, that is, no matter how much the demand for or increase in sago price, the supply of sago section remains the same (DOA Report, 1980). The DOA feels that the inelasticity of supply is due to irregular and unsystematic harvesting of sago by smallholders. For the Chinese millers, this is a major problem, since their mills need a minimum quantity of sections to work at optimal level (2000 sections a day). However, Simon Ubom did not complain of any supply problems. For him, the supply of sago sections to his mill is always constant.

192
In contrast with the income of the cottage industries and the smallholders, the sago millers’ profits are extremely high (at least RM 300 over a day), equivalent to the monthly income of the smallholders and more than double the cottage industries’ average fortnightly profit. (Appendix VII).

The government helps sago smallholders indirectly, by setting up the SEDC mill in 1986 and thereby providing competition to the Chinese millers. The SEDC mill sets a minimum price for the sago sections, with the intention of protecting the smallholders’ interests. In other word, the SEDC sago mill breaks up the oligopolistic character of the milling business.

The millers not only manipulate and exploit smallholders, but also cause environmental problems, mainly through waste disposal. Air and water quality is affect by this waste. According to Anton (1992), there are three types of wastes - bark, hampas (dross) and liquid effluent. Bark is collected and burned in the vicinity of the mills (Figure 6.30) and sometime sold to villagers for fuel.

Figure 6.30 Barks collected at one place and burnt
(Source: Author’s photograph)
When burnt, bark causes air pollution. However, there is still no research on local air quality, especially from bark burning. The 1996 haze problems in South east Asia with Sarawak being hit worse, reached a hazardous pollution index level, and meant that further bark burning would worsen air quality in the area. Open burning has been banned since the haze incident, under The Natural Resources and Environment Ordinance (Prohibition of Clearing and Burning of Vegetation and Combustible Materials) Order, 1997, Section 10. Under this new Ordinance, no person shall, without written authority of the Controller for Environmental Quality, clear and burn any vegetation. However, the success of this regulation depends on the nature and effort of enforcement.

Hampas (dross) can be coarse or fine. Coarse dross is waste from the process of forming pulp slurry by the extractor-separator. Sometime coarse hampas are sold as animal feed, but most of the time they are discharged into an adjacent river. Fine hampas is a suspension of solid particles produced during the formation of starch slurry after going through the fine shaker sieves. Waste from this process is discharged directly into the adjacent river.

All of these wastes are characterised by a high suspended solid load, high BOD\textsuperscript{14} and the presence of plant growth nutrients (nitrogen and phosphorus) which can further increase the BOD of the rivers (Anton, 1992). According to Anton (1992), water contaminated with waste showed a ten-fold increase in BOD. Even, the unaffected river water already has a high BOD with the occurrence of blood worms (Tubifex sp.), indicating low or oxygen-free environments. The dominance of these blood worms suggested permanent anaerobic conditions on the river bed.

In addition to hampas there is liquid effluent, from water used in the various processing stages, carrying a high particulate load of hampas and unrecovered starch. This effluent is also discharged untreated into the adjacent river.

A study by Chew (1992), from SIRIM, suggested biodegradation of sago wastes, which could be done by installing an anaerobic digestion pond. An additional oxidation pond was also recommended as a secondary treatment to meet the Department of Environment standards. However, there was no indication of either anaerobic digestion ponds or oxidation ponds in any of the mills visited.

\textsuperscript{13} Sarawak Economic Development Corporation

\textsuperscript{14} biochemical oxygen demand
Despite the socio-economic and environmental problems imposed by non-traditional millers, they play important roles, as intermediaries between the sago smallholders and international market.

Section 6.6 Conclusion

Sago production in the study area had changed in accordance with a range of external influences, beginning in the 17th Century. Sago changed from a subsistence to a cash crop when Brooke took an early interest in sago as a source of revenue in the early 1860s. Since then, both sago production and processing methods had evolved throughout the years.

The production system has changed from traditional to modern. Nevertheless, traditional methods are still widely used, although they are mainly combined with modern techniques. The combination of both traditional and modern methods reflects the smallholders' dynamism and motivation. However, the findings of this study show that the practice of *adat* among the Melanau is declining. It is no longer "part and parcel" of the Melanaus' routine life, being maintained only in annual and ceremonial events. *Adat* is in danger of disappearing altogether, because of declining knowledge and respect, external influences and the changing demand and aspiration of life, especially among the young. This will be discussed further in Chapter 7.

But, modern methods are restricted by geomorphology and agronomy of the sago palm. Modern methods, as introduced under the SPS are limited to the use of chemicals and the 'straight lining system'. A breakthrough was made when the chainsaw was adapted by the smallholders, carried across from the logging camps. The use of chainsaw have accelerated: it lessens the burden of hard work, such as harvesting and clearing of new sites.

As demand for sago flour from Japan increased during the 1980s, supply problems were anticipated. This prompted the government to establish the LCDA sago plantation. The plantation contributes positively by providing employment for local people, although most respondents are not employed by the plantation due to old age, a preference for self-employment, an obligation to maintain inherited farms, the far distance of the plantation and the low wages offered. The LCDA also positively affects smallholders' income, by increasing the demand for and price of sago suckers. However, there are also problems
related to this increase, particularly those of theft and damage to young palms. As a whole, most respondents have no problems with the plantation; some do not even know that the plantation exists.
Chapter Seven  

The Melanau belief system

This chapter examines the Melanau belief system, beginning with a consideration of the structure and configuration of their *adat* system. This is followed by the discussion concerning the socio-cultural importance of the sago palm, apart from its value as a source of income and food. This section also discusses the findings from the fieldwork concerning the characteristics of the sample households and the outlooks showing the trend of acculturation occurring in the study area, particularly amongst the younger generation.

Section 7.1  

Concept of the Melanau's *adat*

There are two definitions of *adat*. The Sarawak government interprets *adat* as "customary law"; a set of rules characterised by sanctions or recommendations in the case of transgression (Gurreiro in Sutlive, 1993). The Melanau interpretation of *adat* is much more complex; the "idea of order" (Morris, 1991). In the realm of *adat*, there are two other interrelated elements - *adat resam* (custom) and *adat-istiadat* (tradition or ritual activity).

Gurreiro (1993) defined custom as:

"...the "way of doing things" which influences social behaviour within a particular cultural context. In certain circumstances, the behavioural aspects of social relations point at the obligation (for instance, reciprocity). A refusal to comply with the rule (for the individual, the group, household or village) would be exposing oneself to sanctions, material or supernatural" (Gurreiro in Sutlive, 1993; p.131).

When the Melanau first settled in the peat swamp forest environment, the cultivating of sago was for basic biological needs (such as for food, shelter, medicine and so on). The Melanau have learned to make full use of the sago palm. Almost every part of the palm is utilised (from the root up to the fruit), not only as food but also for other functions like construction materials, domestic utensils (baskets, spoon, broom, mats and sago processing items), fishing equipment, fencing for vegetable garden, rails for rolling sago logs, shaft to peg together sago logs during rafting, firewood, rafts and etc. (Merawin, 1994). Over time their technology has developed and they have acquired a unique knowledge of their environment, particularly the sago palm. This traditional technology and knowledge is transmitted and formulated through cultural means, codified in a system of arbitrary symbols, the *adat*.

Symbols are a component of culture. Hutterer et al. (1985) assert that symbols:
"....involve the representation of one reality through another essentially unrelated one, but they also are constituted on an arbitrary basis and are manipulated deliberately" (Hutterer et al., 1985: p.5).

The Melanau's interpretation of adat as an "idea of order" involves a greater sphere of influence than just a set of rules but extending throughout the universe (Morris, 1991). Hutterer et al. (1985) described this as a "cosmological axiom" which explain:

".....the nature of the universe, assign humans a place within it and define the source and purpose of existence. These cosmological axioms entail both explicit and implicit principles for behaviour and action that are general in nature" (Hutterer et al., 1985: p.6).

There are two main functions of adat - to restore socio-economic balance by acting as a conflict-regulating mechanism and to define social relationship in the community (Hutterer et al., 1985; Morris, 1991; Gurreiro in Sutlive, 1993).

The function of adat as a conflict-regulating mechanism deals with internal and external problems (such as tensions, disputes, violence and competition for the use of resources and land tenure). In Melanau society, the elders are the guardians of adat and are responsible for social order. Thus, in the context of adat as a conflict-regulating mechanism, the opinion of the elders are significant, with the presumption that they act in good faith and for the general good. Most actions are based on defending the community against enemies, formulating general policy and regulating social relationship within it. Morris described the importance of adat as a conflict-regulating mechanism in the Melanau community in the following way:

"Men could live safely only by adherence to the adat; but also saw disagreements and dissension as an inevitable part of human affairs. But the existence of adat made reconciliation and containment of dissension possible"(Morris, 1991: p.286).

The Melanau's traditional boundary system is an example of adat acting as a conflict-regulating mechanism, whereby particular trees are planted at the boundary of one farm as a symbol of ownership. A Melanau who understands the boundary system will not trespass or disturb someone else's land. (See Chapter 6).

Another example of adat as a conflict-regulating mechanism is shown by the villagers of Kampung Jebungan, where agents from the LCDA sago plantation are not permitted to enter their village and sell sago suckers, as an act against the widespread theft problem of planting materials.
Adat defines social relationships in the community at household and village levels with all the implications of ritual (practical) and ideological (symbolic) order. Palei is a form of ritual impropriety. Morris, (1991) described palei thus:

“the prohibition of ritually improper behaviour, implies the idea of an ordered universe which is put into disorder by improper actions - disorder that can only be returned to order by material and symbolic expiration”(Morris, 1991: p.125).

Palei is concerned with the behaviour of the villagers to one another at different levels, for instance, the palei in kaul applies at village level; the palei in mourning of the death at household level and; the palei in pregnancy at individual level.

Section 7.1.1 The role of palei in the Melanau community

As a social sanction in sago cultivation palei is influenced by the Melanaus' adat. The Melanaus' adat is shaped by their belief system, which is based from their traditional religion. According to these beliefs, life is inhabited by three forms of beings - the spirits, human beings and other ecosystem species (the animals, plants, soils, sea, river and etc.). The spirits are rest at the top of the life system because there are believed to possess the invisible and extraordinary power of “good” and “bad” forces. The Melanau do not necessarily regard these spirits as God, but they recognise that the spirits exist, are more powerful than them and can harm them (Morris, 1981; Amir, 1989). The Melanau address the spirit through various names: duhiy, amow, tow, jin and ipok (Amir, 1989). These spirits should not be disturbed or harmed, otherwise they will in turn harm the community. It is also believed that these spirits inhabit the environment surrounding their villages, especially the forest, the sea and the mouths of the rivers. Thus, the environment, where the spirits abide, should not be disturbed, otherwise the spirits will harm the villages, particularly the person trespassing the spirits' dwellings.

Besides the spirits, other beings which are part of the local ecosystem, such as animals and plants, also influence the Melanau sphere of life. The Melanau themselves occupy the second tier of the belief system, with the spirits above them and the animals and plants below. As the animals and plants are below the human beings, the Melanau believe that human beings, like the spirits, have the power to harm and exploit animals and plants. They should not harm or exploit the animals and plants in their immediate ecosystem, otherwise the more powerful spirits will harm and exploit them in turn. It is these linked relationships across the three tiers that form the basis of their belief system. In order to ensure peace and harmony among all the beings, all the groups in each tier should not harm each other. The basis of the Melanaus’
“moderation” values is also derived from the concept of restraining oneself from over exploiting any beings in their environment. (See Figure 7.1).

The Melanau belief system not only shapes their “adat” but influences all aspects of their life, at both social and material levels. Adat is practised through the introduction of palei (social sanctions). Palei is a prohibition against eating or doing certain activities at certain times. For example, following a death, family members may not enter the jungle for three days, otherwise they will face misfortune or hazardous accident.

Figure 7.1  The influence of the Melanau belief system in the creation of their adat through palei as means of enforcement
<table>
<thead>
<tr>
<th>Environmental elements</th>
<th>Tanam</th>
<th>Medong</th>
<th>Jebungan</th>
<th>Tellian Ulu</th>
<th>Sesok</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sago pith and leaves (<em>dakan</em>)</td>
<td>• Use to cure all type of illnesses</td>
<td>• Same as Tanam</td>
<td>• Same as Tanam</td>
<td>• Same as Tanam</td>
<td>• Same as Tanam</td>
</tr>
<tr>
<td>Clay (&quot;Tegak&quot;) (bamboo or stick is used to collect the clay)</td>
<td>• Use to cure indigestion problems</td>
<td>• Same as Tanam</td>
<td>• Same as Tanam</td>
<td>• Same as Tanam</td>
<td>• Same as Tanam</td>
</tr>
<tr>
<td>Old Tree Stem (cure all type of illnesses)</td>
<td>• Not available</td>
<td>• Not available</td>
<td>• Available at Kampung Tegak, water in the area seems to be boiling with bubbles</td>
<td>• Available at Tellian river</td>
<td>• Not available</td>
</tr>
<tr>
<td>Moss on sago palm</td>
<td>• Not available</td>
<td>• Not available</td>
<td>• Not available</td>
<td>• Not available</td>
<td>• To cure wounds and cuts.</td>
</tr>
<tr>
<td>Life form that hurt human have healing powers</td>
<td>• Not available</td>
<td>• Not available</td>
<td>• For example a wound from snake bite should be cure by the venom of the snake</td>
<td>• Not available</td>
<td>• Not available</td>
</tr>
</tbody>
</table>

Table 7.1  Traditional medicines derived from the environmental elements

Table 7.1 shows the importance of *adat* in all aspects of Melanau life, including economic activities such as farming, fishing, hunting and collecting forest products. *Adat* also influences Melanaus' social events - traditional healing rituals, rituals like *kaul* (sea appeasing festivals) and ceremonial events (marriage, birth and death). In sago cultivation, constraints on over-exploitation are reflected in the "*palei*", in the form of social sanctions. (See Chapter 6, Section 6.3 on the traditional method of cultivating sago).

The use of traditional knowledge and *palei* is not only limited to sago cultivation. There is also *palei* and traditional techniques that reflect the Melanaus' intimate knowledge of their immediate environment, especially the use of different components of the vegetation, soils and animals as traditional medicine. (See Table 7.1). According to those interviewed, knowledge about traditional medicines is obtained from the elderly and inspired by their dreams.

*Palei* ia also concerned with the prohibition of eating certain types of vegetation and animals, avoiding certain vegetation and refraining from going out on certain days with certain weather conditions. (See Table 7.2).
Palei connected to eating is derived from either inheritance or means of showing gratitude to
the animals and plants concerned. The real reason for the palei of certain plants and animals
may be related to allergic reactions, since most of them reported of skin disorders after eating
them. For example, Penghulu Nikie of Kampung Jebungan reported an incident in his village
about a man who was not supposed to eat the "bertuh" (a type of freshwater perch); not
even to touch its remains:

"There was a man in our village who got terrible swollen and itchy just from sitting on the
cutting board where the "bertuh" fish was cut. He went to the hospital and was injected
three times a day with no improvement. Finally, after lots of effort and meeting all kind of
shamans, someone advised him (through his dreams) to use the "bertuh" fish as a medicine.
This was done by taking the tail of the "bertuh" fish, grilled and grounded until very fine
like ashes and placed on the affected area. At last, the "bertuh" fish cure him."

The villagers of Kampung Medong and Kampung Tanam refuse to eat the "kelepo" (a large
wild yam), as a way of showing gratitude to the plant. The head of the village from
Kampung Tanam, Kab Satamong explained the palei as:

"We are not allowed to eat the "kelepo", due to its curse. The "kelepo" were once used as a
place to hide from our enemy. The "kelepo", thus provided us with some form of protection.
From that day onwards we made an oath not to eat any "kelepo" again."

Sometimes the palei is supported by coincidental incidents which make the Melanau more
convinced of its validity. For example, Mura of Kampung Jebungan told of a man who ate
the "labi-labi" (tortoise) despite the palei that he should not:

"The reason for us not to eat the "labi-labi" is because it has saved our ancestors. Once upon
a time, there was a little boy who wounded his foot. The wound was so bad that no body
could cure it. A tortoise came to lick the young boy's wound until the wound was healed.
Being grateful to the tortoise, the boy promised that his generation will never eat a tortoise
again. If his generation ate a tortoise, they will suffer from wounds or accidents with broken
legs or arms. This had really happened in our village. There was this man who went to the
forest and met a tortoise for three consecutive days, until he could not restrain himself but ate
the tortoise. During a sports day at the village school, the man suddenly fell down and
twisted his elbow. After that he went to see a shaman to treat his elbow, but on the very same
night, he fell down again and twisted back the same elbow when waking up to get some
drink".
<table>
<thead>
<tr>
<th>Other palei related to the environment</th>
<th>Tanam</th>
<th>Medong</th>
<th>Jebungan</th>
<th>Tellian Ulu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prohibition of eating certain vegetation or animals (If eaten would cause skin disorder or accident)</td>
<td>• Plant (&quot;binjai&quot; and &quot;kelepo&quot; (large yam))</td>
<td>• &quot;Kelepo&quot;</td>
<td>• fish (&quot;belulang&quot;, look like mackerel and &quot;bertutoh&quot; (freshwater perch)</td>
<td>• Not available</td>
</tr>
<tr>
<td>Prohibition to go near certain vegetation (believed to be the dwellings of the evil spirits)</td>
<td>• &quot;Binjai&quot; (Mangifera caesia) and &quot;kelepo&quot;, termed as &quot;Titah Antu&quot; (the curse of the evil spirit)</td>
<td>• &quot;Ara&quot; (Ficus spp.) • &quot;Rengas&quot; (Glutta spp.)</td>
<td>• &quot;Binjai&quot;, &quot;Ara&quot;, &quot;Rengas&quot; termed as &quot;kayou pekena&quot; (evil trees)</td>
<td>• Same as Jebungan</td>
</tr>
<tr>
<td>Prohibition to go out in certain weather conditions (it is believed that such weather conditions are the favourite time for evil spirits to walk around, a person who do not adhere to these palei may experience prolong illness)</td>
<td>• &quot;hujan panas&quot; (when it rains with sunshine), if had to go out put a leaf on ears or something on head, if indoors put a broom outside the door • when rainbow appears in the sky • when the sky is red, yellow or orange (refraction)</td>
<td>• &quot;hujan panas&quot; (when it rains with sunshine), if had to go out put a leaf on ears • when rainbow appears in the sky</td>
<td>• &quot;hujan panas&quot; (when it rains with sunshine), if had to go out, pulled out the wild yam from its root upwards and beat all over the body, or attached the wild yam to the parang • when rainbow appears in the sky</td>
<td>• Same as Medong</td>
</tr>
</tbody>
</table>

Table 7.2 Other palei related to the environment
Section 7.1.2 The transmission of palei and traditional knowledge to the younger generation

Traditional knowledge and palei are passed on in three ways - oral folklore, observation and participation. Peteran, a shaman from Kampung Tellian Ulu explained the process whereby adat is passed on to the next generation;

“We tell our children stories related to palei, advise them and bring them along to the sago farm. However, very few of the children today believe and practise palei. There is a danger that the palei will be forgotten one day.”

This is confirmed by the group discussions with the younger generations as;

“We learn adat from our parents and the elderly. Our parent usually forbids us to do things that are against adat. We also observed what and how our parents do things, and also follow the way they do things. Adat is taught depending on the circumstances, sometimes location-wise, that is while in the area, for example in a farm. Sometime before going to the area or before starting a task.”

The young are generally sceptical about adat. However, adat is still followed due to several factors - out of respect to their elderly; partly successfully persuaded by their parents and elderly of the “bad” consequences of not adhering to adat; being convinced that adat will help them to recover, such as following palei during the post-natal period or using the dakan to cure illness and; adat can be fun.

Adhering to adat out of respect to their parents and elderly is a very common reason. In this case, the young are very sceptical of adat and think that some of the practices are absolutely ridiculous and nonsense, but to avoid hurting the feelings of the elderly and especially their parents, they usually follow the adat. In this case, there is a tendency that when the elderly and their parent are gone in the future, most of the practise of adat will also disappear.

Not only are some of the elements of adat perceived as ridiculous but in most cases they clash with the new religions and ideas adopted by the young. From group discussion with the younger generation, most agree to safeguard only the “good” adat and eliminate the “bad” ones;

“The good ones should be followed, while the bad ones forgotten. The one that clashes with religion should be forgotten. So should the ones that sound really ridiculous.”

204
"Good" adat are those that help the community, such as traditional medicines and ceremonial events (like weddings and the kaul ceremony), that uphold identity and promote community solidarity. "Bad" adat are those which clash with the new religions and aspirations. The definitions of "good" and "bad" adat are vague, because some of the elements in the "good" category can also clash with religious belief. For example, the kaul ceremony is the annual event that promotes village solidarity and conserves the Melanaus' identity. But it is also the time when people get drunk, which is against the dictate of Islam. There are also other events worshipping evil spirits in the kaul ceremony, such as sacrificing a white cockerel for
cleansing the village, which is against both Islamic and Christian beliefs. In this case, the younger generation are placed in a dilemma, as if standing at a junction, having to choose between a new road (their new religion and aspiration) and the old one (traditional knowledge and adat). As yet, the process of "acculturation" is not completed, but the slow decline of traditional culture is evident in this brief overview.

This dilemma is shown by their fear of the dangerous consequences of failing to adhere to adat. Zuraidah of Kampung Medong believed in the bad consequences of this, when her sister was bewitched by an unknown person and almost died;

"We are afraid of the consequences of not following adat. My sister had been bewitched, being followed by an evil spirit sent by some unknown person, probably for revenge purposes. She was not well, almost mad, until treated by a shaman. If not she will definitely become mad or die. She was treated by taking a bath which contained different type of flowers."

Awang of Kampung Bakong trusts the traditional knowledge and adat to ensure high and sustainable productivity in farming;

"Adat is followed, for example, in cases like farming to ensure continuous productivity. The knowledge of the elderly is good, like choosing the best months or days to plant. They also have the ability to predict the weather and know the month without looking at the calendar, but just by looking at the moon."

Jeniri of Kampung Tanam, however enjoys adat;

"I enjoy attending a funeral. We have the chance to play poker and drink for three nights. We stay up for three nights, so that the corpse will not be disturbed or possessed by the evil spirit."

Jeniri also said that adat is important in events like wedding ceremonies to enhance the ceremony, otherwise attending a wedding will just be another boring ritual. The elements of fun is also supported by most of the younger generation interviewed as the time to amuse themselves, particularly those living in remote villages, where little live entertainment is available and cannot be compared with television. The kaul ceremony is their favourite, in which they can participate and witness entertaining traditional games like the "lukan";

"Going to the kaul ceremony can be enjoyable. The most enjoyable thing is to watch people playing "lukan". An idol is placed inside a basket that we carry to the forest call "belukou". The basket is worshipped with some verse. "Kemenyan" is also burn at the same time to produce smoke. The basket will dance. Nobody can fight the basket, even five persons will be easily send rolling by the basket."

