

Change of Rural Society and Local Agro-ecological Knowledge in Myanmar

**edited by
Tun Aung Chain
and
Kazuo Ando**

**SEAMEO CHAT in collaboration with
Department of Practice-oriented Area Studies,
Center for Southeast Asian Studies, Kyoto University, Japan**

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Acknowledgements

I first visited Myanmar in January 1997. That year I travelled around in Myanmar three times, each trip lasting four weeks, covering the central plain and the Ayeyarwady Delta, in the dry and the rainy season. My companion was Mr. Kyaw Soe, the driver of a rental car. I came to call him Kyaw Soe San, *san* being a general form of Japanese address, and he liked it. He became a good friend and a teacher of things Myanmar. Thanks to him and his friends Mr. Aung Mya, Mr. Thein Win and Mr. Aung Min Naing of Myatmanaw Travel, I was able to start on my Myanmar life experiencing the general life of the common people. Kyaw Soe San and I stayed at ordinary local hotels where the local people stayed. We ate and drank at local restaurants and took *mohinga* or Myanmar noodle soup and a cup of coffee at roadside teashops in the morning. Kyaw Soe San taught me to wear the Myanmar *longyi* and to enjoy travelling in rural Myanmar. I was always identified as Shan Tayok (Shan-Chinese), a Myanmar national, because of my looks and style of wearing the longyi. He showed me the small joys of the life of the local people. One of my most favourite experiences was to spend time talking with people in the villages and local towns and having coffee at an open roadside teashop listening to Myanmar pop music. Kyaw Soe San showed me the many aspects of happiness and regrets in simple Myanmar life. He is now no longer in Myanmar. He died suddenly of illness three years ago while still in his thirties. He took pleasure eating and drinking and had an ordinary sense of justice. Without him I would not have come into contact with my favourite Myanmar and to implement my project smoothly. Surely, we could not have completed our project successfully without the logistical support of Myatmanaw Travel, and I would like to acknowledge their sincere collaboration with us.

In 2000 I received the opportunity of a JSPS (Japan Science Promoting Society) research grant for four years which enabled me to organize a research team to conduct field work in the Chittagong Hill Tract, Bangladesh, and Rakhine State. This was my first JSPS project focusing on the peripheral areas of South and Southeast Asia. Historically, Rakhine has played an important role in the Bay of Bengal region. To understand the characteristics of Myanmar livelihood tradition and culture, Rakhine is in a unique position from the viewpoint of my experience of working several years since 1978 in rural Bangladesh as a JOCV volunteer and a JICA expert. In addition to that viewpoint, on the basis of my travels with Kyaw Soe San, I came to the thought that Myanmar agriculture and rural life existed independently of the race for development and modernization. To me, Japanese people and Japanese society seemed to be exhausted by the effort to trying to win in that race. We Japanese are losing ourselves in that race and forgetting the small joys and regrets of daily and community life which were well recognized before the rapid growth of the mid-1960s. For us Japanese, it might be very hard work recovering from that feeling of exhaustion. I believe that Myanmar life and livelihood might be a potential alternative of "development" for the Japanese. I have seen the ordinary life and society of Myanmar which is well based on their "tradition." I wanted to learn something about the alternative offered by rural Myanmar. Accordingly, the project was jointly implemented by SEAMEO CHAT, Myanmar, and CSEAS, Japan, in Gwa township, Rakhine State, employing an integrated research methodology drawing on both natural science and humanistic science, with the aim of learning the traditional practical wisdom and knowledge of the local people in Myanmar. Following the field work in Gwa township, a seminar was held to present the results.

For the development of the project, I would particularly like to acknowledge the contributions of Daw Ni Ni Myint, Consultant of SEAMEO CHAT, U Tun Aung Chain, Director of SEAMEO CHAT, and Prof. Narifumi Tachimoto ex-Director, CSEAS, Kyoto University. It was probably in the autumn of 1998 that a team led by Daw Ni Ni Myint and U Tun Aung Chain visited CSEAS. I met them and had an exchange of opinions about my hope of a joint research project. Daw Ni Ni Myint, as Director General of UHRC (Universities Historical Research Centre), invited me to prepare a proposal for a joint research project in Myanmar. I well remember sending the official letter of request addressed to Daw Ni Ni Myint through diplomatic channels from the Embassy of the Union of Myanmar in Dhaka while I was doing field work in Bangladesh. The letter of acceptance of the Myanmar Government immediately reached the embassy in Dhaka by fax. This made me very happy. The procedure for formalizing the project was not easy and simple. However, with Daw Ni Ni Myint and U Tun Aung Chain taking responsibility, the official procedure was cleared. The Myanmar counterparts from UHRC and the Departments of Geography, Zoology and Botany of Yangon University were invited to participate in the project and they did so with the kind understanding of the Heads of Department. In Japan, counterparts were invited from CSEAS and ASAFAS (The Postgraduate School of Asian and African Area Studies) of Kyoto University, Faculty of Agriculture of Yamaguchi University and University of Air (Open University). Professor Narifumi Tachimoto ex-Director advocated the joint project and immediately exchanged an MOU (Memorandum of Understanding) between SEAMEO CHAT and CSEAS. CSEAS officially launched a joint research project again in Myanmar after an interval of about thirty years.

Last, but not least, our heartfelt thanks must be addressed to the rural people of Myanmar, particularly the villagers and local administration officials of Gwa township. Thanks are also due to the staff of SEAMEO CHAT, although I am very sorry that I cannot mention them all by name here. Without their sincere collaboration we would not have been able to complete our field work, the holding of the seminar and the publication of this book.

After the seminar I lost another close friend who was one of the Japanese counterparts in the project, Dr. Kuniyasu Momose, former Associate Professor, Faculty of Agriculture, Ehime University (ex-Assistant Professor, ASAFAS, Kyoto University). He passed away in January 2007 after a year's struggle against illness. He endeared himself by his character and his research capability. Specializing in tropical plant ecology, he intended to actively apply his specialty in Area Studies. He was only thirty-eight years old and we all regret his early passing away. He must have wanted to continue his study in Myanmar as we are doing at this moment. I always have a feeling of his presence in the villages of Bagan and Yamethin in the central dry zone where we are now conducting our research project in continuation of the earlier project. I am sincerely thankful for his collaboration in Myanmar and Japan. He was a good teacher of plant ecology to me and he opened my eyes to plants in my field work.

Personally, I would like to dedicate this book to my two dear friends, Kyaw Soe San and Momose San who passed away prematurely.

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PREFACE

In May 2001, the SEAMEO Regional Centre for History and Tradition and the Center for Southeast Asian Studies of Kyoto University came together to launch a research project, "Historical Development of Rural Societies and Villagers' Livelihood in Myanmar." The aim of the project was to study the changes that had been going on in Myanmar at the village level from the earlier opening up of Myanmar under the colonial order to the more recent developments as Myanmar shifted from being a centrally planned economy to one which was market-oriented.

Since the project was designed as a microcosmic village study, much attention was paid to the selection of an appropriate project site. After a preliminary survey of potential sites, Gwa township in southern Rakhine State was finally selected.

For much of the pre-colonial period, Gwa was an out-of-the-way, obscure area, much removed from the developments in Rakhine State which were centred in Mrauk-oo, the capital, in the north, and in the subsidiary centre of Thandwe in central Rakhine State which provided the main point of overland access to the central valley of the Ayeyarwady. It was mainly during the colonial period that a Gwa began to develop, with a migration into the area from the north via the Ayeyarwady delta which featured largely in the British colonial programme of developing commercial rice cultivation and the export of rice to underwrite British colonial administrative expenses.

Gwa entered into a second period of development when, with the change towards a market-oriented economy when, together with the development of major communication and transportation facilities providing access, the fishing industry of the Rakhine coast was encouraged in the effort to produce marine export products for an international market.

The research project conducted at Gwa from May 2001 to March 2003 was a multi-disciplinary project which attempted to study the change in rural society and villagers' livelihood from a variety of view points. For this multi-disciplinary study, the SEAMEO Regional Centre for History and Tradition was able to draw upon the rich scholarly resources available at several Myanmar academic institutions: the Universities' Historical Research Centre, the University of Yangon and the Institute of Economics.

The conduct of the research project was marked by a close camaraderie among the participating scholars as they exchanged theoretical insights, research methodologies, views and experiences across cultures and disciplines to enrich each other's work. The project also benefited from the welcome and cooperation extended to it by local authorities and the local community.

The results of the research project were presented and discussed by the participating scholars in a two-day workshop, "Change of Rural Society and Local Agro-Ecological Knowledge in Myanmar," held in the SEAMEO Regional Centre for History and Knowledge in Yangon, 16-17 March 2004, and they are now made available to a wider audience in this publication.

Tun Aung Chain
Director
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Historical Development of Local Administration and Community Leadership

Myint Thein

Introduction

This paper is based upon fieldwork on local administration and community leadership in the rural area of Gwa township, Rakhine State. The villagers of Ywathitkone, the village where I conducted my research, have a long tradition of local administration. Through interviews and participant observation, I critically examined the relations between village headman and villagers. I studied not only the specific administration, but the background and root causes of socio-economic problems which relate to local administration. I also visited the township-level government offices to get the basic information relevant to the understanding of the general conditions of the township. Historical knowledge cannot be definitive or absolute, since deeper insights always await perception in the light of additional evidence. Relativity is particularly characteristic in the field of study. So I tried to collect the oral history of the village. I also tried to examine the contradiction between the local administrative system and the village community. In contrast to the local administration I will attempt to present the village administration and the role of community leadership.

My study is presented in four parts: the first part provides a brief background of the study area; the second part describes the local administrative system at township and village levels; the third part studies the changes of in community leadership; the last part examines the relationship between the villagers and the local administrative authority.

I. Study Area

1. Location

Rakhine State is geographically situated in the western part of the Union of Myanmar. There are five districts (Buthidaung, Maungdaw, Sittway, Kyaukphyu and Thandwe) and 17 townships. (Hla Tun Aung: 2003, 671). Gwa township, situated in the southernmost part of Rakhine State between latitudes 17° 15' N and 18° 8' N and longitudes 94° 25' E and 94° 54' E., belongs, together with Thandwe and Taqungkok, to Thandwe district. It is bordered on the west by the Bay of Bengal, on the north by Thandwe township, on the east by Laymyethna township and on the south by Thabaung township.

Gwa township is oval in shape, a little broader in the north and narrowing towards the south. Its broadest width, east and west between the Bay of Bengal and the Rakhine Yoma, is 25 miles; its north to south length is 63 miles, and its total area is 885.11 sq miles. Because of the Rakhine Yoma, Gwa township is thickly forested with the coastal plain generally only 5 miles wide. Kyaintali, Satthwa, Kinpong, Rahaingutuo, Kyaukchaung and Gwa creeks flow through the township into the sea. Within 15 miles of their mouths the water is saline, beyond that it is fresh. (GA 2003: 5). Gwa town was formerly known as Gwa Ywa (village) and since it is an island at the junction of two creeks, Gwa and Rahaingutuo, it was also known as Gwa Island.

The township enjoys a tropical monsoon climate. Generally the rain falls from the last week of May to the end of October, the annual rainfall being about 182 inches. The cold season starts in November and ends at the end of February. From March to the end of May are summer months.

Gwa township comprises three blocks, 34 village tracts and 178 villages. The population in 2002 was 61,639. It had 25,540 acres of cultivated land and 19,200 acres of agricultural land in 2003 and produced 1,090,685 baskets of rice. (GA 2003: 12)

Ywathitkone, the village of my study, is situated in the northern part of Gwa township. It is located at latitude 17° 40' north and longitude 94° 36' east. It is within the Alechaung village tract which belongs to the Myoma zone. These two villages are located far from the other villages in the area. According to the 2003 January census, the population of the two villages was 852 in 124 houses; Ywathitkone village itself had 71 houses and a population of 423.

Over 95 per cent of the population is Bamar, and over 75 per cent of the villagers are engaged, wholly or partly, in agriculture, which is by far most important occupation. Where they have settled down they have extended garden and miscellaneous cultivation. There is no bazaar in the village, only small shops in a few places. There are one primary school and one monastery in the village.

2. Historical overview

People have lived in Rakhine State from ancient times except for Gwa which was a desolate area. However, after the 16th century, Gwa was populated by people and monks who fled from Inwa (Upper Myanmar) because of ill-treatment by the Shan king Thohanbwa. (Phayre 1967: 88). In 1525 Sayadaw (monk) U Wimala and followers from Magyiton village, north of Shwebo township (Upper Myanmar) also fled to the place which was later known as Gwa. Gradually, they moved from the upstream area to the coastal land of Gwa township. They built a monastery and settled in that place. After the building of the monastery, more people came to settle and the residential area was extended. They built security gates along the coast to guard against the threat of Rakhine and Portugal dacoits, the name of Kinyon village of the present day being derived from the word "*kin-yon*" (security gate). (GA 2003: 10)

According to the records, Gwa was frequently attacked by Rakhines whose purpose was to capture people for the slave trade in the 16th century. Therefore, the people living in Gwa were probably not Rakhines but settlers from Upper Myanmar whom the Rakhines called "Ahshaytha" (Easterners) because they migrated from east of the Rakhine Yoma. Historical records told us that old Rakhine villages could be counted on the fingers of one hand, and that beyond the Kyeintali river there was only one small Rakhine colony, at Yahaing near the mouth of the Gwa river. (Tydd 1962: 19)

During the Konbaung period, people from Upper Myanmar used to flee to Lower Myanmar whenever there was political instability. The most prominent events that led to the migration of people to Lower Myanmar and southern Rakhine were: (1) the 1819 court crisis in Bagyidaw's reign, (2) the Myingun and Myingondaing rebellion, and (3) the Third Anglo-Myanmar War. These migrants were the main sources of Gwa's population.

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Gwa came under British administration after the First Anglo-Myanmar War. The British set up a township office in Gwachaung Ywa (Gwachaung village) in 1872 and it became known as Gwa. (GTA 2001: 2)

My chief research site was a village called Ywathitkone located about eight miles north of Gwa town. Before Ywathitkone came into existence, there was a village called Yaykatywa (Yaykat village) one mile away in the east. It was founded 150 years ago by a family from Ahlechaung village and increased to 15 households. Later the village elder was appointed as a Thugyi (village headman) who controlled the four villages of Alechaung, Kyaukta, Ywathit and Yaykatywa. Yaykatywa was almost destroyed during the Second World War, as the situation worsened after the war, the villagers of Yaykatywa moved and settled in a new village near the road, and the village became known as Ywathitkone.

II. Local Administrative System at Township and Village Levels

1. Township level

Local administration is the system of administration established to meet the common needs of the people living in a specific region. Local administrative councils are authorized by the central administration to introduce rules and financial obligations on matters related to the region. Township and village administrations are types of local administration. The village administration has obligatory and optional duties. Obligatory duties include health care, strengthening social relations, preservation of law and order, public works and cultural affairs. The basic body in village administration is the village council.

The main body of local administration at the township level is the Township Council. It is the chief authority of the local administration and consists of one chairman, one secretary and two other members, a total of four members. The Council makes recommendations concerning the conduct of village affairs and determines the things to be done. It represents the central administration and supervises planning.

For administrative purposes, villages are organized into village tracts for effective administration. Gwa township is divided into four zones and all the village tracts within the township are put under these zones according to their geographical location. These four zones, and the number of village tracts in them, are: Gwa Myoma zone (13 village tracts), Sathwa zone (9), Kalarpyin zone (5) and Kyaintali zone (7). Villages under these zones are:- 13 village tracts under Gwa Myoma Township, 9 under Sathwa zone, 5 under Kalarpyin zone and 7 under the Kyaintali zone. There is a total of 178 villages within the 34 village tracts.

The basic consideration in uniting the villages into village is not population but geographical situation. Some village tracts consist of 8 villages and some have only one village, the one village forming the village tract.

It is clear that the setting up of zones is for the convenience of local administration. Since there are four members in the Township Council, each member of the Council takes charge of one of the zones and is responsible for the successful implementation of all government projects in his zone. One of the duties of the Township Council is to discuss and

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make preparations for the successful implementation of projects laid down by the Central Government. Then it gives instructions to the in-charge of the villages for the implementation of the project.

The State Council is the highest authority in the local administrative system. It is directly related to the Central Government and directly gives instructions to the Township Council. Thus, it is a powerful administrative body which plays a vital role between the Central Government and the Township Council.

2. Village level

The Yatkyay Council (Village Tract Council) is a basic body in local administration. Each Yatkyay Council consists of one chairman, one secretary, one member and three reserve members, a total of 6 members. These six members are responsible for all village affairs. The members are selected by the Township Council. Generally, loyalty is the main consideration in the selection of members. After accepting appointment, it is not easy for them to resign.

The most responsible persons of the Yatkyay Council are the chairman, the secretary and the member. The three reserve members do not have any authority and rights but take on duties whenever needed. However, they are asked to participate in the meetings of the villages. The members of the Yatkyay Council do not get any salary but depend on the 20% of the land tax levied from villagers living in the villages they administer.

Ya-ain hmu (in-charge of hundred houses) and *se-ain hmu* (in-charge of ten houses), selected by the Yatkyay Council and villagers, are appointed immediately after the formation of the Yatkyay Council for each village with over one hundred households. Villages with less than 100 households have one *ya-ain hmu* and those with 100 to 200 households have two. Members of the Yatkyay Council also act as *ya-ain-hmu* in their native villages.

III. Changes in Community Leadership

Before the colonial period, the traditional village administration was in the hands of the *ywa thugyi* (village headman) who worked under the *myothugyi* (township headman). He directed the maintenance of local communications and village works, and was entitled to call upon the labour of the whole village. Tradition and the hereditary principle was strong and families of one or two generations continued to exercise traditional leadership.

During the nineteenth century, when British rule was taking shape in Myanmar, the whole system was based on law, and the primary responsibility of all officers in charge of general administration was the preservation of law and order. The British government appointed *thugyis* in the villages after the First Anglo-Myanmar War in 1826. Village committees were established but had little influence. Then *ywangaungs* were appointed to perform village police duties; they came to be called *ywalugyi*. (Mya Sein 1938: 82-83) The most typical indigenous institutions were submerged by a superimposed system, whose sole purpose was the collection of revenue. Continuity between the new forms of government and the local institutions of old was impossible. (Tinker 1954: 24)

Village committees were often composed of the village riff-raff, and the *ywalugyi* did not care to be associated with them. Thus there was little competition for membership, the

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body of the villagers did not respect their authority, and their powers were confined to the judicial field in which there was no Myanmar tradition. (Tinker 1954: 242) But the *thugyi* (village headman) retained absolute control over many functions associated with local government. (Report 1941: 2) The *thugyi* system continued for long time until Village People's Councils were formed by the Revolutionary Council after 1962.

In the traditional system there was also a group of village elders called *ywami-ywapha* who were respected and recognized by all the villagers. A *ywami-ywapha* had to have the following prerequisites: (1) be respected by all the villagers; (2) be elderly; and (3) be religious. The villagers appointed a person who satisfied these prerequisites as the *ywami-ywapha* and three or four colleagues to work with him. If one of the *ywami-ywapha* passed away, the colleagues and villagers held a meeting and appointed a new one.

The *ywami-ywapha* gave advice on village affairs, and also provided leadership, the villagers performing community services together under the direction of the *ywami-ywapha*. If disputes arose between the villagers, the *ywami-ywapha* tried to settle them. It was only when they could not settle a dispute that it went before the government authority and a suit was filed in the township court. It meant that the social structure was based on personality and custom rather than on law and definite regulations. Old and well-experienced, the *ywami-ywapha* managed village affairs on the basis of tradition and their experience. They tried to maintain the traditional culture of the village and considered matters of the village with an orientation to the good of the village. They only supervised but did not wield power over the villagers. The law which they administered was traditional and, although based on Buddhist law, was largely coloured by custom. Local social organization was based on the life of the village or townships and on the Buddhist religion. (Binns 1945: 2)

Later, with changes in the administrative system, there appeared the government-appointed *Yatkyay* Council and village chiefs. The Township Council appointed to the *Yatkyay* Council those whom it considered suitable, and as government authorities the village chiefs took the place of the *ywami-ywapha*. But these new authorities did not all satisfy the qualities for a village elder traditionally recognized by the villagers and some of the new village chiefs could not compare in dignity and influence with the old *ywami-ywapha* who were loved and respected by the people of the village. The duties of the *Yatkyay* Council are to collect revenue, to preserve law and order in the village, and to furnish such statistical information as may be required by township authorities. The *Yatkyay* Council did these more on the basis of power than of tradition and experience.

The new system tended to take away the respect and dignity of the *ywami-ywapha* of the village and they lost their position as representatives of the village.

The importance of the village authorities should be to improve the life of rural communities. The ideal village authority must be a man of parts: he should come from a long-established village family of repute to ensure respect; he should possess some education and experience of the outside situation and agricultural knowledge related to the needs of his village; and he must be endowed with acknowledge personal integrity which would inspire the village folk to action.

However, the new village authorities were persons whose prime responsibility was to implement the tasks laid down by the government hierarchy. To them the implementation

of the tasks assigned to them was primary so they dealt with the villagers wielding power. Hence, the rural people looked on some of the village chiefs with a view different from that which they held for the *ywami-ywapha*. Village leaders require a high degree of confidence and self-respect since community leadership is necessary to reflect the needs and opinions of the community to the administration and to find innovative solutions to the problems faced by local people.

IV. Relations between Villagers and Local Administrative Authorities

The Chairman of the Township Council summons *Yatkynya* Council chairmen, explains to them the directives laid down by the State Council, and guides them in carrying out the directives laid down by the administrative hierarchy. The villages, which are the basic unit of administration, are important in the implementation of the directives, and it is only as the villagers cooperate in matters of land revenue and administration that the directives are realized. However, there are problems in the relations between village chiefs and villagers regarding agricultural matters.

For instance, following the instructions of the Agricultural Department, the township authority directs that the end of July must be the *tunton-paidchein*, i. e. the deadline for finishing the work of harrowing, and that all farmers must follow this directive. The directive is issued, based on the conditions of the delta region. Although lowland farmers in the delta may find it easy to follow this directive, farmers in some villages in Gwa township face difficulties.

In Gwa township, farmland varies topographically. Some are highland fields (*amyint-le*) but some are lowland fields (*aneint-le*). *Aneint-le* can be sown early in the rains because they get enough water to grow paddy. However, *amyint-le* cannot be sown at the start of the rainy season as the farmers have to wait for heavy rain in order to get enough water in the fields. Moreover, rainfall differs according to region. As a result, some fields cannot be sown until the deadline of July because it has not rained yet. Meanwhile, the village chief instructs that fields must be sown before the deadline and so friction develops between the village chief and the villagers.

Fortunately, villagers in hamlets tend to be relatives and they understand that the village chief is only implementing the tasks laid down by higher authorities. Therefore, some problems can be settled. However, it is hard to settle such problems in large villages. Tasks which depend on geographical and climatic conditions cannot be carried out nationwide following the same formula. Township authorities should issue their directives to facilitate the implementation of the tasks taking into consideration local geographical and climatic conditions. By doing so local authorities will progressively strengthen their relationship with the communities they represent and serve them. The relationship between local authorities and villagers is a very critical factor in local administration everywhere.

Township administrative bodies should give special consideration to the responses of village administrative bodies and realize the conditions of the villages in their jurisdiction. Once, in the village I surveyed, I came across a situation in which the local farmers and hillside (*taungya*) cultivators were waiting for the rains to grow their crops. Meanwhile, the Township Council sent a directive to the village requiring the villagers to carry out public

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work for five days along both sides of the motor-road near the village before a certain deadline. When the village chief ordered the villagers to carry out the directive of the higher authorities, they were faced with hardship because their paddy would not be successful if they did not grow when the rains came, yet they had to carry out the task according to the directive.

Most rice cultivation here is small-scale farming, and most of the produce is used for household subsistence with most of the remainder being used to pay agricultural loans to the Government and cover expenses for agricultural implements.

Government bodies, on the basis of state policies, give guidance to farmers to achieve high per acre yields in paddy cultivation. Primarily, they instruct the farmers to plant paddy in rows, telling the farmers that planting in rows yielded more paddy per acre, and making farmers in every village implement the task of row planting.

In most regions of Rakhine State, the paddy is sown by broadcast. Farmers do not want to plant paddy in rows where the soil is so poor that the slightly higher yield achieved by transplanting does not pay for the cost of the operation. Also they cannot afford to use expensive fertilizers to achieve higher yields. Therefore, they grew paddy in rows in the fields on both sides of the motor-road to satisfy the inspectors, but elsewhere in their fields they grew paddy by the method they preferred, i. e. broadcasting. Such incidents support the fact that the polarization of modernist and traditionalist views, which occur throughout Southeast Asia, create many problems. (Cady 1979: 593)

In response to interviews, the farmers said that in their area where the soil was poor, there was no significant difference in paddy yield per acre whether they practiced transplanting in rows or traditional transplanting or broadcasting. Also, there was the consideration of hiring additional farmhands. Some farmers, in expressing their preference for the method of broadcasting, gave the reason that labour was not available and that the difference in grain yield did not justify the extra expense of transplanting.

Planting in rows takes more time and labour than traditional transplanting. It takes two days and five farmhands per acre. When the farmhands are paid at normal rates, one or two meals are generally given throughout the area, although when higher rates of wages are paid no meals are given. Therefore, planting in rows costs more than the traditional method. In the study area, there is no significant difference in grain yield per acre between planting by broadcasting and transplanting; the slight increase in yield per acre through transplanting is offset by the cost of hiring more farmhands

Thus, sometimes, problems arise between village chiefs and the villagers. The village chief has the duty of implementing the directives of higher authorities. On the other hand, the villagers do not want to do the work directed. As the village chief himself is a farmer, he is of the same opinion as the villagers, but he cannot accept the fact that there are weak points in state policies. He negotiates with the village community and builds a good relationship with it. One household also may have an influence on other households as a consequence of its social interactions with those households. (Marten and Saltman 1986: 22). As a consequence, the villagers make a show of sowing in rows in the fields on the two sides of the motor-road for the inspection of the Township Council. Except for those fields planted for show, the villagers use the method suitable to them according to the geographical conditions of their fields. Thus the village chief and the villagers coordinate to solve the

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problem faced by the village. Such situations are not peculiar to my study area but are commonplace everywhere in Rakhine State.

The village chief acts as the representative of the government and also lives close to the villagers. Therefore, the higher authorities should have recourse to the village chiefs to get an understanding of local situations. The use of pragmatic means based on local geographical and climatic conditions can only bring good results. The use of the word "tradition" may convey an impression of strategies, tactics, and information that are unchanging because they have proven adaptive through countless generations and in countless situations. In fact, for cultivators in many traditional agricultural societies, "experimentation is probably as natural as conformity in traditional communities". (Johnson 1972: 196). Farmers are not invariably attached to tradition and are willing to adopt practices which provide beneficial results. The question is of providing these beneficial results in a local context.

Conclusion

Rakhine State has experienced various administrative systems in different periods e.g. of the Rakhine kings in the feudal period, of the Myanmar kings after the Myanmar occupation of Rakhine, of the colonial period, and of the periods after independence. All those administrative systems had an effect on the village, even small villages. The various Myanmar administrative systems usually emphasized an administration based on rural areas. Hence, together with the central and provincial administration of the various periods, there has been a village administration controlled by a headman (*thugyi*) whose existence continued until after independence. Even now, there are still some villages where the term *thugyi* is used to address a village chief.

In the various administrations of the different periods, the administrative system was hierarchical with the village as the lowest and basic administrative unit. So the village administrative system is the basis of administration in rural areas. The main reforms are to ensure that the headman shall really represent and co-operate with the villagers.

As the Myanmar economy is based on agriculture, every government has to take the responsibility for agricultural development and administrative and economic matters are always interrelated. The administrative machinery is devised as a steel frame for the preservation of law and order in the interest of economic progress, the law which it administers functions as an agent of economic forces. Primary rural administration, which is the basic unit in administration, involves agricultural undertakings. In the hierarchy of State/Division, District, Township, and Village administrative bodies, the directives flow from top to bottom; there are few cases of reports going up from the bottom to the top regarding the implementation of the directives at the village level.

The prime role of local authorities in community leadership is to act as the focal point for providing "joined up" solutions to local circumstance. Effective community leadership and governance requires local authorities to be closely in touch with their communities. Community leadership involves influence and power, and should call for public decision-making over one or more spheres of activity. The spheres of activity may include

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an organization, an area of interest, a town, country or a region. Leadership capacity extends beyond the skills necessary to maintain social activities. The leadership skills include those necessary for public decision-making, policy development, program implementation, and organization maintenance. The lack of reciprocal flow in administration weakens the strength of the administrative body, and administrative personnel at grass-roots level face friction in dealing with the basic unit of the society when they have to use force to get things done.

Most rural people usually follow the directives of higher authorities as relayed by the village chiefs. They dare not evade the tasks laid down by the government. Even if the tasks are not relevant to their traditional situations and experiential knowledge, they usually carry out the tasks as bidden without any complaints. Because of this, the situation of some farmers are affected. They fall from the status of landowners to that of landless farmers. Some who cannot bear the suffering go to the mountains and make a living by *taungya* cultivation, not returning to their native village and settling on the hillside like a village. According to the survey, some had to sell their farmland, houses and cattle to repay the debts and turned to the life of *taungya* cultivators. The strength of society is derived from that of forceful individuals. If individuality is lost, all is lost.

The township administrative body carries out the tasks in close collaboration with the village administrative unit. The township administrative body exerts direct control on the basic administrative unit, so they should keep a close watch on the strengths and weaknesses of the basic unit and should be in a position of reporting back on the needs, as well as on the strengths and weaknesses. An integral feature of effective leadership in any contact is strategic vision. Councils have to work with the whole gamut of local organizations and interests in shaping a long-term vision for the areas they serve. That is the key to the development of a nation. The strength of an administration lies within the basic administrative unit. It is necessary to give special consideration to the administration and the response of the official at the grass-roots level.

As the basic administrative unit is related to the economic unit, the strength of the basic unit is the springboard to agricultural development. It is a key link between the drive for political management reform and the emphasis that best value places on improving service quality and efficiency. The survey of administrative situations covers surveys of other fields of study. That is because the policy laid down by the central body is the same and so is the implementation of the tasks in rural areas. Although there may be little difference according to region, study of the consequences can bring about good lessons. The regional approach does provide a useful and necessary context, even though the approach may seem to involve some overlapping and frequent artificial inclusions and limitations. The test of all truth is practical. There is nothing static about truth. The more reforms in the existing administrative system we can make, the more development we will enjoy.

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Local Government Institutions and their Role in Gwa Township

Tin Win

Introduction

There were three periods in the development of local government institutions in Thandwe (Sandoway): the pre-colonial period, the colonial period, and the period after independence. This paper studies the development of local administration in the three periods and current developments in local government, education, health care, communications and public order in Gwa township.

I. Pre-Colonial Administration in Thandwe

In the pre-colonial period Thandwe was governed by a *wun* who was appointed by the king from among the higher officials at the capital. The *wun* had full civil, judicial, military and fiscal powers and was directly responsible to the king. His assistants were: a *sayedawgyi* or secretary, a *sitke* or military commander who was also a senior magistrate, and a *konmin* who sat at Thandwe to hear and decide more important law suits. Subordinate officials were a *myothluygi* at Thandwe and a *taik-ok* at Gwa. Under the latter was the *thuygi* who was in charge of a *taik* (circle). The *thuygi* had civil and criminal powers to settle everyday disputes arising in the village, and was answerable for the preservation of peace; but his most important duty was to apportion revenue demands among villages and to have them collected. The offices of *myothluygi*, *taik-ok*, and *thuygi* were not strictly hereditary, the appointments being subject to confirmation by the king. In addition to these officials there was the *ywagaung*, who was appointed by the *thuygi* to the charge of one or more villages. He assisted in keeping order, and collected taxes, which he handed over to the *thuygi*, who allowed him a small sum as remuneration. None of the officials received any salary. They were exempted from paying taxes, and were allowed to retain fees for law suits and also the fines inflicted by them in criminal cases. The three officials who formed the staff of the *wun* were remunerated by him according to his pleasure out of revenue paid in. The others were also allowed to retain 10 percent of the taxes collected in their jurisdiction. But the chief source of income of all officials was what they made out of revenue collections, each in turned remitting to the higher authority as small a sum as he could without being called to account (BGSD 1962: 54-55).

