

# **New Paradigm for Human Beings and Nature: Frontier of Asian Area Studies**

**Proceedings of International Workshop  
on 3 March 2009, Kyoto**

**March 2009**

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**Kyoto University**

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NEW PARADIGM FOR HUMAN BEINGS AND NATURE:  
FRONTIER OF ASIAN AREA STUDIES

Proceedings of International Workshop on 3 March 2009, Kyoto

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JSPS Program,

*The Mutual Exchange of Young Scholars in Integrated Area Studies  
by Using the Field Stations,*

Co-organized by ASAFAS and GCOE Program “*Toward Sustainable Humanosphere*”,  
CSEAS, Kyoto University

Workshop on March 3, 2009

**“*New Paradigm for Human Beings and Nature:  
Frontier of Asian Area Studies*”**

Inamori Memorial Hall, Kyoto University, Japan

10:00~10:10      Opening Remarks

**Session 1: Cambodian Studies** (Chairperson: Yasuyuki KONO)

10:10~10:30      *Market and Trade Analysis of Charcoal and Wood Fuel, in Kampong  
Speu Province*

Kim Soben (Royal university of Agriculture)

10:30~10:50      *Impacts of Development and the Absorption of Situated Knowledge on  
Natural Resources Management*

Thol Dina (Royal University of Phnom Penh)

**Session 2: Indian Studies** (Chairperson: Takahiro SATO)

10:50~11:10      *Awareness about Environmental Issues and Management of Natural  
Resources by Farmers for Sustainable Agriculture*

R. Arunachalam (Tamil Nadu Agricultural University)

11:10~11:30      *Role of Tanks on the Livelihood of Village People*

D.Periyarramasamy (Tamil Nadu Agricultural University)

K.Palanisami (International Water Management Institute)

**Session 3: Indonesian Studies** (Chairpersons: Kenji NISHIJIMA, Fumiko  
FURUKAWA)

11:30~11:50      *Political Participation of Citizens in Mayor Election, Makassar City,  
Indonesia*

Andi Subhan Amir (Hasanuddin University)

11:50~12:10 *Economic Valuation of Coral Reef Ecosystems  
in Barrang Lompo Island, Makassar*  
Hamzah Tahang (Hasanuddin University)

12:10~13:30 Lunch

13:30~13:50 *Gender in Conservation: A Study on Horticulture Management System  
in the Upstream Area of the Jeneberang Watershed, Regency of Gowa,  
South Sulawesi Province*  
Novaty Eny Dunga (Hasanuddin University)

13:50~14:10 *Assimilation of Persian Culture with Ethnicities in South Sulawesi*  
Supratman (Hasanuddin University)

**Session 4: Lao Studies** (Chairperson: Shinichi KAWAE)

14:10~14:30 *Network Governance in Implementation of Policy on Tourism  
for Poverty Reduction in Lao PDR*  
Saithong Phommavong (National University of Laos)

14:30~14:50 *Alcohol Drinking Practices among Students at the Faculty of Social  
Sciences, National University of Laos, Vientiane, Lao PDR*  
Saychai Syladeth (National University of Laos)

14:50~15:10 Tea Break

**Session 5: Myanmar Studies** (Chairperson: Reiji SUZUKI)

15:10~15:30 *Sustainability of Diversified Farms in Yamethin Area,  
Mandalay Division, Myanmar*  
May Thuzar Moe (Yenzine University)

15:30~15:50 *Study on the Consumer's Behavior and Per Capita Rice Consumption in  
Pyinmana Township, Myanmar*  
Theingi Myint *et. al.* (Yenzine University)

15:50~16:10 *Floristic diversity and structure of the rain forest in Tanintharyi Nature  
Reserve (TNR) of Myanmar*  
Hla Maung Thein (University of Forestry)

16:10~16:30 *Restoration of the Bago Yoma Forest*  
Tin Htun (University of Forestry)

18:00~ Reception (Tonantei)

*Market and Trade Analysis of Charcoal and Wood Fuel, in  
Kampong Speu Province*

KIM Soben

Royal University of Agriculture, Cambodia

**ABSTRACT**

Wood fuel is a source of energy commonly used in both rural and urban areas in Cambodia. Cambodian people traditionally use wood fuel and charcoal in their families for cooking and trading at high price for earning income. In Cambodia, although gas has been developed in many areas, most areas remain using wood fuel. Data from National Statistic Institute (1997) shows that approximately 97.7 % of Cambodian people use fuel wood.

159 sample households were randomly selected from the Oral (n=74) and Chhbar Morn district (n=85) by using Yamane 1967 and 1974 formula.

The survey finding that the local people used many species of plants to produce fuel wood. The source of fuel wood supplied Kampong Speu province such as Oral district, Phnom Srok district, Chbar morn district and Treing Yearng commune, Pechnil was a supply area too. Furthermore, charcoal supply areas were from Horng Samnum and Sankey Satorb commune and some other areas in Oral district.

In Oral district, 58.10% of the population in 4 villages produces charcoal, 17.56% produced wood fuel and 24.32% are farmers who produced rice. 100% of the population in Oral district is new immigrants; and about 13.51% out of them came to produce wood fuel and charcoal. The price of wood fuel and charcoal, along the national road number 4 or urban area is higher than produced areas and forest if comparing to the price sold in the province.

In conclusion fuel wood flow is a main chain production for people in Cambodia and it is an effective way to earn their living.

*Impacts of Development and the Absorption of Situated Knowledge on Natural Resources Management*

Thol Dina  
History Department,  
Royal University of Phnom Penh, Cambodia

**ABSTRACT**

Ratanakiri is located in Northeastern area of Cambodia. It was established in 1959 separated from Steung Treng Province. There are many ethnic groups who have inhabited there in which the majority is highland people followed by Khmer, Lao, and a small number of Cham and Vietnamese. Highland people have mainly practiced upland rice shifting cultivation as well as forest product gathering and fishing along the stream nearby their village locations.

In the context of development with the introduction of land and forest concessions and the flow of immigrants into the province, the livelihood and their resources have been affected. There are land conflicts and land grab in the highland areas. To deal with the outside pressures, some ethnic highland people have situated their knowledge in order to challenge and survive. Therefore, a study on situated knowledge on land and forest use in the context of development must be conducted.

This study focuses on the situated knowledge on land and forest use in the context of development among Highland Kreung in Yak Poy Community which is located in Poy Commune, O' Chum District, Ratanakiri Province, Cambodia. The study has three main objectives. The first objective of the research is to understand the impacts of development in and around the field study. Secondly, it studies on how the highlanders use their knowledge (making claims, etc) in dealing with conflicts in resources management.

According to the research findings, Highland Kreung Yak Poy Community have little impacts on their natural resources, but the areas around their village locations affected badly on their livelihood as well as their resources management. Kreung people in Yak Poy Community, to deal with outside pressures and protect their resources, have situated their knowledge in order to have a stronger and legal voice to conserve their resources. They established Forest Community which helps them control their forest communally among the five villages in Yak Poy Community. In addition, they have adopted the communal land title registration which helps them protect their land security from the outside land grabbing and land cheat which is increasing in the province.

*Awareness about Environmental Issues and Management of Natural Resources by Farmers for Sustainable Agriculture*

R.ARUNACHALAM.

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Tamil Nadu Agricultural University, India

**ABSTRACT**

The phenomenal increase in the population of both men and animals in the last century and fast growing industrialisation and urbanisation have overstrained the natural resources besides creating no of environmental issues. A thorough understanding of the awareness and perception about local environmental issues and natural resource management practices will help in designing suitable extension strategies to make the farmers aware and perceive better about the issues and make them adopt remedial practices. Keeping this in mind the present study has been carried out.

The study was conducted in the Kanyakumari district in the state of Tamil Nadu, India with a sample of 200 practicing farmers. The main objectives were to study the awareness and perception of the farmers on the documented environmental issues and to assess the extent of adoption of natural resource management practices.

Totally, sixteen important environmental issues were identified and documented for the study. The respondents in the study area were aware about the prevailing local environmental issues and also possessed high level of perception about the causes for these environmental issues.

The natural resource viz., land, water, vegetation, animals and labour were considered for the study. Regarding the land management practices, majority of the respondents have adopted the practices namely, selection of right crop for the soil, recommended dose of inorganic manure, optimal use of traditional and mechanised implements and ploughing across the soil for water conservation. With regard to the water management practices, majority of the respondents have adopted the practices viz., rain water harvesting, optimal irrigation, optimal tillage and use of mulches.

The practices namely, agro forestry, farm forestry, growing trees in the bund for timber/fire wood, growing of wind belts and growing vegetation for natural fence were their widely adopted vegetation management practices. Regarding their animal management practices, they faired well in their adoption. About their labour management practices most of the respondents have engaged optimal labourers and effectively supervised them. Majority of them partially engaged operation specific labour contract and worked along with hired labourers sometimes. Skilled labourers were also engaged sometimes for farm operations.



*Role of Tanks on the Livelihood of Village People*

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IWMI-Tata Policy Research Programme, International Water Management Institute,  
South Asia Regional Office, Hyderabad, India.

**ABSTRACT**

Water as a resource is one and indivisible, water is part of eco-system. The irrigation tanks and ponds of south India are traditional water harvesting structures indigenously designed by native rulers and chieftains over several centuries and have been among the most important water for rural communities.

The availability of water is highly uneven in space and time. The precipitation confined to only three to four months with 20-45 significant rainy days in the year. Hence there is imperative need for effective collection of rain water for storing in appropriate places (Reservoirs, Lakes, tanks, ponds, aquifers etc.). In order to use stored water efficiently for economical and social purposes.

The study was conducted in the Chinnapoolampatti tank in Madurai district of Tamil Nadu State, India. The main objectives were to study the performance of tanks on the livelihood of village people and to identify the available resources and to assess the usefulness of tank. Totally, more than ten important resources were identified and documented for the study.

This traditional water harvesting structures situates in drought prone. This tank has multifarious functions like irrigation, drinking water for livestock, domestic needs, ground water recharge, fishing, fire wood and fodder, silt for agricultural lands and brick making, growing palm trees along tank bunds and cradle for migrating birds. Hence, the tank has above social, economical and ecological importance, but the performance of tanks had been declining over the decades. So there is an appropriate policy to safeguard these tanks in the near future.

*Political Participation of Citizens in Mayor Election,  
Makassar City, Indonesia*

Andi Subhan Amir  
Faculty of Social and Political Sciences,  
Hasanuddin University, Indonesia

**ABSTRACT**

This paper aims to describe the political participation of citizens in mayor election in Makassar comparing to lessons from prior governor election, and to figure out the factors influencing it. Some data and other related information are collected from survey institutions including non governmental organization which has concerned to the election, local election commission and in-depth interview with key informants and election control committee. Some results show that the participation of citizens in mayor election was considered to be low. It was only 57.62 % of legal voters that also showed the so-called white party (non-voters) is higher than the winner of mayor election. The white party reached 42 %; meanwhile the mayor election winner reached only 39 %. From this brief study, some factors influencing the minimum participation could be due to: (1) the citizens consciously and voluntarily did not use their right to vote because of their apathetic attitude; (2) the low participation of citizens in mayor election was caused by technical problems (the disorganized of fixed voters list); (3) the participation is also influenced by voters' individual interest; (4) a number of people had no invitation letter. The fourth reason is allegedly to be the primary factor among others.

Key words: Political participation, mayor election, and white party.

*Economic Valuation of Coral Reef Ecosystems in  
Barrang Lompo Island, Makassar*

Hamzah Tahang  
Faculty of Marine Science and Fisheries,  
Hasanuddin University, Indonesia

**ABSTRACT**

The objectives of this study are to calculate of the total economic value of coral reef ecosystem at Barrang Lompo Island, and to find out factors affecting the "willingness to pay" (WTP) in managing the ecosystem for the optimum use for the people living in the island. The study was carried out in Barrang lompo island South Sulawesi. The results will be a valuable information for Ocean and Fisheries Services and local government to formulate proper methods and management purpose. The results show that the total economic value of the ecosystem is found to have four benefits: direct use value, indirect use value, option value, and existence value. Direct use value covers of coral fisheries, ornamental fishes, coral reef mining, diving and research. The indirect benefit of coral reef has a function as a shoreline protection. The optional benefit stands for preservation of biodiversity value. Lastly, the benefit existence value is measured by WTP for the coral reef ecosystem. The Total Economic Value (TEV) for the Barrang Lompo coral reef ecosystem is about Rp 30 million/ha. The value of WTP eventually varies depending on the level of respondent education, annual income and age.

Keywords: coastal management, coral reef, economic valuation, willingness to pay, South Sulawesi

*Gender in Conservation: A Study on Horticulture Management System in the Upstream Area of the Jeneberang Watershed, Regency of Gowa, South Sulawesi Province*

Novaty Eny Dunga  
Faculty of Agriculture,  
Hasanuddin University, Indonesia

**ABSTRACT**

The study aims to; see (1) the involvement pattern of men and women, (2) the factors affecting the relationship between gender and conservation, (3) discuss sustainable horticulture cultivation model with gender balance. The study is a qualitative one, employing 20 families of farmers with snowball sampling. Gender deepening is applied, followed by model discussed using Born and Sonzogni method. It indicates that women dominated in the early phase of vegetable, traditional passion fruit, ornamental and advance phase of vegetable farming. Men dominated passion fruit farming using advanced technology. The lack of correlation between women and conservation is due to gender bias of the policy makers and access to the knowledge which is dominated men. Discussed model of farming systems composed of two components which are farmer households for domestic domain and policy instruments in the public domain. Some inputs are provided for the domestic domain which are; the gender perspective; positive perspective of masculinity and femininity that may serve as a moral basis. In the public domain, the inputs are the policy instruments that should accommodate gender perspective as a reference.

Keyword: *gender, conservation, horticulture, watershed*

*Assimilation of Persian Culture with Ethnicities in South Sulawesi*

Supratman  
Faculty of Humanities,  
University of Hasanuddin, Indonesia

**ABSTRACT**

Common saying mention that Islamic assimilation in ethnicities living in South Sulawesi was primarily introduced by Arabian scholars. This study has been focused on the other side of this saying. It could be also much influenced by the Persian culture which was brought to the region earlier than the Arabic and Gujarati cultures. This side is based on the historical fact that Sayyid Jamaluddin, a Persian Scholar, came to Tosora-Wajo in the 14<sup>th</sup> century. It means that the people were already familiar with Islam prior to the arrival of Datuk Ribandang during the golden age of the Tallo Empire in 1605. Evidence of the works of Persian scholars has also contributed to the enrichment of culture in South Sulawesi. In this connection, the process of cultural assimilation will be examined through various aspects: (1) Apparent cultural organizations, oral tradition and *tasawuf* (2) social behaviors such as cultural celebrations of the Prophet Muhammad's birthday, *Ashura*, and *Assikalaibineng*; and (3) existing artifacts, which can be witnessed in the architectural mosques equipped with twelve windows and two main gates. Those aspects give strong evidences that the Persian culture has been assimilated to the culture prior to the arrival of Arabian and Gujarati Scholars.

Key Words: Cultural Assimilation, Persian Culture, Islam, *Tasawuf*, *Ashura*, *Maulid*, *Assikalaibineng*.

*Alcohol Drinking Practices among Students at  
the Faculty of Social Sciences, National University of Laos,  
Vientiane, Lao PDR*

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Department of Sociology and Social Development,  
Faculty of Social Sciences, National University of Laos

**ABSTRACT**

The study aims to describe and analyze the alcohol drinking practices, factors, and consequences of alcohol consumption among students at the Faculty of Social Sciences, National University of Laos.

The researcher did a descriptive study using the survey approach to get the primary data using distribution of questionnaire, interview, focused group discussion, and participant observation from 184 respondents chosen by stratified random sampling. Some secondary data were collected from different agencies. This study used mix methods through quantitative and qualitative data analysis.

The major results of this study found that all of the respondents (both female and male) experienced drinking alcohol (beerlao) in varying degree, either individually, with friends, relatives of family members among them in different places. They drink alcohol to establish good relationships with others, part of their traditional activities, influence by their family's environment, because of problems, associated with receiving bigger allowance, and in relation to the college course taken. Alcohol consumption brought both positive and negative consequences to the students as drinkers, to the family and to the society as a whole.

Based on the results, recommendations are offered to policy makers, religious, educational and family institution, providers, drinkers, social development practitioners and for future studies.

*Sustainability of Diversified Farms in Yamethin Area,  
Mandalay Division, Myanmar*

May Thuzar Moe  
Yenzine University, Myanmar

**ABSTRACT**

The world during the 21st century will be facing shrinkage of land resources, increasing small holdings, heavy population pressure and accumulation of world resources with developed nations. This is a need to revolutionize and modernize the traditional production systems. In Myanmar, about 70% of the populations are farmers. The rural majority rely on only farm income without others income. Therefore, it is important to study farmers' condition, societies and their traditional farming systems. This study was conducted to develop the capacity to analyze diversified farming systems using tools and perspectives drawn from ecology, agronomy, and sociology and to give some insights into the ways to facilitate the development of sustainable diversified farming. A survey of 80 farmers (10 villages) in Yamethin Area, Mandalay Division was undertaken. The data were collected with structure questionnaire. This paper provides an assessment of the traditional faming system of diversified farms in Yamethin area in Mandalay Division. This finding shows that more diversified farms have more incomes and get diverse types of information relevant to the evaluation of real farming systems.

*Study on the Consumer's Behavior and Per Capita Rice Consumption in Pyinmana Township, Myanmar*

Theingi Myint *et. al.*

Department of Agricultural Economics,  
Yezin Agricultural University, Myanmar

**ABSTRACT**

The rationale of the study was the limitation of actual rice consumption data in Myanmar. The survey sample size was 283 households in Yezin, Pyinmana and Aisaut village to represent government staff, urban and rural consumer respectively. Annual per capita rice consumption based on the income level, some consumer's behavior and perception of different consumer groups were presented as descriptive statistics. According to the results, urban low income group had the highest difference between the preferred and consumed rice variety. Most of the consumers accepted that the rice is the best cereal for their health and daily life. Most of farmers (87.51%) were in favor of the private rice export. Average per capita annual rice consumption of total respondents was 199.08 kg. The highest per capita rice consumption was 233.16 kg by rural worker group and the lowest was 160.91 kg by Yezin high income group. These results came out only from the small area survey. Therefore, further studies should be done to cover the whole country and to estimate the more detailed econometric analysis for the total rice demand function.



*Floristic diversity and structure of the rain forest in Tanintharyi Nature Reserve (TNR) of Myanmar*

Hla Maung Thein,  
University of Forestry, Myanmar

**ABSTRACT**

The study forest is located in the southern part of Myanmar with border of Thailand. Because of the objectives of TNR, information of the floristic diversity and habitat structure is a prerequisite for biodiversity conservation. The vegetation survey was conducted in the fifty 40 m x 30 m sample plots in five 3200 m x 500 m sampling units and six transects 10 m x 100 m. In 6.6 ha, total number of 257 species (dbh  $\geq$ 10 cm) in 46 families was enumerated. The species and stand density per hectare varied from 62 to 81 and 362 to 429 respectively when average basal area density was 32 m<sup>2</sup>( $\pm$ 10.2). The most ecological significant species (IVI) were *Sweintonia floribunda*, *Nephelium* spp, *Syzygium* spp, while the dominant family was Dipterocarpaceae. Due to the results of Shannon-Wiener Index and Evenness, Sorensen's Similarity Index, and Species Area Curve analysis, the characteristic of TNR was the heterogeneous community with high value of floristic diversity. Locally rare species of 164 species were found while 10 species belonging to *Dipterocarpaceae* listed as globally endangered species (IUCN) were recorded. The vertical and horizontal size structure of the observed forest community followed the similar trend of normal distribution of natural forest and was considerably good state.

Keywords: Taninthayi Nature Reserve, floristic diversity, structure, heterogeneous

## *The Restoration of the Bago Yoma Forest*

Tin Htun,  
University of Forestry, Yezin, Myanmar

### OVERVIEW

The Bago Yoma was renowned as a home of natural teak in Myanmar. It is also the birth place of "Scientific Forestry of Myanmar".

In past the forest resources in Bago Yoma was rich, dense and diverse in biodiversity. However, the present Bago Yoma has degraded and decreased to 5.1 million hectares for different causes.

To restore the ecological balance and productivity of this area, Bago Yoma Restoring Plan (2004-2005 to 2008-2009) is drawn with area of 5.1 million ha to conduct the following activities:

- (1) Conservation and Protection of Natural Forests.
- (2) Enrichment Planting.
- (3) Natural Regeneration.
- (4) Establishment of Forest Plantation.
- (5) Establishment of Community Forests and Forest Villages.
- (6) People Participation and Forestry Extension.
- (7) Encouragement of fuelwood substitution.
- (8) Development of water Resources.
- (9) Setting up of Teak Natural Reserves.
- (10) Forest Research Activities.

#### Expected Results:

- (1) Sustainable Forest Management would be fully adopted in Bago Yoma.
- (2) The natural teak forests would flourish.
- (3) Basic needs of the local community would be provided.
- (4) People would realize their role in the socio-economic development of the state, thus, people's awareness would be enhanced.

# Market and Trade Analysis of Charcoal and Fuel Wood, in Kampong Speu Province

*Kim Soben*  
Royal University of Agriculture  
Cambodia

## **1. Introduction**

Cambodia has a predominantly rural economy. Approximately 85 percent of the population consists of farmers living in rural areas. Besides their main daily activities, the farmers are involved in several supplementary economic activities such as cutting trees, collecting woodfuel and non-wood products from forest areas.

Wood fuel is mostly consumed by households for cooking. It is an important source of fuel, which people use widely in either rural areas or urban city. According to National Institute of Statistic (1997) saw that 97.7% of people in Cambodia used wood fuel. Some of wood is converted to charcoal before being used as cooking fuel and for other uses. In that Kampong Speu province is a province that people used fuelwood for cooking about 97.8%, 1.1% used charcoal and 96.7% used wood fuel, base on cancers in 1998. Woodfuel had given a lot of works for resident areas in Kampong Speu province, such as Oral district, Veil Veng, Dey Ambel, and Pichnil. These areas, people cut down tree to sell to traders who come from Chbar morn district, hold sellers.

Base on this issues, just I would like to study a subject “Market and Trade Analysis of Charcoal and Fuel Wood, In Kampong Speu Province” to show the frequency areas that most supply the woodfuel to the province, or study on flow of wood fuel in hold Kampong Speu province.

## **2. Reasonable, Objective and Size of the Studies**

### **2.1. Reasonable of this study**

- According to forest destroyed in local.
- Population growing in areas.
- Increasing of fuel wood used in area.
- Most people in Kampong Speu province is trader of fuel wood (woodfuel-charcoal).
- Strongly of fuel wood market flow in Kampong Speu province and along national road number 4 to Phnom Penh city.

### **2.2. Objectives**

- To understand the biggest fuel wood supply in Kampong Speu province.
- Describe the fuel wood distribution system; include market structure, fuel wood flow, quantity estimate and price.
- To understand the demand and supply of wood fuel-charcoal.

## **3. Methodology and Tool**

### **3.1. Size of studies**

In our studies, we decided to select two districts, Oral and Chbar morn districts, which 159 families will be selected as sample for conducting interviews. We collect 4

villages in each district (Figures 1 and 2).

### 3.2. Sample selecting

To help our study, we use Yamane’s formula for make sample selection. With Yamane’s formula, the probabilities of “e” are 10%. In this case if we use only Dr. Yamane’s formula, so we know only total sample who interviews, but for among of people that need to interviews in each village we don’t know. So after use Dr. Yamane’s formula, require us to calculation the sample in each village with other formula. The formula will be show as following step:

Yamane’s formula, 1973:

$$n = \frac{N}{1 + Ne^2} \quad \text{by} \quad \begin{cases} \mathbf{n} & = \text{Sample number} \\ \mathbf{N} & = \text{Total population} \\ \mathbf{1} & = \text{Real number} \\ \mathbf{e} & = \text{Probability rate} \end{cases}$$

The formula to calculation sample in each village:

$$ni = n \frac{Ni}{N} \quad \text{by} \quad \begin{cases} \mathbf{n_i} & = \text{Number of sample in i village} \\ \mathbf{N_i} & = \text{Total number of people i village} \\ \mathbf{N} & = \text{Total number of people} \\ \mathbf{n} & = \text{Total sample number} \end{cases}$$

**Table 1. Sample selecting in each village at Oral district**

N <sup>0</sup>	Village	Population	Sample	Percentage
1	Tang robung	66	17	23
2	Krang Koki	78	19	26
3	Cham pey	68	17	23
4	Monou rom	84	21	28
Total		296	74	100%

**Table 2. Sample selecting in each village at Chbar morn district**

N <sup>0</sup>	Village	Population	Sample	Percentage
1	Borey Kamkor	173	26	31
2	Kandordom	122	18	21
3	Phsar Yama	277	41	48
Total		572	85	100%



Figure 1. Map of Cambodia and Kampong Speu Province



Figure 2. Map of research area at Oral district

### 3.3. Procedure to interview on sample

The best way for interview to sample we select, use the lottery randomization with list of all heads of families in box and then collect some case as following for people allow the sample number, which we was calculated. On the letter of lottery I wrote some problems such as:

- Highest of standard of living.
- An average standard of living.
- Lowest of standard of living.
- Highest and lowest standard of living together.
- Highest and medium standard of living combination.
- Lowest and medium standard of living.

### 3.4. Questionnaire design

The questionnaire design need the general knowledge and thinks clearly about what we want to select. The step to design questionnaire has 4 stages such as:

- Determine about what we want to know, respond to subject and object, then preparing each points for make question.
- Estimate the answer for question.
- After design question and answer ready, make sure to control it.
- Set the question and answer in order.

### 3.5. Interviewing

We interviewed individuals or family at their home. In this case we requested permission or appointment them for a few days before go to interview. In some cases interview can be with trader along the road when they take the wood fuel or charcoal through.

### 3.6. Observation

After interview on each family, observation method is used for control to answer that they told us. In this case living level and equipment is estimated, and to make sure that what they told us is correct answer. If we don't observe the answer can be most error.

### 3.7. Material

The material to help us when information operation such as:

- Note book, pen, and pencil.
- Camera, recorder machine.
- Questionnaire list.

### 3.8. Analysis process

This is final step of thesis writing. All information that we collected must be treatment or arrangement it in order, but we select only responsible information use to reflect to thesis meaning, and can lead us to discovery any impacts in local. Next, the method to analysis is Microsoft Excel and Data analysis SPSS program.

## 4. Result and Analysis

### 4.1. Charcoal

#### 4.1.1. Kiln

Base on local interview; saw that people use two kinds of kilns such as permanent kiln and nomad kiln. The permanent kiln people would like use in family for product charcoal, they use it all seasons. These kilns can product charcoal 150-160 of wood for *Irvingia malayana* species and other species 160-170 Kg per 1 stair of wood. In one kiln we can prepare wood only 4-5 stair and use 15 days in average with 600-900 kg of charcoal.

By the way, nomad kiln is difficult manage it always move from place to another place. After cycle of charcoal production finish, they move it to forest areas. The size of this kiln 2 m, stock 4 stair of wood and spend 12-15 days. Furthermore, it always escapes from law when they build it with no permission from government, forester. This kind of kiln is considered as it is part of deforestation. Because this kiln, people never think about quantity of wood to cutting down for produce the charcoal.

#### 4.1.2. Wood Species for Produce Charcoal

**Table 3. Wood Species for Produce Charcoal at Kampong Speu Province**

N <sup>0</sup>	Name	Scientific Name	Classifying
1	preah phneu	<i>Terminalia triptera</i> Stapf.	1
2	phchok reang	<i>Shorea siamensis</i> Miq.	1
3	phlow nieng	<i>Adenantha pavonina</i> var. <i>microsperma</i>	1
4	sokram	<i>Xylia xylocarpa</i> (Roxb) Taub.	1
5	trayung	<i>Diospyros pilosantha</i> var. <i>helferi</i>	2
6	reang	<i>Barringtonia asistiaca</i> (L). Kurz	2
7	khlong	<i>Dipterocarpus tuberculatus</i> var. <i>grandifolius</i>	2
8	chambok	<i>Irvingia</i> sp	1
9	chhlik	<i>Terminalia tomentosa</i>	1
10	kroeu	<i>Melanorrhoea laccifera</i>	2
11	thlor	<i>Parinari annamensis</i>	1
12	thbeng	<i>Dipterocarpus obtusifolius</i>	3

#### 4.1.3. Procedure for control charcoal burn

It is very simple to make sure that the charcoal burning complete or not, the best way that can use, we must control to the smoke from the kiln. When they saw black smoke from kiln, it is noted that the wood is starting burn process in kiln. It is contradictory the charcoal burn complete will be bring white smoke. When the white smoke appears, they wait for smokeless and then take mud to close the hole. During the white smoke appear small among they mix mud with water and then irrigated to the kiln two times per day. If the smokeless, they still not close the hole, charcoal will be become not complete or raw material.

However, the hole is closed but the mud spray still practice two times per day until mound become cold. So charcoal people can produce one time per month for big kiln and two times per month for small kiln size.



Figure 3. The kiln is closed the hole with



Figure 4. Woodfuel break as bunch

#### 4.2. Fuel Wood

The trees is cut off from forest and break into 30-40 cm per piece. This wood is brake as small piece to make bunch for sell to commercials or trader at provincial or along national road number 4 and city. Wood fuel people who are trader at Kampong Speu province prefer to sell as a small bunch or big bunch for real seller. But hole seller prefer sell all either small or big bunch or sell as cube. The tree that they would like use for make wood fuel such as *Terminalia triptera* Stapf., *Shorea siamensis* Miq., *Xylia xylocarpa* (Roxb) Taub., *Diospyros pilosanthera* var. helferi.

#### 4.3. Source of wood fuel and charcoal supply

Kampong Speu province is known as forest area and it was considered as source of fuel wood supply for use service at the province and also other areas. However in the area of studying such as Oral and Chbar morn district show that the both district play importance role in wood fuel supply stronger than other province or area at Kampong Speu province.

In the case studied at Oral district, show that this district is a good source of wood fuel supply. Most people in Oral district always work as cutter of tree to make charcoal and wood fuel to sell to trader and commercial that come from other district or areas to buy for sell continue. Some areas that are importance source to supply wood fuel or charcoal such as Tang robung, Krang Koki, Cham pey and Monou rom village.

Beside the areas that we select, the other areas are also concern with study areas too. The case study at Chbar morn district we discovered some areas that supply source such as:

- Phnom Srok district is supply areas of wood fuel to Chbar morn district, cutter always sell wood or transfer to trader who live in Kampong speu province or trader in Chbar morn district. The special area of the Phnom Srok is Treing Troyeung commune, which has three areas such as Veil Veng, Dey Ambel and Pechnil area. These areas are close relationship with wood supply and demand or give service to trader Chbar morn district.
- Chbar morn district has a good position at wood fuel service, but it is a big stock of wood fuel. All trader in this area, most are hold seller and in that also real seller and some time one trader play as either hold seller and real seller. Some areas in Chbar morn district that sell and buy wood fuel from cutter such as BoreyKamkor village, Kandordom and PhsarYama village. But Kandordom village is not as strong as Borey Kamkor village supply. Most traders at Kamdordom village are real seller, so they prefer to sell the wood fuel along the National road number 4 go to Phnom Penh city. By the ways, All traders at the Borey Kamkor village they are hold seller and real seller, but they prefer to sell their wood fuel wood at their house.

For our study show that the most charcoal supply area in Kampong Speu province is Oral district. And people always build charcoal kiln in the forest area. This is a big problem with deforestation in charcoal production areas at Oral.

#### **4.4. Stakeholder in fuel wood supply**

##### **4.4.1. Direct stakeholder in local area**

The following tables show the percentage of people in study areas, who are stakeholder for wood fuel supplier and seller.

**Table 4. Stakeholder at Oral district**

N <sup>0</sup>	Village name	Sample number	Families interviewed		
			Charcoal	Wood fuel	Rice produce, charcoal and wood
1	Tang robung	17	8	2	7
2	Krang Koki	19	14	3	2
3	Cham pey	17	8	5	4
4	Monou rom	21	13	3	5
Total		74	43	13	18
Average among		19	11	4	5
Percent rate		100 %	58.10 %	17.56 %	24.32 %

Base on data from interview at Oral district, we also interview the new immigrants who come to live and work as charcoal producer, about 13.51% who come mostly form Samrong Torng district.



**Table 5. Stakeholder at Chbar morn district**

N <sup>0</sup>	Village name	Sample number	Families interviewed		
			Charcoal	Wood fuel	Rice produce, charcoal and wood
1	Borey Kamkor	26	8	14	4
2	Kandordom	18	6	9	3
3	Phsar Yama	41	5	8	28
Total		85	19	31	35
Average among		28	6	10	12
Percent rate		100 %	22.35%	36.47 %	41.18%

**4.4.2. Indirect stakeholder**

Indirect stakeholders always move from one place to another place for buy charcoal and wood fuel for sell continues at provincial or other areas. Most indirect stakeholder comes from Samroung Tong district -Orpraung, Vour, and Wat kdeychas-Thloul Toteung village Angsnour district. They always come to buy charcoal and wood fuel at Oral district. Some of them go to cut by themselves at such areas as Kiri rom foot of a mountain, Dey Chnang village and some forest areas that nearby their village.

**4.5. Transportation ways**

Transportation is considered as an importance ways for trader, costumer and cutter to move wood fuel or charcoal. There are different ways for people to use the equipments to transport their wood fuel it according to their abilities whether they can buy or not? So for poor people who cutting down the tree in forest, normally they use ox cart for wood movable. In nearly case, it means that their kiln was build in forest, they always carry lumber on the shoulder or use bicycle to replace or reduce their power.

For a trader who has ability to buy vehicles, they use it to transportation. With easy transporting traders always request cutter to make charcoal or cutting down tree more for their need. This concern is more impact to the forest and environment.



Figure 5. Transportation way

#### **4.6. Fuel wood price**

##### **4.6.1. Charcoal price**

The price of charcoal unstable according to place and quality, most traders always buy charcoal to take over a task completely. Charcoal price is cheap during trader buy, and it will be increase after they sell to customer again. When trader buy charcoal from producer at the production areas, trader always give the cheap price to producer or cutter tree to make charcoal. Base on some data from interviewees who are producer at forest, charcoal price decrease by 165.25 reil in average price. If they buy take over a task completely charcoal producer can sell 13,000 reil per bag (1bag = 79.25 kg in average among).

The charcoal price increase when these traders transported to provincial, Kampong speu province, or urban area. At Kampong speu province, trader can sell 275 reil per kilogram in average. The maximum prices that can be reach around 350 reil per kilogram. For price along the National rout 4 are similarly they sell in Kampong speu province too, for movable seller (real seller). But the price of charcoal are better than this price while these traders arrive Phnom Penh city and sell to people either in city or suburb city. They get 350 reil per kilogram in average, and maximum price is 400 reil per kilogram.

**Table 6. Charcoal price in average**

Location	Scale	Unit	Maximum	Average	Minimum
Oral	Kilogram	Reil	120	165.25	200
Chbar morn			250	275	350
Kampong Speu			250	300	350
National rout 4			200	275	350
Phnom Penh			300	350	400

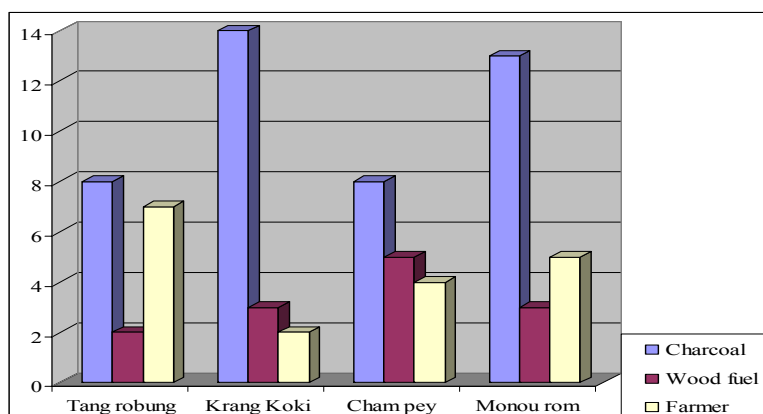
##### **4.6.2. Wood fuel price in average**

Wood fuel is also used widely by people in city and suburb city or public gathering areas. Wood fuel that trader sell has two types such as sell in bunch and in cube. For bunch selling there are two bunches, big and small. The price of wood fuel of the bunch is not large different, its price only 80 reil per small bunch and 160 reil for big bunch, but its size not large different. This price sells by hold seller in Chbar morn district.

This price most real seller always buys wood fuel from hold seller to sell again at different place such as Phnom Penh city. Real seller can sell 100 reil per small bunch and 200 reil per big bunch.

## 4.7. Analysis

### 4.7.1. Source fuel wood supply at Oral district

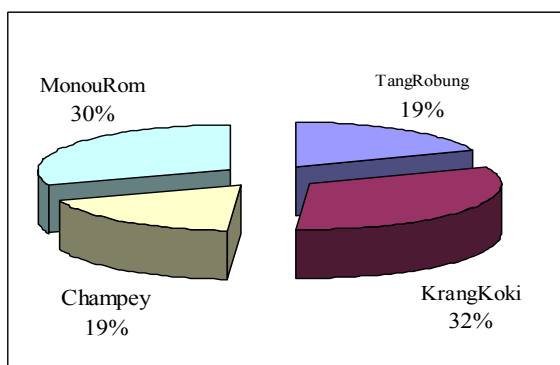


Graph 1. Fuel wood Supply areas in Oral district

Oral district is a big supplier of fuel wood of the Kampong Speu province. According to data from local people, most people living in this area had produce charcoal for increase their standard of their living. By the way in study area, we base on 4 villages such as Tangrobung, Krang Koki, Champey and Monourom village. These areas are higher of charcoal produced of Oral district and Krang Koki is a highest charcoal supply to another places.

