

# MALAYSIA





# Best Rice Practices in Malaysia

By SEARICE

## FOREWORD

**P**lant genetic resources (PGR) in agriculture constitute a very important component of biological diversity. These refer to cultivated crop species and the genetic diversity within them as well as to other agriculturally important plants, including wild and semi-wild relatives of domesticated species.

Agricultural PGR are vital to food production and security yet these resources are affected by massive genetic erosion, or the loss of genetic diversity both among and within species. Genetic erosion is most pronounced in the displacement of local and traditional crops and their varieties from farmers' fields. The Green Revolution, with its promotion of so-called high yielding varieties (HYVs), has been largely responsible for the loss of these genetic resources.

Growing concerns over the impact of genetic erosion to food production and security has prompted various efforts and initiatives to develop new and more appropriate approaches to understanding, conserving, utilizing, and managing local PGR diversity. The Community Biodiversity Development and Conservation Programme (CBDC) is one such effort to establish global cooperation among disparate local activities focused on PGR. Established in 1992 by non-government organizations, formal research institutions, scien-

tists, researchers and development workers, the CBDC aims to support and strengthen community-based conservation, utilization and management of PGR. The programme is being implemented by South organizations operating in the regions of Africa, Latin America and Southeast Asia and is supported by like-minded institutions from the North.

In Southeast Asia, the first phase of CBDC programme in 1994 - 1999 was implemented by organizations based in Thailand (Nan province), Malaysia (Sabah state), Vietnam (Mekong delta region), and the Philippines (Bohol province). The Southeast Asia Regional Institute for Community Education (SEARICE), a Philippine-based NGO, coordinates the regional implementation of the CBDC. Aside from directly supporting and working with local farmers in the on-farm conservation, utilization and management of PGR, the CBDC partners also aim to document and disseminate information, results and experiences from these community-based PGR initiatives.

In this regard, the CBDC regional program has started the publication of the results of its researches and activities of the national projects. These publications, in the form of technical reports, aim to contribute to the knowledge and awareness of local PGR issues and to generate recognition of and support for farmers' role and efforts in PGR conservation, utilization and management. Moreover, the publications will hopefully serve to guide policy makers and agricultural research institutions in crafting legislation, policies and programs in support of PGR initiatives.

This paper is part of a series of technical reports being published and disseminated by the CBDC Southeast Asia program. This is an attempt to document and understand traditional hill rice agriculture to provide insights on how it can be practiced in present-day agricultural systems.

The study was carried out in a Dusun ethnic community in Bundu Village in Keningau District. This village was chosen because its communities still practice hill rice cultivation. This study looks at the productivity of hill rice cultivation in a traditional farming community. Three farmers were involved in recording the amount and use of their farm produce for one farming season.

The study has shown that hill rice cultivation is a productive activity. Aside from the economic return of about RM3000 for one

## **ACKNOWLEDGMENTS**

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## **ABSTRACT**

This study looks at the productivity of hill rice cultivation in a traditional farming community, by involving three farmers in recording the amount and use of their farm produce for one farming season.

The study has shown that hill rice cultivation is a productive activity, contrary to common perceptions. A plot of about a hectare gives an estimated return of about RM3000 in one planting season. Apart from rice as the main crop, several other essential food crops are grown to optimise a certain plot of land. It not only maintains the crops' diversity and vitality but also contributes to the local food supply needs. Its continuation in its current form is inevitable as farmers have limited economic alternatives to support their daily food requirements.

Due to the lack of other better alternatives, giving hill rice cultivation its proper recognition as an important economic activity of rural farmers is necessary. Its role and contribution to economic development and food security, either directly or indirectly should be considered when deciding on how to optimise the utilization of marginal hilly lands.

However, traditional farming is undergoing changes due to pressure from increasing population and changing perceptions towards natural resource use and management. Efforts should be taken to ensure that indigenous knowledge on sustainable traditional farming system is revitalized and supported in research and development.

## INTRODUCTION

This report is part of a larger study on community biodiversity development and conservation issues in Sabah. It focuses on the economic benefits derived from hill rice cultivation in one of the Sabah CBDC project areas.

### Background of the study

Sabah is the second largest state in Malaysia, after Sarawak. About 60 percent of the land area of Sabah is hilly or mountainous with a diverse ecosystem. The major agricultural practice is hill rice cultivation. It is predominantly found in the interior part of Sabah, such as in the Districts of Sipitang, Pensiangan, Tenom and Keningau. This type of agriculture is practiced by about 80 percent of the indigenous communities (such as the Dusuns, Muruts, Rungus, Sungoi and a few others) which form about 70 percent of the estimated population of about 1.4 million<sup>1</sup>.