II. Colonial Administration in Thandwe

British rule was imposed over Myanmar piecemeal in three stages, in 1826, 1852 and 1886. In 1826 the British acquired the two maritime provinces, Rakhine (Arakan) and Tanintharyi (Tenasserin), and these were linked together by the acquisition of Bago (Pegu) in 1852. Each province was governed separately under the Government of India until all

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three were amalgamated in 1862 as one province of British Burma (Furnivall 1960: 5). Before the amalgamation, Rakhine was in the care of the Government of the Presidency of Bengal, the Superintendent of Rakhine being placed under the control of the Commissioner of Chittagong. A little later the Superintendent was elevated to the rank of Commissioner, and Rakhine was excluded from the charge of the Commissioner of Chittagong and placed under the direct control of the Bengal Government at Calcutta as one of the territorial divisions of Bengal (Donnison 1953: 16).

After the British annexation of Rakhine, two districts were formed, Sittwe (Akyab) and Yanbye (Ramree). Thandwe, which at first formed part of Yanbye, was made into a separate district in 1829.

The officers in charge of districts were at first called Assistant Superintendents, but when an assistant was given to the district officer of Sittwe four years later, they were given the term Senior Assistant Superintendents. When Rakhine became a commissionership of the province of Bengal in 1834, the district officers came to be called Senior Assistant Commissioners. Ten years later, when Assistant Commissioners who were not in charge of districts were classed as seniors and juniors, the name of the district officer was changed to Principal Assistant Commissioner. Finally, when in 1862 the province of British Burma was formed and the number and classes of Assistant Commissioner was greatly increased, the district officer was given the title of Deputy Commissioner (BGSD 1962: 55-56).

In 1863 Thandwe district was divided into the Northern and Southern Townships with headquarters at Padin and Kyaukkyi respectively. The officers put in charge were at first Extra Assistant Commissioners, but a few years later they were called Myooks. In 1864, the Myook at Padin was moved to Taungup and the one at Kyaukkyi to Kyeintali. In 1872 the Southern township was divided into two; the northern portion was named the Central and had its headquarters at Thandwe, the other portion was named the Southern and its headquarters continued to be at Kyeintali, but was moved to Gwa in 1874. The three townships were later named Taungup, Thandwe and Gwa (BGSD 1962: 56-57).

Thandwe was the only town with a municipal administration. But although Thandwe was established as a district town, its standard in terms of municipal administration was little higher than that of village. In 1882 a Town Committee was formed, but two of its members, the Deputy Commissioner and Township Officer, were civil servants while the remaining six members were selected by the District Commissioner. The Committee had no right to levy taxes and enact bye-laws and had only the right to administer the bazaar and give licenses for the slaughter house for the acquisition of funds (BGSD 1962: 108).

III. Gwa Township in the Colonial Period

Gwa township, formed in 1872 with headquarters first at Kyeintali but later removed to Gwa in 1874, is the smallest township in Thandwe district. It is also the most southerly and situated between 17°15' and 18°10' N and 94°25' and 94°49' E. The eastern, southern and western boundaries are the same as those of the district, and its northern boundary is the southern boundary of Thandwe township. It abuts on Thabaung township of Pathein district on the east and south.

A long narrow strip between the Rakhine Yoma and the Bay of Bengal which tapers towards the south, Gwa township is extremely mountainous and wooded. The area of the township is 803 square miles. The cultivable areas are of small extent and are found on the banks of the river just behind the coast line. The soil is also poor. In consequence the inhabitants depend largely on other occupations, the chief of which are fishing, boat building and cattle breeding. The population was 15,331 in 1891, which increased to 21,963 in 1911. The vast majority of the population is Bamar, there being fewer Rakhines than in the rest of the district. In 1911 there were 223 villages containing 4,411 houses, with only Gwa having a population in excess of 1,000 inhabitants (BGSD 1962: 108-110).

IV. Local Government in Gwa

1. Development Work in the Villages

For a long time after independence, there was no municipal organization in Gwa and municipal work was carried out by the Department of General Administration. On 11 January 1994, a municipal body, the Gwa Town Development Committee, was set up by Ordinance Number 15/94 of the Department of Progress of Border Areas and National Races, and by Notification 4/35/Ah Da (1); three wards, Kinyone, Ywama, and Myoma were placed under the jurisdiction of the Development Committee (Tin Maung).

After the establishment of the Town Development Committee, although no long-term master plan was yet formulated, it made the development of rural areas one of its objectives. In the realization of this objective, it aimed to renovate the roads which had formerly been the responsibility of the District Council, to build roads usable in all seasons to communicate with the hills, to provide a regular supply of clean water to the villages, to maintain a clean and hygienic environment, to encourage the development of trade between the villages, to construct small bazaars, and to encourage the development of the villages (TDR: 2).

From 1997 to 2001, a plan for the development of model villages was implemented in Gwa township by the Town Development Committee working in cooperation with village Peace and Development Councils. In implementing the plan in 1997-98, in the model village of Kwin Gyi (Kanna), bamboo fencing was erected around each house, and village roads were renovated with earthen works and drainage. Similar works were carried out in the other model villages of Taung Pauk, Thayar Chine (Kanthayar) and Kyaik New.

In 1998-99, latrines with septic tanks were constructed in Kwingyi (Kanna), Taung Pauk, Thayar Chine, and Kyeintali villages (TDR: 25-26).

In 1999-2000, artesian wells providing fresh water were dug and hand-pumps installed in Kwingyi (Kanna). New buildings within the village dispensary premises and a playground for children were constructed in Taung Pauk. A bazaar on one acre of land and a park on half an acre were constructed in Thayar Chine (Kanthayar). The bazaar was relocated to a new site in Kyeintali.

In 2000-01, hand pumps were installed in the remaining tube wells at Kwingyi (Kanna) and Thayar Chine. Shade trees were planted along the sides of the principal road of

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Taung Pauk and two small bridges were constructed on the way to the cemetery at Kyeintali (TDR: 26-27).

Official reports detail the progress made in the model villages but the field study found that not all the progress reported was true. For instance, at Ywa Thit Kone, the plan to provide clean water and to construct latrines with septic tanks was never materialized, and at the village dispensary only one vaccinator was appointed.

2. Development Work in Gwa Town

In the three wards of Gwa Town, the Town Development Committee has not undertaken the supply of clean water. But the people have dug their own tube wells and there is no problem with regard to water (TDR: 32).

In sanitation work, garbage in the three wards and expanded new wards have been systematically collected by the use of a garbage truck and trailers. There are specified places in the town and bazaar for garbage to be discarded for collection. The bazaar is cleaned daily. For sanitation work in the hospital the garbage truck and trailers are used once a week. No special taxes are collected for sanitation work although the expense is given as K 52,390. Although the town is small the Town Development Committee has managed development work well (TDR: 34).

There is no proper system to clear the sewage in Gwa township. Most of the households have pit latrines, only 10% having latrines with septic tank. However, there is no means of clearing the septic tanks.

Electricity for the three wards in Gwa is provided by the township branch of the Department of Electric Power. There are altogether 41 posts for public lighting; two posts have mercury lamps, 22 posts fluorescent lights, and 17 posts light bulbs. For household lighting, private generator engines are used (TDR: 34).

The bazaar in Gwa is managed by the Township Development Committee. The monthly collection of taxes from 67 shops is K 13,400, from hawkers K 26,800, while the income from butcher licences is K 107,200. The monthly expenditure for the maintenance of the bazaar is K 92,900, so that there is an excess of income over expenditure (TDR: 34).

V. Education in Gwa Township

In the pre-colonial period there were only monastic schools and no secular schools. The monastic schools taught Pali and the Pitakas as well as basic mathematics and some astrology and medicine.

In 1866 the British government initiated education with a secular curriculum and encouraged the establishment of secular schools. There were 17 schools in Thandwe district in 1877. This increased to 43 in 1910 (BGSD: 96-98). Parallel with the secular schools, monastic schools also continued to exist. The government tried to prescribe a secular curriculum for the monastic schools, but the monks did not accept it and continued to teach as before.

Despite the existence of secular and monastic schools, the literacy rate was not high. According to official statistics, of 1,000 boys only 349 were literate in 1881 and 347 in 1911. Therefore, instead of an increase in literacy, there was even a decline.

The educational situation improved after independence. In 1958 the government established a State High School in Gwa. The school stands on Myanma Gonyi street in Kinyone ward and is a one-story brick building. The total number of students attending the high school was 150; this included not only high school students but also students at the middle and primary level. Three Senior Assistant teachers, four Junior Assistant teachers and five Primary Assistant teachers were appointed to run the school. More recently, the government opened another high school in Kyeintali (PY: 229).

The education level of Gwa township improved in the 1960's. In 1979-80 academic year, 311 students matriculated. In 1980-81 academic year the percentage of students passing the matriculation examination was 33.13 and in 1982-83 it increased to 40.78 (RRSPC: Appendix 1). When the Outstanding Students programme was started in 1964, the first Outstanding Student from Rakhine State was from Gwa. Gwa continued to produce Outstanding Students in 1965, 1968, 1970 and 1978, while there was an Outstanding Student from Kyeintali in 1984 (RRSPC: Appendix 1).

VI. Health Care in Gwa Township

The health situation was poor in Rakhine at the time of the British annexation, the mortality rate being 2.69 %. The high death rate was due to malaria which was particularly widespread in Rakhine, although there was no smallpox or cholera. Thandwe district stood next to Sittwe in the incidence of malaria.

There was the temporary appointment of a doctor and a dispensary was opened in Thandwe in 1830. But up to 1852 this was the only dispensary for the whole of Thandwe district. In late 1852 the District Council constructed a hospital with bamboo matting and thatch roof. A hospital was opened at Taungup in 1882 but it had to close down in 1887. In 1897 the hospital was reconstructed with public donations. A hospital was built at Gwa in January 1909 with District cess funds which could accept 6 male and 2 female indoor patients. In the year of its opening, it treated one indoor patient and 20 outdoor patients. Rs 2,400 was contributed for renovation of the hospital from District funds. In addition the government agreed to contribute Rs 840 (BGSD: 100-102).

The hospital at Gwa was burnt down by insurgents in 1949. In 1968 the hospital was reconstructed as a 16- bed hospital while in 1979 a hospital for monks was opened at Thandwe.

In 2002 in Gwa township, there were one township hospital at Gwa, one village tract hospital at Kyeintali, four rural health centres at Kalapyin, Sathwa, Nyaung Chaung and Taung Pauk, and 20 village dispensaries at Shaukkone, Sadikwin Poneyet, Dosan, Yekyaw, Gangawtaung, Bawin, Kywechine, Tainkyo, Kyaung Taung, Kinbone, Shwe Oo Kwin, Launkyo, Ywathitkone, Kintaw, Yahinekuto, Shweyachine, Taung Nar Kwin, Pauktu, and Thittauk villages.

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Despite the development of health facilities there was a shortage of medical personnel. The regular staff consisted of three medical doctors at Gwa and one at Kyeintali, but it sometimes happened that the staff was not at full strength. For instance there was a time when there was only one doctor at the Gwa general hospital and another at the Kyeintali village tract hospital, and that, because of the resignation of the doctor at Kyeintali, there was only one doctor in the whole of Gwa township (Township Medical Officer).

Malaria, which had been a health threat during the colonial period, continued to be a problem. In 2000, 887 persons contracted malaria; this increased to 2,509 in 2001 and declined slightly to 2,250 in 2002 (THP).

VII. Communications in Gwa Township

There were no roads and only footpaths in Thandwe district in 1854. Because of the existence of a network of streams, communication was easier by waterway. The sparseness of population and the fact that several wide rivers had to be crossed did not encourage road-making. The first metal road, five miles in length, linked Thandwe and Kin Maw. The second road was constructed in 1872; it linked Thandwe and Ngapali village and was four miles and four furlongs long. A road between Gwa and Thandwe was planned for a long time. From 1899 to 1902 a preliminary survey was made for the construction of the road. The first part of the road, 41 miles long, linked Kyeintali and Thandwe. The second part linked Kyeintali and Gwa and was 38 miles four furlongs long. Construction was started in 1903 and although an unmetalled road was completed, the bridges along the road remained uncompleted up to 1911 (BGSD 1962: 46, 40-50).

From 1989 to 1992 the road between Thandwe and Gwa as well as the bridges were renovated (PY: 229). By 2003 the improvement in road and bridges had been finished completely (Tin Maung). The improvements in communications in Gwa township encouraged regional development.

VIII. Public Order in Gwa Township

In pre-colonial times *thugyis* and *ywagaungs* performed police duties in Rakhine. But Gwa, which was a large village, had its own security squad. The site of the guard house, later occupied by the police station, is still known as Kinyone (guard house) up to this day.

After the annexation of Rakhine, the British first organized a police force in 1826. It consisted of two battalions, the Arakan Provincial Battalion and the Mugh Levy. Organized as a military police, it was officered by army officers and had headquarters at Sittwe with a detachment posted to Thandwe. In 1829 the police force was reconstituted as a civil police under the District Commissioner. In 1852 its strength was 300 and there were police stations at Kyeintali and Gwa. (BGSD 1962: 62-63).

The implementation of the Police Act of 1861 in Rakhine began in 1864. The strength of the police force in Rakhine was such that there was one policeman to every 500 inhabitants. But even after the application of the Police Act, the headmen and head of villages performed police duties as in pre-colonial times. (BGSD 1962: 63-65).

After independence, Rakhine was disturbed by insurgency and on 13 April 1948, Red Flag Communists under Linyone (a) Chit Pe Gyi attacked the police station at Gwa.

Currently in Gwa township there are police stations at Gwa, Kanthayar and Kyeintali, and also at Sathwa and Kalapyin which are of lower status. Within Gwa township there are six police units, one unit each stationed at Baydar, Yahinekuto and Taungpauk, and another three units organized as mobile teams with the duty of patrolling the villages (RDGP).

The incidence of crime is low in Gwa compared to other townships. According to the police report covering the years 1998-2003, there were 3 murder cases in 2000, 2 in 2002, and none in the other years. Other criminal offences during the period 1998-2000 were 16 cases in two years. Preventive measures were carried out in 69 cases (RDGP). Compared to other townships, the population of Gwa township is dense, but although elevated to the level of a township, Gwa town itself looks much like a large village. This probably accounts for the low incidence of crime.

Conclusion

Gwa had been established as a township since the colonial period but the town of Gwa itself was little more than a large village. There was no municipal organization and development works were not carried out. After independence, the activities of the Red Flag Communists hindered development. Starting in the 1960's there was an improvement in the conditions of education and health. Following the establishment of the Department of Progress of Border Areas and National Races, a Town Development Committee was organized in Gwa, enabling it to undertake development works. However, since opportunities of livelihood are limited except for fishery and timber extraction, there has not been much economic development in Gwa township.

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- PY** *Pyiyay Ywalmmu* (Rakhine State).
- RDGP** *Report to the Director General of Police (Rakhine)*, 29 May 2003
- RRSPC** *Report of the Rakhine State People's Council*
- TDR** *Township Development Record (Gwa)*
- THP** *Township Health Profile*

Interviews

- Township Medical Officer, Gwa Hospital
- Station Officer, Police Station, Gwa
- U Tin Maung, (Township Officer, Town Development Dept, Gwa)
- U Tun Maung (former Principal, Gwa State High School)

Changing Traditional Cropping Systems in Rural Rakhine State

Meaning of “Traditional” in Rural Development Study

Ando Kazuo

I. What is “Traditional”?

In March 2001, the modern variety of irrigated rice cultivation was observed only very limitedly even along the side of the national road from Gwa to Thandwe. The green crops were Matpei (Black gram) a variety newly promoted by the Agricultural Extension Office. Usually, the rice stubble-fields spread to a large extent. As shown in Table 1 the crop acreage of Gwa Township, especially the rice production, depends on the wet season's rain-fed field. The villagers also depend on their own manual labor force. In the study village, the agricultural tools drawn by cows or buffalos are shown in Photo 1~ 5. These are locally hand-made from wood and bamboo excepting the iron parts, e.g. ploughshare. The agricultural landscape, crop statistics (Table 1) and the agricultural tools allow visitors to judge the cropping systems of this locality as “traditional” with the connotation of “no change” or “static”, even “un-developed as against modernization”. The farmers in Gwa Township, seem to be obedient followers of traditional agricultural tools and the system of rice cultivation. Outsiders, like urban dwellers and even including the author of this article, usually tend to have such an idea. Why does this happen? Probably, outsiders dwelling in urban areas are much familiar with the rapid change surrounding them and unconsciously believe that the good return of rapid economic growth is realized by “development by modernization”. Their mind is filled with such key words as rapid, new, economic etc. However, is it true that farmers have not changed their agricultural tools and crops? The author would like to advance a negative hypothesis: Certainly the farmers have changed their tools and crops in order to meet their own requirements and not the requirements of outsiders. The present study reveals important clues in this regard. The Da Lein Tone and Setton have been well associated with the development of the Ayeyarwaddy region for several decades and the finding is that the Te or plough has even changed its shape within last 50 years. Also, the villagers cultivate modern varieties of rice under rain-fed conditions. However, these changes are easily overlooked because these have become natural or harmonious in the life of the villagers and village landscape and accordingly the outsiders misunderstand these “new things” as “traditional” or “un-changed”. The Nipa palm locally called as Dani (shown in Photo 6) seems to be natural but all of them are cultivated along the creeks. The Nipa palms too have been adopted into the village landscape. The meaning of “Traditional” appears to the author like the Nipa palm in the village landscape. When the mode and speed of “Change” in the rural livelihood is in accord with the villagers' subjective wish and pace to change themselves, the “Change” appears as “Traditional” to outsiders. Incidentally, the meaning of “Traditional” in ritual studies etc. seems to be “Unchanged” or “Authority”. However, in rural development studies conducted for supporting the rural people, “Traditional” is for outsiders to learn the “things” which have given the rural people sustainability of livelihood in their history. We must learn the principle identified by “Traditional” and, on this basis, we can create the “new things”

together with the rural people to develop their livelihood in a sustainable way. At present, we have enough experiences of Asian countries including Bangladesh, Japan etc. where rapid-modernization has overlooked the wishes of the rural people and has not been sustained ultimately. Furthermore, it has sometimes made rural life worse than before.

II. Cropping Systems in Y Village

1. Agricultural Land Use of Gwa Township

As mentioned before, the cultivation of rainy season rice is dominant and other crops are not cultivated to a large extent. This is well demonstrated in agricultural land use. The classification of agricultural land follows the categories used by the Land Use Office. These are Le (Rice field), Kain (Mainly Peanut, Chili, Vegetable Cultivated in the dry season), Ya (Upland crop field), Garden (Coconut palm, Betel nut palm etc planted field), Dani (Nipa palm growing field) and Taungya (Shifting cultivation land). As shown in Table 2, Le is dominant according to the Crop Statistics of Gwa township (see Table 1). The peanut shown in Table 1 is mostly cultivated in Kain in Table 2, because usually Kain land is submerged by inundation of the river during the rainy season. However, Garden is not at all submerged at any time of the year. The characteristics of crop acreage and agricultural land use are mainly based on the topographical and rainfall patterns in Gwa. The topography of Gwa as shown in Figure 1 indicates that most of the land is mountainous. Plain land spreads just narrowly along the coast. There are plenty of rivers in Gwa, but they are small and short. The annual rainfall is 5262 mm and about 90 % of it occurs from June to September (Table 3). The Kain here is sensitive to the flood. According to the Burma Gazetteer, Sandoway District, Volume A by W.B. Tydd (Reprint - 1962, p. 24) "Kaing (same as Kain) is the name given to lands which are found whenever fresh water streams overflow their banks and deposit a thick layer of silt. The locality of these lands often changes, also their productiveness". W.B.Tydd has also recorded the pattern of agricultural land use in the following way:

"The whole surface (of Gwa Township) is extremely mountainous and wooded, and this character is maintained right down to the sea where the forest-clad hills end as a long stretch of rock bound coast. The cultivable area, which are the poorest in the district, are found on the banks of the rivers just behind the coast line; besides the soil being so poor the cultivable lands are of small extent, and in consequence the inhabitants have to depend largely on other occupations, the chief of which are fishing, boat building and cattle breeding. The area under cultivation was only 13,103 acres in 1902, and in 1911 it had increased to only 16,298; of which 14,309 were under paddy, the other crops raised being scattered over small areas. Owing to sparseness of cultivation the poverty of the soil, and the difficulties of communication, the township is subject to seasons of scarcity" (p.119).

The same basic characteristics of agricultural production and land use were pointed out about 100 years ago. However, between 1911 and 1998, agricultural land has increased from 16,298 acres to 26,780 acres and that of Le (Rice field) has increased from 14,309 acres to 20,128 acres even though the soil is not so fertile. The decrease of Le in 1997/89 as against 1996/97 is explained by the official report of Land Use Office as follows:

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“...The paddy did not grow very well in sandy soil fields and so coconut trees were planted. Therefore, the sandy soil area which was formerly Le has been put into Garden...”

Anyway, villagers have tried to reclaim land for Le from one generation to another. Before proceeding further, it is better to discuss the agricultural land use and cropping pattern in Y village.

2. Agricultural Land Use and Cropping Pattern in Y village.

Tables 4 and 5 show the agricultural land use and cropping pattern of 65 households in Y village in 2002. The survey was conducted intensively in November – December, 2002. In addition to the tables, the relationship between Le holders and other holders is given below.

- i) 31HH, about half of the total house holds, answered that they did not have Le. Among them, 7HHs had no cultivated land, even Taungya. 5HH of 34HHs only had Le.
- ii) Most of Le is mono crop of rainy season rice. However, rice is also cultivated in Kain and Taungya. Particularly, 20 HHs of 21HHs having Taungya answered that they cultivated paddy and other crops including sesamum, maize, Ching Paung, beans, vegetables etc. 1HH of Taungya cultivates only chili and this household also has Le.
- iii) 17HHs of 21HHs having Taungya answered that they did not have Le. 14 HHs of these 17HHs only had Taungya.
- iv) 20HHs of 21HHs having Dani had Le and 4HHs of these 20HHs also had Kain.
- v) 9HHs of 13HH having Kain had Le. 13HHs of 20HHs having Garden had Le. 4HHs of 9HHs having homestead garden had Le.

The characteristics of Agricultural Land Use and Cropping Pattern in Y village are as follows.

- vi) 24HHs of 65HHs depend on agricultural land except Le. Among them, 17HHs' rice production fully depends on Taungya. Taungya is essential for them to get rice.
- vii) There are clearly two types of HH in Y village. One is the so called Le farmers. They commonly have other lands. Another type is the small peasant HH usually depending on commercial crops including chili, Dani, etc.

3. Rice Varieties and Classification of Agricultural Land

Figure 2 shows the map of the classification of agricultural land on the basis of the Land Use Office Land Register. R1, R2, R3 are Le classifications as per potential yield. The yield per acre of R1 is estimated at 75 -100 baskets (1 basket=46 lb of un-husked rice). R2 is 50-75 and R3 is 36-50. The villagers have classified the rice fields into three categories on the basis of hydrological conditions. The high land where water goes out in October is called “

Kon Le". The middle land where water goes out in November is called "Allat Le". The low land is called " Ahneint Le" where water goes out in December. The varieties of rice are also classified into three categories in terms of their growing period; early variety (Kauk Yin: 2.5-3 months), middle variety (Kauk lat : 4 months) and late variety (Kauk Kyi :6-7 months). The middle varieties are sometime classified into two sub-groups; young age or middle early (Kauk lat kale:3.5 months) and old age or middle late (Kauk lat kyi:4 months) . The early, middle and late rice variety groups adapt to the hydrological conditions of High, Middle and Low as well as R1, R2 and R3 respectively. In the high land, the double cropping of rice and pulses including Matpei and Myaypei etc is sometime applied, but usually mono cropping of rice or other crops prevails in the village. Hydrologically rice field for multiple cropping is very limited and the topography of the village undulates largely from hill to swampy creek. Therefore, rice fields of the plain constitute the largest acreage.

4. Mode of Cultivation

Le:

In May-June (Kason), the farmers starts to prepare the land. The Te (Plough) and the Tun (Harrow) are drawn by two cows or two buffalos. In the first ploughing and harrowing, ploughing is done once with the Te followed by a harrowing twice with the Tun in the wet field in which the depth of water is about one foot. The first ploughing of the field is called "Te Kwe De" and the first harrowing "Daung". At the same time, the farmer starts to prepare the seed bed for seedlings. In the second harrowing, the harrowing is done twice with the Tun with the pattern of "Yarr Saung". In the third harrowing, it is done twice with the pattern of "Nan Saung" with a few days interval between the two. The fourth harrowing is done once with the pattern of "Ah Yarr" and the fifth harrowing, with the pattern of "Ah Nan" is done once after at few days interval. The preparation of the field is usually completed within one month for 4-5 acre of land for Le. There is a total of one ploughing with the Te and eight times of harrowing with the Tun. The farmers call the eight times of harrowing as "Shitt Sat". An old man of the village (nearly 70 years) informed us that "Shitt Sat Le De" is a Myanmar saying, derived from this operation. It means that everything is mixed very well. Usually the mud in rice field comes to have a fine texture after "Shitt Sat". A wooden log called Kyandon is finally, drawn across the field in order to level the muddy soil for transplanting seedlings (Pyoe) which are 18 inches high (local measure is one Taung) and 28 days old.

Sometime, instead of the second to fifth harrowing with Tun, Setton is used after the two times of the first harrowing with the Tun: At this first use the Setton is used twice. Then, from the second to the sixth use, the Setton is used once each with few days interval. U Han Myint a 45- year old man and head of the village, started to use the Setton seven years ago. After operation of Setton, the Kyandon is also used to level the muddy soil.

U Han Myint comments that the depth of the water in the field for harrowing with the Tun and Setton should preferably be about 3-4 inches or the width of four fingers (Lat Lay Thit).

The work of transplanting the rice seedlings is performed usually in July-August (Wa So). The harvesting is harvested at three different times. The early variety, locally called,

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Kaukyin, is harvested after the full moon day of Thi Din Gyut or October. The middle variety or Kauklat is harvested in the month of Ta Saung Mon (November –December) and the late variety or Kaukgyi in the month of Nat Taw (December –January).

Matpei (Black gram) has been newly introduced by the Agricultural Office in 2002 with the method of Ye-Lait-Kye. The dry seed is broadcast in standing rice just two weeks before the harvest and when the rice is harvested, the height of the Matpei plant is about 7-8 inches. The soil must be soft but not too wet at the time of sowing the seed.

Kain:

U Ta Bo (72 years old) and U Khin Maung Win (40 years old) explained that after monsoon from October to November (Ta Saung Mone), the first harrowing with the Te is made in the dry field in the late afternoon. The next morning at about 4 or 5 a.m. and till 7:30 a.m. the Kalagyan is drawn through the field 5-6 times. This operation with the Te and Kalagyan is repeated six times in succession. When the seventh harrowing with the Te is given in the evening after the sixth drawing of the Kalagyan, the seed of Myaypei (Peanut) is sown. On the same day or the next morning of the sowing, the Kalagyan is drawn the seventh time to cover the seed with soil. When crushing the soil, the man stands on the Kalagyan, but in covering the seed with soil, he does not do so. Myaypei can be harvested after about three months.

In the case of Chili, the sixth Kalagyan drawing is carefully made. One or two men stand on the Kalagyan to make the soil more compact. The seedlings of chili, which are 30-40 days old, are transplanted with a distance of 1 foot between them. Green chili can be harvested after 30-35 days, Red chili after 50 or more days.

Some farmers like Ko Kyi Lwin a 34-year old man use the Da Lei Tone (Roller) and the Tun in addition to the Te and Kalagyan. Ko Kyi Lwin prepares his field as follows: firstly ploughing with Te in the afternoon; secondly the Kalagyan is drawn the next morning; thirdly ploughing Te in the afternoon at the same day; fourthly drawing the Kalagyan; fifthly use of Da Lei Tone the next morning; sixthly ploughing with Te, and if necessary, weeding with Tun in the afternoon to remove the grasses and weeds. Seventh Kalagyan is drawn the next morning, eighthly ploughing with Te and, if necessary, weeding with Tun. Ninthly sowing the seed of Myaypei (Peanut) after the last ploughing with Te and then the seed is covered with soil using the Kalagyan. If chili is cultivated, Kalagyan is drawn in the next morning and the seedling of chili is transplanted in the evening.

Dani:

Dani (Nipa Palm) is planted in the muddy places along the river where salty water prevails. The place of Dani plantation is classified as “Dani” in land use. The young sprout of the matured Dani is usually transplanted and therefore all the Dani are not natural but cultivated. One acre of Dani plantation can produce 50 Bows or Bundles. One bow consists of twenty sheets (Pyit). One sheet is 4 Toung (4”x18”) in length and one Htwa (8”) in width. Dani leaves are collected in the hot summer season of March – April, because the Dani leaves must be steeped in very salty water for preservation and the salty content of river water is believed to be highest in the summer. The sheet must be steeped for two weeks to twenty days and put

under the sun for three days. After drying, the sheet is pressed by weights to make it flat and straight.

Dani sheets are used for roofing house and they last for two–five years. The villagers consider that the longer leaf is better for roof. If the sheets with overlap closely in the roof, they can last more than five years, but if they do not overlap closely they only last for one– two years. The prepared sheets of Dani are purchased by merchants coming from Gwa who sell them to buyers coming from Ayeyarwady Division. The juice extracted from Dani is called Dani Yay and the villagers drink it as local beer.

Chemicals:

Chemical fertilizers are applied in Le and Kain, if the villagers can purchase them. However, the application of chemical fertilizers is not much. In the case of Peanut, fertilizer “Pale”, most probably Urea, is applied at the rate of one bag or 50 kg per acre two days before sowing the seeds or on the same day as sowing the seed. In the case of Chili, after making the furrows with a plough, the “Pale” fertilizer is placed in the furrows and the seedling is then transplanted. In rice cultivation “Pale” fertilizer is reported to be only applied to the seed-bed. However, the Agricultural Office staff think that it is used in the rainy season rice field because leeches are scarcely observed in the rice fields. Other chemicals, including pesticide, insecticides etc., are merely used in the village.

5. Agricultural Tools drawn by Cows/Bufalos and Draught Animals.

Table 6 shows the number of agricultural tools and indicates that the major tools are Te (35 HHs: Number of HH holding the tool.), Tun (30 HHs), Kalagyan (28 HHs) and Da Lei Tone (25 HHs). On the other hand, the Setton (11 HHs) and Da Kyandon (5 HHs) are not commonly used. 5 HHs of 30 HHs having the Te do not have Le and 4HHs of 34 HHs having Le do not have the Te. However, the HHs having other tools have Le. 16 HHs of 34 HHs having Le do not have any draught animals, namely, cow, bull and buffalo, and rent the cows from other villagers. According to one villager, in renting out a pair of cow for 4 months from Kason (April – May) to Wagaung (July – August) the owner gets 35 government Baskets (Tin) of un-husked rice in return. The figure of HHs which do not have any draught animals indicates that the rental cow system is important among the villagers. There are electronic generators but no tractors.