1 Playing with the spirit of the basket
2 Benzoin, producing a smelly smoke
Section 7.1.3  Socio-cultural roles of the sago palm to the Melanau community

The importance of the sago palm is not limited to its material benefits, for it also influences almost every aspect of life. A key relationship between the Melanau and the sago palm is its in traditional medicine or healing objects, notwithstanding the Melanau conversion to Islam and Christianity. The pith or trunk is carved into the exquisite wooden "sickness figures" or effigies (the “bilum” in Oya and Dalat or “dakan” in Mukah) that are used in traditional healing rituals. In some cases, depending on the illness and the age of the patient, sago leaves are thatched to produce the effigy. This healing process is known as “payun” (Amir, 1989), a ritual that involves the use of “rabuong”. This is a type of dakan carved into boat, which provides a transport system to the rest of the dakan (in various images). The “payun” is performed by the “a bayoh”, a shaman, who sits on a special hammock with a dragon carved on the top, called the “payun”. He goes into trance to meet the spirits that cause the illnesses. When the spirit comes, the shaman will fight or wrestle with it. Lay persons cannot see the spirit, only the actions of the shaman. The surrendered spirit will be driven away from the patient’s body into the dakan that is placed inside the rabuong. On the next morning the rabuong, with several dakans inside it, will be sent to the rivers or sea to be disposed of. The “payun” ceremony is for serious or major illnesses that cannot be cured by the conventional prescription of the dakan through shaman dreams. (See Figure 7.3 and 7.4).

Figure 7.3  The Rabuong
(Source: Author's photograph)
Dakan can also be prescribed by a medium or shaman without the payun ceremony. In his dream, the shaman is inspired by a spirit (ipok) concerning the type and destination of the dakan that is required. The shaman carves or weaves the dakan as inspired by the spirit. The healing rituals involve the piercing of the dakan eyes or any other part of the dakan (according to the part of the body where the patient experiences pain). The shaman then spits on the pierced part of the dakan with a chewed mix of bettel and nuts. The dakan will then be sent off to its destination (usually on the roof of the houses, on top of some trees, in the river or sea or to the forest). The Melanau believe that the dakan should never be disturbed or mocked, otherwise whatever illness that has been transferred into the dakan will be in turn transferred to those who mock or harm it.

Sago is also used in major rituals like “kaul” (the sea-appeasing festival or the cleansing of the village in interior areas). In this festival, the sago trunk, together with other local plants like bamboo (genus Bambusa) and “nipah” (Nypa fruitican) leaves, are used to build a “serahang” (a place where the gifts to the spirit of the rivers and sea are presented, which look like a huge decorated basket on a pole). (See Figure 7.5).
The Kaul ceremony is celebrated in early January (Kampung Medong, Dalat) or late March/early April (in Mukah and other coastal areas inhabited by the Melanaus). Late March or early April is equivalent to the “Bulan Pengejin” in the Melanau calendar, a time where the weather is fine and the sea calm. The Melanau believe that this is the best period, when the “ipok laut” (Spirit of the sea) will listen to their prayers for a health, peace and a prosperous life.

Section 7.2 The Sample households

This section examines the socio-economic characteristics of the sample households. It also includes a description of the working condition of the sago smallholders.

The districts of Mukah, Oya and Dalat cover a total area of 7,236 square kilometers with the total population of about 67,000. Two hundred and fifty five households were selected, from seven villages. The reasons for selecting these villages were due to the spatial location of each village with respect to town centres and the LCDA plantations. The different villages are also characterised by three different religions (Pagan, Christian and Islam). A detailed discussion on the reasons for selecting the villages can be found in Chapter Five. Figure 5.1

Figure 7.5 The serahang, a place of presentation for the gifts to the “ipok laut” (Spirit of the sea)

(Source: Author’s photograph)
of Chapter 5 shows the location of the seven villages; Kampung Tellian Ulu, Sesok, Teh Labak, Tegak and Jebungan in Mukah; Kampung Tanam in Oya; and Kampung Medong in Dalat.

**Section 7.2.1 The socio-economic characteristics of the sample households**

Figures 7.6 to 7.12 show the characteristics of the sample households. They are characterised by an ageing population, mostly without formal education, with large families, low spending and low income. More than half of the respondents are employed in non-agricultural work. Alternative employment provides a ‘safety cushion’. Most respondents (66 percent) also depend on their immediate environment (forest, rivers and the sea) for food sources. Majority are Christians, followed by Pagan and Muslim.

**Figure 7.6 Age structure**

**Figure 7.7 Education level**

**Figure 7.8 Religion of the respondents**

**Figure 7.9 Number of family members**
The ageing characteristic of the households is typical of the rural population in Malaysia (Malaysian Government, Seventh Malaysian Plan, 1996) and results from out migration, to urban areas, for both education and employment. The community in the study area still regards a large family as an important asset, especially for help in the household and farm work. The importance of a big family is influenced by the traditional belief that children will be the one responsible to look after the elderly when they grow old.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Significant (Chi-Square χ²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dependent variable) educate</td>
<td>Education level of the respondent. no formal education (1), primary school (2), secondary school (3), others (4)</td>
<td>yes (p = 0.00984)</td>
</tr>
<tr>
<td>(Independent variables): gender</td>
<td>Gender of the respondent. male (1), female (2)</td>
<td>yes (p = 0.00118)</td>
</tr>
<tr>
<td>familyinc</td>
<td>Income from other members of the family. not available (1), less than RM 50 (2), RM50- RM 100 (3), more than RM 100 (4)</td>
<td>yes (p = 0.00058)</td>
</tr>
<tr>
<td>otherjob</td>
<td>Other job. yes (1), no (2)</td>
<td>yes (p = 0)</td>
</tr>
<tr>
<td>age</td>
<td>Age of the respondent. 10 to 29 years old (1), 30 to 49 years old (2), 50 to 69 years old (3), more than 69 years old (4)</td>
<td>yes (p = 0)</td>
</tr>
</tbody>
</table>

Table 7.3  Crosstabulation between the dependent variable “educate” and the significant result related to personal factors

Crosstabulations shows that there are relationship between the respondent’s education level age, gender, employment and remittances. (Table 7.3 to Table 7.7)
More men than women receive formal education. This is because in the past, the opportunity to study was mainly given to men rather than women. The traditional position of the women is considered to be at home.

<table>
<thead>
<tr>
<th>Education level of the respondents</th>
<th>Gender of the respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>No formal education</td>
<td>Male 67</td>
</tr>
<tr>
<td>With formal education</td>
<td>Male 66</td>
</tr>
</tbody>
</table>

Table 7.4 The relationship between education and gender

<table>
<thead>
<tr>
<th>Education level of the respondents</th>
<th>Income from other family members</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>No formal education</td>
<td>72</td>
</tr>
<tr>
<td>With formal education</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 7.5 Relationship between education and income from other family members

Table 7.5 shows that a higher proportion of respondents without formal education tend to receive supplementary income from other members of the family, compared to fewer with formal education.

<table>
<thead>
<tr>
<th>Education level of the respondents</th>
<th>Alternative employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>No formal education</td>
<td>65</td>
</tr>
<tr>
<td>With formal education</td>
<td>68</td>
</tr>
</tbody>
</table>

Table 7.6 Relationship between education and alternative employment

Table 7.6 shows that most of those with formal education have alternative employment. Although the number of those without formal education with alternative employment is also large, it is about the same as the number of those without formal education and without alternative employment.

<table>
<thead>
<tr>
<th>Education level of the respondents</th>
<th>Age of the respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
</tr>
<tr>
<td>No formal education</td>
<td>22</td>
</tr>
<tr>
<td>With formal education</td>
<td>55</td>
</tr>
</tbody>
</table>

Table 7.7 Relationship between education and age
Table 7.7 shows that most of the older respondents did not receive formal education compared to the younger respondents. This reflects the greater opportunities available to the younger generation today.

Section 7.2.2 Income and employment

Figure 7.11 shows the net income of the sample population. Net income is calculated by subtracting the cost of inputs (farming expenditure) from total income. The graph is skewed to the left, showing that most respondents have low income.

The Sarawak Poverty Level Income (PLI) is set at RM 495 (Malaysian Government, Seventh Malaysian Plan, 1996). The hard core poverty group defined at 50% the PLI value (RM 247.50). Figure 7.11 shows that 68.4 percent of the households fall below the PLI, of which 27.8 percent are in the absolute poverty. Almost a quarter of households (22.7 percent) have a comfortable income, between RM 495 and RM 852. Only 9.4 percent of households receive a high income of more than RM 852\(^3\).

---

\(^3\) The value RM 852 is derived from the standardised value of the total income, whereby, the value RM 871.30 is equivalent to the value of 1 (above average).
The average income of the sample population is RM 468.10. However, this value can be misleading due to the skewed distribution and the presence of outliers. (Figure 7.11). Central tendency and distribution can either be indicated by the median and quartiles (the first 25 percent of the cases). In this case, since the graph of total income is skewed to the left, the lower quartile value is RM 234.95, which is a better representation of the average income of the sample population. This value is low, which is below the hard core Poverty Line Income.

Per capita income is low because of large family sizes. This is because majority of the households have family member of more than 4 (about 84 percent). (See Figure 7.9).

The net income is derived from several sources; principally sago. Some households have other jobs and receive money from their children who work elsewhere. Besides cultivating sago, 53.7 percent of the respondents supplement their income from other jobs. Figure 7.12 shows the varieties of other jobs that the respondents engage in besides cultivating sago.

Most respondents plant other crops as alternative sources of income: swamp rice, coconut, vegetables and fruit trees particularly rambutan. This is followed by tree felling, general labouring, carpentry and fishing. Other kind of employment include working at the LCDA plantations, as civil servant, processing sago for local market and opening small business (small shops or stalls).

![Figure 7.12 Alternative employment to cultivating sago](image)

214
The contribution of the other jobs to income is very small. Most of the sample (66.9 percent) earns less than RM 300 a month from working off-farm, of whom 21.3 percent earns between RM 300 to RM 500 monthly, while only 11.8 percent earn more than RM 500 monthly.

Remittances also contribute to, whereby 48.1 percent of the sample population receive income from other members of their family who works in other part of Sarawak. Most (41.2 percent) receive between RM 50 to RM 100 per month; 35.3 percent receive a supplemented income of more than RM 100 per month, while 23.5 percent receive less than RM 50 per month. Non-timber forest products are collected by 65.6 percent of the sample. From the 139 households using local forests and rivers to collect foods, 57.1 percent state that the food collected from their local environment is important.

Table 7.8 shows the results of a crosstabulation between income and other factors (otherinc, harvest, sagoinc, timefell, hour, spend and otherjob). The total income of the farmers is related to the amount of other income received by the farmers; the frequency of harvesting in a year; the amount of income received from selling sago; the number of sago palms harvested in a year; the number of days spent working in the sago garden; the family’s monthly expenditure and whether or not the farmers have alternative employment.

<table>
<thead>
<tr>
<th>(Dependent variable) income</th>
<th>Total monthly income of the respondent. less than RM 295 (1), RM 296 - 495 (2), RM 496 - RM 595 (3), more than 595.</th>
<th>Significant (Result in Chi-square, $\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Independent variables):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>otherinc</td>
<td>Monthly income from other job. less than RM 300 (1), RM 300-RM 500 (2), more than RM 500 (3)</td>
<td>yes (p = 0)</td>
</tr>
<tr>
<td>sagoinc</td>
<td>Monthly income from sago. less than RM 500 (1), RM 500-RM 1000, more than RM 1000 (3)</td>
<td>yes (p = 0)</td>
</tr>
<tr>
<td>harvest</td>
<td>Number of sago fell in a year. less than 150 palms (1), 150 to 300 palms (2), more than 150 palms (3)</td>
<td>yes (p = 0)</td>
</tr>
<tr>
<td>timefell</td>
<td>Rate of exploitation in a year. less than 2 times (1), 2 to 4 times (2), more than 4 times (3)</td>
<td>yes (p = 0.00352)</td>
</tr>
<tr>
<td>hour</td>
<td>The average number of time spent working in the farm in a day. less than 5 hours (1), 6 to 10 hours (2), more than 10 hours (3)</td>
<td>yes (p = 0)</td>
</tr>
<tr>
<td>spend</td>
<td>Monthly spending. Less than RM 300 (1), RM 300 - RM 399 (2), RM 400 - RM 499 (3), more than RM 500 (4)</td>
<td>yes (p = 0.00383)</td>
</tr>
<tr>
<td>otherjob</td>
<td>Other job. yes (1), no (2)</td>
<td>yes (p = 0.00321)</td>
</tr>
</tbody>
</table>

Table 7.8 Crosstabulation between the dependent variable “income” with the independent variables related to personal and conditions of farming factors
Table 7.9 - 7.15 show the detailed relationship between these crosstabulation results (Table 6.8). Table 7.9 indicates the highly likelihood that higher earners will have alternative employment.

<table>
<thead>
<tr>
<th>Monthly income of the respondents (in RM)</th>
<th>Alternative employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Less than 300</td>
<td>41</td>
</tr>
<tr>
<td>300 - 500</td>
<td>39</td>
</tr>
<tr>
<td>More than 500</td>
<td>53</td>
</tr>
</tbody>
</table>

Table 7.9  Relationship between monthly income and alternative employment

Table 7.10 and 7.11 show that those who received more income from alternative employment and sago production, tend to have higher income. Total monthly incomes are higher where both sources of income (sago and off-farm) make a contribution.

<table>
<thead>
<tr>
<th>Monthly income of the respondents (in RM)</th>
<th>Income obtained from alternative employment (in RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 300</td>
</tr>
<tr>
<td>Less than 300</td>
<td>43</td>
</tr>
<tr>
<td>300 - 500</td>
<td>33</td>
</tr>
<tr>
<td>More than 500</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 7.10  Relationship between monthly income and other source of income

<table>
<thead>
<tr>
<th>Monthly income of the respondents (in RM)</th>
<th>Monthly income from sago production (in RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 500</td>
</tr>
<tr>
<td>Less than 300</td>
<td>68</td>
</tr>
<tr>
<td>300 - 500</td>
<td>59</td>
</tr>
<tr>
<td>More than 500</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 7.11  Relationship between monthly income and income from sago production

Table 7.12 - 7.14 show that the monthly income of the respondents is also influenced by the rate of exploitation (both the frequency of harvesting and number of palms harvested) and by the hours spent working in the farm daily. Table 7.11 and 7.12 show that those who harvested more palms in a year and at a higher frequency tend to have higher income. Table 7.13 shows that most of the respondents who have higher income tend to work longer hours in a day at the sago farm, compared to those with lower income.
<table>
<thead>
<tr>
<th>Monthly income of the respondents (in RM)</th>
<th>Number of palms harvested in a year</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 300</td>
<td>Less than 150</td>
<td>66</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>300 - 500</td>
<td>58</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>More than 500</td>
<td>45</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 7.12  Relationship between monthly income and the number of palms annually harvested

<table>
<thead>
<tr>
<th>Monthly income of the respondents (in RM)</th>
<th>Rate of exploitation in a year</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 300</td>
<td>Less than 2 times</td>
<td>42</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2 - 4 times</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than 4 times</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Less than 300</td>
<td>15</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>300 - 500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than 500</td>
<td>15</td>
<td>32</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 7.13  Relationship between monthly income and annual rate of exploitation

<table>
<thead>
<tr>
<th>Monthly income of the respondents (in RM)</th>
<th>Labour time (hour in a day)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 300</td>
<td>Less than 5 hours</td>
<td>35</td>
<td>40</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Not certain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 - 10 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than 10 hours</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not certain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not certain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than 500</td>
<td>11</td>
<td>49</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 7.14  Relationship between monthly income and labour time (hour)

<table>
<thead>
<tr>
<th>Monthly income of the respondents (in RM)</th>
<th>Monthly Spending (in RM)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 300</td>
<td>Less than 300</td>
<td>49</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>300 - 500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than 500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>37</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.15  Relationship between monthly income and monthly spending

Table 7.15 shows the relationship between monthly income and expenditure. Those with higher income tend to spend more than those with lower income.
Section 7.2.3 Cost of farming expenditure

Figure 7.13 The monthly cost of farming expenditure per household

Figure 7.13 shows the monthly farming expenditure of the farmers in the sample households. The average monthly farming expenditure is RM 60.25. The graph shows that 45.3 percent of the sample households spend below the average farming expenditure. This is followed by 34.4 percent who spend at a moderate level of between RM 61 to RM 93 on their farming expenditure. Only 20.3 percent of the sample households spend at a high level of more than RM 93 for their farming expenditure.

The cost of farming expenditure is calculated on the following:

- transportation (mainly by perahu (long boat), although few cases on bicycle and motorcycle).

- tools (the costs of the spraying tank, insecticides and herbicides) are excluded if farmers received subsidy to avoid double counting. However, the prices of other tools, like parang (long large knife) and etc. are included because all the households interviewed, still buy their own tools due to the poor quality of the ones provided by the subsidy scheme. (Refer to Table 7.16).
### Overhead Cost

<table>
<thead>
<tr>
<th>Transport</th>
<th>Variable Cost</th>
</tr>
</thead>
</table>
| * + 2 because not entirely used for farming but also for general transportation. | + Spark plug = RM 3.00  
+ Sealant = RM 25.00  
+ Motor oil = RM 10.00  
Total = RM 38.00  
\* RM 38.00 + 12 month  
= 3.17 pcm + 2*  
= RM 1.60  
+ Fuel (petrol)  
= RM 5.00 per gallon |

<table>
<thead>
<tr>
<th>Tools</th>
<th></th>
</tr>
</thead>
</table>
| * Chain saw  
RM 1650 + 60 month  
= RM 27.50 pcm | + Chain  
RM 35.00 × 4* + 12 months  
\* (× 4, average 4 times changing in a year)  
\* RM 100 + 12 months  
\* RM 8.30 pcm  
+ Blade  
RM 100 + 12 months  
\* RM 8.30 pcm  
+ Spark plug = RM 3.00  
+ Motor oil = RM 10.00  
Total = RM 13.00  
\* RM 13.00 + 12 month  
\* RM 1.10 pcm  
+ Fuel (benzene)  
\* RM 6.00 per gallon |

|  
Parang = RM 10.50  
Parang potong = RM 50.00  
Cangkul = RM 20.00  
Axe = RM 20.00 |  
Herbicides  
Insecticides  
1 gallon = RM 30.00  
usually used 2 gallons for 3 years  
\* RM 60.00 + 36 month  
\* RM 1.70 pcm |

|  
Spraying tank  
RM 175.00 + 120 month  
= RM 1.50 pcm |  |

### Hire outside labour

| Average RM 25.00 per day |

|  |

---

| Table 7.16 The guideline for calculating the cost of farming expenditure |

Section 7.2.4 Working condition of the respondents

Figure 7.14 - 7.17 shows the main characteristics of the respondents’ working conditions. Most of the respondents’ farms are of medium size (between 0.8 to 2 hectares). The travelling distance from the farmer’s house to his or her ranges from 1 to 3 hours. Most farmers work between 6 to 10 hours a day for 3 to 5 days a week on the farm.
The size of the sago farm, less than 0.8 hectares (1), 0.8 to 2 hectares (2), more than 2 hectares (3)

Period of cultivating sago, less than 10 years (1), 10 to 20 years (2), more than 20 years (3)

Planting other crop, yes (1), no (2)

The average number of time spent working in the farm in a day, less than 5 hours (1), 6 to 10 hours (2), more than 10 hours (3)

Receiving subsidy from the DOA, yes (1), No (2)

Effect of the LCDA sago plantation to the respondent’s farm, yes (1), no (2)

Table 7.17 Crosstabulation between the dependent variable “sizesago” with the independent variables related to economics and conditions of farming factors
Table 7.17 shows the results of a crosstabulation between sizesago and independent variables related to the economic and conditions of farm factors. There is a relationship between the respondents’ farm size and; the number of years the farmers have cultivated their garden; whether they cultivate other crop or not; the number of hours/day spent working in the sago garden; whether they receive any subsidy or not and; the effect of sago plantations on their sago garden.

<table>
<thead>
<tr>
<th>Size of sago farm (in hectares)</th>
<th>Period of cultivating sago (in years)</th>
<th>Less than 10</th>
<th>10 - 20</th>
<th>More than 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.8</td>
<td></td>
<td>7</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>0.8 - 2</td>
<td></td>
<td>23</td>
<td>33</td>
<td>46</td>
</tr>
<tr>
<td>More than 2</td>
<td></td>
<td>7</td>
<td>26</td>
<td>62</td>
</tr>
</tbody>
</table>

Table 7.18 Relationship between the size of sago farm with the period of cultivating sago

Table 7.18 - 7.22 show the details of this crosstabulation. Table 6.18 shows that those who have cultivated for more than 20 years tend to have larger farms. This means that the longer a farmer cultivates sago, the more likely is he or her to accumulate or expand his or her sago farm. Table 7.19 shows that, most of the respondents with larger farms tend to grow other crop besides sago. This is because most of those with larger farm size have been cultivating sago for a longer period, implying that most of their sago palms are already established. This means that little maintenance is needed in the established sago farm, which allow the farmer the opportunity to grow other crops.

<table>
<thead>
<tr>
<th>Size of sago farm (in hectares)</th>
<th>Planting other crops</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.8</td>
<td></td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>0.8 - 2</td>
<td></td>
<td>33</td>
<td>69</td>
</tr>
<tr>
<td>More than 2</td>
<td></td>
<td>53</td>
<td>42</td>
</tr>
</tbody>
</table>

Table 7.19 Relationship between the size of sago farm with the availability of planting other crop

<table>
<thead>
<tr>
<th>Size of sago farm (in hectares)</th>
<th>Labour time (hours in a day)</th>
<th>Less than 5</th>
<th>5 - 10</th>
<th>More than 10</th>
<th>Not certain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.8</td>
<td></td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>0.8 - 2</td>
<td></td>
<td>35</td>
<td>64</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>More than 2</td>
<td></td>
<td>27</td>
<td>60</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 7.20 Relationship between the size of sago farm with labour time
Table 7.20 shows that majority of the farmers with medium and large farm size tend to work longer than those with smaller farms. This is due to the large amount of work needed, to maintain a large farm compared to a small one.

Table 7.21 shows that those respondents with a medium to large farm tend to receive subsidy, compared to those with smaller farm size. This is due to the policy of the Sago Planting Scheme (SPS), which only allowed farmers with a sago farm of 1 hectare (about 1 hectare) to participate in the scheme. (Refer to Chapter 6, Section 6.4). The other two farmers with less than 0.8 hectare, but receiving subsidy must have got away with the policy through other means, or slightly misjudged their farm size.

<table>
<thead>
<tr>
<th>Size of sago farm (in hectares)</th>
<th>Receiving subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.8</td>
<td>Yes: 2, No: 13</td>
</tr>
<tr>
<td>0.8 - 2</td>
<td>Yes: 56, No: 46</td>
</tr>
<tr>
<td>More than 2</td>
<td>Yes: 57, No: 38</td>
</tr>
</tbody>
</table>

Table 7.21 Relationship between the size of sago farm and the availability of a subsidy

<table>
<thead>
<tr>
<th>Size of sago farm (in hectares)</th>
<th>Problems/ benefits from the LCDA sago plantation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.8</td>
<td>Yes: 4, No: 11</td>
</tr>
<tr>
<td>0.8 - 2</td>
<td>Yes: 23, No: 79</td>
</tr>
<tr>
<td>More than 2</td>
<td>Yes: 47, No: 48</td>
</tr>
</tbody>
</table>

Table 7.22 Relationship between the size of sago farm and the effects from the LCDA plantation

Table 7.22 shows that most of the farmers with larger farm size tend to have problems, particularly from the theft of sago suckers, as a result of the setting up of the LCDA sago plantation. Farmers with bigger farms suffer from this problem, because they have a larger stock of sago suckers compared to those with smaller farm size.