The interaction of various ethnic groups with their diverse ecosystems resulted to high diversity of food crops. Based on a survey carried out by PACOS in 1994-96, there are at least 128 varieties of hill rice found in Sabah. Most of the farmers maintain between 3-5 varieties of traditional hill rice, inherited from their ancestors.

The government's rural development program resulted to conversion of large areas of hilly lands to cash crops such as oil palm, cocoa and rubber plantations. In 1995, these three major crops contributed about RM14 billion to the nation<sup>2</sup>. Apart from these crops, the government also increased the land coverage of commercial planting of wet rice<sup>3</sup> in line with the goal of achieving 100 percent rice self-sufficiency by year 2020<sup>4</sup>.

Hill rice cultivation has not been given much encouragement as this is generally seen by the government and some environment organisations as unproductive and unsustainable<sup>5</sup>. However, the farmers continue to practice this traditional agriculture because their livelihood still depends on it, to a large extent, and provides a large

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1. Department of Statistics, 1991

2. Ministry of Science, Technology and Tourism, 1998

3. Daily Express, 1997

4. New Straits Times, 1999

5. Daily Express, 1998

Figure 1: Location of Study Area



section of the rural population with their daily food. The surplus from their farms, which are sold at the local market, provides the farmers with their much-needed cash.

The common question raised was, “Do we really need to continue with traditional hill rice cultivation?” Different interest groups have varied answers and the role and contribution of traditional hill rice cultivation in the cultural, social and economic development of the State is yet to be defined. Yet, the tendency to replace this system with another one is high. This other system is usually equated with commercial activities that can give the nation a better economic return, sometimes without regards for sustainability and community needs.

This study is an attempt to document and understand traditional hill rice agriculture in the hope that this will provide some insights on its possible integration in present-day agricultural systems.

### **Objectives and Scope**

The general objective of the study is to estimate the agricultural produce of rice and other food crops from hill rice cultivation.

Specifically it tries to:

- Document hill rice farming system among the Dusun communities;
- Document the total produce from the farm in cash form within one planting season;
- Evaluate farmers' views towards hill rice farming system; and
- Evaluate the productivity of this farming system.

This study is carried out in a Dusun ethnic community in Bundu Village, within the Keningau District (Fig. 1). This village was chosen as its communities still practice hill rice cultivation.

### **Data Gathering**

Three farmers shared the yield from their own farms for one complete farming season, from August 1997 to August 1998. The criteria in choosing the farmers were their active involvement in hill rice cultivation, their ability to record their produce, and their readiness to cooperate with the researcher.

The three farmers were given notebooks to record all produce from their farm. The researcher monitored their farming activities and status of their farm through regular visit, and participated in some of the farm activities in the community.

Feedbacks and information were also gathered through community workshops. These were held several times before, during and after the enumeration period to explain the rationale and objectives of the study and to convey the results from the three selected farmers to the other members of the Bundu community.

The cash value attached to the farms' produce was based on estimates from the current market price in the nearby town of Keningau, where farmers sell their surplus.