III. Changing Traditional Agricultural Tools

The tools drawn by cows/buffalos that are in use currently are considered to be quite age-old due to their appearance and mode of operation. However, the reality is different from this conception. According to U Soe Myint (57 years old), a dweller of the neighboring village and other old villagers, the Setton, Da Lei Tone and Da Kyandon were not originally used but were introduced into the villages. The Da Kyandon and Da Lei Tone were first used for peanut cultivation in Kain about 15 and 20 years ago respectively. The Setton was first used for rainy season rice Cultivation 15 years ago. These tools were introduced from Ashetha (east), Ashetha meaning Ayeyarwady Division in this locality. U Soe Myint commented that these tools were introduced by the government but it is also true that some villagers privately brought in these

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tools. A Da Kyandon listed in Table 6 was brought from Ayeyarwady Division by a villager last year. Therefore, these tools are not "traditional" in this village. The Burma Gazetteer does not mention these tools (Sandoway Distirct, Volume-A, p 27); on the other hand, it is to be notice that another type of plough, namely *At*, was mentioned:

"The Burmese *Te* only just being brought into the district, the plough in common use is called an *At*. This is an implement, which, as its name signifies, has a narrow, pointed, needle-like shape; but in its more modern form there is an inlay of iron on the upper part of the point. Ploughing with the *At* is a longer and more laborious process, because it only digs into the soil and does not turn the clods over as the *Te* does.

When an *At* is used the land has to be ploughed twice, the second time crosswise to the first. After that, the clods are broken up and all grass and weeds are shaken out of the soil by five to eight turns with a harrow or *Tun* (but in the country south of the Kyeintali River the *Tun* is generally the only implemented used). Most of the grass and weeds have, by the action of the *Tun*, been crushed and worked into the soil, the remainder is heaped on the *Kazins* or bunds enclosing the paddy fields. Then when the soil has been quite cleared, the surface is reduced to evenness by dragging a beam called a *Kyandon* over it. Immediately after this has been done women are employed to put down the seedlings taken from the nurseries."

With this reference, the author asked U Soe Myint about the *At*. He answered that the *At* was used in *Le* and *Kain* and disappeared 30 years before. He drew the picture of another plough namely *Hut*. The *Hut* was introduced into the villages but the blacksmiths could not make it and, so it also disappeared. He suggested that it would be available in the northern part of *Gwa Township* and strenuous attempts were made to find it by an extensive survey. Finally U Soe Myint's surmise turned out to be correct and we found it near *Kyeintali*. The shape of this plough which is shown in Photo 7 is very similar to the Bengal plough or *Nangol* as shown in Photo 8. Later, we continued our survey up to *Mrauk-U* through *Thandwe*, *Taungok* and *Sittway*. In more northern places, saw more of the *At*. However, now, the *At* is commonly used for *Kain* in addition to the *Te*. In *Sittway* and *Mrauk-U* there are many *At* even now. In this region, the *Te*, the *At* and the *Kalakyen* are major tools for the preparation of land. In December 2003, we found the *At* in *Kyaung Taung Village*, 30 minutes away by car from our study village. U *Tun Maw*, a 70-year old man of *Kyaung Taung Village*, told us that the *Te* came to his village before his marriage and that he got married when he was 30 years old. When he was young, only the *Tun* was used in *Le* and the *At* and *Kalakyen* in *Kain*. The *Te* was called *Kala Te* as Indian merchants sold it in the old days. In a village near *Taungkok*, the old villagers informed us that the *Te* was dominant there about twenty years ago instead of the *At*. However, the *At* is still in use in *Kain*.

In *Kyaung Taung village*, the *At* is used with the *Te* in *Tobacco* and *Chili* cultivation in *Kain* in the following manner:

1st, the *Te* is used once in the afternoon (2 pm). 2nd, the *Kalakyen* is used in the early morning of the next day for three - four hours. 3rd, the *Te* is used once in the afternoon. 4th, the *Kalakyen* is used in the early morning of the next day. 5th, the *Te* is used once in the afternoon. 6th, the *Kalakyen* is used in the early morning. 7th, the *At* is used once in the afternoon. 8th, the *Kalakyen* is used in the early morning of the next day. 9th, the *At* is used once in the afternoon. 10th, the *Kalakyen* is used in early morning of the next day. 11th, the *At* is used once in the

afternoon. 12th, the Kalagyan is used in the early morning and in the evening the seedlings are transplanted in the lines drawn by a bamboo.

From the south to the north, the change in the tradition of the plough from At to Te has occurred continuously and quietly among the villagers for nearly 100 years and the change has accelerated within the last 25 years. The main differences between Te and At are in the ploughshare and the function of tillage. The Te has a mould-share but the At share is made by blacksmith with hammering. The difference of tillage function is well explained in the Burma Gazetteer as mentioned above. This change is now occurring not only in Rakhine but also in Chittagong and Assam. Why has it happened? The question has been raised to the author time and again, but it is certainly difficult to answer right now. The At is very similar to the Malay type of plough and also to that of Bengal and Assam. The belt from Indonesia to Bengal through the coast of Myanmar may have special meaning, particularly Rakhine. This was the route of expansion of Mahayana Buddhism in the 7th -12th century and also the merchants' route along the Bay of Bengal. However, this remains outside of the main objective of this paper. Nevertheless, the changing tradition observed in the agricultural tools in our study village helps in the understanding of the question of the question "what is traditional?" posed in the beginning of this study.

IV. Epilogue: Rice Ritual in Ywa Thit Kon

In the village, males operate the plough while females only transplant the rice seedlings. The villagers believe in the spirit or *nat* of the Le, namely Le Daw Shin Ma Nat. They perform the ritual called *Le Myay Tai* on the first day of operating the plough or transplanting the seedling. They bring the offerings in a bamboo basket, the offerings being boiled chicken and rice liquor (wine) or boiled egg and cooked rice. They put all in the ridge of any corner. The villagers pray to the spirit of the Le joining their palms together and facing toward the east. The offerings are put there for ½ ~ 1 hour. They pray with the following words:

Saba Toepwa Aung Saut Shout Pay Par.
Kywe Nwa Kyanmar Aung Htein Thein Saut Shout Pay Par.
Lei Daw Shin Ma Thakima Ko Ar Ko Par De.

Help and maintain to get more paddy.
Help and maintain to secure cows and buffaloes.
We trust to the goddess of the paddy field.

In Kain, there is no ritual.

In Taungya, they start the slash orally requesting the permission of the spirit for the slash. After requesting, they say "God, please move to another place" and then start the slash.

At the time of harvesting rice, villagers conduct the ritual namely *Kauk Oo Swun Kywe Pwe* (First Paddy Cook Rice Feed Ceremony). During the harvest, they select a good day for the ritual and offer newly cooked rice to the Lord Buddha, or, invite other villagers to the monastery.

The villagers also believe in the U Shin Gyi Nat (the spirit or *nat* of the sea.)

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In rural Myanmar, we can meet people like the villagers of Ywa Thit Kon in every locality. The rural people live with their rich tradition and culture. The author believes that rural Myanmar has a life style and knowledge that should be learned by “outsiders”. Nowadays, the “traditional” is not only important for cultural and historical studies but it is also a very important key word with great potential for rural development. The time is ripe to start to learn about the “traditional” from the rural people. Urban dwellers especially, those in the metropolis, can find themselves in the “traditional” of the rural people.

Table 1 Crop Statistics of Gwa Township, 2000/2001

Crop Name	Cropped Acreage(Acre)	Yield (Basket/Acre)
Total Rice	19300	57
Rainy Season	19130	57
Dry Season	170	65
Peanut	5907	37
Rainy Season	400	33
Dry Season	5507	37
Sunflower	50	6
Sesam	133	9
Rainy Season	127	7
Dry Season	6	5
Matpe(Black Gram)	712	7
Pedisein(Green Gram)	50	5
Bokat(A kind of Cowpea)	1702	6
Pesingon(Pigeon Pea)	263	6
Other Pulses	894	3
Chili	660	
Rainy Season	80	446(Viss)
Dry Season	580	185(Viss)
Vegetables	2050	
Rainy Season	450	
Dry Season	1600	
Maize(Grain)	100	7000(Viss?)

Source: Agricultural Office of Gwa Township.

Table 2 Agricultural Land Use of Gwa Township. (Unit:Acre)

Class- ification	Le	Ya	Kain	Garden	Dani	Taungya	Total
1997/98	20128	0	1355	3777	1144	376	26780
1996/97	20485	0	1168	2742	1100	1285	26780

Note: The figure is considered as the present acreage according to agricultural land use classification. The acreage mentioned above for Ya, Kain, Garden, Dani and Taungya is net-cultivated acreage with no un-cultivated acreage. However, the net-cultivated acreages of Le are 19680 in 1996/97 and 19323 in 1997/98 respectively.

Source: Land Use Office of Gwa Township

Table 3 Monthly Rainfall and Daily Average Temperature in Gwa, 2000

Month	1	2	3	4	5	6	7	8	9	10	11	12
Rainfall(mm)	0	0	31	3	249	1283	1404	1231	801	254	6	0
Temperature												
Max HC	28	30	31	33	32	30	29	30	28	31	31	30
Min HC	14	16	18	24	25	24	24	24	24	24	19	16

Source: Meteorological Office of Gwa Township.

Table 4 Agricultural Land Use of Ywa Thit Kon Village. (Unit:Acre)

Class- ification	Le	Kain	Garden	Homestead Garden	Dani	Taungya	Total
2002/03 (HH No)	152.4 (34)	10.5 (13)	21.00 (20)	6.25 (9)	25.57 (21)	34.75 (21)	215.72

Source: Author's survey.

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Table 5 Cropping Pattern as per Land Classification in Ywa Thit Kon Village

Le	Kain	Dani	Garden	Home Garden	Taungya
Paddy (29HH)	Mixed vegetables* (4HH)	Dani (21HH)	Mixed Plants (9HH)	Mixed Plants (9HH)	Paddy + others (20HH)
Paddy +Others (5HH)	Chili (4HH)		Betle (3HH)	Chili (1HH)	
	Paddy +others (3HH)		Coconut (4HH)	Coconut (1HH)	
	Paddy (2HH)		Banana (2HH)	Banana (2HH)	
			Cashew Nut + Mango (1HH)		
			Banana +Betel (1HH)		

Source: Author's survey.

Table 6 No. of Large Tools for Land Preparation etc and Cattle Population in Y Village

Tool and Animals	Number (Holding HH No.)
Te	39 (35HH)
Tun	31 (30HH)
Kalagyan	28 (28HH)
Kyandon	12 (11H)
Setton	26 (25HH)
Da Lei Ton	5 (5HH)
Da Kyandon	1 (1HH)
Cow cart	7 (7HH)
Cow	22+10 (10HH)
Bull	10+4 (6HH)
Buffalo	6 (3HH)
Milk Cow	5+2 (3HH)

Note: HH is House Hold. Small number is infant.

Source: Author's survey.



Fig.1. Topographical Map of Gwa

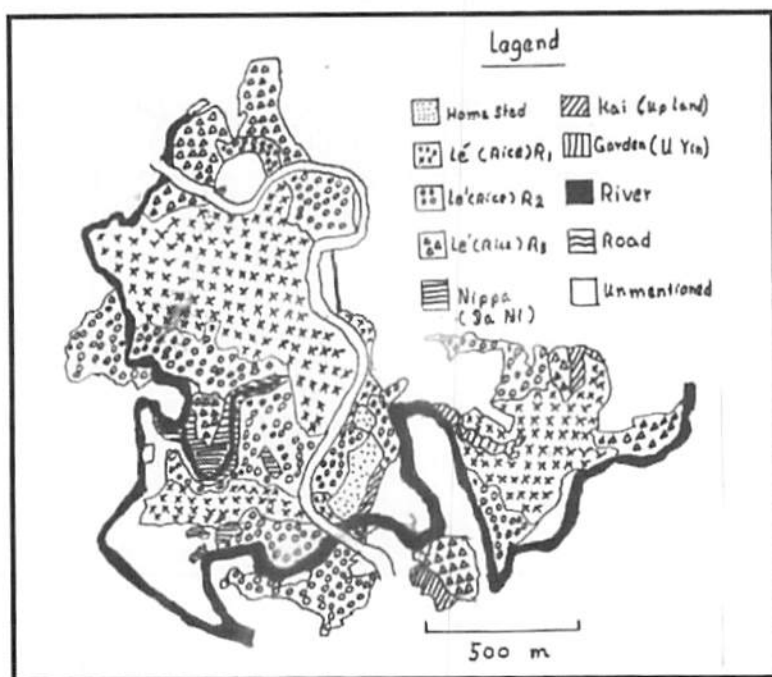


Fig.2. Agricultural Land Classification Map of Ywa Thit Kon Village

Photo 1 Da Lei Ton



Photo 2 Setton



Photo 3 Kalakyan



Photo4 Tun

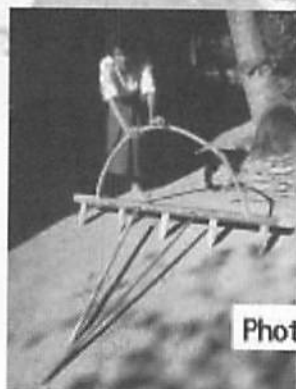


Photo 7. At

At vs. Te



Photo 5. Te

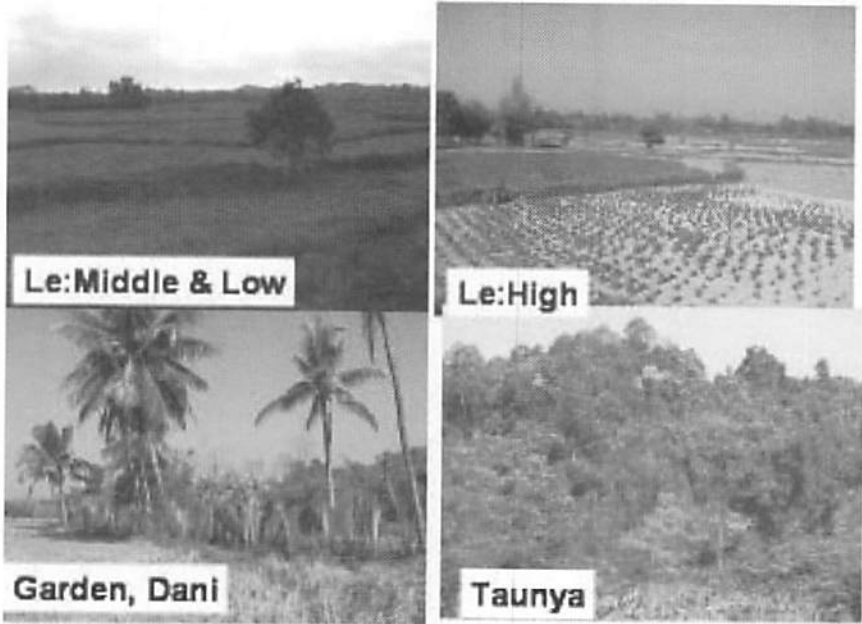


Photo 6. Land of Y Village

Rural Market and its Potential for Rural Development

Saw Pyone Naing

INTRODUCTION

This paper is part of a study on markets and marketing system of a rural society in Rakhine State in which the author emphasized three themes:

1. Markets and marketing system of a rural society,
2. Rural development, and
3. Environmental images and perceptions of rural people.

Change which constitutes a departure from the traditional system and signals the onset of the transformation of a traditional agrarian society into a modern industrial society can also be profitably approached through the study of rural marketing. Basic alterations in the distribution of markets and the patterning of marketing behaviour provide a sensitive index of progress in modernization.

This paper intends to describe two separate but interrelated parts: rural market system and rural development.

Methodology

A household survey was made intensively to get baseline data for the general socio-economic conditions of the study area. A marketing survey was conducted as vendor survey and customer survey in Gwa Market, Gwa periodic Market and Yahaingato Market. A vendor and houseshop survey was made in three villages of Gwa Township, namely Ywathitgone, Yahaingato and Magyeegu.

DEVELOPMENT OBJECTIVES

The great diversity of objectives that can be considered in planning situations can be classified in many ways. Generally the objectives to be considered are income, employment, public goods, natural resources and environment and stability and independence.

There may be some relations between different objectives. One of the fundamental problems associated with the diversity of development objectives lies in the fact that they can be complementary to each other, or contradictory, or neutral. In other cases, the promotion of one objective may directly or indirectly promote improvements with regard to another objective; the provision of better educational facilities, for example, can contribute to a faster development of the regional economy's productivity.

These objectives may be related to resources and actions. This interdependence of development objectives, resources, and actions is important for the development plan. See Figure 1.

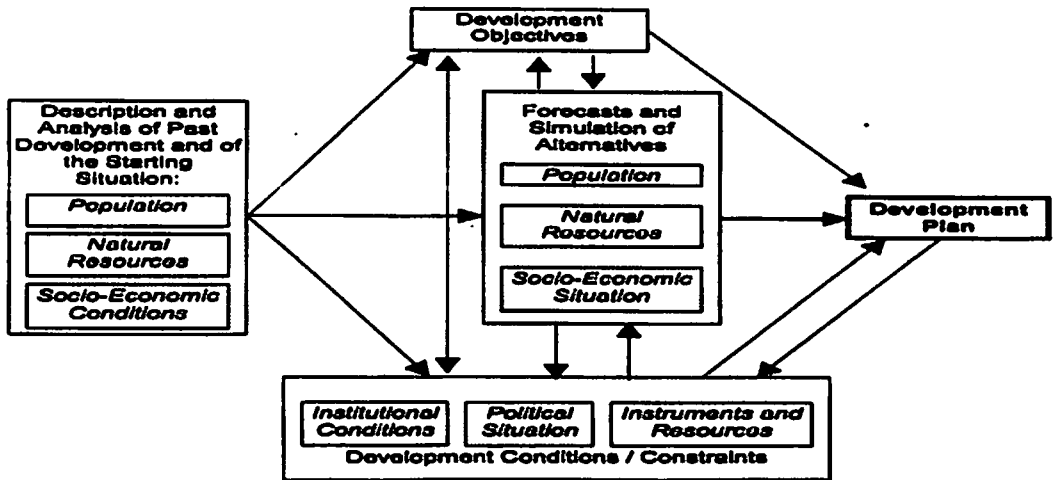


Figure 1. Interdependence of Development Objectives, Resources, and Actions

This interdependency is also important in rural development. In fact, the marketing system in the rural area is somewhat in the primary role of the relationship between population, natural resources and socio-economic situation. This is the fundamental factor for the development plan.

GENERAL OVERVIEW OF MARKETING SYSTEM

Theoretical Background

Two sets of markets operate within economies: the market for goods and services and the market for factors of production. Both sets link buyers and sellers together and so facilitate the exchange of commodities.

The most common, orthodox theory starts from the individual's propensity to barter; deduces from this the necessity for local exchange, the division of labour and local markets; and infers finally the necessity for long-distance or at least external exchange or trade. An alternative theory reverses this sequence entirely, starting that markets can never arise out of the demands of purely individual or local exchange, for markets depend on trade, which means external trade. Markets, then, are not the starting point, but rather the result of long-distance trading, itself the result of the division of labour and the variable geographical location of goods. Thus for the traditional, still largely peasant economies of contemporary sub-Saharan Africa, it has been suggested that the origins of traditional or indigenous markets are explicable only in terms of a hypothesis which views markets as the end product of long-distance trade and contacts, together with the conditioning factors of the kind of physical security that can ensure the market place and a sufficiently high population density to make regular face-to-face contacts of people practicable.

Periodism is an essential element of the local, especially rural, indigenous market structure in most developing countries today, as indeed it was of medieval Europe. The frequent repetition of activities in a periodic market is presumably due to lack of storage

facilities, elementary transport facilities, and a population density too low to support continuous trading. Markets occur at intervals of two to eight days in different parts of the world. It is also known that most periodic markets operate in groups, in what can be termed ring systems or circuits, which work in such a way that neighboring markets do not compete with each other on the same day. Moreover, such a system means that the timing of marketing activities is evened out over the whole circuit so that no settlement is far from a market for more than a day or so. This integrated pattern and timing of markets is logical and convenient and is, in some form or another, characteristic of most countries. It is clearly a wholly indigenous and logical phenomenon, expressing an intelligent mutual self-interest among neighboring settlements, peoples or market authorities. And once again, the similarity between such market circuits in the developing world today and, for instance, in medieval East Anglia or Derbyshire is most striking. See Figure 2.

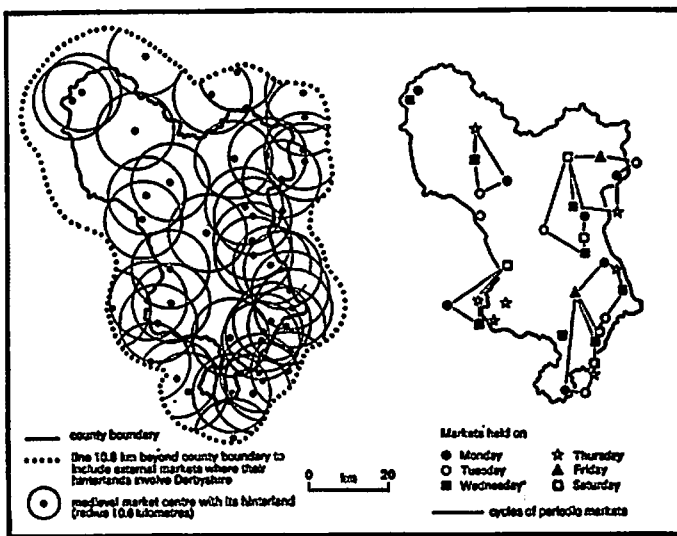


Figure 2. Medieval market circuits in Derbyshire (Source: Hodder, et al.,1974)

The distinction between periodic and daily, continuous marketing usually involves very much more than simply the timing of marketing activities. What data are available point to differences in location and functions as well, periodic market usually being rural and acting chiefly as collecting points for surplus agricultural and cottage industrial products, while daily markets are usually urban and concerned chiefly with retail buying and selling. This distinction can most often be seen in and around a large city, which may be surrounded by a number of periodic markets, organized into integrated system of market circuits and operated largely as suppliers of farm produce and other locally produced commodities to the urban population. Inside the city, on the other hand, the major markets are usually large daily markets.

Periodic marketing may represent an attempt by traders to reduce average costs, increase average revenues or both. Stine (1962) concerned himself with an analysis of market mobility as a means of economic survival.

By rotating the outlet around a series of market places, costs may be spread over a greater volume of sales. In this way, threshold and range could be equated and costs covered. The number of market places in a given circuit (C2, C4) is a positive function of range and of the attractiveness of the market places themselves. See Figure 3.

Perhaps the most important problem requiring much deeper investigation is to understand exactly how changes in the periodic daily marketing structure take place, and in particular in what way periodic marketing eventually becomes continuous trading. On the basis of the available evidence, it seems likely that the trend from periodic to daily marketing is a gradual one and commonly involves a progressive shortening of the period between market days so that, for instance, an eight-day market becomes a four-day, then a two-day and finally a daily market.

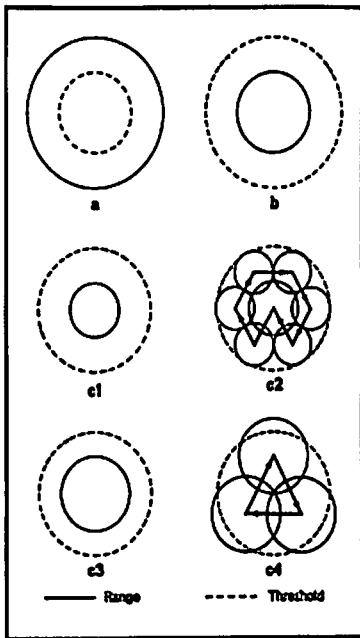


Figure 3. The trader-consumer hypothesis.
(Source: Hodder, et al.1974)

Marketing System in Rural China

In Ch'ing China, as in most traditional agrarian societies, rural markets were normally periodic rather than continuous: they convened only every few days.

On the side of the producer or trader, the periodicity of markets is related to the mobility of individual "firms" in essence, because the total amount of demand encompassed by the marketing area of any single rural market is insufficient to provide a profit level which enables the entrepreneur to survive. By repositioning himself at periodic intervals, the entrepreneur can tap the demand of several marketing areas and thereby attain the survival threshold. From the point of view of the itinerant entrepreneur, periodicity in marketing has the virtue of concentrating the demand for his product at restricted localities on certain specific days. When a group of related markets operates on coordinated periodic (as opposed to daily) schedules, he can arrange to be in each town in the circuit on its market day.

From the point of view of the consumer, the periodicity of markets amounts to a device for reducing the distance he must travel to obtain the required goods and services. We begin here with the restricted nature of those requirements on the part of the average peasant household. General poverty, value emphases on frugality, and traditional consumption norms all contributed to a minimal definition of subsistence needs in the peasant household. Furthermore, these needs were in considerable part supplied without recourse to marketing, for the peasant household produced (or received through wages in kind) much of what it consumed; self-sufficiency was a virtue. Under these circumstances, (1) no household needed to market every day, and (2) the number of households required to support a daily market was very large.

The marketing week, along with the many other temporal cycles which regulate human activity in any society, may usefully be dichotomized as either natural or artificial. Cycles of the former type are tied to the motions of the heavenly bodies, obvious examples being the lunar month and the various seasons of the solar year. Cycles of the latter type are units of so many days which recur in complete disregard of calendars tied to the motions of the sun or moon; when not artificial in origin, they have, like the Western month, been freed from the nature cycle which gave them birth. Most traditional agrarian societies have but one system of market schedules attuned to cycles of one or the other type. The 5 days marketing week of traditional Java and 7 days marketing week of feudal England are typical artificial cycles, while the 10 days marketing week of Tokugawa Japan is an example of marketing rhythms tied to a nature cycle, in this case the lunar month. In China both types of marketing weeks obtained, each in a variety of versions.

Marketing System in Rural Shan State

There is a five-day market system in the rural area of Inlay Lake, Southern Shan State, Myanmar. This system not only applies among the rural villages but also among the towns. The system is primarily based on the lunar calendar and has been practiced since the early days of Sawbwas (who were local authorities in the Shan State). There are three small local circuits of five-day markets in Inlay Lake. Actually, these periodic markets are typically characteristic of Shan State and they fulfill the requirements of traders and consumers of the rural villages. This style, however, is very traditional for rural areas of Myanmar, although only Inlay Lake region maintains the whole periodic market nature in the five-day market cycle. Figure 4 shows the circuits of the five-day periodic market system recently prevailing in Southern Shan State.

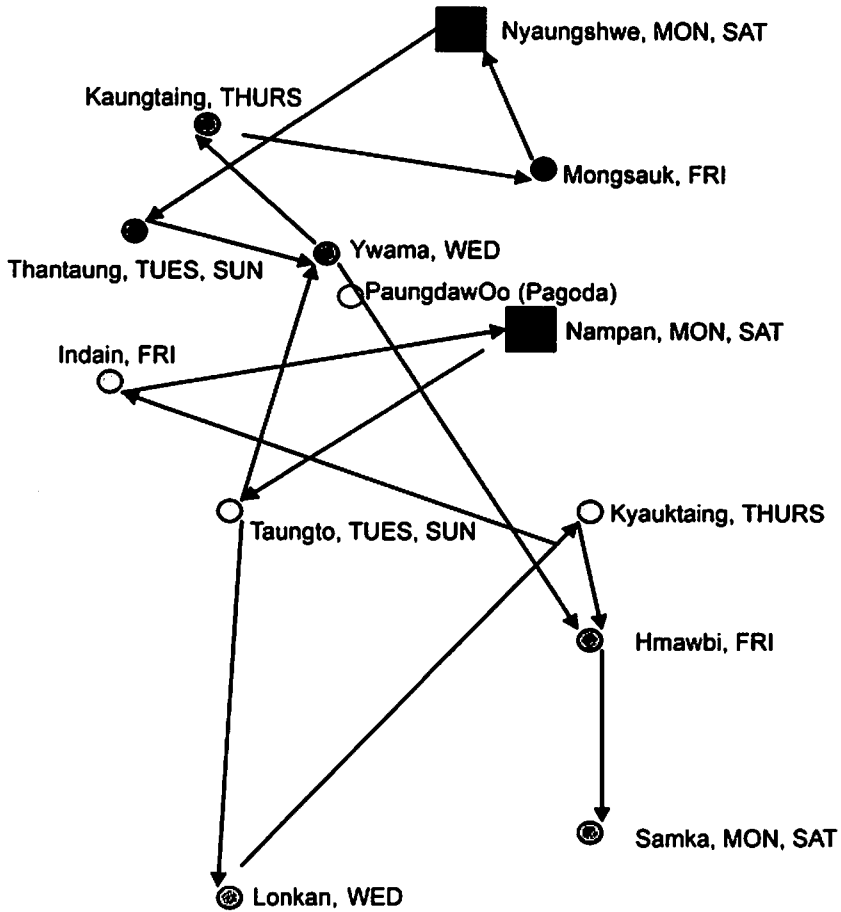


Figure 4. Five-day market system in Inlay Lake, Southern Shan State, Myanmar

Marketing System in the Study Area

In the case of the study area, Gwa Township, the system is somewhat different from rural Shan State. The role of vendors is very common and is solely important for the local marketing system. The authorities and heads of the local community sometimes define the gathering of vendors in a particular place.

THE STUDY AREA

The study area is located in Gwa Township, Rakhine State, as shown in Figure 5.

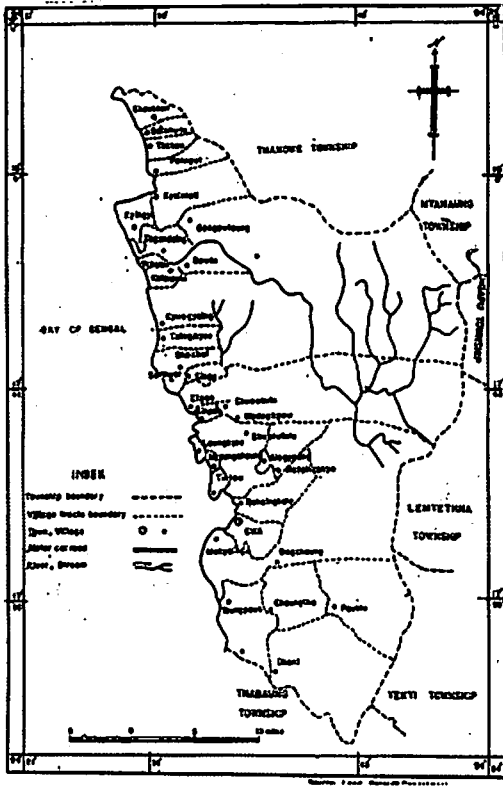


Figure 5. The Study Area.

For the case study, Ywathitgone Village, Yahaingato Village, Magyeegu Village and Gwa Town were selected. The study area is located in the southernmost part of Rakhine State.

Gwa township is one of the three townships of Thandwe District. Gwa township is bounded by Thandwe township in the north, Ayeerwaddy Division in the east and south, and the Bay of Bengal in the west. There are 34 village tracts and one town in Gwa township. Most of the villages are found along the coastal part of the study area.

Physical Features

The relief of the study area can be divided into the eastern mountain ranges and the western coastal lowlands and plains.

Mountain ranges and isolated hills are respectively called *taungnyo* (evergreen forest) and *setaung* (deciduous forest) in local terminology.