For wood fuel supply, people are small among that cut down the tree to sell. But in that people who cut tree to sell also play importance role as charcoal producers.

### 4.7.2. Charcoal supply in Oral district

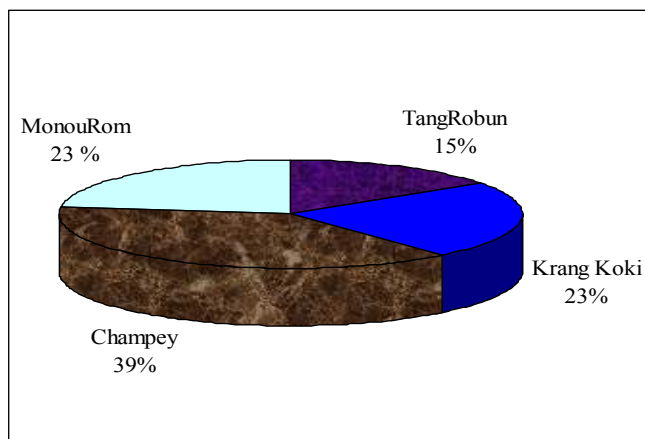


Graph 2. Charcoal supply of the Oral district in percentage

Base on regional studying of the Oral district, 4 villages as sample, however Oral district is a big supplier of fuel wood of the Kampong speu province but these areas are not the same quantities supply. The graph above shows us the higher and lower percentage of areas, which are best supplier of the Oral district in region. The data from interview and data analysis show us clearly the percentage of each study areas in Oral district such as: 32 percent of charcoals come from Krang Koki village. This percent is a largest of study area in Oral district. Other 30 percent source from MonouRom village and the lowest percentage of study areas there are two villages. The both villages are the same among of charcoal supply. Finally, 38 percent from Champey and Tang Robung village -19 percent is Champey and other 19 percent is Tang Robung village.

Moreover, these areas are bought by traders who come to buy at the place of charcoal producer and charcoal along road collection to sell again at other areas such as Kampong speu province, along National route 4 to ward to Phnom Penh city, and some areas as suburb city.

#### 4.7.3. Firewood fuel supply at Oral district

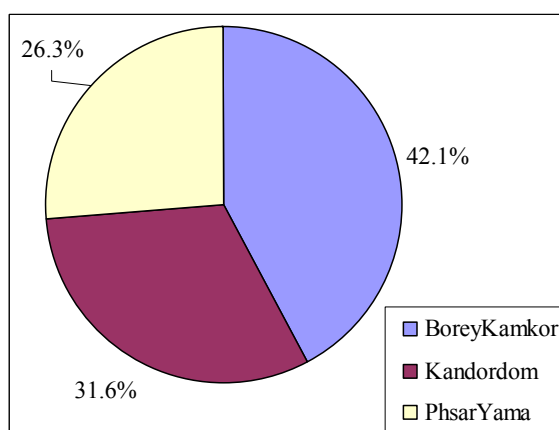


Graph 3. Firewood fuel supply in percentage

According to data treatment and analysis, the graph above shows that 39% of wood fuel come from Champey village, 46% is supplied from MonouRom and Krang Koki village -23% is MonouRom and 23% is Krang Koki village- and 15% is supplied from Tang Robun village.

These percentages show us the wood supplied in Oral district, it has a small among of people who cut tree for sell as wood fuel. Because wood fuel give them small income if compare with their charcoal income. However, wood fuel also gives them the fast income to solve or to reduce their need for a time.

#### 4.7.4. Wood fuel supply in Chbar morn district



Graph 4. Wood fuel supply of study area in Chbar morn district

Chbar morn district is a district that has a lot of trader who earn money with charcoal seller, hold seller and real seller. But most people, who earn money by charcoal is not as strong as wood fuel sell. This is offer to trader who sells wood fuel at their house directly, it mean that their house is the wood fuel storage and the place to sell too. Base on

three study areas in Chbar morn district, we find the importance areas, which is largest wood fuel supplying either hold or real seller.

The graph above describes about the percentage of each study areas with wood fuel supply as percent. With local survey Borey Kamkor village is a village near by Kampong speu province play importance role as wood fuel supplier to other areas about 42.1 % of total one hundred percent of the three studying areas that we consider as completed hold of Chbar morn district. Moreover, Kandordom village is a good supplier too but not better as Borey Kamkor village perhaps 31.6 % is traders who sell wood fuel in front of their home along National route 4. And remaining 26.3% is supply by Phsar Yama village.

**4.7.5. Marketing flow diagram**

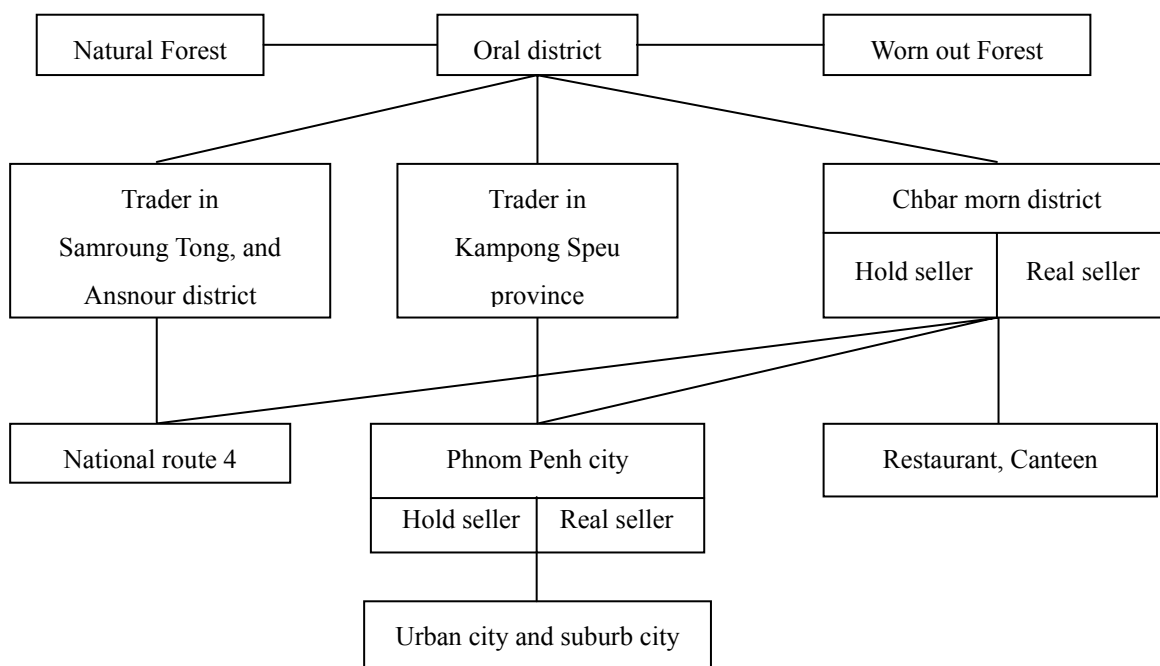


Diagram 1. Marketing flow for fuel wood

The diagram above describes the complexity of fuel wood flow on market from supply areas to using areas. The line of fuel wood supply always close relationship between supplier and user or customers to share fuels for household use in families. Fuel wood is carried out from natural or worn out forest to make charcoal or wood and then sell to hold seller or real seller that come to buy. In other case a local person who is tree cutter also go to sell themselves for get better price from trader at Chbar morn district.

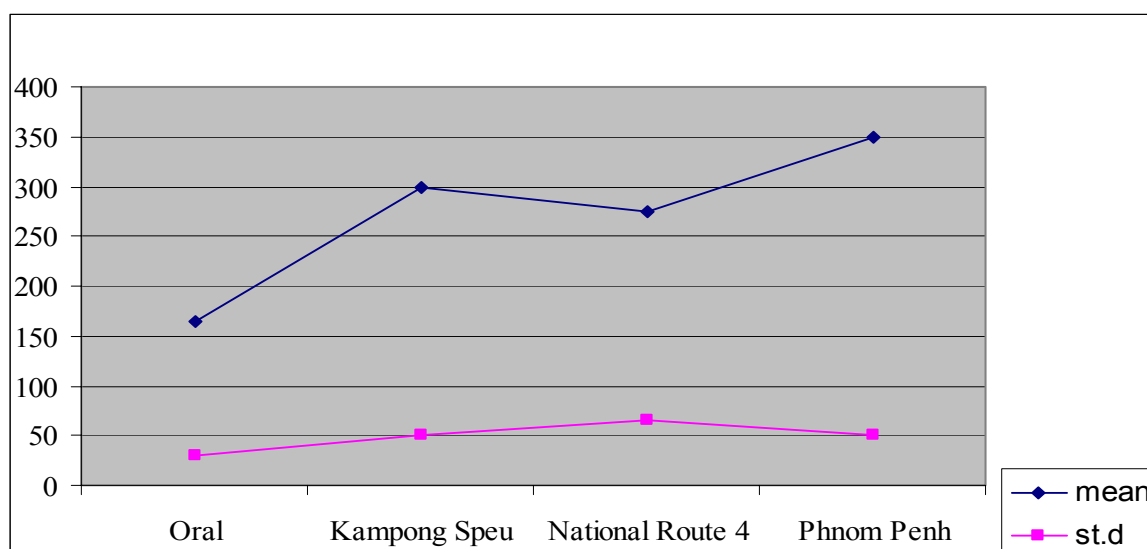
The hold seller and real seller bought charcoal or wood fuel from Oral district to sell continue to people who live along road number 4, provincial and go to share in Phnom Penh city. In Phnom Penh city some time they sell to hold sellers, and other ways they share to customer directly. When they sell to hold seller, most hold sell are live around suburb city.

### 4.7.6. Charcoal and wood fuel price analysis

#### 4.7.6.1. Charcoal price

Table 7. Charcoal price

	Oral	Kampong Speu	National route 4	Phnom Penh
Average price	164.8	300	275	350
Standard deviation	30.26	50.00	64.55	50.00



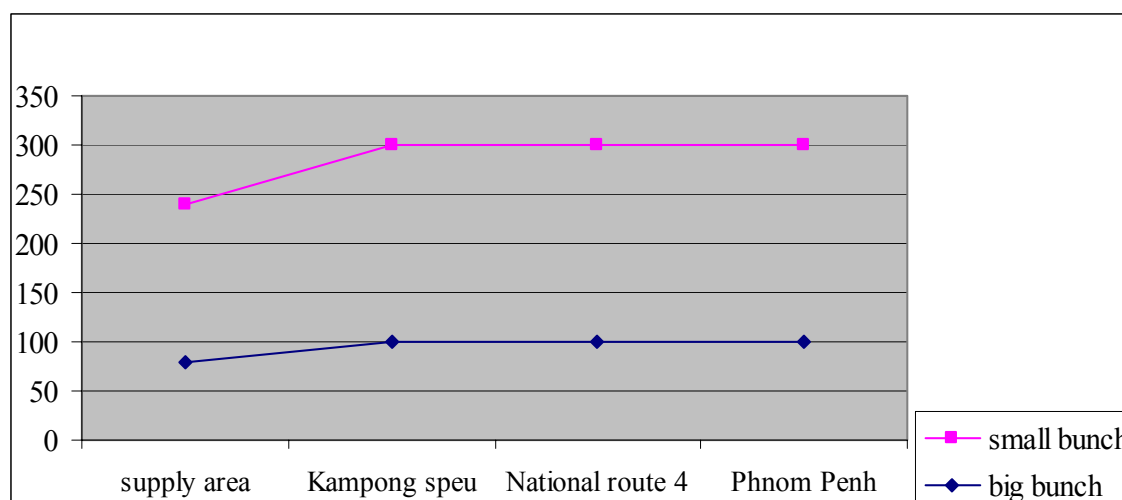
Graph 5. Charcoal price on market flow

Actually, fuel price is not the same from place to another place; it always changes according to local resource. The charcoal price in Oral district is lowest price if compare to Kampong Speu province, it price only 164.8 reil per kilo gram in average. This price always changing around 30.26 reil -standard deviation. But charcoal price get better than this price when trader sell in Kampong speu province.

Kampong Speu province, most people use charcoal to cook their food. When the demand increasing, so supplier need to give enough and this time they can adding price on original price of charcoal. The price of charcoal in Kampong Speu province 300 reil/k.g with standard deviation 50.00 changing around the average price. So the lowest price of charcoal about 250 reil /k.g. On the other hand, charcoal price along National road 4 is 275 reil/k.g in average price, 64.55 reil/k.g that change around the average price. But this price is better than trader sell at Kampong Speu province.

Moreover, with data from interviewees in study area saw that Phnom Penh city however people has high standard of living, but most people also need charcoal to use for cook in house such as roast beef, roast potato or meat roast. Charcoal price in Phnom Penh city is highest price that it increase 350 reil/kg in average, standard deviation is 50 reil changing around average price.

#### 4.7.6.2. Wood fuel price



Graph 6. Firewood price on market flow

Wood fuel is used by local people widely either resident area or small among in city. Wood fuel is prepared as bunch. Its bunch is devise in to two levels such as big bunch and small bunch. Its price is not so change from area to another place and it is limited from hold seller first before trader buy to sell continue. Wood fuel price for hold seller perhaps 80 reil/small bunch and 160 reil /big bunch. This price is 2 times increasing or different between big bunch and small bunch. And wood fuel price for real seller 100 reil/small bunch and 200 reil/big bunch. These prices not change when traders sell in Kampong Speu province, along National route 4 and sell in Phnom Penh city or suburb city.

### 5. Conclusion

Fuel wood is the importance source that gives most advantage to people both local people and other households. Fuel wood give a lot of works to people in Cambodia and incomes properly to increase standard of their living but all of this also give impact to the natural resource.

In the study areas we can give a good conclusion that; Oral district is the main source of fuel wood supply, charcoal and wood fuel. The most people live there base on forest for cutting down and produce charcoal or sell as wood. But its price is very cheap when people just sell their product at the place of charcoal produce and cut. Charcoal price in Oral district around 164.5 reil per kilogram in average price when they sell charcoal to trader who come Chbar morn district or other place to buy.

Charcoal and wood fuel price in Chbar morn district is better than the prices that sell in Oral district. Charcoal price has increased and its price 300 reil per kilogram in average price. So according to result and data analysis, we show that fuel wood supply can be consider as traditional fuel that make a good trade for people in Cambodia convert it in to commercial trade to run business and give works to local people. However its price is low but it is a part of work or income source for resident people earn money for their families.

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# Impacts of Development and the Absorption of Situated Knowledge on Natural Resources Management: A Case Study in Yak Poy Community, Kres, O' Chum District, Ratanakiri Province, Cambodia

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## 1. Introduction

Ratanakiri is located in the extreme north-east of Cambodia with an area of 12,561 square kilometers covered by rich basaltic soil and abundant natural resources. This province was established in 1959. The whole province is divided into nine administrative districts. In these nine districts, there are many different highlander ethnic groups who have inhabited for years. They practice their traditional practices mostly seen as rice shifting cultivation as well as forest products gathering in various ecological zones<sup>1</sup>.

The ecological zones in Ratanakiri are classified into four main agro-ecological zones: the central plateau, hill region, mountainous region, and low land plains region (Colm 1997: 5). The central plateau ranges from 200 meters nearby Vietnam border and 500 meters elevation near Banlung. Because of the rich red basaltic soil which allows trees to grow well, this area has dense semi-evergreen forest including swidden cultivation plots. The hill region locates in the average of 300 meter elevation. Mountainous region is located north of Sesan River along Ratanakiri and Laos border. This location rises to 1000 meters elevation with dense forest and abundant wildlife. Finally, lowland plains region is located in the average elevation ranges from 60-100 meters. This location has fertile alluvial land from Sesan and Srepok River with small area of low land cultivation.

Most highland people live in a poor condition because of several reasons. Firstly, most of them are illiterate and live far from downtown and business areas as well as public services. Secondly, their natural resources are exploited by the powerful outsiders who cause trouble to their sustainable subsistence, especially on land security which is in dangers because of the appearance of land grabbing. Furthermore, the introduction of agro-industry which occurs from the introduction of market economy after 1993 has also threatened the highland community's land security.

Nowadays, all the nine districts have more or some experienced with the development projects mainly land concession and land contraction. Conflicts on land ownership occur nearly every month between the highland people with the same highland people and between highland people with the outsiders as well as high rank people. Traditionally, highland people controlled their land communally with cultural boundary. They did not have legally land title for each family, but they have a good system of land division. Because they do not have legal land title and have little understanding, it is easy for the outsiders to grab their land by using legal land title.

At the same time, the interaction between highlanders and lowlanders is increasing because of the improvement of infrastructure in the province as well as the

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<sup>1</sup> There are two kinds of language groups among those highland groups in Ratanakiri Province. The first group belongs to the Austro Asiatic or Mon-Khmer group which consists of Tampuan, Kreung, Kachak, Kavet, and Khmer. The latter one belongs to the Austro-Polynesian which has Jarai and Cham. Tampuan is the most populous follow by Jarai, Kreung and Khmer.

access to modern tools such as motorbike or cars among the highland people. This can be seen through the improvement of road quality from Ban Lung to Borkeo, Ban Lung to O Chum, Taveng and Veun Sai districts. With these roads, people can travel quicker to other districts towns in dry season. However, the living standard of the highlander people is not even better. In contrast, within the context of development and market economy, the land price increases, and the highlanders' land property is facing threat.

However, although the property land of highlander people is being threatened by powerful outsiders who grab land, most of those ethnic highlander groups still practice their traditional knowledge while only some of them have changed their practices. This research is designed to study the impacts of development and the ways highland people have situated knowledge from their traditional practice of land and forest use, the development or the repertoire of their knowledge, and the strategies of dealing with outsiders by using their located knowledge<sup>2</sup>.

Nearly a century that northeastern provinces of Cambodia have involved in many development projects since French colonial period till nowadays which have caused serious problems to upland community than any previous periods. Some upland communities lost their land from land grabbing and land contraction. Despite the encroachment of forest land, land grabbing, land cheating, and land concession by outsiders, many highland communities can still keep and protect their forest, land, and their traditional practices as well as their customary laws. They can do like this because of the participation of NGOs, the appearance of Land law 2001, and especially the enhancing of their traditional knowledge with the legal laws.

Development brings both advantages and disadvantages to highland people. From the author's observation, on one hand, highland people have a bit better road infrastructure which enable them to travel to long distant areas, especially to the provincial town. Also, highland people can have access to health care center, markets, and modern tools such as motorbike, TV, VCD players, battery and so on. Further, some upland people receive a valued at it benefit. It means that they can bring their products to the market, especially they will have a bit better living standard when they live along the main roads. Living along the main roads provides them the economic opportunity to make their lives better.

On the other hand, highland people are facing with land insecurity that occurs from land and forest concession, land grabbing, land cheating and land contraction. The whole province has experienced serious problems of land conflicts between outsiders with upland community or intra-community land conflicts. Just only in O' Chum district where was visited by the researchers, there are many problems related to land and forest use. The Hero Taiwan land concession area overlapped with some upland Kreung communities which affected their livelihood. In addition, the activities of the company such as logging and building some roads are harmful to natural resources, environment and the crops of the upland people.

The villages surrounded Yak Poy and Yak Kaol communities such as Ekapheap, Laak, Kam, and many other villages suffered from the land grab, land cheating, and land contraction. Some local authority used to take the land from upland people and sold it to low land people. In addition, the same highland people sold other people village land to low land people by claiming that it is their ancestor's land. Furthermore, land contraction is increasing among the upland community. Recently, Tangtrapoung village, located near Yak Kaol community lost big piece of land along the road to Taveng district because

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<sup>2</sup> The words land and forest use in this article refer to the practices of highland people on land and forest as well as the management.

some people in the community sold it to one business man in Ratanakiri who is very famous on land contraction. Even though they already planted rubber trees on that land, upland people are still protesting about this case.

From these impacts, upland people do not have enough land for cultivating their upland rice. In addition, some of their traditional practices become weaker. Conflicts among the same ethnic groups or between highland people and low land people are increasing<sup>3</sup>. However, there are some highland communities that can preserve much of their traditional practices and have efficient natural resources regulations, especially on their land use practices. Thus, with the later one what are the impacts and their traditional land use practices of highland people in the context of development? Taking this into consideration, a research must be conducted.

### **1.1. Research Objectives**

Following the research question, two main objectives have been raised to answer it. The first objective of the research is to understand what are the impacts of development on highland people? Secondly, it investigates how highlanders' knowledge has been developed, maintained and strengthened in the context of development. This focuses on the development of highlanders' knowledge on their natural resources in the field of land use from French period to the present day. Thirdly, it studies on how the highlanders use their knowledge (making claims, etc) in dealing with conflicts in resources management. Doing this research, the researcher raises the hypothesis: development affects the local knowledge, especially on land use management and land property which lead to absorption of situated knowledge.

### **1.2. Research Site and Methodology**

From desk documents, interviewing those who have experienced in Ratanakiri, and a brief preliminary field work in November, Yak Poy community which is located in Poy commune, O' Chum district, Ratanakiri province is chosen for doing field research. There are two communities in Poy commune: Yak Kaol community and Yak Poy community. Yak Poy community is chosen for the research because it has several criterions fit to the objectives of the study. Firstly, this site has been settled by the highlanders and they still practice their traditional knowledge on land use and maintained both customary laws while the other nearby highland villages such as Kam, Laak, and Ekapheap experienced serious impacts of land lost, except Yak Kaol Community. Secondly, the highlanders in this district have experienced with development projects, especially with land grabbing and land conflict including the introduction of cash crops. Thirdly, the highlanders in this study site used to use their knowledge in claiming their land property in order to deal with outside pressures, especially from land contractors and low land immigration.

Conducting this research, the researcher also has employed several research methods for data gathering: participant observation, key informant interviews, informal interviews, and document research.

Firstly, participant observation is used to gather data on the every day practices of land use practice in the village, including farming activities. This method will be used for getting information while conducting field work. After arriving in the village and introducing, the researcher will ask villagers to participate with their activities in order to

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<sup>3</sup> During dry season year 2008, Khmer people in O Chum district caused serious wound to a highland person who live in the same village. The problem comes from the conflict of residential land area. Khmer person use the saw to cut the highland hand. After this, the highland victim got serious injury.

understand the knowledge on land use practices. By doing this, the researcher will have the opportunity to live, work, and join the ceremonies with highland people. From this participation, the author will have the chance to learn, observe, and explore the local knowledge. Further, the researcher, after building rapport with highland people, will have time to talk with many people about their land use as well as the way they protect their land from the outside pressures.

Secondly, a numbers of key informants who have a wide knowledge about highlander people, especially the knowledge related to traditional knowledge on land use practices will be asked for the permission for interviewing. The key informants were asked to answer question related to land use practices, the development of their traditional knowledge, especially from the French period, and the use of their knowledge in dealing with outsiders. Key informants are the important sources of knowledge about history, and kinship network in the village which help the researcher gain deep understanding on their perceptions on natural resources management, particularly on land use and management.

Thirdly, the researcher will also use informal interviews in order to get more information related to the objectives. The researcher will do this by joining the activities with old people or have conversation with them by starting from a general to specific information. Talking with old people provides a lot of knowledge about the village history as well as their lives which enable to understand village history and their traditional knowledge transformation.

Fourthly, documentary research by reviewing the information comes from the short time survey conducted by NGOs related to Ratanakiri, especially on the highland people issues. Other sources of information come from the books about indigenous people that most of the book were written by foreigners and government statistics. In order to fill some gap of information, interview with the people who have good knowledge about indigenous people was also conducted.

## **2. Development Concept**

There are many theories and concepts about development. In this paper, I choose only one theory of development to explain and apply as a guideline for this research. Technology of power is one well known theory in development study, particularly in Ratanakiri province. The development agencies and the state government claim to build the local capacity in order to join with the process of development. In Ratanakiri, building local capacity was initiated during 1995 with the establishment of SEILA program. This section will discuss some concepts of development discourse in term of technology of power.

From the development and state agencies, they always mention that development is good people because development will help people to understanding their potential and use it to improve their living standard. However, from the development project, powerless and poor people are always the target and the victims from the impacts of it (Kaufman 1997: 118). In Cambodia, most ethnic highlanders became the victims of the development works. With the grant of land and forest concession, highland people lost their land and forest because the granted company areas usually overlapped with their territories. In addition, some companies committed illegal logging which destroyed the forest rapidly and affected on the livelihood of highland people because most of them rely on the forest product gather besides their rice shifting cultivation.

Development has been introduced in northeastern area of Cambodia long time ago. At that time, the state power (French) viewed development program as civilization

mission to pull people from poverty, poor health condition, and improve the condition. In fact, this kind of development programs brought little benefit to poor people. In contrast, it is seen as the way the state used it to strengthen their power and get benefits for them (Komatra 1998: 337). During French period, they built military post and rubber plantation around Memot and Snoul. French purpose at that time was to collect tax from people in the northeastern area. However, French could not collect much tax from the highlander people because they lived in the forest in which they can escape from French more easily. Even French caused burden to highland people, but they helped stop the slavery in the area.

The popular ideas of development related to the process of transforming poverty into prosperity and the integration of ethnic minorities into mainstream society (Pen 1996). This policy is widely practiced by many states in Southeast Asia countries with their own highland people. In Cambodia, during Sangkum period, the government initiated new policy to integrate highland people into Khmer society. To make this policy work, the government at that time built school, health care centers, prepared journey for highland people to see low land area, and establish Phum Kumrou<sup>4</sup>. With this initiation, the government hoped to help highland people to increase their livelihood and increase their rice products. The policy failed to help highland people because the government did not provide enough technical tools for highland people who never practiced the low land rice technique.

The education system worked very little because the lesson was not suitable for the students and the big barrier was that low land teachers did not understand well about the culture of highland people. Most importantly, the low land people still felt scared to live with the highland people who they used to have not good perception on them. For the other reason, the policy of the government at that time was to control highland people and strengthen their administrative in this area to protect the spread of communist movement.

After colonial period, development is seen as the model of progress in which it aims to promote people living standard. Development appears as the economy improvement which is mostly based on the concept of Westerners without paying much attention to local perceptions in the areas implemented. According to Shiva (1989) this type of development tends to exploit local people resources and violate the landscape and affect their culture. Drawing from the examples from ethnic highland people in Ratanakiri, with the open of market economy after 1993, highlander people have faced challenges from the impacts of development. Their forest resources have been destroyed rapidly by the illegal logging. Further, with the increase of land price, their land is grabbed or cheated. These factors affect their culture and their livelihood because they lost forest sources and do not have enough land to cultivate upland rice.

Development is also implemented in order to bring modernization to people. It aims to pull people from poor living and experience the modern tools and technology. However, previous experiences indicate that modernization undermined the traditional society and traditional structures, identity, culture and livelihood of the people. With modern technology, some ethnic highlanders in Ratanakiri gradually abandon some of their traditional practices. Highlander people used to have traditional Kong when they celebrate their ceremonies. Nowadays, many villages do not use Kong to entertain in the ceremonies. They prefer to use modern musical tools in their ceremonies. Modernization also brings new culture to highland people. Traditionally, young highland people

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<sup>4</sup> Phum Kumrou (Pattern Village) was established both in Ratanakiri and Mondolkiri province. The main purpose of creating these villages was to introduce the low land life style to highland people to follow. Low land from Takeo, Kampong Cham, and Prey Veng were encouraged to live and practice low land rice as a pattern for highland people.

respected the elderly advices, but now they ignore the advices and do not pay attention to the teaching of elderly people.

The highland people are being marginalized and suffered from the impacts of development plans (Komatra 1998). They are excluded from making any important decision making for their future development. The government or development agencies do not listen to local people perceptions, but instead they design it for local people as if they have deep understanding of local people. Furthermore, development also reduces the social capital in the community. It means that when development exists, people care more about their own benefits and they will protect their interests through different activities which sometimes affect the people in the same community. Drawing on the examples from Ratanakiri province, some highland people have conflict with the same highland group because of the interest. Some highland people sold other village land to the business people or low land people by claiming that it is their ancestor land. This activity causes conflict among the same highland group and reduces the trust and social capital in their communities.

Development also focuses on the participation approach. Development and government agencies turn their approaches from model of progress, economic improvement, and modernization to participation. They stress on the participation of local community in the process of development in order to get more success. Again, according to Peter Hammer (2008), participation is not different from the previous approaches. It still serves the interests of development and state agencies. Participation is just a kind of new layer bases on the previous layers. It means that participation approach is designed to be new color, but in reality it is the same as the previous techniques. In participation approach local people are like the fish that swim in a pond of water and do not know clear about the water they are living in.

Population growth can cause particular challenges to the natural resources management including land use. The increase of population can result in the stressed farming system if land holdings are already in short supply. As Sianouvong Sovathvong (2000) pointed out that the population growth in highland of Laos increased land pressure. People do not enough land for sustained agriculture because some of their land is divided to children and next generations. To solve this problem, farmers developed adaptive strategies by changing and diversifying their land use and modifying their cultivation practices.

Furthermore, the transformation of land use affects on the household strategies. Some farmers who are lacking necessary resources are facing declining productivity and are forced to look for other opportunities such as off-farm activities or migration to another place. He also mentioned about solution on how to enhance technical capacity of the village community through access control, use regulations, and resources maintenance. Finally, he concluded that in-migration led to deforestation because of the demand requirement increases. In addition, market oriented and the policy of forest land allocation also led to the inappropriate land use.

Outside pressure can also lead to the expansion of the upland and agricultural land. It means that with the encroachment of the outsiders in the upland area, more demand on land use also increased. Research undertook on problems of “sustainable land use and natural resources management in a community in Thailand” (Catherine 2002) indicated that increased accessibility such as logging and transport improvement, fertile upland and highland soil, free market labor, market economy, land grabbing, and perception of land security caused unsustainable land use. From these external pressures, deforestation which causes the reduction of forest quality, increase on remained forest, high utilization of NTFP among highlanders, and the decrease of soil fertility.

Not only outside pressures that caused problems on land use, but the traditional practices of the insiders also contributes to the unbalanced land use and resources management. The traditional land inheritance can also make landlessness and the unsustainable use of land. For example, Decha Karnjangkura (1996) stated that the tradition of land inheritance division equal among all children led to landlessness among rural people in Thailand because of the small fragmentation of land which led to the inadequate yields.

According to Ouk Thira and Ou Sopheary research on participatory land use planning (2004) concluded that the main cause of forest degradation in Toul Sambor resulted from forestland encroachment through illegal activities such as forest clearing for shifting cultivation, permanent cultivation, and new settlement. In addition, a study of community based protected area management and sustainable livelihood by Seng Leang, Pouk Bunthet and Dul Vuth (2004) found that shifting cultivation of people in Roveang district, Preah Vihear province contributed to the destruction of forest.

In his study on “Customary Land Rights of Indigenous People and their Violation in Ratanakiri Province, Cambodia, Sokong Chhay found that the highland land security is facing threat. He discussed the international right aspects on highland people and the Cambodian laws on highland people. He found that after 1993, the land price increases and led to land speculation. Highland people land was grabbed and their customary laws were violated. He also stated that land law 1992 and land laws 2001 worked little to help highland people to deal with the challenges.

According to recent research in northeastern provinces of Cambodia, ethnic highland community is changing. Kristina Chhim (2005) found that the transformation of highland community in northeastern provinces involved with the development of agro-industry and the land grabbing by the lowland people. She found that the agro-industry lead to land stability because more and more land is required to plant cash crops. In addition to the cash crops appearance, highland people are facing with the land lost resulted from land grab and land contraction.

In 2005, Sovathana Seng conducted a research on “The transformation of Northeastern Cambodia: The Politics of Development in an Ethnic Minority Community of Yak Kaol”. In his study, he found that development brought transformations to the highland community. Development projects such as land and forest concession such as Hero Taiwan Company caused harmful effects on livelihood, belief system, and the environmental landscape on highland people in Yak Kaol Community. To deal with this condition, highland people have adapted their knowledge on land tenure and enhance their management.

The previous studies found good results on the condition of highland people who have faced challenges from the impacts of development. I agree with the finding stated that development brought agro-industry and land grabbing. Development also brought changes and harmful affects on the poor community. Land and forest concession affected the livelihood, traditional practices, customary laws and lead to the adaptive knowledge as what stated in Sovathana study. In the context of development, highland people have also situate their knowledge in order to deal with the pressures.

My research will provide more knowledge for the understanding of adaptive practices of Ethno-Ecological Knowledge or situated knowledge among highlanders. Because of the time constraint and the financial matter, I could not study very detailed with all the ethnic groups in Ratanakiri. Therefore, my study focuses only on the on highlanders who are living in Poy Commune, O' Chum district, Ratanakiri province.

## **2.1. Research Conceptual Framework**

Based on the above literature review, the researcher comes to a conceptual framework for the study on situated knowledge on land use practice in the context of development. A numbers of factors such as NGOs, local authority, land law, and the customary laws in the highland community as well as Krak Chhrok and community elderly councils play important roles in the situated knowledge. Firstly, the diagram shows the aspects of indigenous knowledge. Secondly, the diagram indicated the state agencies through development discourse and technology of power which have impacts on the indigenous knowledge. Thirdly, the diagram reveals the appearance of situated knowledge with the support from NGOs, local authority, and land laws, in order to deal with the effects on development. Finally, property regime is used to reflect the property system of highland community in both indigenous knowledge and situated knowledge system.

## **3. Findings**

This study has sought to observe the development impacts and the traditional practices of highland people in Yak Poy Community on their land use, historical development that affected their knowledge, and the absorb of situated knowledge in order to deal with the pressures. The effects of the development on land use practices must be considered in broader aspects of historical development in Ratanakiri province and the development of local knowledge in Yak Poy Community. A central theme of this research focuses on how the highland people absorb their knowledge to deal with the outside pressures on land management. It also analyses how the appearance of community forest establishment and communal land title registration play important roles in developing situated knowledge.

The study of development impacts and situated knowledge on land use practice in the context of development tries to explore the development impacts on their traditional knowledge which leads to the adaptation of situated knowledge to deal with the challenges as well as to protect their resources. The study focuses on the traditional practices on land use among highland people in Yak Poy, above all Kres village that has been practicing their knowledge on land use and has been adapting to situated knowledge in order to have stronger voice to protect their resources. It is also stresses on the roles of customary laws, NGOs agencies, and local authority that have been involved in the processes of strengthening local capacity and enhances their knowledge to protect their resources. The following point focuses on the impacts of development on the highland people in the field research area and the surrounding areas.

Since Cambodia opened its free market economy, there are many investments that have flown into Cambodia. There are many foreign investors who came to Cambodia with huge amount of money to build factories or companies. Also, infrastructure system has been improved within the whole country in order to provide comfortable transportation and economic benefits. In addition, education program, especially in the northeastern provinces of Cambodia where many people had little chance to get better education, is also enhancing. To protect forest and provide job to local people in order to reduce poverty, the government also granted many land and forest concessions to many companies. Ratanakiri province, with abundant natural resources such as dense and valuable trees as well as red soil which favors the industrial crops, has become the target of development policy, particularly for land concession and land contraction. Further, this province has attracted many low land people to immigrate because of the economic opportunity that they can get to make their lives better.



With the land and forest concessions, huge numbers of immigrants, and the existence of land contractions and land grabbing cause by the outsiders, many highland communities are facing serious problems that affect both their environment and their cultures. Some land concessions such as Oil Palm concessions in O Yadao district and Hero forest concession overlap with the territory of the upland communities. Clearly the Hero concession area in O' Chum district overlapped many upland communities such as Kalai, Svay, Santuk, Krolar...etc. Not only land and forest concession that affect the upland communities, but the flow of immigration and land contraction also shape the landscape, traditional practices, and the solidarity of highland communities.

What are mentioned above really influence the upland communities. With land and forest concession as well as large numbers of immigrants and land contractions, many troubles arise among those communities. Some villagers lost their residential area and the upland rice shifting cultivation plot. Some Kreung communities located near O' Chum town already lost their residential area and some part of their shifting cultivation plot which requires them to move further into forest areas in order to make new settlement area and clear new upland rice fields. In addition to this problem, the practices of rotational rice cultivation seem not to have sustainability. With land shortage (from land grabbing, land selling, and the conversion of some upland rice plots into cashew plantations among highland communities) contribute to the unstained rotational rice cultivation.

In the past, highland community, after several years of rice cultivation (depending on the quality of soil), kept the plot fallow for 10 to 15 years. Doing like this, forest can regenerate until it was cleared again. However, nowadays in many upland communities, the period of keeping land fallow last for short time (around 3-5 year) because they do not have enough reserved forest area as they had in the past. Within short time of fallowing, young forest can not regenerate and the land quality also decrease which affects the livelihood of the people who mostly depend on the rice yield for their subsistence.

Land and forest concession, immigration, and deforestation cause by outsiders' plotting also make serious problem to upland communities' livelihood. Traditionally, the highland communities depend on the meat from hunting and fishing. This additional meat provide protein to their daily in which most of the time they have only steam rice with boiled vegetable or edible leaves. However, with the destruction of forest which is the shelter of various wild animals and the anarchy use of gun (left from the time they stopped served as soldiers), people rarely get wild animal from their hunting. In addition, with the destruction of ecology in and around the lake such as the water pollution and the stream block through felling big trees in the stream or lake which interrupts the movement of fish and some fish die. As a result, the wild animal and fish in their upland communities decrease which more or less affect the daily food nutrition. Besides having an effect on landscape and the sustainable ecology system, development in the images of land and forest concession including the immigrants and land contraction, also harmful to the customary law and community solidarity.

Traditionally, upland community had maintained good relationship among their members. They were controlled by the Krakchhrok and the elderly council who were responsible for managing, teaching, transferring knowledge, and solving the conflicts among their members in the communities or with outside community. Ritual ceremonies played an important role in enhancing social solidarity because all the members, at this time, meet, work, and drink together. In addition, it is also a time that elder people can transfer their knowledge to young generation. During the ceremonies, members in one upland community can invite people in other communities to join and drink with them.

This can be seen through the ghost ceremony of Tampoun people.