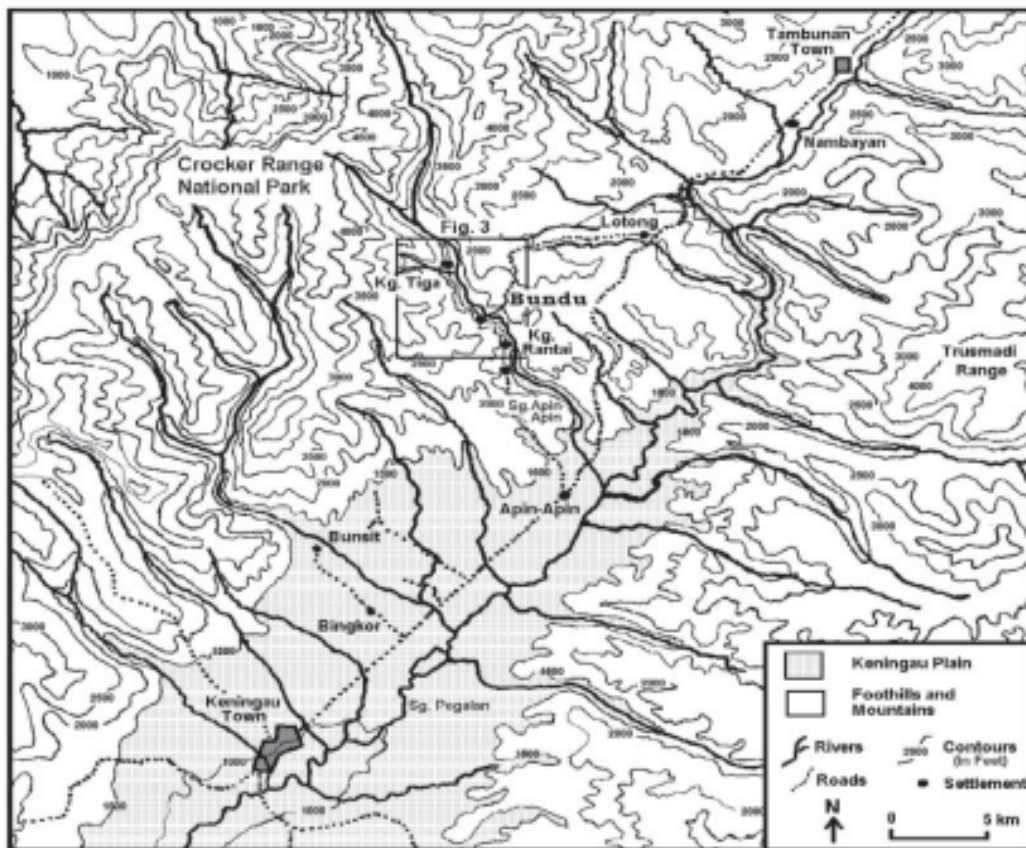
## RESULTS

### Background of Bundu area

#### A) Physical Environment

Steep hills and mountain ranges of 500-800 m with associated narrow valleys characterize the Keningau District on its western (Crocker Range) and eastern (Trusmadi Range) boundaries. A broad alluvial plain about 300 meters above sea level lies in between the main ranges. The mountain ranges provide the water catchments areas for several major river tributaries of the main Pegalan River (Fig. 2).

Figure 2: Land Form of Northern Keningau District, Sabah



The area has average daily temperatures around 31 degrees Celsius. At night, cooler air from the surrounding mountains may cause temperature to drop to around 20 degrees Celsius. The annual variation in temperature is small. Annual rainfall recorded is about 2000 millimeters, which ranks it among the driest areas in the interior region. The district lies in a rain shadow area so is not affected di-

rectly by the northeast and southwest monsoons, which normally occur during the middle and end of the year. Thus the wet and dry season is not clearly marked.

Tropical rainforest of one type or another characterizes most of its vegetation. A large portion of the hilly areas is covered with dipterocarp forests while lowland areas are either covered with secondary forest or under cultivation.

The parent material from which almost all the soil here is formed is from a sedimentary formation consisting of sandstone, siltstone and mudstone. Thus, the soil formed is sandy, clayey or loamy, which may be eroded to form alluvial plains. Soil thickness ranges from 50-120 cm beneath the surface. The lowland areas are generally well drained and suitable for agriculture. In the sloping areas, the soil condition is generally susceptible to erosion due to its loose texture.

A network of dry weather roads connects most of the district. The sealed Tambunan-Keningau-Tenom road forms the major road connecting the district with other major towns.

Most of the forested areas in the region are classified as State Land or Commercial Forest Reserves (Class II). These areas cannot be arbitrarily cleared or alienated, but may be logged under license. Almost all the Commercial Forest Reserves have been logged already. For the benefit of local communities, some State Land is also excised for communal use such as for village and grazing reserves.

Agricultural land has also been alienated. Large tracts of logged-over land have also been alienated for trees (e.g. acacia mangium)