Climatic Condition

Thandwe, Taunggote and Gwa townships experience the summer monsoon climate. These townships have distinct wet and dry periods. The total annual rainfall of Gwa is 157.96 inches and 97.8 per cent of total rainfall is received during May and October, the wet season. See Table 1 and Figure 6.

Table 1. Monthly Rainfall of Thandwe, Taunggote and Gwa Townships.

Township	Months												Annual
	J	F	M	A	M	J	J	A	S	O	N	D	
Thandwe	0.07	0.13	0.19	1.29	13.85	48.05	64.88	50.13	24.30	2.74	3.02	0.40	214.05
Taunggote	0.05	0.17	0.21	1.36	14.23	43.94	58.02	47.13	21.07	9.21	2.45	0.54	198.38
Gwa	0.01	0.07	0.08	0.89	12.48	40.23	49.51	26.27	19.62	6.44	2.00	0.36	157.96

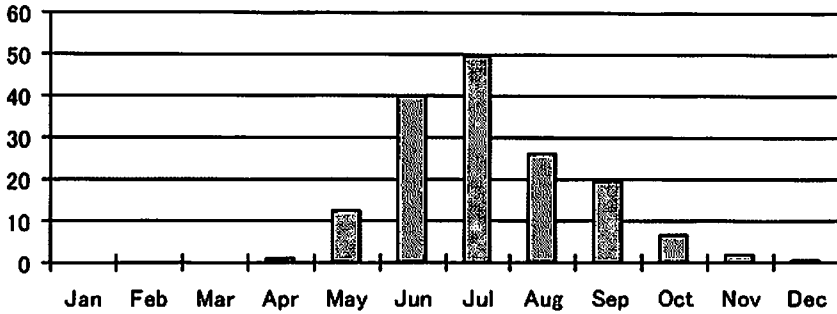


Figure 6. Normal rainfall (in inches) of Gwa Township

Population and Race

According to the population data of Gwa Township in 2001, there are 49,960 persons living in the whole township. Of them 5,433 persons or 11 per cent of the total population live in Gwa Town (Municipal Area). The rural population or people living in the villages accounts for 89 per cent of the total population. Therefore, the role of rural society is important for the region. See Table 2.

Table 2. Population in Wards of Gwa Town and Village Tracts, 2001.

No.	Ward/Village Tract	Houses	Families	Population
1	Kinyone Ward	285	301	1019
2	Ywama Ward	286	286	2198
3	Myoma Ward	521	575	2216
4	Yahainggato	721	725	3375
5	Yahaingpya	113	113	509
6	Chaungthagy	85	90	47
7	Pauktu	176	288	875
8	Dani	295	295	1535
9	Daunt Chaung	297	311	1351
10	Taung Pauk	471	529	2216
11	Kintaw	154	154	623
12	Alechaung	117	140	618
13	Nyaung Chaung	248	252	1021
14	Longgyo	221	225	1012
15	Kinpon	229	243	971

Table 2. continued..

No.	Ward/Village Tract	Houses	Families	Population
16	Shwe Oo Kwin	262	269	1182
17	Shwe Twintu	119	119	604
18	Satthwar	615	697	2857
19	Thinku	112	136	545
20	Tainggyo	450	600	2257
21	Kywe Chaing	527	659	2355
22	Kalarpyin	387	387	1838
23	Yegyaw	305	325	1374
24	Kyingyi	214	266	1122
25	Gangawtaung	263	286	1403
26	Kaingkhon	169	122	725
27	Bawin	261	278	1479
28	Zigone	168	185	907
29	Madawkyaw	130	180	614
30	Sarchet	49	49	206
31	Magyeegu	266	304	1665
32	Kyaintali	1232	1275	5302
33	Ponnyet	103	103	515
34	Taungpatle	214	224	1008
35	Theegone	117	117	518
36	Zedikwin	162	180	847
37	Shaukkon	340	340	1524

The majority of the people is Rakhine with a population of 46,649 persons. The second largest group is Chin, with a population of 2,733. The Bamar population is only 575 persons for the whole township. There is a very small number of the Kayin, Mon and Maramargyi ethnic groups. See Table 3.

Table 3. Distribution of Ethnic Groups in Gwa Township, 2001.

No	Ward/Village tract	Rakhine	Bamar	Chin	Kayin	Mon	Maramargyi
1	Kinyone Ward	987	32	0	0	0	0
2	Ywama Ward	1243	49	6	0	0	0
3	Myoma Ward	2132	0	81	0	0	0
4	Yahainggato	3194	171	10	0	0	0
5	Yahaingpya	509	0	0	0	0	0
6	Chaungthagyi	439	34	0	0	0	0
7	Pauktu	875	0	0	0	0	0
8	Dani	1535	0	0	0	0	0
9	Daunt Chaung	934	42	0	0	0	0
10	Taung Pauk	2216	0	0	0	0	0
11	Kintaw	611	12	0	0	0	0
12	Alechaung	616	0	2	0	0	0
13	Nyaung Chaung	1007	14	0	0	0	0
14	Longgyo	967	45	0	0	0	0
15	Kinpon	971	0	0	0	0	0

Table 3. continued..

No	Ward/Village tract	Rakhine	Bamar	Chin	Kayin	Mon	Maramargyi
16	Shwe Oo Kwin	1171	9	0	2	0	0
17	Shwe Twintu	604	0	0	0	0	0
18	Satthwar	2816	35	0	4	1	1
19	Thinku	473	0	72	0	0	0
20	Tainggyo	2039	0	218	0	0	0
21	Kywe Chaing	2355	0	0	0	0	0
22	Kalarpyin	1812	21	4	0	0	0
23	Yegyaw	1374	0	0	0	0	0
24	Kyingyi	1117	5	0	0	0	0
25	Gangawtaung	3	2	1398	0	0	0
26	Kaingkhon	718	6	1	0	0	0
27	Bawin	778	3	4	0	0	0
28	Zigone	907	0	0	0	0	0
29	Madawkyaw	605	9	0	0	0	0
30	Sarchet	200	5	1	0	0	0
31	Magyeegu	1605	60	0	0	0	0
32	Kyaintali	4874	20	404	0	0	4
33	Ponnyet	515	0	0	0	0	0
34	Taungpatle	757	0	251	0	0	0
35	Theegone	503	0	15	0	0	0
36	Zedikwin	847	0	0	0	0	0
37	Shaukkon	1274	0	250	0	0	0

There are two parts to be considered in the study of the rural market of Gwa Township.

1. General pattern of marketing system, and markets, and
2. The role of house shops and vendors.

PART I.

GENERAL PATTERN OF MARKETING SYSTEM IN THE STUDY AREA

According to the Markets Section Survey of the Department of Agriculture published 1962, the marketing system of Myanmar is formed by fairs, markets, and produce exchanges.

Fairs include distributive fairs associated with popular religious festivals, which are common throughout the country and of particular importance in Upper Myanmar.

Markets generally include

- (1) periodic retail markets held in the open on the roadside or in semi-permanent sheds,
- (2) wholesale markets, and
- (3) retail markets.

Produce exchanges are those

- (1) organized under auspices of a trade association and unorganized exchanges.

The general marketing system of the study area is composed of retail outlets, wholesale channels and barter system.

Retail Outlets

Retail outlets are mostly found as markets, house shops, vendors or petty traders and producer-sellers. See in Figure 7.

The role of vendors and house shops is very important in rural areas and even in town. They provide various kinds of commodities from fresh products to special kinds of local foods. Producers usually sell their own products such as fresh water products like fish and vegetables from *taungya*.

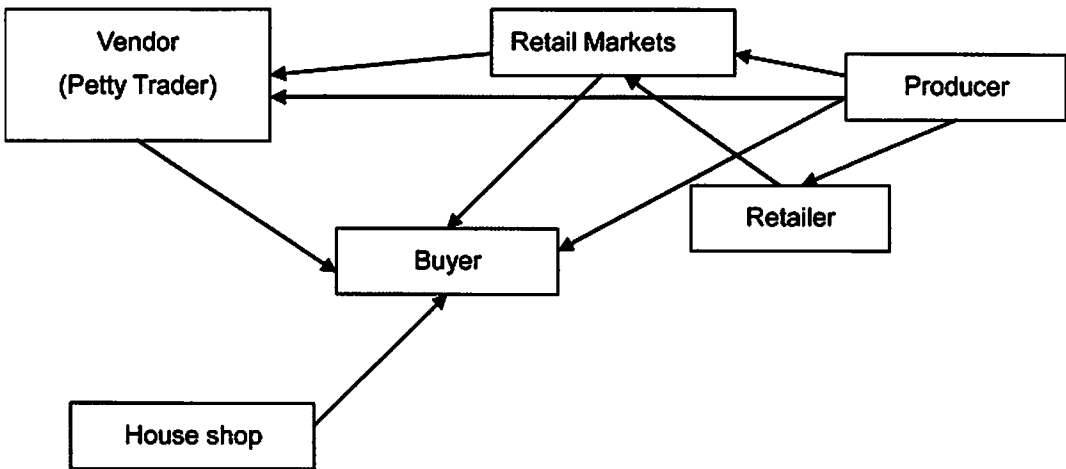


Figure 7. Retail Outlets in the Study Area.

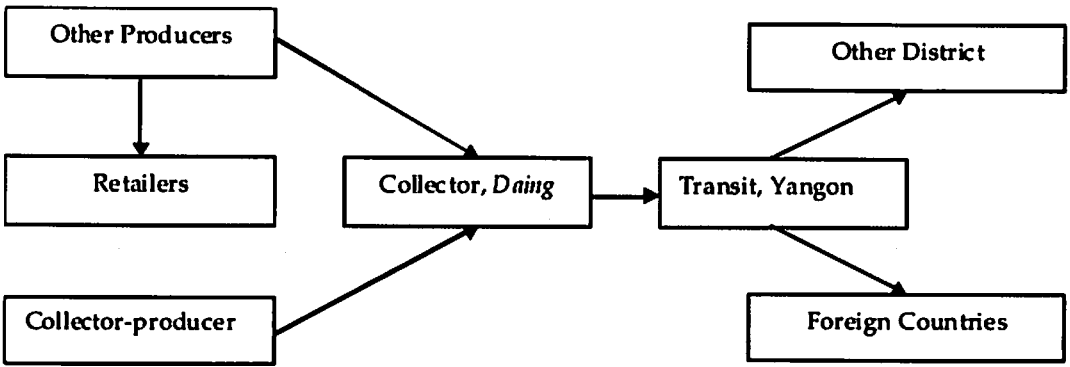
Wholesale Channel

Two channels of wholesale trade are apparent in the study area :

1. a channel operated by collectors or *daing* and
2. a channel directly controlled by private business or company.

Although these *daings* and companies sell their sub-standard quality goods to local markets, their main intention is to export to foreign countries and to other districts of Myanmar. One of the significant examples of channel 1 is the fish *daing* located at Gwa Jetty. One example of channel 2 is the Fish Products Company producing its own Grouper fishes at Yahaingato Village. See Figure 8.

Channel I



Channel 2

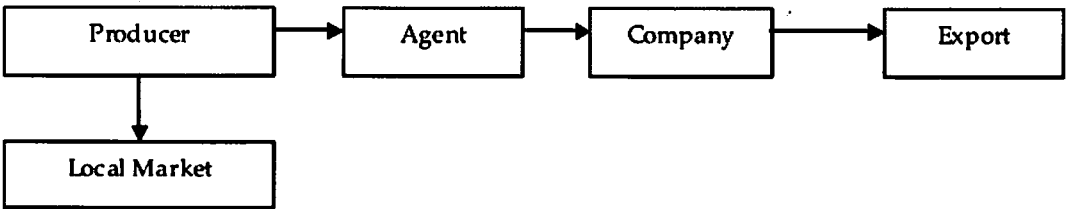


Figure 8. Wholesale Channels in the Study Area.

Barter System

Generally, the barter system is not very common, but it still exists in some villages for certain types of goods. For example, a person from a fishing village selling dried fish sometimes accepts rice or paddy from a farmer’s village or vice versa. In such cases, they usually sell goods received from other producers if the goods are plentiful enough for a surplus after home consumption. See Figure 9.



Figure 9. Barter System.

Therefore, the general marketing system of the rural environment in the study area consists of three main components: barter, retail outlets and wholesale channel. See Figure 10.

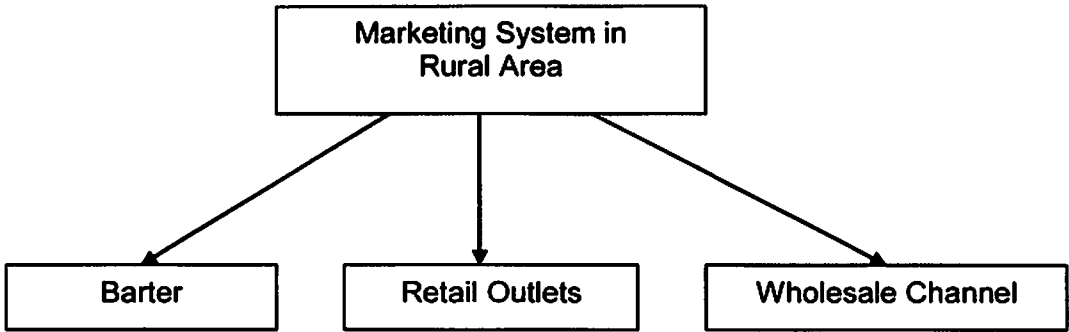


Figure 10. General Marketing System of the Study Area.

CASE STUDY

This study mainly emphasizes the retail markets of Gwa Town and Yahaingato Village. Vendor and customer surveys were conducted in Gwa Myoma Market, Gwa Periodic Market and Yahaingato Market.

Gwa Market

Spatial Allocation of Shops

Local fresh products are usually sold in small shops and in open spaces whereas durable goods such as household goods, clothes and cosmetics are sold in shops allocated in big and permanent sheds of the same market. Local farm products are gathered in temporary small sheds and often on the ground. Fresh products sometimes include items imported from other places outside the region.

The space for one shop is usually fixed but the location is not registered and not fixed. Therefore, the seller can use any open space he likes and can operate the space for that day (usually only in the morning). It is necessary to compete for a good location of the shop on that particular day. Shops for fish and meat are in separate sheds due to the nature of the goods.

Vendor Survey

Most of the vendors selling in Gwa Myoma Market come from Gwa Myoma, Gwa Myothit (New Town) and from Aleywa which is located on the outskirts of Gwa Town. Others come from nearby villages such as Theingone, Mwaytway, Yahaingpya and De Chaung. They usually sell vegetables, fruits and fish. Vendors from Gwa Town buy their vegetables from the producers-sellers who gather near the market in the very early morning before the opening of Gwa Market. See Table 4 and Figure 11.

Table 4. Vendors Selling in Gwa Myoma Market

Sr.	Origin of Vendor	Number
1.	Theingone Village	1
2.	Aleywa Village	13
3.	Mwaytway Village	3
4.	Yahaingpya Village	5
5.	Gwa Myoma	43
6.	Gwa De Chaung Village	2
7.	Gwa- Myothit	11



Figure 11. Gwa Myoma Market.

These vendors usually sell farm products, garden products, water products and food and sweets. See Table 5.

Table 5. Items sold in semi-permanent building and on ground, Gwa Myoma Market

Sr.	Items	No. of Shops
1.	Farm products (<i>taungya</i> , <i>kaing</i> etc.)	70
2.	Garden products	20
3.	Water products (fresh)	15
4.	Pork, beef and chicken	2
5.	Dried goods (rice, oil etc.)	17
6.	Food	17
7.	Cosmetics	0
8.	Others	1

Customer Survey

Most of the customers came from nearby areas especially from Gwa Town and Aleywa which is located in the vicinity of the town. These customers usually buy daily needs for food and vegetables. Items include vegetables, oil, fish, meat, morning food, flowers, rice and general items for daily cooking. These customers come walking to the market. See Table 6.

Table 6. Purchases in Gwa Market

Sr.	Residence of Customer	Number	Goods bought
1	Gwa	33	Vegetables
2	Aleywa	4	Oil
			Fish
			Meat
			Morning Food
			Flower
			Rice
			General items for daily cooking

Gwa Periodic Market (Temporary Market)

Spatial Allocation of Shops

Shops in this market are small and are only a temporary gathering of sellers. The shops open on the ground for selling local produce. Vegetables, fruits and flowers from farms and gardens and fresh water products such as fish and prawns are common items in these shops. There are some snack shops in the market. The market is only temporary and the shops are allocated along the main road as roadside shops. The shops open in the early morning and close at about 9:00 AM. Some sellers come from *taungya* (shifting cultivation sites) and some come from farmer villages. See Table 7.

Table 7. Items Sold on the Ground, Gwa Periodic Market.

Sr.	Items	No. of Shops
1.	Farm products (<i>taungya</i> , <i>kaing</i> etc.)	28
2.	Garden products	9
3.	Water products (fresh)	9
4.	Pork, beef and chicken	2
5.	Dried goods (rice, oil etc.)	3
6.	Foods	15
7.	Cosmetics	0
8.	Others	1

Vendor Survey

Vendors selling in the Gwa Periodic Market mostly come from the town area. Some vendors come from nearby villages like Aleywa and Tamangone. However, there are some vendors who come from *taungya* sites and sell their own *taungya* products. See Table 8.

Table 8. Vendors in Gwa Periodic Market

Sr.	Origin of Vendors	Number
1.	Gwa	30
2.	<i>Taungya</i> Site	3
3.	Aleywa Village	3
4.	Gwa-Tamangone	10

Customer Survey

The customer survey shows that the customers who come and buy in this temporary market are from Gwa Town and nearby villages like Magyeegu Village which is located on the other side of Gwa Town. See Table 9.

Table 9. Customers in Gwa Temporary Market

Sr.	Origin of Customer	Number	Goods bought
1.	Gwa	34	Vegetables
2.	Magyeegu Village	1	Oil Fish Morning Food Flower Rice General items for daily cooking

Yahaingato Market

Spatial Allocation of Shops

The market is very small but it has one building for permanent shops. There are some vendors and sellers from nearby villages on the ground in front of the market building. These shops usually sell fresh fruits and vegetables and fresh fish. Some dried goods, rice, and food shops occupy the building, while fresh product sellers normally favour having their shops on the ground. The market starts at 6:00 AM and closes at about 9:00 AM every morning. Vegetable sellers usually come from other farmer villages and from *taungya*. Fresh fish sellers come from the nearby Yahaingato Village. See Table 10.

Table 10. Items sold on the ground, Yahaingato Market

Sr.	Items	No. of Shops
1.	Farm products (<i>taungya, kaing</i> etc.)	9
2.	Garden products	4
3.	Water products (fresh)	5
4.	Pork, beef and chicken	0
5.	Dried goods (rice, oil etc.)	7
6.	Food	10
7.	Cosmetics	0
8.	Clothes	1
9.	Others	0

Vendor Survey

Most of the vendors selling in the Yahaingato Market come from Yahaingkwin and Yahaingato villages. This market operates only in the morning from 5:00 am to nearly 9:00 am. Most of the vendors sell their own products. See Table 11.

Table 11. Vendors in Yahaingato Market

Sr.	Origin of Vendors	Number
1.	Yahaingkwin	11
2.	Yahaingato	14

These vendors sell not only in the market building but also on the ground by paying taxes and charges. They sell vegetables, fish and sometimes clothes which are relatively cheap and lower in quality. See Figure 12.



Figure 12. Yahaingato Market

Customer Survey

Most of the customers who bought in this market come from Yahaingato and nearby villages. Some people who come from Ngathaing Chaung to buy fish also purchase daily fresh goods like vegetables. See Table 12.

Table 12. Customers in Yahaingato Market

Sr.	Origin of Customer	Number	Goods bought
1	Yahaingato	24	Vegetables
2.	Ywetchaing	1	Oil
3.	Ngathaingchaung	1	Fish Morning Food Rice General items for daily cooking

SPATIAL PATTERN OF THE MARKETING SYSTEM, AN OVERVIEW

The urban area, Gwa Town in this case, operates its circuit of marketing with the components of market, vendors, *daing* or collectors, house shops and company or business entrepreneurs. This circuit includes marketing the flow of goods both within the region and out of the region. Outside region flows usually go from wholesale channels. See Figure 13.

In the villages or rural areas, producers, vendors and house shops are important for meeting their immediate needs. Vendors play a crucial role in the marketing circuit of the study area. Vendors, in this case, include vendors who gather in the markets and vendors who wander through the villages. They sell fresh goods, such as vegetables and fishes, as well as prepared food and sweets like boiled sticky rice.

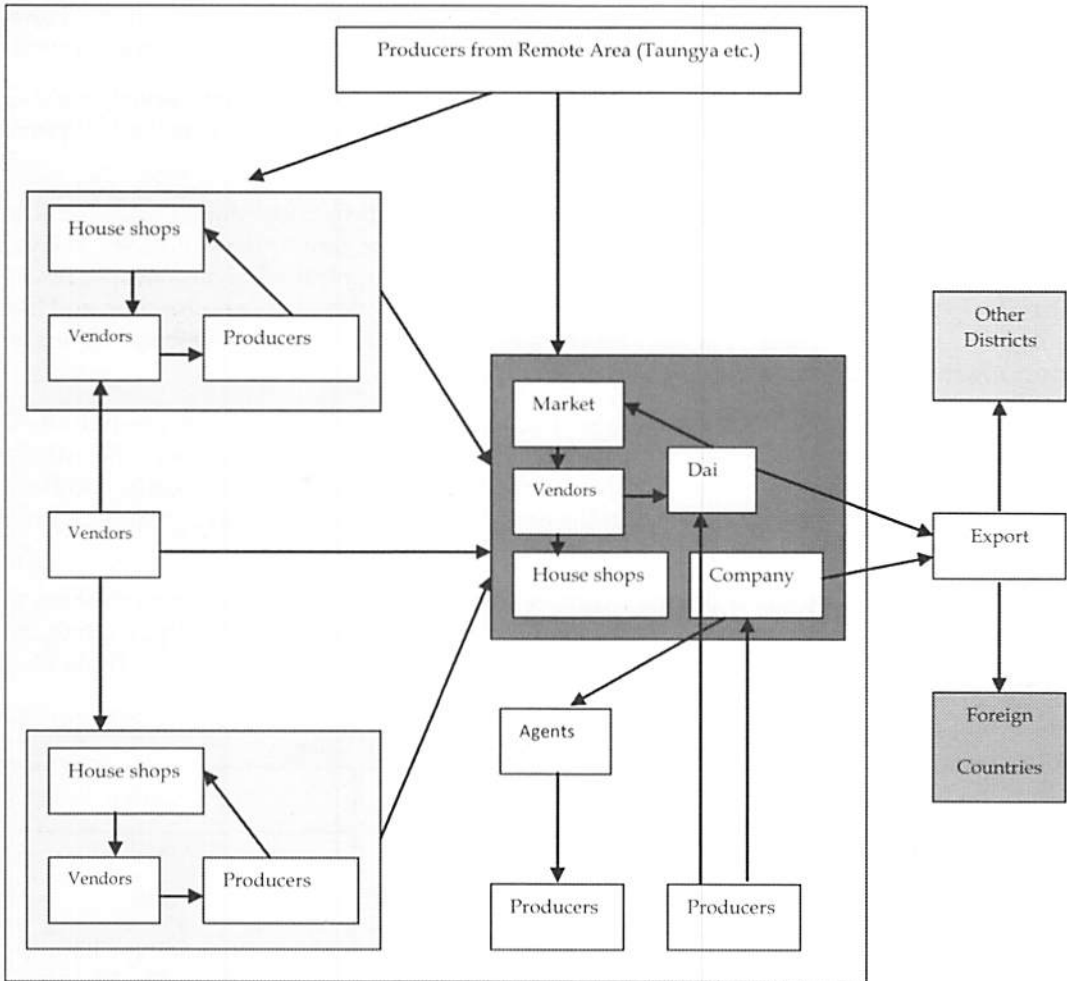


Figure 13. Spatial Pattern of Marketing System in the Study Area

PART II.

**THE ROLE OF HOUSE SHOPS AND VENDORS
IN THE MARKETING SYSTEM OF GWA**

HOUSE SHOPS IN THE STUDY AREA

House shop in Ywathitgone Village

There are 7 house shops in Ywathitgone Village. About 10 years ago there were only 2 or 3 house shops in the village. In an example of a house shop in Ywathitgone Village, the owner is a primary school teacher, 37 years old, and her husband is a farmer, 40 years old. They own 14 acres of paddy fields.

Interdisciplinary Geriatric Study on Elderly Residents...

The owner orders items from Yangon through passenger buses. She goes to Gwa Town once a week to give the car owner a shopping list and to receive commodities she ordered.

Items sold in the shop are *ngapi* (fish paste), cooking oil (oil-palm), onion, noodle, beans, potato, soap, candles, matches, cold drink (C-Plus), note book, pencils, ball pens, nails, blankets, *longyi*, shirts, and shirts for children.

She mentions that the prices of these goods are high in Gwa Market and that it is necessary for her to sell the goods in her own shop as the same prices of those in Gwa Market. Therefore, she needs to buy goods directly from Yangon at relatively cheaper prices in order to get a profit. She has to request the car owner who also owns a house shop and has a money lending business. She pays for the goods she orders, as well as for the labour in carrying them and for taxi or trishaw charges in Yangon.

She also sells some local products such as rice and cooking oil. She gets groundnut oil from Nyaung Chaung Village and sesamum oil from Taungya and Ywathitgone. She usually goes and buys the groundnut oil. For the sesamum oil, she buys sesamum seeds, and have them pressed in Ywathitgone Village if the amount is small, and goes to Nyaung Chaung Village if the amount is large. She then sells the oil in her house shop.

She sells rice especially during the rainy season. She buys paddy and carries them to the small rice mill in Alechaung Village to mill the rice. She buys the paddy in Ywathitgone Village, but during the rainy season she buys rice from Ngathaing Chaung. See Table 13.

Table 13. House shop in Ywathitgone Village

Selling price of rice (per <i>pyi</i>)	Season	Source
250-280 kyats	Dry	Local
450 kyats	Rainy	Local
600 kyats	Dry	Ngathaing Chaung
800 kyats	Rainy	Ngathaing Chaung

She also sells dried chillies. She buys some from Yangon and others from *kaing* land in nearby villages. She usually goes and buys dried chillies in nearby villages.

She buys betel nuts from Yangon and betel leaves from nearby villages like Sutthwar, Zigone and Yahaingato villages.

House shop in Yahaingato Village

There are 23 house shops in Yahaingato Village. These includes 12 variety shops, 1 shop for machine parts, 1 shop for clothes and 10 small shops for small items such as sweets.

A grocery shop, owned by a 29-year old woman, has various items for the immediate needs of the household. The items range from very small items like sweets for children to medicine, but the amounts are not too big. Most of the goods are ordered from Yangon

through the bus owner who operates a daily bus service in the village. Some items are bought from a big retail shop in the village which is also owned by the bus owner. Sale items and their sources are shown in Table 14.

Table 14 Items sold in house shop in Yahaingato

Sr..	Items	Source
1	Soap, oil	Big shop in Yahaingato
2	Sweets and instant food	Yangon
3	Household items	Yangon
4	Utensils	Yangon
5	Rice	Yahaingato
6	Betel nuts	Yahaingato
7	Salt	Yahaingato
8	Cosmetics	Yangon, big shop in Yahaingato
9	Medicines	Big shop in Yahaingato
10	Variety	Yangon and big shop

House shop in Magyeegu Village

There are some house shops selling small items of immediate needs for daily food and meals.

One retail shop was studied to get an understanding of the house shop in Magyeegu Village. The owner of the shop is about 27 years old and her husband is a farmer working *kaing* land. Among the items sold, oil and betel leaves are their own products, while other items are bought from Gwa Town. They produce vegetables in their *kaing* land and sell them to vendors and villagers. They produce oil from groundnuts which is one of their products from *kaing* land. See Table 15. The shop owner mentions that 4 or 5 vendors usually come to their *kaing* land and buy *kaing* products like radish, chilli, roselle, and groundnuts.

Table 15. Items sold in house shop in Magyeegu Village

Sr.	Items sold	Source
1	Variety	Gwa
2	Rice	Gwa
3	Eggs	Gwa
4	Potatoes	Gwa
5	Oil	Own produce
6	Soap	Gwa
7	Shampoo	Gwa
8	Coffee mix	Gwa
9	Sweet	Gwa
10	Tea leaves	Gwa
11	Betel leaves	Own produce

VENDORS IN THE STUDY AREA

Vendors in Ywathitgone Village

There are 19 vendors in the village. They are from *taungya* and *kaing* land and from Ngathaing Chaung.

Table 16. Vendors in Ywathitgone Village

Origin of Vendor	Items sold
<i>Taungya</i> <i>Kaing</i> <i>Ngathaingchaung</i>	Roselle, chillies, pumpkin, cucumber, egg-plants etc. Chillies, roselle, pea, cucumber, tomato etc. Cabbages, gawrakha, tomato, coriander, chillies, cauliflower etc.

Some vendors come from Gwa Town and sometimes from Ngathaing Chaung. They sell seasonal goods, while non-seasonal goods are bought from Gwa and sold in the village. See Tables 16 and 17.

Table 17. Vendors from other areas

Origin of vendor	Items sold
Gwa	Vegetables and fish
Yahaingato	Only fish
Gwa	Clothes and slippers

From the *taungya*, all vendors sell their own products. From the *kaing*, 4 or 5 houses sell their own products. During the rainy season, the vendors engage in agricultural work and their number is reduced. Fishermen catch and sell the fish themselves, usually in the village, but, if the catch is large, they sometimes sell to the Gwa *Daing* (collector).

Vendors in Yahaingato Village

There are 14 to 15 vendors who sell fish in the village and in nearby villages. The fish is from boats arrived back from the sea. See Table 18.

Table 18. Fish vendors at Yahaingato

Vendor	From where they come	To where for selling
1	Yahaingato	Yahaingkwın
2	Yahaingato	Yahaingato
3	Yahaingato	Ywathitgone, Yahaingpya
4	Yahaingato	Kwinyache
5	Yahaingato	Yahaingkwın
6	Yahaingato	Yahaingkwın
7	Yahaingato	Yahaingkwın
8	Yahaingato	Yahaingkwın

Table 18. Fish vendors at Yahaingato

Vendor	From where they come	To where for selling
9	Yahaingato	Ywathitgone, Alechaung
10	Yahaingato	Aleywa, Yahaingkwin
11	Yahaingato	Gwa
12	Yahaingato	Yahaingpya

This data shows that most of the vendors selling fish and marine products are from Yahaingato Village and mainly related to fishing boats. They usually go to other farmer villages to sell their goods. See Figure 14.



Figure 14. Vendors selling fish in Yahaingato Village.

Vendors in Magyeegu Village

Vendors in Magyeegu Village usually sell daily food and vegetables from Gwa and nearby villages. See Table 19.

Table 19. Vendors in Magyeegu Village.

Vendors	From Where	To Where	Selling items
1	Gwa	Magyeegu	Vegetables
2	Gwa	Magyeegu, Shweyachaing	Vegetables
3	Thinbaungdaw	Gwa	Vegetables
4	Thinbaungdaw	Gwa	Vegetables
5	Thinbaungdaw	Gwa	Vegetables
6	Sheyachaing	Magyeegu	Sticky rice
7	Magyeegu	Magyeegu	Monthinga
8	Magyeegu	Magyeegu	Sticky rice
9	Gwa	Magyeegu	Boiled corn
10	Shweyachaing	Magyeegu	Snail

According to these vendors, some fish vendors go to Gwa Town and buy fish to sell in the villages. Some vegetable vendors usually come from Gwa and nearby villages like Thinbaungdaw Village and Shweyachaing Vilage. Vendors from Magyeegu Village sell daily ready made food like sticky rice and other sweets.