Externally, it is the chance for villagers to meet and drink or share knowledge to young generation, but internally the ceremony indicates us the building social capital not only among members in a community, but also with the other community. However, in the context of development and the appearance of land concession, immigration, land contraction, land grabbing, and the introduction of cash economy, social capital among some upland communities becomes weaker. People in the same community do not trust each other and less active in the ritual ceremony. Also, they become ambitious and cheat. They cheat both their community members and the outside highland community through persuading them to left their finger print for accepting the development project such as building road or making big plantation which will provide benefits to them and help make their lives better. In contrast, there are no real development projects besides land contraction.

Land contraction also happens among the community and the outsiders. There are several cases that some upland communities sold the other upland community to outsiders by claiming that it is their ancestor's land. This activity causes conflict among the upland communities and really affects the intra-ethnic relationship which they had maintained in their ancestors' time. This can be seen clearly through the example happened in Ekapheap commune in year 2004 that Om villagers sold 150 ha of Pa Or village to outsiders.

Also, in this year, people in Kam village sold some part La Eun village to outsiders. Both events caused protests from the victims communities and de facto the inter-community relationship becomes weaker and it will be worst if the customary law in those communities were not enhanced or any legal solution are not provided because of the corruption. Although there are many upland communities experienced bad effects from the stream of development on both their landscape and traditional practices, but there are also some highland communities, until nowadays, can maintain their land security from both inside and outside pressures. In addition, they can maintain strong customary law working associate with the administrative system to protect their benefits and their traditional practices. From this section on, I will call this kind of knowledge as Situated Knowledge.

### **3.1. The Appearance of Situated Knowledge**

Since the first use in 1950s, situated knowledge has become more and more popular among the anthropologists (Conklin 1954). Indigenous knowledge, local knowledge or ethno-ecological knowledge are the predecessors of situated knowledge when this knowledge faces with new environment or harmful conditions in which it automatically has to adjust in order to survive. Thus, situated knowledge is a dynamic and diverse force which means that it can adapt with new situation by still maintaining most of its traditional components, but more legalized accepted. In the other word, it means that when local knowledge faces with the serious problems, it has to adapt or transform in some level in order to survive in new situation. Doing like this situated knowledge has both traditional and legalized entity to deal with problems. However, this adaptation does not mean that most traditional components disappeared and the rests are going to vanish in the future.

Upland Kreung communities in Poy Commune, O' Chum district, Ratanakiri province has situated their knowledge in order to survive as well as to deal with the troubles that are arising with their neighboring communities. All the nine Kreung villages located in Poy commune (Svay, Krolar, Santuk, Khmeng, Kres, Tagnach, Koy, Kanh Chheun, and Mass village) use their customary laws cleverly to associate with the legal

law to protect their communities successfully. These communities, since 1990s, have enhanced their local capacity by using both their customary laws with administrative help. We also cannot forget the contributions of some organization that provided both materials and legal assistance.

Obviously, to protect their forest from illegal logging, five villages in Poy commune (Kres, Tagnach, Koy, Kanh Chheun, and Mass village) initiated to establish community forest which was called Yak Poy Community Forest. This community forest covers the area of more than 5000 ha of forest area. This community forest located in the east and northeast of Kres, Tagnach, Koy, and Kanh Chheun current village location while it covers all the location of Mass village. In this community forest, there are dense forests with big valuable trees, wild lives, medicinal plants, vegetables, vines...etc. This community forest was established after a meeting of the five village representatives with help from NTFP and the recognition of the authority. Then in year 1997, after making regulations, drawing maps, and legally registered, Yak Poy Community Forest was established.

Later on, seeing pattern from Yak Poy Community, all the rest villages in Poy Commune also initiated to established another community forest which covers 3 700 ha of forest land. Even some part of Yak Kaol Community Forest overlapped with the concession area of Hero Company, but with the strong determination of local villagers and help from NTFP and Oxfams as well, they finally can create Yak Kaol Community for Krolar, Svay, Santuk, Khmeng, and Vorng villages. Upland community in Poy commune does not only associate with forest protection by combining their customary laws with the administrative laws, but recently it also participates in the process of communal land tenure registration.

Krolar, one of the biggest Kreung community in Poy which has stayed on the same location for generations, participated actively with the process of communal land tenure registration. In 2002, Krolar villagers agreed on the regulations and status of communal land tenure registration after long discussions among members of the community, village chief, Krak Chhrok, elderly councils, and the relevant stakeholders. Highland people observed that the upland communities have experienced serious land lost and land grab which required them to have legal acceptance within their customary laws to protect their traditional practices as well as their ancestors' land from the threat. Therefore, NGOs, local authority seem to play important roles for helping the upland community in Poy commune, but most important factor is the highland customary laws and their elderly councils that have played very important roles in maintaining, preserving, and articulating their legacy.

### **3.2. Roles of Customary Law and NGOs as an articulation for Situated Knowledge**

In upland community, traditional roles and the important people such as Krakchhrok and elderly councils play crucial roles to maintain, transfer, and disseminate knowledge to young generation as well as solving conflicts and enhance their social solidarity. In the same way, when facing outside threat, customary laws play vital roles to challenge the difficulty. When the problem is serious which is far from the power of customary laws to solve, help from NGOs plays important roles in assisting local community people to build their capacity.

Traditional laws play crucial roles in protecting the traditional practices as well as their identity. In Yak Poy community, with strong customary laws, Kreung communities in this area can preserve much of their traditional practices on land use and land management. With the strong customary laws which ban the community members from selling land, this community can preserve much of their traditional practices and

land security compared to other highland community surrounding. As a matter of fact, all the highland community in Poy commune, except Mass village that used to grant about 500 ha of land to outsider with some promises, can protect the land from outside land contraction or land grab.

Communal land control is still strong among the highland community in Yak Poy community. All the highland Kreung control their upland rice areas communally. In the other word, it means that all the rice shifting cultivation spot belongs to every highland Kreung members in the community. Even though they have their own rice plot and cultivate for their family, but the piece of upland rice plot a family is cultivating does not belongs privately to that family. It is the common property of the community; the common property of every member of the village.

Every member in the community can cultivate any plots they prefer within their community boundary by respecting the traditional rules. They can clear new upland rice farm in the reserved forest or on the old plot of somebody plots, but they need to ask permission from the people who used to cultivate on that plot. Usually, highland people will permit other people to cultivate on their old plot if they do not plan to cultivate on that old plot. This traditional system is still strongly practiced among the Kreung people in both Yak Kaol and Yak Poy community in Poy commune.

However, with the population growth and the enlargement of cash crop farms, people in each community need more cultivated land which requires them to broaden their upland rice plots. As a result, some highland community made new upland rice plots overlap with neighboring community. This can be clarified through the example of Krolar community that some of their members are cultivating the upland rice plot in the territory of Tangtrapong community. In addition, people in Kres community mentioned that several families from Koy village are planting upland rice in their community territory while Krolar community claimed that Kres community is using some area (along O Tong stream) that belongs to their community. Although there is some overlapping of upland rice field between some communities, there were not any serious problem existed from such events.

To deal with this territory overlapping, elderly councils from the relevant villages including the authority representatives such as village chief and commune councils negotiate and define the boundary that is recognized by all the parties. This can be seen from the negotiation between the elder councils from Kres village and Krolar about the overlapped area along O Tong stream located on the south of Kres village. The negotiation also occurred between Krolar elder councils and Tangtrapoung village which some of Krolar villagers are cultivating on the territory of Tangtrapoung boundary. Through these events indicate that the upland people in Poy commune still strongly practice their customary laws on land use to negotiate and solve the problems. This system reinforces the social capital among the highlanders and also helps strengthen their traditional institution from the outside pressure, especially on land grabbing and land contraction.

In every highland village in both Yak Kaol and Yak Poy community, traditional laws play an important role in protecting their land security. Besides controlling communally on the upland rice cultivated plot, traditional laws also function as a powerful authority to forbid the villagers from land selling with outsiders. Although the traditional laws do not directly restrict the village members not to sell their land to outsiders, but it de facto influences the villagers' decision on land selling with outsiders. All the families in Kres village, from my observation and interviews, indicated that they do not dare to sell their land to outsiders even selling is not completely forbidden. Most of the villagers mentioned that they are afraid of land less, especially from the traditional

sanctions after they sold their land.

In Yak Poy community, most of villagers do not fine those who sell their land to outsiders, but they sometimes will not allow those who involved with land contraction return to live in the village. Most seriously, they do not give or allow those people to cultivate on their reserved area since they are afraid that those people will sell their land again. Even the reserved areas in the village is communally managed which means that it is belongs to every members of the village, but with those who concerned with land selling will face difficulty to make use of the communal management since many people in the village, particularly the elderly councils agree not to allow those people to control another piece of land in their village. This system works well in Poy commune, especially in my field work (Kres) where a majority of the population respects the system of restriction for those who sell land to outsiders.

People can not sell all kinds of land in the village to outsiders. They can sell only the land that it is de facto belongs to their private ownership. Not all land is the private property of those who used to cultivate or are cultivating on that land. As mentioned above, most of the land in the village such as upland rice plots, reserved forest areas, forest community, streams, and mountains are the common properties of the villagers whose village boundary covers. From the local perception, land that covers by cash crops such as rubber, cashew, coffee, and other fruit trees are supposed to be the private properties of the holders. Even though this system is not mentioned in the land law 2001, but it is commonly accepted in Poy commune as well as other places in Ratanakiri.

Most of the private land property of upland people in Yak Poy community is the cashew crop farm. Huge amount of this area located around the village location while the further area is reserved for upland rice cultivation. Within this ownership, on one hand the holders can sell this private land property to outsiders, but on the other hand they also face challenges to find new piece of land if they want to stay in the same village and practice rice shifting cultivation.

From nearly two months of participating with the highlanders in Kres village, accompanied by visiting to various villages in Yak Poy community, I observed and found that nearly all of the villagers are afraid of marginalization from their community if they sell land to outsiders. They strongly claimed not to sell their land to outside people even they give them a high price. They mention that if they sell land, people in their village including the elderly councils will not allow them to cultivate on the other plots so that they will face difficulty since they do not know how to support their livelihood besides depending on traditional rice cultivation. I also observed that people in other villages in Yak Poy community have similar tendency as those in Kres village on their land use. From this tendency, it indicates that traditional laws plays an important roles in maintaining and preserving the land security of the highland people in Yak Poy community as well as those upland people in Poy commune.

Traditional laws do not always prevent highland people from selling their land all the time. Traditional laws do not restrict the highland people to sell their land to outside people, but it allows people to sell their land to the same ethnic groups who have their clan in the village that the sellers are living. People in the same village can sell their land to other people who are living in the same village. This activity rarely happens among the villages in Yak Poy community since every member of the village has equal right to take advantage from the communal land within their village boundary. Land contraction among the community exists when the seller wants to move to other village with reasons, but mostly because he or she moves to live with his or her spouses. In this case, they can sell only the land that they planted cash crop such as rubber or cashew trees. In my field work there is one case of intra-village land selling because the seller has to

move to live with his wife in other village where he has enough cultivated land.

Upland people can hire their cash crop farm to other people in the same ethnic group in return of something, especially money and motorbike. When the highlanders need money or motorbike, they can hire their cash crop farm to other people with exchange of the required tools with the limited duration. Usually, the period of hiring is not long since they know that it will be harmful if they rent their cash crop farm for long time.

There are two cases of this situation happened in my field work. There are two cashew farms were rent for two years in exchange of motorbike. Besides renting cash crop farm to other people, upland people can also invest with outside people on their land. It means that the outsiders pay money and all the required materials for the highlanders work on the farm. Then, they will share the benefits in three parts. The outsiders who have the capital get two parts of the benefit and the rest goes to highland people who have labor and land.

Although people can hire land to outsiders or invest their land with outsiders, it does not mean that they are against the traditional laws. Traditional laws still play important role on land protection since every upland people do not favor the land contraction to outsiders. Thus, the land owners can only rent or invest without the possibility to sell land to outsiders because of the pressure from the majority who oppose land selling to outsiders. The awareness of the land value and the effects of land lost among the upland people is also another contribution to the land security in Yak Poy community. NGOs have played crucial role associate with customary laws to build people capacity and make them aware of land for their traditional conservation as well as their next generation's future.

There are many NGOs that have been involved with the upland people in Ratanakiri. However, we should notice that before the presence of these organizations, there was one program called SEILA that worked with the upland community. After SEILA there are many NGOs were established in which most of their works are relevant to the upland people. These organizations focus on different fields such as building local capacity, health care improvement, agricultural training skills, traditional conservation, land security, and natural resources management. Among these organizations, I noticed that there are several organizations that are working actively in Yak Poy community. These organizations are working closely with the traditional laws to assist highland people to protect their tradition, improve their living standard, and conserve their natural resources.

CIDSE (currently calls DPA) was involved with the improvement of agricultural works. They help highland people to improve their living standard through the improvement of their agricultural work. They conducted short course training skills to local people in order to assist them to improve their agricultural product. They teach highland people to plant more crops, especially cash crops on their land. In addition to training, they also provide seeds and cash crops tree to upland people. DPA also establish cow bank, rice bank, and buffalo bank for the local people through providing the resources for them. The poor people and widow families have priority to get this benefit, but they have to change the resources to other people in a limited time.

Further DPA helps highland people in my field work to establish the Association of Red Soil Agricultural Development which local people are the core members of this association with technical and needed resources from the organization. This association aims to assist local people to get more benefits from their cashew crop. DPA will train people how to run the association with providing machine to grind cashew nut into a product which will help highland people get more benefits than sell cashew nuts to

middlemen. Most important, DPA also established literacy class for both adult and children, but there is only children literacy class since old people are very busy and do not have time to study at night time.

Recently, DPA plans to help people improve the upland productions through the introduction of new cash crops. The organization intends to provide cassava and oil papaya to highland people in Kres village. Within the new cash crop introduction and the benefits they get from the cash crops, upland people tend to convert as much of their possible land to cash crops farm. This tendency is rapidly spreading among the highland people in Kres village which requires more land for cash crop trees. From the researcher observation, he noticed that with the tendency to cash crops planting, more and more shifting rice plots will be converted to new cash crop plantation. Nowadays, each family in Kres village own around 2 ha of cashew plantation in which we can multiple with 52 families in the village equal 104 ha. Kres village posses only 502 ha of land and now around 100 ha were converted to cashew crop. In the cashew farm, they can not plant any other crops because new crops can not survive under the cashew trees. Thus, they have to plant new cash crops on the upland rice plots which will make the rice shifting field shrink.

HA also plays crucial roles in awakening and preserving the traditional culture of upland people. The organization sends their staffs to every district of Ratanakiri to interview as well as to keep the record of the traditional practices. In addition to the work of HA, other organizations such as HU, CARE, and CANDO also involve with the upland people in Poy commune. HU and CARE works on the health promotion while CANDO works on the promotion of weaving. Still there is one organization that works closely with the upland people to manage the natural resources.

NTPF plays an important role relevant to land security and build local people capacity to deal with the outside land grab. They teach upland people the land law 2001 in which some articles mention about right of upland people to manage their resources. In addition, this organization also helps highland people to establish community forest and recently land title communal registration for upland people. NTPF works contribute to the adaptation of local knowledge in Poy commune because their works and objectives are not so different from the traditional practices. Land title communal registration which is legally recognized by the authority is similar to traditional common land property that upland people have used it for centuries. In addition, communal land registration will help upland people to protect their land security from land grab which is spreading widely in Ratanakiri province.

### **3.3. Community Forest Establishment**

With increasing pressures on the natural resources, especially the encroachment to the dense and semi forest area that have provided other additional food sources to upland people after their rice. This situation caused concern to highland people whose lives depend on the natural resources. To deal with this challenge, in January 1997 representatives of Kreung highlanders from six villages (Kanchheung, Koy, Kres, Klong, Mas, and Tagnach) in Poy commune met in Poy commune centre to initiate a forest conservation association to protect their four old grown forest sites located in northern Poy commune. These four parts cover huge forest area which upland people in Yak Poy community can collect NTPF.

**Conserved Forest in Yak Poy community**

Forest Name	Covered Area (ha)	Village Use NTFP
Tapean	1800	Kanchheung and Mas
O Tabarr	1600	Klong, Koy, Kres, Tagnach
Stieng	900	Mas
Yao	850	Mas
<b>Total</b>	<b>5150</b>	<b>Kanchheung, Koy, Kres, Klong, Mas, Tagnach</b>

Source: NTFP project, May 1997

From the meeting, with concern on the danger which required the six villages to control the four main forest areas together, the representatives of the six villages agreed to establish conservation association. To control the forest areas legally, six village representatives suggested NTFP in Ratanakiri to compromise the authority and the relevant institutions in order to get recognition from the authority. Thus, Kreung people in Yak Poy Community can control the forest officially and can protect it from any serious dangers. In respond, NTFP worked actively to compromise the authority and finally they can establish Yak Poy Forest Community with the creation of clear status and regulations for the six village members to implement.

Yak Poy Community Forest located in Poy commune and covers the four main forest areas that six villages in Yak Poy community are using. This community forest covers 5390 ha of reserved forest as well as a lot of medicinal plants, vegetables, and fruit trees. In the north, it borders Ton village in Taveng Leu, while on the south it shares the boundary with La'ak village. On the east, it frames with O Chul and community rice shifting cultivation plots on the west. In this community forest has dense forest, semi forest, streams, and mountains.

**Yak Poy Community Forest**



Source: NTFP project, May 1997

In the status of Yak Poy Community Forest, there are seven chapters which divided into thirty seven articles. Chapter one mentions the aim and objectives of the Community Forest, chapter two indicates the general regulations, chapter three reveals

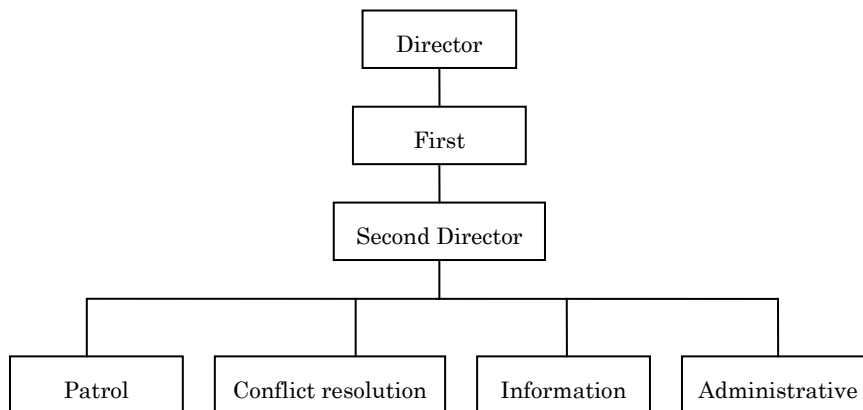


the community structure, its duties and responsibility, chapter four talks about the budget such as income and expense, chapter five describes the NTFP activity, while chapter six points out the fining and punishment, and the last chapter refers to the conclusion. Following, I will briefly summarize the important points from the first six chapters of the community forest status. In chapter one mentions about the aims of the Yak Poy Community Forest Committees which focus on the sustainable use of the resources that can last long for generations. In addition, it aims to improve the living standard of the six Kreung villagers who use the forest. It also cites the action to protect the anarchy use and conserve the forest as well as reforestation.

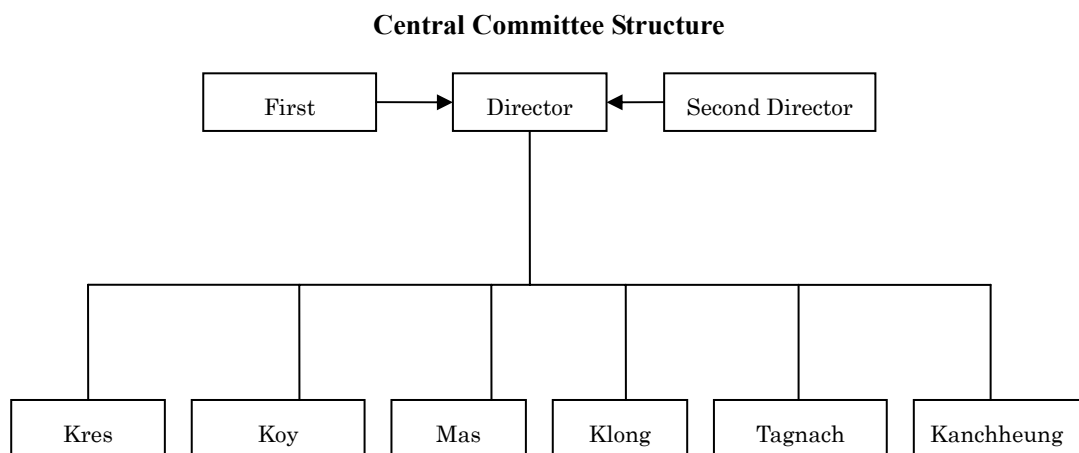
Chapter two focuses on the location, resources, and the villages that can use Yak Poy Forest Community. In addition, it bans the encroachment into the community forest area as well as the use of illegal tools such as guns or electronic tools. Further, the regulations required upland people in Yak Poy to reforest.

Chapter three describes the community forest committee, its duties, and responsibilities. The community forest committee structure consists of central committee and village committees work in cooperation with the supporters and commune advisors. Each village has its own committee which has director, two vice directors, and four departments. The four departments have patrol department, conflict resolution unit, information unit, and administrative sector. All the committee members are elected from the villagers and has two year mandate.

#### Village Committee Structure in Yak Poy Community Forest



Central committee which is the main committee to control the Community Forest has six members in which each member is the director of each village committee. This central committee works closely with the supporters and commune advisors that consists local authority, relevant institution from the government, and other volunteer organizations.



Source: Yak Poy Community Forest status book

Chapter four of the community forest status mentions about the income and the expense of the central committee and village committee obtained from tourist, donor, supporters contribution as well as income from the NTFP. Chapter five describes the regulations on getting benefits from NTFP and the procedures required when villagers want to use trees and other NTFP products for their local use. In addition, this part also bans the falling down trees without permission, especially the fruits trees as well as the use of harmful tools trees in the community forest. Furthermore, it provides opportunity for outsiders to use the NTFP in the community forest, but the outsiders have to respect the rules and regulations.

Chapter six talks about the fining and punishment for those who commit against the rules and regulations of the community forest status. Local people in the six villages will be fined 230000 Riel per ha if they make their rice plot in the area of community forest. For the outside villagers have to pay 500000 Riel per ha if they make rice field or Chamkar in the community forest and they will be fined four times which equal 2000000 Riel per ha. It also regulates the punishment for those who cause forest fire. For forest fire causes by intention, the people who are responsible has to pay 150000 Riel per ha, but if it is caused by accident, they have to pay 50000 Riel per ha.

In short, the community forest regulations focus mainly on the communal forest conservation, reforestation, restrictions on the forest use as well as NTFP, banning illegal logging or using harmful tools in the community forest, and the punishment for those who violate the regulations and cause dangers to the community forest. All of these regulations are enforced by the central committee and each village committee which has four units to implement.

### **3.4. Land Use Tenure Adaptation**

Traditionally, highland people controlled their land communally which means that people in the village have the same right to use land in the village with clear sense of ownership. Although they did not have clear boundary on map, but they know clearly which patches of land belong to this family and other families. They rarely had serious problem with land use as well as land management because they had enough cultivated land with low population and less pressures from outside. However, after 1993 lots of pressures have appeared in the highland community. Land grabbing and land contraction are spreading among highland community in Ratanakiri as well as in O Chum district where a majority of ethnic Kreung inhabit. Many highland villages in O Chum district

experienced land grab and land contraction which provided little benefit compare to negative effects. Some villages lost most or nearly half of their land along the main roads or path and some conflicts also arise within the same ethnic people and with outsiders. With money from selling land, they bought modern tools, popularly motorbikes which Land pressure encourages highland people to find new solution to protect their land security and their traditional practices. Inevitably, highland people have to tackle with the pressure through using their local knowledge, legally solutions, or combining the first and the second.

Some villages in Poy commune where I conducted my study have cleverly chosen the third choice to protect their land security. With helps from NGOs and local authority, they establish communal land title registration which is the combine of their local knowledge and the legal laws. The tendency toward the adaptation of local knowledge on land protection and land right appeared in 1997 among highland Kreung in Krolar village. At this time, a representative from Krolar village expressed their concern on land encroachment and their intention to reconstruct the community rules and regulation to the participants who participated in the national forum such as IMC, PLTD, NTFP, CIDSE, UNDP, CARERE, and ILO. This is the first time that highland people expressed their concern and intention on their land use and management in a public forum to support the highland community development, especially their willing to awake the awareness of upland people regarding their resources management.

Responding to the highland concern, intention, and suggestion, in 1997, NTFP created a network with Krolar village and helped strengthening the local capacity through short course training as well as study tour to some provinces in Cambodia and Thailand. In the same year, NTFP conducted a pilot project on land right options in Poy commune mainly focused on Krolar village. As a result, they found that land security options for agricultural land and forest land in Poy commune included several main points such as individual title for the paddy rice, communal title for all or nearly all the current village agricultural land, communally management through traditional decision making processes, long term user or community concessions for use of communal agricultural lands, and long term user or community concession rights for forest lands through a contractual arrangement between the government and local villages or the commune.

In 1998, Land Use Committee carried out a workshop in Krolar to teach the villagers the land rights and land tenure policies. From the workshop, villagers agreed to control their land communally based on their customary laws combining with existed legal laws to protect their natural resources. By doing so, they have collective voice which is more legally acceptable and have stronger voice to deal with outside pressures on their land security which they can use legal actions to protect their land from the outside encroachment who usually use their power or any legal activities to grab the upland land.

To accomplish this purpose, Krolar villagers and NTFP staffs worked closely to prepare the land status, rules, and regulations. In order to make status, rules, and regulations, NTFP provided a numbers of trainings and meetings to Krolar villagers, especially the village chief, Krakchhrok, and elderly councils who are the important people in the village or in any decision. Local villagers shared ideas and discussed the status, rules, and regulations with helps from NGOs and relevant authority. Any rules and regulations derived from the local people while NGOs worked to compromise and facilitate them. Each rule and regulation are discussed and accepted from the villagers who participated in the discussion.

Before reaching status, rules, and regulations, NTFP helped villagers to draft their village map. They first train important people how to draft map and what should

they include in the map. Then, they will ask villagers such as village chief, Krakchhrok, elderly people, and villagers to draw a map on the paper. Villagers draw all the important locations in the village on the map as well as their village boundary with neighbor villages. When the draft map is completed, several days meeting will be held to discuss the draft map. Village chief, Krakchhrok, and elderly people from each neighbor village come discuss the draft map. They check the draft map carefully and discuss the draft map if there are some overlap areas. Then, they will compromise until each village representatives agree on the map.

#### **4. Conclusion**

In conclusion, development brings both advantages and disadvantages to highland community. For some highland community face serious impacts from some development projects, but there are also some communities that can survive from this situation. Highland people in Yak Poy Community have situated their knowledge to maintain their traditional practices, customary laws, as well as to have more legal status in protecting and managing their community resources. This can be seen through the establishment of Community Forest in which the six villages agreed to control their forest area communally with the legal recognition from the local authority and the state. In addition, highland people in Yak Poy Community have also situated their knowledge on land use and management. They have adapted the communal land title registration that allow them to have legal title with the communally control on their community land except the cash crop area that is controlled by the family that plant the crops.

This kind of adaptation is very useful for the rural community to protect their resources as well as their traditional practices and customary laws. As the benefits for the local people, the development agencies or decision-makers should take this pattern into consideration in order to have sustainable development in which it provides satisfaction to development agencies and accept by the local people in order to avoid the development discourse.

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## Awareness about Environmental Issues and Management of Natural Resources by Farmers for Sustainable Agriculture

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### 1. Introduction

In India the present population of over 1000 million, accounting for about 18 percent of the world's population, is estimated to become 1.4 billion by 2025 and 1.7 billion by 2050 AD, needing annually about 380 Mt and 480 Mt food grains respectively (Yadhav 2008). This scenario along with the increasing industrialization and urbanization will place tremendous pressure on the shrinking natural resources. However, we still have the capacity to produce enough food to meet the basic requirements of the burgeoning population, but the moot question is whether, we can do so while maintaining our natural resources and preserving the bio diversity at the same time.

#### 1.1. Basic natural resources in agriculture

##### 1.1.1. Land

The dwindling per capita availability of land that decreased from 0.5 ha in 1950-51 to 0.15 ha in 1999-2000 because of population escalation. It is likely to reduce further to 0.08 ha in 2020AD. Continued and excess application of chemical inputs and erosion due to wind and water has made our soils unproductive and nearly unfit for cultivation of crops. In India at present 3.90 million hectares of the land is used for non agricultural purposes and 8.53 million hectares of land is found in water logged condition. Alkali soils account to 3.58 million hectares and salinity in 4.04 million hectares of land.

##### 1.1.2. Water

It would be of interest to know that the irrigated area in India has increased from about less than a million hectares in 1800 to about 5 m hectares in 1900 and now it is 88 million hectares. In India, rivers, tanks and underground water forms the basic source for the irrigation. Every year nearly 1.75 lakhs of tube wells are added and the water table is declining steeply everywhere. Tanks are the most popular mode of cheap *in situ* and consumer friendly way of water storage system in ancient India. Now, tanks got silted up and converted in to housing plots or sewage tanks (Leena 2006). However, tanks irrigate 10 per cent of the cropped area. The country now faces shortage of water a key input for agricultural production despite an annual average precipitation of 400 mha m. Erratic monsoons and faulty water management practices have contributed to the present state of affairs.

##### 1.1.3. Vegetation

India is still far away from the goal of bringing 33 per cent of its geographical area under trees as stipulated in the vision statement of National Forest Policy. At present the forest cover in our country is 637,293 sq km which is 19.39 per cent of the geographical area of the country. The declining trend due to deforestation is - 0.01 per cent / annum. There is steady increase in the deforestation rate (Arunachalam 2007).

#### **1.1.4. Animal**

Livestock is another major natural resource in Indian farming. In the absence of favorable condition for agriculture, livestock rearing is the only alternative source of livelihood for majority of the rural population. During 1951 the livestock population was 292.2 million and now it is 652.7 million. India has got about 9.5 per cent of the world's cattle population, while the total geographical area is only 2 per cent of the world's geographical area. Variations in the number of cattle from state to state seem due to climate, grazing facilities and the area under fodder crops. The cattle dung annually available amounts to about 1200 million tones of which 400 million tones are used as fuel and 215 million tones as manure and the balance being wasted (Pandey 2007).

#### **1.1.5. Labor**

In India there are four common labor types available namely, family labor, hired labor, skilled labor and contract labor and among which family labor use pattern is most common in rural India. It may be noted that the proportion of agricultural laborers to the total labor force is at present 25.70 per cent (Singh 2008).

Even though there is a steady increase in agricultural labor force, the demand for labor in agriculture is highly seasonal and uneven due to the seasonal nature of agricultural operations. At present, agricultural production in the country faces severe labor related constraints such as, non availability of laborers during peak seasons and high cost of labor. The agricultural laborers also migrate to neighboring towns and cities for white collar jobs because the employment in agriculture is seasonal and uncertain. Moreover, the payment is also comparatively low than such non agricultural works.

### **1.2. Environmental Issues and Natural Resources**

A perusal of different literatures on natural resource management clearly indicates the following threats to the sustainable agricultural production.

- Unabated land degradation.
- Depletion of soil organic matter.
- Global warming and shrinking of water bodies and ground water.
- Depletion of grazing resources and soil erosion.
- Lack of adequate efforts for ground water recharge, recycling and water disposal.
- Soil erosion and run off.
- Soil salinisation.
- Lowering of water table in intensive cropping zones.
- Nitrate pollution of ground water.
- Excessive use of chemical inputs which spoils atmosphere, weather and soil.
- Monocropping affects soil fertility, pest out break and loss of natural bio diversity.
- Spurious inputs and over or under doing of pest management practices.
- Decreasing crop and livestock bio diversity.
- Rapid industrialization, poor waste / effluent disposal and recycling facilities.
- Subsistence farming and High cost of labor.

A thorough understanding of the awareness and perception about environmental issues and natural resource management practices will help in designing suitable extension strategies to make the farmers aware and perceive better about the issues concerned and adopt remedial practices. Keeping this in mind the present study has been carried out with the following objectives:

- 1) To identify and document the environmental issues and to study the awareness and



- perception of the respondents towards the documented environmental issues.
- 2) To study their utilization pattern of the natural resources.

## **2. Methodology**

Kanyakumari district of the state of Tamil Nadu was selected for this study as this district falls under high rainfall zone, and it is most benefited by both South west monsoon and North east monsoon. Various types of crops are cultivated in this district and hence, we can expect various types of resource use pattern in this district. A sample size of 200 farmers was selected by employing proportionate random sampling method.

An exhaustive list of environmental issues related with agriculture was prepared based on the knowledge gained in the pilot study and also in consultation with the local extension workers and environmentalists. Sixteen important environmental issues alone were considered for further analysis. On the identified issues farmers' awareness and perception were studied using well structured interview schedule. Based on the experience gained in the pilot study and also in consultation with the local extension workers and environmentalists an exhaustive list of land, water, vegetation, farm animal and labor management practices was prepared. Using this list the natural resource management utilization behavior was studied by employing appropriate statistical techniques.

## **3. Findings and Discussion**

### **3.1. Awareness about environmental issues**

A thorough perusal of the table 1 revealed that almost all the respondents were aware about the environmental issues namely, increased soil erosion, reduced ground water potential, uncertainty in the onset of seasonal rainfall, disappearance of traditional crops and varieties, loss of real taste in grains of field crops, fruits and vegetables, intensive weed growth, health hazards during cropping, increased atmospheric temperature, conversion of cropped area for residential purposes and consequently, the loss of green cover. An overwhelming majority of the respondents, were aware about the environmental issues namely, development of resistance to pest and diseases (95.50 %) and more incidence of pests and diseases (93.50 %). Further, it is noted that 90.00 per cent of the respondents were aware that, the rain fall pattern has been disturbed to a greater extent, ground water became more salty and increased level of soil salinity. Nearly 90.00 per cent of the respondents were aware about the loss of soil inherent fertility. Around three fourth of the respondents (74.50 %) were aware about more water logging and poor drainage.

### **3.2. Perception about environmental issues**

The findings in the table 1 shown that cent per cent of the respondents had agreed that, due to lack of vegetative cover and deforestation, heavy wind and rainfall displace the soil particles and consequently, it lead to soil erosion. All the respondents had also opined that due to the introduction of synthetic rubber, the area under rubber plantations was converted in to residential plots, which lead to the loss of green cover. Further, they have also agreed that the deforestation is the main cause for the increased atmospheric temperature. Almost an equal percentage of the respondents (99.00 %) had right perception that, excessive withdrawal of ground water and inadequate application of water harvesting techniques to recharge the same, lead to the reduction in ground water

potential.

Almost all the respondents have agreed that the introduction of hybrids and high yielding varieties lead to the disappearance of the traditional crops like ‘Jambaka’, ‘Bread fruit’, ‘Valuthulanga brinjal’, ‘Kanthari chillies’, ‘Red rice’ and ‘Nei poovan banana’.

An overwhelming majority of the respondents (98.50 %) had perceived rightly that improper handling of chemical inputs was the real cause for the increased health hazards during cropping. Almost an equal percentage of the respondents (98.00 %) have admitted that deforestation is one of the major causes for the prevailing uncertainty in the onset of seasonal rainfall. They further stated that the use of high yielding varieties and application of more chemical inputs lead to the loss of real taste in the grains of field crops, fruits and vegetables. Further, 93.50 per cent of the respondents viewed that the intensive weed growth was due to poor tillage and poor crop management practices.

Most of the respondents (87.50 %) were of the view that deforestation is again one of the major causes for the present disturbances in the pattern of rainfall. But 84.50 per cent of the respondents had agreed that the repeated and excess application of the same chemicals over a period of time against pests lead to the development of resistance in pests and diseases. About three fourth of the respondents (74.50 %) possessed right perception that the gradual increase in soil salinity is due to the application of more chemical inputs. The same percentage of the respondents agreed that the incidence of particular pests and diseases were found more in the monocropped areas.

**Table 1. Distribution of respondents according to their awareness and perception about environmental issues (n = 200)**

Sl. No.	Environmental issues and perception statements	Awareness				Perception			
		Aware		Not aware		Agree		Disagree	
		No	%	No	%	No	%	No	%
1.	E.I. Soil salinity - gradually increasing trend	180	90.0	20	10.00				
	Per: Application of more chemical inputs makes the soil saline					149	74.50	51	25.50
2.	E.I. Incidence of soil erosion more	200	100	--	--				
	Per : Lack of vegetative cover, deforestation, heavy wind lead to loss of soil thro' wind and rain water					200	100	--	--
3.	E.I. Soil inherent fertility lost	177	88.5	23	11.50				
	Per: More application of chemical inputs lead to loss of soil inherent fertility					136	68.00	64	32.00
4.	E.I. Ground water potential reduced	200	100	--	--				
	Per: Excessive withdrawal and absence of mechanism to recharge it lead to the issue					198	99.00	02	01.00
5.	E.I. Ground water became more salty now a days	180	90	20	10.00				
	Per : Excessive withdrawal of ground water over a long period of time leads to this issue					101	50.50	99	49.50
6.	E.I. More water logging and poor drainage	149	74.5	51	25.50				
	Per: Poor water management practices are the causes for this issue					119	59.50	81	40.50

7.	E.I. Onset of seasonal rainfall uncertain now a days	198	99.0	02	01.00				
	Per : Deforestation is one of the major causes for this issue					196	98	04	02.00
8.	E.I. Rainfall pattern disturbed to a greater extend	180	90.0	20	10.00				
	Per : Deforestation is one of the major cause for the issue					175	87.50	25	12.50
9.	E.I. Pest and diseases developed resistance	191	95.5	09	04.50				
	Per : Repeated and excess application of same chemicals over a period time against a pest leads to this issue					169	84.50	31	15.50
10.	E.I. Traditional crops like 'Jambaka', 'Bread fruit' Valuthulanka Brinja;', 'Kanthari chillies', 'red rice' 'Neipoovan Banana' have disappeared	198	99.0	02	01.00				
	Per : Introduction of hybrids and high yielding varieties lead to the disappearance above crops					198	99.00	02	01.00
11.	E.I. Grain of field crops, fruits and vegetables lost real taste	199	99.50	01	00.50				
	Per : use of high yielding varieties, hybrids and application of more chemical inputs make this issue					194	97.00	06	03.00
12.	E.I. Intensive weed growth	198	99.0	02	01.00				
	Per : Poor tillage operations and poor crop management practices lead to this issue					187	93.50	13	06.50
13.	E.I. Incidence of particular pest and diseases are more	187	93.5	13	06.50				
	Per : In monocropped fields such incidence are greater					149	74.50	51	25.50
14.	E.I. Respondents suffer due to health hazards during cropping.	200	100	--	--				
	Per : Improper handling of chemical inputs lead to this issue					197	98.50	03	01.50
15.	E.I. Area under plantation crops are being converted for residential purposes and loss of green cover	200	100	--	--				
	Per : Introduction of low cost synthetic rubber leads to this issue					200	100	--	--
16.	E.I. Atmospheric temperature has increased now a days	200	100	--	--				
	Per : Deforestation is one of the main reasons for this gradual increase in atmospheric temperature.					200	100	--	--

**E.I.:**Environmental issues

**Per:** Perception statements

### 3.3. Land management practices

There were totally twelve land management practices selected for this study. Out of the twelve land management practices, the adoption behavior of the respondents on the following practices were found conducive for achieving sustainability in agriculture.