Meeting with farmers

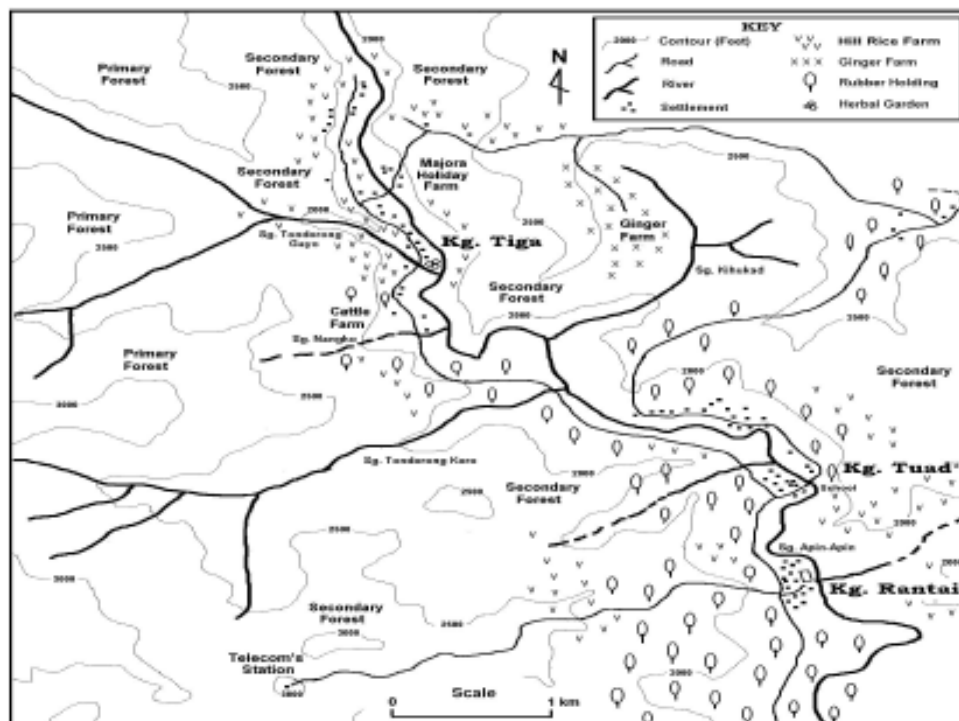
and cash crop plantations (e.g. rubber and oil palm). Native Sabahans are entitled to apply for land under Native Title (NT) on State Land. However, most indigenous people are still not very familiar with the process of obtaining this title.

The people who filed applications have to wait for several years before being issued with a title. Thus, land tenures in the interior region are still mostly under LA (submitted application) or under Native Customary Rights (NCR). While NCR is legally recognized by the State, existing provisions do not provide adequate protection to those holding claims to it.

## B) Cultural and Socio-economic Development

Bundu is a cluster of four villages located at the district boundary between Tambunan and Keningau. The nearest town is Apinapin, located about 14 km to the south, whereas Tambunan and Keningau Towns are about 30 km to the north and south, respectively. The villages are connected by graveled road from the Tambunan-Keningau trunk road, except for Kampong Tiga, which is connected by a dry weather logging road (Fig. 3).

**Figure 3: Physical Environment and Land-use Pattern of Bundu Village**



Bundu has a primary school located in Kampong Tuad, about 5 kilometers from Kampong Tiga. A government-run preschool is available in Kampong Rantai, whereas a community preschool is available in Kampong Tiga. Treated piped water and electricity is not yet available to the villages. However, most houses have been installed with solar power for lighting and gravity-source water from small streams. The solar systems, supplied by the government to the villages about 10 years ago are mostly not functioning. Each village has a community hall (balai raya) whereas only Kampong Rantai has a football field.

The total population of Bundu is about 500 people. Almost all are from the Kadazandusun ethnic group and are Christians from the Catholic and Protestant religions. Each village has their own place of worship. Most of the people are originally from this village, with a few coming from the other side of the mountains, like Tambunan, Ranau and Papar.

Apart from a few working as government servants, the people in Bundu are self-employed farmers. Their livelihood is still very much dependent on subsistence farming, utilizing both alluvial river deposits and hilly areas to grow wet and dry rice and other food crops. As land suitable for wet rice cultivation is limited, most farmers practice hill rice cultivation, whereby each family opens-up about 1-2 hectares of secondary forest every year.

The people's other food needs are mostly derived from livestock, from the Apin-apin River, and from the surrounding secondary forest to a limited extent. Cash income is mostly derived from selling vegetables and fruits in the nearby Apin-apin, Keningau and Tambunan Towns or as far as Kota Kinabalu, the capital town. Among the vegetables, ginger has become very popular among farmers because of its good price and high demand outside Keningau.

Selling of handicrafts made from rattan and bamboo from the surrounding forest is also an important source of income. Rubber is a new income source for those who have titled land and received assistance from Sabah Rubber Fund Board about seven years ago.

Like other indigenous groups in Sabah, the people of Bundu still maintain much of their community values and practices. The practice of helping each other to do a certain task known as gotong royong is still common among the people. Clearing, planting and harvesting

of rice and ginger is usually done following this practice. After each activity, a large group of people gathers to share food and drinks. Social events and ceremonies like birthdays, deaths, weddings and harvest festivals are very much a community activity. Such events provide villagers an opportunity to strengthen their social relationships.