Vendors on the Road

Some vendors walk around the township selling their own products or items bought from the morning wholesale market of Gwa Town. One of the vendors goes up to 12 miles from Gwa Town along the Gwa-Ngathaing Chaung Road to sell green chillies and to buy local products.

CONCLUSION

Although the traditional system of farming, marketing, and social relations still prevails in the study area, one also finds the impact of the recent development of the market oriented economy. It is evident that the rural marketing system still depends on vendors, periodic markets, and even a barter system of sorts. Two different kinds of marketing also prevail in the study area: traditional marketing, and marketing of products through the export channel of some private entrepreneurs.

Markets have a place in rural development since they reflect the social and economic relations of rural places. They indicate the social network of an area, comprising social relations which are complementary, as well as the use made of natural resources. Sustainability also assumes importance in the region because the use of such natural resources as fish, forest products and agricultural products have to be at a sufficient level of subsistence. Rural dwellers are always concerned about maintaining nature and the products derived from natural resources; this appears in the local periodic markets where the items sold are only relevant for daily food. This is because of the fact that shortages in natural resources will immediately impact on their daily food. Therefore, rural peoples or villagers usually try to maintain the products of nature as much as they can.

In drawing up a development plan for a rural area, it is extremely important to understand what kind of exchange system prevails in the area, what type of economic activities are dominant, and what characteristics of social network are common in the area. All these factors are sometimes very clearly found in the markets and marketing system.

In Gwa Township, two different kinds of economic activities, farming and the fishing industry, reflect the complementary system which prevails in the area. Product exchange is also very common in the area.

It is also interesting that the five-day periodic market system is not common in the study area. This is because the extent of the area is small, obstacles in transportation are relatively rare, and the complementary system of pedlars or wandering vendors is quite sufficient.

Items sold by vendors in the markets and by wandering vendors show the use of natural resources and the dependency of rural people on natural resources. A farmer produces vegetables on his farm or *taungya*; some are for home consumption and some for sale in the village. The wife of the farmer sells the products as a vendor in the village in which they live, or goes from one village to another.

In fact, as stated earlier in the development objectives, income, employment, public goods, natural resources, environment, stability and independence of an area all come together in the markets or marketing system. It is, therefore, necessary to understand the markets and their potential for rural development and development planning for the future.

Interdisciplinary Geriatric Study on Elderly Residents...

Fallow Vegetation of Short Cycle Shifting Cultivation and Its Economic Significance as a Safety Net

Kuniyasu Momose

In mountainous areas of continental Southeast Asia, weed control is an important factor for determining fallow periods of shifting cultivation. Usually, when harmful perennial weeds increase, shifting cultivators wait until perennial weeds are suppressed by woody vegetation through fallow periods of 10 years or more. However, in the special cases that certain types of vegetation cover fallow fields, length of fallow periods can be shortened greatly. In South Rakhine, Myanmar, bamboo forests, dominated by *Melocanna bambusoides*, cover fallow fields. Thus, the perennial weeds are suppressed quickly, and fallow periods needed for weed control are only three years. However, in the fields near settlements, because bamboo shoots are consumed mainly by livestock and consequently bamboo forests do not grow well, long fallow periods over 10 years are necessary. (A) Although fields for shifting cultivation situated far from settlements have great advantages in weed control and the activity of shifting cultivation in remote areas has changed depending on security, when public security is well-maintained, shifting cultivation with short fallow periods is the best way for people to produce provisions for self-consuming as well as to have quick cash income, without owning property.

Part 1. Ecological factors of the newly expanding style of shifting cultivation in Southeast Asian subtropical areas: why can fallow periods be shortened?

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1.1 Introduction

Shifting cultivation (= swidden agriculture (C), slash and burn farming) is the focus of a dispute (D) as to whether it is a sustainable land use pattern or is destructive to the environment. People often accept the too simple conclusion: traditional is sustainable and untraditional is destructive [Linh and Binh 1995; Wang et al. 1997]. In the past few decades, the style of shifting cultivation has changed in Southeast Asian subtropical areas. In some areas, where the greatest change is observed, fallow periods have shortened, and fallow vegetation has changed from forest to herbaceous meadow, whereas in other areas traditional systems are well retained or change is only slightly noticeable. Researchers and politicians have believed that traditional systems have collapsed due to population pressure in areas where herbaceous meadow is spreading [Linh and Binh 1995; Wang et al. 1997]. Based on this kind of misunderstanding, "untraditional" farmers are often forced to change their ways of subsistence. This paper aims to clarify that recent changes in the ways of shifting cultivation have rational ecological backgrounds.

The study conducted by Roder, Phengchanh and Keoboulapha [1995] reveals the fact that rice yield in shifting cultivation was not related with fallow period length and soil fertility (N P K contents and pH) in North Laos. Instead, the quantity of weeds was related to rice yields [Roder, Phengchanh and Keoboulapha 1997], and fallow length was related to weeding

labor [Roder, Keoboulapha and Phengchanh 1998]. It is agreed that weed control is the most important factor for determining fallow length in Southeast Asian subtropical areas [Roder, Phengchanh and Keoboulapha 1997].

In Southeast Asian subtropical mountain areas, including North Laos, North Vietnam and Xishuangbanna, Southwest China, until 1960s fallow length was 10-30 years, and the climax fallow vegetation (E) was forest [Roder, Phengchanh and Keoboulapha 1997; Yin 1994]. Mr. Zhouli, Baka-shaozhai, Jinuo-shan, Xishuangbanna (83 years old) informed the author about fallow vegetation of the past. The following local names are expressed in Chinese pinyin. The fallow of the 1st and 2nd year was called "so peru", and "yangcao" = *Conyza sumatrensis* (Retz.) Walker and "yi" = *Imperata cylindrica* (L.) P. Beauv. were common. The fallow of the 3rd to 6th year was called "so nu", and "lupelu" = *Colona floribunda* (Wall.) Craib, "qiazo" = *Eurya* spp., "pingala" = *Melastoma* spp., and *Imperata cylindrica* were found. The fallow of 7th to 13th year was called "so ku", and was covered with "susa" = *Schima wallichii* (DC.) Korth., the tree up to 20 m high. Usually in the 14th year, the fallow was slashed-and-burned, and rice was then cultivated for three years.

Recently, fallow length was shortened to 5 years. The fallow vegetation is a herbaceous meadow dominated by *Eupatorium odoratum* L. (= *Chromolaena odorata* (L.) King et Rob.) [Roder et al. 1995; Furukawa 1997], which originated in South America and spread to the Southeast Asian subtropical areas after 1950s [Roder et al. 1995] (see the section II for more detailed descriptions). Why was it possible to shorten fallow periods? This paper demonstrates that the invasion of *Eupatorium odoratum* enabled the establishment of a new style of shifting cultivation with shorter fallow periods.

1.2. Study Site and Plant Materials

1.2.1 Study site and outlines of farming systems

Field experiments and observations were carried out in Baka-shaozhai, Jinuo-shan, Xishuangbanna, near the Southwest border of China (21°58-59'N, 101°13-14'E, 650-810 m alt.). In Jinhong, 42 km apart from the study site, annual rainfall is 1221 mm, of which 89 % is concentrated in the rainy season from May to October [Yang 1987]. Monthly mean temperatures in Jinhong (540 m alt.) range from 15.5 to 25.5 °C [Yang 1987]. Mean temperatures in the study site are estimated from the altitude to be 0.6-1.6 degrees lower. The author visited this village for the first time in December 1998, and observed the farming systems. Field experiments started from August 1999, and were completed in June 2000.

In the present shorter-fallow-period system, after slash-and-burning fallow, the villagers cultivate upland rice for three years continuously, or cultivate rice for two years and cultivate maize in the third year. After harvesting rice in the first and second years, the fields are ploughed using water-buffaloes (each household keeps 1-3 water-buffaloes). After the third year rice / maize fields are left as fallow for five years. Table 1 is the annual schedule of farm work.

From May to September, while the crop is growing, water buffaloes are excluded by fences from the fields that are a mosaic of cultivated fields and fallow fields, and they are pastured in semi-primary forests (natural forests slightly affected by human activities: canopy trees are *Hopea*, *Pometia*, *Litsea*, *Lithocarpus*, *Castanopsis*, etc.). From October to April the

water buffaloes are pastured in the fields. All buffaloes in the village are mixed and kept free, and they move around whole fields except plantations of rubbers and passion fruits, which are fenced using barbed wires. Before plowing or excluding them from fields, buffaloes in fields are called back by owners. Salt, which attracts buffaloes, is used for calling them back, but friendship between buffaloes and owners is most essential.

In rice fields, herbaceous weeds are killed by a selective herbicide, 2-4-D, which kills only non-grass plants, to avoid damaging rice. According to villagers the herbicide was introduced to the study village in 1974. The herbicide is sprayed using shouldered hand-pumping spray machines. In 1999, 2-4-D was 12 RMB (1 US\$ = 8.3 RMB) per kg, and 1 kg of herbicide was enough to kill all herbaceous weeds that appeared in May and June within cultivated fields of 1 mu (15 mu = 1 ha). After July, grasses still remain, and they are pulled out by hand. Annual grasses without rhizomes can be easily removed, but perennial grasses with rhizomes are difficult to kill.

Weeding is easier in maize fields than in rice fields, because crops are well spaced and hoes can be used. In fields where cultivation is exceptionally continued for five years, not rice but maize is cultivated, because weeds increase greatly, although maize requires high soil fertility [Watase 1997]. However, as the demand for maize is small (usually for feeding pigs, not for human diet), such long continuous cultivation is exceptional.

1.2.2. Plants dominating in fallows

Eupatorium odoratum is a perennial herb of the family Compositae, which originated in South America and spread to Southeast Asian subtropical areas after 1950s [Roder et al. 1995]. Today, this species is found throughout tropical and sub-tropical areas of the world. The well-branched stems reach 2-3 m in height. The rhizome is absent. Once plants are pulled out or killed by herbicide, no more shoots emerge. The leaves and stems are toxic for livestock, and water buffaloes kept in the study site do not eat them. The seeds are dispersed by wind.

Imperata cylindrica is a perennial grass (the family Graminae), distributed from temperate to tropical zones in Asia, Africa and Australia. The plants reach 1-2m in height. The branching system above ground is not developed like other grasses. Instead, the rhizome under ground is developed very well. This species is extremely difficult to remove because of its rhizomes with strong restoring ability. The best way to control *Imperata cylindrica* is shading [MacDicken et al. 1997]. In the traditional shifting cultivation systems, *Imperata cylindrica* is excluded from the fields by tree shading over long fallow periods of 10 years or more. The seeds are wind dispersed.

1.3. Methods of observation and experiments

1.3.1. Vegetation of cultivated fields

In rice fields (1st year after burning), the number of weed individuals exceeding 1 cm in height were counted in June 2000 at ten quadrates (1 × 1 m) before weeding was done. The numbers of weed individuals were also counted in maize fields (3rd year after burning), and in an exceptionally old maize field (5th year after burning), using the same method. These 30 quadrates were settled along a pass (ca. 3 km) traversing a slope of 20-30 degrees facing South or West along which rice fields, maize fields and fallow fields were distributed forming a mosaic. Ten quadrates settled in an old maize field were restricted within the range of 100 m,

because such fields were exceptional. Other 20 quadrates settled in rice fields and young maize fields were distributed throughout the traversing pass. According to a farmer, the habitat of the old maize field was not special, because yields and weeding labors in the first to third years after burning were just the same as in surrounding fields. Thus, the ten quadrates concentrated within a small area are comparable with other quadrates.

1.3.2. Vegetation of fallow fields under natural and controlled conditions

In the fallows at various stages: 1st year, 2nd year, 4th year and 5th year, the coverage of each plant species along five lines (10 m) was measured in June 2000. The coverage was measured at the canopy strata (the highest continuous crowns of the plant community) and at lower strata (20 cm above the ground). In the estimation of coverage, the length of the lines that was covered with plant crowns were summed and expressed as a % of the total length of the line. The lines were distributed in the range of ca. 3 km along the traversing pass noted above, and were settled at right angle against the pass, i. e. the lines were parallel to slopes.

On 24 August 1999, *Eupatorium odoratum* was removed from first year fallows (6 × 6 m, 5 repeats). It is impossible to exclude *Eupatorium odoratum* perfectly from the fallow, because buried or dispersed seeds germinate if vegetation is cleared during rainy seasons. In this experiment, however, the author managed to greatly reduce the amount of *Eupatorium odoratum*. On 4 June, 2000, the coverage of plants (%) along the central lines (5 m) of five plots (6 × 6 m) was measured by the same method as above. The vegetation was compared with that of the second year fallows under natural conditions.

The effect of buffalo grazing was examined in the following way. In young rubber plantations, water buffaloes are excluded by barbed wires. The observed plantation was originally a field for shifting cultivation. After rice was cultivated for three years, rubber trees were planted at the intervals of 2.5m × 5m. From the sixth or seventh year tapping starts and a strong non-selective herbicide, Paraquat, is used repeatedly so that tapping workers can walk around easily. The observed field had been enclosed by barbed wires for four years at the time of observation (June 2000), but herbicides had not yet been used. Thus, this field was comparable with a fourth year fallow except for the existence of small crowns of the rubber trees (1.5-2.5 m across). The vegetation of this young rubber plantation was observed in the same method as fallows of natural conditions, and compared with that of the fourth year fallow. It might be ideal if many rubber plantations could be distributed along the pass where other observations were made. However, such ideal conditions can not be expected. According to a farmer, the observed rubber plantation used to be an ordinal field for shifting cultivation in the sense of yield of crops, labor of weeding and vegetation of fallow. Thus, comparisons are possible.

1.4. Results

1.4.1. Vegetation of cultivated fields

In June young herbs (the dominant species was *Ageratum conyzoides* L. *Eupatorium odoratum* was also included) and annual grasses (*Paspalum conjugatum* Berg., *Digitaria ciliaris* (Retz.) Koel.), all germinated in May (beginning of rainy season), were found in rice and maize fields, but few perennial grasses were found (Fig. 1). In October (still in the rainy season and just after the harvest), a number of weed seedlings emerge again, but they are killed by plowing in December with the exception of some perennial plants with rhizomes. During the

dry season, from December until April, few weed seedlings emerge. If cultivation was exceptionally continued for five years, perennial grasses, especially *Imperata cylindrica*, appeared (Fig. 1).

1.4.2. Vegetation of fallow fields

The first year fallow was covered with various plants which germinate in October, including annual herbs (*Conyza sumatrensis*), perennial herbs, (*Eupatorium odoratum*), and perennial grasses (*Imperata cylindrica*, *Isachne albens* Trin.). In the second year fallow, annual herbs mostly disappeared, and species diversity decreases. Instead, *Eupatorium odoratum* dominates. Toward the older fallows, *Imperata cylindrica* decreased, and the dominance of *Eupatorium odoratum* was conspicuous. Some tree saplings were established (Fig. 2).

The fallow vegetation was completely different when *Eupatorium odoratum* was removed. As the result of removing *Eupatorium odoratum*, *Imperata cylindrica* was dominant compared with the second year fallow under natural conditions (Fig. 2). The mean coverage of *Imperata cylindrica* of the canopy strata was 9 % (SE 2.2) in the second year fallow, and increased to 22 % (SE 8.4) in *Eupatorium*-removed plots. The latter was significantly larger (U test, $U = 2$, $p < 0.05$). This experiment suggests that two species, *Eupatorium odoratum* and *Imperata cylindrica*, are competitive to each other, and that the former reduces the dominance of the latter in the fallow. This is the reason why *Imperata cylindrica* can be excluded quickly from the fields without the need of long fallow periods.

Even when *Eupatorium odoratum* was present, fallow vegetation was different if buffalo grazing was absent. Young rubber plantations from which water buffaloes had been excluded for four years were dominated by *Imperata cylindrica* (Fig. 2). The mean coverage of *Imperata cylindrica* of the fourth year fallow was 4 % (SE 8.9), and increased to 94 % (SE 5.5) in the young rubber plantation. The latter was significantly larger (U test, $U = 0$, $p < 0.01$). Water buffaloes do not feed on *Eupatorium odoratum* and prefer Graminae including *Imperata cylindrica*. This result suggests that *Eupatorium odoratum* cannot suppress *Imperata cylindrica* without buffalo grazing. However, as shown by the experiment reducing *Eupatorium*, buffaloes themselves do not eradicate *Imperata cylindrica*, because they graze only the leaf blades. Clearly *Eupatorium odoratum* gets the advantage from buffalo grazing in competition with *Imperata cylindrica*, and quickly suppresses it. So both *Eupatorium odoratum* and buffalo grazing are necessary in the new shifting cultivation system.

1.5. Discussion

Although *Eupatorium odoratum* is regarded as a noxious weed in India [Kushwaha, Ramakrishnan and Tripathi 1981], in Southeast Asian subtropical areas, Roder et al. [1995] have revealed from the administration of questionnaires that it is preferred by farmers as fallow plants. However, the relationship among the newly expanding style of shifting cultivation, invasion of *Eupatorium odoratum* and buffalo grazing has been pointed out in this paper.

Researchers and politicians have believed that traditional sustainable shifting cultivation systems have collapsed because of population pressure [Linh and Binh 1995; Wang et al. 1997]. However, the distribution of this new style of shifting cultivation is not restricted to areas with high population density, but is often found in areas where natural forests still remain, like Baka-shaozhai. Even without population pressure, villagers have motivations of

shortening fallow period length. If they have long fallow periods, they must commute to distant fields. According to villagers, it sometimes used to take several hours from the villages to the farthest fields. (F) It is natural that if environmental conditions permit, people prefer shorter and shorter fallow periods. In Southeast Asian subtropical areas, the invasion of *Eupatorium odoratum* was an essential change of environmental conditions that allowed fallow periods to shorten. In Baka-shaozhai, the new shifting cultivation systems have continued for more than 30 years (four cycles), but no evidence of land degradation was found, and rice yield has been high enough as upland rice (3-4 tons per ha, according to interviews to 10 farmers. Most of the Chinese farmers, including ethnic minorities, know their land areas and yields exactly). However, overgeneralization of this conclusion might be dangerous. There is a possibility that further shortening of fallow periods would result in land degradation. (G)

Although the short fallow system with herbaceous meadow is common in Southeast Asian sub-tropical areas, other types of fallow vegetations and crop-fallow cycles are also found [Yin 1994]. Fallow systems may partly be related with climatic and geological conditions. In addition, methods and intensities of pasturage have great influences on the present shifting cultivation systems. In Baka-shaozhai, water buffaloes are introduced to fields in the dry season (October to April). Before plowing or excluding them from fields, owners must find the buffaloes and call them back from the fields. Such method of pasturage has been continued for a long time, and it enabled the establishment of short fallow systems when *Eupatorium odoratum* invaded.

Recently, improved fallow managements born from farmers' trials have been reported. For example, seeds of shrubby legume are broadcasted in fallows in Northern Laos [Roder and Maniphone 1998]. Similarly, seeds of alder (*Alnus nepalensis*) are broadcasted in Nujian, Yunnan [Yin 1994], and in Wenshan, Yunnan [Momose 2001]. This paper demonstrates that improved fallow management depending on invading plants and traditional livestock is also possible.

Since 1974, a selective herbicide, 2-4-D has been used. According to farmers, although the herbicide greatly helped to reduce weeding labor, short fallow systems were also possible even before introduction of the herbicide. This is understandable because *Eupatorium odoratum* does not have rhizome systems and is easy to kill unlike *Imperata cylindrica*.

However, in the farming system observed today, another reason why *Eupatorium odoratum* is not noxious is that farmers have 2-4-D. (H) *Eupatorium odoratum* suppresses grasses, and 2-4-D kills *Eupatorium odoratum* and other herbs, so rice can grow without competition against both grasses and herbs. The recent farming system requires cash income to buy herbicides. In the case of Baka-shaozhai, cash income is obtained from the collection of mushrooms and butterflies, pig raising, cultivation of sharen (*Amomum villosum* Lour.), passion-fruit and rubber. Thus, not only the invasion of *Eupatorium odoratum*, but also easier access to the market has brought about the change of farming systems.

Part 2.

Two kinds of shifting cultivation, tree fallow system and bamboo fallow system in Gwa, South Rakhine, Myanmar and their economic significance.

2.1. Description of two kinds of shifting cultivation

To reveal the economic significances of shifting cultivation with short fallow, the author studied two kinds of shifting cultivation in South Rakhine, Myanmar.

The study site, Gwa township, is located at the southern end of Rakhine state, Myanmar. Most of the agricultural villages are settled on the foot of Arakan Ranges adjoining coastal plains, where flooded paddy fields are spread. Two kinds of shifting cultivation system were found. The first type, long fallow system (forest fallow) was found in slopes facing coastal plains. The second one, short fallow system (bamboo fallow) was found in hills a few to several kilometers inland from coastal plains.

2.1.1. Long fallow system

The long fallow system was operated by villagers having flooded rice fields and cattle (Table 2). Two kinds of crop patterns were observed: (a) mixed cropping including maize and (b) pure stands of chili (Table 3). In both cases, crops were cultivated for one season only after slash and burn, and lands were left as fallow.

Even if bamboos invade into fallow lands, young shoots are eaten by cattle. Thus, bamboo fallow hardly established (Table 4). In the first two years, perennial grasses and herbs grew in fallow. From the third year, fast growing trees like *Trema* increased, but perennial grasses including *Imperata* were still remaining. Fallow older than nine years was covered with trees, and grasses and herbs disappear. Such fields can again be cultivated by slash and burn. All crops were sold. Cash income for 7 months (Sep-Mar) was up to 600,000 Ks/acre for chili fields, and 240,000 Ks/acre for mixed crop fields dominated by maize (Table 5).

2.1.2. Short fallow system

The short fallow system was operated by people without lands and cattle for cultivating flooded rice fields and, who migrate frequently depending on security or economic conditions (Table 2). After slashing and burning land, upland rice and various crops were cultivated together (Table 6). Rhizomes of bamboo, *Melocanna bambusoides*, resist fire. Young bamboo shoots were removed during weeding in July and September. Bamboo shoots emerging later will grow into fallow bushes (Table 7). After three years fallow, lands can be slashed and burnt again. Rice was for self-consumption. The yield of unhusked rice was 30 baskets per acre = 1.5 t/ha. Rice for one family can be produced in fields less than 1 acre. Other crops were sold. Cash income for 7 months (Sep-Mar) was up to 178,500 Ks/acre.

2.2. Merits of short fallow system

For people who do not have land for flooded rice fields, shifting cultivation is the only way of subsistence. On slopes facing flooded rice fields, regeneration of bamboo, which can greatly shorten fallow periods, is prevented by the grazing of cattle. As result, shifting cultivation must have long fallow periods. Such slopes are occupied by villagers whose major subsistence is cultivation of wetland paddy. Thus, people who do not have land for flooded rice fields must operate shifting cultivation in areas remote from coastal plains.

Areas remote from coastal plains have problems in security and are inconvenient for growing cash crops for scale. On the other hand, there is the advantage that people can operate shifting cultivation with short fallow system, because bamboo can regenerate in fallow without

the disturbance of animal grazing.

The merits of this system are the following:

If fallow periods are long, the ratio of cultivated land per fallow is small. People must live scattered. If many families want to live together, they are forced to travel a very long way from their settlements to the fields. Under the short fallow system, the above problem is solved. Many families can live together for security, and at the same time they can save labor in travelling between houses and farms.

There is another merit in crowded living. People cultivate upland rice for self consumption, but all other crops are sold. Families living together can exchange information about trading and avoid being cheated or paid a low price by buyers. In addition, large settlements can have close and stable partnership with traders.

Finally, because there is greater capacity of people per area in sloped areas with short fallow systems, land far from settlements are left as relatively intact forests. Such forests supply various forest products: timbers, rattans, mushrooms, game animals, and medicine. People without poverty rely greatly on natural resources [Momose 2002b, Momose and Shimamura 2004]. Short fallow systems contribute to the conservation of forests supplying such natural resources.

Fig. 1. Vegetation in early June of various stages of cultivating fields

Mean number of plant individuals exceeding 1 cm in height of ten quadrates (1 × 1 m) in rice fields (1st year after burning), maize fields (3rd year after burning), and an old maize field (5th year after burning) are shown.

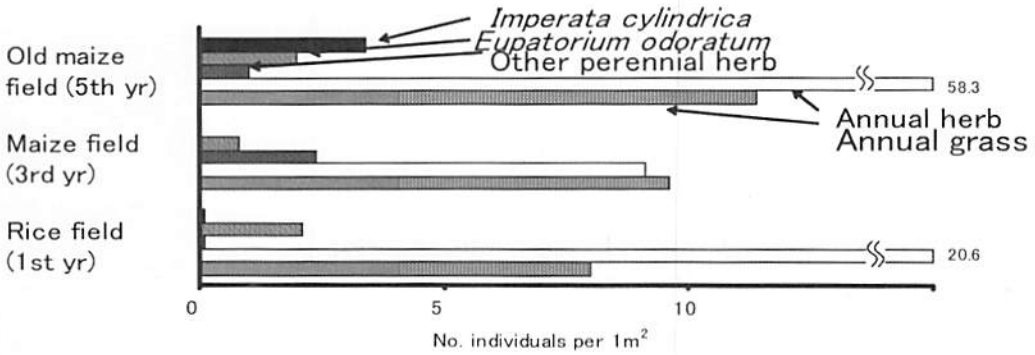


Fig. 2. Vegetation in early June of various stage fallows and experimental plots

Concerning on fallows at various stages and the young rubber plantation from which water buffaloes were excluded (see text for details), mean coverage by plants (%) along five lines (10 m) is shown. Concerning on the experimental plots where *Eupatorium odoratum* was removed nine months before observations (see text for details), mean coverage of plants (%) along the central lines (5 m) of five plots (6 × 6 m) is shown.

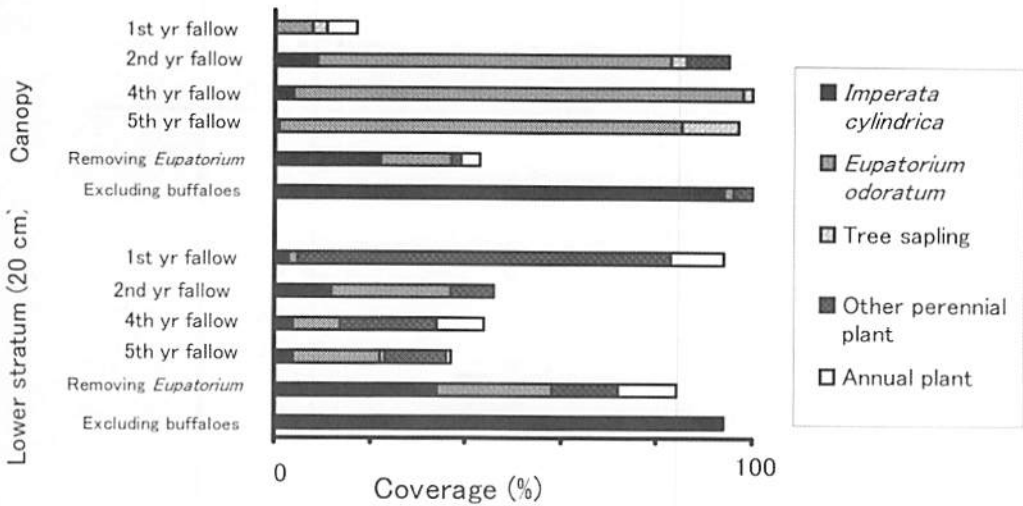


Table 1. The annual schedule of farmwork in Baka-Shaozhai (solar calendar).

Month	Farmwork
Jan	Slash the fallow (continued).
Feb	
Mar	Burn the fallow
Apr	
May	Seed rice and maize. Exclude buffaloes from the fields.
Jun	Weed by herbicide.
Jul	Weed by hand (rice field) or by hoe (maize field).
Aug	Weed by hand or hoe. Harvest early-ripening rice.
Sep	Harvest rice and maize.
Oct	Harvest late-ripening rice. Introduce buffaloes to the fields.
Nov	
Dec	Slash the fallow. Plow the cultivating fields.

Table 2. Household members, lands for flooded paddy, number of cattle and shifting cultivation system in Gwa. L: long fallow system; S: short fallow system

No.	system	adult	child	cattle	flooded paddy (acre)	upland paddy (acre)
1	L	2	4	2	3	1
2	L	3	0	3	7	1
3	S	2	3	0	0	0.5
4	S	2	1	0	0	1
5	S	2	3	0	0	1.5
6	S	4	1	0	0	1.3
7	S	2	0	0	0	1
8	S	2	0	0	0	1.3
9	S	4	0	0	0	1.3
10	S	2	0	0	0	1.5

Table 3. Farmwork schedule in the long fallow system.

Month	Farmwork
Feb-Mar	Slash.
Apr	Burn. Before rain, broadcast roselle and <i>Solanum</i> in fields where maize and various crops will be mix-seeded later.
May-Jun	After rain, seed maize and gourd mixed into stice-made holes. Broadcast <i>Vigna</i> and okura in maize fields.
Jul	Weed. Broadcast sesame
Sep-Oct	Weed. Harvest maize and <i>Vigna</i> .
Sep-Mar	Harvest roselle, <i>Solanum</i> , guard, okura, and chili.
Jan	Harvest sesame.

Table 4. Fallow vegetation in the long fallow system.

years fallowing	height (m)	dominant genera	tree BA (mm ² /m ²)	grass/herb shoots (/m ²)
0	1.6	<i>Eupatrium</i>	0	1.10
1	3.4	<i>Eupatrium</i>	403	16.3
3	5.6	<i>Eupatrium</i>	553	1.73
9	8.5	<i>Horsfieldia</i> , <i>Duabanga</i>	2557	0.00

Table 5. Yields and prices of various crops of shifting cultivations in Gwa.

crop	yield/acre (mix-planting)	price at fields	price at market	income/acre
rice (unhusked)	30 basket		500Ks/bsk	(15,000)
maize	4500 ps	6~10Ks/ps	14Ks/ps	63,000
sesame oil	27.5 viss		1000Ks/v	27,500
sesame less	25 viss	100Ks/viss		2,500
<i>Solanum</i>	1500	1~3Ks	2~5Ks	3,000~7,000
pumkin	150	100Ks	200Ks	30,000
cucumber	15000	30Ks	70Ks	105,000
chili	1000 viss	400Ks/v	600Ks/v	600,000

Table 6. Farmwork schedule in the short fallow system.

Month	Farmwork
Feb-Mar	Slash.
Apr	Burn. Before rain, broadcast <i>roselle</i> and <i>Solanum</i> in fields where maize and various crops will be mix-seeded later.
May-Jun	After rain, seed rice and gourd mixed into stice-made holes. Broadcast <i>okura</i> in upland rice fields.
Jul	Weed. Broadcast <i>sesame</i> in upland rice fields.
Sep	Weed.
Sep-Mar	Harvest <i>roselle</i> , <i>Solanum</i> , guard, and <i>okura</i> .
Jan	Harvest <i>sesame</i> .