- Selection of right crop for the soil (98.50 per cent).

- Use of traditional implements (86.50 per cent).
- Use of mechanized implements (56.00 per cent).
- Ploughing across the slope for soil and water conservation (58.50 per cent).
- Practicing mono crops (03.00 per cent).
- Use of bio pesticides to soil - Recommended dose (48.50 per cent) and Excess application (50.00 per cent).

Almost all the respondents have selected right type of crops for their soil. Traditional implements were optimally utilized by most of the respondents and optimum use of mechanized implements was seen with majority of them. Majority of the respondents followed the inter-cultivation operation of ploughing across the slope for soil and water conservation. Most of the respondents followed mono cropping practices sometimes and adequate application of soil bio pesticide was seen with nearly half of the respondents. Hence, it could be concluded that the above management behavior of the respondents could contribute to sustainable agriculture. In the case of adoption of maintaining optimal cropping intensity, use of organic manure, use of inorganic manure, crop rotation and chemical application to soil (like herbicides) the respondents were found to be on the wrong footing.

Majority of the respondents inadequately applied organic manure and excess application of inorganic manure was seen with 43.00 per cent of the respondents. The above two conditions will definitely affect the soil fertility and also its structure. Nearly three fourth of the respondents have sometimes followed crop rotation practices and excess chemical application was seen with 40.00 per cent of the respondents. When crop rotation is not followed, the farmers could not effectively utilize soil nutrients available at various depths. It is a well established fact that excess application of chemicals in to the soil will definitely spoil its structure and ultimately affect its productivity.

#### **3.4. Water management practices**

Out of the nine selected practices, the management behavior of the respondents on the following practices confirmed to the prescribed norms of achieving sustainability in agriculture.

- Rain water harvesting (61.50 per cent).
- Optimal irrigation (90.00 per cent).
- Optimum tillage to increase soil water holding capacity (90.50 per cent).
- Organic management practices like use of mulches (61.50 per cent).

Majority of the respondents have adopted rain water harvesting methods and optimal irrigation to the crops was done by 90.00 per cent of the respondents. Majority of the respondents (61.50 per cent) used mulches to improve the soil water holding capacity. Hence, it could be concluded that the management behavior of the respondents on the above practices could contribute to achieve sustainable agriculture. But in the case of construction of farm pond, regular cleaning of irrigation channels, lining of channels, disposal of excess water and use of drip system, the respondents were found adopting them in a way that may hinder sustainable agriculture. The above mentioned practices can be considered as very important as they relate to water harvesting, avoiding wastage of available water and the effective utilization of available water for increased production. The department of agricultural engineering should take adequate effective measures to convince the farmers, to adopt water conservation and use technologies for which the

government is providing liberal subsidies too.

### **3.5. Vegetation management practices**

Out of the nine vegetation management practices, the management behavior of the respondents on the following eight practices were found to be in line with achieving sustainable agriculture.

- Farm forestry (73.00 per cent).
- Agro forestry (92.00 per cent).
- Growing trees in field bunds (88.00 per cent).
- Growing wind brakes (76.00 per cent).
- Growing vegetation for natural fence (90.50 per cent).
- Burning vegetation for soil sterilization (76.00 per cent).
- Burning crop wastes for non agricultural purposes (68.50 per cent).
- Use of bio pesticides against crop pests and diseases (57.00 per cent).

It is observed that a vast majority of the respondents have adopted the above practices, which are essential for achieving sustainability in agriculture. Regularly following the above practices will aid in the conservation of this resource for future use.

Further, it is seen that only in the use of green and green leaf manure, their management behavior was not in conformity with the standard norms of achieving sustainability in agriculture. Only 8.00 per cent of the respondents were found adopting this practice.

In the study area, the extent of land use is very high compared to other districts and this has reduced the availability of source for green leaf manure. Under such circumstances, it is essential to make farmers in the study area to grow green manure crops in order to enrich their soil and to reap the benefits continuously in the years to come.

### **3.6. Animal management practices**

Out of the five selected practices, the management behavior of the respondents on the following practices confirm that they have taken adequate measures to achieve sustainability in agriculture.

- Keeping farm animals and birds (96.50 per cent).
- Carrying out farm operations with animals - Partially done (93.80 per cent).
- Providing balanced feed for the animal (59.00 per cent).
- Maintaining cleanliness in the animal shed (91.50 per cent).

Compared to olden days, the farmers have slowly reduced the no of animals maintained in their household and some of them have even stopped the practice due to acute shortage of labor and their changed attitude. But it is heartening to note that majority of the farmers are maintaining few animals and birds in their houses, which not only helps in performing various farm operations, but also supply considerable quantity of organic manure. Thus, the findings of this study by and large have clearly indicated that most of the respondents were managing their available resources very effectively in line with achieving sustainability in agriculture. It may be due to the fact that, it was Kanyakumari district which has cent per cent literacy level in the state of Tamil Nadu.

### **3.7. Labor management practices**

There were seven labor management practices selected for this study. The adoption behavior of the respondents on the following practices confirmed to the standard norms in achieving sustainable agriculture.

- Use of external labor - engaged sometimes (48.50 per cent).
- Effective supervision of hired laborers (98.00 per cent).
- Optimal engagement of labor (89.50 per cent).

Majority of the respondents used external laborers sometimes. Most of the respondents have effectively supervised the laborers and have engaged optimal laborers in their farms. Laborers were engaged to perform various farm operations, most of which involved the handling of various resources like water, manure and chemicals. Effective supervision will ensure the optimum use of available resources and also correctly performing various tillage operations. So the findings of this study in this regard showed that the respondents were consciously following labor management practices which can be believed to lead to sustainable agriculture.

In the case of use of family laborers (13.00 per cent), working along with hired laborers (25.00 per cent), operation specific contract system (30.00 per cent) and use of skilled laborers (32.00 per cent), the respondents were found lacking to the expected level. Effective extension education efforts should be taken in this regard to improve their management behavior.

## **4. Conclusion**

The study indicated that vast majority of the respondents were aware about various environmental issues and they have rightly perceived the cause of the issues. However the facts remain that the people themselves are responsible for such a state of affairs. Therefore, it is necessary to educate them not to do anything that may adversely affect their environment. Extensive use of mass media and personal approaches are suggested to achieve this.

The findings of this study indicated though the respondents were aware about various natural resource management practices, they were found lacking in the adoption of the natural management practices like, use of green and greenleaf manure, maintaining optimum cropping intensity, water conservation and optimal use of animal power, Intensive use of extension efforts to convince the farmers is suggested. They further expressed that lack of proper guidance and motivation on various natural resource management practices were their main constraints in adopting them. Formulating and standardizing appropriate natural resource management practices for achieving sustainable agriculture by the agencies concerned is essential in this regard.

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## Role of Tanks on the Livelihood of Village People

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### **1. Introduction**

According to our National Water Policy, planning and development of water resources needs to be governed by National perspective. It has been estimated that out of the total precipitation around 400 million .ha .m in the country Out of this, only about 50% can be put to beneficial use because of topographical and other constraints. The availability of water is highly uneven in space and time. The precipitation confined to only three to four months with 20-45 significant rainy days in the year. Hence there is imperative need for effective collection of rain water for storing in appropriate places (Reservoirs, Lakes, tanks, ponds, aquifers etc..) In order to use stored water efficiently for economical and social purposes.

Tank irrigation contributes significantly to agricultural production in parts of south and Southeast Asia. Especially in South India, tank irrigation has a long history and many currently used tanks were constructed in past centuries. Tank irrigation systems are less capital-intensive and have wider geographical distribution than large projects.

Water as a resource is one and indivisible; rainfall, river water, surface ponds and lakes and ground water are all part of one eco system. Water is also a part of one larger eco-system. So far, the principle consumptive use of water is irrigation .The irrigation tanks and ponds of south India are traditional water harvesting structures indigenously designed by native rulers and chieftains over several centuries and have been among the most important water for rural communities. . The distribution of tanks was quite dense in some areas. Bandara (1985) opined that the close juxtaposition of most tanks compelled some authors to believe that these tanks were not used entirely for irrigation but for storage purposes and to maintain high water table levels in the vicinity.

According to Sharma, tanks are the first among the nine types of wetland ecosystems in India. Sengupta (1993) argued that tank irrigation is an attractive proposition to farmers because it is estimated that the average net returns from tank irrigated hectare in terms of food grains is about three times higher than those from the unirrigated hectare. Tanks are more desirable from the welfare point of view in that they promote the development of backward areas.

### **2. Methodology**

#### **2.1. Selection of tank**

The study was conducted in the chinnapoolampatti tank in Madurai district in the state of Tamil Nadu, India. This traditional water harvesting structures situates in drought prone (or) low level tract. It has multifarious functions like, Irrigation, Drinking water for human, livestock, domestic needs, ground water recharge, fire wood and timber production, fish farming, fodder development, silt for agricultural lands and brick making, growing palm trees along tank bunds, cradle for migrating birds Totally, more than ten important resources were identified and documented for the study. The respondents in the study area were aware about the prevailing local resources



## **2.2. Objectives**

- 1) To study the performance of tanks on the livelihood of village.
- 2) Documented the available resources and to assess the usefulness of tank for village people.

## **2.3. Study location**

Chinnapoolampatti village comes under peraiyur taluk of Madurai district in the state of Tamil Nadu, India. Location of the village located Latitude is 09°45'30" and Longitude is 77°48'00". It has a total population of 1,189.

## **2.4. Particulars of the tank**

The tank comes under Panchyat Union. That means the tank command area is less than 40 ha. Which is maintained and operated by local Panchyat Union. Ayacut area is 40.12.5 Ha. Extent of the tank is 20.78.0. This tank comes under vaippar minor basin. The capacity of the tank is 8 mcft. The tank is non system tank which depends only rain fall.

## **2.5. Social composition of the village**

Total number of Household is 424. Out of that 300 Households own the agricultural land (both nanjai and punjai) rest of 124 households landless, work as agricultural labor (during agricultural season) and brick making (during non agricultural season).

In this study, an attempt has been made to analyses the performance of panchayat tanks on the multipurpose perspective. Various aspects on tank water supply and the overall tank performance are discussed in detail. The analyses and the discussion in this study are based on the detailed survey.

An irrigation tank is a small reservoir constructed across the slope of a valley to catch and store water. Generally the tanks have a maximum depth of not more than five meters although some are as deep as 10 meters. The tanks have existed in India from time immemorial, and have been an important source of irrigation especially in southern India. In Tamil Nadu state alone, there are about 39,202 tanks with varying sizes and types with system tanks (which receive supplemental water from major streams or reservoirs in addition to the yield of their own catchment area) accounting for about 15 per cent of the total. Non-system tanks (which depend on the rainfall in their own catchment area and are not connected to major streams, or reservoirs) account for 85 percent of the total tanks in the state.

## **3. Tanks and Resource Mobilization**

In ancient days, tanks were considered to be the property of rulers. The farmers paid a portion of the produce to the ruler. Farmers also were in charge of the maintenance of the tanks, and supply channels. Zamindars ensured the proper maintenance of the tanks, and channels, since they reaped the benefits of farming in large areas. However, when the British introduced the ryotwari system in 1886, tanks with an ayacut of 40 ha and above were brought under the control of PWD and smaller tanks were under the administrative control of local bodies, or vested with the villagers themselves. Since the local bodies did not have qualified engineers and the duties of the ayacutdars were not clearly mentioned, the system of the farmers themselves taking up maintenance work known as "kudimaramathu" works slowly decline.

Irrigation tanks in India are the classic examples of common property resources which are mostly distributed in southern states, viz., Andhra Pradesh, Karnataka and Tamil Nadu accounting for about one-third of the total irrigated area in these states. Most of the tanks have, over time, degraded into open access resources due to weak property relations. Encroachment, privatization and government appropriation of the tanks have been the main outcomes of the failure of local authority system to enforce the institutional arrangements under common property resources management regime. Tamil Nadu state has irrigation tanks with varying sizes and types with an irrigation potential of about one million ha.

There are also funds mobilized from forestry, fishery resources besides farmers own contribution. More commonly, the resources mobilized in the recent years can be grouped under forestry and fishery resources. Minor sources such as grazing lease, and goat rearing in the command areas (after harvest), sale of trees in tank bunds and village common lands were also considered in quantifying the resource mobilization by the farmers and authorities.

#### **4. Assessing Tank Performance in Multiple Use Perspective**

The tanks support not only crop production but also a host of other related activities such as providing water for drinking, washing, bathing (domestic uses), fodder and drinking water for livestock, fish culture, bricks making, social forestry and silt collection etc., (non-agri uses). Hence the performance of tanks needs to be re-evaluated in terms of the tanks' ability to shape the village economy in a holistic framework. The multiple tank uses have been evolving historically to some extent.

Tanks designed primarily to serve the village community, the tanks served the purposes of domestic, livestock and crop production needs. Brick making, fisheries and social forestry uses evolved gradually. Of these social forestry is of most recent in origin, but has greater revenue generation potentials. Due to the lack of formal property rights tanks also generate potential conflicts among competing users and the perception of relative importance varies among the various users of the tank based resources.

Thus even among the various multiple uses, some uses are most important and some uses may be less important for sustaining the village economy hence the farmers perception about various multiple uses need to be accounted for while assessing the performance of tanks. Hence proper weightage is given for each multiple use based on the preferential ranking of various uses by the farmers of the respective tank commands. The methodology employed for assessing the overall tank performance is given below.

Totally, more than ten important resources were identified and documented for the study. The respondents in the study area were aware about the prevailing local resources. This traditional water harvesting structures situates in drought prone (or) low level tract. It has multifarious functions like,

##### **4.1. Economical Usages:**

- Irrigation for agriculture.
- Livestock rearing (ranching and drinking).
- Fish farming.
- Silt for agricultural lands and brick making.
- Social forestry for fodder, fire wood and timber production.
- Common wells adjutant to tank for drinking and irrigation.
- Growing palm trees along tank bunds.

- Domestic use.
- Employment generation.
- Local market.

#### **4.2. Ecological Usages:**

- Ground water recharge.
- Cradle for migratory birds, etc.

##### **4.1.1. Agriculture**

Though several, potential uses exist for the tank water and tank space, irrigation use of the tank water is still most predominant. In any case, collective action for tank maintenance largely emanates from agricultural users. Invariably, the Water Users Organizations whether formal or informal revolve around. The farmers who use the tank water for irrigation purposes. The ratio of irrigated area to the ayacut area which otherwise represents the unadjusted tank performance index is taken as a proxy for the relative importance of agricultural use in the tank system in determining the overall tank performance. 150 Households depend on tank for irrigation in the tank command area. Tank is a heart of the economy at village level. People will get the income of roughly Rs 1,500,000 from paddy cultivation.

##### **4.1.2. Livestock rearing (ranching and drinking)**

Next only to agriculture livestock rearing is an important activity in the tank village. Around 75 households ranch their cattle in and around the tank area, around 100 households ranch their goats and sheep inside the tank area. The grazing will be available for nine months. Drinking water for livestock is available only four to five months. The livestock rearing is the supplementary source of income for village people. Sufficient amount of livestock manure helps to increase the fertility of the soil.

##### **4.1.3. Fishery**

It is an important water based resource of the tank system. The rights of the people to the artificial tanks are usually customary usufruct rights of the people if the tank is on public land. Rights of the tank are vested in the panchayat. But if the tanks are on private land the state or the people have no rights. If the lakes and tanks are natural, then the people have the customary rights and the state has the absolute rights.

Historically, the rights to benefits were vested with the respective local village panchayats as regards the fishery in the tank systems. There were no organized set up to culture fish and enjoy the benefits. But the village panchayats enjoyed the benefits whatever there was available establishment of Fish Farmers Development Agency (FFDA) in 1982 there has been an organized way of promotion, maintenance and harvesting and sharing the benefits of fishery in the tank system.

In this tank panchayat will seed the fish during the tank filling season, the water will be available next 3 to 4 months, by that time the fish will be matured. The panchayat will give tender to private party, by the way panchayat will get around Rs 15,000 per season.

##### **4.1.4. Silt for agricultural lands and brick making**

Silt is a fine particle of soil, which is carried by rain water from the catchments area which is surrounded by small slopes of hills. Silt is a productive soil which is suitable for agricultural growth. The silt removal historically has been through bullock carts. So bullock and bullock drawn carts population has been one of the major reasons for the

decline of silt removal from the tank beds for field application.

The silt is also useful for the making of bricks. Every year more than 200 to 250 trucks load of silt is removed from the tank area. But panchayat administration is not charging for that, because the removal of silt will increase water storage capacity of the tank. The water will be sufficient for the entire cropping season. The worth of the silt per truck load is around Rs 100. Every year they are losing around Rs. 20,000. This year panchayat administration is planning to collect some money from the truck owner. This tank location more than 25 brick industries depends on this tank for making bricks. Silt will be available for nine months periods.

#### **4.1.5. Social forestry**

Social forestry project was launched in 1981 with Swedish International Development Authority's (SIDA) assistance in Tamil Nadu. The project contemplated a massive afforestation programme to ensure sustained supply of fuel wood, bamboo, small timber, fodder, grass, fruit, oil seeds and other minor forest produce to rural population to satisfy local needs. More than 80 per cent of the social forestry has been established in tank foreshores and bunds and became integral part of tank systems in the recent years. Consequently a new set of rules and regulations were framed by the government for selection, planting, maintenance, harvest and sharing of income thereof.

In this village social forestry (*Prosopis* spp.) is an important tree in the tank area, particularly most of the trees are grown along the bunds. This practice is to increase the strength of the bund from erosion. This tree is useful for fodder for livestock, fuel wood and timber for village people. The panchayat will be responsible for cutting the trees. They will cut the trees once in 3 years and they will get around Rs 15,000 per cutting.

#### **4.1.6. Common wells adjuncts to tank**

There are one common well for irrigation during insufficient water supply at the tank. This well is located at adjuncts to the tank area. The well is recharged by the tank during the rainy season subsequently stored water by the tank. The well is owned by panchayat. They will be charging Rs 10 per hour.

There are one bore well near tank bund for drinking purpose. The water is pumped to overhead tank and distributed to village people for drinking purpose. The bore water is recharged by the tank throughout the year.

#### **4.1.7. Growing trees along the bunds**

The palm trees are growing along the bunds which strengthen the bunds from erosion. The leaves are useful for roofing the huts, wood for constructing the houses. Every year panchayat will lease the trees to some private party and they will get around Rs 1,500. This money will utilize for the small works to be carried out at tank area.

#### **4.1.8. Domestic usages**

When the tank filled, people tend to use the tank water for washing their cloths, and bathing, by the way more than 200 people utilize those recourses during the two months period.

#### **4.1.9. Employment generation**

There are 124 households who do not have owned land. So they work as agricultural labor and also most of the households in the village also engaged as agricultural labor.

#### 4.2.1. Ecological Important

Water filled in the tank during the rainy season which helps to improve the ground water level at nearby areas particularly in wells. In this reason common wells for irrigation and drinking water situated in the nearby areas. There are 12 wells and 4 bore wells situated in the tank command area, which helps to irrigate during the water scarcity period as a supplementary irrigation. The farmer who do not have well, they will get water from the well owner at the rate of Rs 20/hr.

The tank acts as a cradle for the thousands of migratory birds and helps to maintain the flora and fauna of the tank ecosystem.

In view of the inadequate financial support from the state for tank maintenance, farmers mobilize financial resources for tank maintenance from tank usufructs. The major sources of income are: a) sale of fishes raised in tank water, b) sale of trees grown on the tank bunds and the water spread area, c) sale of silt for brick making.

#### 4.3. Needs to be Strengthen

- a. Collection of fees from cattle growers for allowing the cattle in the tank command area after harvesting of rice crop.
- b. Sluice condition to be strengthened.
- c. Create awareness for using silt for agricultural purpose.
- d. Collect money for removing silt for brick making.
- e. Fish culture done by farmer themselves, by the way income will be maximized.
- f. From palm tree value added products like palm candy, toddy palm, handicrafts to be prepared.
- g. Renovation work to be required for common well for agriculture.

### 5. Conclusion

An important problem in creating new irrigation potential is limited financial resources coupled with improper utilization of minor irrigation sources (tanks). Using 39,202 tanks in Tamil Nadu, potential area are to be irrigated by tanks would be around 900,000 ha, loss due to defunct tanks about 50,000 ha, and hence, area that could be irrigated will be about 850,000 ha but actual area irrigated is around 670,000 ha. The estimated area lost due to the mismanagement will be about 180,000 ha palanisami (2001). Hence, improving the performance of tanks in Tamil Nadu seems to viable best available option. The tanks have wider geographical distribution and hence any investment to improve and restore them would be reach vast majority of the people. Moreover, tank irrigation is the most desirable system of water harvesting from the ecological and sustainable points of view.

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## Political Participation of Citizens in Mayor Election, Makassar City, Indonesia

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### 1. Introduction

General election is one indicator of stable and dynamic democratization of a nation among others. In Indonesian context, general election execution has been conducted periodically since the beginning of nation's independence. However, democratization process through prior general elections was not able to make it enough to mature democratic values due to authoritarian political system.

The expectation to an ideal democratic form started to emerge after 2004 general election execution which had been held relatively smooth and safe for a nation which has recently been free from authoritarian system. The execution of 2004 general election consisting of legislative and presidency election which was held without any serious harassment and chaos became a historical achievement for the nation.

The democratic stages of Indonesia were retested through governor and mayor election since 2005. Although, some people are still skeptic with the election due to insufficient of material and infrastructure preparation however, the governor and mayor election moment should ideally be considered as a process of democratization reinforcement.

The chance of political conflict in power struggle will increase along with the decision of governor and mayor election mechanism at the beginning of 2005. In the weakness of political awareness in grass root level, the Governor and Mayor Election become potential conflict, manipulation, money politics and intimidation.

In state context, people political participation is an individual involvement (private citizen) in understanding, realizing, analyzing, lobbying, and protesting a policy released by the government in order to influence the policy according to their interest.

From the above illustration, people participation can be understood as people involvement in narrow political context - state and citizens relation in governance frame, and also in wider political context - All citizens involvement in the process are unified to influence or to make a change in decision. People political participation is indeed a central theme of democratization process. In this point, the citizens have a role as a subject in determining their future.

Controversy about political participation in Indonesia is limited only to the level of participation of citizens in every general election. Before the reformation era, the rate of participation<sup>1</sup> was always 90 percent average (LSI 2007: 2-3). Therefore it's easily for people to say that the citizens' political participation is high. Actually it's not the case, or it's not exactly the only measurement of high participation of citizens in the general election. The more important thing is the guarantee and standard mechanism, convenient for all people to canalize their thoughts into a formal institution. Such an important people role is performing social control to the government and other institutions like House of Representatives or even the court.

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<sup>1</sup> Participation of voters in some references was called *voter turnout*.

We might be able to say that political participation of the citizens' increases lately. Demonstration become more intense, interactive TV and radio broadcasting dominate mass media programs. However, had the conditions mentioned guaranteed the real political participation?

Unfortunately it had not. The political participation on governor and mayor election tends to decrease lately. Truly, the execution of governor and mayor election becomes a moment to strengthen the political participation of the citizens; it does not only make the election as a political euphoria. With the governor and mayor general election, the political participation will be more effective.

However, the evaluation of governor and mayor election for 2006–2008 which had been conducted showed how low the political participation of the people in it. Some results which showed the low participation seen in the following table:

**Table 1. Political Participation of people in governor and mayor election**

<b>Province/ Regency (City)</b>	<b>Not involved in the election (percentage)</b>
City of Medan	45.32%
Province of West Sumatera	36.28%
Bengkulu	30.27%
City of Depok	40.23%
City of Pekalongan	36.49%
City of Blitar	46.34%
City of Surabaya	48.59%
City of Makasar	46.45%
Province of North Sumatera	48.42%
Province of West Java	32.7 %

Source: Program Officer on voters education network for people (JPPR)

In the past two years, city of Makassar, which is also as a capital of South Sulawesi province had conducted general elections twice. First, governor election 2007 and the second was mayor election 2008. In the governor election, from 927,553 citizens who had the right to vote, only 54.24 percent used the right to vote. The percentage was found out as soon as the local election commission (KPUD) finished counting the recapitulation on November 5, 2007.

According to the chief of the local election commission (KPUD), Zulkifli Gani Ottoh, the participation of voters in governor election was considered very low. There were about 503,063 voters only. Approximately 424,466 citizens didn't vote. From the total voters, there were 8,322 voting tickets or 1.65 percent considered illegal. It will then come to some questions as follow:

- 1) How is political participation of citizens in Mayor Election in city of Makassar?
- 2) Is there any significant lesson from the experience of governor election before?
- 3) What are the factors influencing the political participation of citizens in city of Makassar?

The study was conducted in the period from November 2007 to December 2008 in city of Makassar. Collecting primary data from key informants through in depth interview with Chief of local election control committee (PANWASLU) and local general election commission (KPUD). The Secondary data were obtained from survey institutions,



non-governmental organizations concerning to the election in Indonesia and other references (literatures). The data collected were analyzed through qualitative approach.

## 2. Results and Discussions

### 2.1. Mayor election in Makassar

The low participation of citizens on governor election tried to be anticipated by the government of Makassar city along with the local election commission (KPUD) by applying personal identity card as a voting card in mayor election of Makassar. The use of personal identity card is considered as a solution on voting data processing problems in the past governor election. Besides, the voting day of mayor election as a day off is expected to mobilize the citizens free from routine activities in order to use their right to vote.

A number of quick counts showed the participation of the citizens in mayor election reached about 60 percent. The quick count by Indonesian survey institute (LSI) declared the exact of 60.2 percent of participation. It was released in Al-Aqsha mosque, the base of Ilham Arif Sirajuddin and Supomo Guntur’s supporters. Meanwhile, another quick count announced separately by one of daily local newspaper, in cooperation with insert institute, proclaimed more than 60 percent participated in current mayor election. The data were officially released by program of insert institute, Muhammad Aris.

The official voting result released from the local general election commission decided the final counting of mayor election as follows:

**Table 2. The Official Voting Result**

No	MAYOR AND VICE MAYOR’S CANDIDATE	VOTE (SHARE)
1.	Ir. Ilham Arif Sirajuddin, MM and Drs. H. Supomo Guntur, MM (IASmo)	370,912 votes <b>(67.6 %)</b>
2.	H. Idris Manggabarani, SE and Ir. H. M. Adil Patu, M.Pd. (IDIAL)	102,241 votes <b>(14.8 %)</b>
3.	H. Halim Abdul Razak, SE, M.Si. and Drs. H.M. Jafar Sodding (HJ)	37,507 votes <b>(6.78 %)</b>
4.	Ir. H. Ridwan Syahputra Musagani and Irwan A. Paturusi (RI)	11,885 votes <b>(2.15 %)</b>
5.	Firmansyah Mapasawang and Kasma F. Amin (FASmi)	13,509 votes <b>(2.44 %)</b>
6.	Ir. H. Iriantasyah Kasim DM, M.Si. and Abd. Razak Djalle (IKRAR)	12,950 votes <b>(2.34 %)</b>
7.	H.M. Ilham Alim Bachrie and Herman Handoko (IDOLA)	4,107 votes <b>(0.74 %)</b>

The sum of legal votes acquired was 553,111 votes (100%) with 57.62 percent of participation only.

The rate of “white party” or people who don’t use their right to vote in mayor election of Makassar reached 42.38 percent of 959,814 legal votes. It, however, decreased compared to the past governor election which reached 45.76 percent with the increase of 3.38 percent only. Yet, it’s still a big concerned that “the white party” is higher than the winner of mayor election. The “white party” reached 406,703 votes; meanwhile the mayor election winner reached only 370,912 votes.

The low participation of citizens in mayor general election is an ironic indeed, seeing how big the budget spent by the government for this event. Besides, there’s no

significant lesson from the “failure” experience of governor election before.

## **2.2. The Low Political Participation of the Citizens (People)**

From the data of mayor election in Makassar, it showed some causes of minimum participation in the election. First, the citizens consciously and voluntarily did not use their right to vote because of their apathetic attitude. They believe the candidates engaged in the election do not have the capacity to make their dream and hope come true. Besides, they realized that using the right to vote or not had the same effect; it doesn't have any significant influence on their lives.

Secondly, the low participation of citizens in the governor and mayor election was caused by technical problems. In this case, the disorganized of fixed voters list (DPT) initiated the high number of unlisted people. It thus brought down their right to vote as a consequence. The disorganized of fixed voters list (DPT) had become a crucial problem which is likely unresolved yet. The governor and mayor election in any province and region especially in Makassar, South Sulawesi, was the latest example.

The tendency of taking inaccurate fixed voters data leads to many problems in the field. Such as; less than five years old and dead people had official voting card, there were also double voting card for same voter, the distribution of official voting card was also considered too close to the voting day. The official voting cards were distributed just two days before the voting day, so if there's any complaint to the local general election commission, it won't be well handled due to a very limited time of complaint.

Third, the participation is also influenced by voters' individual interest. The voters prefer other interests related to their daily necessity or urgent needs rather than coming to voting spot. In this case, many voters prioritize their individual necessities such as going to the rice field for farmers, come to the factory for labors or do not go back home for those who stay away from home rather than go back home to voting spot to use their right (to vote).

A farmer or a labor would prefer going to work or factory rather than going on the voting spot. It's clear that by doing something in their own job will guarantee better livelihood quality or fulfilling their better welfare and finance. On the contrary, going to the voting spot to use their political right doesn't guarantee their basic needs or welfare. Neither do the home leavers, considering the cost of transportation back to their home.

In a situation a voter has such political pragmatic consideration, the law of economy emerged. The party who needs their attendance badly as well as their political choice tries to do money politics practices. The money politics practices come in many forms. It's starting from gentle way, such as an incumbent giving any assistance for public facility, to the rough way, by giving an envelope of money in door to door system. Sometimes, the party or the candidates held a religious event then the participants get money for attending. They called this “money for transport”. In other words, due to the difficulty of pushing people political participation independent, the pragmatism practices emerged. In this position, political participation becomes more expensive.

Political participation is getting more costly, all things need cost. The voters' pragmatism tendency for material reasons become real phenomenon in current democracy. The democracy performance which promises beautiful dreams is not able to make the people's life better because they live in sorrow. The people measure of democracy very simple; that their political participation in the election gives positive impact to their welfare. But it is contrary.

In the situation when the voters' idealism tends to be critical, the party and general election organizer (KPUD) took a contra productive action. The policy “facilitating” the voters' pragmatism through material service is an inappropriate step.

The way of following “market” driven by voters is a contra productive action to strengthen democratic values.

Last but not least, the low of citizens’ political participation was not caused by the low people consciousness. In the custom of Buginese and Makassar, people will come to crowd or party in groups if they were invited. The failure to vote was more likely caused by a number of people didn’t have invitation letter. Furthermore, the Buginese and Makassar custom will not attend any party or celebration if they don’t get invitation. Even though, in this case, citizens can use their right to vote by simply showing their personal identity card in the voting spot if they don’t have official voting card.

Political participation in democratization context is a politics based on things: the voters should have an independency to choose their own political choices. The way of offering facility such as t-shirt and money politics distinctly, takes the independency away from the voters. A proverb saying, “take its money, reject its party” did not easily happen in the field. What happened was, “take the money and vote the party”.

The voters must be rational and mature in deciding their own political choices. Voters’ rationality couldn’t be simply measured by their attendance to the voting spot. Their absence in the voting spot for some people is part of their rationality. It’s the political choice of being absent to vote. The election commission together with its staff with the available budget should conduct political education for people. Therefore, they will come with high political awareness and maturity.

The voters should have idealism to their own political choice. This is the party’s duty, political elites, and leader candidates conduct political communication. They must be able to explain and implement work programs to the constituents. They’re also required to explain ideology and their work program. Let the voters decide which political choice is suitable to their heart. Of course, the party or leader candidate obviously has ideology and agenda to make them prosperous.

The urgent challenge is to make the election as people’s political articulation form which is rational and critical. This is the essence of people political participation. As long as the election process dominated by political party’s elites who has corrupting mentality, the people will find the election be merely euphoria. On the other hand, general election will become euphoria when manipulation practice, money politics and political violence still exist.

It’s hence, the people are supposed to be given the independency to decide their own choice. The people should be able to decide their political rights consciously and responsibly. As a new process and ascertaining civilized democratic life, the general election should be understood as fully dynamic process. Besides, technical preparedness which has officially been the domain of government and the general election commission in terms of data of voters must be immediately improved, so that the voter’s right does not disappear in vain.

The failure of political party as well as the general election commission in pushing citizens’ political participation, will precisely become unhealthy people’s political participation and extremely costly. When it’s getting more expensive, the sovereignty or democracy is just in capital owners’ hand.

### **3. Conclusion**

The political participation of citizens in mayor election of city of Makassar was considered low. One main indicator showed that the “white party” (GOLPUT) or those who did not use their right to vote reached 42.38 % (406,703 votes) of 959,814 legal

votes. It much higher compared to mayor election's winner who got 39 % (370,912 votes) only.

There's no significant lesson from the "failure" experience of prior governor election compared to current mayor election in Makassar. It didn't decrease the number of white party significantly even though, there was a slight (3 %) increase from 45 % (governor election) to 42 % (mayor election) but it was still considerably low.

Factors influencing the political participation were: apathetic attitude, technical problems, voters' individual interest and a high number of people did not get invitation letter.

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## Economic Valuation of Coral Reef Ecosystems in Barrang Lompo Island, Makassar

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### **1. Introduction**

#### **1.1. Background**

Economic value of certain natural resources is specific. Therefore, calculating the economic valuation for coral reef resources is not only the value of the fish but also the role of coral reefs for its environmental services, such as for shoreline protection, existence benefit, tourism benefit and another benefit which is the valued as entire utilization.

Exploitation of fishes at coral reef ecosystems which has high economic values is currently done by fishermen in Spermonde water includes the water of Barrang Lompo Island by using both legal and destructive fishing. Probably the value or number of catching is still below the maximum sustainable yield of fishes at coral reef ecosystem, however the impact of destructive fishing is more threaten coral reef fish conservation because not only the number of fish being caught but also destruction of coral reef as the habitat of fishes.

So far, the effort of people to protect coral reef is still low, which is indicated by coral destruction is still continue to be threatened in alarming rate at almost all parts of Indonesia. In the progression of resource utilization in recent economic progression development, a progression in development could be shown not only by the global economic indicators but also by the quality of resource and environment which damaged due to the developments (Dutton et al. 2001). Therefore, in order to obtain information on ecological and economical conditions of coral reef in Barrang Lompo waters, it is necessary to carry out studies to obtain management models especially on coral reef optimally with conservation as one of aspects which seriously considered in maintaining them for more sustainable mode.

#### **1.2. Objectives**

The economic value of coral reefs shall help decision-makers understand the contribution of the goods and services that coral reefs provide to the various stakeholders and sectors of the economy. Determining the value of coral reefs is a 'first step' to protecting and managing coral reef ecosystems. From the estimated economic value of coral reefs, the discounted future benefits can be compared with current and future costs of various protection/management options thus, providing critical information on the impact of marine protection. In addition, the recognized economic value of coral reefs will generate the political will essential for sustaining coral reef management processes, thus, safeguarding the productivity of coral reefs.

The objective of this study on economic valuation of coral reefs ecosystem in Barrang Lompo is:

- 1) to calculate of the total use value and non use value of the coral reefs ecosystem at Barrang Lompo Island, then influence factors of the willingness to pay value by community in Barrang Lompo for maintain existences coral reefs ecosystem, and
- 2) to find out factors affecting to manage the water ecosystem correctly and the

optimum use value for the localities of Barrang Lompo Island.

It is highly expected that result of this study is to be valuable information for Ocean and Fisheries Services and local government to formulate proper methods and management for ecosystem of Barrang Lompo waters.

### **1.3. Research Method**

This case study was carried out at Barrang Lompo waters, Makassar, a part of Spermonde Archipelago. Barrang Lompo Island is chosen as a research location because there is a huge area of coral reefs and exploitation activity of coral reef resources in this location is high. Research object as population is communities and directed or indirected linked institutions with coral reef utilization in Barrang Lompo. Stratified Random Sampling was used based on type of activities in coral reef utilization. Quota Sampling was used to choose total sampling. Population was classified in several groups based on their activities in coral reef utilization. Economic valuation methods are implemented to calculate of the total use value and non use value of the coral reefs ecosystem at Barrang Lompo. Economic valuation is a powerful tool for raising awareness about the economic value of natural resources and about the implications of different development or management decisions. Economic valuation assesses a resource in terms of its value to humans (Burke and Maidens 2004).