Generally, the people still maintain a close relationship with the forest, land and streams. Some have extensive knowledge of the use and care of these resources. Traditional medicines derived from the forest are widely used for minor injuries and sickness.

The Bundu people are facing several problems related to land tenure, illegal logging and inadequate infrastructure. Most villagers still do not have their land title, although they have sent in their applications years ago. Their land applications are threatened by the government's decision to classify the upper course of the Apin-apin River as a water catchment area. Compounding this land tenure problem is the competing claims by several individuals from different villages to untitled areas further upstream of the Apin-apin River.

The efforts of the villagers to look after the well being of the remaining forested areas is also being threatened by a renewed interest in illegal logging by some individuals from Bundu itself. Illegal logging activities first started in 1987, with the building of road network in the early 80's. Protest from villagers has successfully halted the logging until early 1997.

The trend towards large-scale opening of privately owned secondary forest along the Apin-apin River solely for ginger plantation is not only threatening the river-forest ecosystem but also the food security of the community. Apart from that, this oversupply of ginger will potentially lower the market price of this commodity.

There are also indications of deteriorating community values, such as greed and individualism because of these problems. Bundu still lacks power supply and the condition of the village roads leading to Bundu is bad. Children from Kampong Tiga have to walk to the primary school that is 5 kilometers away. Getting the farmers' produce out of the villages to be sold in the town is also quite difficult.

## HILL RICE FARMING SYSTEM

### A) Cultivation Season and Cycle

Hill rice cultivation in Bundu and surrounding areas is determined by the local dry and wet season. The activity starts from June to February, whereby the planting and harvesting of rice starts during the month of August and January, respectively.

The field preparation involves the clearing of secondary forest areas by cutting, drying and burning as shown in Table 1. The ash from the burned trees is an important source of nutrients. The farmers in Bundu usually return to previously open-up forested land after a certain fallow period of about 5-7 years.

Each farmer has usually, one farm for one planting season. The farms of the three selected farmers in this study are from cleared secondary forest, left for fallow between 7-10 years thus, the tree trunks are quite big. Their families own the land. Each of the farmers opened up about 1 hectare per farm, based on their family needs and capacity.

**Table 1. Hill Rice Cultivation Cycle**

Activity	Month	Note
Clearing of undergrowth	June	<ul style="list-style-type: none"> <li>• Clearing of undergrowth and small trees is carried out with a long machete.</li> <li>• Work is shared by all members of the family.</li> </ul>
Felling of big trees	July	<ul style="list-style-type: none"> <li>• Work is mostly done by men using axe and chainsaws.</li> </ul>
Burning of felled trees	July - August	<ul style="list-style-type: none"> <li>• The perimeter of the farm is cleared to prevent the spread of fire to surrounding areas.</li> <li>• This work is usually carried out with the help of other men.</li> <li>• The weather should be dry, at least for a few days before burning.</li> </ul>
Planting of rice	August - September	<ul style="list-style-type: none"> <li>• Unburned trees are gathered and burned before planting.</li> <li>• The entire family helps in the work.</li> <li>• Other food crops are also planted.</li> </ul>
Weeding	End of October to November	<ul style="list-style-type: none"> <li>• Mostly carried out by women.</li> <li>• Other food crops are planted in between the rice plants.</li> </ul>
Tending	December January	<ul style="list-style-type: none"> <li>• Farmers do other off-farm work like house repair, produce handicrafts, sell farm produce or seek temporary employment outside.</li> <li>• Some of the men usually go on hunting trips.</li> </ul>

Harvesting	January - March	<ul style="list-style-type: none"> <li>• All members of the family help.</li> <li>• The neighbors of the farmers come and help too.</li> </ul>
Threshing and Winnowing	March - April	<ul style="list-style-type: none"> <li>• Threshing is usually done by men using the feet.</li> <li>• Winnowing done by women.</li> </ul>
Storing	April - May	<ul style="list-style-type: none"> <li>• Rice is usually stored in a permanent hut near the farmer's house.</li> </ul>
Rest	May	<ul style="list-style-type: none"> <li>• Time for farmers to celebrate with rice wines, dances, songs and traditional games.</li> <li>• Preparation for the next cultivation cycle.</li> </ul>

## B) Types of Food Crops Cultivated

Farmers plant other food crops at different periods of the rice cultivation cycle. The most common food crops include cassava, sweet potato, maize, vegetables, sugar cane, tobacco and short-term fruit trees such as bananas and papayas. Vegetables include bayam, cucumber, short and long beans, winter melon, white and red gourd, chilli, ginger and several leafy vegetable. Several wild leafy vegetables are available for the farmers to gather.