Most of the farmers have been cultivating sago for more than 20 years. The older they are, the longer they have been cultivating sago (Figure 6.18 and Table 6.23)
Figure 7.18  The farmers' period of cultivating sago

<table>
<thead>
<tr>
<th>Period of cultivating sago (in years)</th>
<th>Age of the respondents ($\chi^2$ test, $P = 0.0069$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>Young (less than 50)</td>
</tr>
<tr>
<td></td>
<td>Old (More than 50)</td>
</tr>
<tr>
<td>10 - 20</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td>More than 20</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>86</td>
</tr>
</tbody>
</table>

Table 7.23  Relationship between period of cultivating sago and the age of the respondents

Figure 7.19  Types of labour working in the sago farms

Most smallholders (78.8 percent) only use family labour on their farm. Only 21.2 percent employ outsiders. (Figure 7.19). Previous studies have highlighted a division of labour between men and women in sago cultivation. According to Morris (1953), men do the hard work of cultivating and transporting sago while women process the sago logs into wet starch (lemantak). However, since the early 1960’s when the Chinese sago millers began operations, the division of labour between gender started to diminish, as womens’ jobs were replaced by the mills.
Fieldwork in 1995, revealed that this division of labour no longer existed. Both men and women shared all the hard tasks of cultivating sago, although the hardest jobs like (such as felling large and heavy trees) were still predominantly done by men. This change in labour is explained by Pemanca Henry Elli of Kampung Medong thus:

"Nowadays, there is no longer a division of labour between gender. Both men and women work equally and hold similar responsibilities. This is because, most of the men work off-farm, usually in timber companies, outside Dalat. If the women are to wait for their husbands, they will have no sago farms".

The changes in the division of labour has been due to the effects from the mechanisation of sago processing (sago millers) and the need for the head of most households in the area to work else where due to the decline of sago market price, in the mid-60's.

The rate of exploitation is measured annually, since it is not definite when harvesting will take place. The farmers' decision to harvest the sago palms differs from the conventional harvesting routine of other crops like rice. This is possible due to the nature of the matured sago palms that allow at least 2 years of availability and profitability to harvest (Refer to Chapter 6). The need for harvesting depends on several factors. This is both confirmed by an interview with one of the farmers and the extension worker from the Department of Agriculture.

Mura, a farmer from Kampung Jebungan, Mukah started as a sago smallholder in 1979. Before that, he worked as a general labourer in Sibu, although educated with a secondary level qualification. He is presently the head of the AJKKK4 at Kampung Jebungan and Kampung Tegak. He is settling down with his wife and three children, with two of them studying at the established Missionary Secondary School in Mukah. During the interview on the rate of exploitation, he expressed the following opinion:

"People here do not harvest their sago palm every definite month. We will fell the palm when we need the money. The farm is our bank, not the bank in Mukah. For example, in my case, when the school terms open, I will need extra cash to buy school uniforms and other school expenditure, so I will go to the farm and fell several palms. Last month, I felled extra palms to buy a fridge".

Haji is a well-known and respected extension worker. He has been working in the areas for more than twenty years. He visits more than 5 villages, according to the areas designated by

---

4 Ahli Jawatan Kuasa Kemajuan Kampung (Village Development Committee)
the Mukah DOA\textsuperscript{5}. During a personal interview concerning the farmers' rate of sago palm exploitation, he stated the following:

"There is no way to calculate the rate of exploitation monthly. In my opinion, the possible way is to ask them annually. There is no definite ruling on when the smallholders will harvest their farm, it is a personal matter, depending on individual and circumstances. There are many factors that determine the decision to harvest. The farmers will harvest when they need cash, for example for occasions like wedding, death or birth. They will harvest if they have the manpower to do so, sometime, when there is not enough labour, the palm will need to wait. There is also the factor of time and health. If the farmer is engrossed in other activities like fishing or building a house, he may delay his harvesting. In rare occasions, the farmer may also harvest when the sago millers request sago logs. Harvesting sago palm is not the same as harvesting other crops like cocoa, swamp rice or palm oil. The biological nature of the sago palm allow this flexibility".

![Diagram](image)

**Figure 7.20** Factors affecting the decision to harvest

The sago harvest is affected by several factors - the need for cash; the availability of labour and/or time; farmers' health condition and; to some extend the demand from the sago millers. (Figure 7.20)

Figure 7.21 shows the number of sago palms felled in one year. Twenty of the respondents have just started planting their palm, therefore, their palms are not yet ready for harvesting. The majority of respondents cut less than 150 palms a year. Figure 7.22 shows the annual rate of exploitation of sago palm. Most of the farmers cut their sago palm between two and four times a year.

\textsuperscript{5} Department of Agriculture
7.21 Number of sago palms cut annually

Table 7.24 shows that most of the respondents who obtained less income from sago also cut less sago palm annually and vice versa. This also follows correspondingly in terms of the frequency of harvesting. Majority of those who cut less in terms of the number of sago palm, also cut less in terms of frequency, that is less than twice than twice a year. (Refer to Table 7.25).

<table>
<thead>
<tr>
<th>Number of sago palms harvested (annually)</th>
<th>Sago income (in RM)</th>
<th>Less than 500</th>
<th>500 - 1000</th>
<th>More than 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 150</td>
<td>-</td>
<td>142</td>
<td>27</td>
<td>-</td>
</tr>
<tr>
<td>150 - 300</td>
<td>2</td>
<td>11</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>More than 300</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.24 Relationship between the number of sago palm harvested and income derived from selling sago

<table>
<thead>
<tr>
<th>Number of sago palms harvested (annually)</th>
<th>Rate of exploitation in a year</th>
<th>Less than 2 times</th>
<th>2 - 4 times</th>
<th>More than 4 times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 150</td>
<td>-</td>
<td>70</td>
<td>71</td>
<td>28</td>
</tr>
<tr>
<td>150 - 300</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>More than 300</td>
<td>-</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.25 Relationship between the number of sago fell and the frequency of cutting sago in a year

Table 7.26 shows the results of a crosstabulation between harvest and independent variables related to the farming situation factors. The number of palms felled in a year is related to the annual rate of sago palm exploitation and income derived from selling sago sections.
Table 7.26  Crosstabulation between the dependent variable “distance” with the independent variables related to the conditions of farming factors

Section 7.2.5  Methods of sago cultivation

Most of the smallholders (52.8 percent) combine both modern and traditional methods. 30.2 percent used modern method only, while only 17 percent used traditional method alone. This section presents some of the findings showing the relationship between the dependent variable “method” (method of farming) and various independent variables (personal, conditions of farming, spatial locations and socio-economic) factors.

Table 7.27  Crosstabulation between the dependent variable “method” and the personal factors variables

Table 7.27 shows the crosstabulation done to find the relationship between the dependent variable method and various personal factors variables (gender, age, education and
religion). The crosstabulation shows that there is a relationship between the methods of cultivating sago and gender of the respondents. There are no relationship between the methods of farming with the; age, education level and religion of the respondents.

Table 7.28 shows that most men use modern method than women and vice versa.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Methods of cultivating sago</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Modern</td>
<td>Modern + Traditional</td>
</tr>
<tr>
<td>Male</td>
<td>46</td>
<td>73</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 7.28 Relationship between methods of cultivating sago and gender

<table>
<thead>
<tr>
<th>variables</th>
<th>Definition of the variables</th>
<th>Significant (Chi-Square χ²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dependent variable) method</td>
<td>the methods for cultivating sago, traditional (1), traditional and modern (2), modern (3)</td>
<td>No (ρ = 0.16941)</td>
</tr>
<tr>
<td>(Independent variables): persago</td>
<td>period of cultivating sago, less than 10 years (1), 10 to 20 years (2), more than 20 years</td>
<td>No (ρ = 0.44578)</td>
</tr>
<tr>
<td>distance</td>
<td>distance of farm from the household, more than 1 hour (1), 1 to 3 hours (2), more than 3 hours</td>
<td>No (ρ = 0.81640)</td>
</tr>
<tr>
<td>harvest</td>
<td>number of sago fell in a year, less than 150 palms (1), 150 to 300 palms (2), more than 150 palms (3)</td>
<td>No (ρ = 0.49628)</td>
</tr>
<tr>
<td>timefell</td>
<td>rate of exploitation in a year, less than 2 times (1), 2 to 4 times (2), more than 4 times (3)</td>
<td>No (ρ = 0.19445)</td>
</tr>
<tr>
<td>hour</td>
<td>the average number of time spent working in the farm in a day, less than 5 hours (1), 6 to 10 hours (2), more than 10 hours (3)</td>
<td>No (ρ = 0.04152)</td>
</tr>
<tr>
<td>day</td>
<td>the average number of day spent working in the farm in a week, less than 2 days (1), 3 to 5 days (2), more than 5 days (3), not certain (4)</td>
<td>No (ρ = 0.72900)</td>
</tr>
<tr>
<td>sell</td>
<td>buyer of sago logs, factory (1), middle person (2), factory and middle person (3)</td>
<td>No (ρ = 0.65591)</td>
</tr>
<tr>
<td>pay</td>
<td>form of payment received from the buyer, cash on delivery (1), paid by instalment (2), paid in advance (3), c.o.d. and instalment</td>
<td>No (ρ = 0.05371)</td>
</tr>
<tr>
<td>plant</td>
<td>problem of planting the sago, yes (1), no (2)</td>
<td>No (ρ = 0.71598)</td>
</tr>
<tr>
<td>plant</td>
<td>problem of maintaining the sago farm, yes (1), no (2)</td>
<td>No (ρ = 0.29161)</td>
</tr>
<tr>
<td>harvest</td>
<td>problem of harvesting the sago, yes (1), no (2)</td>
<td>No (ρ = 0.05371)</td>
</tr>
</tbody>
</table>

Table 7.29 Crosstabulation between the dependent variable “method” and the characteristics and conditions of farming

Table 7.29 shows the crosstabulation between the dependent variable method and various variables related to the characteristics and conditions of farming. The results show that there are no relationships between the dependent variable modern with any of the variables related
to the characteristics and conditions of farming (period of cultivating sago, distance of farm from the household, number of sago fell in a year, rate of exploitation in a year, the average day and time spend working in the farm and buyers of the sago log, form of payment received from the buyer and the problems in the different stages of farming).

Table 7.30 shows the relationship between the dependent variable method and the independent variables related to the spatial locations of the farmers (district and village). The results of crosstabulation shows that there is no association between the method of farming and the spatial locations of the farmers, both in respect with district nor villages.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Significant (Chi-Square $\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>method</td>
<td>The methods for cultivating sago. traditional (1), traditional and modern (2), modern (3)</td>
<td></td>
</tr>
<tr>
<td>district</td>
<td>Mukah (1), Dalat (2), Oya (3)</td>
<td>no ($p = 0.05789$)</td>
</tr>
<tr>
<td>village</td>
<td>Medong (1), Tanam (2), Jebungan and Tegak (3), Teh Labak and Sesok (4), Tellian Ulu (5)</td>
<td>no ($p = 0.07865$)</td>
</tr>
</tbody>
</table>

Table 7.30 Crosstabulation between the dependent variable “method” and the independent variables related to spatial locations of the farmers

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Significant (Chi-Square $\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>method</td>
<td>The methods for cultivating sago. traditional (1), traditional and modern (2), modern (3)</td>
<td></td>
</tr>
<tr>
<td>praadat</td>
<td>The practice of palet. yes (1), no (2)</td>
<td>yes ($p = 0.00005$)</td>
</tr>
<tr>
<td>pedok</td>
<td>The practice of pedok. yes (1), no (2)</td>
<td>yes ($p = 0.00075$)</td>
</tr>
<tr>
<td>labour</td>
<td>The people involved in the sago cultivation. family (1), employ outsiders (2), family and outsiders (3)</td>
<td>no ($p = 0.30893$)</td>
</tr>
<tr>
<td>family</td>
<td>The number of household members. less than 4 (1), 4 to 8 (2), more than 8 (3)</td>
<td>no ($p = 0.87228$)</td>
</tr>
</tbody>
</table>

Table 7.31 Crosstabulation between the dependent variable “method” of cultivating sago and the social factors of the household

Table 7.31 shows the crosstabulation results between the dependent variable, method and the independent variables related to the social factors of the households in the sample population. The result shows that there are relationships between the method of farming with the
knowledge of *palei* and the practise of *pedok*. There are also no relationships between the method of farming with the number of members in the household nor the people who are involved in the sago cultivation. Table 7.32 shows that regardless of the methods of cultivation used, most who know *palei* practise it, but in term of proportion most of them belong to those who either used the combination or the traditional methods. Table 7.33 shows that most of those who cultivate sago using the traditional and the combination methods tend to practise *pedok* compare to those using the modern methods.

<table>
<thead>
<tr>
<th>Practising Palei</th>
<th>Methods of cultivating sago</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Modern</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Modern + traditional</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>traditional</td>
<td>17</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 7.32** Relationship between methods of cultivating sago and the practise of *palei*

<table>
<thead>
<tr>
<th>Practising Pedok</th>
<th>Methods of cultivating sago</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Modern</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Modern + traditional</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>traditional</td>
<td>26</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>43</td>
</tr>
</tbody>
</table>

**Table 7.33** Relationship between methods of cultivating sago and the practise of communal work

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Significant (Chi-Square $\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dependent variable) method</td>
<td>The methods for cultivating sago, traditional (1), traditional and modern (2), modern (3)</td>
<td></td>
</tr>
<tr>
<td>(Independent variables):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sizesago</td>
<td>The size of the sago farm, less than 0.8 hectares (1), 0.8 to 2 hectares (2), more than 2 hectares (3)</td>
<td>no $\chi^2$ ($p = 0.16780$)</td>
</tr>
<tr>
<td>income</td>
<td>Net monthly income of the respondent, less than RM 295 (1), RM 296 - 495 (2), RM 496 - RM 595 (3), more than 595 (4)</td>
<td>no $\chi^2$ ($p = 0.32390$)</td>
</tr>
<tr>
<td>sagoine</td>
<td>Net annual income of sago, less than RM 500 (1), RM 500 to 1000 (2), more than RM 1000 (3)</td>
<td>no $\chi^2$ ($p = 0.27187$)</td>
</tr>
<tr>
<td>costinpu</td>
<td>Net cost of farming expenditure, less than RM 50 (1), RM 50 to 100 (2), more than RM 100 (3)</td>
<td>no $\chi^2$ ($p = 0.10413$)</td>
</tr>
<tr>
<td>subsidy</td>
<td>Receiving subsidy from the DOA, yes (1), no (2)</td>
<td>yes $\chi^2$ ($p = 0$)</td>
</tr>
<tr>
<td>selfsuff</td>
<td>Other sources of food, such as from the local environment, yes (1), no (2)</td>
<td>no $\chi^2$ ($p = 0.63199$)</td>
</tr>
<tr>
<td>otherjob</td>
<td>Engaging in other jobs besides cultivating sago, yes (1), no (2)</td>
<td>no $\chi^2$ ($p = 0.10712$)</td>
</tr>
<tr>
<td>otherinc</td>
<td>Income from other sources besides sago, less than RM 300 (1), RM 300 to 500 (2), more than RM 500 (3)</td>
<td>no $\chi^2$ ($p = 0.07719$)</td>
</tr>
</tbody>
</table>

**Table 7.34** Crosstabulation between the dependent variable “method” and the independent variables related to the economic factors of the households
Table 7.34 shows the crosstabulation results of the dependent variable method with the independent variables related to the economic factors of the household in the sample. There is only a relationship between the method of farming and whether the farmer receives any subsidy or not. There are no relationship between the method of farming with other economic factors like the cost of farming expenditure; the size of the sago farm; income of farmers; the annual income receive from selling sago and; farmers with other sources of food, income nor job.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Description of variables</th>
<th>Dependent variable (method)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Traditional</td>
<td>Traditional &amp; Modern</td>
<td>Modern</td>
</tr>
<tr>
<td>Religion</td>
<td>Muslim</td>
<td>4</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Christian</td>
<td>26</td>
<td>79</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Pagan</td>
<td>6</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Age (in years)</td>
<td>Young (&lt; 50)</td>
<td>8</td>
<td>45</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Old (&gt; 50)</td>
<td>28</td>
<td>67</td>
<td>40</td>
</tr>
<tr>
<td>Self-sufficiency</td>
<td>Yes</td>
<td>23</td>
<td>71</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>13</td>
<td>41</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>(Collect forest and riverine products for food and income)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educate</td>
<td>Yes</td>
<td>11</td>
<td>52</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>25</td>
<td>60</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>(education level), formal education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family members</td>
<td>Small (&lt; 4)</td>
<td>5</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Large (&gt; 4)</td>
<td>31</td>
<td>95</td>
<td>52</td>
</tr>
<tr>
<td>Income (in RM)</td>
<td>Low (&lt; 500)</td>
<td>28</td>
<td>74</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>High (&gt; 500)</td>
<td>8</td>
<td>38</td>
<td>20</td>
</tr>
<tr>
<td>Labour</td>
<td>Family members</td>
<td>31</td>
<td>84</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Outsiders</td>
<td>5</td>
<td>28</td>
<td>12</td>
</tr>
<tr>
<td>Spend (in RM)</td>
<td>Low (&lt; 500)</td>
<td>35</td>
<td>103</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>High (&gt; 500)</td>
<td>1</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Cost (in RM)</td>
<td>Low (&lt; 56)</td>
<td>19</td>
<td>46</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>High (&gt; 56)</td>
<td>14</td>
<td>57</td>
<td>38</td>
</tr>
<tr>
<td>Other job</td>
<td>Yes</td>
<td>17</td>
<td>74</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>19</td>
<td>38</td>
<td>22</td>
</tr>
</tbody>
</table>

Table 7.35  Summarised breakdown of the other factors (with no association with the methods of farming)
The farmers' method of farming is related to gender; knowledge of palei; practise of pedok and; whether farmers receive subsidy or not. There is no relationship between the farmers' spatial location and the characteristics or conditions of farming. Table 7.35 shows the summarised breakdown information of other factors that do not influence methods of sago cultivation.

Although the SPS was introduced to increase the output of sago yield and consequently the income of the smallholders, there is no relationship between an increase in income and the method used for cultivating sago. This means that despite an increase in the acreage of farm and the number of sago palms, the farmers do not harvest all their palms. This is due to their concept of a sago farm as an asset rather than as income. (Refer to Figure 7.20). Farmer’s decision to harvest is important as it influences the supply of sago logs to the mills. The government has probably known this fact, regarded it as a hindrance to the development of sago industries in Sarawak, due to the inelasticity supply of sago logs. The demand for sago from Japan has been very high during the late 1980’s adding to Sarawak’s export earnings. The only solution for a constant supply is to have direct control over the resources, which is done by setting up the LCDA sago plantation.

**Section 7.2.6 The decline in the practice of palei and pedok**

Figure 7.23 and 7.24 shows the decline in the use of palei in sago cultivation. From the survey collected, only 31.1 percent of the respondents have some knowledge of palei, implying that a bulk of 68.9 percent have no knowledge of palei. Those who know palei tend to apply them - 90 percent of them practise palei, while 10 percent do not.

![Figure 7.23 Knowledge of palei](image)

![Figure 7.24 Practice of palei](image)
The group who practises *palei* explained their continuous support to their belief system; in order to avoid unwanted hazard (47.5 percent); as a way to show their respect or obedience towards their traditional belief system (35.6 percent) and; in order to avoid low productivity (16.9 percent). The group who refuses to practice *palei*, although have the knowledge about the system think that *palei* is no longer important (42.9 percent); conflicts with their new religion (42.9 percent) and; impedes progress, that is, making the farm work troublesome and therefore less efficient (14.3 percent).

![Graph showing the practice of *pedok*](image)

**Figure 7.25**  **The practice of *pedok***

Figure 7.25 shows that majority of the respondents do not practise *pedok*. This indicates a decline in the practice of communal work, one of the traditional elements that has contributed significantly in promoting communal solidarity and the redistribution of income amongst the smallholders, during the harvesting stage of sago cultivation. (Refer to Chapter 8).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of the variables</th>
<th>Significant (Chi square $\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dependent variable) <em>palei</em></td>
<td>Knowledge of <em>palei</em>. yes (1), no (2)</td>
<td></td>
</tr>
<tr>
<td>(Independent variables): <em>pedok</em></td>
<td>Communal work. yes (1), no (2)</td>
<td>yes ($\rho = 0.00089$)</td>
</tr>
<tr>
<td>religion</td>
<td>Religion of the respondent. Muslim (1), Christian (2), Pagan (3)</td>
<td>yes ($\rho = 0.006$)</td>
</tr>
</tbody>
</table>

**Table 7.36**  **Crosstabulation between the dependent variable “pantang” and significant personal factors**

Table 7.37 shows the crosstabulation results showing the relationship between the dependent variable *palei* with the significant results related to the personal factors (*pedok* and *religion*).
There are associations between the knowledge of *palei* with religion and whether the households practise *pedok* or not.

<table>
<thead>
<tr>
<th>Practise of Communal work (<em>Pedok</em>)</th>
<th>Knowledge of <em>Palei</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes: 42, No: 57</td>
</tr>
<tr>
<td>No</td>
<td>Yes: 24, No: 89</td>
</tr>
</tbody>
</table>

Table 7.37 Relationship between the knowledge of *palei* and the practise of *pedok*

Table 7.37 shows that most of those who have the knowledge of *palei* tend to practise communal work (*pedok*) and vice versa.

<table>
<thead>
<tr>
<th>Religion</th>
<th>Knowledge of <em>Palei</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Muslim</td>
<td>Yes: 16, No: 13</td>
</tr>
<tr>
<td>Christian</td>
<td>Yes: 38, No: 110</td>
</tr>
<tr>
<td>Pagan</td>
<td>Yes: 12, No: 21</td>
</tr>
</tbody>
</table>

Table 7.38 Relationship between the knowledge of *palei* and religion of the households

Table 7.38 shows that most of the Christians and Pagans have no knowledge of *palei*. Only a slightly more Muslim has better knowledge of the *palei*. This result shows a significant decrease in the proportion of the sample households who have knowledge of the *palei*. It is even more surprising that most of the Pagans, whose religious belief are based on the Melanau *adat* and consequently the practise of *palei*, do not have any knowledge of *palei*.