## **2. Results and Discussion**

### **2.1. Direct use from coral reef fisheries**

Barrang Lompo communities in conjunction with coral reef utilization conduct several activities such as: rock cod fishing, squid fishing, jack mackerel fishing, sea cucumber collected, sea ranch at floating net, hunting with arrow, hunting fish with spear, fish caging and coral reef transplantation.

Total income of communities from fisheries is approached by calculating the average output such as depreciation cost, maintenance cost and operational cost per year and revenue or gross income then calculating the net income. Total net revenue is calculated by multiplying net income with population. Total revenue from fisheries (direct use) is Rp. 1,831,230,214/year. The highest value of direct use is come from coral reef transplantation (Rp. 189,157,559.5/year). For comparison, fisheries supported by the coral reefs in Indonesia's Wakatobi National Park in Southeast Sulawesi produce an average of \$10,340 per km<sup>2</sup> annually and have a present value of over \$2.2 million, calculated over 20 years with a 10% discount rate (Hargreaves-Allen 2004).

### **2.2. Direct use from ornamental fish**

Based on the results of respondent interviews, types of ornamental fishes used to collect were angelfish (*Centropyge* sp.), butterfly fish (*Chaetodon* sp.), clownfish (*Amphiprion* sp.) Anemofish (*Amphiprion rubrocinctus*), blue velvet (*Neoglyphidodon oxyodon*), bannerfish (*Hariochus* sp.) and batfish (*Platax* sp.). Total cost which consists of depreciation cost, operational cost and maintenance cost for catching ornamental fish is Rp. 18,859,556/year and total revenue (based on total catch per year and the price) is Rp. 45,770,000/year, and then net value is calculated by multiply the value with all ornamental fishermen and the result (direct use of ornamental fish collections) is 26,910,444/year.

### **2.3. Direct use from coral mining**

A study analyzed the costs and benefits of coral mining in Lombok, looking at

the societal costs of coral mining associated with losses to typical reef function. The economic valuation presented two scenarios. For both scenarios, therefore, coral mining constituted a significant, long-term loss to society. The net loss of the fishery function was valued at \$74,900 in both scenarios; loss of the tourism \$2,900 for the 'LOW' scenario and \$481,900 for the 'HIGH' scenario; and loss of coastal protection \$12,000 for the 'LOW' scenario and \$260,000 for the 'HIGH' scenario (Cesar 2002).

Based on respondent interviews it was found that there are 34.4% of them have permanent houses, 34.1 % have semi-permanent houses and 29.5 % have traditional houses. Materials from coral reef are used for foundations of buildings by 65.5 % of permanent and semi-permanent houses. Therefore, total coral reef used in Barrang Lompo is 3,777.3 m<sup>3</sup>. The price of the reef stone is 50,000 / m<sup>2</sup>. Therefore total direct use from coral mining is Rp. 188,865,000 (3,777.3 m<sup>3</sup> × Rp. 50,000).

#### **2.4. Direct use from life coral trade**

Live coral have high value in international market and local market, it use for decoration aquarium. Based on interview with respondent to known the price of live coral in international market among 4 – 5 US\$/piece and local market Rp. 5,000 – Rp. 50,000/piece. Hardianto et al. (1998) in Chuuk, price coral live is 33 US\$ /1 m<sup>3</sup>. Direct use value of coral trade is approached by calculating total cost (investment, depreciation cost, operational cost and maintenance cost) and calculating revenue of coral trade. Total income calculated from multiplying net revenue with population of coral traders is Rp. 57,360,444/year. The result of direct uses of coral trade is Rp. 57,360,444/year.

#### **2.5. Tourism benefit**

Many tourist activities take place on coral reefs. These activities are mainly SCUBA diving, swimming, snorkeling, beach combing, boating, jet skiing, sun bathing and fishing (recreational/sport) and visiting fishing villages. Tourism contributes to the economy of many coastal communities. The coral reef in Barrang Lompo areas are diving destinations by domestic and foreign tourists. For comparison, Negril Marine Park, Jamaica-the recreational use value of the park was estimated at US\$5.3 million per year using a financial analysis and contingent valuation (Cesar et al. 2003).

The value of coral reef-associated tourism is assessed using a financial analysis method. This method involves calculating the gross revenue of tourism and recreation, and subtracting operating costs to arrive at net revenue. The presence of coral reef ecosystem in Barrang Lompo waters would attract local and foreign tourists. This information was received from observations and interviews of some respondents from Hasanuddin University Marine Station. There are 89 of divers came to Barang Lompo in 2004, six of them come from Germany, 45 of them were diver trainee and the rest were local tourists. Therefore total cost for diving activities spent by the divers was 34,215,000/year.

#### **2.6. Direct use from research activities**

Direct use value of research activities in coral reef ecosystem of Barrang Lompo waters is approached by calculating cost of all research conducted in that area. Based on interview with Personnel of Marine Station of Hasanuddin University, there were 30 researchers (6 from Germany, 3 doctoral students and 21 students) who conducted their research at that area during 2004. They stayed at Barang Lompo for about 7 days. They spent their money for room, food etc. Total direct use of research was Rp. 33,585,000/year.

## 2.7. Total economic value of direct use of coral reef ecosystem

Total economic value of direct uses of coral reef ecosystem in Barrang Lompo waters is sum of five direct uses (direct use of coral reef fisheries, direct use of ornamental fish, direct use of coral mining and coral trade, direct use of diving activities and direct use of research activities). Table 1 show that economical value of total direct use of coral reef ecosystem in Barrang Lompo waters is Rp. 2,168,736,102/year. This value indicates that economic value of total direct use of coral reef ecosystem in Barrang Lompo Waters is high.

**Table 1. Total Direct Use Value of Coral Reef Ecosystem in Barrang Lompo**

No	Type of direct use	Value (Rp/year)	%
1	Fisheries	1,831,230,214	84.3
2	Ornamental fish	26,910,444	1.2
3	Coral mining and trade	246,225,444	11.3
4	Diving activities	34,215,000	1.6
5	Research activities	33,585,000	1.6
	<b>Total Value</b>	<b>2,172,166,102</b>	<b>100</b>

Source: Processed Primary data, 2006

## 2.8. Indirect use shoreline protection

Islands and beachfront properties are protected by coral reefs structures. The importance of coral reefs in protecting the shoreline will increase with rising sea level and increased storm intensity associated with warming seas. Much less than half of the Caribbean coastline is protected by coral reefs (Burke and Maidens 2004). In this study, the value of shoreline protection was count by material cost for making wave breakers. Break waters were built by using cement, reef stone, sand and iron stick. Cost of break water is Rp. 120,000/m<sup>3</sup>. If the area of coral reef in Barrang Lompo waters is 137.2 ha, the area of break water to prevent coastal abrasion (if all of coral reef is damage) is 13,720 m<sup>3</sup>. Therefore the cost break water as the indirect use value of coral reef ecosystem to prevent abrasion is Rp. 1,646,400,000/year or Rp. 16,464.00/ha/year.

## 2.9. Option value

Option value of coral reefs in Barang Lompo measured of biodiversity. Sawyer (1992) the coral reefs have conservation value compare of tropical rainforest. Ruiteenbek (1992) potential l value of coral reef biodiversity is US\$ 1,500/km<sup>2</sup>/year or US\$ 15/ha/year, White and Trinidad (1998) biodiversity coral reefs in Manila US\$ 2,400 – 8,000/km<sup>2</sup>/year. Based on the reality in the field, condition of coral reef in Barrang Lompo waters is almost damage with different rates. Therefore the value of biodiversity of coral reef of Barrang Lompo waters is US\$ 5,200/km<sup>2</sup>/year or US\$ 52/ha/year. Since the area of coral reef is 137.2 ha and the exchange rate is Rp. 9,000 per US\$ 1, the alternative use value based on biodiversity of coral reef of Barrang Lompo is Rp. 64,209,600/year.

## 2.10. Existence value

The contingent valuation (CV) method attempts to place a value on ecosystem goods or services by directly asking people to state their willingness-to-pay (WTP) or willingness-to-accept (WTA) for a specific set of ecosystem goods and services or for changes in those goods and services. In this study, the value of Existence was count value by (CV) and regression analysis for know that affecting factors. This method is useful for assessing non-use values such as the value of simply knowing that a coral reef exists



(Emerton and Bos 2004). Based on education level of respondents, there is tendency that the higher of their education, the higher of their existence value to coral reef ecosystem in Barrang Lompo. Statistically, the existence value based on “willingness to pay” (WTP), is from Rp. 1,000,000 to Rp. 5,000,000 per ha and the mean value is Rp. 2,062,500. Regression formula on the existence value of coral reef ecosystem based on WTP is:

$$\text{WTP} = 3.996 + 0.972 E + 0.215 I - 0.056 A$$

The result of statistical analysis on the average value of existence use of respondent based on WTP is Rp. 2,062,500 per ha. Therefore in order to find the existence value of coral reef ecosystem, the average value of WTP is converted with the area of coral reef (137,2 ha). The existence value of coral reef ecosystem in Barrang Lompo waters is Rp. 282,975,000/year. One example where economic valuation has been successfully applied to a coral reef policy decision is in Bonaire, Netherlands Antilles. The willingness to pay (WTP) expressed by scuba divers in Bonaire was used to support a fee of US\$10 per diver in the Bonaire Marine Park (Dixon et al. 1993).

### 2.11. Total Economic Values of Coral Reef Ecosystem

A total economic value (TEV) is based on identification results of all utilization of reef ecosystem in Barrang Lompo, and then all of the utilization is calculated. All of the estimation of the use value of coral reef ecosystem in Barrang Lompo is shown in Table 2 as follows.

**Table 2. Total Economic Values of Coral Reef Ecosystem in Barrang Lompo Waters**

No	Type of use	Value (Rp/year)	Value (Rp/ha/year)	Value (%)
1	Direct use value	2,172,166,745	15,832,114	52.1
2	Indirect use Value	1,646,400,000	12,000,000	39.5
3	Option value	64,209,600	468,000	1.5
4	Existence Value	282,975,000	2,062,500	6.8
<b>Total Economic Values</b>		<b>4,165,750,702</b>	<b>30,362,614</b>	<b>100</b>

Source: processed primary data, 2006

Table 2 shows that Total Economical Value of the coral reef ecosystem in Barrang Lompo with the area of 137.2 ha is Rp. 4,166,750,702/year or 30,362,614/ha/year. From those values can be calculated the direct use of fisheries gave contribution Rp. 2,172,166,745 or 51.1% followed by indirect use Rp. 1,646,400,000 (39.5%), existence use Rp. 282,975,000 (6.8%) and alternative use Rp 64,209,600 (1.5%).

### 3. Conclusion

Based on the results and discussion, several conclusions can be made as follows:

- Total Economical Value of coral reef ecosystem in Barrang Lompo Island is Rp. 4,165,750,702 or Rp. 30,362,614 per ha. The largest contribution is from direct economical use value (52.1%) and follows by indirect use value (39.5%), existence use value (6.8%) and alternative use value (1.5 %).
- Willingness to Pay (WTP) value of communities is depending on education levels, income levels and age of respondents. The value is from Rp. 1,000,000 per ha to Rp. 5,000,000 per ha with the average is Rp. 2,082,500 per ha.

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# Gender in Conservation: A Study on Horticulture Management System in the Upstream Area of the Jeneberang Watershed, Regency of Gowa, South Sulawesi Province

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## **1. Introduction**

Due to the population growth rate of Indonesia rising to 1.6 % per year and the poor nutrition of the people, Indonesia is facing the challenge of food security -to be able to provide sufficient food to feed its people. As more agricultural land is converted for human settlement, this causes the agricultural land to be further pushed to open vulnerable land. This expansion may further cause land degradation which has become evident in the Regency of Gowa where the land has a 45° slope. This land is used as an intensive horticulture farming area for planting vegetables (PSL 2000).

Having the perception that “farmers are men”, women are rarely involved in public activities such as agricultural extension (Li 1993: 5; see also Dunga 2004: 70). Under this constraint, the women’s understanding of conservation farming is very limited. The implication from the improper land cultivation is land erosion. In contrary, the women’s role in horticulture farming of the upstream area of Jeneberang River is significantly high in which 80 % (percent) of the farmers are women (ESC 2001).

Therefore, to advocate a sustainable agriculture system, this research is aimed to see the participation of men and women in horticulture farming that will become a basic model of conservation-based horticulture farming in the upstream area of the watersheds of Jeneberang specifically in the Bulluballea vicinity.

## **2. Methodology**

This research applies a qualitative approach, with an analytical descriptive type of study which describes the object through holistic and comprehensive presentation.

A study on the interrelationship of the identified phenomena is done by applying interdisciplinary approaches on several case studies. Further on, there will be discussions on the model of sustainable horticulture farming that integrates “gender” as one variable in the SSM-*Soft System Model* with the objective to achieve sustainable welfare for the people (Chekland in Purnomo 2005).

## **3. Results and Discussions**

### **3.1. The development of horticultural cultivation in Buluballea**

The farming system pattern in Buluballea over a span of time can be categorized as follows: (1) traditional passion fruit cultivation in which the farmers did not apply full cultivation techniques; (2) passion fruit cultivation by applying cultivation practices; (3) farming system in ornamental plant cultivation; (4) early-phase vegetable cultivation, introduced by migrants (Haji Ilyas) that brought in techniques for vegetable farming; (5) advanced-phase vegetable cultivation, as people developed their vegetable farming to

become part of their farming system.

### 3.2. Gender roles in horticultural cultivation

In general, the division of labor is dominated by women if the respective agriculture work is considered as not the main source of living. In Table 1, from the five categories of farming system as referred to above, the early-phase vegetable cultivation is dominated by women with a ratio of 75 to 25. Meanwhile for the traditional passion fruit farming system, the labor ratio of women to men is 68 against 32. The third type of farming system that is dominated by women labor is in the ornamental plant cultivation. Table 1 shows a summary of the labor division in various farming systems in the target area of research.

**Table 1. Division of labour in various farming system in the research area**

Farming system	PWD\ People's work days	Men	PWD	Women	PWD
		Contribution %		Contribution %	
Traditional passion fruit	290	32,07	93	67,93	197
Passion fruit w/cultivation tech.	620	59,84	291	40,16	249
Ornamental plant	390	47,69	186	52,31	204
Early-phase of vegetable	469	24,52	115	75,48	354
Advanced-phase of vegetable	469	47,97	225	52,03	244

Source: Primary data, 2006 (processes)

In the farming system of ornamental plant cultivation and advanced-phase of vegetable farming, the women's role was relatively in balance with the men's role.

### 3.3. Environmental conservation and its correlation with gender roles

From the five types of farming systems that were observed, the passion fruit farming that employs the cultivation techniques apparently applies the highest degree of conservation-based practices (Table 2). The cultivation methods included conservation techniques such as terracing and planting along the strips of land.

**Table 2. Role dominance and conservation level in various types of farming system**

No	Farming system	Role domination	Conservation rank
1	Traditional passion fruit	Women	2
2	Passion fruit w/cultivation tech.	Men	1
3	Ornamental plant	Women	3
4	Early-phase of vegetable	Women	3
5	Advanced-phase of vegetable	Women & Men	4

Source: Primary data, 2006 (processes)

The traditional passion fruit farming is the next rank that applies lower level of conservation techniques, in which the land plowing is done only superficially and the passion fruits are grown naturally on forestal trees. This type of planting is closely similar to forestry agriculture system. The third rank is held by the early-phase vegetable farming and ornamental plant cultivation. Since these two types of farming have not been developed extensively, there is no over-exploitation of the land. In addition, the farming is done on relatively flat land. The land is almost constantly covered with plants, since it is cultivated almost all year round, which minimizes erosion. In contrast, advanced vegetable farming tends to exploit the land and does not take into account conservation

practices.

Passion fruit farming that applies cultivation techniques has the highest degree in conservation practice, since this type of farming system is dominated by male workers who have actively participated in the agricultural extension held by *PT Markisa Segar*. The agricultural extension provided know-how techniques such as: conservation cultivation for passion fruits, using appropriate fertilizers, pest and plant disease control. The terracing of land was also introduced, which again, was mostly done by the male workers.

From this research, it has been found that there is no significant correlation between the dominance of women's role in farming system and conservation activities. The women's role in farming system does not have direct correlation with the degree of conservation activities. Why is there no correlation between the degree of women's role and conservation activities?

Under ***gender deepening***, the correlation between gender and conservation is greatly affected by several supporting factors. These factors may come from the domestic domain or from the public domain. From the domestic domain, the "actor" factor –the decision maker in the family– and the "knowledge factor" of the farmers are the main reasons. In the public domain, the determinant factors are the "actor" factor – namely the decision makers of relevant institutions – and the prevailing policies/regulations of the government that are related to conservation activities.

### **3.3.1. Influencing factors from domestic domain**

#### *Decision maker factors in the family*

Decision making in agriculture activities is dominated by men. Starting from deciding the land utilization, what type of plants to sow, the farming system, conservation and planting season and harvesting, all the decision making processes are dominated by men.

#### *Farmer knowledge factors*

The women's limited knowledge in agriculture is mostly due to their lack of participation in the agricultural extension. Despite being dominant in some agriculture activities, the women have not been actively involved in the training on agriculture conservation.

### **3.3.2. Influencing factors from public domain**

#### *Decision maker factors and the influencing policy in the line agencies*

The Service Offices related to agriculture activities are all headed by men. Therefore, the decisions on policy planning are also made by men. Another factor that restrains the involvement of women is the lack of data base that represents the accurate demographics of male and female in the community.

Nevertheless, the government has issued a policy on gender mainstreaming through the Presidential Instruction Number 9 of 2000 regarding Gender Mainstreaming in National Development. However, most of the government apparatus and the program workers apparently do not have a strong understanding of the essence of gender mainstreaming.

As a result, although the government issued a written policy to eliminate discrimination on women, in reality, in the implementation level, some people tend to not promote equal opportunity for women to participate.

### 3.4. Conceptual model of sustainable horticulture cultivation

The proposed conceptual model for a sustainable horticulture cultivation applies the Born and Sonzogni model (1995: 167) in *Integrated Environmental Management* by using the *Soft System Methodology* (Checkland 1989 in Purnomo 2005). This model is recommended since the SSM is driven by the idea that the objective of this system is problematic. In managing comprehensive natural resources, the system applied is only human-constructed that is expected to understand the complex phenomenon. Since this system is man-constructed, therefore, obviously the objective of the system is merely constructed by the human mind (Purnomo 2005).

The main agenda of this paper is to promote justice and gender equality in horticulture cultivation. It is expected that men and women participate in contributing their potential in every activity to achieve *a harmonious humanosphere*.

The model is designed as a conceptual model, based on the interactive components in the horticulture farming system in Buluballea. The components are: 1) Domestic domain, with inputs from the farmers' household; 2) Public domain, with inputs from government policy instruments.

**Figure 1. Conceptual Model of horticultural cultivation in the upper part of Jeneberang watershed**

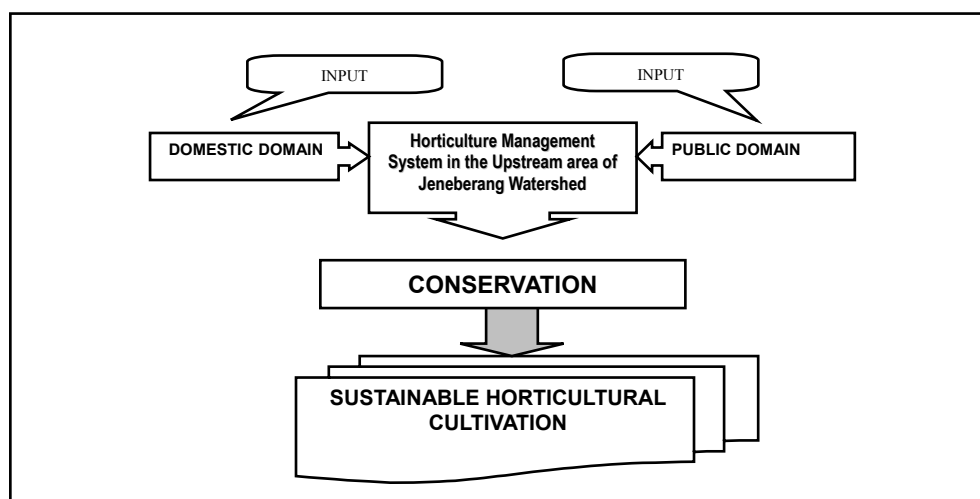


Figure 1 explains the relationship between the relevant components. To maintain sustainable horticulture cultivation, several inputs are necessary for the each component.

- 1) Farmers' Household Components in the domestic domain need the following inputs:
  - Gender Equality Perspective: this input has great effect on the equality of decision making. Gender Equality training is given to enhance the awareness of both men and women on the importance of active participation of all the family components. This gender perspective is also integrated in every activity of the farmers' association. For the male group, one of the active medium is the mosque after every Friday Prayer. For the women group, it is common to gather at routine meetings to recite the Al Quran, or at the savings club meetings that are adjusted to the women's available time and taking into consideration the women's reproductive activities.
  - Non-formal education should be provided such as training and counseling on conservation, since intensive horticulture cultivation may pose a risk for land erosion. These trainings should provide equal opportunity for men and women to participate, so that the women who have a dominant role in horticulture cultivation in Buluballea and the men who have ample know-how on conservation cultivation, can work

- together to maintain a sustainable and environmentally friendly farming system, which in turn will promote the welfare of the people. However, it is recommended that the training sessions be held separately for men and women.
- Provide training to enhance family income and understand economic analysis: through introduction to alternative livelihood and understanding basic balance sheets to manage simple financial bookkeeping.
  - Helping farmers to build awareness on the importance of group collaboration. A strong association among the farmers will allow the farmers to have a stronger bargaining position in determining their production and marketing activity. The association of farmers should use a bottom-up approach which enables easy access of information exchange. The existing association such as *Dasawisma*, apparently has great potential in accumulating detailed and sorted information from the community. The government, NGOs and also universities can gain benefit by advocating these farmers association.
- 2) The components of policy instruments from the public domain that are aimed to build institutional capacity, need the following inputs:
- Gender Equality Perspective: inputs include training, workshops and seminars on gender issues for policy makers. It is expected that there will be better understanding of the benefit from women involvement in every activity of the institution. Training on gender equality perspective should be considered as mandatory in the curriculum of career promotion training.
  - Demographics should be clear in recording the population based on gender (male and female) as a basis for policy making and program designing.
  - Include gender issues in the planning process to enhance effectiveness and efficiency of the program.
- 3) The components of policy instruments from the public domain that are aimed for improving the regulations, need the following inputs:
- Review the Policies: Review and revise policies that are gender bias and apply gender equality.
  - Basis for Gender Equality Perspective: should explicitly state the equal opportunity for men and women to participate in development activities and become beneficiaries of the development results.
  - Basis for sustainable agriculture development: each policy should take into consideration the economical, ecological and social aspects of the people in equal proportion.
  - Incorporating the Presidential Instruction Number 9 of 2000 into the Regional/Local Regulations as a mandatory regulation for the local institutions and offices in the region.
  - Drafting a Regional Regulation on the utilization of erosion-susceptible land to maintain sustainable agriculture, for example tax incentives for land utilization.

Civil Society Organizations or Non-Government Organizations as well as universities as independent bodies should take the role as the evaluator of the implementation of these programs. For example, institutions such as Women's Study Center and fieldwork programs (KKN) for university students should be involved so that they can function as reviewers of such programs.

#### 4. Conclusions

The horticulture farming system in the upstream area of Jeneberang Watershed is dominated by women workers as opposed to the male workers. The female workers are mostly involved in the early-phase of vegetable farming system, in traditional passion fruit farming system, in ornamental plant farming system and in advanced-phase of vegetable farming system. Meanwhile the male workers are found in the passion fruit farming system that applies cultivation techniques.

It is apparent that there is no significant correlation between the women's role in farming system and the conservation activities in the community. The determinant factors in the domestic domain that influence this insignificant correlation is the lack of the women's role in decision making and the limited knowledge of the women in the society, which is mostly male-dominated or dominated by the husband. Whereas in the public domain, most of the public policy making is dominated by men, leaving very little room for women to participate in the process.

Discussions on a sustainable horticulture cultivation model should review two main components, namely the households of the farmers in the domestic domain and the policy making in the public domain. In the domestic domain, the inputs to be considered are: a gender equality perspective so that women and men can collaborate actively in every training opportunity such as training on conservation cultivation; having positive perspective of masculinity and femininity that may serve as a moral basis in establishing interrelationships that have implications on the economy, social as well as ecological aspects in every activity that is oriented towards a sustainable and environmentally-friendly horticulture cultivation. In the public domain, the inputs are from all the policy instruments that should accommodate gender equality perspective as a reference.

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## Assimilation of Persian Culture with Ethnicities in South Sulawesi

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### 1. Introduction

It is a common belief that South Sulawesi's ethnicities assimilated with Islamic values and teachings. However, there can be no denial that they had also assimilated with Hindu, Buddha and Western cultures. This article attempts to provide a nuanced analysis on the different kinds of Islamic cultures that had made their mark and influence on various ethnicities in South Sulawesi. This would entail an analysis on various assimilation processes that involved Arabic, Gujarati and Persian cultures.

The significance of this study lies in the effort to counter the common perception among the peoples of South Sulawesi, and perhaps elsewhere, that Islamic influence on the traditional ethnicities in the peninsula was solely derived from Arabia, undermining the vast impacts of other kinds of Islamic influence, most notably the Persian. In South Sulawesi, all Islamic cultures is understood and claimed as the Islamic Arabic influence, or presented by the Arabic man. The peoples of South Sulawesi especially the muslim haven't known the Islamic Persian culture.

There are some reasons behind the fact. First, Islamic exclusive view which considers Islam is equivalent with Arabian. Second, the Persian scholars, in diffusing Islam preferred to use Arabic language, as consequence people knew and claimed them as Arab. Third, the Persian people, in terms of physical appearance are similar with the Arab people. Fourth, the high-rank individuals, such as king, scholar, historian, and religious leader had a strong contribution to support this anomaly and deviation.

As an example, not many people aware that Sayid Jamaluddin Husein Al-Akbar is a Persian. He was born in Samarkhand, Persia. According to Martin Van Bruinessen (1995) that children of Syah Ahmad, Jamaluddin and his brothers, had allegedly wandered to Southeast Asia. Jamaludin, at first, trampled his feet in Kamboja and Aceh. Then he sailed to Semarang and spent many years in Java Island. Finally he continued his traveling to Bugis Island and lived there until he died. By told a story, he diffused Islam to Indonesia with his family's caravan. His son, Sayid Ibrahim (Maulana Malik Ibrahim) remained in Aceh to educate the people about Islamic teachings. Afterward, Sayid Jamaluddin went to Majapahit Empire. Then moved to the Bugis land, and he died in Wajo (South Sulawesi). He arrived in Bugis land in 1452 and passed away on 1453<sup>1</sup>. Uka Tjandrasasmita, an Indonesian prominent historian, estimated that Sayid Jamaluddin entered Tosora-Wajo in the middle of 14th century<sup>2</sup>. According to Graaf and Pigeaud that Sayid Jamaluddin was a legendary Islamic holy man and also known as a sacred scholar of Islam<sup>3</sup>.

In other version, based on my interview with Amir Djumbia, Publication Staff of Ancient Inheritance Conservation Office of Makassar, several years ago a Persian muslim

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<sup>1</sup> Martin Van Bruinessen, *Kitab Kuning dan Pesantren*, 1995, Mizan-Bandung.

<sup>2</sup> Tjandrasasmita, Uka, ed. 2006. *Ziarah Masjid dan Makam*. Jakarta:Departemen Kebudayaan dan Pariwisata.

<sup>3</sup> H.J. de Graaf dan TH. Pigeud. 2003. *Kerajaan Islam pertama di Jawa Tinjauan Sejarah Politik Abad XV dan XVI*. Jakarta: Pustaka Utama Grafiti.

who visited the eastern part of Indonesia confirmed that Sayid Jamaluddin indeed visited Sulawesi and that he was a Persian. He (the Persian muslim) said that in South Sulawesi, there were some muslims around 2 Hijriah. He also informed about the attendance of Islam among the South Sulawesi people. According to him, Islam in South Sulawesi was propagated by Sayid Jamaluddin who came from Aceh by way of Java (Padjadjaran). Sayid Jamaluddin came to Java on grounds of Prabu Wijaya's invitation. Prabu Wijaya ruled Padjadjaran from 1293 to 1309. Sayid Jamaluddin continued his journey together with 15 entourages to South Sulawesi. They came into the Bugis region and stayed in Tosora-Wajo and passed away there around 1320 M.

The data above showed that the Persian Islam has indeed existed and has been assimilated into the livelihood and culture of the peoples in South Sulawesi. This assimilation was presented by Sayid Jamaluddin who was born in Persia as well as by Datuk Ribandang, Datuk Patimang, Datuk Ditiro who were born in Sumatera. They came to Tallo Harbor, South Sulawesi in 1605<sup>4</sup>.

## **2. Cases, Objectives and Methods**

This paper will focus on the Persian cultural assimilation affecting the culture of South Sulawesi ethnics, especially in Bugis-Makassar ethnics, and select Wajo Regency as the main field of study due to the fact that this was place where Sayid Jamaluddin came for the first time in Bugis-Makassar region, while other regions merely served as comparison to the main focus of the study.

The objective of this paper is to identify the kinds of the Persian cultural assimilation on the culture of South Sulawesi and explain the meaning.

This case study was constructed using literature research and in-depth interviews with community leaders of Cikoang, Tosora and some of Islamic scholars in South Sulawesi.

## **3. Results and Discussion**

According to Herudjati Purwoko (2003), there are three of material cultures, namely: Organizational Culture, Act Culture, and Artifact Culture<sup>5</sup>. Concerning the analysis and results of this paper are following.

### **3.1. Organizational culture**

#### **3.1.1. Language and literature**

Christian Pelras in 'Manusia Bugis' explained that the word 'Waju' in Bugis language means 'clothes', and it was originated from the Persian word, 'Bazu'<sup>6</sup>. Bazu in Persian is 'arm'.

According to Muhammad Buya Nasir Taraweh and Ambo Tang, Islamic scholars from the name of Belawa sub-district, in district Wajo, that Belawa is derived from 'baa' and 'alawi'. Ba, in Persian, means 'together with' and 'Alawi' is the calling for the descendants of Prophet Muhammad. Sayid Jamaluddin is descendant of the Prophet

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<sup>4</sup> Busro, Mustari. 2008. *Tuang Guru, Anrong Guru dan Daeng Guru: Gerakan Islam di Sulawesi Selatan 1914-1942*. Makassar: La Galigo Press.

<sup>5</sup> Purwoko, Herudjati. 2003. *Tiga Wajah Budaya: Rekayasa, Tingkah laku, Artefak*. Semarang, Indonesia: Masscom Media.

<sup>6</sup> Pelras, Christian. 2005. *Manusia Bugis*. Jakarta: Nalar bekerja sama dengan Forum Jakarta-Paris, EFEO.

Muhammad. Thus, 'Belawa' means being together with the prophet descendants. Sayid Jamaluddin propagated the teachings of Islam in Belawa.

In the Islamic Persia belief that following and becoming the family of the prophet Muhammad as a leader is indispensable. The famous saying of Prophet Muhammad, "Verily, I am leaving behind two precious things among you: Book of Allah and my kin, for indeed, the two will never separate until they come back to me by the Pond on the Day of Judgment."

That is why after visiting of Sayid Jamaluddin, the content of literature of South Sulawesi were mostly portraying the figures of Ali bin Abi Thalib, Fatimah Az-Zahra, Hassan and Hussein. For example: Daramatasia Story, War Poem of Makassar (Syair Perang Mengkasar), Assikalabineang, and so forth.

### 3.1.2. *Tasawwuf* (esoteric dimension of Islam)

The biggest *tharekat* in South Sulawesi is Khalwatiyah that has a doctrine is the unity of being. Being is the unknowable and inaccessible ground of everything that exists. God alone is true being, while all things dwell in nonexistence. Being alone is non-delimited, while everything else is constrained, confined, and constricted<sup>7</sup>. The great sufi master of the unity of being teaching was Hussein Ibn Mansyur Al-Hallaj<sup>8</sup>.

*Sulapa Eppa* (four sides) is a real form of manifesting the unity of existence concept in the tradition of people of South Sulawesi. This Sulapa Eppa concept could be applied into various cases, such as: Firstly, Lontara (Bugis-Makassar alphabet). Sulapa Eppa concept is based on Bugis-Makassar myth and world view where they believe that this universe as one in unity of being which is expressed by symbol  $\diamond = sa$ , it means  $\diamond = seua$  (one). Symbol  $\diamond$  is a microcosm of the human body. On the top part is head, on the left side and the right are hands, and on the under is leg. The head part is called "saung"  $\diamond$  that means mouth. Mouth is part for expressing everything, that is  $\diamond = sound$ . The sound is constructed so that it has a meaning (symbols), it is called  $\diamond = ada$  (divine word). From word  $\diamond$  (ada) goes out everything which covers all cosmos orderly. If the word (ada) is added up an article  $\diamond = E$ , it becomes  $\diamond = adae$  (that word). This is the source of the word  $\diamond = ade'$  (traditional law), namely divine word or arranging properly, making orderly, controlling, disciplining which cover all universe  $\diamond = sa$ <sup>9</sup>.

Secondly, Sulapa Eppa is also philosophically applied in architecture of house. The Bugis-Makassar traditional house is inspired by the cosmos structure where the universe divided into three parts; first, the top universe part is the sacred place, second, the middle universe part is the place for human life interaction, and third, the low universe part is the place for the living creature interaction with its environment.

When the people of South Sulawesi want to build a house, they need to request some considerations from 'Panrita Bola' (the expert of house), such as: looking for location and a good direction. The good directions are, namely: facing to the rising sun direction, facing to the highland area, and facing to the one of wind direction, including for choosing a good time. They also believe on 'Posi Bola' (Middle or Navel of the house) which must be first determined than the other three pillars before other parts were constructed.

<sup>7</sup> Chittick, William C. 1994. *Imaginal Worlds: Ibn Al-Arabi and the Problem of Religious Diversity*. Albany, New York: State University of New York Press.

<sup>8</sup> Hussein Ibn Manstur Al-Hallajis a great Sufi master who was born on 858 A.D in Persia and grew up in Baghdad-Iraq. He was martyred in 922, as a result of his controversial statement which expressed the nature of his mystic union: *ana-al'ha'qq* ("I am the Truth").

<sup>9</sup> Mattulada. 1995. *Latoa: Satu Lukisan Analitis Terhadap Antropologi Politik Orang Bugis*. Ujungpandang: Hasanuddin University Press.

Thirdly, Sulapa Eppa is the living philosophy of the traditional people of South Sulawesi. A view of ontology is to comprehend the universe universally. Sulapa Eppa as the philosophy of life is considered as the myth of the origin of human creation which consists of soil, water, fire and wind. These fourth elements couldn't be separated for constructing a perfect man.

Fourthly, Sulapa Eppa is also to understand a relation balancing within four dimensions in our life, namely: The harmonious relationship of human being with God, society, nature, and government.

The concept of Sulapa Eppa's relation recognizes no one on the dominant position. All of them are in an equal relation with each other. The main key for applying and practicing them is *assedingengnge* (cohesiveness) as a model of cohesiveness, in the tradition of Bugis-Makassar, is declaring a vow in front of public between the people and the king<sup>10</sup>.

The life attitude is upholding which expected to be a personality for every Bugis and Makassar man, especially for the state apparatus (*Pakkatenni 'Ade'*) which is most emphasized in Sulapa Eppa concept are; *Malampu* (honesty and integrity), *Acca na Warani* (cleverness and braveness), *Temmapasilengeng* (justice), *Reso* (ethos of work).

With the cultural wisdom as mentioned above, if we apply and improve in our life will set up the balanced and visible life. Thus, it's most relevant with the concept of humanosphere argued by Dadang Ahmad Suriamiharja as harmonious relation between human being with his/her environment. In the same way, Kaoru Sugihara presented that if we wish to understand how humans have coexisted with nature in the past, and could do so in the future, at a general level of abstraction, it is necessary to study how humans have come to terms with the tropical environment and built a living environment (humanosphere) for increasingly large population, by fighting with the threat of epidemic disease, by domesticating plants and animals, and by securing drinking water and heat energy<sup>11</sup>. In fact, *Sulapa Eppa* is a concept that not only narrates and embodies all those aspects but also sacred things that must be treated, cultivated and dignified because, all of them in the Persian and Bugis Muslim belief are as an attributes of God<sup>12</sup>.

### **3.1.3. Oral tradition**

Oral tradition is one of the most popular of literature genre in Persia. It has the most important role in developing the written Persian epic. 'Shahnameh' is one of evidence. Shahnameh was written by Abul Qasim Firdausi (c.1000 CE) using the ancient legendary materials which the Persian people often narrated either with musical narration or not. For the Iranian people indeed live in and by means of their poets; and the importance of the poems of Firdausi for the preservation of the Iranian character can in no way be overestimated<sup>13</sup>.

Oral tradition in South Sulawesi is also popular, but there is a little difference with Persia. In Persia, oral tradition is done by all people and until now is still going on and known by the people while in Bugis, it can be done only by special person, for example, *Pansirrili* and *Bissu*.

In addition to the rich oral tradition of the Bugis, origin narratives have been

<sup>10</sup> Patunru, Abd.Razak Daeng. 1993. *Sejarah Gowa*. Ujung Pandang: Yayasan Kebudayaan Sulawesi Selatan.

<sup>11</sup> Sugihara, Kaoru. 2008. On the Constituency of Humanosphere Studies. *Kyoto University Global COE Program Newsletter* 2: 7.