Table 2. Timing of Planting Other Food Crops

Timing	Food Crop
Before rice planting	These wild vegetables are carefully looked after until they are ready to be harvested and leafy vegetable
During rice planting	White gourd, red gourd, cucumber and melon.
After rice planting	Cassava, sweet potato, long and short bean, banana and papaya.

The seeds of the other food crops are planted and mixed with the rice seeds as shown in Table 2.

Farmers mix vegetable seeds with the rice seeds before planting. Crops, such as ginger, cassava, banana and papaya are planted after the rice has been harvested. Food crops such as maize, dawo and bayam are planted first along the periphery of the farm. Vegetables

such as the white and red gourds are planted together with the rice seeds.



**Mixed cropping  
(rice, corn, vegetables)**

All food crop are well looked after. Weeding is usually done manually once or twice during the rice growing period without any chemicals. The weeds are not thrown but used as cover to prevent soil erosion and maintain soil moisture and fertility. The weeds tend to be minimal when the right field is selected. This is usually dependent on the length of fallow period before the area is used again. The size of the trees should be enough to suppress and eliminate existing weeds.

#### **D) Collection of Farm Produce**

During the entire rice cultivation stage, the other food crops are collected in stages. The first to be harvested are the bayam, tobacco and maize. The cucumbers and several other wild vegetables such as the tutan and soringki follow. Only then will winter melons, white and red gourds be collected. The collection of these vegetables can continue for several months after the rice has been harvested, together with bananas, papayas, ginger and chillies.

Harvesting of rice is done with the help of other farmers. This is also the opportunity for them to collect some of the vegetables for their own consumption. The rest of the farm produce is collected from time to time by the owner with the help of the family.

#### **E) Usage and Amount of Farm Produce**

The yield is used to meet the daily food requirements of the farmer's family. The rice harvest is just about sufficient to meet the needs of

the family until the next season. They usually have surplus in vegetables and these are sold in the local market or given to needy neighbours and relatives. Some of the food crops that they usually sell include cucumbers, white and red water gourds, tutan (wild leafy vegetable) and batad (melon family).



**Water gourd**



**Tutan**



**Batad**

The amount of farm produce depends very much on the performance of the crops in a particular season. It is greatly influenced by the type of field selected, size of the fields and amount of crops planted, and the extent of labour invested. These factors were beyond the control of this study. The farmers determined the site and size of their fields.

The following are the data gathered from the records of each farmer within a 5-month period from September 1997 to January 1998 (Tables 3, 4, 5, 6, 7, 8, & 9).

**Table 3. Amount of rice harvested during the 1997/98 season from three farmers**

Farmer's Name	Amount of Rice Harvested
Walter Lugas	2240 kg
Tikin Gobili	1400 kg
Biana Ujil	490 kg

**Table 4. Types and amount of vegetables collected by farmer**

<b>Name of Farmer : Walter Lugas Size of Field : 1 Hectare</b>				
Name of Vegetables	Parts Eaten	Total Produce	Total Sold	Income
Cucumber	Fruit and shoot	330 kg	112.5 kg	RM 75
White Gourd	Fruit and shoot	40 kg		
Bayam	Stem and leaf	5 kg		
<i>Soringki</i>	Stem and leaf	2.5 kg		
Wild Mushroom	Stem	0.3 kg		
Melon	Fruit	9 kg		
Corn	Fruit	4 kg		

Note :

White gourd = 2 kg each

Cucumber &amp; Melon = 1.5 kg each

Leafy vegetable = 0.5 kg per bunch

**Table 5. Types, amount and usage of crops collected by farmer**

<b>Name of Farmer : Tikin Gobili Size of Field : 1 Hectare</b>					
Types of Vegetables	Total Amount	Own Use	Given to Relatives	Sold	Income
<i>Tutan</i>	28.5 kg	18 kg	1.5 kg	9 kg	RM 20.00
Gourd shoots	3.5 kg	2.5 kg		1 kg	RM 3.00
Bayam	3 kg	3 kg			
Leafy vegetables	2.5 kg	2.5 kg			
Peria shoots	1 kg	1 kg			
Cucumber	10.7 kg	10.7 kg			
Corn	7.2 kg	7.2 kg			
White gourd	8 kg	8 kg			