<table>
<thead>
<tr>
<th>Variables (Dependent variable)</th>
<th>Definition of the variables</th>
<th>Results (Chi square $\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>praadat (Independent variables)</td>
<td>The practise of <em>palei</em>. yes (1), no (2)</td>
<td></td>
</tr>
<tr>
<td>religion</td>
<td>Religion of the respondent. Muslim (1), Christian (2), Pagan (3)</td>
<td>yes ($p = 0.00760$)</td>
</tr>
</tbody>
</table>

Table 7.39 Crosstabulation between the dependent variable “praadat” and the independent variable religion

Table 7.39 shows that there is a relationship between the practise of *palei* and the religion of the households in the sample households. The religion of the respondent also shows a significant result, whereby all of the 12 Pagans who know *palei*, practise it. (Table 7.40).
Table 7.40  Relationship between the practise of palei and religion of the households

<table>
<thead>
<tr>
<th>Religion</th>
<th>Practise of Palei</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Muslim</td>
<td>11</td>
</tr>
<tr>
<td>Christian</td>
<td>36</td>
</tr>
<tr>
<td>Pagan</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 7.41  Kruskal-Wallis one way Anova test, the influence of personal factors and spatial location to the knowledge of palei

Table 7.41 shows the result of a Kruskal-Wallis one way Anova test, to find out whether personal factors and spatial location influence the respondents’ knowledge of palei. The tests show that the knowledge of palei differs according to the respondents’ education, religion, age, district and the village where they live. Income does not seem to influence the difference in the respondents’ knowledge of palei.

According to the mean rank values, in terms of religion, most of the Muslim respondents know more about palei compare to other religions. Older people (69 years old plus) tend to know more about palei compare to the younger ones. Whereas, in terms of spatial location, most of those living in the Oya districts know more about palei than those living in either Dalat or Mukah.

Table 7.42 shows the result of the Kruskal-wallis test to find out whether the practise of palei differs according to the respondents’ personal factors and spatial locations. The result shows...
that religion and age influence the practice *palei*. It is not influenced by education level and income. In terms of spatial location, the respondents’ practice of *palei* is influenced by the districts they live in, not by the village they live in.

<table>
<thead>
<tr>
<th>Binomial variable</th>
<th>nominal variables</th>
<th>Description of variables</th>
<th>Significant (Chi square $\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>praadat</td>
<td></td>
<td>Practise of <em>palei</em>. yes (1), no (2)</td>
<td>no ($p = 0.390$)</td>
</tr>
<tr>
<td>educate</td>
<td></td>
<td>Education level of the respondent. no formal education (1), primary school (2), secondary school (3), others (4)</td>
<td></td>
</tr>
<tr>
<td>religion</td>
<td></td>
<td>Religion of the respondent. Muslim (1), Christian (2), Pagan (3)</td>
<td>yes ($p = 0.008$)</td>
</tr>
<tr>
<td>age</td>
<td></td>
<td>Age of the respondent. 10 - 29 years (1), 30 - 49 years (2), 50 - 69 years (3), more than 69 years (4)</td>
<td>yes ($p = 0.715$)</td>
</tr>
<tr>
<td>income</td>
<td></td>
<td>Net income of the respondent. less than RM 295 (1), RM 296 - 495 (2), RM 496 - RM 595 (3), more than 595 (4).</td>
<td>no ($p = 0.248$)</td>
</tr>
<tr>
<td>district</td>
<td></td>
<td>Mukah (1), Dalat (2), Oya (3)</td>
<td>yes ($p = 0.022$)</td>
</tr>
<tr>
<td>village</td>
<td></td>
<td>Medong (1), Tanam (2), Jebungan and Tegak (3), Teh Labak and Sesok (4), Tellian Ulu (5)</td>
<td>no ($p = 0.081$)</td>
</tr>
</tbody>
</table>

Table 7.42  Kruskal-Wallis one way Anova test, showing the influence of personal factors and spatial locations with whether the respondent practise *adat* or not

When looking at the mean rank values, Pagans practise *palei* more than other religion. In term of spatial location, most of those living in Dalat tend to practise *palei* compare to those living in either Oya or Mukah.

The vignettes in the next 2 pages show two typical families with contrasting perceptions of the role of *adat* in their daily lives, particularly in relation to sago production. One of them (Peteran of Kampung Tellian Ulu, Mukah) still strongly follows a traditional life, by upholding the values of *adat*, while the other (Simon Ubom of Kampung Tanam, Dalat) has led a typical ‘modern’ life, discarding all traditional values and acquiring ‘new’ and ‘foreign’ ones.
Simon Ubom is a well-known entrepreneur, who lives at Kampung Tanam, Dalat. His house is not located within Kampung Tanam itself, but isolated at the very end of the village, behind his sago mill. Simon and his family belong to the Catholic Church of Dalat.

Simon owns a sago mill, a large sago farm, several properties (land and bungalows in other village, in Kampung Teh) and also a fleet of ‘Express boats’ servicing daily from Dalat to Sibu. Although the sago mill is a family business, due to the heavy workload incur, Simon employs the villagers from all over the study area to work there. In sago cultivation, Simon uses modern methods. Simon also employs the villagers to work in his sago farm, especially during harvesting for about RM 25 to 30 daily. His ‘Express boat’ business is handled by his brother and also employs both people from Dalat and Sibu to manage it.

Simon has a big family, a wife and 6 children. All of his children help in running the business. His children go to the local school, and some older ones are sent to urban centres for further education to gain skills and qualifications, beneficial for his businesses when the children inherit them in the future. Simon do not believe in all the palei and do not have the time to tell his children about adat or palei. In the interview, he was so concern with his business that;

“I usually stay up all nights thinking about my business and profits. In order to be successful, you have to be fully committed and work hard.”

Although Simon is rich, his villagers and local people considered him an ‘outcast’. One of the villagers described him as;
“He is more Chinese than the Chinese.”
Peteran lives in Kampung Tellian Ulu, Mukah as a sago farmer and a shaman. He has a large family to support, 2 wives, with 9 children. Like any other villagers, his children attend the school provided by the government in the villages. However, apart from providing his children with formal education, he always ensure that his children are also equipped with the knowledge of *adat*, by transmitting *adat* to them through observation and participation. This is mainly done by bringing the children to work in the farm, collecting forest and riverine products in the nearby forest or river and bringing them along to the healing rituals ceremony where he performs. His children also act as an assistant to him in the healing rituals ceremony like the 'payun'.

Peteran has an average size sago farm of about 2 hectares from which he derived a reasonably comfortable average income. His income is not only derived from selling sago alone, but also contributed by his shamanism practice, as demanded by his fellow villagers and the people all around the study area. His deep knowledge of *adat* and *dakan* has won him a three years contract with the 'living museum', which exhibits the various customs of all the ethnic groups in Sarawak, known as *Kampung Budaya* (Sarawak Cultural Village) at Damai beach in Santubong, near Kuching. The living museum is one of the major tourist attractions in Sarawak. However, he refuses to renew his contract with the living museum because of the low wage and no alternative ways to supplement his income there. When I visit him in 1995, he was in the process of finishing carving all the different types of *dakan* for the Sarawak Melanau Society to be exhibited in their headquarters in Kuching. Despite his contributions to the living museum and the Sarawak Melanau Society, Peteran does not gain much financially. In the interview he said;

"Those people have squeezed all my knowledge of *adat* and *dakan*, but look at what I get. I’ve asked for just a small financial help from the government to rebuild the ‘jembatan’ (a small bridge made from wooden plank) leading to my house, but they is no reply."

In sago cultivation, Peteran adheres strictly to the practice of *palei* and always ensures that his wives and children, whom are also the main workforce in his farm following all the *palei*. During harvesting, he calls his neighbours and friends to practice *pedok*. Apart from sago, Peteran also plants other crops, mainly fruit trees and vegetables for his family daily consumption.
Section 7.3 Conclusion

The sample households reflect a typical peasant situation, characterised by an ageing population, the majority of them without formal education. Most respondents are very experienced in cultivating sago and have done so for more than 20 years. The sample households are also from large families, providing farm labour.

Although more than half of the respondents are categorised as below the State Poverty Level Income (PLI), they are self-sufficient, particularly, in terms of food supply. Most of the respondents do not rely solely on sago production for their main source of income. Diversification of food and income involves alternative employment; receiving supplementary income from other members of the family working elsewhere; practising inter-cropping (mainly for daily consumption, like vegetables and fruits) and utilising the local environment, (both river and forest) for food supply which is sometimes sold to supplement income.

Exploitation rates are low. Although sago is a cash crop, farmers do not gain a steady and continuous income from the selling it. Harvesting is influenced by the need for cash, the availability of time and labour and to some extent the demand for sago logs from the millers. Farmers regarded the sago farms as more important as an asset than as a regular income source derived from selling the palms. This is not only due to the socio-cultural importance of sago (including the spiritual role of the plant), but also due to historical factors (the slump of the 1960’s) which have forced the Melanau to take precautionary action, to avoid over-dependence on sago. Thus, the trend in the sample households reflects a diversification strategy, enabling farmers to maintain their farms, both in times of boom and slump.

Adat is still practised in the study area, but is diminishing in importance. This is indicated by both the younger generations’ perception of adat and the shift in the methods of sago cultivation from traditional to modern. Another major indication of ongoing acculturation in the study area is the decline in the number of those who know palei, which consequently lead to a decline in its practice. Pedok is another traditional elements of adat which is also losing its popularity in the study area.

The changes in the perception of adat among the younger generations are mainly due to the emergence of new aspirations; as a result of exposure to new beliefs, outmigration to the
urban centres, the introduction of formal education and the provision of health facilities by the government. Mass media like television and newspapers also expose the younger generations with to ideas and aspirations.

The shift in the methods of sago cultivation from traditional to modern results mainly from direct government intervention, particularly through the subsidy scheme. However, not all modern tools are introduced by the government. Modern technology like the chain saw is known of from the villagers' experiences working at the logging camp. In fact, although being exposed to modern methods, most farmers still retain traditional methods by combining them with modern methods ones. However, the practice of palei and pedok (two important elements of adat in sago cultivation) have declined. Some elements of palei include indigenous knowledge which are promoted culturally by relating them to spiritual and symbolic explanations.

The Melanau have been controlled by different state administrations, beginning with the Brunei Sultanate in the early Seventeenth Century to the Brooke Administration by 1860, the British protectorate after the Second World War and finally joining the confederation of Malaysia in 1963. All these different administrations have a common interest in the study area - sago production as a source of state revenue. In the process of acquiring sago for export, external influences are introduced into the study area which not only affect the nature of sago production and processing but also Melanau socio-cultural values. Thus, sago has changed from a subsistence to a cash crop. Foreigners have entered the study area such as the Pengirans from Brunei, the Malays from Kuching, the Christian missionaries from UK, the Chinese sago millers, the extension workers from the DOA and recently the Indonesian workers from the LCDA sago plantation. These 'outsiders' influence the Melanaus' religion, labour system, methods of sago cultivation and to some extent have encouraged monetization.

Under the current government, more intensified 'assimilation programmes' have been operated in the area, through the SPS, the setting up of the LCDA sago plantation and the improvement of downstream ancillary sago-related activities, particularly the sago mills. The 'assimilation' programme's main aim is to create 'uniformity' in the aspirations and perceptions of the Melanau; as compared with the rest of the State's people, especially those living in the urban centres. Under these programmes, large, commercialised and monetised system are promoted, with the implicit intention of displacing traditional and 'backward'
Melanau values. Acculturation is therefore one of the intended outcomes of such programmes. Chapter 8 discusses the implications of acculturation to the sustainability of sago production and the Melanau community. Acculturation has important implication to the sustainability of sago production in the area.
Chapter Eight Acculturation - implications to the Melanau and the sago production

Acculturation is the process of social and/or cultural transition, or change, experienced by many indigenous people, mainly as a result of modernisation and development introduced by the state government. It is undeniable that acculturation may bring positive elements to a community, but in most ways the transition results in culture loss and social dysfunction (Eder, 1987). In this context, culture encompasses multitudes of meanings — arts, beliefs, customs, institutions, inventions, language, technology, and values. In short, culture is a way of life, which can be divided into material and nonmaterial elements. Material culture consists of all the things that are made by the members of a society. It includes such objects as buildings, jewellery, machines, paintings and other artefacts. Nonmaterial culture is revealed in a society's behaviours and beliefs. A handshake, a marriage ceremony, and a system of justice are examples of nonmaterial culture. The pattern for agriculture, for example, includes the time when crops are harvested (nonmaterial), the technical methods (nonmaterial) and machinery (material) used in harvesting, and the structures for storing the crops (material). Individuals find their identity in both material and non-material cultures.

Social cohesion is maintained by culture, in the case of the Melanau, the adat. Indigenous people usually mediate external influences through complex traditional cultural beliefs and institutions which effectively maintain social cohesiveness or community solidarity. When traditional beliefs and institutions are under threat, individuals can become isolated, lacking the support that society formerly gave them. According to Bodley (1990) acculturation follows when indigenous people are exposed to ‘modernisation’ and when their traditional ‘adaptations’ have been disrupted. However, communities and individuals continue to try to adapt to change in two ways — by internalising “external” influences and; by transforming their social relations as and when existing social reproduction strategies fail to cope. (Refer to discussion on acculturation in Chapter 2)

According to Mc Caskill and Kampe (1997), indigenous people;

“.... have a common heritage, language, and culture, are generally indigenous to the land (but not necessarily) or at least inhabit and identify with some territory, are only partly integrated into the dominant nation-state, are usually discriminated against or put at a distinct disadvantage with respect to the national majority population, and share a common desire to affirm their identity and self-determination” (Mc Caskill and Kampe, 1997: 4).

However, the perspective of the state and developer is somewhat different;
"...primitive, backward, less civilised people, who must be 'modernised' and integrated into the national socio-economy and the state on the terms of the state and the majority of the population" (McCaskill and Kampe, 1997: 3).

Thus, state policies are driven by conscious efforts to homogenise disparate people in an attempt to consolidate national identity. In the process, indigenous people often have very little, if any, voice in the design and evaluation of the policies and development programs directed at their future. Indigenous people are vulnerable to forces of modernisation and development introduced by the state because they are non-state people, politically powerless, not linked to an industrial mode of production and only partially integrated into the dominant nation-state (McCaskill and Kampe, 1997).

States that have accepted the capitalist-modernised ideologies seek to transform indigenous economies. According to Hutterer et al. (1985) they have;

".....tended to look with some disdain or disinterest at indigenous agriculture and peasant economies which were expected to have diminishing importance relative to the modern urban-industrial sector, both as source of output and as a means of employment" (Hutterer et al., 1985: 378).

For the state, cultural difference is an impediment to its development goal of material progress and national identity; people should go through the changes or transition through the diffusion of technology, communication and population movements via their development programs.

Eder (1987) classified the causes for acculturation into visible and less visible forces. One example of the visible force is the establishment of corporate agricultural plantations on indigenous lands. The less visible forces are associated with the political economics of modern nation states, such as market incentives, formal education, cultural pressures and new religious ideologies. These forces often inspire new ways of thinking and behaviour, and in the process disrupt individual and indigenous welfare.

Acculturation is directly implicated in the loss of indigenous knowledge. Therefore, according to Eder (1987), the concern for acculturation;

".....reflects not only a moral imperative but a growing awareness of the practical contribution that the cultural knowledge of indigenous societies might someday make to our survival" (Eder, 1987: 2).
This chapter discusses the implications of acculturation in terms of two potential impacts; to the main natural resources upon which the Melanau depend as their source of living but also in other socio-cultural roles and; to the Melanau community itself.

The extent of the impacts of acculturation are examined through the case study, in particular with respect to the implications for sago production that result from the decline of the role of adat, (which is indicated by the decline in the knowledge and practise of palei and pedok), but also through the fact that indigenous skills are displaced by modern techniques of production.

Section 8.1 Impacts of acculturation on sago production

The role of adat in sago cultivation is reflected in the practice of palei and pedok. Both of these practices are on the verge of extinction. (See Chapters 6 and 7). The sustainability of sago production in the study area has been influenced by adat in several ways - the role of palei; the role of indigenous knowledge; the role of sago in the Melanau’s ritual activities, particularly as their traditional medicines; and the Melanau’s traditional belief that a sago farm is valued as a cultural asset rather than merely for its revenue.

In this chapter, the sustainability of sago production is discussed in the context of the long term sustainability of sago cultivation, not only in terms of the sago palm’s successful growth, but also in terms of the continuation of the acreage of the smallholders’ sago farm. It also includes the long term capacity of the peat swamp environment to cope with continuous sago production (in terms of maintaining the nutrients content and conserving the immediate environment of the peat swamp forest in the study area). Sustainability also includes the effects of sago production on the culture and economy of the Melanau’s society.

Section 8.1.1 The contribution of palei in sustaining sago production

There are some practices of palei which contribute to the sustainability of sago production, such as the “Penawar Balau” (sago palm’s “antidote” against pest) and “eating conduct” palei, which act as a natural pesticide.

The function of the “Penawar Balau” as a form of natural pesticide is ingenious. Targeted pests are monkeys, wild boar, squirrels and rats. Four types of local vegetation with different
characteristics are chosen for the purpose. These are the “didek” (a plant that produces chemicals that will make the pest itchy); the “tuba” (a root, popular for its poison); the “pinang” (betel nut) and “akar binak” (both produce a bitter taste which will put off the pest from further destroying the sago suckers). All four plants are placed around the first sago sucker during planting. The farmer will immediately go home after planting just one sago sucker during that day. Planting work will resume several days after that, to ensure that the tactic works. By this time, any animals that have tried the first sago sucker will no longer be interested in disturbing the rest of the newly planted palms.

The function of the “eating conduct” palei as a natural pesticide is to counter monkey attacks on the palm. During lunch break, a farmer should eat in a “proper” manner; that is, he or she is forbidden to eat and walk at the same time, or to make fun, laugh loudly and make a lot of noise. The Melanau believe that the forest bordering their farm is inhabited by spirits and animals. Therefore the occurrence of nuisance sounds during the lunch break will annoy the other “inhabitants”, which will result in the destruction of their newly planted sago palms by the animals. The Melanau believe that monkeys like to imitate human beings. Thus, if the farmer “misbehaved” in the farm, the monkey will follow suit, by eating their newly planted palms in the same way the farmer has “misbehaved”.

The obvious “real” function of the above palei is promoting “good ethic”, regardless of where individuals are. “Good ethic” is an important element, stressed in adat, which includes not only co-ordinating and maintaining relationship between humans, but also to other beings, such as animals and plants. Therefore, the “eating conduct” palei promotes and maintains “good” social order within the community and its immediate ecosystem.

In terms of eliminating the pest, the question of “effectiveness” does not count, because the monkey is, in fact not a serious problem. Smallholders feel that they can successfully control the monkey by the two ways mentioned above. Mura, a smallholder from Kampung Jebungan described this as,

“The only time monkeys are shot is when we hunt them for food. Otherwise, there is no need to shoot or poison them, as they do not pose such serious threats to the sago palms. Even so, there is still a need to control them as a pest, of which those prescribed by the “palei” have been effective and sufficient for hundreds of years”.

245
Alternative modern methods that can be used to eradicate monkey are shooting and poisoning. Apart from the apparent low "cost" factor and less dependency on "outside" inputs, the main advantage of natural pest control is its ability to minimise side effects.

Modern methods are able to eradicate most monkeys efficiently, but may produce disastrous side effects. In fact, the presence of monkeys in the area can sometimes be beneficial, as it is known locally that monkeys not only eat grasses and leaves but also insects, such as termites. The termite is one of the major pests of the sago farm and is mainly eradicated by preliminary burning during site clearance and the occasional burning of dead branches and trunks. Some farmers use insecticides to eliminate termites as prescribed by the DOA. Thus, monkeys in the area can "control" the number of other pest, particularly insects like termite. Therefore, the use of natural pesticide contributes to environmental sustainability by protecting the environment through preserving the "pest-predator" relationship and avoiding the use of artificial chemicals.

The rest of the palei, particularly those related to bad omens from seeing or hearing animals are simply a psychological way for the Melanau to boost their confidence, working in the hostile environment of the peat swamp forest and to consolidate their indigenous belief system, and thus to ensure continued social cohesion and a common identity. The belief in the supernatural power of certain animals to tell tales and warnings are embedded in their traditional beliefs (Refer to Chapter 6, Figure 6.4). The Melanau regard animals as part of their ecosystem, which have their own places and roles and therefore should be respected, in order to ensure that they, as a human beings are not disturbed by the spirits. The real, material function of such beliefs is to control the exploitation of resources, to maintain respect for the social order that allocates authority amongst the community.

Only certain birds and animals can convey messages, which reflect the Melanaus' knowledge in recognising the ability of the animals in their ecosystem. The significant of this knowledge reflects the Melanau intimate knowledge of their microenvironment, which can assist researchers or other professionals in creating database of the flora and fauna in the study area. Their knowledge of the animals is also crucial in determining the way they deal or treat the animal, so as not to disrupt the harmonious relationship as set up in adat. Their behavioural knowledge of the animals also presents an opportunity for taking benefits from
the knowledge of animals for their own advantages, particularly to assist farming and for safety reasons.

The Melanau believe that the four chosen birds have special characteristics — in having better senses than humans. They can warn of early attack from a predator, the birds are more alert in sensing danger than human beings. Melanau knowledge of animals that can convey messages are derived from their parents through the transmission of palei, observation and participation when helping their parents during childhood. Some palei stem from legends and oral folklore and, above all, through maintaining close contact with nature. Perhaps during that time, it was by mere coincidence that something "bad" happened and a sound of a particular bird was heard, which prompted the Melanau to believe that the bird had some supernatural power to convey bad omens.

Perhaps the animals chosen also signified as a form of metaphor. For example, the ability of the bird to fly signifies a form of power which human beings lack. This is what Hutterer et al, (1985), described as a "mental construct" or values; "which are part of a larger, hierarchically ordered system of meaning that is expressed, professed and confirmed in the liturgical order of rituals" (Hutterer et al, 1985: 6).

Palei is just such a ritual, encapsulating the Melanau's system of representation. It gives us a small insight of the way in which they recognise the natural world.

The significance of palei towards the sustainability of sago production is described by Jamieson and Lovelace (1985);

"......many tropical environments, particularly rainforests, are highly fragile and consequently demand special managerial skills from humans depending on them over long periods of time. Traditional societies in Southeast Asia have, of course, successfully maintained themselves in such environments for thousand of years. Among the topics of major interest within the broader issues of interactions with the environment are not just those concerning environmental and technical skills, but the conceptual and symbolic forms through which various societies have rationalised, directed and reproduced their practices and integrated them into broader cosmological and transcendental world view" (Jamieson and Lovelace in Hutterer et al, 1985: 65).

Sustainable sago production depends on several factors — the value of sago for food and income; socio-cultural value of sago, such as for medicine and status symbol; and the geographic condition of the peat swamp forest that favours the growth of the sago palm. (See Figure 8.2). The environmental sustainability of sago production depends on the maintenance
of the ecological functions of peat swamp forest, such as the pH, nature and composition of its soils and nutrients, capabilities of storing and draining water. (Refer to Section 6.1 of Chapter 6). There are two important contributions of the peat swamp forest to the growth of sago palm — its acidic soils and annual inundation. Sago palm is a natural plant of the peat swamp forest, and unlike other potential crops (like pineapple or wet rice) it does not need chemicals to reduce soil acidity and does not require as much forest clearance comparatively. Annual inundation is important to the growth of sago palm, as the water from the interior rainforest is full of nutrients that facilitate growth.