Table 7. Fallow vegetation in the short fallow system.

years fallowing	height (m)	<i>Melocanna bambusoides</i>			tree BA (mm ² /m ²)	grass/herb shoots (/m ²)
		diam	height	shoot		
0	0.7		0.44	0.75	0	1.10
1	6.2	9.08	2.95	6.6	403	16.3
3	7.8	13.9	4.14	9.4	553	1.73

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Plant Utilization and its Socio-economic Value in Gwa Region, Rakhine State

Win Myint and Aye Kyi

Introduction

Background of Rakhine State

Rakhine State lies between latitudes North 17° 31' and 21° 31' and longitudes East 92° 10' and 94° 50' and is situated in the western part of Myanmar. It covers a total land area of 36,778 square kilometers with 2,711,448 people in 2000 (Aung 2003). There are 17 townships in the state and one of them, Gwa is one of the beautiful places of Rakhine State and Kanntharyar a very popular beach in Gwa Township. It has coastal regions, islands and mountains and rich natural resources. Local communities are Rakhine (82%) and Chin (18%) (Lyanm, 2003). There is shifting cultivation as well as commercial hunting of wildlife. The economic occupations of local residents are cultivation, fishing, and timber, cane and bamboo extraction. These support the local community in the study area although they have a negative impact on nature and environmental conservation.

Background of study region

Gwa lies between latitudes North 17° 15' and 18° 8' and longitudes East 97° 25' and 94° 54' in Rakhine State and is 63 miles from North to South and 14 miles from East to West. The mean temperature is 96° F -100 F in April and 60° F - 65° F in December. The annual rainfall is 0.37" in March, 0.95" in April, 26.65" in July, 27.26" in August and 2.13" in December. Gwa Township adjoins the Bay of Bengal, Thantwe Township and Ayeyarwaddy division. According to the Gwa Township Administrative Record, the forest land in Gwa region has evergreen forest, *indaing* forest, tropical and temperate forest, beach and dune forest, as well as tidal forests along the coastal region

I. The Study Programme

1. Statement of the problem

In the perspective of nature and biodiversity conservation for sustainable development, one of the major threats is plant utilization for different purposes - trees to provide fuel wood, fibre and timber for construction material and for making agricultural implements, etc. It may cause plant species depletion, forest community degradation, and the extinction of some wild species in the future. Trees are a source of income and employment to millions of the rural poor, and they are protected, planted and managed on forest lands in a variety of situations. Forest utilization may provide benefits to the local community. For instance, Kyein (*Palaquim polyanthum* Merr.), Taung Pain (*Artocarpus chaplasha* Roxb.) and Pyin-ga-do (*Xylia dolabriformis* Benth.) products have large markets in Gwa township. However, despite a close linkage with farming systems, until recently not much research

has been done on farm trees and their management. A recent study observed a general neglect of trees in the farm economy, for example, it was found that it was very difficult to get Ka-nyaung (*Shorea thorelii* Pierre ex Laness.), Ka-shit (*Pentace burmanica* Kurz.) and Pyin-ka-do (*Xylia dolabriformis* Benth.) in the region. Moreover, shifting cultivation, wildfire, deforestation and habitat alternation also affect environmental depletion and degradation. Human activities make an impact on the natural environment and the use of plants species for different purposes by humans pose vital problems for wild flora species survival. With plant species utilization in Gwa and other regions ever increasing, and with the cutting and collection of wild floras for commercial trade and other purposes, flora resources seem to be exploited beyond the capacity of the given ecosystem. The effects of this exploitation and the continuing decrease of natural resources can cause the depletion and degradation of the forestry community. The cycle repeats year by year and the rate of deforestation becomes a vital problem of nature and biological conservation in Gwa region.

2. Rationale of the study

Fitzgerald (1989) has pointed out that if properly controlled, plant utilization can be a strong force for conservation; in particular, he mentioned the provision of economic incentives for the protection of the habitat and management of the forest in such a way as to allow continued harvesting while ensuring the long term survival of species. Therefore, in the consideration of plant utilization for effective and efficient nature conservation, the perspective should be widened beyond the different purposes of flora species use in Gwa region to analyze the backward and forward linkages among the regions in Rakhine State which are spatially connected and interrelated in forest utilization. By doing so, the policy maker and planner will be able to conceptualize the mechanisms and counter-measures for the sustainable use of plant resources for the socioeconomic development of Gwa region.

3. Objective of the study

The objective of the present study is to carry out a collection and classification of plant species in the study area together with their utilization by the local community. Put more generally, the aims of the study are:

1. to collect and classify the plant species of the region;
2. to describe the sustainable use of plant species for different purposes by the local people;
3. to explain how flora species support the local community;
4. to make recommendations regarding the future study of forest resource conservation.

4. Scope and limitation of the study

Because of limitations of time and money the study does not cover all plant species in the whole of Gwa Township. Taking into consideration the related issue of the socio-economic situation of the local community, it focuses on the study on the plants species in Gwa region, especially Ywar-thit-kone, Ya-hine-ka-do and Ma-gyi-ngu villages, and their utilization for food, firewood, agricultural tools, construction, medicine and cultivation. In other words, the different purposes in the utilization of plant species as they support the socio-economic life of the local community is studied. In addition, the interest in the cutting

and collecting of plants, the awareness of wild flora conservation, and land use of the area are also investigated. Qualitative and quantitative analyses are made to examine aspects of wild flora species and the related issue of their socio-economic relevance to community development.

5. Natural environment of the area

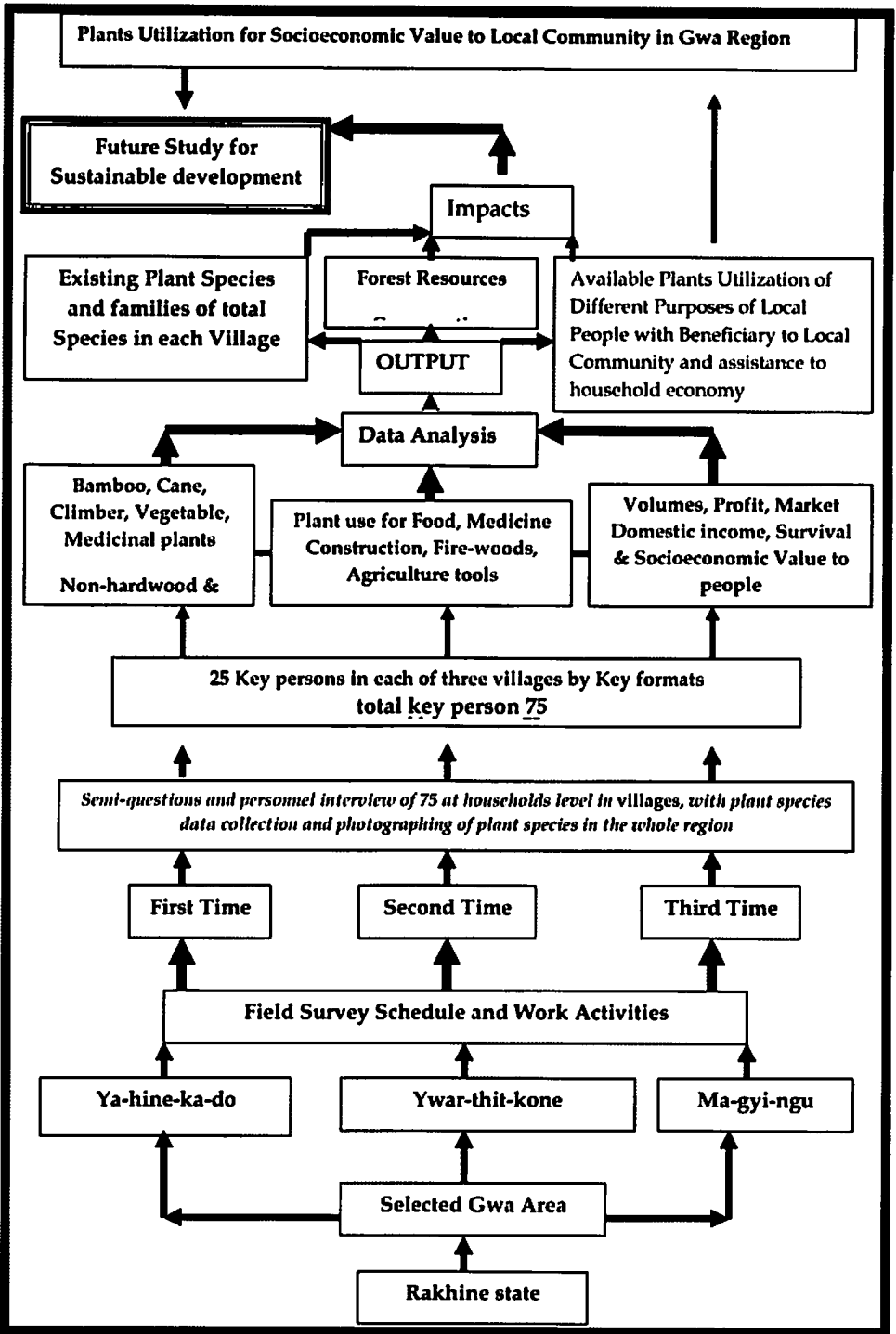
The selected study area is Gwa Township, in particular, the three selected villages. Gwa has a wide variety of natural ecosystems, ranging from marine and coastal to forest ecosystems. The various ecosystems are useful in their own way, providing essential resources for the economic and social well-being of the people. Gwa is a favourable region for this great variety of ecosystems since it includes cropland, grassland, woodland, coastal forestland, and tropical forest land together with the physical features of sea, island and mountain. Forest land and coastal land covers much of the land area and the resources of sea, river and forest have supported the local people. There are six principal forest types: tidal forest, beach and dune forest, swamp forest, evergreen forest and hill and temperate evergreen forest. While utilization of this natural environment has affected the socio-economic situation of the local community, it is also the cause of environmental disturbances – deforestation, habitat loss, habitat alternation and unbalanced biota population sex ratio in the region. Therefore, environmental conservation depends on the poverty cycle of the local people and the condition of rural development.

6. Research methodology

As purposefully designated, primary data was used in the research on plant utilization in Gwa Township. Secondary data from various available sources such as reports, research papers, field documents, manuals, information leaflets/ booklets and materials from government organizations was also used. Plants collection and identification of collected species was conducted according to A.B. Rendle (1925)'s herbarium technique. Interviews were conducted with local people and local herbal medicine practitioners. Photographic records were made in the localities.

The study in Gwa lasted from 18 February 2003 to 23 December 2003 and comprised field survey, observation and personal interviews in the local community, with such persons as medicinal plant users, timber traders, plant users for agriculture tools, the owners of *taungya* land, plant users for food, hunters, fishermen, government staff and local people in the study area.

7. Survey Design



8. Socio-economic base of work activities

Opportunity is afforded to the local community by the long coastal region with a great variety of ecosystems, including evergreen forest, temperate forest and tropical forest. There are rich flora, fauna, and marine resources in sea, mountain and island environments. The people of the community engage in different types of work activities based on their interests, beliefs, thoughts, traditions and individual inclinations. Generally, the major work activities are farming, livestock breeding, cutting timber and bamboo, fuel wood collection, charcoal making, agriculture, fishing, medicinal plants collecting, tourism, and fish and prawn breeding. Some depend on natural resources such as forest products and marine resources and some on agriculture and livestock breeding.

In agriculture, there are two kinds of crops and vegetation in the region. The major crops are rice, maize, sesame, rubber, sugarcane, cotton and groundnut. Next in importance are tobacco, potato, chilies, pepper, mustard, cabbage, flower cabbage, bamboo, concinna leaves, sweet-potato, water-cress, taro, drumstick, djankol-bean, lemon, lime, fig, mango, banana, papaya, carrot, and onion.

Generally, the local community is based on marine resources, forest resources, agriculture and vegetation. The main transportation is by waterways and roads. The Yangon-Gwa-Thandwe-Taungkok road is the major road for cars and motorbikes. By waterway, one can go from Gwa to other towns by ship, boat, motorboat and speedboat.

II. Findings of the Study

1. Plant utilization for various purposes by the local community

Plant utilization for various purposes is vital in the life of the local community in Gwa. The field survey in the Gwa region recorded a total of 77 families, and 123 species; 28 families and 50 species used for timber, 4 families and 8 species used for firewood, 10 families and 13 species used for food and others, 16 families and 16 species used for medicine and 19 families and 36 cultivated species. Plants utilized as timber occupy the greatest area in the region, followed by those used as medicine, while plants utilized as food and firewood have a high potential in the region, with plant products having a large market in the Gwa region. The situation of all plant species are nearly the same in all villages. On the other hand, marine resources are over-exploited in some villages such as Ya-hine-ka-do and Ma-gyingu. At present there is a slight decrease in all plants used for timber in this area, while cane, coconut and *dani*, used for domestic purposes, have been reduced to one-fourth of all floras.

2. Plant utilization for timber

In the study area 28 families and 50 plant species are recorded as used for timber. Some species are utilized for other purposes such as fruit, firewood and medicine. *Da-nyin* (*Abarema bigemina* L. Kosterm.), *Kokko* (*Albizia lebbek* L. Benth) and *Sha-byu* (*Acacia ferruginea* DC.) have a multi-purpose use as food, medicine and timber. *Kokko* (*Albizia lebbek* L. Benth.) is important in herbal medicine. *Taung-pein* (*Artocarpus chaplasha* Roxb.), *Ka-nyaung* (*Shorea theoretic* Pierre ex Laness.) and *Pein-ne-pho* (*Palaquium polyanthum* Merr.) are mainly utilized for boat making. *Mada-ma* (*Dalbergia collettii* Prain.) is mainly used for making charcoal.

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Traditionally, local people use Myuk-ngo (*Harpulia burmanica* Kz.) as soap. Pyin-ma (*Lagerstroemia speciosa* L.) and Than-that (*Stereospermum fimbriatum* Wall. ex G. Don A. DC.) are also cultivated for their flower in all villages.

Abarema bigemina (L.) Kosterm. (MIMOSACEAE) Da-nyin: It usually grows to a height of 40 to 60 feet and a girth of 3 to 5 feet and its fruit is edible, being used as a vegetable throughout the country. Local people want to get an income from selling the fruit of the Da-nyin after cutting the tree, and the cutting can cause deforestation.

Acacia ferruginea DC. (MIMOSACEAE) Sha-byu: It is a small to moderate size plant. Its wood is red, very hard and durable; rather hard to work, but turns excellently and seasons and polishes well. It cannot be attacked by white ants. The wood is used for agricultural implements by local farmers.

Acrocarpus fraxinifolius Wight ex Arn. (CAESALPINIACEAE) Ma-ya-nin: It is a very tall and straight tree. The wood is pale red in colour, with darker lines. It is easy to work, has a good surface and polishes well. It is suitable for planking, boxes, shingles and furniture.

Actephilia excelsa Muell. (EUPHORBIACEAE) Taw-za-lut: Its timber is used for planking and interior material. It attains 70 feet in height and 6 to 7 feet in girth. The colour of the wood is yellowish white.

Albizia lebbek (L.) Benth. (MIMOSACEAE) Kokko: Its leaves are medicinal, and its paste is externally applied on sores. The fruit is used as animal food. The oil extracted from the seed is used as raw material in soap making. It attains a height 80 or 90 feet and girth of 8 or 10 feet. The wood is strong and fairly durable. The Kokko makes excellent furniture and panelling and is particularly valued by the local people for oil-mortars. Other utilization is for building, ploughs, well, cartwheels, casks and carving.

Amoora wallichii King. (MELIACEAE) Auk-chin-sa: The wood is reddish and very sturdy and works nicely. When air-seasoned it tends to split and show surface cracks unless protected against rapid drying. A good high-class furniture wood; it is also used for panelling and boats and seems suitable for boxes.

Anogeissus acuminata Wall. (COMBRETACEAE) Yon: It is very common in the region. The wood is yellowish, fairly hard, straight-grained, strong and elastic. Yon is not easy to work, but is used for axe and hammer handles.

Anthocephalus cadamba Mig. (RUBIACEAE) Ma-u: The tree can reach a height of 100 feet or more and 3 to 5 feet in girth. The wood white with a yellowish tinge, soft, even-grained and is used for building, boxes, canoes, yokes and turning.

Antidesma collettii Craib. (EUPHORBIACEAE) Kin-balin: The tree reaches a height of 90 feet and 7 to 8 feet in girth. The wood is whitish, fairly hard, straight-grained, strong and elastic. It is easy to work, and is used for building.

Artocarpus chaplasha Roxb. (MORACEAE) Taung-pain: It attains 70 to 80 feet in height 7 feet or more in girth with a long, clean, usually straight stem. The wood is yellow to brown, fairly hard and strong, even-grained, and works and seasons well. It is durable under cover but less so in exposed positions. In the region, it is used for ship-building, canoes and light construction. In addition, it is suitable for turnery, carving, light furniture and interior work.

The Use of the Plant Materials in Rakhine State

Callicarpa tomentosa Benth. (VERBENACEAE) Kyun-na-lin: It is a small deciduous tree with thin grayish-white bark. The wood is light grey streaked with yellow, purple or faint green, moderately hard and smooth. It is for local use only.

Cerbera manghas L. (APOCYNACEAE) Za-lat: It is not a very tall straight tree. The wood is pale white. It is easy to work and suitable for furniture and the interior of buildings.

Dalbergia collettii Prain. (FABACEAE) Mada-ma: It attains a height of 25 to 40 feet and 2 to 4 feet girth. It is a mangrove type and not plentiful. The wood is grey or yellowish-brown, fairly hard. It is suitable for cart shafts and masts of boats. It also makes very good axe-handles.

Dalbergia cultrata Grah. (FABACEAE) Yin-daik: A medium size tree, it rarely exceeds 60 feet in height and 5 feet girth. The trunk is usually fluted and the timber often shaken internally. The wood is available in small sizes. The heartwood is somewhat like ebony and can be blackened to ebony by burying in the ground for some time.

Dalbergia paniculata Roxb. (FABACEAE) Thit-na-nwin: It is a medicinal plant. It usually reaches a height of 30 to 50 feet, and a girth of 5 to 7 feet. The wood is yellow, resinous and soft. It is easy to work. Only a small amount of timber is produced and it is for local use only.

Desmodium gangeticum D.C. (FABACEAE) Kye-mi-hpo: It usually reaches a height of 50 to 70 feet and a girth of 7 to 8 feet. The wood is white in colour and fairly hard although it is easy to work. It is used in building and for farm implement.

Dichron febrifuga Lour. (HYDRANGEACEAE) Yin-bya: It usually reaches a height of 40 to 60 feet and a girth of 3 to 7 feet. The wood is brown. It is used in local needs. A small amount of timber is produced and it is for local use only.

Dillenia eleta Pierre. (DILLENACEAE) Zin-byun: It is a medium size tree, 40 to 50 feet high, common in the plain forests of Rakhine region. The wood is reddish in colour, mottled and fairly hard. It is difficult to split and is very hard on saws and planking machines. It is used for interior planks.

Diospyros pendula Hasselt. ex Hassk. (EBENACEAE) Ma-gyi-kyawe: It is small size tree, 40 to 50 feet high. The wood is reddish in color, mottled and fairly hard and difficult to split. It is used for yokes and some agricultural implements.

Dipterocarpus tuberculatus Roxb. (DIPTEROCARPACEAE) In: The tree usually reaches a height of 70 to 110 feet and a girth of 5 to 10 feet in good condition. The wood is reddish brown, resinous and hard although it is easy to work. It is obtainable in large sizes and quantities. In Myanmar, it is used in building cheap houses, and for carts, boats, and many other purposes.

Eugenia bracteolata Wight (MYRTACEAE) Tha-bye: It is a large tree and the wood is reddish-grey, rough, fairly hard and strong; moderately durable, lasting well under water. It is useful for buildings, carts, wheels, boats, masts, well construction and cheap furniture.

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Eugenia oblate Roxb. (MYRTACEAE) Tha-bye-ni: It is a medium size evergreen tree. The wood is hard, heavy, and brown and can be used for several purposes like house-building, tool-handles and making charcoal.

Ficus obtusifolia Roxb. (MORACEAE) Nyaung-gut: The tree usually reaches a height of 70 to 85 feet and a girth of 6 to 8 feet in good condition. The wood is reddish brown, resinous and hard although it is easy to work. Only a small amount of timber is produced. The leaves are fairly good fodder.

Garcinia heterandra Wall. (HYPERICACEAE) Pala-wa: It usually reaches a height of 50 to 70 feet and a girth of 5 to 7 feet. The wood is reddish brown, resinous and hard, but it is easy to work. Only a small amount of timber is produced and it is for local use only.

Harpulia burmanica Kz. (SAPINDACEAE) Myuk-nyo: It is usually a tall tree 50 to 60 feet high and a girth of 3 to 4 feet. The wood is grey, streaked and soft. It makes good boxes, planks, wells, oars and canoes.

Heterophragma sulfureum Kurz. (BIGNONIACEAE) Thit-lin-da: The tree usually reaches a height of 70 to 90 feet and a girth of 5 to 10 feet in good condition. The wood is white and hard although it is easy to work. It is used in building and for fuel.

Hopea odorata Roxb. (DIPTEROCARPACEAE) Thin-gan: The tree usually reaches a height of 90 to 110 feet and a girth of 6 to 10 feet in good condition. The wood is brownish, hard, close and even-grained, strong, elastic, durable and easily worked. It is resistant to white ants and boats made of it last twenty years.

Lagerstroemia speciosa L. (LYTHRACEAE) Pyin-ma: It is a medium size tree and usually reaches a height of about 50 to 80 feet and a girth of 5 to 7 feet. The wood's quality is excellent and the quantity is considerable. The wood is light-brown, hard elastic and strong. It is used for building, construction and boats.

Lannea coromandelica (Houtt.) Merr. (ANACARDIACEAE) Na-be: It usually grows to a height of 70 to 80 feet and a girth of 7 to 8 feet. The wood is reddish in color and fairly hard. The wood is used for planking boxes, cheap furniture, carts, yokes, wells and boats.

Litsea nitida (Roxb.) Hook.f. (LAURACEAE) Nya-sha: It usually reaches a height of 70 to 90 feet and a girth of 3 to 5 feet. The wood is white and fairly hard although it is easy to work. Only a small amount of timber is produced and it is for local use only.

Mitragyna parvifolia (Roxb.) Korth. (RUBIACEAE) Htain: It is medium size and usually reaches a height of 50 to 80 feet and a girth of 6 to 7 feet. The wood is yellowish brown, and fairly hard so it is easy to work. Only a small amount of timber is produced and it is used for farm implements and interior works of buildings. It is for local use only.

Myristica glaucescens Hk.f &T. (MYRISTICACEAE) Thit-htan: It usually grows to a height of 70 to 90 feet and a girth of 4 to 6 feet. The wood is reddish brown and hard. It is for local use only and used in household materials and as firewood.

Palaquium polyanthum Merr. (SAPOTACEAE) Pein-ne-pho: It is a very important timber in local use, especially for traditional boat making. It reaches a height of 60 to 120

feet, and a girth of 6 to 8 feet. The wood is yellowish gray, fairly hard although it is easy to work. It is used in furniture, building and boat making. It is durable in marine water.

Pentace burmanica Kurz. (TILIACEAE) Ka-shit: It usually reaches a height of 60 to 100 feet and a girth of 4 to 5 feet. The wood is reddish gray, fairly hard although it is easy to work. It is used in furniture, building and farm implements.

Pterospermum semisagittatum Ham. (STERCULIACEAE) Na-gel: It usually reaches a height of 40 feet and a girth of 5 to 7 feet. The wood is reddish grey, fairly hard, and used for axe-handles. It is good as fuel.

Pterygota alata (Roxb.) R. Br. (STERCULIACEAE) Shaw-bya: It usually attains a height of 40 to 50 feet and a girth of 6 to 7 feet. The wood is bluish white, resinous and hard. Only a small amount of timber is produced and it is for local use only.

Sandoricum koetjape (Burm. f.) Merr. (MELIACEAE) Thit-to: It usually reaches a height of 80 to 90 feet and a girth of 7 to 8 feet. The wood is pinkish when freshly cut, drying to a light reddish brown. It works well and has been used as furniture. It is also used for carts, boats, barrels and is particularly sought for sandals.

Sapium insigne (Muell.Arg.) Trimen (EUPHORBIACEAE) Thit-pyauk: It usually reaches up to 100 feet in height and 8 to 10 feet in girth. The wood is whitish, soft, and spongy. It is used to make drums and a small amount is produced for local use.

Saraca indica L. (CAESALPINIACEAE) Thaw-ka: It usually reaches a height of 30 to 50 feet and a girth of 5 to 7 feet or even more. The wood is whitish brown and soft and easy to work. Only a small amount of timber is produced and it is for local use only. Now it is cultivated for ornamental purposes.

Shorea thorelii Pierre ex Laness. (DIPTEROCARPACEAE) Ka-nyaung: It attains a height of 70 to 100 feet and a girth of 8 to 9 feet or even more. The wood is whitish brown, resinous and fairly hard although it is easy to work. A large amount of timber is produced but it is for local use only. It is famous as a timber for traditional boat building.

Stereospermum fimbriatum (Wall. ex G. Don) A. DC. (BIGNONIACEAE) Than-that: It is a medicinal plant. It usually reaches a height of 60 to 70 feet and a girth of 6 to 9 feet. The wood is light reddish brown in color and hard but it is not easy to work. Only a small amount of timber is produced and it is for local use only.

Stereospermum grandiflorum Cubitt & W.W. Sm. (BIGNONIACEAE) Than-de: It usually grows to a height of 50 to 70 feet and a girth of 6 to 7 feet. The wood is grey, hard and moderately durable. It is almost impossible to saw, the fibre being so stringy that a few cuts destroy the saw.

Streblus asper Lour. (MORACEAE) Ok-hne: It usually reaches a height of 30 to 40 feet and a girth of 2 to 4 feet. The wood is white and soft. It is best known use is ingredients of Myanmar cheroots, for which purpose it is chopped up fine and mixed with tobacco.

Swintonia floribunda Griff. (ANACARDIACEAE) Taung-tha-yet: It usually reaches a height of 80 to 120 feet and a girth of 8 to 9 feet. It is very abundant in the forest. The logs are

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available in large size and of good quality. It is used in cheap housing and general construction. The wood is white and soft, fairly strong, and easy to work.

Syzygium cymosum DC. (MYRTACEAE) Thit-ni-galay: It usually reaches a height of 60 to 80 feet and a girth of 6 to 8 feet. The wood is reddish brown and hard, but it is easy to work. It is suitable for building, housing, boxes, and canoes.

Terminalia chebula Retz. (COMBRETACEAE) Pan-ga: It usually reaches a height of 70 to 80 feet and a girth of 6 to 7 feet. The wood is small irregular hardwood and is yellowish brown. It is a popular wood for rough use in house-building, furniture, carts, and bolsters in timber carts.

Tetrameles nudiflora R. Br. (DATISACEAE) Thit-poke: It is of moderate size and usually reaches a height of 50 to 60 feet and a girth of 4 to 5 feet. The wood is of very little value. Only a small amount of timber is produced and it is for local use only.

Trewia nudiflora L. (EUPHORBIACEAE). Ye-myoke: It usually reaches a height of 40 to 50 feet and a girth of 4 to 6 feet. The wood is white and hard, but it is easy to work. It is for local use only.

Vitex coriacea Kz. (VERBENACEAE) Kyet-yo: It is a medicinal plant. It usually reaches a height of 30 to 40 feet and a girth of 3 to 6 feet. The wood is brown, hard, close-grained, smooth, durable. It is used for building and tool-handles and can be made into handsome furniture.

Xylocarpus dolabriformis Benth. (MIMOSACEAE) Pyin-ka-do: Under favourable conditions it reaches a height of 100 to 120 feet and a girth of 10 to 12 feet. The wood is reddish brown. The bole is usually long, straight and cylindrical, so that timber is obtainable in very large clean sizes. It is available for major markets and for export. It is hard and very durable and resistant to white ants. Shrinkage is completely low. It is fairly well known in the European market and has been used for harbour works, freshwater locks, piling, rubbing fenders, gangways, chutes and other works subject to hard wear and rough usage or for purposes where great durability under exposed conditions is required.

3. Plant utilization for firewood

In the region there are 4 families and 8 species utilized as firewood such as Sha-byu (*Acacia ferruginea* DC.), Daung-da-laung (*Dalbergia mimosa* Roxb.), Thit-pa-gan (*Dalbergia lanceolaria* L.), Ma-da-ma (*Dalbergia collettii* Prain), Su-gote (*Capparis sepiaria* L.), Ka-na-zo (*Heritiera fomes* Buch.-Ham), Byaik (*Dalbergia spinosa* Roxb), Byu-chidauk (*Rhizophora mucronata* Lam), and Ma-da-ma (*Ceriops tagal*) and 5 families - MIMOSACEAE, FABACEAE, CAPPARACEAE, PAPILIONACEAE, and RHIZOPHORACEAE. Among them, Ma-da-ma (*Dalbergia collettii* Prain.) and Ka-na-zo (*Heritiera fomes* Buch.-Ham.) are utilized for making charcoal and Su-gote is also used for making living fences.

Acacia ferruginea DC. (MIMOSACEAE) Sha-pyu: The major utilization of this plant is for firewood and charcoal. It can also be used as a medicinal plant; its resin being used in traditional medicine. It can prevent cough and diabetes, and is an astringent, demulcent and, alterative. It is also utilized for agricultural implements such as carts, wheels, wells, handles of tools, rice pestles, oil crushers, harrow teeth and spear handles.

*Dalbergia mimos*a Roxb. (FABACEAE) Daung-da-laung: The major use of this plant is for firewood. It is also a medicinal plant and used for the treatment of sore throat and its leaf is applied on sores for healing.

Dalbergia lanceolaria L. (FABACEAE) Thit-pa-gan: The major use of this plant is for fire-wood. It is also a medicinal plant, assisting digestion and also used as a purgative. The seed is used treating arthritis.

Dalbergia lanceolaria L. (FABACEAE) Mada-ma: It is important in making charcoal and is suitable for cart shafts and boat masts, and very good for making axe handles.

*Dalbergia collett*ii Prain. (FABACEAE) Mada-ma (same name in Myanmar): The major use of this species is for firewood. It also has other uses, such as building, making boats, oars, masts, spars and furniture.

Capparis sepiaria L. (CAPPARACEAE) Su-gauk: The major use of this species is for firewood. It is also used to make a living fence around farmland to protect it from domestic animals

Dalbergia spinosa Roxb. (PAPILIONACEAE) Byaik: The major use of this species is for fire-wood. Its root is an antidote against alcoholism.

Rhizophora mucronata Lam. (RHIZOPHORACEAE) Byu-chidauk: The major use of this species is for fire-wood. Its bark has medicinal value and is used for treating haematuria.

4. Plant utilization for other purposes

There are 10 families and 13 species used for other purposes, such as Bwe-gyin (*Bauhinia vahlii* W.&.A), Ohn (*Cocos nucifera* L.), Ka-nyin (*Dipterocarpus alatus* Roxb.) Su-gote (*Capparis sepiaria* L.), Min-baw (*Caryota mitis* Lour.), Da-ni (*Nipa fruticans* Wurmmb.), Thin (*Donax grandis* (Miq.) Ridl.), Tha-baw (*Pandanus foetidus* Roxb.), Tha byu (*Dillenia indica* L.), Pe-sin-nyon (*Cajanus cava* L.), Hta-ma-sok (*Glochidion glaucifolium* Muell. Arg.), Sa-lu (*Licuala peltata* Roxb.) and Myuk-kyaine (*Flagellaria indica* L.).

Bauhinia vahlii W. &.A. (CAESALPINACEAE) Bwe-gyin: The local people use the leaves as food, while the timber is also used for firewood.

Cocos nucifera L. (ARECACEAE) Ohn: It is a very useful and beneficial plant for the local community, all its parts being used for a variety of purposes, such as thread, fruit, oil, charcoal, broom, and brushes.

Dipterocarpus alatus Roxb. (DIPTEROCARPACEAE) Ka-nyin: Traditionally, the resin is used as varnish. The timber is used for houses, building and particularly for traditional boats.