**Table 6. Types and amount of crops collected by farmer**

<b>Name of Farmer : Biana Ujil Size of Field : 1 Hectare</b>					
Types of Vegetables	Total Amount	Own Use	Given to Relatives	Sold	Income
Bayam	2.5 kg	2.5 kg			
Wild mushroom	0.3 kg		0.3 kg		
Cucumbers shoot	2 kg	1.5 kg	0.5 kg		
Cucumbers	64.5 kg	34.5 kg	30 kg		
Corn	10 kg	10 kg	4 kg		
Losun	1 kg	1 kg			

**Table 7. Other food crops collected**

<b>Farmer's Name : Walter Lugas</b>			
Types of Crops	Estimated Amount	Total Sold	Income
Cassava			
Papaya	20 kg		
Banana	30 kg		RM 7.00
Ginger	1000 kg	1000 kg	RM 1800.00
Chilies	5 kg	3 kg	RM 12.00
Wild mushroom			
<b>Total</b>			<b>1819</b>

**Table 8. Other crops collected**

<b>Farmer's Name : Tikin Gobili</b>			
Types of Crops	Estimated Amount	Total Sold	Income
Cassava	1000 kg		
Papaya			
Banana			
Ginger	200 kg		
Chilies			
Wild mushroom			
<b>Total</b>			

**Table 9. Other food crops collected**

<b>Farmer's Name : Biana Ujil</b>			
Types of Crops	Estimated Amount	Total Sold	Income
Cassava			
Papaya			
Banana			
Ginger	400 kg		
Chilies			
Tobacco	1.2 kg	1 kg	RM 100.00
<b>Total</b>			<b>RM 100.00</b>

## F) Cash Value of Farm Produce

The data gathered by the three farmers differed slightly. Only two farmers managed to record how their farm produce was utilized.

The focus here however is the total cash value from each selected farm. This exercise is not easy to do since not all the farm produce are sold by the farmers. Only a few selected crops are saleable in town (Table 10).

**Table 10. The income from selling common vegetables at one time at the local market**

Name of Vegetable	Market Price	Average Income from 3 Farmers
Tutan	1 bunch/ 0.5 kg @ RM 1.00	RM 25.00
Cucumbers	1 fruit/ 1.5 kg @ RM 0.50	RM 30.00
Long and short beans	1 bunch/ 0.5 kg @ RM 1.00	RM 20.00
White water gourds	1 fruit/ 2 kg @ RM 1.00	RM 10.00
Cucumber shoots	1 bunch/ 0.5 kg @ RM 1.00	RM 10.00

Based on the record of the three selected farmers, they earned an average of RM 150 to RM 160 from selling their vegetables alone in the market during the 5 months period. The other villagers disputed this value and said this was too low. The other farmers gave an estimate of about RM 500 or more for one farming season. This difference is generally attributed to soil fertility of individual farms, types of food crops grown and pest attacks. The market price for their produce also fluctuates. Furthermore, some farmers sell their farm produce more often than others do.



Saleable vegetables in town

Based on the current market price of hill rice, cassavas, vegetables and fruits, a rough estimate could be generated from the average farm produce from the three farmers (Table 11). Each farm would generate between RM 100 to RM 3000.

**Table 11. Estimated cash value of farm produce**

Name of Crop	Estimated Market Value	Average Amount from 2 Acres Farm	Estimated Value
Hill Rice	1 kg @ RM 3.00	200 kg	600.00
Cassava	1 kg @ RM 0.50	1000 kg	200.00
Corn	1 @ RM 0.25	100	25.00
Sweet potato	1 kg @ RM 0.50	35 kg	100.00
Tobacco	1 plastic/ 0.02 kg @ RM 2.00	1.2 kg	120.00
Leafy vegetable	1 bunch/ 0.5 kg @ RM 1.00	15 kg	30.00
Banana	1 bunch/ 10 kg @ RM 5.00	30 kg	25.00
Papaya	2 kg @ RM 1.00	20 kg	10.00
Groundnut	0.3 kg @ RM 1.00	0.5 kg	3.00
Cucumber	1.5 kg @ RM 0.50	90 kg	30.00
Ginger	1 kg @ RM 2.00	700 kg	2000.00
Chili	1 kg @ RM 3.00	3 kg	10.00
Cucumber shoot	0.5 kg @ RM 1.00	5 kg	10.00
White gourd	2 kg @ RM 1.00	200 kg	100.00
<b>Total</b>		<b>3263.00</b>	

### G) Farmer's Insights on Hill Rice Cultivation

The farmers in the village will continue to plant hill rice despite the fact that it has been negatively perceived by some interest groups. The farmers do not have alternatives to support the needs of their families because they do not have land suitable for wet rice planting.