<sup>12</sup> Hamonic, Gilbert. 1991. God, Divinities and Ancestor for the positive representation of a religious plurality in Bugis Society, South Sulawesi. *Southeast Asian Studies* 29(1): 3-34.

<sup>13</sup> Shahbazi, Shapur. 1991. *Ferdowsi: A Critical Biography*. Tehran: Mazda Publishers.

recorded on lontara palm leaves since around sixteenth century. One such recorded narrative told about Sawerigading and We Cudai.

When Islam came into life of South Sulawesi peoples, the content of narration changed to Islamic narration. This Islamic narration is intended to narrate the life of Ali bin Abi Thalib and Fatimah Az-zahra. Both of them were perfect symbol of human as a person as well as a husband-wife, father-mother, boy-girl, child. Becoming Ali-Fatimah as a perfect model for human life in Islamic view is a main teaching of Persian Islam. Following is one of example: The fourth mate is His Majesty Ali// He is a son-in law of the prophet Muhammad//His strong is matchless//The Lion of God is his nickname//<sup>14</sup>.

### 3.2. Behavior

#### 3.2.1. Celebrating 'Maudu Lompoa' in Cikoang, Takalar

An outstanding treasure, a truly beautiful expression devoted to the blessed memory of the Mawlid prophet Muhammad, his birthday. All muslims have always celebrated Mawlid functions in the month of Rabi al-Awwal. They always gave charity in the nights of that month and expressed their happiness. It is a common practice of Muslims that they particularly make mention events of those incidents which are related to the birth of Rasool-Allah.

Mawlid is a yearly festival celebrated in many muslims regions by presenting ritual meals and reciting special prayers recounting the life of the prophet Muhammad, the latter known as Barzanji.

For the muslims in Cikoang, according to Muhammad Adlin Sila (2001) that Maulid Nabi, locally called Maudu' is a ritual feasting. It is said to have been first conducted on the 8<sup>th</sup> of *rabiul-awwal* 1041 H (1620 AD), primarily pioneered by Sayyid Jalal al-Din in conjunction with I-Bunrang (a local), and was performed in I-Bunrang's house. At that time, Sayyid Jalal al-Din asked for I Bunrang's assistance to provide ten liters of rice, forty chickens and 120 chickens or duck eggs for forty guests. Thus on this first occasion there were forty *kanre Maudu'* (Maudu' food, put in a bamboo basket) altogether. In the following year, on the 12<sup>th</sup> Rabi'ul Awwal 1042 H (1621 AD), the number of participants increased greatly. Every participant representing his household was therefore asked to prepare *kanre Maudu'*, the preparation being known as *Maudu' Caddi* (the smaller Maulid), under the guidance of its own *anrongguru* (religious specialist). The *kanre Maudu'* consists of four liters of rice, one chicken, one coconut for each household and at least one egg for each member of the household<sup>15</sup>.

Further, Sila said that the *maudu'* festival consist of two stages, the first being the *Maudu' Caddi*, where each household makes a *kanre Maudu'* in their own house, and the second being the *Maudu' Lompoa*, a ritual meal where the *kanre Maudu'* prepared by each household of the al-Aidid clan are gathered publicly at the edge of the estuary of the Cikoang River<sup>16</sup>.

There are several petty boats used for the *Maudu' Lompoa*, locally called '*Julung-julung*' (literally meaning the jamming together of two petty boats as in a pair) in which *kanre Maudu'* are placed collectively. This *julung-julung* is then placed in a real boat. The number of *julung-julung* indicates the number of marriages in the Sayyid family conducted throughout the year. Thus, *julung-julung* are also called *bunting beru* (literally

<sup>14</sup> Enci Amin. 2008. *Syar Perang Mengkasar*. P.76. Ininnnawa-KITLV-Jakarta.

<sup>15</sup> Sila, Muhammad Adlin. 2001. The Festivity of Maulid Nabi in Cikoang, South Sulawesi: Between Remembering and Exaggerating The Spirit of The Prophet. *Studia Islamika: Indonesian Journal for Islamic Studies* 8(3): 16.

<sup>16</sup> Id. at 17.

meaning newly married couples)<sup>17</sup>.

The religious reason for using boats in the ritual is based on expression of Prophet Muhammad comparing his kin to Noah's ark. He said, "My family among you is like Noah's ark. He who sails in it will be safe, but he who holds back from it will perish."

### 3.2.2. Celebrating *Ashura*

*Ashura*, is the 10<sup>th</sup> day of the Muslim month of Muharram, the first month of the Islamic calendar. On *Ashura* in 680, Husayn, grandson of the Prophet Muhammad was killed during the battle of Karbala- Iraq, which opposed supporters of Husayn to those of Yazid, Muawiyah's son.

Husayn's death in several sects' opinions is an event locked neither in time nor in place, but reflective of any community that considers itself oppressed, persecuted or humiliated. In the early days of the Iranian revolution in 1979, and again during the Iran-Iraq war a frequent slogan in Iranian streets and on Iranian broadcasts read, "Every day is Ashura, every place is Karbala, and every month is Muharram."

On this special day in South Sulawesi, Muslims will cook a special porridge known as the Ashura Porridge ("*Bubur Asyura*") to be distributed mainly to the poor and the needy. This *bubur asyura* is normally cooked in big pots at the house of the high ranking person or mosques in a joint community effort by the residents, and each household will get a helping of the porridge. The poor, orphans and vagrants are specially invited to come and they are given generous portions of this porridge, being a special day in Islam.

### 3.2.3. *Assikalaibineng* (etiquette of having sexual intercourse)

*Assikalaibineng* (etiquette of having sexual intercourse) in the tradition of the muslim of South Sulawesi is not just for releasing of married couple's libido, but also, the intercourse essence of married couple is symbolically religious act on behalf of Ali and Fatimah figure. And one of the identities of Islamic Persian culture is becoming Ali and Fatimah as religious or sacred symbol.

The meaning of this symbolic religiosity is to give spirit and essence for married couple intercourse so that the married couple follow and obey to the rule and ethic which is done by the praiseworthy family: Ali and Fatimah. This intercourse becomes an honorable deed if the married couples do an intercourse belonging to spirit and principle of Islam as Ali and Fatimah did.

Therefore, the tradition of muslim in South Sulawesi before doing an intercourse for the first time have to do what is called '*Nikah Bathin*' (Inner Marriage). Concerning the rule of inner marriage is: "...say salute:" Assalamu alaikum, Ali grasp, Fatimah is grasped. "That is an obligatory rule belonging to behavior of Ali and Fatimah"<sup>18</sup>."

### 3.3. Artifact

Tosora was as the first place where Sayyid Jamaluddin Akbar Al-Hussein arrived and stayed in Bugis land. And based on explanation above, Sayyid Jamaluddin Akbar Al-Hussein, of course, had a strong influence and big followers in Tosora. He left many important artifacts to this region including the architecture of the mosque with 12 (twelve windows and 2 (two) main gates style.

Two main gates mean two safe ways. According to Islamic Persian, which Sayid

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<sup>17</sup> Ibid.

<sup>18</sup> Hadrawi, Muhlis. 2008. *Assikalaibineng: Kitab Persetubuhan Bugis*. Makassar: ininnawa.

Jamaluddin believed, that Prophet Muhammad – may Allah bestow peace and benedictions upon him and his pure Progeny – said: “Verily, I am leaving behind two precious things among you: the Book of Allah and my kin, my household Ahlul Bayt, for indeed, the two will never separate until they come back to me by the Pond of Judgment.”

Twelve (12) windows are also based on saying of the Prophet Muhammad, “There will be twelve Muslim rulers.” That is why we believe that the Holy Prophet did nominate his successor and Imam of the Muslims. The first one would be Ali and the last one the promised Mehdi (A)<sup>19</sup>.

#### 4. Concluding Remark

The assimilation of Persian culture with the ethnics in South Sulawesi couldn't be denied. There are many clear evidences of the assimilation especially in the Islamic culture of South Sulawesi, such as in the literature and language, tasawwuf and philosophy, celebrating religious matters, so forth.

What is more, based on mentioned above, we can make a conclusion that the Persian culture is coming earlier in South Sulawesi than the other Islamic color such as Arab or Gujarati. It can be signed with the coming of the Persian Muslim in South Sulawesi, Sayid Jamaludin Hussein Al-Kubra, approximately 300 years earlier than Datuk Ribandang, Datuk Patimang, and Datuk Ditiro who are known as Islam disseminator in South Sulawesi.

The method which was used by Sayid Jamaluddin to introduce Persian Islam culture to the people of South Sulawesi was developing the local culture with a new, better and more enlightening belief.

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## Alcohol Drinking Practices among Students at the Faculty of Social Sciences, National University of Laos, Vientiane, Lao PDR

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### **1. Introduction**

#### **1.1. Locale of the Study: National University of Laos**

During 1975 to 1995, there were three (3) institutions which were considered to provide university-level programs (the Pedagogical Institute of Vientiane, National Polytechnic Institute, and the University of Health Sciences). The Government of Lao PDR (GoL) collected these institutes to be a university, called National University of Laos (NUOL) in June 1995. The first academic year (AY) took place on November 5, 1996. The NUOL is the biggest higher education institution in the country. In the AY 2006–2007, NUOL has been divided into 11 faculties, several studies centers and a foundational school offering higher education diploma, bachelor and master degree courses. In the academic year 2008–2009, the population was 36,706 students and more than 1,540 personnel staffs<sup>1</sup>.

The Faculty of Social Sciences (FSS) is the only highest social sciences institute in the country. The FSS first was combined with the Faculty of Social Sciences and Humanities, with one faculty. It was created together with the creation of NUOL from the decree of the Prime Minister No. 50/PM dated 09/06/1995 till year 2000, as the decree No. 87/PM dated 20/06/2000. NUOL has increased its number of faculty, from eight to eleven faculties. The Faculty of Social Sciences and Humanities before was divided into two categories as the Faculty of Social Sciences (FSS) and the Faculty of Letters (FOL). At first, FSS was composed of three departments such as the Department of Political Science, the Department of Geography, and the Department of History. Since 2005, the Department of Tourism and Hotel Management, the Sociology and Social Development Program were established. Presently, FSS has opened six baccalaureate degree programs below: 1) Geography and GIS, 2) History and Anthropology, 3) Political Science, 4) Tourism, 5) Hotel Management, and 6) Sociology and Social Development programs. The population of FSS increased to 1,836 students and more than 68 staffs (2 Ph. D, 3 Ph. D candidates, 9 master degrees, 9 master degree candidates, 38 bachelor degrees, and 7 supporting staffs).

#### **1.2. Situation of alcohol consumption among students in FSS**

As a policy, NUOL does not allow students to bring any kind of food and drinks inside the classroom. Eating is not allowed while the teacher/lecturer is discussing the lessons because it will disturb the class. However, inside the campus, several shops serve food, water, soft drinks as well as beer, wine, and other kinds of alcohol.

Alcohol consumption is a common activity in the every day life of Lao students and many of them are familiar with beer and wine. As can be observed in FSS, the heavy drinking can be seen during many occasions such as during the break time, after football competition, institutional parties, festival, birthday, after final and midterm examinations, weekends and so forth. After their heavy drinking, they got drunk and they do not want to

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<sup>1</sup> National University of Laos. 2009. [www.nuol.edu.la](http://www.nuol.edu.la)

attend their classes nor go to the library any more. Further, many of them continued going to the bars, pub and entertainments (Figure1). However, drinking also created other social issues like road accident, gambling, fighting, stealing, illicit sexual relationship and allowance spent for alcohol. These problems have negative effects on their living condition, education, relationship with friends, family and society.



Figure 1. Students drinking at beer shop

### **1.3. Motivations to conduct this study**

The alcohol drinking observed and experienced by the researcher inspired him to undergo this investigation. Further, the following reasons motivated him to undergo this study. First, the official report of Vientiane Public Security Department (July 5, 2007) stressed that causes related to heavy alcohol drinking among young created new issues such as fighting among each other, road accident, drug addiction, illicit prostitution, health injury, death, economic loss, poverty, and consumerist attitudes. Drunk- driving is responsible for a large number of deaths, injuries, damage and road accidents every year in Laos<sup>2</sup>.

Second, the report of the Lao National Assembly on “Limiting and Preventing Alcohol Abuse” during the official workshops of the national assemblies of Cambodia, Laos, Thailand, and Vietnam (held in Vientiane, Lao PDR on October 1, 2007) emphasized that the National Assembly of Laos also considers alcohol abuse as a new issue to be urgently addressed. Thus, the policy makers would like to make policies to be implemented in order to manage alcohol abuse in the country.

Third, particularly in National University of Laos (NUOL), it greatly stressed not to allow students to drink alcohol in NUOL premises and not to allow students to wear uniform of NUOL when drinking in bars. Thus, the researcher would like to know, how this rule/ article was practiced, implemented and observed by their students.

Fourth, during the researcher’s work as a lecturer and coordinator in the Faculty of Social Sciences, National University of Laos, the researcher had a good chance working with several foreign experts. They also made good suggestions regarding how to prevent drinking much of alcohol among staffs and students and how to make NUOL and the neighboring communities free from excessive alcohol drinking.

Fifth, through the researcher’s study tour in some higher educational institutions in Cambodia, China, Malaysia, Philippines, Thailand, and Vietnam, he observed that schools do not serve alcohol and also do not allow drinking alcohol inside the campus. The researcher thought that, this is a good practice and the challenge is how to apply these practices/ policies in the different schools in his own country.

Sixth, with the researcher’s work as a lecturer and as a social development worker, this study will be helpful for him to understand and learn more about how to prevent problems related to alcohol abuse and be able to educate students to be safe, healthy and observe good quality of life. Finally, to stop excessive alcohol drinking, it is

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<sup>2</sup> Lao News Agency. July 6, 2007.

not only student or one person can do but it requires to every one and all sectors must be participate in making policy especially inside the university campus. Since FSS is the highest educational institution for social sciences in the country, the teachers and students wish to make FSS alcohol free for the future generations.

#### 1.4. Objective

The study aims to describe and analyze the alcohol drinking practices, factors, and consequences of alcohol consumption among students at the Faculty of Social Sciences, National University of Laos, Vientiane, Lao PDR.

#### 1.5. Methodology

The researcher did a descriptive study using the survey approach to get the primary data from 184 respondents chosen by way of a stratified simple random sampling. Moreover, some necessary documents were collected from different agencies such as the Lao National Assembly, Ministry of Public Health of Lao PDR, Vientiane Capital Public Security Department, Lao National Institute of Public Health, Mahosod Hospital, Mittaphab Hospital, Lao National Television, Lao National Library, Central Library of the National University of Laos and Library of Faculty of Social Sciences. For the data gathering techniques of this study, the researcher used the distribution of questionnaire, interview, focused group discussion, and participant observation. In treating the data, the researcher followed these processes: For *quantitative data*, the researcher checked, categorized, coded, tabulated, presented, analyzed and interpreted the data. For *qualitative data*, the researcher grouped the data according to the similarities and differences and analyzed by classifying them into categories. Some statistical tools were also used to analyze the data in this study like SPSS, frequency and percentages distributions, weighted mean and Chi-Squares test ( $X^2$ ).

## 2. Findings and Discussion

### 2.1. On socio-demographic profile of the respondents

The results of this study found that majority of the respondents are teenagers, Buddhists, single, from rural areas, living with their parents and relatives, studying and are in the first, second and third school levels. The study showed that both male and female experienced drinking alcohol like beerlao. All of them received financial supports from different sources for their studies. The average mean of the respondents' monthly expenditure for drinking alcohol is 48,328.43 Kips or equals to US\$ 5.



Figure 2. Students drinking beer together

### 2.2. On alcohol drinking practices of the respondents

Majority of the respondents' drink alcohol once a week, during evening time, do not have fixed the days and occasions to drink alcohol, and drinking alcohol at their friends' house. Also, they do not have a fixed group of people to drink alcohol with. The most popular alcohol is beerlao and the common mode of payment is through shared

payment after drinking alcohol with others.

**2.3. On the main factors associated with alcohol drinking practices**

There are five (5) main factors that could be associated with alcohol drinking practices among students. These include personal needs, cultural, family, friend, and social environment (PNCFFSE) factors. However, the results of the study revealed that only friends and social environment factors were the most important factors associated with alcohol drinking practices among students at the Faculty of Social Sciences, National University of Laos.

**2.4. On the consequences of alcohol drinking practices**

Alcohol consumption brought both positive and negative consequences to the drinkers themselves, family and society as a whole. For the *positive effects from alcohol consumption*: The results of the study found that drinking alcohol were unclear to create good effect to drinkers. However, it is seen that alcohol drinking practice can create more joy/fun or bless for the family members. In addition, drinking alcohol also made better relationship to members especially among drinkers.

In this case, alcohol consumption leads to create social problems in the country such as fighting among each other, road accident, drug addiction, illicit prostitution, health injury, death, economic loss, poverty and other consumeristic attitudes because drinkers did not think about the negative/dangerous effects of alcohol drinking. That some people got drunk and were driving causing a large number of deaths, injuries, damage and other accidents every year is a hot issue. Moreover, anti-drunk-driving advertising campaigns aimed to raise awareness of the legal situation and the dangers of driving while intoxicated, but it seemed the activities were not pushed through and people were not interest in campaigns ‘no driving while drunk’ (Mao Leo Bor Khab in Lao word). In addition, there is no limitation among drunk-driving scanning for **blood alcohol content** (BAC) in the country while compared with some South-East Asia countries below<sup>3</sup>.



Figure 3. Anti drunk-driving campaign

Country	Blood Alcohol Content
Cambodia	0.05 %
Lao PDR	No limit
Malaysia	0.08 %
Philippines	0.05 %
Singapore	0.08 %
Thailand	0.05 %
Indonesia	No limit

On the other hand, the results of this study showed that excessive drinking alcohol created *bad effects to drinkers* like personal problems: getting drunk, headache, stomachache, liver and kidney diseases, tuberculosis, high blood pressure, becoming uncontrollably talkative and lazy to study or do nothing. To *family*, heavy drinking

<sup>3</sup> <http://en.wikipedia.org/wiki/Wikipedia>

alcohol made parents lose their economic and monetary resources, conflicts and loss of their good family life among family members. And to *society*, excessive drinking alcohol created several social problems like **road accident**, fought with other people, noise in their neighborhood, time lost in going to the bar/beer shops, illicit sexual relationship, and absence from their class at FSS after getting drunk.

As we have seen, the most dangerous effect from excessive drinking alcohol is road accident; however several drinkers were not careful and afraid about this danger (death). The number of road accidents caused by excessive drinking alcohol increased every day in the whole country especially in Vientiane Capital. According to the statistics on road accidents in Vientiane Capital revealed that “more than 5,113 cases of road accidents happened in the year 2006, for male cases were 4,257 people who were involved with road accident. The main cause of road accident was of being *drunk and driving vehicles/motorcycles comprising over 1,377 people*. While the number of road accident increased over 4,844 people in the year 2007 comprising 1,835 people who drunk alcohol and driving.<sup>4</sup>” The Traffic Police Department reported that most of the crashes were results from excessive drinking alcohol and driving at high speed, an ignorance of traffic regulations, and most deaths were from motorbike riders who were not wearing helmets<sup>5</sup>.

From the findings, two students were not be able to finish their education (one student has become disable person since 2007 and another student passed away because of road accident on January 2, 2008. These are the worst cases caused by excessive alcohol consumption that the researcher could collect during his data gathering at the Faculty of Social Sciences (FSS), NUOL from December 11, 2007 to January 15, 2008. Actually, there were several dangerous crashes and injuries due to road accident caused by excessive alcohol drinking among students at FSS happened in the past. Every year, a case like this is visible.



Figure 4. Road accident caused by drunk

## **2.5. On the implications of the findings to policy makers, social institutions, providers, drinkers and to the researcher**

The results of this study have revealed both positive and negative experiences, feelings and opinions on alcohol drinking practices among students. The magnitude of excessive alcohol abuse is such that it involves the total community, family, schools, religious units, government, private sectors and also drinkers them selves. All sectors of the society must participate through the introduction of different programs in terms of preventing, educating, controlling, caring, healing, rehabilitating and treating. In this issue, the researcher strongly appreciates the Caring, Healing and Teaching Model of Human Services Delivery developed by Danilo E. Ponce (2007) which can be applied to this

<sup>4</sup> Department of Traffic Police. December 18, 2007.

<sup>5</sup> Vientiane Time Newspaper. January 3, 2008.

phenomenon<sup>6</sup>.

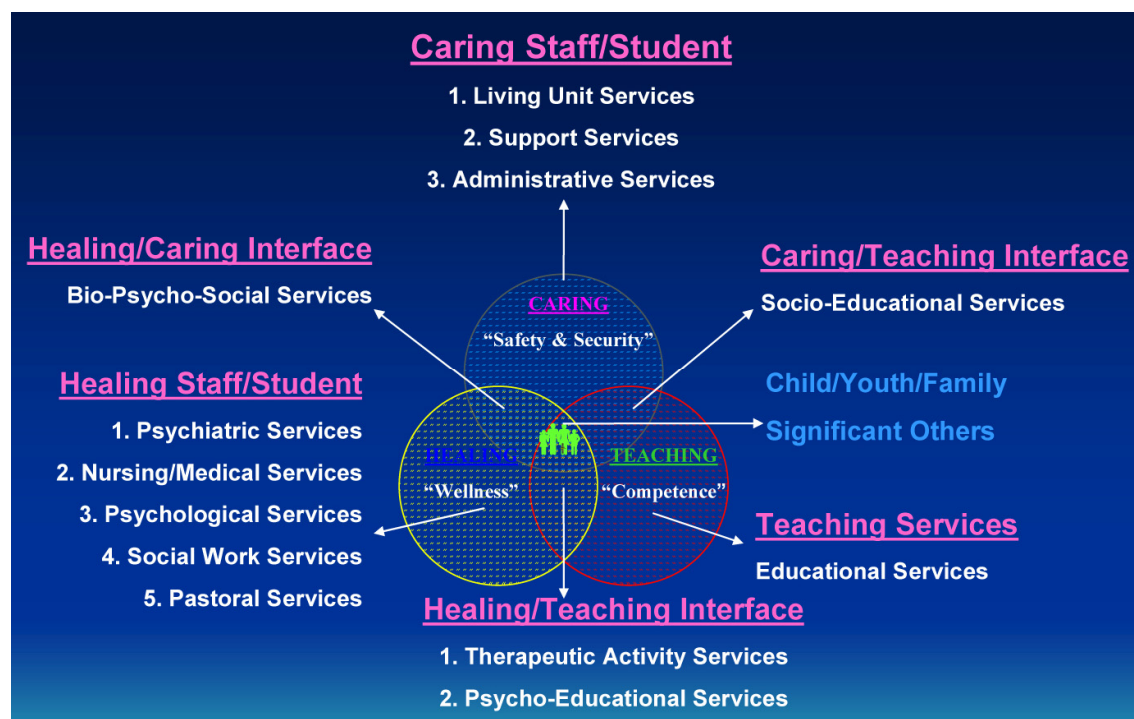


Figure 5. A caring, healing and teaching model of social delivery system

### 3. Conclusions

- 1) All of the respondents ever drank alcohol. Both male and female students are experienced with dinking alcohol like beerlao.
- 2) They usual drank alcohol with friends, relatives and family members in different places. They drink beer or white wine to establish good relationships with others, part of their traditional activities, influence by their family’s environment, because of problems, associated with receiving bigger allowance, and in relation to the course taken.
- 3) For most students, paying beer consumed is through sharing while others have friends who pay for their beer because they were invited and also through credit.
- 4) The most important factors/reasons are associated with alcohol drinking practices among students are friends and the social environment factors.
- 5) Alcohol consumption brought both positive and negative consequences to the students as drinkers, to the family and to the society as a whole.
- 6) Reducing excessive alcohol consumption could reduce other social problems.

### 4. Recommendations

Based on the conclusions, recommendations are offered to policy makers and government leaders, religious institution, higher educational institutions, family institution, economic institution (providers), drinkers/ students, social development practitioners and researchers in preventing harmful or social problems which caused by excessive alcohol drinking (Figure 6).

<sup>6</sup> Ponce, Danilo E. 2007. *Caring, Healing and Teaching Model*. Pp.7-13.



Figure 6. Implications, preventions and recommendations

The whole discourse on alcohol drinking practices may be summed up in the statement of Rev. Williams Wail who said that, “Prevention starts where drinking starts with our young men and women in the 18.25 age groups. Prevention means only one thing; education and as far as drinking is concerned, the best teachers are the parents and the best classroom is the home. The best textbook is being a good example and the best introduction medium to drinking alcohol should be an average of moderation.”<sup>7</sup>

For future studies, a comparative study should be conducted in different ASEAN Countries on the same phenomenon to draw out possible preventive measures for road accidents cause by excessive drinking and other negative consequences.

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<sup>7</sup> Salcedo, Lucila. 1999. *Social Issues*. P.170.

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# Sustainability of Diversified Farms in Yamethin Area in Dry Zone of Mandalay Division

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Myanmar

## **1. Introduction**

The economics of Myanmar depends on the production of crops. Most of the people are only depend on their farming. An increase in population, the expansion of infrastructure and growing single cultivars in ever-larger monocultures in the area of Yamethin District has resulted in non-sustainable use of natural resources. Therefore, there is an urgent need to study the conditions of sustainable farming systems in this area of Yamethin District in Myanmar. Mandalay Division lies in tropical zone. April is the hottest month in Myanmar. The average mean temperature of April is 89.7°F in Mandalay and 87.9°F in Yamethin and 88.7°F in Pinyinana respectively. Agriculture not only significantly affects the environment but is also impacted directly by changes in the environment. The social and economic impacts of environmental changes are also significant in many developing countries as agriculture is the major source of livelihood support (Rao and Rogers 2006). Sustainable agriculture is defined as a practice that meets current and long-term needs for food, fiber, and other related needs of society while maximizing net benefits through conservation of resources to maintain other ecosystem services and functions, and long-term human development. This definition emphasizes multidimensional (economic, environmental and social) goals of sustainable agricultural development. Sustainability is assessed on a simplified scale: (1) stability of the social, economic and ecological framework; (2) farmer's risk awareness, attitudes and management; (3) grey energy (machines, buildings, and external inputs); and (4) animal health and welfare (Haeni et al. 2003).

### **1.1. Problem statement**

The world during the 21<sup>st</sup> century will be facing shrinkage of land resources, increasing small holdings, heavy population pressure and accumulation of world resources with developed nations and consequently more hungry faces particularly in the developing countries. So to overcome these constraints and new challenges of the century this is a need to revolutionize and modernize the traditional production systems in the light of new challenges and to develop production-oriented and economic-based cropping systems with new geometric forms for sustainable development in agriculture sector and to meet the increasing demands for food, feed and forage by effective utilization of agricultural resources (Bhatti 2005). The crops are grown on the farms excessively. Also, land has been used intensively for agricultural purposes and the use of chemical fertilizer and pesticides has increased tremendously. As a result, degradation of natural resources such as soil erosion as well as the accumulation of pesticides and fertilizer, toxic to water and soils, may occur, with an adverse impact on human health and living conditions.

### **1.2. Objectives of the study**

- 1) To compare the sustainability of diversified and non-diversified farming systems.
- 2) To know diverse types of information relevant to the evaluation of real farming

system.

## 2. Literature Review

There are several studies to support the view that diversification through crop and animal enterprises will help to conserve natural resources and promote sustainable agriculture. Swaminathan (1988) has illustrated that intensive crop and animal husbandry techniques practiced on an ecologically sustainable basis are essential for the rehabilitation of degraded lands and to conserve our rich genetic heritage. Farm diversification helps to conserve natural resources and protect the environment (FAO 1991).

The disregard of biochemical and ecological feedback mechanisms of agro-ecosystems results in a decline in soil organic matter content and soil activity, the elimination of pest-predator insects, and the degradation of the animal auto-immune systems by prolonged use of antibiotics (Van and Verkly 1991). These effects can be reversed by basing the farm system on diversification and optimum use of internal inputs. According to Petit and Barghouti (1996) agricultural diversification offers an approach for stemming further environmental degradation through the establishment of multi-commodity production systems that are not only economically profitable but also environmentally sound. Diversification is widely thought to offer considerable scope for improving the economic viability of many farm businesses. Many farm diversification activities can also provide benefits for the wider rural economy and community by, for example, encouraging and providing additional job opportunities.

**Table 1. Crop combination by township in Mandalay Division, Myanmar**

No.	Townships	Crop Combination	Index
1.	Amarapura	R-P-S-Fr	R= paddy
2.	Patheingyi	R-P-S-C-Fr-G-F	P= pulses
3.	Pyin-Oo-Lwin	R-P-W-Fr-M-C-G-F-P-Su	S= sesame
4.	Madaya	R-P-G-S-C	F= fodder crop
5.	Sinku	P-G-R-M	Mi= millet
6.	Mogok	R-V-Fr-M-B	G= groundnut
7.	Thabeikkyin	Sc-P-G-R	W= wheat
8.	Kyaukse	R-P-S-C-Sc	C= cotton
9.	Singaing	P-R-S-Sc-C-F-V	M=maize
10.	Myittha	R-S-C-P	Fr= fruit
11.	Tada-U	P-S-F-G-Su-C-WR-M-Ch	B= banana
12.	Meikhtila	P-S-F-C-R-Mi-Su-V	Su= sunflower
13.	Mahlaing	Mi-G-V	V= vegetable
14.	Thazi	S-P-F-Ch-Mi-C-R	Sc= sugarcane
15.	Wundwin	R-F-S-C-P	Ch= chili
16.	Myingyan	R-S-T-Mi-C-F-G-M-Su	T= tobacco
17.	Taungtha	P-S-Mi-C-G	
18.	Natogyi	P-S-Mi-C	
19.	Kyaukpadaung	S-P-F-W-Su-C-R	
20.	Nyaung-U	P-G-S-W	
21.	Yamethin	R-Ch-P-G-Su-C-V-S	
22.	Pyawbwe	F-S-C-V-Su-R-P	
23.	Tatkon	R-G-S-P-C-M-Sc-F-Ch-Su	
24.	Pyinmana	R-P-Sc-S-M-V-Su-G-Ch	
25.	Lewe	R-S-P-Sc-V-G-F	

Source: Thein Tun and Thet Tun (2001).

### 3. Research Methodology

#### 3.1. Source of data and collection

The survey was conducted at Yamethin township, dry zone area, central part of Myanmar. The total area of Yamethin Township is 1,088,289 ha. Annual rainfall is 1,140 mm and soil type is meadow soil, meadow alluvial and alluvial soil. Population density is 12/sq-km. Average land holding is less than 3 ha per household. Farm operation is done by family labor and own animal labor. About 72% of cultivated land is paddy land and others are garden, pulses and oil seed crop land. Small farm machines are introducing. There are 68 village tracts in Yamethin District. “Thit sone” dam is partially useful for summer rice production. The survey area is about 9 miles far from the dam. Water is released on the end of February every year into the survey area.

The survey was conducted on 88 farmers (10 villages). Two stages stratified random sampling method was used to select the study villages. Primary data were collected by interviewing farmers with structure questionnaire and semi structure interview was used for village head office and agricultural office at the sample villages. Secondary data were collected from villages head committees, district and township level of Myanmar Agriculture Service (MAS). Sample size of famers in the study villages in Yamethin Township was shown in Table 2.

**Table 2. Sample size in the study villages in Yamethin Township**

No.	Name of Villages	No. of Respondents
1	Naung dauk	8
2	Ingin kan	8
3	Ta back kar	8
4	Sie pin	8
5	Shaw phyu kaing	8
6	Thar sie	8
7	Le pyin thar	8
8	Phayar gone	8
9	Htan lay pin	8
10	Zey naung kaing	8

#### 3.2. Methodology

Data gathered from the experiment were subjected to Microsoft Excel 2003. Descriptive statistics such as frequency distribution, cross-tabulation and t tests were calculated. A sustainability index is developed to measure the sustainability level of the farming systems. Economic viability and ecological soundness were the two dimensions of sustainable agriculture adopted in constructing the index. Economic viability and ecological soundness were the two dimensions of sustainable agriculture adopted in constructing the index. Economic viability refers to the level of adoption of economic principles in the management of farm activities and the extent to which the farm output is considered to be economically efficient. Similarly, ecological soundness refers to the level of adoption of ecological principles and the extent to which the farm was considered to be ecologically efficient.

Economic viability was measured using seven indicators shown as follow.

#### **Box 1. Economic Viability Indicators**

**Production efficiency:** The non-weighted average of the yield for each activity on a farm expressed as a percentage of the average yield of that activity in the region.

**Net return:** The non-weighted average of the rate of return (net return divided by variable cost) of each activity on a farm.

**Cultivated land utilization index:** The total days land is occupied during the year, expressed as a percentage of full (365-day) utilization.

**Technology use level:** The non-weighted average score for the adoption of recommended practices for each activity for the proportion of recommended ‘low-cost’ technologies used.

**Farm family employment level:** The proportion of total available farm family labor days spent working on the farm.

**Self-reliant level:** A score that measures the degree to which farmers were self-reliant with respect to capital, farm implements, farmyard manure, labor, and information on cultivation practices, processing and market knowledge.

**Self-sufficiency level:** A score that measures the degree to which the farm household was self-sufficient in food, fodder and fuel.

Two indicators were selected to measure ecological soundness:

**Box 2. Ecological Soundness Indicators**

**Eco-friendly technology use level:** The non-weighted average scores for the adoption of eco-friendly activities for each activity. The technologies included suitable variety and use of growing spacing.

**Organic recycling level:** The non-weighted average (for all recycled products on the farm) of the proportion of the total product produced that is recycled).

The sustainability index was constructed by considering both sets of indicators:

**Box 3. Calculating the Sustainability Index**

**Economic viability:** The average of the seven economic viability scores.

**Ecological soundness:** The average of the four ecological soundness scores.

**Sustainability index:** The average of the economic viability and ecological soundness scores.

## 4. Results and Discussion

### 4.1. Education level of respondents in Yamethin Township, Myanmar

The education level of the farmers and family labors in farm are described in table 3 and table 4 respectively. The education levels of respondents are categorized into three groups; monastery, primary and secondary level. Family labors in farms are grouped into 4 categories.

**Table 3. Educational level of the respondents**

No.	Educational level	Respondents Number	Ratio
1	Monastery	13	16
2	Primary	27	34
3	Secondary	40	50
	Total	80	100

**Table 4. Family labors in farm**

No.	No. of family labors	Respondents	
		Number	Ratio
1	1	12	15
2	2 - 4	45	56.25
3	5 - 6	14	17.5
4	7 - above	9	11.25

#### 4.2. Farm diversification of Yamethin Township, Myanmar

The cropping sequences prevailing in Yamethin area are more or less uniform throughout their villages. Grape and Betel are perennial crops and other crops are grown according to their seasonality. According to the data collected from the survey farmers, wet land (55%), dry land (47.5%) and garden (75%) are grown in this area.

**Table 5. Distribution of farming systems based on the respondents**

No.	Types of farm	No. of farmers	Ratio
1	Wetland farming	44	55
2	Dry land farming	38	47.5
3	Gardens	60	75

#### 4.3. Economic viability of diversified and non diversified farms

Indicator measurements relating to the economic viability of diversified and non-diversified farms are presented in table 6. The results show that -with the exception of production efficiency, self reliant level and self sufficiency level - all the resting indicators measurements for diversified farms were significantly higher than those for non-diversified farms. Production efficiency for diversified farms is not significant different with those of non-diversified farms. Therefore, it can be assumed that the farm management skills are the same for diversified and non-diversified farms. Net-return for diversified farms is significantly higher than those of non-diversified farms. It can be generally supposed that the more the farms diversify the more income the farmer can get. For almost every farmer, his income comes from the farms, so if farmers grow more diverse cropping pattern, it will be more economical and surely they will become wealthy. Cultivated land utilization index for diversified farms is significantly higher than non-diversified farms. Farmers who grow many crops at the same season continuously use all of their own land area throughout the year. They get benefits not only by using their land without fallowing but also by incoming more money.

The result shows that technology use level for diversified farms is significantly higher in comparison with those of non-diversified farms. Then farmers conducting the recommended cultural practices, new varieties and some pre-harvest and post-harvest technologies given by Myanmar Agriculture Service had to be found that they grow more diverse farms. The comparison of family employment level for diversified and non-diversified farms is highly significant. Family labors used for diversified farms are higher than non-diversified farms. Therefore, they will give more care and systematic management to their farms than the hired labor. Self reliant level is not significantly different between diversified and non-diversified farms. That means that the way they own farm machineries and farm animals is not different between these two groups and getting more net return has no correlation with their properties. Self-sufficiency level is also same and has no significant difference between the diversified and non-diversified

farms. The uniformity in cropping patterns throughout the survey area, be it diversified or non-diversified farms, resulted in similar levels of production efficiency, self-reliant level and self sufficiency level. The overall economic viability of diversified farms was significantly higher than non diversified farms.

**Table 6. Economic viability of diversified and non diversified farms**

No.	Indicator	Percentage Level		t- value
		Diversified farm (n = 67)	Non-diversified farms (n = 13)	
1.	Production Efficiency	100.36	84.57	1.8 <sup>ns</sup>
2.	Net Return	170.8	33.0	2.9 <sup>**</sup>
3.	Cultivated Land Utilization index	72.7	59.7	2.4 <sup>*</sup>
4.	Technology Use Level	55.3	71.5	2.4 <sup>*</sup>
5.	Farm Family Employment Level	38.1	12.5	3.5 <sup>*</sup>
6.	Self Reliant Level	35.3	36.5	0.15 <sup>ns</sup>
7.	Self Sufficient Level	242.4	475.7	1.3 <sup>*</sup>

\* means Significant at 0.05 level of probability.

\*\* means Significant at 0.01 level of probability.

<sup>ns</sup> means Non- significant.

#### 4.4. Ecological soundness of diversified and non diversified farms

Indicator measurements for ecological soundness of both diversified and non diversified farms are presented in table 7. The result shows that one out of two indicator measurements for ecological soundness- eco-friendly technology use level is significantly higher for diversified farms.