In short, the sago palm is the most suitable crop for these particular geographical conditions. The nature of the sago palm cropping system does not demand major changes to the ecosystem, in fact it helps to maintain the ecological functions of the peat swamp forest. These include protecting coastal areas from the full force of storm waves and filtering by trapping pollutants washed down from the land. (Refer to Section 6.1, for further ecological functions of the peat swamp forest). Moreover, most peat swamp forests in other parts of the world have experienced tremendous change, making it more vital to preserve those still relatively undisturbed, as in the study area. Peat swamp forests are being cut down for their wood, and to make room for buildings and crops such as rice. They are also being damaged by pollution, especially oil (Bowles and Whelan, 1996). The state of Sabah in Borneo has lost about 40 per cent of its peat swamp forest, mainly to the Japanese woodchip industry (Parry, 1990). In southern Queensland, Australia swamp forests have been felled and cleared to build houses and canals (Pringle, 1987); in West Africa for rice cultivation (Parry, 1990). In Puerto Rico, the refuse from mining activities has smothered large areas of peat swamp forests (Pringle, 1987).

The importance of the peat swamp forest is not limited to supporting sago palm as a crop alone. It has other multitudes of aesthetic and economic values (wood for making paper, building and fuel, leaves for thatch, bark for dyes, etc.), as well as being of interest to science and for survival (food and shelter for diverse range of animals such as fiddler crabs, mudskippers, herons and kingfishers, mangrove snakes, and monkeys) (Bowles and Whelan, 1996).
Section 8.1.2 The contribution of the traditional techniques in sustaining sago production

The Melanau’s intimate knowledge of the environment and the agronomic system of the sago palm contribute to the sustainability of sago production. Traditional knowledge is reflected at all stages of cultivation, from forest clearance until the harvesting stages. This section also includes comparison and assimilation of modern to traditional methods.

Clearing and burning techniques eliminate weeds, pests (especially termites) and provide essential nutrients for the soils. Nutrients are provided through the slow decomposition of the residue of burnt materials, acting as natural compost. Nutrients are also provided through inundation (regular but not permanent flooding) which brings in minerals from upriver. Proper and “sufficient” burning is essential to ensure the minimum number of pests in the later stages.

Government extension workers are not taught of these clearing and burning techniques at the training headquarters in Sibu. On the contrary, weeds are meant to be controlled through herbicides (gramoxone, a type of paraquat) and insecticides (example pyrethroid) respectively. Chemicals are not only costly, but may also produce health and environmental hazards. No matter how safe chemicals are claimed by their manufacturer, they are still poisonous and dangerous. Apart from the spraying can, the Department of Agriculture does not provide protective clothing to farmers. There is a danger of exposing to occupational hazard problems, particularly those related to being in contact with hazardous chemicals, such as inhaling chemical and accidental poisoning. Other danger includes excessive and careless application on crops.

There is no guarantee that the herbicide used will not affect other vegetation in the area, especially those plants consumed by the Melanau. Poisoning can reduce or even eliminate the number of plants available. From the quantitative survey, 66 percent of the households utilise the forest and river for food supply. Collecting wild plants as food is important in supplementing the households’ income. Natural controls contribute to socio-economic sustainability by protecting wild plants for human consumption.

Pests are also controlled by allowing some other vegetation to survive in the sago farm. The traditional method avoids clear weeding. From the outsider’s point of view, Melanau farmers may seem lazy, because of the weeds in the sago farm. However, there are reasons for
allowing vegetation, other than sago to thrive on the farm; that is, for controlling pests. Insects and other herbivorous will have some food allocated for them, and, will therefore be less likely to destroy sago palms. Moreover, carnivorous animals will be able to feed on the insects and the herbivorous, thus creating a balanced food web on the farm. Some farmers purposely plant their palms near to each other to "reserve" food for the pests. However, weeding is still done regularly around the palms, or when the farmers think that the weeds will compete with the sago palms for nutrients and light.

Farmers do not totally reject modern methods (refer to Section 6.3), but prefer to use them minimally and selectively, that is when it is safe or crucial to do so, depending on the severity of weed problem and age of the palm. Farmers supplied with chemicals under the SPS programme use herbicide to make pathways in their farms for easier access. They also experiment with chemicals, and are free to modify instructions given by the extension workers according to their own discretionary needs. For example, the extension worker suggests that herbicide should be applied two years after planting, but the farmers feel that four years is the ideal time, arguing that at two years, the palm is not sufficiently mature or immune to the effects of the herbicide.

However, a complete dependence on outside inputs, such as pesticides and herbicides will mean an increase in the fixed and variable costs of expenditure for farming. This is despite the availability of free chemicals from the DOA, which the farmers are only eligible for at his best performance for the period of 12 years. (Refer to Section 6.3 under discussion on eligibility of joining the scheme). This implies that after that period the farmers are left to buy the chemicals using their own financial resources. Farmers with a small farm (less than 1 hectare) are not eligible to join the scheme. The loss of traditional methods in controlling pests and weeds would force them to spend their meagre financial resources on artificial chemicals. Thus, the loss of traditional techniques in controlling pest and weed and over dependence of modern inputs, such as the artificial chemicals negatively affect the socio-economic sustainability of the Melanau.

Insect pests are controlled by "light" burning of pruned branches and fronds during the maintenance stage. In this case, "light" burning functions in two ways - the smoke deters the insects, while the ashes provide a continuous supply of nutrients to the growing sago palms.
Burning can be dangerous and successful burning process required experienced farmers with sufficient knowledge about the techniques of burning.

Pests are not only controlled by *palei* and the traditional techniques during clearing, burning and maintenance stages, but also controlled by the Melanau themselves. The Melanau directly control pests by eating them, especially sago weevils. "Modernised" Melanau are often disgusted at the thought of eating sago weevils, which looks like a fat white caterpillar. Traditionally, the Melanau eat the sago weevils to add protein to their diets. This is due to the lack of protein in sago starch. Protein is also provided by fish, prawns and other sea and riverine food sources. Game from hunting is also a source, some of which is obtained from the farm itself, such as wild boar, monkey and squirrel. As a result, the influence of new beliefs and new aspirations copied from the urban areas, changes the Melanau's diet. Sago was once the only staple food, but now rice is preferred. Some Melanau obtain rice from their swamp paddy, but most have to buy from the local shops. Sago is still eaten, together with rice, but not as much as before (Morris, 1991). The "modernised" and "urbanised" Melanau have changed their diet altogether. Muslims are forbidden from eating wild boar, monkey (due to its sharp fangs) and squirrels (due to its sharp claws). There is no real problem over this, because animals caught are donated to neighbours who can still eat wild boar, monkey and squirrel (mainly the Pagans). Moreover, the Melanau are very liberal in accepting new religions. In one household there may be as many as three different religions. For example, the grandparents may be Pagans, the parents can be Christians, while some of the children can be all sorts of religion, even Muslim. This implies that in some cases, there is not much of a problem with religion. Of course, there are households with only one religion. However, in the future, sago weevils will become a major pest problem, if the Melanau stop consuming them as part of their diet.

In a different perspective, the "good" techniques of clearing and burning protect instead of destroying the forest bordering the targeted site. Clearing is selective. All useful plants are kept aside for general uses or transplanted to another plot of land. Examples of such useful plants are the wild lemon grass and several wild herbs consumed or used in traditional medicines. Edible plants like wild ferns, mushrooms and shoots are collected for home consumption. If in the future, these "conservative" techniques of clearing and burning are not followed by the younger generations, uncontrolled bush fires may result, as has happened recently in Kalimantan and Sumatra, Indonesia. Fire spread out of control because of the
burning of forest by plantation companies setting up new commercialised plantations. At least for the LCDA plantation, clearing and burning were contracted either to the local farmers or experienced logging contractors of the peat swamp forest who had a good understanding of the peat swamp forest environment.

The Melanau’s sago propagation techniques also contribute to the sustainability of sago production. The mode of propagation is important because of its function as a means to renew and maintain the sago palm stock population. Traditional techniques emphasise the need to ensure success and at the same time maintain the well-being of the older sago palm, such as in the case of the cutting and selecting of a sago sucker. Great care is taken in selecting the sucker, according to its age and position with respect to the mother palm. Even the age of the mother palm is also considered. The theft of sago suckers is one of the main detrimental effects from the setting up of the LCDA sago plantation, which not only reflects injudicious techniques of cutting and selecting sago suckers by the thief, but also leads to the destruction of the older palm. Continuous theft problems will eventually interfere with the traditional ways of maintaining the sago palm stocks.

The design of the “floating nursery” (refer to Chapter 6, Figure 6.14) takes into consideration the amount of water needed by the sago suckers to survive, before becoming ready to be transplanted into the ground. Bamboo rafts are tied in such a way that there is just enough space for the sago suckers to float, not too high nor too low, but just at the right height to supply both water and air to the sago suckers. This transition period is crucial in determining the successful growth of the sago suckers following eventual planting.

The Melanau’s way of propagating sago is confirmed as the best method by the DOA. The DOA has spent part of its research funds for sago in investigating the best way of propagation. Several methods were tested: propagation from seedlings, from cuttings and from clonings (Research Branch, DOA Annual Report, 1990; 1991; 1992; 1994). Results showed that the most convenient and reliable method is the propagation by using the sago suckers. As a consequence, propagation methods under the SPS scheme and in the LCDA sago plantation now follow the Melanau’s traditional techniques.

The conflict over which is the better, between traditional and modern cultivation methods is mainly reflected at the planting stage. Most farmers disagree with the “straight lining
system" due to their views concerning the "best" planting points. Traditionally, a farmer will avoid certain planting points, especially those with large trunks or roots embedded below the point. This site is regarded as infertile, due to the future inability of the sago palm's root to penetrate into the ground, which will not only make anchorage of the rooting system difficult but also hinder the absorption of ground water. It is also argued that not all the planting points along the straight line are the "best" points.

Another disagreement concerning the "lining system" is the compulsion to keep the sticks, which mark the planted sago suckers. This is done for the purpose of weeding, applying pesticides and counting the number of sago palms during its establishing period. This contradicts the palei of one of the villagers, Kampung Jebungan. He believes that if the stick used to support the sago sucker is not pulled out, the farmer who planted that particular sago sucker will die, as his or her soul has been stamped into the soil. The release of the stick indicates the release of the farmer's soul. Of course, this is another metaphor. It is not the farmer’s soul that will be harmed by the stick but the soul of the sago sucker. During the growing stage, it is possible that the present of the stick can interfere or prevent the rooting system from spreading more efficiently into the ground, which will consequently impede the normal development of the plant.

These two examples show that although the "lining system" seems perfect in theory, both neat and logical, it is not effective when applied on the ground. The two examples also show the logic of the traditional system, in ensuring the successful growth of the sago palm, which the DOA perceives as haphazard. When farmers refuse to follow technical advice from the extension workers, they are often branded as "anti-development" or "narrow-minded", without having the chance to defend their point of view. This situation mirrors Shiva's (1997) description of indigenous systems:

"Indigenous knowledge systems are by and large ecological, while the dominant model of scientific knowledge, characterised by reductionism and fragmentation, is not equipped to take the complexity of interrelationships in nature fully into account" (Shiva, 1997: 8).

In the harvesting stage, Melanau traditional techniques show a sign of dynamism and creativity in tool innovation. For example, in the "dayung" (a tool use to roll the sago logs, which replace the once "break-backing" manual job of pushing the logs by bare hands) and the "pathways" for rolling the sago logs. In the case of the pathways, DOA research has tried to improve the pathways by replacing sago branches with PVC pipes. However, the
pipes are not only expensive to buy, but also not easy to transport around the farm. This is because of the nature of sago harvesting, which is selective and scattered throughout the farm, depending on the maturity of the palm. As a path liner, the sago branch is free and easily available in all corners of the farm. Both the *dayung* and the pathways are made of local materials, which are cheap and easily available. Traditional techniques which evolve from within the community use local materials, which contribute to the sustainability of the environment as a whole by not using any non-renewable resources such as PVC. The Melanau have always made a habit of recycling all the materials available that can possibly be reused. The innovation of the "*dayung*" indicates that traditional techniques evolve through time. They do not stagnate as some perceive, especially the pro-modernist government officer.

Besides artificial chemicals introduced under the SPS programmes, other modern tools used by the Melanau are outboard engines to power the long boat, and the chainsaw for clearing and harvesting. Outboard engines and chainsaws are accepted whole-heartedly by the Melanau, mainly for convenience (62 percent) and speed (44 percent). Only 6 percent said that using modern methods would increase their productivity and income. (Refer to Chapter 6 under Section 6.3) This is despite the high cost of purchasing and maintaining such equipment. It cost RM 1,600 to buy a chainsaw, 6 times the average income of the sample population (RM 240). The maintenance cost is RM 150 per quarter year, more than half the average income of the sample population. (See Chapter 7, Section 7.2.2). Outboard engines cost RM 3,500, 14 times the average income of the sample population. The maintenance cost is RM 130 per quarter year. The government does not provide credit assistance for the purchase of both these items. The Chinese shopkeeper often offers credit, but usually at a high interest rate.

Besides the cost, effects on safety and health also need to be considered. Nevertheless, safety and health issues do not seem to concern the Melanau, despite the carcinogenic characteristics of the benzene that powers the chainsaw. During the interviews, Ramon of Kampung Sesok said,

"Personally, I believe most will agree with me that inhaling benzene from the chainsaw for the purpose of maintaining your own land is a thousand time more worthwhile than inhaling the chemicals at the timber camp, making profits for the Chinese and Japanese companies".
The use of the chainsaw and the outboard engine again show that the Melanau do not totally reject modern methods. New methods and tools can be assimilated into their farming practice according to their needs and the situation.

**Section 8.1.3 The socio-cultural values of sago and its impact on sago production**

The Melanau not only value sago for its material contribution to their livelihoods (income, food, raw materials for building construction, fishing and etc.) but also for its spiritual values. The sago palm occupies a role as the main material for their traditional healing methods. As a result of exposure to external influences, mainly from the conversion to new religions and the introduction of modern medical facilities in the study area, the belief in the spiritual values of sago as a healing method is dying out. Traditional medicines consist of an "effigy", a form of carved idol or figure, as a symbol or medium through which "bad" spirits that cause the illness are kept, before being transferred to their ultimate destinations. (Refer to Chapter 7, Section 7.1 for further details of the process).

The "sickness figure" or "effigy" is made from sago pith, trunk or leaf. The "effigy" is known as *bilum* in Dalat and Oya, and *dakan* in Mukah. The *bilum* or *dakan* is the traditional Melanau healing object, used in their medicinal ritual to cure all types of illnesses. The Melanau believe that the sago palm possesses a spirit locally called "*semangat balau*". For them, it is necessary to use the material from sago to cure any illnesses, since sago is their staple food. Thus, their energy and soul are derived from sago. A shaman (*bomoh*) carries out the healing rituals.

However, there are conflicting views concerning the role of sago as the main material for making the *dakan* or *bilum*. Peteran, a shaman from Kampung Tellian Ulu, Mukah insisted that the *dakan* or *bilum* should be made from sago. If not it would not work. On the other hand, another shaman, (Merdit from Kampung Tanam, Oya) gave me some rational reasons for selecting sago, but insisted that any vegetation can be used as long as the incantation and procedures are properly followed. According to Merdit, the reason sago is selected as the material for making *dakan* or *bilum* is because sago is easily available in the study area. Secondly, sago is chosen due to its soft texture, which enables the shaman to carve the pith or branch into figures quickly. According to Merdit, quick and easily available materials like sago are essential in traditional medicines;

"Just imagine, if a woman is suddenly in labour pain, if the materials is not easily available in the village, then the patient will suffer. Curing with the *bilum* is not the same as taking a
ready manufactured pills, there are different types of *bilum* for different illnesses. It is dangerous to carve the *bilum* in advance because the *bilum* may endanger other people if not properly taken care of. If for instance, the *bilum* is made from a rubber tree, which is hard and difficult to carve, it will take me 3 hours to carve a *bilum*, whereas, due to the soft texture of sago pith, time can be cut down to say, only 3 to 5 minutes. In order to save a patient, I need to be alert and fast, otherwise what is the purpose of me as a shaman.”

The decline in the popularity of traditional healing is also attributed to the decline in the number of shamans. The shaman’s knowledge of ritual procedures and the skills of carving the *bilum* or *dakan* cannot easily be transferred. A shaman is naturally born through inheritance. However, not all the shaman’s children can inherit the skills or the power of the “three eyes”. The talent may be inherited by one of the selected children or even grandchildren. Normal people usually see with their two eyes, but the shaman has another symbolical extra eye to see things that ordinary people cannot. After exposure to the wider world, the new generation has new aspirations and is not interested in becoming a shaman. Some may not realise that they have the gifted talent to become one. This is another major contribution to the decline in popularity of traditional medicines amongst the present Melanau community and a loss of cultural identity. The shaman plays an important role in organising rituals ceremonies.

In this aspect, acculturation has diminished the spiritual role of the sago palm, which in turn has an indirect effect on the sustainability of sago production. This is because the sago palm is the main material for making healing objects (*dakan* or *bilum*). In the old days, the Melanau would have ensured that sago production was sustained to meet the demand for sago pith, branch or leave as the material for their healing rituals.

These views and arguments should be accepted with caution, however, because of the conflicting views among the shamans concerning the “compulsory” need for sago as the material for making the *dakan* or *bilum*. This is a case of an “egg and chicken”, which one was created first, egg or chicken? Do the Melanau use sago as their healing objects because of its availability? Or, do the Melanau sustain sago production because they need sago as the material for their healing object? If the former is the answer, then there should not be much impact of the declining role of sago as traditional medicine to the sustainability of sago production in the study area. If the latter is the answer, there is obviously a large impact on the sustainability of sago production. However, in reality other values come into the equation.
to ensure that sago production persists: factors such as inheritance, climatic conditions and other coping strategies, which are discussed in detail in Section 8.3.

Section 8.1.4 The sago palm as an asset

Another socio-cultural value that cannot be easily understood by outsiders, especially the policy-makers in Malaysia, is the Melanau's perception of the sago palm as an asset. For the Melanau the farm is more important than cash. In Chapter 7, I have referred to this matter, whereby farmers harvest not only to obtain a steady and exact amount of income per month, but according to their needs, the time availability of labour and the demand from the millers. For them, the sago farm is a sort of bank. This perception originated from their past culture, which perceived land (sago farm) as the sign of wealth and power. This was because, before Brooke came to the area, Melanau social structure was hierarchical, like the caste system of India (Morris, 1991). During that time, only descendants of high rank could own land or a sago farm. Slaves were denied ownership. When Brooke came in early 1860, the hierarchical system was abolished. The idea of slavery was detested by Brooke, who was familiar with Iban egalitarianism. From then on, everybody, including former slaves, could buy and own sago farms. Until today, they are proud to own sago lands. Therefore, it is not likely for the descendants of those who were originally denied land ownership simply to give up their sago farms today. Valuing land as an “asset” also indirectly contributes to sustaining sago production in the study area. Despite this history, however, younger generations, who have little concept of the hierarchical system of the past, find it easy to abandon, pawn or sell their farm for money, with the obvious result of diminished sago production.

The Melanau show “gratitude” and “loyalty”, even to animals and vegetation. Chapter 7 reported the case whereby the Melanau refuse to eat certain plants (like the ‘kelepo’, for protecting the Melanau from being seen by their enemies) and animals (like the tortoise for helping a boy to cure his cuts). In the case of the sago palm, the Melanau show their “gratitude” and “loyalty” to the palm because of its contribution in helping them to survive the Japanese Occupation in Sarawak during the Second World War. Most of the elderly remember well that all other ethnic groups in Sarawak suffered tremendously from a lack of food at that time, while the Melanau themselves had no problem. The sago palm was always there for them, but for other groups, dependant on rice, and with their rice fields destroyed by the Japanese armies, there was nothing. Despite the slump in the international price of sago during the mid 60s, the Melanau continue to maintain their farms because they feel confident
that sago will help them again in the future, and as a way of showing gratitude. As long as those who have experienced the Japanese Occupation live, sago farms will be maintained. However, most of the younger generations have little idea of the historical contribution of sago during the Japanese Occupation, and thus their "loyalty" to sago is less, or none at all. This lack of "loyalty" may eventually contribute to a future decline in sago production.

Section 8.2 The implication of acculturation to the Melanau community

The particular palei discussed in this section are limited to sago cultivation, eating prohibition and those related to the Melanau's environmental knowledge, such as the prohibition against contacting certain types of plants and going out during certain weather conditions. This section also discusses the contribution of other traditional medicinal practices derived from the Melanaus' immediate environment, apart from the dakan (as discussed in Section 8.1). However, in the Melanau community, there are additional palei, related to other economic activities, such as fishing; and hunting and palei related to occasions like pregnancy, birth, death and marriages, which are not discussed here.

This next section considers the role of adat, in the context of palei and pedok that act to ensure social cohesion and community solidarity amongst the Melanau. The palei includes the "forbidden time", when farmers must not go to their farms (for example, during the death of a villager and kaul). Other elements of note are "the compulsory donation of the first harvested palm to other people" during harvesting and the practice of pedok, which promotes social solidarity.

Section 8.2.1 The decline of palei and pedok practice amongst the Melanau and its implication

The palei that forbids the farmers from visiting his farm has a social implication, particularly in the case of a death of a member of the village. Traditionally, the logic of this palei is translated in spiritual terms by the Melanau elderly. A member of the deceased's village cannot go to his farm or to the forest because bad spirits will smell the death through the person who breaks the palei. If a person breaks this palei, bad spirits will attack the village in search of the dead body.
From a different perspective, this palei effectively binds social relationships among the Melanau. These social relationships are defined and bonded by adat, with palei as one of the elements that ensures social harmony among the community (Morris, 1991). The Melanau village is a very close-knit society. In the past, the villagers lived in one long house, known as the ‘tall house’. Most of the villagers are related to one another through marital kinship. Traditionally, the grief and joy of one of the villagers is shared by the whole village. In times of bereavement, the whole village will help by giving financial, physical and moral support to the bereaved family. The palei that forbids a farmer from going to his farm at this time was one way of expressing moral support and showing respects to the bereaved family.

Social decay comes with the decline of such a palei. Nevertheless other, new beliefs can also promote good relationships amongst community members. The success of a new religion in replacing the function of palei depends on whether or not it is accepted or understood as a whole, or just partly, by the Melanau. Unsuccessful conversion occurs when those who adopt the new religion merely do so for pragmatic reasons, such as gaining a license to marry or just following the trend. The negative effects of acculturation do not simply occur because of the coming of new beliefs, since these beliefs also have their own way of dealing with daily events, but result from a misunderstanding or lack of understanding about the new religion.

The palei that forbids farmers from going to the farm also applies during the kaul day. In Medong, not only are the farmers denied access to the farm, but three days after the kaul ceremony, they are also forbidden from using the chainsaw. This is to prevent upsetting the spirits along the forest and rivers that have been presented with the kaul gifts. Any farmer who breaks the palei must pay a fine of one cockerel, a spade and an amount of gold to the kaul committee members (consisting of the village elderly). The Melanau know that the chainsaw is a dangerous machine, but it has helped them to speed up and lighten the burden of clearing the forest for a new farm and harvesting. This palei was only introduced in the late 60’s, after chainsaws appeared in the study area. The elderly in Kampung Medong feel that there is a dilemma about preserving their adat, especially through the practise of palei in this case. The sound of the chainsaw obviously prevents those who practise palei (through the sounds of birds and other animals) and yet there is a need to use the chainsaw to speed up and lighten the work load, so that farmers have the opportunity to engage in alternative jobs. Alternative jobs or other sources of income are particularly important, as the Melanau know they cannot rely solely on sago cultivation after the lessons from the slump in the sago
international price of the 1960s. Fifty four percent of the respondents from the sample population supplement their income from other jobs. (Refer to Chapter 7 under Section 7.2.2). The elderly have the 'once in a year' chance to control the use of chainsaw through the kaul palei.