They are aware that hill rice cultivation requires hard work and the yield is lower than in a similar land size from wet fields. Most of their children are now working outside of the village so they do not give that much support to the farmers.

To compensate for the lower amount of rice harvest, a variety of other food crops were planted together with the hill rice in the same plot of land. They cannot do this in a wet field. To some farm-

ers these food crops are vital for their well being, as it saves them from working elsewhere to earn cash to buy these crops in the market.

One of the major problems currently faced by farmers is the presence of pest and diseases that attacks their rice crops and other food crops. Despite these problems, hill rice cultivation still provides most of their foods.

Hill rice cultivation is to most farmers already a part of their culture inherited from their ancestors. It is integrated in the use and management of the ecological resources around them. Thus some of the traditional Bundu farmers can not imagine surviving without this farming practice. The yearly harvest festival for example, revolves around it. The social relationship in Bundu is strengthened yearly through the process of labour and farm produce exchanges.

## **DISCUSSION**

### **Productivity**

The produce from a farm depends on the favorable weather conditions, soil fertility, presence of pests, distance from the road and labour available to maintain it. Not all farmers plant the same food crops together with rice in their farm. Some plant a wide variety of crops for sale, whereas some plant those that are needed most. Therefore the total produce tends to vary from each farmer.

The cash obtained by the three farmers in this study came from their surplus, mainly from vegetables. The amount is not that significant because the produce is mostly utilized by the farmers themselves to meet their food requirements for the year.

However, the farmers can earn a considerable large amount of money if all the farm produce in a mere hectare plot of marginal hilly land will be sold. The minimum monthly income from the whole farming process can reach to about RM 270 per month. This amount is slightly less than obtained from other commercially oriented utilization of the same piece of land, such as rubber plantation.

Some of the farmers in Bundu own a small rubber holding in their titled land, and their minimum income from a similar size of

land is about RM 330 a month. Presently, apart from the large scale planting of ginger and fruit trees, the other alternative use of hilly land here is quite limited. The large-scale plantation of ginger, which is getting popular, gives a fairly good cash return to the farmers.

However, devoting an entire plot of land to ginger alone has its disadvantage as farmers are dependent on the market to get their traditional food supplies. This will put more pressure on the government to increase imports on food that otherwise could be obtained locally. This will also have implications on the food security of the State, an issue commonly taken for granted by development agencies.

### **Sustainability**

Hill rice cultivation is commonly referred to as shifting cultivation due to the mistaken perception that farmers shift aimlessly from one place to another in search of primary forest each year. This perception has played a critical role in the survival of traditional rural farming communities.

Hill rice cultivation is not practiced in isolation but is integrated in their use of the natural resources available here such as the forest and rivers. The forests are equally important to them as sources of foods, medicines and building materials. The farmers also know very well that without the forest, they would not be able to grow hill rice, as the fertility of their fields is very much dependent on the healthy regrowth of secondary forest. Once this interdependence is lost, there is a grave danger that more forest cover will be lost.

Evidence is already available in Bundu, whereby, the farmers do not value as much the regrowth of the surrounding forests as they used to when they stopped hill rice farming. There are already patches of rubber trees surrounding the barren hills.

The traditional farming system also incur minimal soil erosion as the farmers take extra pain to choose suitable sites which is not too steep, keep the surrounding plots fully vegetated, open up only a small size of secondary forest at one time, and use the land for only a short period of time. In contrast, commercial ventures usually open up huge portions of land disregarding the physical landscape of the land. Road networks are built everywhere, which contributes to soil erosion and slope instability.

## **CONCLUSION**

This study has shown that hill rice cultivation is a productive activity, contrary to what is common notion about them. Apart from rice, several other essential food crops are grown to optimise a certain plot of land. This not only maintains the diversity and vitality of these but provides for the food requirement of the people. Its continuation in its current form is inevitable as farmers have limited economic alternatives to support their daily food requirements.

## **RECOMMENDATIONS**

Hill rice cultivation is a vital economic activity of the rural farmers due to lack of better alternatives for them. Its role and contribution to economic development and food security of the State, either directly or indirectly should be taken into account when deciding on how to optimise the utilization of marginal hilly lands. Some marginal lands may prove to be more productive when planted with hill rice and other food crops, as the case in Bundu illustrates.

This traditional farming is itself undergoing changes due to increasing population and changing perceptions towards natural resource use and management. Research and development efforts should support and revitalize the indigenous knowledge on hill rice planting including sustainable use of the natural ecosystem.

The fragrant varieties of hill rice are potentially marketable in the local and regional population if only the farmers can produce surplus from their farm.

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