Capparis sepiaria L. (CAPPARACEAE) Su-gauk: In the area, farmers use it as a living fence around crop land to protect the entering of domestic animals. It is useful for firewood.

Caryota mitis Lour. (ARECACEAE) Min-baw: Traditionally, the leaves are used for thread. The trunk is used for houses and building.

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Nypa fruticans Wurm. (ARECACEAE) Da-ni: Traditionally, the leaves are used for thread. Its young flower stalk is tapped for sugary juice and made into jaggery or alcohol.

Donax grandis (Miq.) Ridl. (MARANTACEAE) Thin: Its yield is well known as fibre for making the best quality of *thinbyu* or cool sleeping mats. Its stem is also used in the weaving of mats.

Pandanus foetidus Roxb. (PANDANACEAE) Tha-baw: It usually grows near wet land. Its leaf is used to make mats. First, the leaves are cut from the plant and left to dry. When dry, the spines are discarded and the leaves split into thin strips and woven into mats.

Dillenia indica L. (DILLENACEAE) Tha byu: Its wood is a high value timber. Its fruit is used to cook a traditional sour soup. It is important as fuel wood for domestic purposes.

Cajanus cava (L.) Mills. (FABACEAE) Pe-sin-ngon: It is a cultivated species in the region. Sometimes local people use the fruit as a snack after boiling.

Glochidion glaucifolium Muell. Arg. (EUPHORBIACEAE) Hta-ma-sok: It is not a cultivar. The leaves are used for dyeing, being especially used for dyeing fishing nets to make them durable.

Licuala peltata Roxb. (ARECACEAE) Sa-lu: It is not a cultivar. Traditionally, the leaves are used by local people as thread and provides occupation for them.

Flagellaria indica L. (FLAGELLARIACEAE) Myuk-kyaine: It attains a length of 200 feet and is used instead of ropes, particularly in making timber-rafts and in basket-work.

5. Plant utilization for medicine

There are 16 families and 16 species of plants used for medicinal purposes in the Gwa region. Some are used for a single purpose, while some are multi-purpose and utilized as traditional medicine, food, agricultural tool, firewood and house-timber. Nga-yoke-khar (*Andrographis paniculata* Nees.), Indine-se-ni (*Ochma fruticulosa* Kz.), Ka-du (*Blumea virens*), Let-pan (*Bombax ceiba* L.), Than-that (*Stereospermum fimbriatum* L.), Ka-law (*Gynocardia odorata* R.B.), Sin-na-maung (*Heliotropium indicum* L.), Taw-sa-be (*Jasminum angustifolium* L.), Naga-mauk (*Lea nequata* L.), Kyi-baung (*Loranthus pentapetalus* Roxb.), Pin-ku-htak-pake (*Leucas cephalotes* Spreng.), Taung-pet-won (*Mallotus cochinchinensis* Lour.), Lauk-ya (*Schima khasiana* Dyer.), Kha-yan-ka-zuk (*Solanum trilobatum* L.), Taline-noe (*Willughbeia edulis* Roxb.) and Taung-ohn (*Arenga saccharifera* L.) are well-known and important in traditional herbal medicine.

Andrographis paniculata Nees. (ACANTHACEAE) Nga-yoke-khar: This species is useful only for medicinal purpose. The paste of some parts of the plant is a bitter tonic which is used to treat malaria and liver disorders. The paste is also used as an antidote for snake bite.

Arenga saccharifera Labill. (ARECACEAE) Taung-ohn: It is found in the deep forest. The base of the leaf-stalk produces a fine horse hair-like fibre, with the sheaths another fibre of good quality. The fibres are utilized for filtering water, caulking boats, making ropes for underwater use, and as brushes.

Blumea virens DC. (ASTERACEAE) Ka-du: Both the seed and the leaf of this plant are useful as medicine. The leaves are applied on wounds and an infusion of the leaves is used as a tonic. The seed is used as an appetizer.

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Bombax ceiba L. (BOMBACACEAE) Let-pan: This plant is utilized only as medicine. Its root is used as a tonic for impotency and the seed is also applied on small-pox boils.

Gynocardia odorata R.B. (FLACOURTIACEAE) Ka-law: This plant is utilized for medicine. A decoction of the bark is used as a pain killer, and a powder of the bark is used as a purgative. It is also used for diarrhea, dysentery and cholera. In addition, it is used as an antidote for snake bite in this area.

Heliotropium indicum L. (BORAGINACEAE) Sin-na-maung: All parts of this plant are used as medicine. It is a cure for nervous disorders and chronic fever.

Jasminum angustifolium Vahl. (OLEACEAE) Taw-sa-be: The leaf and root are useful as medicine, the leaf being a good remedy for persistent ulcers and skin diseases, and the root an antidote for snake bite.

Leea nequata L. (LEEACEAE) Na-ga-mauk: The leaf of this plant is used to cure chronic fever while the tuber is used as a liniment for pain.

Loranthus pentapetalus Roxb. (LORANTHACEAE) Kyi-baung: The fruit is used as a laxative and it is also used to treat asthma.

Leucas cephalotes Spreng. (LAMIACEAE) Pin-ku-htak-pake: The root and paste are useful for traditional medicine. Paste is applied as an antidote to snakebite and is also provided relief from fever. It is used to cure severe headache and insect strings and particularly root paste is used to treat asthma.

Mallotus cochinchinensis Lour. (EUPHOBIAEAE) Taung-pet-won: The bark is utilized to cure coughs and headaches and to lower pressure.

Ochna fruticulosa Kz. (OCHNACEAE) Indine-se-ni: An extract of the whole plant is taken orally as an antidote for snake bite as well as applied externally on the snake bite. It relieves asthma and is used to cure the pox and measles, dysentery and diarrhea.

Schima khasiana Dyer. (THEACEAE) Lauk ya: The paste of the leaf is applied on cuts and wounds as an antiseptic and to check bleeding.

Solanum trilobatum L. (SOLANACEAE) Kha-yan-kazuk: The leaf is taken orally to relieve liver and skin diseases, the fruit is used to treat eye diseases, and a decoction of the seeds is given orally to mothers after birth for reshaping the body.

Stereospermum fimbriatum (Wall. ex G. Don.) A. DC. (BIGNONIACEAE) Than-that: A juice of the leaves is used as tonic and obliquor. The juice mixed with honey or liquor is taken orally to cure ringworm infection.

Willughbeia edulis Roxb. (APOCYNACEAE) Taline-noe: The resin is used to treat wounds and sores.

6. Plant utilization as cultivated crops

In Gwa region, there are 19 families and 36 cultivated species. The major species are Saba (*Oryza sativa* L.), Jyon (*Riticum aestivum* L.), Pyawn (*Zea mays* L.), Sat (*Setaria italica* L.),

Mye pe (*Arachis hypogaea* L.), Hnan (*Sesamun indecum* D C.), Nay gyar (*Tithonia diversifolia* A. Gray.), Su pan (*Mahonia thunbergii* DC.), Si ohn (*Elaeis guineensis* Jacq.), Bo cate/ Pe lun (*Vigna catjang* Walp.), Bo sa pe (*Phaseolus vulgaris* L.), Htaw bat pe / Pe gya (*Phaseolus lunatus* L.), Kalape (*Cicer arietinum* L.), Pe boke (*Glycine max* (L.) Merr), Mat pe (*Phaseolus mungo* L.), Pe byu gale / Pe gyi (*Lablab niger* Medik.), Pe di sein/ Penauk (*Phaseolus radiatus* L.), Pe ya za (*Lens culinaris* Medic.), Pe yin (*Phaseolus calcaratus* L.), Sa daw pe (*Pisum sativum* L.), Ra ba (*Hevea brasiliensis* (Willd. ex A. Juss.) Muell. Arg.), Ohn (*Cocos nucifera* L.), Ngayok (*Capsicum annuum* L.), Kyetthun-ni (*Allium ascalonicum* L.), Kyetthun-byu (*Allium sativum* L.), Monyin (*Cardamine hirsuta* L.), Kazun (*Ipomoea batatas*), Tha khwa (*Cucumis melo* Duthie & Fuller), Thabyu (*Dillenia indica* L), Pe taunk shi (*Vigna catjang* Walp.), Danyin (*Abarema bigemina*), Kamonchin (*Acacia concinna* DC.), Su boke (*Acacia megaladena* Desv.), Yakhine ngpaw (*Musa sapientum* L.), Myaik (*Melocanna baccifera* (Roxb.) Kurz), Phalan taung mway (*Costus speciosus* Smith.), Dani (*Nypa fruticans* Wurm.), Thanaphet (*Cordia dichotoma* Forst.) and Myet (various kinds). The cereal group cultivated for food consists of 1 family and 4 species. The oilseed group cultivated for food and oil contains 5 families and 5 species. Pea and beans group cultivated for local food as well as for commercial purposes includes 1 family and 11 species. The rubber and coconut group consists of 2 families and 2 species and is used for food and industrial use, as oil and charcoal. The last group, species and condiments, has 2 families and 3 species. There are 8 families and 10 species used as vegetables.

Conclusion and Recommendation

The economic situation in the Gwa region is based on the maintenance of sustainable natural resources. Fortunately, there is a great variety of ecosystems including cropland, grassland, woodland, coastal forest land, and tropical forest land, together with the sea, Bay of Bengal, island and mountain, to benefit the local community. In particular, rural people in the region have the best opportunities in terms of natural environment and the rich marine fauna species. Economic development in the region is based on natural resources – marine aquatic species, forest resources and plant species – which are also used in the agricultural sector and in ecotourism. However, if the people think of the natural resources as a simple gift of nature to them, then, this can be an impediment to sustainable environmental development. There is a total of 123 plant species in Ywar-thit-kone, Ya-hine-ka-do and Ma-gyi-ngu, and they help support the socio-economic life of the local people. There are 36 cultivated species and 19 families. The cultivated crops and the other plant species are mainly used for food, oil, vegetable and commercial purposes, including the legal and illegal extraction of timber and bamboo, with Ywar-thit-kone as the major village followed by Ya-hine-ka-do. This utilization can have a negative impact on nature and biodiversity conservation. Plant species utilization rate is high in Gwa region, and there are threats to wild plant species in its firewood utilization, medicinal plants utilization, agricultural tools utilization, food utilization, timber and bamboo use for commercial trade and house-timber utilization. Generally, plant utilization in the form of timber for commercial trade, house-timber, firewood and medicine are overwhelmingly significant factors in species extinction.

Taung-pain (*Artocarpus chaplasha* Roxb.), Thin-gan (*Hopsea odorata* Roxb.), Pein-ne-pho (*Palaquium polyanthum* Merr.) and Ka-nyaung (*Shorea thorelii* Pierre ex Laness.) are extracted for legal and illegal markets, with Taung-pain (*Artocarpus chaplasha* Roxb.) having the biggest

demand in the market. The status of Ka-nyaung (*Shorea thorelii* Pierre ex Laness.) has been decreasing in the present compared with the past. In general, all plant species are decreasing year by year, with plant utilization as the most serious issue, followed by utilization as traditional medicine.

In terms of marine resources, the major products of marine resources are fish, crab, prawn, lobster, sea cucumber, molluscar and others. Marine fish breeding is vital for the regional economy. The catching of fish and prawn is also a traditional occupation of the local people. More recently, ecotourism is also available in Kanntharyar beach near Gwa. Thus, marine resources also help to support the socio-economic life of the local people.

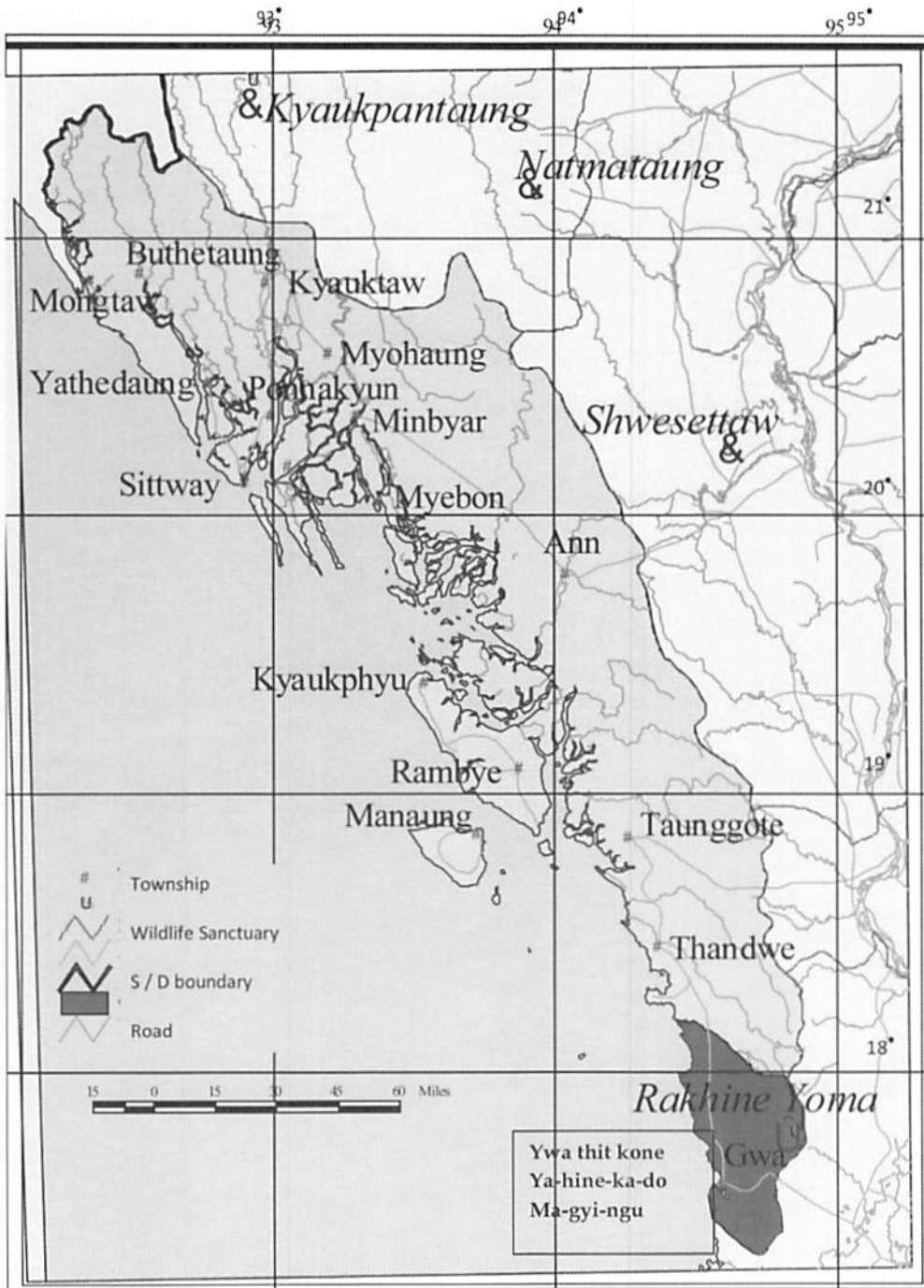
Recommendations for Future Study

- (1) Gwa region needs to monitor the situation of a proper balance between natural resources utilization and resources survival in the present and in the near future.
- (2) Gwa region needs to conduct a forest community research project in depth so that plant species taxonomy can be better implemented at regional and national levels.
- (3) There is a need to initiate the control of wild flora species in Gwa region which is a major centre of forest products and also of cutting timber for illegal commercial purposes.
- (4) Gwa needs marine resource conservation projects, which is one of the ways to prevent coastal region degradation and damage.
- (5) GOs and NGOs in Gwa region need to pay more attention to develop ecotourism at present and in the future.

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Figure I the Study Area of Gwa Township in Rakhine State, Myanmar



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Fishery Activities Related to the Livelihood of the Local People in Gwa Township, Rakhine State

Pyone Aye

Introduction

This paper studies the livelihood of the local people in three villages and one ward in Gwa Township. The local people here are mainly engaged in fishery activities, and the study focuses on how the locals engage in this activity and how their products reach the market.

I. Study Area

Rakhine State (N. Lat 17°31' and 21°31', E. Long. 92°10' and 94°50'), located in the western part of Myanmar, is bounded by Chin State in the north, by Magwe, Bago and Ayeyarwady Divisions in the east, by Ayeyarwady Division in the south, by the Bay of Bengal in the west, and by Bangladesh in the northwest. The state has an area of 14,200 sq. miles (36,778 sq. kilometers) and consists of five districts (Buthidaung, Maungdaw, Sittway, Kyaukpyu and Thandwe) and 17 townships.

Rakhine State lies between the water parting of Rakhine Yoma and the Bay of Bengal, and many offshoots of the Rakhine Yoma come very close to the coast. The main river is the Kissapanadi (Kaladan) flowing from north to south in the northern part. Other rivers and streams are Mayu, Lemro, Dalat and Ann in the north, and Taunggok, Thandwe, Kyeintali, Sathwa and Gwa in the south.

Marine fisheries along the Rakhine coast are important resources which contribute to the economy of the State.

Myanmar possesses both freshwater and marine fisheries, but throughout the historical period and up to the mid-1950s, the majority of the Myanmar people preferred freshwater fish to marine fish, with only those living along the coast being accustomed to marine fish. However, since the transporting of marine fish from the coastal to the inland areas was started, people throughout the country have become accustomed to marine fish. Most of the marine fish of various kinds that are thus transported are from Rakhine State as the coastal waters of this State are rich in aquatic organisms, particularly fish.

The villages of Gwa Township are situated mainly along the banks of Gwa river. Initially, the villagers here worked in the fields. However, according to the villagers, the soil was unfavourable for agriculture. They thus switched to fishery, and the area became a marked fishing ground after the independence of Myanmar. Fishing increased after 1958 when it was realized that fishery products fetched a much higher income. In addition, according to the local people, Gwa Township was the earliest fishery area in Rakhine State.

Local people as well as people from Ayeyarwady Division and Upper Myanmar joined in the fishery activities.

Three fishing villages in Gwa Township, Yahaingkadoe, Mageengu and Ahleywa, well noted as fishing areas, were selected for the study of fishery activities related to the livelihood of the local people. The ward U Shwe Le Kone in Gwa Township, where a greater number of depots existed than in the chosen villages, was also surveyed for the same purpose.

II. Objectives

The main objectives in this study are:

- to assess the importance of the fishery sector;
- to study the activities related to fishery carried on by the local people in accordance with seasonal changes;
- to compare the income between fish depot owners and fishermen;
- to study the relationship between communications and fishery activities; and
- to understand the views of the local people regarding the management of fishery.

By fulfilling the proposed objectives this work aims to serve as a guide to those working on socio-economic matters.

III. Methodology

1. Survey period

Three survey trips during the months of July, November and December (2002-2003) were made during this study.

2. Accommodation and communications

Zinyaw, the Guest House in Gwa Township, was made the base for visiting the chosen villages and the ward. From this base, Ahleywa and Yahaingkato villages lay towards the north, U Shwe Le Kone ward to the south and Mageengu village to the southwest. There was no communication problem regarding Ahleywa village as it was close to the base and could be easily reached by walking. Travelling by a trishaw was usually an easier communication, as Yahaingkato village and the ward were not as close to the base as Ahleywa village. The farthest was Mageengu village which is in the southwest of Gwa Township. Travelling by motor boat from the jetty at U Shwe Le Kone ward was the only means of reaching the village.

3. Type of questions asked

Questions were asked related to the following:

- seasonal fish caught in the catch
- traditional methods of catching fish
- fishing methods and types of fishing gear utilized
- seasonal predominant fish species in the catch
- forms of marketing based on fish type

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- ways of marketing and transportation to other parts of the country
- type of fish of highest economic importance
- ratio of natives and immigrants in village population
- relationship between depot owners and fishermen with emphasis on benefited income
- problems faced by depot owners and fishermen

The views of depot owners and fishermen were assessed based on the answers to these questions.

IV. Findings

The two main fish species of economic value are *Sardinella spp.* (Nga-kone-nyo) and *Hilsa spp.* (Nga-tha-lauk), although assorted fishes, including groupers, are in the catch. Some fishermen work independently while some sign a contract with the depot owners. Those who work on contract have to send their catch regularly to their respective depot owners. Independent fishermen, on the other hand, sell their catch in the market after keeping aside some for their family. They might send their catch to the depots when they catch fish beyond their needs.

Fish catching is usually seasonal, depending on the fish species. The Nga-kone-nyo season lasts from April to August while the Nga-tha-lauk season is only in July, although it might extend into August. The season for assorted fishes lasts eight months from September to April. The assorted fishes are usually market fish but contract workers send their whole catch (the two main species plus the assorted fishes) to their respective depot owners. Live groupers are of more economic value than dead ones. Live groupers of good quality fetch a high price as the floating net-cage owners buy them and rear them in cages until they are of the desired size for exporting. The dead groupers taken to the depots together with other assorted fish are either frozen or dried and transported to various parts of the country. Nga-tha-lauk is frozen and Nga-kone-nyo salted, the freezing and salting of the fish taking place at the depots.

The Nga-kone-nyo season is the period when the villagers enjoy a better income. Almost all the villagers, both adults and youngsters, take part in the process of salting. The head of the Nga-kone-nyo is cut off and the internal viscera removed prior to salting. Thus, the busiest time for the villagers is during the Nga-kone-nyo season. The depot owner pays 10 kyats a viss for the cutting and removal of internal viscera. Each worker earns around 2,000 to 3,000 kyats daily depending on his efficiency in cutting and removing the internal viscera. The workers take the cut heads and internal viscera of Nga-kone-nyo to use as fish bait or to feed their domestic chicken and ducks. Experienced depot owners usually carry out the process of salting themselves. However, reliable fishermen who have a good relationship with the depot owners also aid in the salting when there is a large catch. Ten viss of Nga-kone-nyo requires three viss of salt. Salt sellers also benefit during the salting of Nga-kone-nyo as the demand for salt is highest during this period. The Nga-kone-nyo is sometimes salted and dried whole when the weather is suitable for drying fish. However, such occasions are rare.

There is a canning factory in Yahaingkato village, this being the only canning factory in Gwa Township. It is from this factory that canned Nga-kone-nyo is sent to Yangon and distributed to all parts of this country. However, the factory is limited in its capacity and capable of canning only 2,000 viss of Nga-kone-nyo daily. Fish for the factory is obtained from the depot owners who regularly send fresh Nga-kone-nyo to the factory. The workers in the canning factory are mainly youths (male as well as female) of that village and from nearby villages. The workers of the factory stay in separate male and female hostels in the factory. The male workers are paid 5,000 kyats and the female workers 4,000 kyats monthly. The male monthly salary is 1,000 kyats more because males carry out heavier manual work than females. The workers receive a bonus at the end of the Nga-kone-nyo fishing season, the amount of the bonus depending on the profits received by the factory. Work in the factory ends once the Nga-kone-nyo fishing season is over, and the workers of the factory then became general workers. Some of the workers go back to the factory for the next fishing season but most workers prefer to go for permanent jobs. The factory therefore has to recruit new workers in the next fishing season.

Depot owners provide fishing boats and fishing equipment for those who are on contract with them. They also make an advance of up to 20,000 kyats to the contract holders prior to the fishing season. The depot owners then deduct from the advance during the fishing season when the contract holders bring in their catch to the depot, the deduction depending on the size of the catch.

The deduction from the advance is made at the first delivery when the catch is good. However, when the Nga-kone-nyo season is unfavourable, the depot owners deduct only a partial amount after each catch. In some cases, the contract holder needs to work for another fishing season until the depot owner gets back his full advance. The contract holder has to pay back the remaining amount of the advance if he no longer wishes to work with the same depot owner.

The catch of Nga-kone-nyo is from 1,000 to 2,000 viss when the season is favourable. In Yahainghato village, the contract holder gets one-third and the depot owner two-thirds of the total sales, while in Mageengu village the total sales is shared equally. The captain of the fishing vessel receives 15% of the total sales plus his portion of the one-third crew's share. The depot owners also give a certain amount of fish to the contract holders for home consumption.

The busiest fishing season for Nga-tha-lauk is July. This fish is merely frozen and no other processing is necessary as in the Nga-kone-nyo. Frozen forms came into existence only after 1990. Fresh fish is mainly for local markets while the salted and frozen forms are for transportation to various parts of the country.

The same conditions with regard to depot owners and contract holders apply for Nga-tha-lauk as for Nga-kone-nyo. The only difference is that the ratio of 1:2 in the division of income between contract holders and depot owners is the same in all surveyed villages and ward. Independent workers also participate in the fishing of Nga-tha-lauk on the same basis as in the Nga-kone-nyo. The depot owners buy the fish in the catches either by individual weight or in the mass. The depot owners give 1,000 kyats for each fish in the weight range 8-10 kg, and 700 kyats for a fish in the weight range 3-5 kg. Consumers favour Nga-tha-lauk of these weights. Smaller sized fish are sold in the mass at 200 kyats per viss (1.6 kg).

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The Nga-tha-lauk is an offshore fish and the expenditure for its fishing is greater than that for the Nga-kone-nyo. The higher cost of Nga-tha-lauk fishing is due to the greater quantity of fuel utilized for the fishing vessel which has to travel from Gwa right up to Thabaung in Ayeyarwady Division. The ice needed for freezing the fish also adds to the cost.

Independent workers do not owe any obligation to the depot owners; they have more freedom than the contract holders and lead a simple and peaceful life. They fish at will, either for their own consumption or for marketing to get a certain income to meet their requirements. They convert to other jobs when not fishing; these other jobs include carpentry (Ahleywa), processing of coconut products (Mageegnu), and general work such as repairing fishing nets and maintaining fishing vessels (in all surveyed sites). They prefer to lead their own simple and contented life.

Depot owners and contract holders are mainly immigrants come from various parts of Myanmar for their own benefit. Conflicts usually occur between depot owners and contract holders with problems arising when the other party becomes disloyal. Depot owners who mainly work for their own benefit are lacking in consideration, while unfaithful contract holders cheat the depot owners by not delivering their fish catch regularly. The partnership then lasts for only one fishing season.

Unfavourable weather sometimes prevents the fishing vessels from going out to sea for quite some time. Both depot owners and contract holders then face serious problems. The depot owner has to take care of the welfare of the captain and crew of the fishing vessel. The members of the fishing vessel would have spent most of the advance payment given to them by the depot owner before the fishing starts. The depot owner thus requires more money to meet the demands of the workers. A bank loan is the only source. Here again, a bank loan is not an easy solution since bankers give loans only to those who can declare their assets and there is a serious problem for the depot owner who cannot show his assets. The members of the fishing vessel double their debt by taking a second advance payment before they have paid back the first.

Both depot owners and members of the fishing vessel have to work extra hard to make up for the loss when fine weather approaches, especially in the Nga-kone-nyo season. This is because the Nga-kone-nyo provides more income than the Nga-tha-lauk as the fishing season is longer in the former (5 months) than in the latter (usually one month). The local people say that storms during bad weather change the course of the currents, and that this in turn affects the passage of the Nga-kone-nyo, and the normal fishing ground of the fish is destroyed. The local people also claim that new fishing gear other than the drift gin net and more developed methods are also factors in destroying the normal fishing ground.

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Conclusion

The following conclusions can be made based on observation during the survey:

Independent workers

- independent workers have much more freedom than contract holders although their income may not be regular
- most independent workers are natives of the villages and the ward surveyed
- independent workers still maintain concepts of a rural life
- independent workers lead a simple and contented life
- independent workers obtain their food mainly from the sea
- traditional methods of fishing (utilizing fishing pot) is still practiced by independent workers
- independent workers are ignorant of more developed fishing methods as most of them are illiterate
- experienced independent workers have a better knowledge of fishing grounds and weather conditions than the immigrants

Depot owners and contract holders

- depot owners providing the fishing requisites benefit more than the contract holders
- the amount of investment depends on the wealth of the depot owners
- good relations between depot owners and contract holders are most important in making their partnership last
- the income received by contract holders lasts for only one fishing season
- contract holders lose their job when they are disloyal

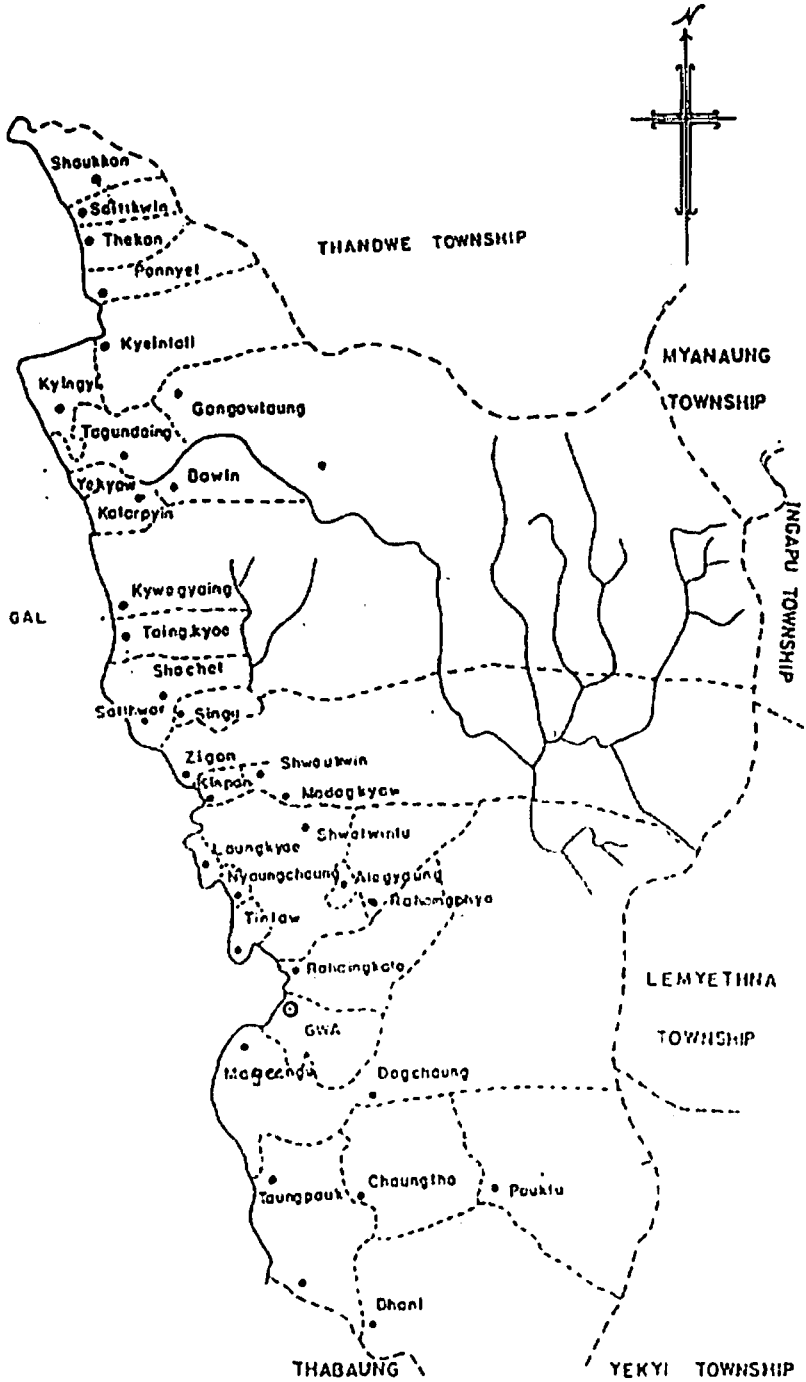
General

- weather conditions play an important role in the success of fish catches
- fishing grounds shift when there are changes in the course of water currents due to bad weather conditions
- depot owners as well as contract holders face serious problems in bad weather conditions
- the economy of Gwa Township suffers when Nga-kone-nyo catches are low
- the standard of living has not improved in rural areas in accordance with the recent developments in fishing

Finally, the immigrants need to develop good relations with the natives and make them aware that their presence will result in mutual benefits without adversely affecting the means of livelihood of the natives. Unity and loyalty between the depot owners and contract holders is also essential for their work together to be successful.