Kaul is the most important communal event in the calendar of the Melanau. The origin of kaul as an annual festival is associated with the need for the Melanau to 'feed' their 'ipok' (spirits) through the presentation of gifts or 'serahang'. (Refer to Chapter 7). The presentation to the spirits was felt necessary by the shaman due to the afflictions that befell the Melanau community long before immunisation was introduced in Sarawak, particularly by contagious epidemic diseases like cholera and smallpox. The Melanau believed that such afflictions were the result of their own wrong-doings; it was therefore their duty to hold the 'cleansing of the village' ceremony. In villages near to the coast, the kaul ceremony is held at the seaside, near to the river mouth, where the gifts are floated off to the South China sea. In inland villages like Medong, the ceremony is held at the village community hall; gifts are given to the river at a site determined by the village shaman. Over the years, the functions of kaul have multiplied, not only as a way of avoiding afflictions, but also as a time to pray for good harvests, peace and harmony in the village.

The kaul ceremony of today still follows traditional rituals; the sacrifice of white cockerels to safeguard the village community, villagers making a personal wish at the small hut where the cock is sacrificed, by donating items as required by the shaman (usually cloths, food items like salt, needles and coins); the presentation of food prepared by the whole village to fill in the serahang for the presentation to the spirits, and lastly the sending of the serahang to its predetermined destination. Moreover, the villagers who attend the ceremony are also entertained by traditional dances and martial arts, performed by people invited from outside the village or by the villagers themselves. Reflecting the wider world of today, a political figure, usually the 'Wakil Rakyat' (Member of Parliament) or the District Officer (DO), is invited to such events. There is also the chance for the influential elderly in the village, including the Ketua Kampung (Head of the village) and Pemanca, to discuss current problems and future development projects in the village. In contrast to past generations, who only dealt with the spirits’ demands, the present generation are making use of kaul as an opportunity to discuss and bargain with the political figures from the state government concerning their livelihoods and future.
In the future, if the shaman does not pass his knowledge of the rituals to younger generations, and if the younger generations are not interested in learning the rituals, even if retained, the kaul ceremony will acquire different procedures and meaning. The meaning of kaul today among the young is not the same as how the elderly used to perceive kaul. For the young, kaul is merely the festival, when they can take days off from their job in towns to join their families back home. In Medong, kaul is celebrated together with the coming of Christmas and the New Year. The kaul ceremony is becoming more commercialised. Villagers prepare food for guests, and shop to enhance their households (buying new sofas, curtains and clothing for the family) for the purpose of the ‘open house’ tradition. ‘Open house’ is the event when anybody can come to any villagers’ house. The house owner is obliged to entertain visitors (even those with whom they are not acquainted).

Regardless of the changes in the meaning of kaul among the younger generation, it is the time when villagers meet to assert their sense of belonging and of unity. It is also the time to enhance and revitalise each individual’s identity and cultural tradition.

Another way in which palei (in sago cultivation) binds social relationship is the ‘obligatory donation of the first harvested sago palm in each new harvesting to other people’. This palei fosters goodwill among villagers by redistributing and sharing the harvest, especially to those in need. According to the Melanau elderly, the first sago palm harvested in each new harvesting, cannot be consumed or sold by the owner; otherwise the owner will not be able to enjoy the rest of the harvested palms (meaning that the farmer will get terribly ill, his or her farm destroyed or, in the worst case, he or she will die. In reality, this palei is a redistributive mechanism, with similar effects to a government tax system. It is far better that the formal redistributive mechanism imposed by the state, as palei is already ingrained as a belief. Farmers are afraid of evading the palei because they believe that afflictions will befall them. Sometimes it can be an exploitative control mechanism, as farmers restrain from making rampant harvesting, because each harvesting means giving away a palm to someone else.

The average cost of a palm is RM 60, a quarter of the sample’s average income. Therefore, harvesting is not free. However, the introduction of chainsaw in harvesting, result in a void of palei, as farmers can harvest more palms per harvest. In the future, if this palei is not followed, there is no cultural means of controlling the sago rate of exploitation in the area, which may consequently lead to over exploitation.
Modern market-based regulatory systems may be introduced to replace *palei* in controlling sago exploitation. However, the success of this new and alien system imposed from outside is not guaranteed. First of all, in the present condition, farmers do not answer to the “demand and supply rules” signalled by the market. Other socio-cultural factors play major roles in sustaining the sago farm. (See Figure 8.2). Indeed, a total dependence on international demand as a guide to the harvesting rate might cause farmers to abandon sago farms altogether, for example, when international demand and market prices are very low. This is indicated by a study of sago farmers in Johore, West Malaysia, whereby farmers switch sago for other crops, as a result of declining in international demand and market prices (Tan, 1983).

Secondly, there have been examples of the failures of formal regulated systems imposed by the government, particularly in logging activities. For example in 1993, not a single environmental impact assessment (EIA) report was been submitted to the Department of Environment by logging companies, despite the law coming into force five years before (in 1988) and with 400,000 hectares of forest being logged annually (New Straits Times, 1993). Under existing regulations, before a forest area of 500 hectares or more is approved for logging, a project proponent must conduct an EIA outlining the mitigating measures to be taken. Failing this, the offender can be charged under Section 34(8) of the Environmental Quality Act, which carries a maximum fine of RM 10,000 or two years’ jail or both. He or she is also liable to a further fine of RM 1,000 daily for each day the violation continues after a notice is served by the DOE director-general. In later years, loggers have manipulated the rules by finding loopholes, such as working on only 499 hectares of forest, known locally as the “499 factor” to evade conducting the EIA. Other loopholes include clearing more than 500 hectares but dividing the forest under several names (each one of which accounted for less than the 500 hectares minimum). In short, outside rules on the sago smallholders would probably not be complied with; in contrast to the regulation prescribed by the *palei* that are already long embedded in their socio-cultural system. Furthermore, such a regulatory system is also costly to enforce.

*Pedok* is the practice of communal work, which occurs mostly during the harvest. It is an even more important mechanism of redistributing income amongst the Melanau community. Traditionally, a rich farmer who has many palms to harvest, but lacks labour, will call upon
the villagers to help in harvesting his or her farm. In return, the owner contributes a third of the harvest to those who help. Today, the practice of *pedok* is not as common as before. Many Melanau already work as wage labourers (between RM 25 to 30 a day), mainly in harvesting. This reflects an increasingly monetised economy that slowly replaces the values of traditional community work promoted by *palei* and *pedok*. People will become more individualised as they increasingly seek money. The “community” slowly disintegrates.

Section 8.2.2 The contributions of other *palei* and traditional medicines to the Melanau community

The impact of other *palei* and traditional medicines, related to and derived from the peat swamp forest, are also significant. These *palei* are essential for the Melanau’s survival against diseases and the hostility of the peat swamp environment. They are little short of a ‘data base’ of indigenous knowledge, slowly accumulated since the Melanau first settled the area.

Older Melanau are particularly concerned with the ‘eating *palei*’. There are three types of eating *palei* – those inherited from parents; those embraced by the community, usually by the whole villagers as a way to show gratitude for the food and; those associated with certain activities (such as clearing a site for a sago farm) or during certain treatment periods (treatment with the shaman or during a postnatal period). The eating *palei* include the prohibition against eating certain animals (riverine and games products) and vegetation. They vary from village to village. (Refer to Table 7.2, Chapter 7). The material logic of all these eating *palei* is to maintain good health and prevent the occurrence of hazards or mishaps, either to the individual or to the whole community. These reasons are usually explained spiritually and symbolically through myths and oral folklore. (See Chapter 7).

However, the rational of the eating *palei* is linked to the Melanaus’ allergic reaction to the animals and vegetation concerned. The eating *palei* is important, as its contents are based on the accumulated information of the range of allergies, based on along history of ‘trial and error’ and observation of the environment. Most of the side effects of eating the forbidden foods are associated with itchiness and skin disorder. In the old days, it was important that the Melanau knew the eating *palei*, in order to avoid allergic reactions. Today, as a result of the decline in the knowledge and practice of *palei*, this information is not so readily available as before, or in some cases not available at all. The significance of the eating *palei* is its capacity to prevent illnesses occurring among the community, even though modern medicines

263
are available in the study area. Even in the modern era, where 'cures' can be bought over the counter, 'prevention is still thought to be better than treatment'.

In a similar vein there are palei which discourage physical contact with certain plants. (Refer to Chapter 7, Table 7.2). The Melanau believe that such plant species are the favourite dwelling place of evil spirits, and should be avoided at all costs. The 'binjai', 'kelepo' and 'rengas' trees often have similar characteristics, mainly having fruits or barks excreting tannins or saps which produce poisonous chemicals. Contact with these tannins or saps results in skin rashes and itchiness.

However, not all of the palei have an obvious logical explanation. The palei that prohibit the Melanau from wandering outside their homes during certain weather conditions is one of them. The weather conditions include in the palei are: storm and lightning with heavy downpours; rain with sunshine; the appearance of reddish and yellowish skies in the late evening (scientific explanation as caused by refraction) and; when a rainbow appears in the sky. The reason for the palei is that, these are the favourite times for the evil spirits to wander around, thus it is safer to stay at home than being in contact with the wandering evil spirits. However, the palei is flexible for those who are in need of going out due to certain circumstances. Certain types of plant will protect them from the evil spirits that are usually attached to their body. (Refer to Chapter 7, Table 7.2). These weather conditions, however have similar characteristics, an 'abnormality in appearance'. In most aspects of life, the Melanau who live in such a hostile environment will not risk their health and safety by engaging or doing things in circumstances or weather that they are not familiar with, or those which appearances seem to be 'abnormal'. The palei reflects a situation of 'playing safe' as a tactic of survival, practised by their ancestors for years with apparent success the Melanau have survived to the present.

Apart from the dakan (traditional medicine derived from the sago palm), the Melanau also have other sources of medicines. These include the use of moss (which can be found covering the surface of an established sago palm) to cure cuts and wounds; the use of soil (a type of clay which is usually found on the river bank) to cure illnesses related to digestion problems; the use of old tree stems (usually located in rivers), believed to have certain magical power to cure all sort of illnesses and; the use of animal venom to heal the pain caused by the same animals. Until recently, the Melanau still believed in their traditional medicines. The
knowledge of traditional medicines provided them with alternative to modern medicines, now available in district clinics and state government hospitals. However, there is no report of conflicts between modern and traditional medicines. Most who work in the local clinics and hospital have a wide understanding of the Melanau attitude to the treatment of illness, particularly those believed to result from not adhering to certain palei or of ‘evil doings’ by an evil shaman. In some cases, where there is no scientific or logical explanation of the illness, doctors or nurses will advice the patient to seek traditional treatment.

These illustrations of palei and traditional medicines reveal the Melanau’s intimate knowledge of their environment. For the younger generation, who have moved to the towns, where environmental conditions and diet are different from the study area, there is less concern and interest. Outmigration from the study area will eventually erode both the knowledge and practice of palei and traditional medicines. The implications of the decline in the knowledge and practice of these palei and traditional medicines are the loss of an important information system, collected throughout the years by the Melanau ancestors and also the decline in self-sufficiency and comprehensive yet careful utilisation of the peat swamp environment, not only as a source of food and income but also for its pharmaceutical value.

Section 8.3 The realities - the Melanaus’ coping strategies against external influences

Acculturation is an ongoing process in the study area, as indicated by the data in Chapter 7. So far I have discussed the likely implications of acculturation, both to sago production and to the Melanau community. The effect of acculturation on the Melanau is important, as they have been the ones who ‘captured and cultured’ (tamed) and ensured the ‘safekeeping’ of sago. Any changes in the Melanaus’ perception of sago will affect the ‘sustainability’ of sago production.

What now follows is an examination of the effects of external influences that have continued in the study area since the early Seventeenth century. Within this long period, the focus will be mainly on the effects of recent government policies. This section also assesses the extent of acculturation and the Melanaus’ coping strategies against changes throughout the years.
Acculturation has resulted from several factors - the introduction of new religions; the setting up of mechanised sago mills; the subsidy scheme; the establishment of the LCDA sago plantations; the impact of the mass media; the provision of education, health and other infrastructural services and the outmigration of the Melanau, especially the young, to urban centres. Most of these emanate from the state government’s policies, both past and present. They are driven by government’s need to acquire revenue through the export of sago flour and meal. Thus, the main interest of the government in the study area seems to rest with the contribution of the Melanau in producing sago. This is obviously reflected by the policies implemented by the Sago Planting scheme (SPS); the setting up of the LCDA sago plantations and the Research and Development (R&D) programmes to improve the processing equipment in the sago mills. The former government of the Brooke administration had introduced the Chinese sago millers into the study area as a way to speed up and process sago in great quantity to meet the demand of the international market at that time, while at the same time acquiring revenues to support its administration.

As a result of these external influences, there has been a shift in the methods of cultivating sago from traditional to modern or to a combination of the two. The SPS plays an important role in extensifying sago production in the study area, leading to an increase in land under sago cultivation in the study area. It is hoped that an increase in the acreage of sago farm will also increase the supply of sago sections, to fulfil the demand from both the sago millers and the international demand of sago flour from Japan.

The SPS is also attempting to ‘modernise’ sago cultivation, again with the hope that production will increase. Pesticides and herbicides, together with the ‘straight lining system’ are introduced under the schemes. However, the introduction of modern tools is limited to the promotion of chemicals. Farmers find little use for this, and instead are more interested in their own adaptation of the chainsaw (having gained experience when working for the timber companies.) Even the ‘straight lining system’ has its disadvantages. (Refer to Section 8.1.2). The area of land cultivated increased as a result of the SPS, but not sago production. This is mainly due to the traditional perceptions of the farmers regarding harvesting. They value sago palms more as a living bank than always for the cash derived from selling them. Thus, the government’s aim of providing a continuous supply of sago palms from the scheme is not realised.
In reality, although there is empirical evidence to show that the use of traditional methods has declined, most respondents still retain traditional techniques by combining them with modern methods. Farmers are not just passive receivers of modern techniques, but adapt the tools provided under the scheme to suit their own needs and situations. For example, some farmers only use herbicides to make pathways in their farm. Some only apply the chemicals at a late stage of sago cultivation, disregarding advice from extension workers. They use them selectively and with only a minimum application. The "straight lining system" has also been modified by the farmers, by reducing the suggested planting distance of 10 to 7 metres. (Refer to Chapter 6, Section 6.3).

The shift from traditional to modern methods is therefore a 'fluid' process. This is possible due to the existence of a good relationship between the Department of Agriculture (DOA), especially the extension workers in charge, and the farmers. Rather than imposing policy strictly, the farmers are given the freedom to choose what is best for them. At the ground level, implementation is flexible. There is a good rapport and understanding between the DOA and the farmers.

Despite these benefits, the scheme also has some weaknesses. Farmers feel that the cash allocated for buying sago suckers is insufficient. This is only worsened by the increase in the price of sago suckers, as a result of the increasing demand for the planting materials from the LCDA sago plantation. Farmers with established farms, who are supposed to have plenty of planting stocks, also suffer because the number of sago suckers has either declined or been damaged through theft. Those who are not eligible for the subsidy, (i.e. farmers with small farm of less than 1 hectares, or those with no farm at all, but just started to clear a site for a sago farm) will suffer as a result of the increase in the price of sago suckers.

Farmers consider the scheme as not only insufficient but also a waste of financial resources. The chemicals are of little use and the tools (parang, spade and etc.) are of low quality. Very little information is given to farmers as to where the allocated funds are spent. They know that low quality tools cost less than better quality ones. Ultimately farmers abandon the low quality tools and buy new and better quality ones from the Chinese shopkeepers.
The type of equipment which the farmers feel more important in relieving their work burden, such as outboard engines and chainsaws are not provided by the scheme. These two items are useful, yet expensive to purchase.

The scheme is implemented merely to fulfil official duties and targets and as an agenda item to be reported in each annual meeting. The success of the schemes is often measured by the number of participants and the acreage of land converted to sago farms, not by the standard of living of the farmers. Although the implementation of the scheme is flexible, it neither fulfils the needs of the farmers, nor the aims of the government.

Another factor that causes the shift in the methods of sago cultivation is the introduction of new religions. Two main religions were introduced by former governments: Islam was introduced by the Pengirans of Brunei, during the Brunei Sultanate control of the area; and Christianity, mainly Catholic, by the missionaries from UK, under the Brooke and the Colonial administrations.

In the early days, there seems to have been little conflict between the new religions and the Melanau adat. There are several possible reasons for this. Firstly, during that time, adat was still strongly embedded in Melanau society, and therefore hard to displace. Secondly, those who converted the Melanau, such as the Brunei pengirans, were mainly merchants, who travel to and fro from the study area to Brunei, implying that the religion was preached intermittently, rather than constantly. In the process of conversion, the Melanau tended to adapt or mix adat with the new religion. Those who were preaching the new religion were also careful not to offend the Melanau by criticising their adat, in a bid to win their support.

The fusion of adat and the new religions continues to the present day. This is shown in the kaul festival in Medong, where, Christmas and kaul are both celebrated at the same time. The Christians of Dalat use the sago palm during their Palm Sunday celebration. This also happens during a wedding ceremony in the Muslim community of Oya, which is conducted by the ‘imam’ with readings from the Quran; but at the same time all palei related to wedding ceremony are also practised. The practice of combining elements of both religions is unlikely to last for much longer. As older generations pass away, adat infusions will progressively decline.

268
The new religions have been embraced by the Melanau since the Seventeenth century, though only recently by the younger generation. These latter have been further influenced by other external factors such as formal education, links to the urban centres and the availability of mass media in the study area. Chapter 7 has shown the dilemma that the younger generations are facing, the choice between preserving adat and following the new religions. The problem with preserving adat is that most of the adat values conflict with their new monotheistic beliefs. This is particularly obvious in the explanatory component of the adat, which tends to be linked with spiritual concept (polytheism) of the Pagan religion. This is especially true in sago cultivation. For the practice of palei and pedok to be accepted and continually practised by the younger generation, there must be an effort to present and explain the reasons behind the palei and pedok in different perspectives. The first step is to provide analytical and rational explanations that can be accepted, without conflicting with their new religions. In Islam and Christianity, any initiative at conserving the environment by whatever technique is not wrong, as long as the ‘intention’ of doing so is for the good of the environment and the community. At the same time the reasons behind any palei explanations should not rest on the power of evil spirits, because, according to the new religions, the spirits, like human beings, are part of God’s creation. Some of the palei, as illustrated above, contribute to the sustainability of sago production. It is in this aspect that the loss of adat is of great concern.

It is undeniable that the current government has also played an important role in providing social development in the study area, with positive effects. Social development projects include the provision of formal education, health and other infrastructural services (such as water and electric supplies, telephone lines and a road system). Formal education was noted by respondents as one of the main factors that has caused the decline of adat. This is because the children are taught under a secular national curriculum, which promotes the aspirations of the government (development through commercialisation and modernisation, in contrast with adat as ‘backward’ elements impeding development goals). Inevitably, the younger generations have been more sceptical of the validity and usefulness of adat, despite early exposure through their parents and the older community.

In a positive way, formal education has enabled the Melanau to find other alternative employment and migrate to the urban centres for better paid jobs. Alternative employment and supplementary income from those members of the family who work in the urban centres
are two important coping strategies that the Melanau have depended on since the slump of the sago price in the 1960s.

The Melanau have tolerated and accepted changes from different government administrations and from foreigners (from the Brunei pengirans to the Kuching Malay and then the Chinese millers), all of whom are interested in the study area for the sake of sago.

The Brooke government brought Chinese sago millers to the study area, which consequently led to the disruption of the Melanau system of labour division between gender, mainly as a result of the mechanisation of the sago mills, which displaced the women as the traditional processors of sago.

Under the current government, research and development programmes have been designed to improve the machinery in the sago mills, with the aim of producing the higher quality sago flour demanded by Japan. In contrast to the sago millers, financial help for the cottage industry is limited only to the building of one or two belanga in a village. The provision of belanga is, in fact, a 'political token' gesture by the state government, as a way to show that the government cares. The official opening ceremony of a new belanga is often celebrated in the village by the arrival of an MP, in the pursuit of votes.

The concentration of financial spending on R & D to improve sago milling serves the interests of the government. Higher quality flour means a higher demand and an increase in the reputation of the country in providing good quality products. However, the sago millers still face problems of supply, because sago sections are produced and controlled by the Melanau. This impedes the flow of sago exports. The only solution is to take control of supply as well as processing. The government, therefore, set up the LCDA sago plantations to ensure that the supply of sago is consistent, as the suppliers from Melanau smallholders are not reliable.

The short term impacts of the LCDA sago plantations have been presented in Chapter 6, Section 6.5. The LCDA sago plantations compete with the smallholders for planting materials. In the future, the income of the smallholders is likely to be affected by the plantations as they provide sago sections for the millers. With a surplus on the market, the price of sago sections might fall, to the advantage of the Chinese sago millers but not the producers, unless the demand for sago continues to rise. In the long run, the reliability and
consistency of demand from Japan is questionable, especially in the light of the present uncertainties clouding the global market. These uncertainties are clearly illustrated in the recent economic crisis in Asia, which has affected both Japan and Malaysia.

The plantations were expected to help local people by providing employment, but this has not been warmly received by most people in the study area. This is because most of the people in the study area have their own farm to attend to. They prefer to work freely without the stress from supervisors of the plantations. Another reason for the failure of the plantation to attract the Melanau as employees is due to the ageing of the population. It is hard enough for them to find sufficient labour to harvest the palms, because of wearing physical strength of the elderly. There is little possibility for them to work in the plantation given the strict time regulations. Meanwhile, most of the young refuse to work in the plantation because of low wages. They can get better payments in other employment sectors, like the logging companies or urban centres like Sibu. Some of the women are interested in working at the plantations but they are hindered by the lack of transport facilities and the long distance between their homes and the plantation.

For those who are already working in the plantations, they refused to renew their contracts, partly because of the poor wages, but also due to the delay in receiving their wages. The Melanau live close to the plantation are able to leave and enter the plantation (as workers) whenever they like. This has caused a serious labour problem and encouraged plantation managing to opt for foreign labourers like the Indonesian immigrants and the Ibans.

It is not only difficult to find employees but also contractors. Local contractors refused to deal with LCDA due to the inefficient payment system. (See Chapter 6 under Section 6.4). As a result, outside contractors were signed on, implying a failure to help local entrepreneurs.

In this case, the government intention of curbing outmigration is not successful. On the contrary, the opportunity cost that can be derived from other employment, compared to the low wages offered by the plantation, will increase the likelihood of outmigration to other part of Sarawak.

At the time data was collected, there is no "minimum wages" in Malaysia. Wages offered by contractors were influenced by the amount received from the LCDA. The allocated amount
given to contractors, depends on the total budget allocated at the national level (in this case, the Seventh Malaysian Plan). Wages are low maybe due to 2 factors – insufficient financial support from the government and/or contract workers regarded as low priority in the “financial allocation checklist”, thus given less financial allocation.