**Table 7. Ecological soundness of diversified and non diversified farms**

No.	Indicator	Percentage		t - value
		Diversified farms (n=67)	Non-diversified farms (n=13)	
1.	Eco-Friendly Technology Use Level	55.3	71.5	2.4 <sup>*</sup>
2.	Organic Recycling Level	23.6	28.6	0.9 <sup>ns</sup>

\* means Significant at 0.05 level of probability.

<sup>ns</sup> means Non- significant.

#### 4.5. Levels of sustainability for diversified and non diversified farms

From table 8, it is evident that the sustainability level of diversified farms (83.5%) was found to have a high level of sustainability, whereas the majority of non-diversified farms (72.6%) had a moderate sustainability level. In this study, the sustainability level of the diversified farms is greater than those of non-diversified farms. But there is no significant difference between these two types of farming system. Therefore, the sustainability level of Yamethin area may be predicted as moderate to high.

In Myanmar, most of the farmers together use the same techniques at the same time (i.e. agronomic practices such as animal manure, inorganic fertilizer, pesticides

application, and adopting new technology for time of sowing or transplanting or direct seeding or to use new varieties and other practices recommended by the authorized organizations, especially by MAS, and buying farm machineries and equipment). That's why some levels of measuring economic viability and ecological soundness are not significantly different between the groups of framers conducting diversified and non-diversified farming system.

**Table 8. Levels of sustainability for diversified and non-diversified farm**

Sustainability level	Diversified farms (n = 67)		Non-diversified farms (n = 13)	
	No.	%	No.	%
Low	15	22.4	3	23.1
Median	32	47.8	3	23.1
High	20	29.9	7	53.8
Mean	83.5		72.6	
Mean difference	10.9			
t- value	0.66 <sup>ns</sup>			

<sup>ns</sup> = non-significant

## 5. Conclusions

An increase in population, the expansion of infrastructure in the central part of Myanmar has resulted in non-sustainable use of natural resources. In many places, forests have been converted to agricultural land. In addition, the fallow period of land use has been shortened. Also, land has been used intensively for agricultural purposes and the use of chemical fertilizer and pesticides has increased tremendously. As a result, degradation of natural resources such as soil erosion as well as the accumulation of pesticides and fertilizer, toxic to water and soils, has occurred, with an adverse impact on human health and living conditions. Moreover, farmers' existing agricultural systems have changed in favor of market-oriented systems. Therefore, there is an urgent need to study the conditions of sustainable farming systems in the central areas of Myanmar. The sustainability of farms growing diversified cropping pattern is important both from an economic and ecological point of view.

Overall, the finding indicates that farms with greater agricultural diversity have higher agricultural income but no significance statistically. The farms that include rice, pigeon pea, sunflower and green gram and garden activities (diversified farms) have been found to be more economically viable and ecologically sound than other non-diversified farms. However, the farming systems that conduct Le (lowland rice) only and Yar (some upland crops) was found to be less economically viable and ecologically sound in comparison with the other more diverse farming systems. Diversification reflects the reduced dependence of farmers on agriculture as a source of income. Diversification also implies some kind of entrepreneurial activity on behalf of the farmer. To instill confidence in farmers to diversify their farms, model diversified farms based on scientific principles may be developed in the villages. It is also necessary for the research system to explore other possible options for locally appropriate diversification.

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## Study on the Consumer's Behavior and Per Capita Rice Consumption in Pyinmana Township, Myanmar

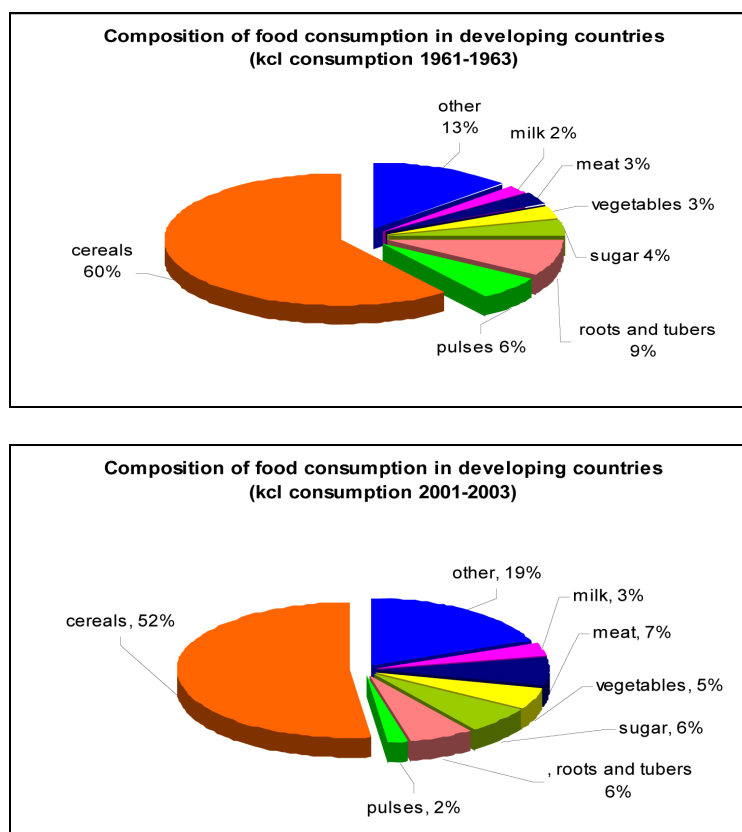
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### 1. Introduction

More than one hundred countries in the world depend on rice as their staple food which is especially true in Asian countries who are the major rice producers. Rice constitutes the basis food. In Myanmar, it is the major food crop and the majority of livelihood of rural people depends on the paddy production.

Per capita world food consumption was rising from an average of 2,280 kcal/person/day in 2001–2003. The annual percentage change in the cereals growth rate was 2.2 % in world (1961–2005) and 2.8 % in developing countries (FAO 2007).

In developing countries, the progress in rising and diversifying per capita food consumption has had positive and negative effect. According to the Figure 1.1, the consumption of cereals decreased from 60% (1961–1963) to 52% (2001–2003) in developing countries. The decreased consumption of these was replaced by raising the consumption of milk, meat, vegetables and sugar. In developing countries, this diet transition resulted in rapidly growing rates of overweight, obesity and a number of diet-related non-communicable diseases.



Source: FAO, 2007.

Figure 1.1. Composition of Food Consumption in Developing

Income growth, relative price changes and urbanization have altered dietary patterns in both developed and developing countries. When people have more money to spend, they normally add more variety and more expensive and high value foods to their diets, although responses differ between developing and developed countries.

Rising of incomes has an immediate and pronounced impact on diet, as people adjust their budget to include higher-value food items. As wages increase, people are also willing to pay for convenience, freeing up their time for income-earning activities or leisure. Large urban markets create opportunities for the establishment of large supermarket chains, and they attract foreign investment and marketing from global corporations. Non-traditional foods are also becoming more accessible to urban population as a result of trade liberalization and declining transportation cost (Pingali 2007).

In Asia, rice is the dominant staple food crop in developing countries, particularly for the humid tropics across the globe. Almost 90% of rice is produced and consumed in Asia and 96% in developing countries. The growth in rice consumption has started slowing down because of urbanization and increases in per capita income leading to diversification of the diet. High levels of rice consumption have already reached in many countries, and progressed in reaching population growth. The trend in per capita consumption of rice in selected Asian countries was shown in Table 1.1. Rice consumption has been declining in the middle and high income countries in Asia such as Japan, South Korea, China, Thailand, and Malaysia.

Myanmar was one of the top ten paddy production countries all over the world in 2003 (FAO 2004). The paddy production was 37% of the total crop production in 2007–2008 in Myanmar (MOAI 2008). According to the estimation of FAO, annual per capita rice consumption of Myanmar was 203 kg in 1999–2000 (Table 1.1).

**Table 1.1. Changes in Rice Consumption in Selected Asia Countries**

Country	Consumed Milled Rice (MT) 1999-2001	Per Capita Consumption (kg/person/yr)			Change in Population (%)	
		1970-72	1989-91	1999-01	1970-2000	2000-2030
China	113.51	79	93	89	54	17
India	76.45	69	79	76	82	40
Indonesia	31.62	105	147	149	77	33
Bangladesh	21.37	150	153	155	94	43
Vietnam	13.03	157	154	167	82	41
Myanmar	9.71	160	209	203	78	31
Philippines	7.65	86	96	101	107	49
Japan	7.53	89	65	59	22	-5
Thailand	6.83	152	110	109	74	27
Korea, South	4.12	119	104	88	46	12
Cambodia	2.03	163	158	155	89	82
Malaysia	1.96	123	81	88	105	48
Pakistan	1.78	29	14	13	128	93
Korea, North	1.73	82	73	78	55	19

Source of basic data: FAOSTAT database, FAO, 2004.

For low income Asian countries, such as Indonesia, Philippines, India, Bangladesh, Vietnam, and Myanmar, per capita consumption has reached a high level and expectedly may not grow further because of very low income elasticity of demand and

rapid urbanization (Hossain 2004).

The condition of production and consumption of rice in Myanmar during 2000–2007 was mentioned in the Table 1.2. The paddy production was increasing gradually from 21,323,869 MT in 2000–2001 to 30,974,946 MT in 2006–2007. As the population was increasing to over 6 millions during 7 years, the amount of consumption was also rising from 15,039,000 MT to 16,953,000 MT. However, as a relationship with international market, the export amount of paddy was declining, especially in 2003–2004 (from 793,500 MT to 168,500 MT).

From the view of consumer preference, the consumers of lower Myanmar prefer to eat soft rice varieties but those of central Myanmar consume hard varieties. In the condition free from the preference, it is clear that consumers want price stability. The poor would be expected to be much more price responsive than the rich in their food purchase, even in the case of controlling the income effect of price changes. Stable food price is especially important for urban consumers who must purchase all of their food from the market.

**Table 1.2. Sown Area, Production and Consumption Balance of Paddy in Myanmar (2000-2007)**

<b>Year</b>	<b>Sown Area (ha)</b>	<b>Paddy Production (MT)</b>	<b>Population</b>	<b>Export (MT)</b>	<b>Consumption* (MT)</b>
2000/01	6359051	21323869	50130000	251,000	15,039,000
2001/02	6451059	21915543	51540000	939,200	15,462,000
2002/03	6488240	21805301	52170000	793,500	15,651,000
2003/04	6542939	23135868	53220000	168,500	15,966,000
2004/05	6860000	24330000	54300000	182,000	16,290,000
2005/06	7580000	28370000	55400000	180,000	16,620,000
2006/07	8124546	30974946	56510000		16,953,000

Source: SLRD, 2007, MOAI, 2007, FAO, 2006.

Note: \* Per capita annual consumption of paddy = 300 kg.

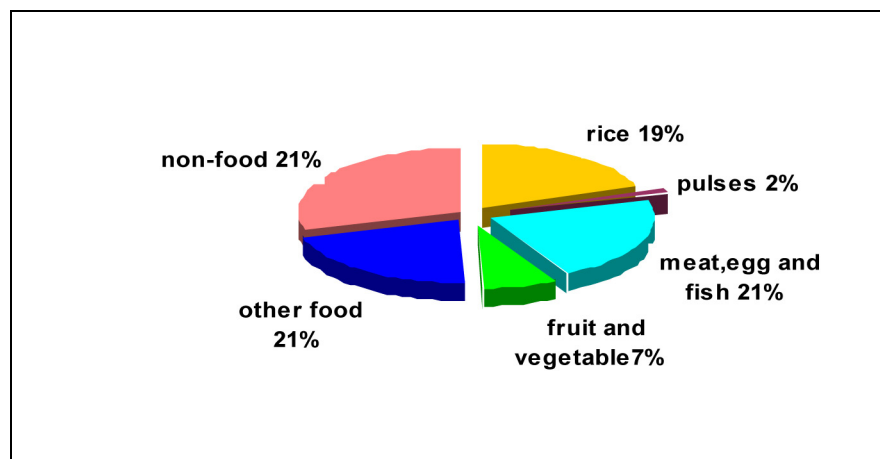
The anxiety due to lack of confidence in the availability and cost of staple foods contributes directly to lowering consumers’ welfare, irrespective of the quantities purchased and prices paid for the food itself. Of course, there is no market where consumers can “buy” food price stability and the confidence of the consumers. For the consumer’s expenditure, rice price stability is the important factor because per capita rice consumption is not changed significantly.

### **1.1. Problem statement**

Rice is the most important food item for the consumer’s expenditure. According to the information of household expenditure in Myanmar, share of household expenditure on food was about 79 percent and expenditure for rice was about 19 percent (Figure 1.2).

The rate of rice consumption per capita per year by Myanmar was estimated by different organizations. However, there were no up to date data on rice consumption per capita in actual term. The second rationale of the study is to know the behavior of the consumers; what kinds of rice they prefer, how to substitute the rice and what are their opinions for the private rice export. The third issue is to estimate the amount of total domestic consumption which is applicable for the calculation of rice surplus or deficit

according to the rice production annually.



Source: CSO, 2002.

**Figure 1.2. Distribution of Household Expenditure in Myanmar, 1999**

However, it is difficult to estimate the rice consumption and to determine consumer's behavior for the whole country. This study tries to collect the samples of 283 households which have different income levels and different localities in Pinyinana Township to solve the stated problems partially with the following objectives.

### **1.2. Objectives of the study**

- 1) To compare the differences between consumed and preferred variety by consumer groups.
- 2) To get the consumer's perceptions for rice consumption when they have high income and when they face high rice price.
- 3) To assess the consumer's opinions for rice export if the government allows the private sector.
- 4) To compare the annual per capita rice consumption of different consumer groups.

## **2. Literature Review**

Rice consumption at the household level was carried out by CSO for the household income and expenditure survey (HIES) in 1997 as nation-wide scale. The HIES used a nationally representative sample of 5,670 household scattered across 36 townships. The survey collected information on income, expenditure, housing, health, education, water supply, sanitation and so on. According to HIES, rice is consumed by every household in Myanmar. It was estimated that rice per capita monthly consumption to be about 11 kg for urban and 13 kg for rural Myanmar. Therefore, 132 kg and 156 kg of rice were consumed annually by urban and rural consumers respectively. Based on this data, per capita annual consumption of rice for rural consumers was 24 kg higher than that of urban consumption (CSO 1997).

By using the above data and apparent rice consumption in Myanmar (1989–2002 data from FAO), the regression analysis was used to determine systematically the determinants of rice among Myanmar households. The own price elasticity of rice demand was -0.1 which indicated that there was a few response to the rice price and little substitutability between rice and other foods. The expenditure elasticity was statistically significant at 5% level and it had a value of 0.12 reflections that lower income of the

people (Nay Myo Aung 2005).

The Family Income and Expenditure Survey (FIES) were conducted by the statistics Bureau of the Management and Coordination Agency in Japan. The FIES data set for 1997 covered a total sample of 95,223 households. The descriptive analysis focused on income–consumption relationships. From this analysis, the household rice consumption showed a strong positive relationship with income for all age groups, especially for the range of 35–45 years of age and elderly, more than 65 years groups. Households in the highest income group showed some declines in rice consumption. Overall household daily consumption of rice in 1997 varied from 258.19g for the lowest-income group to 309.34 g for the highest income group (FAO 2003).

Per capita rice consumption tended to fluctuate over the various income levels, except the older group. This pattern was unreasonable because many other factors affect per capita rice consumption, for example, household size. For a household of four members, the per capita consumption of rice steadily increased over income levels, from 66.57 g/day for the lowest income group to 81.94 g/day for the highest-income group. These descriptive statistics provided that rice was not an inferior good in Japan. Furthermore, it should be noted that, even if the descriptive data were to show strong negative relationships between rice consumption and income, it cannot be assumed that rice was an inferior good (FAO 2003).

Another important finding from the descriptive statistics was that there were strong positive relationships between price and income for many foods in Japan. Higher income household paid higher prices for rice in every income level. It may be reasonable to assume that higher-income and older households tended to buy higher-quality rice than lower-income and younger households. Although the survey did not provide information about the purchased quality rice by households, it may be possible to investigate the demand for different quality of rice by estimating the demand function for separate income and/or age groups (FAO 2003).

The Marrakech Agreement, 1994 of the General Agreement on Tariff and Trade (GATT) Uruguay Round started a process of agricultural market liberalization. In order to obtain an accurate forecast of the impact of liberalization of the Japanese rice market, it was necessary to estimate the demand elasticity precisely. Cross sectional household data were used. Estimation was based on a total of 95,223 observations.

The food item surveyed were non-glutinous rice, bread, noodles, fresh fish and shellfish, fresh meat, milk, eggs, fresh vegetables, fresh fruits, fats and oil. The own-price, cross-price and expenditure elasticity of the 11 products were estimated, and some selected demographic variables were analyzed. Contrary to previous studies on rice consumption patterns, the empirical results reported that own-price and expenditures elasticity for rice were high in absolute terms. In addition, these high elasticities were robust across different estimators (FAO 2003).

These results implied that Japanese rice is no longer a staple food, and rice had become more of a luxury food than many other foods. The economic results also showed that rice is strong substitutes. Results from demographic variables showed that Japanese food consumption patterns were different across households. Older heads tended to have more traditional dietary patterns, including a higher budget share for rice. The general dietary patterns of younger households could be characterized as Westernized: these households tended to consume more bread, noodles and meat, which were not traditional Japanese food items. Using 1997 household data, econometric results indicated that traditional Japanese dietary patterns have changed.

### 3. Research Methodology

#### 3.1. Source of data and method of data collection

This study was based on both primary and secondary data. The primary data collection was done by interviewing the respondents with prepared questionnaires. The sampling method was stratified random sampling method. The survey was conducted at Yezin, Pyinmana and Aisaut Village during June, 2008 by a group of the students of Agri-business Management Stream. The survey data from these areas were used to reflect the consumer's behavior and per capita rice consumption. Moreover, the secondary relevant data were used from Ministry of Agriculture and Irrigation (MOAI), Central Statistical Organization (CSO), Settlement and Land Record Department (SLRD), and Food and Agricultural Organization (FAO).

The primary data were collected from different levels of government staff in Yezin Agricultural University and Department of Agricultural Research. Low and high income consumers were selected in Pyinmana to represent the urban consumers. Rural households from Aisaut Village were taken as rural consumers separated by rural workers and farmers. Table 3.1 shows the sample size of selected consumer groups in this study. Total selected samples were 283 respondents for all groups.

**Table 3.1. Sample Size of Selected Consumer Groups**

Consumer group	Yezin		Pyinmana		Aisaut	
	Low Income	High Income	Low Income	High Income	Rural Worker	Rural Farmer
Sample size	50	50	48	39	48	48

Both quantitative and qualitative data were collected to demonstrate the consumer's behavior and per capita rice consumption. In the quantitative data, the respondent age, income per month, age of respondents, family members, consumed amount of rice per day, substituted foods for rice were collected. The collected qualitative data were the occupation, education level of the respondent's family members, consumed rice type, preferred rice type, and people's behavior such as change in attitude after changing income, and opinions of private rice export.

#### 3.2. Method of analysis

Descriptive analysis was used to compute the per capita rice consumption. In this study, some assumptions were accepted. If respondent's income is higher than 100,000 kyat/month, it was assumed as high income. If income of household is 100,000 kyat/month and lower than 100,000 kyat/month, this group was described as low income. In computing per capita rice consumption, rice consumption of two children younger than 8 years equivalent to one man. Based on the assumptions and the responses of the different consumer's income groups, annual per capita rice consumption was calculated for different consumer groups in Pyinmana Township.

Changes in rice consumption of the respondents in relation to high income level and high price of rice were calculated. Consumer's perceptions for rice export were also described in percentage of the samples based on the given reasons of the respondents.

## 4. Results and Discussion

### 4.1. Demographic characters of different consumer groups

The ages and monthly income (kyats) of the respondents were shown in Table 4.1. In the survey area, the average age of the respondents was around 48 years old, ranging from the youngest as 42.9 years to the eldest as 49.6 years.

**Table 4.1. Demographic Characters of Different Consumer Groups (Age and Income)**

Consumer Groups	N	Age (years)			Income/month (kyats)		
		Max.	Min.	Avg.	Max.	Min.	Avg.
Yezin low	50	66	23	42.90	100,000	15,000	54,080
Yezin high	50	78	25	48.88	3,200,000	102,000	320,080
Pyinmana low	48	71	23	45.77	100,000	15,000	56,354
Pyinmana high	39	60	35	49.00	2,000,000	150,000	730,769
Aisaut worker	48	75	23	46.56	720,000	15,000	94,583
Aisaut farmer	48	85	28	49.69	50 ac*	1ac*	8.77 ac*

Note: \* Farm size of respondent.

The different income groups were used to compare the consumer's behavior and per capita rice consumption. The range of income was from 15,000 Kyats to 3,200,000 Kyats per month. In Aisaut village, consumer group's income could not be directly calculated into amount of income per month. Therefore, rural respondents were divided into rural worker who have no farm land and the farmers who have farm land. The workers contained tenants, those who are living from hand to mouth, farmhands, and share-croppers. The average land holdings of Aisaut farmers were 8.77 acres ranged from 1 acre to 50 acres based on the 48 rural farmers.

The average education level and family size were described in Table 4.2. The education levels of respondents were categorized into three groups; graduate level, high school level and under high school level (primary and middle school level).

**Table 4.2. Demographic Characters of Different Consumer Groups (Education level and Family size)**

Consumer Groups	N	Education level (%)			Family members (%)		
		G	HS	<HS	>55yr	8-55	<8
Yezin low	50	33.93	44.64	21.43	10.70	82.25	14.08
Yezin high	50	54.39	21.93	23.68	14.66	80.17	10.34
Pyinmana low	48	16.96	42.86	40.18	5.93	93.77	0.59
Pyinmana high	39	62.42	28.86	8.72	12.5	87.5	0
Aisaut worker	48	2.03	11.49	86.49	6.98	83.79	20.45
Aisaut farmer	48	3.52	31.69	64.79	13.22	79.74	9.38

Note: The family size was grouped into three categories.

In rural household, 86.49% of workers and 64.79% of farmers were primary and middle school level. The graduate level of Aisaut farmer (3.52%) was relatively higher

than of rural worker (2.03%). The most educated people were found as 54.39% and 62.42% in high income group in Yezin and Pyinmana respectively. But, low income group in Pyinmana has lower level of education than both in Yezin.

The family size was grouped into three categories based on the assumption of Market Information Service, Department of Agricultural Planning.

- 1) Less than 8 years was described as young people and they range from 5.93% to 14.66%.
- 2) Between 8 and 55 years old were described as middle aged group which were observed around 85%.
- 3) Above 55 years old were classified as old people and they ranged from the lowest 0% to highest 20.45%.

#### 4.2. Consumed rice varieties and difference between consumed and preferred variety by consumer groups

Table 4.3 shows rice varieties consumed by different income groups and the difference between consumed and preferred variety of the consumers in the survey area. According to the responses of consumers, both groups of Yezin and Aisaut farmers preferred to consume Thukha rice variety. Pawsan was consumed mostly by Pyinmana high income group and it is not popular in rural area. Most of the rural workers like Thukha and some of them want to eat IR variety depending on their income level. According to these findings, Thukha is the most preferred variety among other rice varieties in Pyinmana Township. The differences between consumed and preferred variety were not so big among the consumer groups of Yezin and Aisaut village. However, urban consumers with low income in Pyinmana had differences between preferred rice and consumed rice variety (45.83%). However, only 7.69% of high income group from urban area had difference between preferred and consumed variety. Therefore, they could have rice variety what they preferred (Figure 4.1).

**Table 4.3. Consumed Rice Varieties of Different Consumer Groups in Studied Areas (percentage of respondents)**

Rice Varieties	Yezin		Pyinmana		Aisaut	
	Low	High	Low	High	Worker	Farmer
Thukha	78	62	47.92	28.21	54.17	75
Pawsan	8	18	31.25	66.67		
Pawsan+Thukha		8	2.08	5.13		
Thukha+IR		2			20.83	10.42
IR	14	10			25	12.5
Emahta			14.58			
Medon			4.17			
Innmayebaw						2.08
N	50	50	48	39	48	48



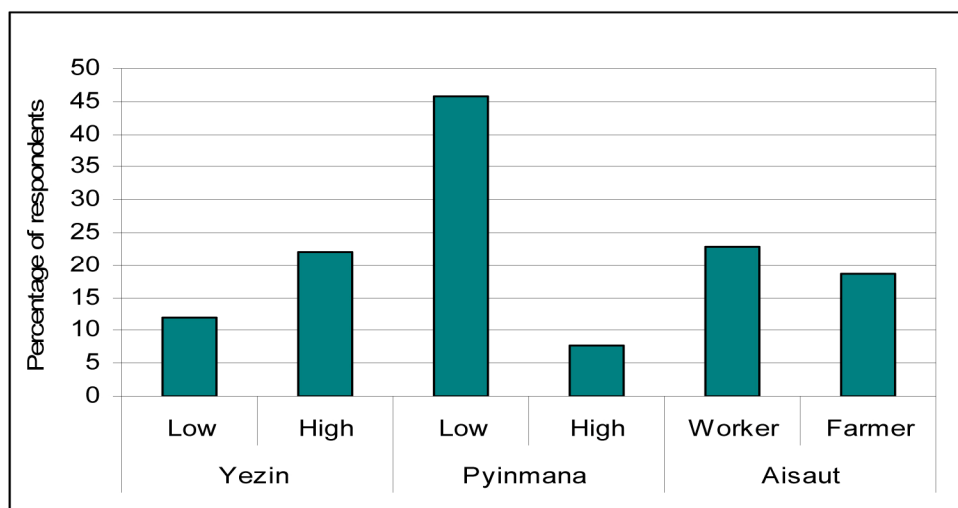


Figure 4.1. Differences between Consumed and Preferred Rice Variety by Consumer Groups

### 4.3. Substitute foods for breakfast by consumer groups

There are many substitute foods for breakfast such as rice processing foods and wheat processing foods as shown in Table 4.4. Rice processing foods are fried rice, rice noodle with gravy (Monhinga), rice noodle salad, Shan noodle, and Vermicelli soup, etc. Wheat processing foods are fried stuffed pastry, India pancake, India flat bread (Nanpya), Chinese dumpling, fried dough sticks, wheat noodle salad, noodle with coconut milk gravy, bread, cake, etc. Table 4.4 indicates that Pyinmana urban people have higher substitution for their breakfast than other two groups. For the urban consumers, wheat processing foods were more preferred than rice processing food. The rural consumers (both groups in Aisaut) and low income group of Yezin had no substitution especially wheat processing foods for their breakfast.

Table 4.4. Substitute Foods for Breakfast by Consumer Groups (percentage of respondents)

Substitution foods	Yezin		Pyinmana		Aisaut	
	Low	High	Low	High	Worker	Farmer
Rice processing foods	6.00	10.00	12.50	7.69	2.08	2.08
Wheat processing foods	0.00	2.00	79.17	87.18	0.00	0.00
No substitution	94.00	88.00	8.33	5.13	97.92	97.92
N	50	50	48	39	48	48

### 4.4. Consumer’s perceptions

Table 4.5 shows changes in rice consumption of the respondents in relation to high income level and high price of rice. In both cases, most of the all groups did not obviously change their consumption style. This information explains that the most consumers like the rice as the best for their health and daily life.

The differences between consumed and preferred variety were not so big among the consumer groups of Yezin and Aisaut village. However, urban consumers with low income in Pyinmana had differences between preferred rice and consumed rice variety (45.83%). However, only 7.69% of high income group from urban area had difference between preferred and consumed variety. Therefore, they could have rice variety what they preferred (Figure 4.1).

**Table 4.5. Consumer's Perceptions for Rice Consumption When High Income and High Rice Price (percentage of respondents)**

Situations	Behaviors	Yezin		Pyinmana		Aisaut	
		Low	High	Low	High	Worker	Farmer
High Income	Change	18	10	2.08	0.00	17.00	10.42
	Unchanged	82	90	97.92	100.00	83.00	89.58
High Rice Price	Change	0	4	4.17	2.56	6.25	4.17
	Unchanged	100	96	95.83	97.44	93.75	95.83
The Best Cereal	Rice	98	100	100.00	100.00	100.00	100.00
	Wheat	2	0	0.00	0.00	0.00	0.00
N		50	50	48.00	39.00	48.00	48.00

In Table 4.6 and 4.7, it describes the consumer's opinions for the private rice export. Table 4.6 indicates the percentage of respondents who are in favor of rice exporting with their own reasons. Among their reasons, earning foreign exchange is the main objective and promoting the farmers' life is also one of the objectives.

Most of the rural farmers (87.51%) eagerly in favor of private rice export with their expectations of the high rice price as far as they are rice producers. In the Table 4.7, there are many reasons not to export rice. Domestic sufficiency and lower and stable rice price were the common reasons.

**Table 4.6. Consumer's Opinions for Rice Export (percentage of respondents who agree)**

Reasons for rice export	Yezin		Pyinmana		Aisaut	
	Low	High	Low	High	Worker	Farmer
1. To earn FE	12.00	24.00	29.17	41.03	12.50	70.84
2. To promote farmer's life	2.00	0.00	2.08	2.56	0.00	0.00
3. Both (1+2)	0.00	0.00	0.00	15.38	0.00	0.00
No reason	44.00	46.00	0.00	0.00	14.58	16.67

**Table 4.7. Consumer's Opinions for Rice Export (percentage of respondents who do not agree)**

Reasons for not to export	Yezin		Pyinmana		Aisaut	
	Low	High	Low	High	Worker	Farmer
1. Domestic Sufficiency	2.00	8.00	41.67	17.99	45.83	8.33
2. Not to be High price	6.00	16.00	22.92	10.26	18.75	2.08
3. Low Price for Rice Quality	0.00	0.00	4.17	2.56	0.00	0.00
4. Both (1 +2)	0.00	0.00	0.00	7.69	0.00	0.00
No reason	20.00	2	0.00	0.00	4.17	2.08

Figure 4.2 clearly showed that the percentage of consumers who did agree with rice exporting were higher than those who did not agree in the groups of Yezin, high

income group of Pyinmana and Aisaut farmer groups.

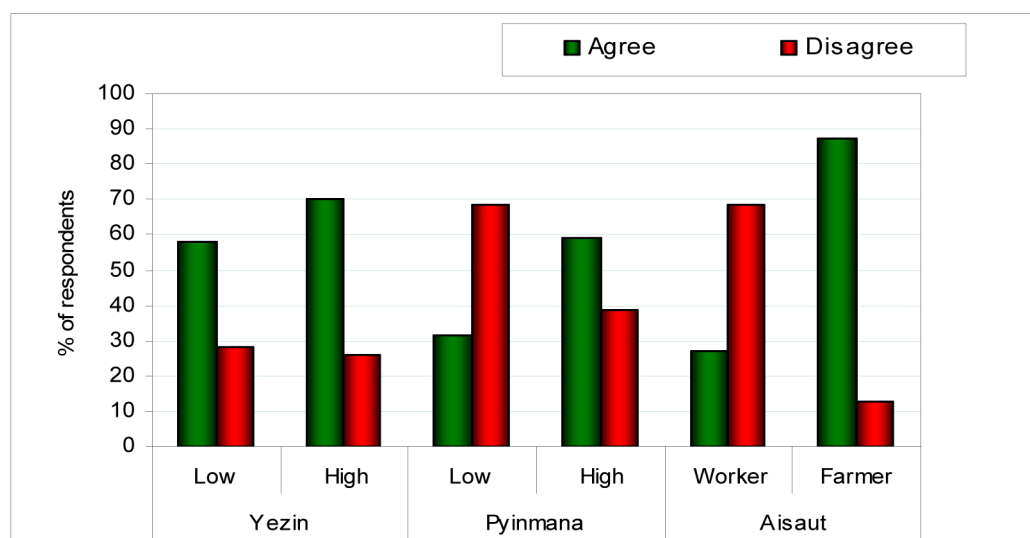


Figure 4.2. Percentage of Respondents showing Opinion for Rice Export

#### 4.5. Annual per Capita Rice Consumption of Different Consumer Groups

The mean of annual per capita consumption with various statistics for different consumer groups are described in Table 4.8. The average per capita rice consumption was 163.93 kg in Yezin low income group and 160.91 kg in Yezin high income group. Therefore, there was not big difference between each other.

However, Pyinmana low income group consumed 213.5 kg per year and high income group had 200.18 kg of rice per annum. The difference was 13.33 kg of rice which was greater than that of other groups. The highest rice consumption was found in rural worker group. The lowest per capita rice consumption was observed in Yezin high income group. The lowest per capita rice consumption (43.1 kg) was found in Yezin high income group and maximum rate was 465.51 kg by rural farmers. Moreover, average per capita rice consumption for the different consumer groups can be compared by the Figure 4.3.

Table 4.8. Annual Per Capita Rice Consumptions of Different Consumer Groups (Kg/year)

Per Capita Consumption (Kg/year)	Yezin		Pyinmana		Aisaut	
	Low	High	Low	High	Worker	Farmer
Mean	163.93	160.91	213.51	200.18	233.16	226.06
Standard deviation	56.90	72.32	56.04	51.26	76.22	74.60
Range	267.67	364.22	193.96	177.80	339.44	349.13
Minimum	96.01	43.10	96.98	96.98	48.49	116.38
Maximum	363.68	407.32	290.94	274.78	387.93	465.51
N	50	50	48	39	48	48

Note: Average per capita rice consumption of total respondents = 199.08 kg/year.

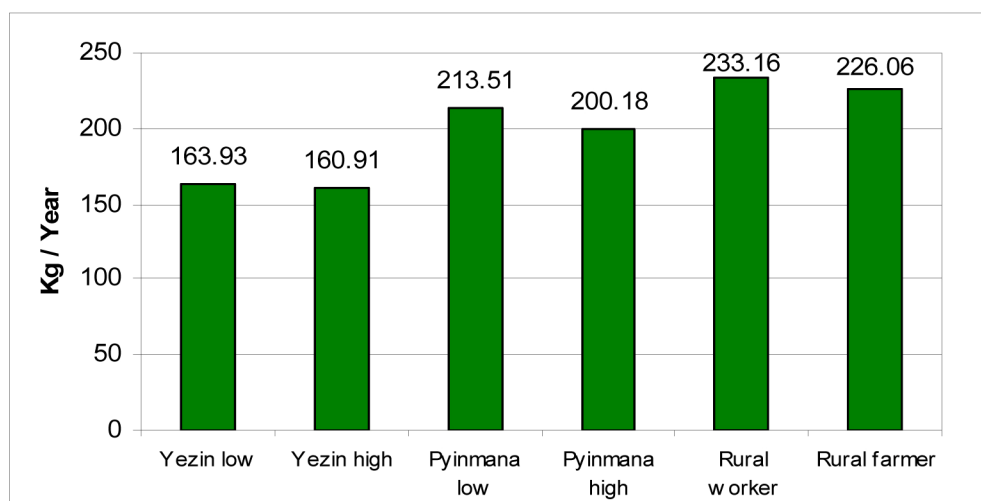


Figure 4.3. Average Per Capita Rice Consumption of Different Consumer Groups

## 5. Conclusions

The difference between the consumed and preferred variety in Pyinmana is clear but it was not obvious in Yezin and Aisaut. The income level is not related with substitution for breakfast in urban and rural consumers. Urban consumers have more substitution for their breakfasts than rural ones. Most of the consumers prefer rice in all conditions.

Rural farmers are rice consumers as well as rice producers; most of them are in favor of rice exporting. The major reason was to earn foreign exchange for the economy. The major reasons of respondents who did not agree to export rice were domestic sufficiency and stable rice price.

The average per capita rice consumption of total respondents was 199.08 kg per year. The highest per capita rice consumption was found in rural worker (233.16 kg), and the lowest was found in Yezin high income group (160.91 kg). Average per capita rice consumption of total respondents was 199.08 kg per annum.

According to the FAO data, annual per capita rice consumption was 203 kg in 1999–2001 and 162 kg in 2005 (300 kg of paddy) in Myanmar. Therefore, secondary data would be over or under estimation for Myanmar rice consumption based on the result of this study although it covered only for Pyinmana Township. Based on the experiences of this study, there are big ranges in actual per capita rice consumption by means of income levels as well as by rural and urban consumers' behaviors. Therefore, the further studies should be carried out for the whole country to get the accurate real per rice consumption data. Moreover, it is necessary to estimate the more detailed econometric analysis for the total demand function.

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## Floristic diversity and structure of the rain forest in Tanintharyi Nature Reserve (TNR) of Myanmar

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### **1. Introduction**

In Myanmar, 50.2% of the total land area (676,577 km<sup>2</sup>) is covered with 8 different categories of major forest ecosystems due to different ecological conditions (FRA 2005). Hence, Myanmar is endowed with a wealth of biodiversity in a number of forest habitats. However, because of increasing population, the major contributors of threats to biodiversity are improper and unsustainable agricultural practice in upland areas, encroachment into forests, and indiscriminate cutting of forests causing deforestation and consequently loss of natural habitats and declination of forest biodiversity. Forest Department therefore, is emulating a network of PAS which represents important ecosystems all over the country for biodiversity conservation, ecosystem balancing and environmental stability in the long run. Taninthayyi Nature Reserve (TNR) has been notified under PAS in 2005 with the area extent of 1700 km<sup>2</sup> for sustainable management of biodiversity and rain forest ecosystem. Tropical rain forest widely distributes in Taninthayyi division in southern part of Myanmar (Anon., FD 2003). Whitmore (1998) stated that among the various forest ecosystems in the tropics, tropical rain forest is globally significant as reservoir of biodiversity. Species diversity and different size of plant species provide a variety of habitats, shelter and food in different level of vertical and horizontal structure for biodiversity (Hunter 1990). A number of studies on species composition and vegetation structure analysis on the moist deciduous teak forest were reported by some researchers. But no attempt has yet been made to study the species diversity and forest community structure in tropical rain forest of TNR even though the diversity of flora and habitat structure provide unique information for efficient management and biodiversity conservation. Crome (1996) pointed out that “the remaining evergreen forests in TNR stand out as regionally and nationally significant forests”. For these reasons, the present study has focused on information about the floristic composition and forest structure which are of great importance to promote the conservation, maintenance and sustainability of biodiversity.