The government argues that the plantation will contribute positively to the local economy, by creating a ‘multiplier effects’ which will attract both investment and income into the area. However, there seems to have been little positive effect so far. Rather, what effects there have been are negative.

Firstly, there is a competition for planting materials, and secondly for land. In dealing with the first problem, social network has emerged to counterattack the competition and problems related to the procurement of planting materials. The AJKKK\(^1\) of Kampung Jebungan, Mukah have banned all dealings with agents from the plantation. This action has significantly delayed the planting schedules in the plantation.

From the survey, two farmers report of farm’s dispossession. Although the percentage is not high, but it is a serious matter if overlook. In land matters, the Melanau are powerless against the government and its policy. Farmers are not compensated because their farms are not officially registered with the Land and Survey office in Sibu. They are obviously frustrated with this action because their farms are already at the established stage. All their hard work over the previous five to six years has been wasted. When asked about the effects of the plantation, Ras of Kampung Teh Labak, Mukah (a village in the vicinity of the Mukah plantation) complained;

“I am really bitter that the plantation people took the site that I had cleared as sago farms. All of the efforts that I and my family put on the farm were wasted, the sago palms were already 5 to 6 years old, just a matter of another 9 to 10 years to mature and ready for harvest. According to them, it was my fault for not registering the land with the survey people in Sibu. There was no compensation because in their law, the land was not rightly mine. It was what they call the state land. There was nothing that I could do”.

Unlike other ethnic groups in Sarawak, particularly the Ibans, the Melanau tend to “keep their hands off” lands outside their “territory” (State or Reserve lands). Instead they concentrate on working lands inherited from their ancestors. From the 1950s until the early 1970s the acreage of sago farms remained constant in the study area at 6,000 hectares. This

\(^{1}\) Ahli Jawatan Kuasa Kemajuan Kampung (village committees)
The concept of “keeping to their own lands” however changed after the government introduced the extensification programmes, implemented by the SPS, that increased farm acreage to 20,000 hectares. The government feels that the increase is still not optimal, considering that the total acreage of land cultivated under sago is only about 1.5 percent of the total peat swamp forest (total of 1.47 million hectares). Thus, the decision was taken to establish a plantation of 85,972 hectares. However, the direct consequence of setting up the plantations is that the Melanau are obviously at a loss, since in the future there will be no more land available to them. The Melanau who have suffered from the instability of the sago international price will be left with little land to produce sago and few resources (as the nearby forest has been converted to plantation) to pursue their traditional hunting and gathering activities, which have provided them with self-sufficiency in food supply and to some extent has supplemented their household income.

The Melanau have already experienced the depression in the global market in the 1960s. Before the government became interested in sago as an export crop, the sago palm was cultivated for subsistence. Dependency on sago as a cash crop arose after the Second World War and continued until the 1950s, when international demand and the price for sago soared. For ten years after, the Melanau increasingly depended on sago as their main source of income, until the slump in the international price in the 1960s.

Their reaction was to reduce dependency on sago as a cash crop. That is why the role of the sago palm has changed. In fact, it is now effectively a ‘controllable’ cash crop, underpinned by coping strategies such as diversifying incomes. In other words, the Melanau are very careful not to become over dependent on sago as their only source of income. (Refer to Figure 8.1 and 8.2).

Figure 8.1 shows the traditional role of the sago palm: as a main source of income; for food; as a source of traditional medicines; and for raw materials for building, fishing equipment, household utensils, etc.
Figure 8.1 The traditional role of the sago palm in the Melanau community

Figure 8.2 Factors that sustained sago production in the study area
From then on, several coping strategies have been designed to sustain sago production. Because of both its cultural and material importance, the ‘loyalty’ of the Melanau to sago is not surprising. Production can be sustained, even when the market price drops as low as RM 0.65 (as it did in 1965). Other coping strategies have also enabled the Melanau to maintain sago production. These coping strategies are in the form of diversifying sources of income, besides income derived from sago alone. By engaging in alternative employment; planting other crops, both for food supply and to supplement income; receiving income from other family members working elsewhere, particularly in the urban centres and; utilising their immediate environment for food supply and sometimes to supplement income, the Melanau have diversified their economic base so as to reduce dependence on sago. These findings coincide with similar coping strategies found in Asia and Africa (Hirschman, 1970; Norman, 1974; Hill, 1977; Chambers et al., 1989; Chambers, 1993).

Having been displaced by mechanisation in the early 1970s, the women of the study area has concentrated their efforts on the cottage industries. In the 1990s, the demand for sago pellets has increased, especially in the large urban centres such as Kuching and Sibu. The Sarawakian has acquired a certain exquisite taste for sago. Sago pellets are no longer considered as “poor” food, but have become part of the menu of sophisticated hotels in the urban centres. This also provides a form of income diversification. Despite these efforts, there seems little doubt, that overall, the role of sago as the Melanaus’ staple food and traditional medicines has declined, largely because of acculturation as discussed in Section 8.1.2.

The inheritance system has also helped to sustain sago production in the area. Sago farms are passed down from generation to generation, obliging the Melanau to maintain, if not at least retain, their farm. Most of those who migrate to urban centres will return home during their retirement years and continue to grow sago. At the same time, the availability of traditional knowledge and skills in sago cultivation also enables the Melanau who return home for retirement to continue working on the farm.

Finally, the unsuitability of the peat swamp for other crops helps to sustain sago production. Farmers in Kampung Medong have tried to switch to cocoa and rubber, but in vain. Coconut has also been tested by some of the farmers, but the income derived from its cultivation is not as much as sago.
The Melanau strive to maintain sago production because of its cultural significance, as their sacred plant - used for food, traditional medicines and gifts during rituals. Apart from that, historical lessons have also warned the Melanau not to depend too much on sago as a source of income. Therefore they have developed a range of coping strategies; through diversifying their incomes through alternative employment, by being self-sufficient by planting other crops and utilising their environment as a food supply, by sending children outside the home area in search of additional income and by processing sago for the local market. Sago production also survives in the study area because of the land tenure system and the continued efforts to transfer traditional skills and knowledge. It is also helped by the flexibility of the schemes provided and implemented by the government, with the exception of the plantation. However, the government could still play a better role in improving and sustaining sago production in the area. The form of help provided by the subsidy scheme needs to be revised to meet the genuine needs of the farmers. The financial resources spent on the LCDA plantation might have been better spent on in situ projects, rather than on a large commercialised project which has created competition and problems for smallholders, and has also affected the environment in the areas through large clearings of the forest.
Chapter Nine

Conclusion

There are four parts in this concluding chapter. The first section summarises the main findings of the study. The second section sets out recommendations and implications of the findings. The third discusses the weaknesses and insufficiencies of the study and lastly the final section lists potential research that can be further pursued in relation to the study.

Section 9.1 Summary of the findings

Applying conventional development without modifying it to suit local circumstances reveals the dangers and not an appropriate way of development planning. This is confirmed by the findings in the context of government policies (intensification and extensification programmes through the SPS and LCDA plantations). Not only do the policies fail to reach their objectives in improving the socio-economic conditions of the Melanau but are also insensitive to their socio-cultural needs and the local environment. In contrast the contributions of indigenous knowledge to sago production, as part of Melanau society and culture, is overlooked and often undermined, despite its potential for contributing to developmental programmes. It maintains stable production system and minimises disruption to the local environmental system.

The effects of government policies are discussed in three different perspectives – economic, cultural and environmental.

Section 9.1.1 Indigenous knowledge and sago production

Despite ongoing acculturation, indigenous knowledge still plays a role. There is no "clear-cut" case for deploying either modern or traditional knowledge. In fact, we witness a dynamic process combining both traditional and modern elements, in accordance with farmers' needs. There is no association between the methods of farming and income of farmers, implying no tension between conserving socio-cultural values, through practising indigenous knowledge and promoting socio-economic gain, that is, generating income. (These are discussed in greater details in Section 9.1.2). Thus, using indigenous knowledge does not contribute to economic decline.

In fact, there are four socio-economic contributions of using indigenous knowledge (including adat and palei) – minimising risk-taking; providing food self-sufficiency; providing low cost of expenditure; and providing a redistribution system through palei.
Decisions based on traditional values emphasise risk minimisation. In a way, traditional aspirations not only minimise risk-taking in the face of an unstable international market price, but also help to control over exploitation of the sago palm. In addition, there are a range of ‘coping strategies’ (Section 9.1.2), providing a further buffering for variable income.

Customary practice enhances food self-sufficiency through inter cropping or mixed cropping; preserving and utilising useful wild plants and herbs on the farm; and utilising the immediate environment outside their farm (forest, sea and rivers). The immediate environment is protected through indigenous knowledge, adat and palei to ensure that hunting pursuits and collecting forest products can continue.

Indigenous knowledge favours low input farming, for it is the basis of utilising local resources. Organic fertiliser is derived from soil burnt during site clearance and compost accumulated from the pruning of fronds. Burning reduces the danger of pests in the later stages of growth. Branches from sago palms are used as pathways to ease the transport logs during harvesting; the invention of the “dayung” uses local woods to facilitate transportation in harvesting and local bamboo is used to make frames for propagation. (See Chapter 6, Section 6.2).

Palei has its redistributive function, as in harvesting, whereby poorer sections of the community share the harvest, when certain animals fell from or pass over the sago palms or logs. There is also palei that required the first palm planted or harvested to be donated to other people. (See Chapter 6, Section 6.2 and Chapter 8, Section 8.2.1).

Indigenous knowledge and traditional practices like adat and palei have their own inherent value that individuals can associate or identify with. A significant contribution of adat and indigenous knowledge in cultivating sago is the promotion of co-operation, binding the community through communal harvesting, as in pedok. Indigenous knowledge, adat, palei and pedok ensure the continuity and preservation of tradition in a community.

As a traditional artisanal activity, the cottage industry continues, albeit in a reduced form. Traditionally, Melanau women processed sago logs into wet starch and sold it on to the millers. However when the mills were mechanised, their services were no longer needed, for the mills process the wet starch more efficiently. Women’s role in sago processing was also affected by the price slump, which forced men to leave home in search of other
employment, particularly with the logging company. Consequently, women had to take over all the hard jobs on the farm, normally the preserve of the men. The continuation of the cottage industry, in spite of these setbacks, provides a symbolical way for the women to re-emphasis their status in society. The income derived from this labour also empowers them, and gives them some financial independence.

The base of indigenous knowledge and the functional rationale of *adat* enhance environmental sustainability, evident in cultivation techniques which utilise renewable and on-farm resources that are energy-saving and environmental friendly (organic fertiliser, natural pest-predator control, etc.). (See Chapter 6, Section 6.2).

We can say that, indigenous cultivation techniques maintain "harmony" between human and environment. For example, during site clearance, factors such as, the time of the year, the weather and wind conditions are considered before burning procedure is carried out to assure minimal risk of danger to neighbouring areas. Clear cutting is avoided and useful plants are selected and replanted at other suitable sites. This requires an intimate knowledge of micro-environments and ecological processes. When propagating sago, a particular "cutting technique" is used to ensure that other sago palms are not damaged. (Refer to Chapter 6, Section 6.2 and Chapter 8).

**Section 9.1.2 The Subsidy Planting Scheme (SPS)**

The objective of the SPS is to increase both income and the area of land under sago production. The government assumes that modernisation of sago cultivation is needed to improve the economic livelihood of the Melanau sago smallholders. However, poverty persists among the sago smallholders despite such development. In the sample population, 68.4 percent of households are below the State's Poverty Level Income. (Refer to Section 7.2.2 and Figure 7.11). Moreover, crosstabulation reveals no association between farming methods (modern, traditional or combination of both) and income. The income derived from cultivating sago using modern method is not necessarily higher than using traditional ones. Income is not influenced by the methods of farming but other factors - alternative employment, remittances from family members and the rate of sago palm exploitation. (See Chapter 7, Section 7.2.2).

Although the contribution of alternative employment is small, as most respondents receive less than RM 500, it is still important as one of many coping strategies. Similarly, remittances might be quantitatively small, but they still contribute significantly to a
household's income. The "moral economy" of sending money back to the family home is influenced by socio-cultural values. A more affluent member of the family is obliged to help parents, as well as other unfortunate members of the family. However, obligation may well erode over time, especially with the ongoing acculturation in the community, with the implication of losing another important coping strategy.

Income is also influenced by the rate of sago palm exploitation. The Melanau acknowledge that harvesting more palms means higher income. However, farmers regard sago farms as much as an asset as a source of regular income. Their decision to harvest is influenced by other factors such as the short-term cash needs; the availability of time and labour and, to some extent, the demand for sago logs from the millers. Farmers are able to control harvesting time according to their needs due to the biology of the palm. Sago starch will remain at its best in terms of both quantity and quality, for two years after it reaching maturity.

The importance of the sago farm as an asset is attributed to several factors - the symbolic and spiritual role of sago palm as a healing power, and historical factors (a hierarchical social system that influences land ownership; the Japanese occupation in the Second World War and the sago price slump of the 1960's). The Melanau are careful to avoid over dependence on sago as their only source of income. The trend in the sample households is therefore to diversify. This enables farmers to maintain their farms, though both booms and slumps. Policy-makers refuse to acknowledge the cultural and historical contributions of the sago palm to the Melanau. Their view is that the progress is hindered by non-physical constraints such as conservatism, a lack of entrepreneurship and a strict confinement to adat.

The government's extensification policy seems to be successful. The area under sago farms increased from 6,075 hectares in the 1950's to 20,000 hectares after the introduction of SPS in the early 1970's. (See Chapter 8, Section 8.3) However, this is small compared to 86,000 hectares of land used to set up the LCDA plantations in late 1990s. (for further discussion on the implication of this, see Section 9.1.3). Nevertheless, SPS has successfully increased smallholder area.

Despite the 'quantitative' success, there remain problems of equity, especially in the way benefits from the scheme are redistributed. The issue of redistribution arises from the fact that not all farmers are illegible to join the scheme. Farmers with small farms (less than 1
hectares) are not illegible. There is also a flaw in the way farmers are selected. Apart from the decision made by the Senior Agriculture Officer (SAO), the selection of applicants is also recommended by influential members of the village, (the village ruling elite and the Village Committee members). The dangers of favouritism or the misuse of power are ever present. Relatives or close friends of influential village members could be given priority over others.

The insufficiency and irrelevance of the SPS scheme is mainly related to what and how help is given, that is the physical constraints involved. These include financial limitations, manpower shortages, and inadequate access to the study area. Although the government argues that the SPS is not hindered by financial constraint, farmers feel that aid is insufficient and the quality of tools is low. Moreover, the tools that the farmers really need, but which are expensive (chainsaw and outboard engines) were not included in the subsidy package. In terms of the technical advice and the co-operation between farmers and extension officers, the result is mixed. The success of the SPS in delivering technical advice depends on the dedication and tolerance of the extension workers, their willingness to listen to farmers, as well as other staff, especially the discretionary decision of the Senior Agriculture Officer (SAO).

There is a problem of manpower, since the community is an ageing population. Sixty four per cent of the sample population is more than 50 years old. (See Chapter 7, Section 7.2.1). This is because most of the young migrate to urban centres in search of other jobs, partly to escape community pressure (to continue working as sago farmers) or/and playing the role of buffering their family incomes as part of the coping strategies. Manpower is one of the factors upon which the decision to harvest is made. (Refer to Chapter 7, Section 7.2.4, Figure 7.20).

The socio-cultural impact of the SPS is to promote further acculturation. The main effects are the erosion of indigenous methods and values of *pedok*, *palei* and *adat*. For example, the introduction of “straight line planting”, outside inputs and the contradictory advice from extension workers, often undermine indigenous methods of sago production. (See Chapter 6, Section 6.3). Although the chainsaw is not introduced under the SPS, it directly contravenes the *palei* related to warnings from birds and other animals (because of its loud mechanical noise). Commercialisation and monetization have undermined *pedok*, as farmers' decision-making is increasingly driven by profit and wages. Collectively, and along with others this consequently developed an aspects of modernisation, these have
promoted individualism and materialism within the community in contrast to the values of adat which emphasise communality.

However, acculturation is not only caused by the introduction of SPS. It comes about through a continuous and accumulating historical process. The Brooke reign had influenced sago production considerably by changing the crop from subsistence to cash. The new role of sago as in international trade continued during the British protectorate period until Sarawak joined Malaysia. Acculturation in the study area is also caused by other factors – the introduction of formal education, the impress of the mass media, improved communication to the area and outmigration. (See Chapter 8).

The future effects of acculturation on the Melanau and its sago culture demands consideration. Sago production had been sustained partly by Melanau society and culture. If the perception concerning the importance of owning a sago farm changes, with an increase in monetization and concern for profit, sago production under unfavourable market price might decline or even cease. As aspirations change, farmers will be more willing to switch to other, more profitable crops. Acculturation also implies a decrease in the role of sago as traditional medicine and as a symbolic feature in rituals and ceremonies. As the cultural importance of sago declines, so does the need to maintain sago production. The future of sago production is also influenced by changes in the Melanaus’ diet and taste.

The SPS affects the environment through its extensification policies, implying the loss of peat swamp forest, as more forest are cleared to be converted as sago farms. The introduction of chemicals not only affects the environment but also causes health hazard to farmers.

Section 9.1.3 The relationship between the sago millers and smallholders

Efforts to improve the sago farmers' income have also failed because of the exploitative relationship between the sago millers and the sago smallholders. Although a rapport had been built between the millers and smallholders, in terms of profit, the exploitative nature is still apparent. (See Appendix IV and Chapter 6, Section 6.5.2). The sago millers’ daily profit is about as much as the smallholders’ monthly income. The mills might provide employment to the locals, but wages are low. Furthermore, the mills can only employ a small number of workers. (See Chapter 6, Section 6.5.2).
The exploitative relationship between millers and farmers is not only illustrated by low pricing of sago logs, but also the way millers control farmers through credit ties, the worst scenario being the loss of the farm. Control of farmers is essential to ensure a continuous supply of sago logs.

The DOA denies this exploitative relationship. In fact, millers themselves are being exploited by the exporter (a person to whom they sell the flour and meal and usually also provides them loan to set up the mills). In other word the exploitative relationship is blamed on a "ladder of indebtedness" in the sago export system. There is no minimum price setting or price control in favour of the farmers. Furthermore, financial aid specifically reserved for sago research was in fact spent on improving production at the mills, with the objective of producing better quality flour and meals. It is assumed that farmers will gain from the "trickle down effects" of an increasing international demand for sago. Such a policy benefits the millers more than the farmers, since they earn a larger share of the profits.

Farmers seem not to react to market signals, as much as the government might like them to. (Refer back to discussion in Section 9.1.1) The government and the millers both worry about the inconsistent supply of logs (as the mills need to process 2000 sago logs a day to ensure profit), leading to the setting up of the LCDA plantations.

Section 9.1.4 The LCDA plantations

The LCDA plantations have not provided the employment and increased incomes that were expected. Only 2 percent of the sample population work on the plantation. Most respondents refuse to work there because wages are too low. Other inhibiting factors include – the old age of the farmers, the necessity of maintaining the family farm, the remoteness of the plantations and associated problems with transportation. Some respondents expressed and wished to work but have so far not been approached by the plantations. In other words there is no clear procedure of how applicants should apply for the jobs. Most jobs are given to friends and relatives of the contractors. (See Chapter 6, Section 6.4). Even so, the contractors complained of problems regarding manpower. Locals refused to work due to inflexible strict hours and supervision. Most who started left their jobs before finishing their tasks, thus forcing the contractors to employ outsiders, such as the Indonesian and Iban. There were also problems with the inefficient bureaucratic networks of LCDA, such as delays in finishing rail tracks within the plantation and late payment. As a result, problem emerged with local contractors. Again, outside contractors were employed, bringing with them more outside workers, and thus signalling a failure for the plantations in their goal of employing locals.
However, the plantations have contributed positively to the income of the locals by providing extra cash from the sale of planting materials. In so doing, a chain of socio-cultural problems emerged, creating social unrest over the theft of planting materials and the destruction of palms due to indiscriminate cutting. Some villages reacted by banning and boycotting agents from the plantation.

Besides the obvious effect of clearing large areas of the forest (about 80,000 hectares), other consequences include the loss of local farmers’ opportunity to extend their farm in the future, as more of the Reserve Land is claimed by the government for the LCDA projects. Some farms were even directly displaced by the plantations.

The plantations also compete with smallholders’ production, particularly when the palms reached maturity, creating a surplus of logs on the market. An increase in supply leads to a reduction in price, with damaging effects on smallholders’ livelihoods.

Section 9.2 Implications of the study

The main implication of this study is that, the ‘conventional’ development policies are not appropriate at least as far as sustainability and Melanau livelihoods are concerned.

A modified policy could emerge through a better understanding of the Melanau sago production system. This will need radical changes in the way policy is designed – a “bottom-up” approach is required, where the needs and problems of all farmers (not only the village elite) are taken into consideration. The present policies fail to address the issues of justice and redistribution, in terms of its equitable effects on different groups of the village. The poor and those “not in the circle of receiving information” tends to be ignored. There is also a deficiency in the procedures and conditions of selecting farmers to join the SPS, that exclude farmers with small land or just starting off. A more appropriate policy will require comprehensive changes – increasing financial funds, removing irrelevance and unnecessary tools, adding desired tools, focusing on the most needy farmers and modifying technical advice to fit in with the socio-cultural needs of the Melanau.

Farmers feel that the financial support for buying planting materials is insufficient. The price of planting materials has increased, because of the high demand, which has resulted from the establishment of the LCDA plantations. The DOA office can consult the farmers
in removing irrelevance and poor quality tools. A more efficient way of spending allocated funds might be in the provision of cheaper loans or outright subsidy, for farmers who wish to invest on chain saw, outboard engine and even transportation means to their farm (long boat, small pick-up truck).

Sago production is not merely an economic activity. It also has deep cultural significance, particularly in a symbolic role. Indigenous knowledge and other traditional elements emphasise the "sacredness" of the palm, and in so doing offer a multitude of environmentally sound techniques. In order to preserve, apply, appreciate and make full use of these indigenous techniques, there is a need to train the entire DOA department, particularly extension workers, to understand and perhaps modify modern techniques to fit into the existing system of cultivation. For example, the use of chemicals can be reduced and research can be done to test for more environmental-friendly pest and weed control methods based on indigenous techniques. Experts can help to improve techniques, to suit specific conditions. Most importantly, an attitudinal change is needed in the extension workers, so that ethnocentric and patronising attitudes are shed and a more compromising and sympathetic approach to the needs of the farmers is adopted.

The study also indicates an ongoing acculturation, which directly affect the sustainability of sago production, implying the need for some sort of 'cultural revival'. Besides accommodating indigenous knowledge and traditional values in the SPS scheme, other means of modern technologies can also promote and preserve indigenous knowledge, such as the mass media (documentation in book, video or software). Formal education institution can also preserve and promote indigenous knowledge and traditional values to the sceptical younger generations, by including them as part of the school syllabus and curriculum. Indigenous knowledge and traditional values can also be revitalised through symposium, seminar and fair, apart from the current annual rituals of "kaut" and ceremonial feast.