### **2. Objectives of the Study**

The main purpose of this study is to identify the diversity of flora and forest communities including their distribution and structure with the broaden aspect of biodiversity and ecosystem conservation.

### **3. Ecological Description of the Study Site**

TNR lies in the southern part of Myanmar between the Andaman sea in the west and Myanmar-Thailand international border line in the east (Fig.1) and is geographically

situated between the latitudinal range of N 14°20'50" to 14°57'55" and the longitudinal range of E 98°5'10" to 98°31'32". Most area in TNR is undulating and high elevation of terrain in the range of above sea level from 15 m in low land to 1,400 m at the ridge of Thai border (Anon., RS & GIS, FD 2007). The climate in the study area is the seasonal and tropical monsoon type with high rainfall. Average annual rainfall is 5,000 mm with temperature range of 25–28°C (Meteorological Department of Dawei District). The soil type in the study site falls into the yellow at the high elevation and red brown in low land (Smith, 1926). TNR is almost covered by tropical rain forest distributed in high elevation of mountain site, but the forest is associated with the deciduous hardwood and bamboo forest in the low land (Smith 1926; Maxwell 2001; Anon., RS & GIS 2007).

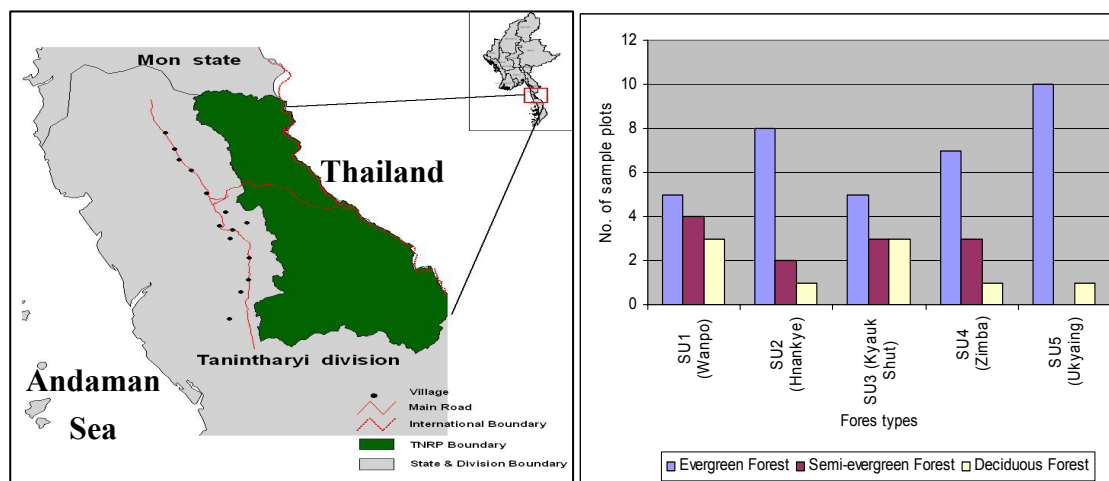


Fig. 1. Location of Tanintharyi Nature Reserve

Fig. 2. Vegetation types in survey areas

## 4. Methodology

### 4.1. Sampling method

The vegetation survey of 6.6 hectare was conducted using the systematic sampling and transect methods (Alder et al. 1992). Five sampling units (3,200 m × 500 m) were subjectively selected with an approximate distance of 8 km between adjacent units based on maps of crown coverage classes and forest types of TNR, developed by GIS/RS section of FD. In a 3,200 m × 500 m rectangular sampling unit consisted of the cluster of ten 40 m × 30 m sample plots, systematically spaced 800 m × 500 m along the orientation and predetermined on the maps. The sample plot was sub-divided into 12 subplots of 10 m × 10 m for recording flora ≥10 cm dbh. In addition, vegetation survey was also done in six transect belts of 10 m × 100 m near and within the respective sampling units. The transect belt was sub-divided into 10 subplots of 10 m × 10 m. Using GPS, the survey team firstly visited the predetermined point of each sampling unit and selected the actual sampling point depending on the topography and stand conditions. Areas with very steep slope with greater than 40-degree inclination, fully fallow land and bamboo brake were avoided and actual sampling point was set as close as possible to the preset point. Topography in terms of slope inclination, orientation and altitude of the plots was recorded together with its geographical location. Diameter at breast height (dbh ≥10 cm) and height (≥5 m) of all plants were measured in all sample plots of sampling units. The plants found in sample plots were firstly identified by the field team (Kress et al. 2003; Hundley et al. 1987; Gardner et al. 2000). And then all plant specimens were identified for the family and species level by the taxonomists from Botany Department of Dewai

University. Furthermore, the remaining unknown specimens of the species were sent to the herbarium of FRI, FD, Yezin for further identification.

## 4.2. Data analysis

Using the Excel 2000 and SPSS soft ware, analysis of species diversity, similarity and importance value was undertaken in this study. Among the several methods of diversity measurement, Shannon-Wiener Index and Shannon Evenness were applied because it especially emphasizes the rare species and is relevant to the higher number of rare species composition for nature conservation (Magurran 1988). The significance test for the difference of species diversity between the sampling units in the value of Shannon-Wiener index ( $H'$ ) obtained from 5 sampling units was conducted by using Student's  $t$  test (Jayarman 2000). Similarity of species composition between the individual sampling units was assessed using the index of Sorensen coefficient (Sorensen 1948, cited in Magurran 1988). The method consists of assigning categories of ecological importance to each species into communities (Curtis et al. 1951).

## 5. Results

### 5.1. Floristic richness and diversity

#### 5.1.1. Floristic richness

In 6.6 ha, total number of species with dbh  $\geq 10$  cm was 257 species with 46 families. Regarding life forms, 248 tree species were recorded together with 4 climbers, 2 bamboos and 3 palms. Among the sampling units, species density per hectare varied from 62 to 81 while the largest species density was observed in sampling unit 1 and sample unit 3. The dominant family was Dipterocarpaceae with 15 species followed by Euphorbiaceae (12), Laurace (11), Anacardiaceae (10), Myrtaceae (10) and Sterculiaceae (10). Ten tree species belonging to Dipterocarpaceae listed as globally threatened species (IUCN 2004, cited in Birdlife International 2005) were accounted for.

#### 5.1.2. Importance Value Index (IVI)

According to the relative abundance, relative dominance and relative frequency, ranking of ecological significance species in the study area was notably possessed by *Sweintonia floribunda* follow by *Xerospermum noronhiana*, *Nephelium* spp., *Myristica* spp., *Pentace griffithi*, *Shorea cinerea*, *Parashorea stellata*, *Syzygium* spp., and *Barringtonia* spp. Those could be considered as ecological indicator species of the study site. Lamprecht (1989) stated that species having absolute abundance of less than 4 in 1 ha. could be considered as rare species. Accordingly, in the study site, the composition of rare species was 164; 99 species were observed once, 32 species twice, 22 species thrice and 11 species with four times (Fig. 3a).

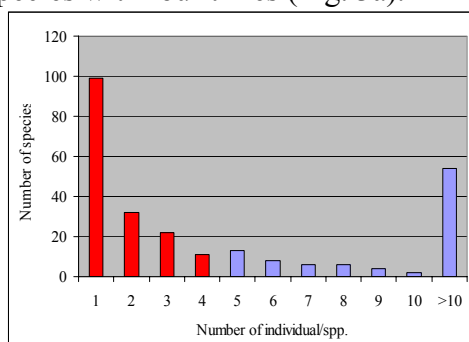


Fig. 3a. Population across species (Red tapes represent rare species.)

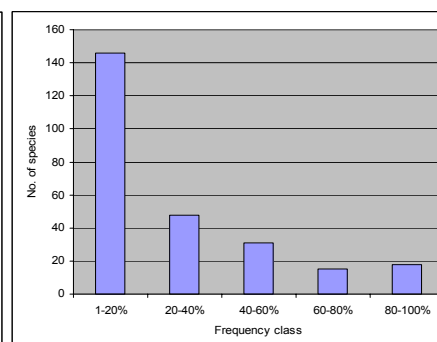


Fig. 3b. Frequency distribution

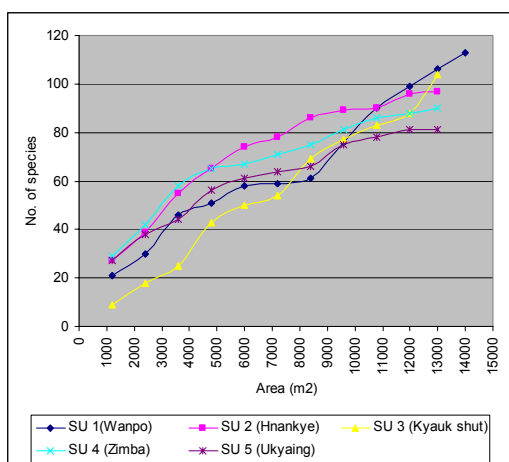


### 5.1.3. Species distribution by frequency classes

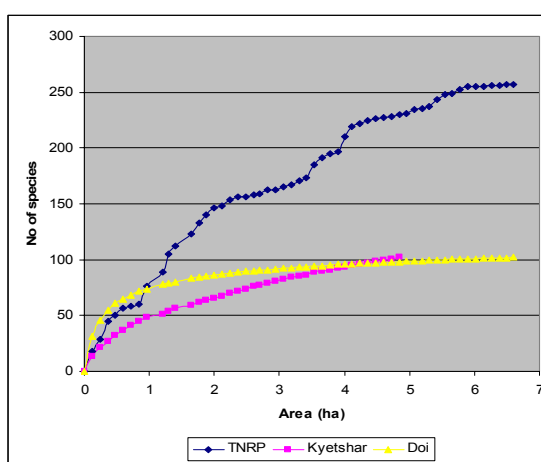
As the result of frequency analysis in detecting homogeneity or heterogeneity of the species distribution, 76 % of the total number of species were accumulated in lower frequency classes: 1 (1–20%) and 2 (20–40%); while low values were observed in higher frequency classes: 3 (40–60%), 4 (60–80%) and 5 (80–100%) (Fig. 3b). It indicated that the study forest had a very heterogeneous forest community (Lamprecht 1989). The species in high frequency class 5 were *Shorea cinerea*, *Parashorea stellata*, *Barringtonia* spp., *Abarema bigemina*, *Xerospermum noronhiana*, *Nephelium* spp., *Callerya atropurpurea*, *Myristica angustifolia*, *Pavetta indica*, *Artocarpus chaplasha*, *Sweintonia floribunda*, *Syzygium* spp., and *Pentace griffithi*. Those species can be identified as the most common species in the study forest.

### 5.1.4. Species-area relation

Species-area curves for the individual sampling units and also for overall total survey area were constructed to express number of species, not only to consider the minimum representative area but also to detect the habitat diversity within the survey area (Fangliang et al. 1996). The pattern of curves in sampling unit 1, 3 and 4 pointed out that new species were still considerably increasing without reaching the asymptotic tendency (Figs. 4a and 4b). This trend indicated that different floristic types and habitats occurred among the plots within the sampling unit. In this respect, the sample plots area for flora survey in the units 1, 3 and 4 could still be extendable to reach the minimum representative area. However the survey area for units 2, 5 and all units combined consisted of minimum representative area for flora survey (Fig. 4a), because the curves showed asymptotic tendency in which the increase in number of species was below 10% with 10% expansion of survey area (Lamprecht 1989). The curve representing all units combined had frequently some rises although the end point of the curve was gradually reached the asymptote. The number of species in the study area was greater than the natural teak forest in Bago Yoma of Myanmar and the mountain rain forest of Doi Inthernon in northern Thailand (Kanzaki et al. 2004). It was observed that the study site had more heterogeneous floristic community according to the trends of curve (Fig. 4b).



**Fig. 4a. The species area curves of individual sampling units in study forest**



**Fig. 4b. The species area curves of Doi Inthanon montane forest, Kyetshar natural teak bearing forest of Bago Yoma and Study forest of TNR**

### 5.1.5. Diversity indices and evenness

In order to investigate species diversity and homogeneity, the floristic diversity of the study area was calculated using the Shannon-Wiener index ( $H'$ ) and evenness ( $E$ ). The diversity indices values of individual units 1, 2, 3, 4 and 5 were 4.03, 3.83, 3.76, 3.90 and 3.53 respectively with slight variation from all units combined. Diversity value for overall of sampling units was 4.43. Evenness ( $E$ ) is constrained between 0 and 1. The result of evenness for units 1 to 5 ranged from 0.8 to 0.87 with 0.79 for all units combined. The indication of higher evenness index was that the most species were evenly represented by number of individuals and high equitability distribution. The difference in the value of Shannon-Wiener index obtained from the sampling units was tested for significance using Student's  $t$  test. Species diversity between sampling unit 1 and 3; between unit 1 and 5 were highly significant at the level of both 1% and 5%. Nevertheless, significance was found between unit 1 and 2, 3; between unit 5 and 2, 4 at 5% level of probability. But no significance was found between unit 2 and 3, 4; between unit 3 and 4, 5. It could therefore be concluded that species diversity was significantly higher in sampling 1 than others.

### 5.1.6. Species similarity

Species composition similarity between certain pairs of sampling units using Sorrenson's Similarity Index was investigated (Sorensen 1948, cited in Magurran 1988). Two related coefficients are commonly used which have ranged from 0 (completely dissimilarity) to 1 (total similarity). In the present study, because of the values of similarity index were almost less than 0.5 ranging from 0.34 to 0.48, the similarity of species composition was low across the sampling units.

## 5.2. Forest structure

### 5.2.1. Stand density and distribution

A total of 2,587 stems with dbh  $\geq 10$  cm were recorded in the survey area of 6.6 ha. Among the sampling units, stem density per hectare varied from 362 to 428 with an average of 392 ( $\pm 27$ ) in which the highest stem density was observed in the sampling unit 2 and the lowest in the sampling unit 3.

### 5.2.2. Basal area distribution

Basal area per hectare was 20.3 m<sup>2</sup> in sampling unit 1, 34.9 in unit 2, 26.6 in unit 3, 30.6 in unit 4 and 47.5 m<sup>2</sup> in unit 5 with an average of 32 m<sup>2</sup> ( $\pm 10.2$ ). The 10 most abundant species in terms of basal area occupied 48% of the total, of which *Sweintonia floribunda* was the most dominant species with 21% followed by *Xerospermum noronhiana*, *Nephelium* spp., *Shorea cinerea*, *Parashorea stellata*, *Dipterocarpus turbinatus*, *Pentace griffithi*, *Myristica angustifolia*, *Syzygium* spp., and *Dillenia parviflora*.

### 5.2.3. Distribution of population and species by DBH classes

In the present study, population structure across DBH classes in the study forest decreased from class to class with a steeper gradient in lower DBH classes and with a gentle slope in higher classes (Fig. 5a). Out of total number of stems inventoried, 53% of the stems were accumulated in the lower DBH class of 10-30 cm while only 4.4% was found in DBH 70 cm and above. This pattern followed the trend of normal distribution in a natural forest with a close correlation between the DBH classes and stand density. Distribution of species by DBH class clearly followed the same trend as stand density

distribution (Fig. 5b). The largest number of species was found in 10-19.9 cm smaller DBH class (211 species, 79%) but a few number reached to larger size classes. Species number steeply decreased from 10-20 cm to 20-30 cm DBH class and gradually decreased from over 30 cm diameter class. Stand density and species richness had consistently decreased with increasing DBH classes from 10 cm to 150 cm. *Sweintonia floribunda*, *Dipterocarpus turbinatus*, *Anisoptera scaphula*, *Syzygium* spp., *Shorea farinosa*, *Lagerstroemia speciosa*, *Xerospermum noronhiana*, *Nephelium* spp. and *Sterculia foetida* were found in the higher DBH class of 80 cm and over. Within the 56 sample plots, the range of maximum DBH varied from 28 cm to 144 cm with the largest tree species of *Sweintonia floribunda*.

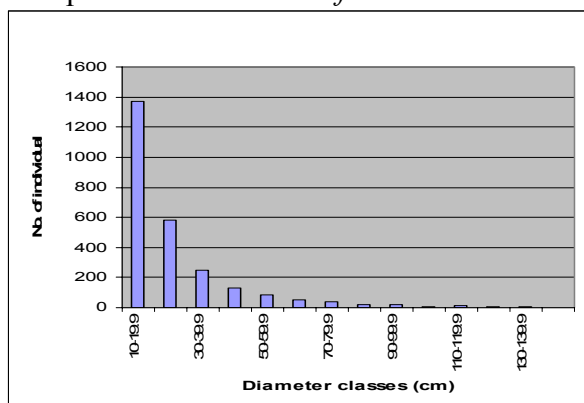


Fig. 5a. Population distribution by DBH classes

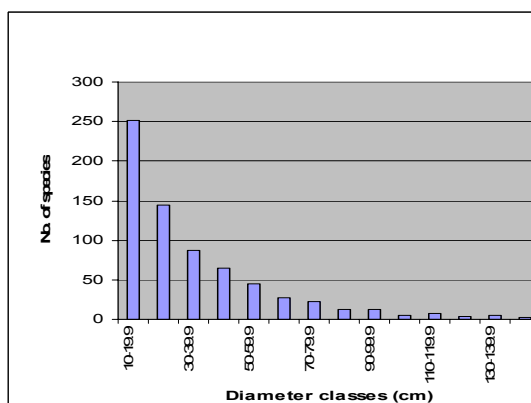


Fig. 5b. Species distribution by DBH classes

### 5.2.4. Distribution of population and species by height classes

Population density was concentrated in the lowest height classes of 5-15 m with 57% of the total. The stand density decreased with increasing height classes (Fig. 6a). Number of the individual over 30 m height was rare with 6% coverage of the total. The density of species composition in different height classes was very similar pattern with species distribution by DBH classes (Fig. 6b). 60% of the total was covered in 5-10 m height class while less than 7% was reached over 30 m height in the observed forest. The maximum height in sampling units was ranged from 12 m to 58 m with the tallest tree reaching 58 m of *Sweintonia floribunda*. The species reached in the co-dominant layer of high structure over 40 m height were *Amoora rohituka*, *Chaetocarpus castanocarpus*, *Shorea cinerea*, *Dipterocarpus costatus*, *Swintonia floribunda*, *Eugenia oblata* and *Pentace griffithii* while most of the species found in lower and mid layer of the stand.

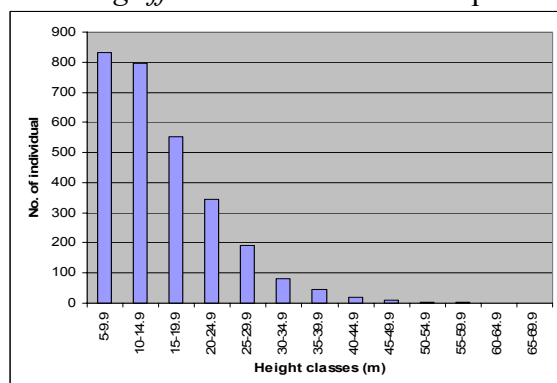


Fig. 6a. Population distribution by height classes

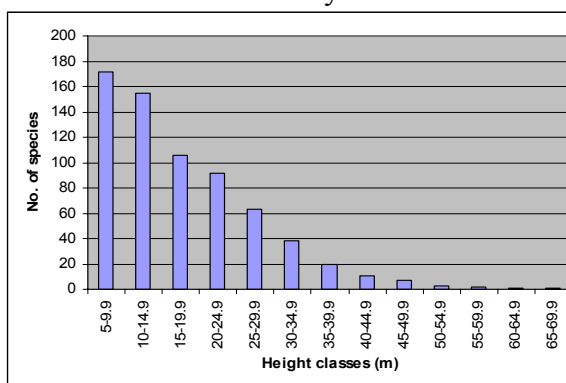


Fig. 6b. Species distribution by height classes

## 6. Discussion

The forest types in the study area varied from dense evergreen in the highlands and inner part of TNR area, through semi-evergreen in the lower slopes to degraded deciduous type in the lowlands. In each of the sampling unit, most plots were dominated by the evergreen species with dense stand density and located at higher elevations (Fig. 2). However, association with evergreen and deciduous species in lower elevation distributed in some plots while a few plots characterized deciduous type with sparse vegetation and bamboos in low land due to human settlement and shifting cultivation in the past. The patches of forests along the streams and near the TNR boundary were covered by open semi-evergreen forest, but the major portions of inner part of TNR were dominated by dense evergreen forest. Because the forests near the streams and along the boundary of TNR are close to human settlements, they are subjected to human disturbances particularly logging, fuel wood collection and seasonal fire. Diversity of forest types in each sampling unit varied from site to site. Sampling unit 5 was covered by evergreen forest type with a small portion of deciduous type which gives rise to less heterogeneity when compared to unit 1. Sampling unit 1 constituted of 3 diverse types of forest which was the most heterogeneous community with high species richness. The reason was that sampling unit 1 lied in the transitional zone from evergreen to deciduous forest types due to very close to village tracts and highly prone to forest fires and logging. Species diversity and basal area in the present study site were considerably greater than natural teak forests (Khin Thida Htun 2006; Kyaw Lwin 2001; Kanzaki et al. 2004; Than Soe Oo 2003; Nyi Nyi Kyaw 2004) and some forests in India (Hitendra et al. 2004; Chittibabu et al., 2006) and were closely similar with some of the forests in India and Andaman (Sukumar et al. 1992). Regarding the size structure of the study forest, the number of individuals and species decreased with the increasing of dbh and height classes as the trend of normal distribution in natural forests. The maximum height ranged from 12 m to 58 m and the dbh from 28 cm to 144 cm with the tallest and largest tree species of *Sweintonia floribunda*. Vertical structure apparently existed as several layers such as emergent, dominant, co dominant, middle, lower and ground vegetation in the forests of higher elevation areas but it had three strata of vegetation in lower parts. Except *Dipterocarpus kerrii* and *Dipterocarpus costatus*, the population of threaten species belonging to Dipterocarpaceae family appeared to be quite low population which were declining and likely to be extinct in the very near future. Special attention therefore is needed to conserve not only the globally endangered species mentioned above but also locally rare species.

## 7. Conclusions

The study forest can be designated as heterogeneous forest community because of the results of diversity index and evenness, species area curve, IVI value and frequency analysis. The findings of species-area curve and coefficient of Sorensen species similarity also supported that the study site consisted of high floristic diversity. Population density and species richness with size structure in all of individual units and all units combined consistently exhibited reverse J shaped structure in which larger number of species and stand density were distributed in lower size classes while a few reached higher size classes so that the study area can be assessed to exist in a relatively good state. Therefore quantitative and qualitative information of species diversity and habitat structure from this study will be the vital indicators which can be effectively applied to develop in

designing management plan for conservation of the biodiversity and sustainable management of rain forest ecosystems in the nature reserve of TNR.

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## Overview on the Restoration of the Bago Yoma

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### 1. Introduction

Bago Yoma is situated in the central part of lower Myanmar. It comprises mountain ranges running north to south roughly between North latitude 17°15' to 20°30' and East longitude 95°15' to 96°30'. The area covered by this region is 5.1 million ha (12.53 million ac). It consists of (4) divisions out of 17 divisions of the country.

In the past the forest resources of Bago Yoma was very rich and diverse in biodiversity. People were utilizing the forest recklessly, consequently the Bago Yoma forests had been degraded and the people had faced the socioeconomic problems. Nowadays, people realize the role of forests as a source for their livelihood and as a mechanism for balancing the micro-climate, soil and water resources.

Therefore, protection, conservation and rehabilitation of forests of Bago Yoma are collectively considered as one of the state's priorities.

### 2. Background

Bago Yoma is the birth place of the "Myanmar Selection System" which has been practiced throughout the history of Myanmar Forestry. The First Forest Working Plan of Myanmar was also introduced in this area and was the origin of the Forest Department, Forest Policy and Forest Act.

Bago Yoma is main source for socio-economic development of local community and it is main ecosystem in balancing the climate, soil and water resources of the region. Moreover it is catchment for two major river systems namely the Ayerwady and the Sittaung.

Bago Yoma Forest of Myanmar was also well-known for its natural teak stands and commercially valuable other hardwoods such as *Xylia xylocarpa*, *Pterocarpus macrocarpus*. As referred to the records of Dr. Dietrich Brandis, the area of Bago Yoma in 1856 was 8.5 million hectares of dense forest and which was equal to the total forested area of the then Germany (Negi 1991). However, the present area of Bago Yoma has decreased to about 5 million hectares of the different land use as Bago Yoma forests have been encroached and transformed into agricultural lands to which shifting cultivation is also attributed. Valuable species including teak have also been extracted for socio-economic development of the people. Hence, it has been apparent that Bago Yoma forests have been degraded. According the records of the Forest Department, 728,740 hectares of forest have degraded in last 15 years in Bago Yoma. The following table shows the silvicultural characteristics of some degraded area of Bago Yoma.

Study area	No. spp. found	Abundance( N/ha)	Basal area(m <sup>2</sup> /ha)	Source
Yedashe	55	423	8.456	Tin Htun(1999)
Pyinmana	49	401	7.646	Kyaw Lwin(2003)
Oktwin (1cmdbh&up)	13	*1078	**31.4	Suzuki R.(2004)

\* 76% (823) is bamboo individuals. \*\* 88 % (27.64 m<sup>2</sup>) of 31.4 m<sup>2</sup> is bamboo basal area.

According to the some scholars this deterioration of forest resources of Bago Yoma is mainly due to fuel-wood collecting, illicit cutting and encroachment in the forests like shifting cultivation and construction of dams. These causes are typical causes of some developing countries for deterioration of their forest resources as a consequence of population explosion.

### 2.1. Encroachment

It is evident that shifting cultivation is a major cause of forest depletion and degradation. It is not merely an economic practice for the landless poor living in and around the forests. It is both a cultural practice and a way of life evolved in consonance with the physiographic set up and has thrived for thousands of years especially for the ethnic minorities residing in the hilly and frontier regions. An estimated 10 million people are involved in shifting cultivation in Myanmar (Kyaw Tint 2001).

#### Extent of shifting cultivation in Myanmar (km<sup>2</sup>)

Sr. No.	Particulars	1975	1980	1989
1.	Closed and degraded forests affected by SC	177,520	189,810	206,040
2.	Percent of total land area	26.2	28.1	30.5
3.	Annual increase		2,050	1,620

Source: Planning & Statistics Division, FD

In the case of Bago Yoma, 49,160 ha of shifting cultivated area was found in the Bago Yoma as referred to the survey done by the Planning & Statistics Division of the Forest Department.

Moreover, as another type of encroachment, 67 dams and reservoirs constructed in Bago Yoma also inundate the 141,640 ha of forests of Bago Yoma.

### 2.2. Fuelwood consumption

The World Bank (1985) estimated that total woodfuel consumption in Myanmar was 29 million m<sup>3</sup> in 1980, and 34 million m<sup>3</sup> in 1989/ 90, and another scholar also projected sustainable yields and internal consumptions of fuelwood for the years 1990, 2000 and 2005 as shown in the following table (Kyaw Tint 2001).

Having calculated that forest cover and density would continue to decrease due to over cutting for firewood and agricultural expansion, sustainable yield of fuelwood production declined, while consumption rises with the increase in population. The deficit has thus enlarged from 8.37 million m<sup>3</sup> in 1990 to 21.19 million m<sup>3</sup> in 2005 (Kyaw Tint 2001).

Woodfuel yield /consumption, mio.m <sup>3</sup>	1990	2000	2005
Sustainable yield	26.83	25.05	23.40
Consumption	35.20	40.56	44.59
Net deficit	-8.37	-15.51	-21.19



### 2.3. Illicit cutting

Although the Forest Department has been attempting to control the illicit cutting, it still occurs in some area which is especially adjacent to the populated area. If the illicit cutting can not be controlled properly, it will attribute to serious deterioration and fundamental causes of illicit cutting are increased demand, high price of timber based on the imbalance of supply and demand.

Therefore the Forest Department tried to restock the degraded Bago Yoma Forests through establishment of two teak plantation projects with the aids of Asia Development Bank two decades ago. However, the teak plantations of these projects were lost due mainly to illicit cutting of planted trees once they started to reach usable size (pole size). The implication of this problem is the absence of either social or economic link between teak plantations and local people. Local villagers conceived that forests including plantations were state-owned and common-property resources. As a consequence, Bago Yoma Forest is still degrading. In this context, it is urgently needed to restore the Bago Yoma.

### 3. Present Land-use of the Bago Yoma

Out of the total 5 million ha of the Bago Yoma area, 2 million ha or 40% is Permanent Forest Estate (PFE) called Reserve forests and protected public forests. Land-use of the Bago Yoma region is shown in the following table.

**Table 1. Land-use of Bago Yoma (hectare)**

No.	Type	Reserved & Protected Public Forest	Other land	Total	%
1.	Closed Forest	323,740	97,120	420,860	8.30
2	Open Forest	716,290	186,150	902,440	17.80
3	Bamboo Forest	12,140	16,180	28,320	0.56
4	Scrub Land	534,180	493,710	1,027,890	20.27
5	Agriculture Land	441,100	2,144,830	2,585,930	51.00
6	Fallow land	0	28,320	28,320	0.56
7	Water bodies	4,040	32,370	36,410	0.72
8	Gardens & Villages	4,040	36,420	40,460	0.79
<b>Total</b>		<b>2,035,530</b>	<b>3,035,100</b>	<b>5,070,630</b>	<b>100</b>

### 4. Bago Yoma Restoration Plan

In order to restore the Bago Yoma, the Forest Department prepared a plan called Bago Yoma Restoration Plan with the involvement of the officials of the Forest Department and local authorities concerned with the supervision of the Ministry of Forestry. This time the basic approach is based on people's participation with the sharing of the benefits and responsibilities in forest management.

#### 4.1. Objectives

##### *Development Objective*

To restore the ecological balance and productivity of Bago Yoma through the planting of teak and locally adaptable valuable species so that Bago Yoma will be restocked and contribute to local, regional and national developments in social and economic perspectives.

*Specific Objective*

- 1) To maintain Bago Yoma as the 'Home of Natural Teak Forests' forever.
- 2) To prevent deforestation and to restore Bago Yoma Forests by means of plantation establishment, silvicultural treatments and effective protection by forest law.
- 3) To protect water resources and manage water supply for agriculture.
- 4) To reinforce the restoration of Bago Yoma with the establishment of Community Forests through participatory approaches.

**4.2. Project period**

Bago Yoma Restoration Plan is a 5-Year Project from 2004–2005 to 2008–2009.

**4.3. Project area**

The project area covers the whole of the Bago Yoma forests and amounts to 5.1 million ha (12.53 million ac). It includes 31 townships in 8 districts of 4 divisions. The 8 districts are Yangon (North), Thayawady, Pyi, Bago, Taungoo, Thayet, Magway and Yamethin.

**4.4. Formation of zones**

Bago Yoma area is relatively a very vast. Therefore the project area is divided into 3 Zones and the districts included in each zone are as follows.

- Zone 1 - Yangon (North), Thayawady and Pyi Districts
- Zone 2 - Bago and Taungoo Districts
- Zone 3 - Thayet, Magway and Yamethin Districts

**4.5. Administration and organization of the project**

For this project, the project staffs are in-service personnel who, at present, are working in the townships and district forest departments in the Bago Yoma Region at present.

For over-all monitoring and supervision of the Project, the Director of Watershed Management Division from FD Head office is assigned as Project Director. Three Deputy-Directors are assigned to take charge of the 3 Zones respectively. Assistant Directors (District Forest Officers) and Township Forest Officers in Bago Yoma Region are also assigned as responsible persons in their respective districts and townships for the Bago Yoma Restoration Project.

**4.6. Major activities**

The following activities are to be done for the restoration and restoration of the Bago Yoma.

- 1) Conservation and Protection of Natural Forests.
- 2) Enrichment Planting.
- 3) Natural Regeneration.
- 4) Establishment of Forest Plantation.
- 5) Establishment of Community Forests and Forest Villages.
- 6) People Participation and Forestry Extension.
- 7) Encouragement of fuelwood substitution.
- 8) Development of water Resources.
- 9) Setting up of Teak Natural Reserves.
- 10) Forest Research Activities.

#### 4.6.1. Conservation and protection of natural forest

In Bago Yoma, 156 Reserved Forests and 15 Protected Public Forests have already been formed with areas of 1,870,870 ha and 149,820 ha respectively. The natural forests in these reserved forests and protected public forests will be protected and conserved in the following ways.

- 1) Boundaries of reserves and compartments will be repaired by replacing boundary pillars and making new blazes for clear identification and durability.
- 2) Sign Boards, warning against agriculture and shifting cultivation encroachments into the conserved forests, will be placed along the boundaries at points easily visible to the public.
- 3) Harvesting operations of MTE in the natural forest conservation area are to be monitored and assessed effectively.
- 4) For the control of illegal logging, special teams will be formed and assigned to patrol the forests.
- 5) On the main roads to the forest, check-points will be placed and forest staff will be stationed there full time.

#### 4.6.2. Enrichment planting

Enrichment planting is done in 64,410 ha of open forests as follows by planting or seeding of valuable and marketable species.

#### 4.6.3. Natural regeneration

To ensure the natural regeneration in forested areas, undesirable species will be removed with the opening for light, together with pruning and coppicing in 74,040 ha (182,950 Ac) still forested area.

#### 4.6.4. Establishment of forest plantations

80,000 ha of different kinds of Plantations are established in opened forests and scrub land.

1) Commercial plantation	37,680 ha
2) Watershed plantation for dams and reservoirs	29,960 ha
3) Fuelwood plantation for local villages	8,980 ha
4) Industrial plantation	3,870 ha
5) Other plantations	736 ha
<b>Total</b>	<b>81,226 ha</b>

#### 4.6.5. Establishment of community forests and forest villages

People from the villages in and around the Bago Yoma, shifting cultivators and forest dwellers are organized to establish community forests for the reclamation of shifting cultivation lands and sustainability of the forests. The restoration of Bago Yoma will be effected through the extensively establishment of Community Forests by participatory approach.

To meet the labour requirements for these restoration activities, forest villages will be established. For their socio-economic development, the establishment of permanent farm and community forests, and in-kind assistance of seeds for perennial and seasonal crops are provided by the forest department.

#### 4.6.6. People participation and forestry extension

To promote people participation in the Bago Yoma Restoration project a extension unit will be formed. Training courses on Agroforestry, Community Forestry,

Silvicultural Operations, National Code of Forest Harvesting Practices and making of efficient stove are conducted for local people, forest staff, and timber harvesting private companies. Furthermore, forestry related subjects will be introduced in schools in rural areas.

#### **4.6.7. Encouragement of fuelwood substitution**

The heavy cutting for fuelwood is one of the most serious causes for deterioration of the forests. Therefore, distribution of 273,250 energy efficient stoves, 3 million pieces of fuel wood substitute briquettes and 29,350 tons of agricultural residues will be done to reduce the fuelwood consumption in the Bago Yoma area.

#### **4.6.8. Development of water resources**

To promote the health and development of community, availability of clean water is one of the prerequisite. In this context, tube well, checked dams and small ponds will be constructed.

#### **4.6.9. Establishment of teak nature reserves**

Bago Yoma is known as the legendary home of natural teak. Nevertheless, quality of teak is decreasing in Bago Yoma due to social and economic implications. Hence, this project will initiate the establishment of Teak Nature Reserves for the conservation and study of the ecology of natural teak forests in Bago Yoma.

Furthermore, Teak Seed Production Areas and Teak Clonal Seed Orchards are to be established for the assurance of good quality seed supply for the long run.

#### **4.6.10. Forest research activities**

In support of the successful implementation of BYRP, Forest Research Institute undertakes the following research activities.

- 1) Provenance Trial
- 2) Spacing Trial
- 3) Bamboo Trial
- 4) Medicinal Plants Trial
- 5) Fertilizer Trial
- 6) Species Trial
- 7) Agroforestry Trial
- 8) Lesser-used Species Trial
- 9) Multi-storey Trial
- 10) Mixed Forest Trial
- 11) Seedling Trial

Research findings and results will be distributed to the local communities as well.

#### 4.7. Work plan & achievement

The yearly activities and achievement of BYRP are shown in the following Table.

Year	Conservation and protection of natural forests (ha)	Enrichment planting (ha)	Natural regeneration (ha)	Forest plantation (ha)	Establishment of community forests (ha)	Distribution of stove (nos)	Tree planting program (tree nos)	High land crops & perennial crop cultivation (ha)
2004-05	9,110	3,077	1,255	12,810	1,215	45,500	4,000	
2005-06	101,509	11,579	13,300	15,154	1,619	54,300	5,000	2,024
2006-07	117,966	14,049	15,770	15,725	1,619	54,300	5,000	2,024
2007-08	136,967	16,681	19,960	17,531	2,024	54,300	5,000	2,024
2008-09	173,126	19,029	23,786	19,608	2,024	64,850	5,000	4,049
Total	538,677	64,414	74,071	80,828	8,502	273,250	24,000	10,122
Achieved	538,521	42,171	62,970	77,726	3,058	223,077	24,000	10,122

#### 4.8. Expected results

The project will be implemented in expectation of the following achievements.

- 1) Sustainable Forest Management would be fully adopted and practiced so that the natural teak forests would flourish forever.
- 2) Watersheds in Bago Yoma would be systematically managed so that the life-span of dams and reservoirs would be longer to ensure sustainable water supply for agriculture.
- 3) Basic needs of the local people would be fulfilled.
- 4) Proper utilization of the forest resources through participation of local community realizing their vital role in forest management.

#### 5. Conclusion

With successful implementation of this 5-year Bago Yoma Restoration Plan followed with continuous aftercare programme, ecological system and productivity of the Bago Yoma can be restored for the long run.

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