A successful rural policy that will effectively deliver its goals can be reflected from what the clients need. For example, in this case, as most of the farmers diversify by planting other crops, the DOA can help by providing extra financial and technical help in planting crops that are not currently available, especially orchard fruits and vegetables. Besides merely focusing on intensifying sago production in the area, other aspects related to sago or other potential rural production can also be considered. This may include marketing, research on other potential downstream uses of sago and other products and the promotion of other form
of alternative flexible employment that fit into the socio-cultural and demographic pattern (mainly ageing group) of the population.

The government can reassure farmers about international price fluctuation, by setting price control to protect farmers' interest. Apart from that, the exploitative relationship between farmers and millers can be regularly checked and regulated. An independent body, such as a Commission Inquiry can be set to regulate the oligopolistic nature of the downstream processing industry (including the relationship between millers and exporters). Another way to break up the exploitative relationship is to train and encourage the local Melanau, especially the younger group, to get involved in similar or better sago downstream processing industries. More R and D is needed to find alternative and profitable ways of processing sago, apart from the conventional sago meal and flour.

The overwhelming dominance of the LCDA plantations particularly, in terms of its size can be rectified. Part of the plantations, if not all should be returned to the local people through scheme similar to FELDA or FELCRA (operated by DOA). The most needy and poor farmers (especially those with small farm) are selected from the study area community or other Melanau villages to participate in the scheme. The participators are then allocated accordingly, supervised and monitored but still allow freedom in decision-making, until their farms are established. The participators can pay the government their instalments of the land in small amount, as soon as they reap benefits from harvesting. In this way, sago production in the area can continue to be built and supported by sources that the villagers can trust, such as their families and next of kin, rather than by outsiders. Moreover, access to land and control to the production system will also assure minimal disruption or modification to socio-cultural values.

Section 9.3 Reflections on the study

The study has been constrained by several factors: time, financial and sampling concerns. These have been particularly felt during the field survey. The nature of the study (documenting and understanding indigenous knowledge and traditional values) is not only a sensitive and intricate subject, but also time-consuming. An in-depth understanding of the socio-cultural system ideally needs a long time for interaction and observation, in order to capture a better and clearer picture. The socio-cultural traits, values and elements under consideration are not only limited to sago production itself, but also to a multitude of other daily routines, pursuits, rituals and ceremonial events. Seasonal factors (rainy and dry
seasons) also affect decision-making in sago cultivation (particularly decision to clear a site for planting and harvesting) and guide the date of annual rituals and ceremonial events. A long time is needed if full pictures of all the events are to be recorded, understood and analysed.

The cost of collecting data, of travelling to remote and inaccessible villages invariably costs more than resources available. As a result of these constraints, the breadth of coverage and the sample size has been constrained.

Both quantitative and qualitative methods have been used to obtain much of the needed data. Except for the uncontrollable non-response of some, uncooperative government officers and millers, these different methodologies have sufficed. However, more time could have been allocated for qualitative surveys, especially given the slow and intricate process of capturing data, especially the participant-observation survey.

In terms of data collected, a truer and clearer picture of wealth and income would have emerged if elements other than money and size of sago farm, have been included (materials of inheritance and cultural importance, such as brassware, chinaware, china vase, precious ornaments and oddments). Other factors such as connection to electricity, phone and water supply, can also be indicators of wealth and income. The possession of modern artifacts like refrigerators, televisions, settees, telephones, etc. can also be indicators of wealth and income.

A mix of experienced and well-trained and inexperienced enumerators (local students) would maintain quality control during the questionnaire survey. While respondents will feel more at ease with familiar faces (local students), but some experienced enumerators from outside the area would have provided a consistent checking of quality. Local students can navigate around the area and translate difficult words and expressions, while the experienced and well-trained enumerators can provide useful advice and ensure that a minimum of errors are made throughout the survey sessions.

Section 9.4 Recommendations for other research

Following the findings, there are three aspects that need to be looked into in greater detail: technical practices and the wider role of indigenous knowledge, apart from sago cultivation
and revisiting the villages, focusing on the new impacts of the plantations on the smallholders.

In the domain of technical practice, there is a need for research specifically focusing on the possible combination of indigenous knowledge and modern technologies in sago cultivation, based on farmers' current experience. This will help to improve cultivation technology, not only having the advantage of fitting in with the socio-cultural conditions of the Melanau, but also inspiring the development of environmental-friendly techniques.

The study examines the role of indigenous knowledge only in the context of sago cultivation. The role of indigenous knowledge, traditional traits and values should also be examined within a broader context, in order to capture a more holistic picture about the role of indigenous knowledge in the study area. This includes studying indigenous knowledge in relation to other socio-economic activities and leisure pursuits, such as hunting, fishing, collecting forest products and so on. Like sago cultivation, such activities are also closely related to the exploitation of natural resources. Indigenous knowledge can play an important role in controlling the exploitation of resources of such activities, and may contribute significantly to the conservation of the peat swamp forest in the area. Further in-depth research on the role of indigenous knowledge in traditional medicines and socio-cultural events, such as annual celebrations and rituals should also be pursued. The role of indigenous knowledge in traditional medicines may have a potential contribution to the pharmaceutical industry and can be modified and revived in a modern way. It is important to pursue and research the role of indigenous knowledge non-material contexts, adat in particular is a holistic and complete philosophy that binds and guide the community to a certain accepted form of "identity" and "culture". In other words decisions concerning the social and economic world are not only influenced by environmental availability but also by cultural practices and rituals (usually for the purpose of controlling exploitation or redistributing resources).

Research should also be undertaken to find ways in which indigenous knowledge can be revitalised, considering the pace of acculturation amongst the younger generation and those who emigrate to other areas, particularly the urban centres. Perhaps a comparative study of opinions between those still living in the area, and those who have left the area, can be done to determine the importance of indigenous knowledge, adat and palei. The research should include the extent of the respondents' knowledge of indigenous knowledge and other traditional values, their interest and whether they can still identify with these values. The
recommended research can captured the aspirations of the newer generations, in terms of their attitudes towards indigenous knowledge and *adat*.

There is also a need to revisit the area, particularly when the LCDA plantations have begun harvesting, to see further impacts of the plantations on the smallholders. Possible impacts include competition introduced by the plantations to the smallholders, as a result of increasing sago logs supply to the market, which may reduce the prices set by the millers. This may put the smallholders in a disadvantaged position, in such a way that their incomes and bargaining powers with the millers may be reduced. Other possible impacts may be social and cultural (long term impacts of being employed by the plantations and/or having to cope with the foreigners working at the plantations). The environment may also be affected (long term impacts of large clearings on the peat swamp forest; the availability of local flora and fauna and possible microclimate changes such as seasonal flooding, drought, etc.).
Bibliography


Daly, H. E. and John B. Cobb Jr. (1989) For the Common Good: redirecting the economy toward community, the environment, and a sustainable future, Beacon Press: Boston.


Flint, M. (1991) *Biological Diversity and Developing Countries: issues and options*, ODA.


303


Jaspan, M.A. (1976) Insular Southeast Asia: ethnographic studies, Section 1, Sumatra, F.M. LeBar, compiler, Human Relations Area Files: New Haven (Conn).


Pearce, D. (1986) *The Sustainable Use of Natural Resources in Developing Countries*, University College: London.


Sarawak Information Service (1964) *An Introduction to Sibu and Third Division*, Information Service, Sarawak: Kuching.


Sarawak, Department of Agriculture (1966) *A Digest of Agricultural Statistics [Sarawak]*, Department of Agriculture: Kuching.


Universiti Pertanian Malaysia, Faculty of Agriculture (1978) *Food and Agriculture Malaysia, 2000*, Universiti Pertanian Malaysia, Faculty of Agriculture: Serdang.


Appendices

Appendix I  Translation of questionnaire used in the household survey

INTRODUCTION

The purpose of this questionnaire is to find out the nature of sago cultivation and the effects of technological innovations and plantation to sago farmers.

Respondent number : _______

Area : ______________________________

SECTION 1 (Socio-economic/Background of farmers)

1 a. Sex

□ 1 □ 2 □ 3

1 b. Age

□ (1) 10 - 29 years  □ (2) 30 - 49 years  □ (3) 50 - 69 years  □ (4) more than 69 years

1 c. Education

□ (1) No formal education  □ (2) Primary school  □ (3) Secondary school  □ (4) Others (Please specify)_________
1 d. Monthly average income of household

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 e. Monthly average spending of household

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Less than RM 300</td>
</tr>
<tr>
<td>(2)</td>
<td>RM 300 - RM 399</td>
</tr>
<tr>
<td>(3)</td>
<td>RM 400 - RM 499</td>
</tr>
<tr>
<td>(4)</td>
<td>More than RM 500</td>
</tr>
</tbody>
</table>

1 f. Number of family membership

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Less than 4</td>
</tr>
<tr>
<td>(2)</td>
<td>4 - 8</td>
</tr>
<tr>
<td>(3)</td>
<td>More than 8</td>
</tr>
</tbody>
</table>

1 g. Religion

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Islam</td>
</tr>
<tr>
<td>(2)</td>
<td>Christian</td>
</tr>
<tr>
<td>(3)</td>
<td>Pagan</td>
</tr>
</tbody>
</table>

323
SECTION 2 (Sago production)

2 a. How long have you been cultivating sago?
   □ (1) Less than 10 years
   □ (2) 10 - 20 years
   □ (3) More than 20 years

2 b. How big is your sago farm?
   □ (1) Less than 2 acres
   □ (2) 2 - 5 acres
   □ (3) More than 5 acres

2 c. How many hours does it take to travel from your house to the farm? (from the furthest farm)
   □ (1) Less than 1 hour
   □ (2) 1 - 3 hours
   □ (3) More than 3 hours

2 d. Do you have other jobs besides cultivating sago?
   □ (1) Yes (Please specify) ____________________
          if Yes, go to 2 (e)
   □ (2) No If No, go to 2 (f)
2 e. How much is the average monthly income that you get from other jobs?

2 f. How much is the average monthly income that you receive from other members of the family who work elsewhere?

2 g. Do you cultivate other crops besides sago?

☐ (1) Yes If Yes, go to 2(h) and 2 (i)

☐ (2) No If No, go to 3(a).

2 h. How important is sago contribution to your household income compare to other crops?

☐ (1) Very important

☐ (2) Important

☐ (3) Same

☐ (4) Quite important

☐ (5) Not important

☐ (6) Not sure

2 i. How much is the monthly average income that you get from cultivating other crops?
**SECTION 3 (Rate of exploitation)**

3 a. How many sago palm do you harvest in a year?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>(1) Less than 150</td>
</tr>
<tr>
<td>□</td>
<td>(2) 150 - 300</td>
</tr>
<tr>
<td>□</td>
<td>(3) More than 300</td>
</tr>
</tbody>
</table>

3 b. How much is the average monthly income from cultivating sago?

3 c. In a year, how many time do you harvest the sago palm?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>(1) Less than 2 times</td>
</tr>
<tr>
<td>□</td>
<td>(2) 2 - 4 times</td>
</tr>
<tr>
<td>□</td>
<td>(3) More than 4 times</td>
</tr>
</tbody>
</table>

3 d. In your experience, when was the most lucrative period of sago planting?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>(1) Before 1970</td>
</tr>
<tr>
<td>□</td>
<td>(2) 1970 - 1980</td>
</tr>
<tr>
<td>□</td>
<td>(3) 1980 - 1990</td>
</tr>
<tr>
<td>□</td>
<td>(4) Since 1990</td>
</tr>
</tbody>
</table>

3 e. In a day, how many hours do you spend working at the sago farm?

3 f. In a week, how many days do you spend working at the sago farm?
3 g. What are the problems that you faced during:

a) planting sago palm

b) maintaining sago farm

c) harvesting sago palm

3 h. Please estimate your cost of input for cultivating sago:

1. fertilizer ___________

2. pesticides and weedicides ___________

3. transportation ___________

4. agricultural tools ___________

5. others (please specify) ___________

3 i. Apart from yourself, who else are involved in sago cultivation? (Please arrange according to importance)

☐ (1) spouse

☐ (2) children

☐ (3) relatives

☐ (4) paid workers

☐ (5) others (Please specify)
3 j. To whom do you sell the sago palm?

☐ (1) sago mills
☐ (2) middle person
☐ (3) others (Please specify)

3 k. How is the payment made?

☐ (1) Cash on delivery
☐ (2) credit
☐ (3) paid in advance

3 l. Do you receive any help from the Department of Agriculture?

☐ (1) Yes If yes, go to 3m
☐ (2) No If No, go to Section 4

3 m. What kind of help do you receive?

☐ (1) Technical agricultural advises
☐ (2) Financial subsidy
☐ (3) Financial loan
☐ (4) Agricultural implement subsidy (such as fertilizer, pesticides and etc.)
SECTION 4 (Self-sufficiency)

4 a. Do you use the forest and river as sources of food?

□ (1) Yes If Yes, go to 4 (b).
□ (2) No If No, go to Section 5

4 b. Please specify the type of food.

4 c. Do you think that food derived from the forest and river is important?

□ (1) Yes
□ (2) No

4 d. Please explain your response to the above question.

4 e. Is it easy to gather food from the forest and rivers compare to the past?

□ (1) Easier
□ (2) Unchanged
□ (3) Harder

4 f. Please explain your response to the above question.
SECTION 5 (The impacts of technological innovations)

5 a. Do you use modern method to cultivate sago?

☐ (1) Yes If Yes go to 5 b
☐ (2) No If No, go to Section 6

5 b. What modern methods of sago production are used? (Please tick as appropriate)

☐ (1) Pesticide
☐ (2) Weedicide
☐ (3) Chemical fertilizer
☐ (4) Agricultural machinery and appliances
☐ (5) Powerboat
☐ (6) Others (Please specify)

5 c. Why do you use modern method?

_____________________________________

5 d. Do you have any problem when using modern methods? If so, please specify.

_____________________________________

5 e. What is the effect of using modern method to your household income?

☐ (1) Increase
☐ (2) Unchanged
☐ (3) Decrease
5 f. How do you describe the condition of the river in your area?

- □ (1) Cleaner
- □ (2) Unchanged
- □ (3) Dirtier

5 g. Please explain your response to the above question.
SECTION 6 (The use of traditional method in sago cultivation)

6 a. Do you use traditional method in sago cultivation?

☐ (1) Yes If Yes go to 6(b) and 6(c) 88 ☐

☐ (2) No If No, go to 6(d) 89 ☐

6 b. What type of traditional method do you use?
(Tick as appropriate)

☐ (1) Organic fertilizer (burning of soil, grass and palm trunk) 90 ☐

☐ (2) Intercropping 91 ☐

☐ (3) Others (Please specify) 92 ☐

6 c. Do you have any problem when using traditional method? If so, Please specify

6 d. From whom do you learn about sago cultivation techniques? (Please tick as appropriate)

☐ (1) The elders 93 ☐

☐ (2) Extension workers 94 ☐

☐ (3) Own experience 95 ☐

☐ (4) Others (Please specify) 96 ☐

6 e. Do you practise “pedok” during harvesting?

☐ (1) Yes 97 ☐

☐ (2) No 98 ☐
6 f. What is your opinion about communal activity compared to the past?

☐ (1) Decline  
☐ (2) Unchanged  
☐ (3) Improve  

99  
100  
101  

6 g. Please explain your response for the question above

6 h. Do you know anything about “palei” in sago cultivation?

☐ (1) Yes If yes, please go to 6 i  
☐ (2) No If no, please go to Section 7  

102  
103  

6 i. Do you practise “palei” in sago cultivation?

☐ (1) Yes If yes, please go to 6 j  
☐ (2) No If no, please go to 6 k  

104  
105  

6 j. Why do you practise “palei” in sago cultivation?

6 k. Why not?
SECTION 7 (Effects of plantation to sago farmer)

7 a. What effect has development of sago plantation had upon your household income?

□ (1) Increase
□ (2) Unchanged
□ (3) Decrease

7 b. Please explain your response to the above in more detail.

__________________________________________________________________________________________________________________________________

7 c. Does the plantation affect your sago farm?

□ (1) Yes If Yes, please go to 7d
□ (2) No If No, please go to 7e

7 d. Please specify the problems

__________________________________________________________________________________________________________________________________

7 e. Are you willing to work at the plantation?

□ (1) Yes If Yes, please go to 7f
□ (2) No If No, please go to 7g
7 f. If yes, why are you not working at the plantation?

7 g. Why not?

7 h. Do you agree, if I said that there are more outsiders working in the plantation than the locals?

☐ (1) Agree
☐ (2) Disagree
SECTION 8 (Prevailing mood of the farming community)

8 a. Why do you choose to be engaged with sago cultivation?

8 b. Are you willing to replace sago palms with other crops?

☐ (1) Yes  If Yes, please go to 8c and 8d

☐ (2) No

8 c. Why do you want to replace sago palm with other crops?

8 d. Which alternative crops do you favour?

☐ (1) Rice

☐ (2) Palm oil

☐ (3) Cocoa

☐ (4) Rubber

☐ (5) Others (Please specify)

☐ (6) Do not know
Appendix II  Contact summary form

(Derived and modified from Miles and Huberman, 1994)

Contact type

Visit_________________  site_________________
Phone_________________  contact date___________

1. What were the main issues or themes that struck you in this contact?

2. Summarise the information you got (or failed to get) on each of the target questions you had for this contact.

Question_________________  Information_________________
3. Anything else that struck you as salient, interesting, illuminating or important in this contact?

4. What new (or remaining) target questions do you have in considering the next contact with this site?
Appendix III  Document summary form
(Derived and modified from Miles and Huberman, 1994)

Site: ___________
Document: ___________
Date received or picked up: ___________
Date: ___________

Name or description of document:

Event or contact, if any, with which document is associated:

Significance or importance of document:

Brief summary of contents:
Ingredients and profits from processing the *saguk* (sago pellets) and *tebaloi* (sago crackers) in Dalat

(Information taken from Mak Zuraidah, Kampung Medong, Dalat)

**Ingredients and profits from processing *saguk* (sago pellets)**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Costs (in RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>coconuts</td>
<td>10.00</td>
</tr>
<tr>
<td>salt</td>
<td>0.20</td>
</tr>
<tr>
<td>sago flour</td>
<td>40.00</td>
</tr>
<tr>
<td>grounded rice husk</td>
<td>4.00</td>
</tr>
<tr>
<td><strong>Total costs of ingredients</strong></td>
<td>54.20</td>
</tr>
<tr>
<td><strong>Other costs</strong></td>
<td></td>
</tr>
<tr>
<td>rent</td>
<td>6.00</td>
</tr>
<tr>
<td>fuel (bark of sago palms bought from mills)</td>
<td>1.30</td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
<td>61.50</td>
</tr>
<tr>
<td><strong>end-products</strong></td>
<td></td>
</tr>
<tr>
<td>6 tins (RM 30 per tin)</td>
<td>180.00</td>
</tr>
<tr>
<td><strong>Profits (180 – 61.50)</strong></td>
<td>118.50</td>
</tr>
</tbody>
</table>

**Ingredients and profits from processing *tebaloi* (sago crackers)**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Costs in RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>sago flour</td>
<td>15.00</td>
</tr>
<tr>
<td>coconuts</td>
<td>7.50</td>
</tr>
<tr>
<td>eggs</td>
<td>3.50</td>
</tr>
<tr>
<td>banana leaves</td>
<td>2.00</td>
</tr>
<tr>
<td><strong>Total costs of ingredients</strong></td>
<td>18.00</td>
</tr>
<tr>
<td><strong>end-products</strong></td>
<td></td>
</tr>
<tr>
<td>2 tins (RM 30 per tin)</td>
<td>60.00</td>
</tr>
<tr>
<td><strong>Profits (60 – 18)</strong></td>
<td>42.00</td>
</tr>
</tbody>
</table>
Appendix V

Ingredients and profits from processing the *saguk* (sago pellets) and *tebaloi* (sago crackers) in Oya

(Information taken from Mak Seraya, Kampung Teh, Oya)

Ingredients and profits from processing *saguk* (sago pellets)

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Costs (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>coconuts</td>
<td>16.00</td>
</tr>
<tr>
<td>salt</td>
<td>0.40</td>
</tr>
<tr>
<td>sago flour</td>
<td>40.00</td>
</tr>
<tr>
<td>grounded rice husk</td>
<td>2.00</td>
</tr>
<tr>
<td><strong>Total costs of ingredients</strong></td>
<td><strong>58.40</strong></td>
</tr>
<tr>
<td><strong>Other costs</strong></td>
<td></td>
</tr>
<tr>
<td>rent</td>
<td>4.00</td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
<td><strong>62.40</strong></td>
</tr>
<tr>
<td><strong>end-products</strong></td>
<td></td>
</tr>
<tr>
<td>7 tins (RM 28 per tin)</td>
<td>196.00</td>
</tr>
<tr>
<td><strong>Profits (196 – 62.40)</strong></td>
<td>133.60</td>
</tr>
</tbody>
</table>

Ingredients and profits from processing *tebaloi* (sago crackers)

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Costs in RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>sago flour</td>
<td>4.00</td>
</tr>
<tr>
<td>coconuts</td>
<td>3.20</td>
</tr>
<tr>
<td>eggs</td>
<td>3.00</td>
</tr>
<tr>
<td>banana leaves</td>
<td>2.00</td>
</tr>
<tr>
<td><strong>Total costs of ingredients</strong></td>
<td><strong>12.70</strong></td>
</tr>
<tr>
<td><strong>end-products</strong></td>
<td></td>
</tr>
<tr>
<td>2 tins (RM 25 per tin)</td>
<td>50.00</td>
</tr>
<tr>
<td><strong>Profits (50 – 12.70)</strong></td>
<td><strong>37.30</strong></td>
</tr>
</tbody>
</table>
Appendix VI

The different stages in sago processing at the sago mill

1. Sago sections at mill
2. Stripping off bark → Bark sold as wood fuel
3. Cutting sago pits into batons for rasping
4. Grated sago ripo → Dross (hampas) sold as animal feed
5. Lemantak (wet starch) settled in trough or table (sedimentation tank)
6. Water drained from trough or tank leaving the lemantak → Lemantak sold for local consumption
7. Lemantak dry in drying kiln or sun drying
8. Sago flour packed for export → Exporter
Appendix VII  The costs of processing and profits from one sago log

(Sources: Lim, 1992)

Cost per section = RM 6.00
Cost per sago log = RM 60.00
Each log, 240 kilograms of sago flour could be obtained.

Therefore, gross output per log processed (RM 41.60/100 kg.)
= RM 41.60/100 x 240
= RM 99.80

Gross margin per log processed
= RM 99.80 - RM 60
= RM 39.80

Throughput/day, say 1815 kg. of sago flour

Therefore, number of logs (whole) processed/day
= 1815/240
= 7.56

Therefore, gross margin/day = RM 39.80 x 7.56
= RM300.89

Contract work at RM 3.00 per 100 kg. of flour bagged from initial point of processing

Therefore, labour cost for 1815 kg.
= 1815 kg. x 3.00/100
= RM 54.45

Therefore, possible gross margin less labour cost/day
= RM 300.89 - RM 54.45
= RM 246.44

Consumption of diesel/day, say 30.8 litres @ RM 0.64/litre

Therefore, cost of diesel/day = RM 0.64 x RM 30.8
= RM 19.71

Therefore, possible net return/day (without deducting fixed cost)
= RM 246.44 - RM 19.71
= RM 226.73