Fishery Activities Related to the Livelihood of the Local People

Fig. 1. Map of Gwa Township, Rakhine State



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Fishing Industry of Taungote, Thandwe and Gwa Townships

Thida Khaing

Introduction

Because of its long coastline and limited land available for agriculture, Rakhine has traditionally had fishing as a major occupation. More recently, the development of markets beyond Rakhine State, including overseas markets, has brought about new developments in this traditional occupation. The present paper studies the fishing industry of three townships in southern Rakhine – Taungote, Thandwe and Gwa Townships – to highlight these recent changes.

I. Physical Features

1. Location and Size

Thandwe, Taungote and Gwa Townships are included in Thandwe district. Thandwe district is one of the five districts of Rakhine State and is located in the southern portion of the Rakhine coastal strip of Myanmar. The districts included in Rakhine State are Sittwe, Kyaukpyu, Maungtaw, Buthitaung and Thandwe. It lies between north latitude 17° 20' and 19° 33' and between east longitude 93° 58' and 94° 55'.

These three townships are bordered by Ann township of Kyaukpyu district in the north, Thayet, Pyay, Pathein and Hinthada districts in the east, Pathein district in the south, and the coastal shore provides the western border.

Thandwe, Taungote and Gwa townships have an area of 4,152 square miles; as the area of Rakhine State is 14,200 square miles, this is about 29% of the total state area. At its longest, it is 164 miles, at its widest 39 miles.

2. Climate

The type of climate of these townships is the Summer Monsoon climate. Like other parts of Myanmar these townships have distinct wet and dry periods. The total normal annual rainfall of Taungote is 198.38", of Thandwe 244.08" and of Gwa 157.96". The percentage of rainfall of the wet season, May to October, of the annual rainfall is 97.7% at Thandwe, 97.5% at Taungote and 97.8% at Gwa.

These townships can be hit by depressions and cyclones of the Bay of Bengal in the pre-monsoon months of April and May and also in the post-monsoon months of October and November. The storms of the pre-monsoon period are more severe and can be accompanied by sea surges if astronomical tidal conditions are favourable.

The rainy season begins with the arrival of the southwest monsoon in the last week of May. The onset of the monsoon may be one week to ten days earlier or later than the

normal date of 25 May. In the pre- monsoon month of April and May there may be rain due to the tropical cyclones of the Bay of Bengal and upper level weather disturbances moving eastward. These pre-monsoon cyclones cause heavy rains, strong winds and sea surges causing damages. The rainy season rainfall is generally reckoned as the rainfall of May to October, which accounts for 99% of the total annual rainfall in all the three townships. During the rainy season, July rainfall is the most abundant. The copious rainfall, wind and storm, and sea-surges can be very dangerous to the fishermen of Rakhine State.

The southwest monsoon withdraws from south Rakhine State between the end of September and the middle of October, and is followed by the cool season which lasts until the end of February. In the cool season, weather conditions are generally fair and the prevailing wind is from northeast and northwest, with northwesterly winds bringing colder air. Rainfall during the cool season is very scanty, the normal rainfall of the three townships in this season being less than 3".

The hot season is from late February until the onset of the southwest monsoon in late May. Since these townships are on the coast, maritime influence prevents extreme daytime temperatures during the hot season, and the difference between maximum and minimum temperatures in April and May is small. From the records available, April is the warmest month, with mean monthly temperatures over 95° F at Gwa and Thandwe.

In April and late May, afternoon thunder-squalls with accompanying tornadoes are possible. They affect limited areas but with very disastrous effects.

Tropical depressions and cyclones affect the area and those of April and May can hit the coast with sea-surges often 10' high and some times 20' or more which can cause damage to the fishing industry along the coast and loss of property and life to offshore fisheries. Cyclone and depressions of the post-monsoon months of November and December are not so severe but can cause untimely rainfall in the area.

II. Marine Fishery

1. Myanmar Marine Fishery Resources

Marine fishes can be classified into five main categories depending on their environment.

Environmental conditions

- | | |
|--|--|
| 1. Mud-bottom fish | kakuyan (Indian thread fin), nga mote (pomfret), nga shwe (pike conger), nga yaung (sea catfish) |
| 2. Hard-bottom fish | nga parni (red snapper), nga bayin (silver bream), nga gon (grunt), kyauk nga (grouper), etc. |
| 3. Oceanic fish | nga meilon (yellowfin tuna), nga kunshut (Spanish mackerel), etc. |
| 4. Neritic fish / on continental shelf | nga nitu (anchovy), nga konnyo (sardine), nga kunshut (Spanish mackerel), etc. |

5. Coral fish nga leikpyar (butterfly fish), nga kyaymar (soldier fish),
kyauk nga (giant grouper), nga phaung yoe (rough fluke
mouth), etc.

Shrimps are usually found at the muddy sea bottom hiding among mud and sand during daytime, only exposing their antenna. They come out from their hiding places for feeding during night time.

2. Marine Fishery in Rakhine

The length of the Myanmar coast, stretching from the Naaf river mouth to Kawthaung, is about 1,760 miles. The area of the Myanmar continental shelf is 82,200 square miles and there are many offshore islands, large and small, studded along the coast. The area of the fishing zone at a depth of 100 fathoms is 64,700 square miles. The Rakhine coastline is about 630 miles and the area of the Rakhine continental shelf is 16,000 square miles. The coastline of the three townships studied is 164 miles long. Fishing is carried on along the coastal areas and inlets and also within the inland rivers and streams.

There are abundant aquatic plants such as algae and planktons providing food for fish especially during the months of December to May. Thus the Rakhine coastal areas are quite favourable for marine fishery. Marine products and fishes caught include nga kunshut (Spanish mackerel), nga konnyo (sardine), nga meilon (tuna), yekhu (jelly fish), yengan pazun kyauk (tiger shrimp), nga nitu (anchovy) and nga tagun (hairtail). They are the most popular species of fishes caught in this area.

There are many fishing villages along the coast. In Taungote Township, Panhtaw, Khanyine, Pandin Karayaung, Faung Kharr, Khaung Laung Tu, Natkan Island, etc., are important fishing villages. In Thandwe Township, Singaung, Mazin, Ngapahi, Lintha, Myapyin, Thanpyu Chaing, Gaw, etc. In Gwa Township fishing is carried out at Laungkyo, Yahinekatoe, Kyauk Chun, Sauthwar Gwa Island, Kyeintali village.

In these townships marine fishery is carried on within 5 miles from the coastline. Ordinary and mechanized boats are used in daily fishing near the shore and motorboats of 20 horsepower and small ships are used when fishing further offshore.

Fish caught include kakadit (sea perch), nga mote (pomfret), nga kunshut (mackerel), nga parni (red snapper), kakuyan (Indian threadfin), nga thalauk (hilsa), yengan pazun kya (tiger shrimp), nga man (shark), crabs, nga konnyo (sardine), grouper, nga nitu (anchovy), yekhu (jelly fish), lobster, nga tagun (hairtail), nga yaung (sea catfish), etc. Of these fish products, jelly fish, lobster and crabs are exported and earn foreign exchange for Myanmar.

The three townships engage mainly in marine fishery. Fresh water fishing is carried on only to a small extent because inland fresh water can be obtained only during the rainy season.

3. Implements and Devices Used In Marine Fishery

Implements used in the marine fishery of these three townships include whiting gill net (three layer net), nga konnyo paik, kyawt paik, nga thalauk paik, hmyin paik, kyauk pazun paik (lobster net), kyauk kup paik, hook and line, trawl, etc.

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Whiting gill net (three layer net)

It is also known as mackerel gill net or nga byet paik. The net consists of two outer layers of six-inch mesh and a middle layer of three-inch mesh and is 20-22 yards long. Altogether 30 to 40 nets are used in catching fish.

Two or three fisherman are needed to use this net. They go out to about 5 nautical miles from the shore in a 10'-15' long mechanized vessel with a 5-6 horsepower engine. The nets are dropped when the tide ebbs. They let them drift and haul them in when the water rises with the tide. The catch includes nga byet, nga thalauk (hilsa), nga yaung (sea catfish), nga man (shark), nga pote thin (croaker), yengan pazun kyar (tiger shrimp), etc.

Kyawt paik

It is used within 5 nautical miles of the coast. Fishing by kyawt paik is carried out from September to April. It is 300 yards long and 62 yards wide and made of light material, such as nylon, and is closely knit. The upper part of the net is attached to floatable dried gourds (*bu thee*) while the lower ends are attached to copper rings.

A large vessel, 48' long and 9' wide, with a 18-20 horsepower engine is needed. Larger boats need about 20 fishermen and smaller boats need 5-7 fishermen for handling. The net is dropped from the large boat and the small boat and dragged along to round up schools of fish.

The main catches includes nga nitu (anchovy), nga konnyo (sardine), palatu, nga parni (snapper) and nga tagun (hairtail).

Hilsa gill net

It is used mainly in Taungote and Gwa Townships and is of the same type as the three layer net. It is made of nylon thread with the two outer layers being 6-ply nylon and the inner layer 3-ply nylon. The mesh of the two outer layers net is 9" and that of the inner layer is 4". The length of the net is 70 yards and the width is 9 yards.

To handle the nets 4 fishermen and 24' vessel with an under-20 horsepower engine is used. Fishing is usually done within 5 nautical miles from the shore.

Fishing is carried out during the monsoon season from June to November. One end of the net is released from the vessel across the tide and the whole net gradually released as the vessel moves along. The net vessel drifts with the tide and many marine species are trapped in the net. The main catch is nga thalauk (hilsa), nga yaung (sea catfish), and small sharks are also caught.

Nga konnyo paik (or) round net

Fishing with the nga konnyo net is carried on mainly in Thandwe and Gwa Townships during the rainy season. Each net is about 80 yards long and 17 yards wide. The upper part of the net is attached to floatable dried gourds while the lower edge of the net is attached to small pieces of lead.

Three men are needed to handle the net which is released into the water and left to drift with the current. When confronted with a school of fish the net is dragged into the

boat. Nga konnyo (sardine) is the main catch, about 1,000-2,000 viss being caught in one day.

Shrimp net (hmyin paik)

The fishermen of Taungote, Thandwe and Gwa Townships use this kind of net to catch shrimp for making *ngapi* (fish/shrimp paste). It is light and floatable with a ¼ inch mesh, and is usually 200 yards long and 12 yards wide.

Usually a small boat 42' long is used and about 20 men are needed in fishing. One end of the net is released from the shore as the boat goes out towards the sea. Then the other end of the net is dragged back towards the shore after rounding up a school of shrimps. It is a coastal means of fishing and small shrimps and fish (hmyin) are caught for making *ngapi*.

Trawling

The trawl is used for offshore fishing at Thabyu-chaing village in Thandwe Township where offshore fishing is most important.

A trawl is a conical net bag with a wide mouth fitted with weights on the ground rope and floats on the head rope. When the vessel is under way the net is kept open by two outer boards (door) wooden or iron structures which are towed by the warps attached forward of their centre so that they tend to diverge. The two other boards are tied to the net by bridles of rope or wire. These may be up to 200 yards long and sweep the seabed over a wide area.

In Thandwe Township, 26 companies are operating offshore fishing using 96 local vessels. The vessels take 20-25 days on a fishing trip. The catch by trawls include nga yaung (sea catfish), zinbya (illisha), nga gon (grunt), nga tagun (ribbon fish), etc.

III. Shrimp Culture

1. Lontha Shrimp Hatchery

The Department of Fisheries (DOF), assisted by the FAO (Food and Agriculture Organization), started on a project of shrimp culture development, the project's objectives being the development of backyard hatcheries and development of shrimp demonstration farms for attracting foreign participation in the shrimp farming industry.

The Inland Fisheries Development project established the Lontha shrimp hatchery in 1983 with a loan from the Asian Development Bank. The hatchery was completed during June 1993 and is currently operated by the Department of Fisheries (DOF).

The aim was to increase the production of shrimps which was in great demand in the world market and earn foreign exchange for Myanmar. Varieties which were in demand, such as giant fresh, water prawn (*Macrobrachium rosenbergii*) and jumbo tiger shrimp (*Penaeus monodon*) were selected for shrimp culture. In 1998, there were about 40,000 acres of traditional shrimp farms, mainly located in Rakhine State.

The marine shrimp hatchery of Lontha village is located 10 miles away from Thandwe Township and has an area of 14 acres. Local technicians now carry on the rearing of larvae

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and post larvae and other hatchery operations such as collection and selection of spawners, spawning, and hatching. The rate of salinity for hatching is 28-32 PPT (part per thousand), and at Lontha hatchery, the required rate of salinity can be obtained from December to June or for 7 months in the year. The stages of hatching include:

- (1) production of phytoplankton stock in the laboratory
- (2) growing of phytoplankton as feeds for rearing shrimp larvae
- (3) preparation of 28-32 PPT tanks for hatching
- (4) collection of fertilized spawners.
- (5) hatching and rearing of larvae.
- (6) rearing of post larvae.

At Lontha shrimp hatchery, hatching is done 5 times annually, at the rate of 2 million each time, 10 million PL per year being produced. The hatchery was initially designed to produce 12 million PL per year in 12 hatching ponds. To produce 2 million PL, about 5,000 tons of disease-free sea water at the salinity rate of 28-32 PPT is required

Table 1. Times of Hatching

Month	Hatching
April, May	1
June, July	1
October, November	1
December, January	1
February, March	1
Total	5

In October the work of cleaning and measuring the salinity of hatching tanks begins. As soon as hatching begins phytoplankton mass culture is also started. When seawater in the tank attains the salinity rate of 28-32 PPT, the work of collecting spawners is carried out with the aid of local fishermen using three-ply net. Then, within 12-18 hours, spawners are carried to the hatchery for selection and rearing in maturation tanks. After eyestalk ablation of females, spawners are left with males for spawning at the ratio of 2:1 for 6 to 8 days.

Then, from spawners of stage 3 and 4, female shrimps of over 9.5" (150-200 gram) are selected and put into the spawning tank. They lay eggs within 24 hours in the tank, and within 15-18 hours nauplius stage larvae are produced from the eggs.

After 6 stages of nauplius, 3 stages of zoea and 3 stages of mysis, post larvae are produced. It takes about 2 days to change from nauplius to zoea, and 4 to 6 days from zoea to mysis. From mysis to post larvae (PL) it takes 3 to 4 days. At PL stage (15-20 days) they are ready for distribution marketing and rearing in shrimp farms.

2. Feeding of Post Larvae

Post larvae are fed with natural organic feeds or phytoplankton. After feeding on natural organic feeds (algae) substitute feeds are added to the natural organic feeds. Survival rates differ with differences of feed.

It is better to give substitute feed 5 times a day instead of twice a day because there is more effective consumption by larvae and the avoidance of feed accumulation at the bottom of the tanks. The accumulation of feed and disposals at the bottom of tanks can bring about unnecessary disease and pollution of water in the tank and lessen the rate of survival.

At zoea stage natural feed plus substitute feed is given, but at mysis stage the required meat or protein is obtained by giving artemea to mysis. From zoea stage to mysis stage, movement is rather slow and only by heat killing of artemea and feeding can the survival rate of larvae be increased.

3. Change of Water

In rearing larvae the required substitute feed must always be tested and controlled without accumulation of feed at tank bottoms. Without the accumulation of feed at the bottom of the tank, the water quality can be maintained, not necessitating change. Unclean sea water must be treated with chlorine 15-20 PPM and blower, then left for 2-3 days to settle before being used. Natural seawater is passed through a rapid sand filter, then collected in tanks, treated with chlorine and blower, and tested in the filter bag before use.

In changes of water, the change of water temperature can affect the survival rate of larvae. At mysis stage 2, only 10% of water should be changed and the accumulated feed at the tank bottom extracted by siphon. At later mysis stages the change of not more than 20% of the water in the tank should be done on alternate days. Only at stage PL 15 are larvae harvested and transferred to another tank.

Before transferring, larvae tanks are washed out with fresh water, applied with formalin, then left to dry and evaporate for one day. At PL12 stage, raw seawater is used for changing 50% of water in the tank on alternate days. Raw seawater collected in the tanks is used without filter.

During summer when the temperature is high, larvae feeding is normal. In winter when the water temperature is below 25°C, feeding gets irregular. Thus rate of feed should be examined and controlled before feeding. Over stage PL 12, raw seawater is used, but survival rate gets higher and larvae are healthier.

At present the PL produced can be sent to farms within the region and also to Kyaukpyu area by car and motorboat. The PL source for shrimp farms in Yangon Division is also from DOF Lontha hatchery, PL being successfully transported from Lontha hatchery to both Ayeyarwady and Yangon Divisions.

Table 2. Annual Production of Hatchery

Year	Production (million)	Remarks
1993-94	6.45	July-March
1994-95	0.94	Nov-March
1995-96	0.46	Joint Venture Thai
1996-97	2.71	DOF I
1997-98	1.57	DOF

Source: Shrimp Hatchery (Lontha)

IV. Marine Shrimp Farming

1. Pond Preparation and Feeding

Myanmar has a long coastline of 1,760 miles and there are many rivers and streams flowing into the sea. Along the coastline, rivers, mouths and estuaries offer favourable sites and environmental conditions for natural breeding grounds of fish and shrimp, including economically important species in lagoons and estuaries of Rakhine coast.

At present fish and prawn farming is widely carried out. With the increase in the population of Myanmar the amount of fish and prawn required has also increased. Reliance on natural catch alone can bring about the depletion of fish and shrimp species; therefore, it is necessary to increase the production of fish and prawns not only for local consumption but also for export.

Table 3. Shrimp Farming Acreage

State / Division	Acres
Yangon	15,000
Ayeyarwady	40,000
Rakhine	40,000
Mon / Kayin	10,000
Tanintharyi	15,000
Total	120,000

Source: DOF

Marine shrimp farming is carried on in Taungote, Thandwe and Gwa Townships in mangroves swamps, uncultivable fallow wastelands and scientifically prepared shrimp ponds.

Before the raising of shrimp begins, land and water conservation works and building of bunds and sub-bunds resistant to high tides and other construction works are carried out. After digging and constructions of ponds, and one month before shrimp raising begins, soil

Fishing Industry of Taungote, Thandwe and Gwa Townships

pH value in the pond is tested. A marine shrimp pond should be about 2 acres wide and soil pH value of the selected site should be 6-7.

In a shrimp pond of about 2 acres, it is necessary to scatter 300 kg of quicklime into the bottom of the pond. About two days after the scattering of quicklime, the pond is filled with water. Filters are attached at water locks and pipes when filling and draining the pond with water to prevent the entering of carnivorous fishes. When filling the shrimp pond with water, natural fertilizers, chicken droppings and chemical fertilizers are scattered in the water. After the required amount of water (about 1 meter) is obtained, the temperature, cleanliness and p^h value of water in the pond is measured. After the required volume and conditions of water in the pond are obtained, tiger shrimp post larvae 15-20 brought from Lontha hatchery are put in to be raised.

As soon as shrimp raising is started, the quality of water in the pond should be tested daily for cleanliness. For marine shrimp culture, the temperature required is 22-23°C, the rate of clean water 25 cm at the lowest and 60 cm at the highest level, the rate of salinity 28 - 30 PPT, and the p^h value of water in the range 7.5-8.5.

Feeding begins from the day the PL 15-20 are put into the shrimp pond, feed being given 4 times a day from the time feeding starts to harvesting time, feed has to be increased gradually depending on the size and weight of the shrimps in the pond.

Ingredients in feed include dried fish dust, dried prawn dust, dried squid dust, sesamum cakes, soya beans, broken rice, maize flour, vitamin, minerals, etc.

A month before the harvesting of the shrimp, squid, grunt and small fishes are ground for feeding.

2. Change of Water and Harvesting

During the period of high tide shrimp ponds are filled using water locks and pipes. During low tides flow pumps are used to fill shrimp ponds. For filling and draining shrimp ponds, water pipes of diameter 4" to 6" are used. The change of water in the ponds is carried out from 3 to 20 times during the shrimp raising period.

During the shrimp raising period, feeding, change of water, checking of cleanliness, etc., are carried out daily. Beside habitation, survival rate, growth rate are always taken care of. Before and during the raising period, the occasional killing of wild fish is also carried out.

After the shrimp raising period of 4 months, harvesting can be started. In harvesting marine shrimps, the system is used of partially draining the water in the pond and, when the volume of water in the shrimp pond has been reduced, fishing nets are used to harvest shrimps. Continuous draining and harvesting by net is carried out until all the water in the pond is drained off and all the shrimps are harvested.

Tiger shrimps of sizes 4" to 6" are harvested after a period of over 4 months. In a shrimp pond of 4 acres, 100,000 shrimp PL are raised and, at the survival rate of 60-90 %, a total of over 11,000 kg tiger shrimps is harvested.

Problems and difficulties in marine shrimp farming include the high cost of preparation of a shrimp pond and difficulties of getting essential equipment and supplies such as diesel

oil and implements for measuring temperature, salinity and p" value of the water. Sometimes the PL arrival can be late, and the mortality rate can be high during the period of raising due to irregular climate and high tides.

Table 4. Shrimp Ponds of Thandwe District

Township	No. of farmers	Reserve	Acre		Total
			Scientific	Field	
Thandwe	16	1250.31	24.5	54.25	78.75
Taungot	10	485.04	6	140.00	146.00
Gwa	9	1131.70	-	68.00	68.00
Total	35	2867.05	30.5	262.25	292.75

Source : Department of Fisheries (Thandwe Township)

V. Dried and Smoked Fishery Products

About 50% of the catch of Taungote, Thandwe and Gwa Townships is sold to foreign companies, 30% is for local consumption while 20% is preserved by different means. Fish, shrimp and others are sun dried, smoked, mixed with salt, canned, or made into *ngapi*. The preserved products are either kept for local consumption or exported to Yangon.

The different kinds of fish and shrimp are classified and sun-dried on bamboo racks and shelves along coastal areas and seashores. In drying, the heads of big fishes are cut off, sliced, cleaned and salted. The amount of salt used is one-sixth or one-fourth of the weight of the fish. The fishes are left on racks and shelves and sun-dried for 3-4 days. 25-30 tical of dried fish is obtained from 1 viss of fresh fish. Fish used for drying include kakuyan (Indian threadfin), nga kunshut (mackerel), nga konnyo (sardine), nga tagun (hairtail), nga meilon (yellowfin tuna), shark, nga leikkyauk (ray), nga yang (sea catfish) and grouper.

Usually prawns caught together with sea fish by fishing traps and nets are sorted out and dried. The prawns are first cooked for 5 to 10 minutes in a big pan of boiled sea water, then drained and sun dried. The sun-dried prawns are then put into jute bags, beaten hard, then taken out and sifted and classified into first class dried prawn, second class dried prawn and prawn dust or particles. The prawn dust or particles is used as animal feed in poultry farms and fishery ponds. Only 1 viss of dried prawn is obtained from ten viss of fresh prawns.

As firewood can be obtained cheaply and some people prefer smoked fish, smoked fish and prawns are also made for sale. First of all the cleaned and cut fishes are put on green bamboo shelves. A slow fire is prepared under the shelves and the fish or prawns are smoked slowly for 6-12 hours. Fish preserved by smoking include nga leikkyauk (rays), sharks, nga parni (red snapper), grouper and nga shwe (pike conger). Smoked prawns are made during the rainy season.

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In making sun dried and smoke dried prawns, the dried skin, head and interior particles and dust are collected and used as feed for chicken, fish and prawn.

Small fishes and prawn (hmyin) gathered from the Rakhine coastal region are used for making hmyin ngapi (prawn paste). A hundred viss of small fish and prawn is mixed with 30-40 viss of salt, drained, and then sun dried. After that they are pounded and sun dried again. After sun drying the pounded paste 2-3 times, the hmyin ngapi is obtained, 40 viss of hmyin ngapi being obtained from 100 viss of fresh hmyin.

VI. Production of Fish and Prawn

The annual production of fish and prawn in Thandwe Township increased gradually during the period 1990-91 to 1996-97, the highest production being in 1993-94, when 4,186,000 viss was produced. The annual production of fish and prawn in Gwa Township also increased, with the highest in 1997-98 when 2,277,000 viss was produced. In Taunggote Township, the annual production in 1990-91 was 1,305,000 viss, and it decreased, the lowest being in 1995-96 when 990,000 viss was produced.

In Rakhine State, the annual production of fish and prawns gradually increased from 24,695,000 viss in 1990-91 to the highest in 1996-97 when 36,126,000 viss was produced. In 1996-97 the annual production of the three townships studied amounted to 6,242,000 thousand viss or 17.27 per cent of the annual production of Rakhine State.

Table 5. Production of Fish and Prawn ('000 viss)

Year	Rakhine State	Thandwe	Taunggote	Gwa
1990-91	24,695	2,520	1,305	1,800
1991-92	24,775	3,283	1,300	1,250
1992-93	31,463	3,493	1,000	1,000
1993-94	34,055	4,186	1,000	1,000
1994-95	26,438	3,200	1,000	1,652
1995-96	33,785	2,947	990	2,089
1996-97	36,126	3,034	1,031	2,177
1997-98	-	3,134	1,132	2,277

Source: Department of Fisheries

VII. Labour

It is necessary to develop a labour force for the establishment of commercial fishery. Fishing is seasonal and either the scale of operations must be large enough for the seasonal earnings to sustain the fishermen throughout the year, or supplementary workers must be available. There are many villages which earn their living by marine fishery. Marine fisheries differ depending on the equipment used. There is also a difference in the incomes received

by entrepreneurs and fishermen, with the products shared at the rate of 60% to entrepreneurs and 40 % to the fishermen.

In Thandwe District, there were 6,500 employed inshore fishermen and 5,200 offshore fishermen in 1998.

VIII. Distribution and Marketing

1. Purchase of Fishery Products

Since 1990 many companies have opened fishery purchase depots to which fishermen of nearby villages come to sell their marine products. In Thandwe, Taungote and Gwa Townships, companies compete in the purchase of such marine and fishery products as marine shrimp and fish, lobster, jelly fish, crabs, etc. The rise in price of fishery and marine products has stimulated the development of fishing activities in the coastal areas of Rakhine State.

2. Cold Storage and Transportation

Facilities like ice making, chilled storage freezing and cold storage are available along almost the entire coast where road connections are good with Yangon. At Thandwe, Taungote and Gwa Townships, fishery and marine products are collected and purchased, carefully stored, and packed. After that, they are sent to markets within Myanmar and also abroad.

In recent years, with the increase of shrimp and quality fish being processed and exported in a frozen condition, there are some new developments in storing shrimp, either frozen or iced. The Thabyu Chaing cold storage in Thandwe Township was built in 1985 on 6.75 acres of land. The factory produces 70 tons of ice per day and stores 200 tons and is the largest cold storage in Rakhine State for the collection and storage of fish, lobsters and marine products to be exported abroad to earn foreign exchange. It creates job opportunities and helps promote the living standard.

Marine fishery boats anchored along the shore indicate that transportation plays a major role for a perishable commodity like fish. When a large number of ordinary boats and motorized boats land their catches at many scattered coastal fishing villages, they are urgently distributed.

Transportation by carrier boats and trucks has developed in Rakhine State. Sea transport is the cheapest and most convenient means of transport for fish in Myanmar. Almost 95% of dried and salted fish, including fish paste and shrimp paste, is transported to Yangon by cargo vessels. Using sea transport these products are distributed from Rakhine (Mayo Bay Port, Thandwe Township) to upper and central Myanmar.

There is only one fair weather road linking the coastal fishing towns of Gwa, Kyaintali, Thandwe and Taungote. An all weather road links Taungote to Pyay, with the Nawaday bridge facilitating communications, and from there onwards to Yangon. In southern Rakhine, there is an earth and gravel fair weather road from Gwa through Ngathaingchaung to Yangon, crossing the Ayeyarwady river.

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Marketing of fresh and dried fish in Rakhine is done mainly by the private sector, and, to a small extent, by co-operatives. Due to the insufficiency of ice, the transportation of fresh fish is confined to a radius of 8-10 miles, and marketing is very limited. In most cases, the family members of fishermen themselves sell the fresh fish in towns near the landing centres. Most of the dried fish, salted fish, and shrimp paste from Rakhine (including, Thandwe, Taungote and Gwa Township) is transported to Yangon by schooners. From there they are sent to central and upper Myanmar by road and water.

In villages and towns there are specific areas in public markets for the display and sale of fish. These are mostly on the ground in villages, and on raised platforms in towns and cities. The sale of fish in most cases is by weight of viss (1 viss=1.633 kg).

The marine products are exported to foreign markets such as Thailand, Singapore, Malaysia, Japan and Korea from Yangon, and not directly from sources such as Taungote, Thandwe and Gwa Townships.

Conclusion

The coastal areas of Rakhine State, Ayeyarwady Division, Yangon Division, Mon State and Tanintharyi Division are the main producing areas of fish and shrimps. Myanmar with a long coastline of 1,760 miles (1,832 kilometers) and an extensive river system is rich in both marine and fresh water fish resources and the fishery sector is considerably important in Myanmar economy because fish constitutes a major export item for Myanmar. The export of Myanmar fishery products was started in 1972. In the 1996-97 budget year 64,700.82 MT of various fishery products, valued at US\$ 163 million, was exported to 33 countries. These fishery products are frozen, chilled, live and dried salted, and most of them are exported by sea freight in containers but also by air freight for chilled and live products.

Taungote, Thandwe and Gwa Townships in southern Rakhine State are favourably located with physical features which are most suitable for the development of fisheries. The proximity to the sea and the numerous rivers and creeks subjected to tidal influences are conducive for fishery and fish and shrimp farming. As a coastal area it receives abundant rainfall, one of the circumstances most required for fish and other aquatic species. Alluvial soils deposited by numerous rivers and streams also encourage the growth of fish in natural habits and in dugout ponds.

After 1988, private companies, co-operatives and joint ventures were also permitted to export marine products. Thus the production and export of fresh water and marine fish has increased. The high price of shrimp in the world market has also encouraged the development of shrimp exports from Myanmar at US\$ 5,000-7,000 per ton to US\$ 24,000 per ton for the best quality. The total income from fresh water and marine products has increased from US\$ 49.98 million in 1996 to US\$ 55.97 million in 1997.

Marine fish and shrimp products are chilled, frozen and dried before transportation for export. These exportable products need careful testing and screening to be free from disease, soft shell and spoilage bacteria in order to fetch high prices. Fish and shrimp should be transported in insulated plastic containers with ice and shrimp products at the ratio of 2: 1 and temperature of 0° C-5° C in order to avoid damage by bacteria, chemical and enzyme

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actions. The majority of fishermen are small producers with small capital investments, although the nature of their work is considered commercial fishery. Thus they lack the capital for the extension of large-scale fish and prawn farming and the conduct of fish and prawn research. The integration of small fishing enterprises to form large commercial firms with more capital and ability to employ scientific methods to improve and expand commercial fishery would provide better prospects. The Myanmar Livestock and Fisheries Development Bank Ltd was started on 15 February 1996 for the promotion of the production, distribution and marketing of marine products. Some of the problems concerning transportation have also been solved. Under the Foreign Investment Law, joint ventures were formed with foreign companies. They carried out fishing in deep sea areas of Myanmar waters, brackish waters shrimp farming, establishment and installation of fish meal plant, cold storage facilities and ice factory, distribution of fishing implements, production and marketing of fish and shrimp products. Therefore the prospect for the fishing industry in Thandwe, Taungote and Gwa Townships is bright.

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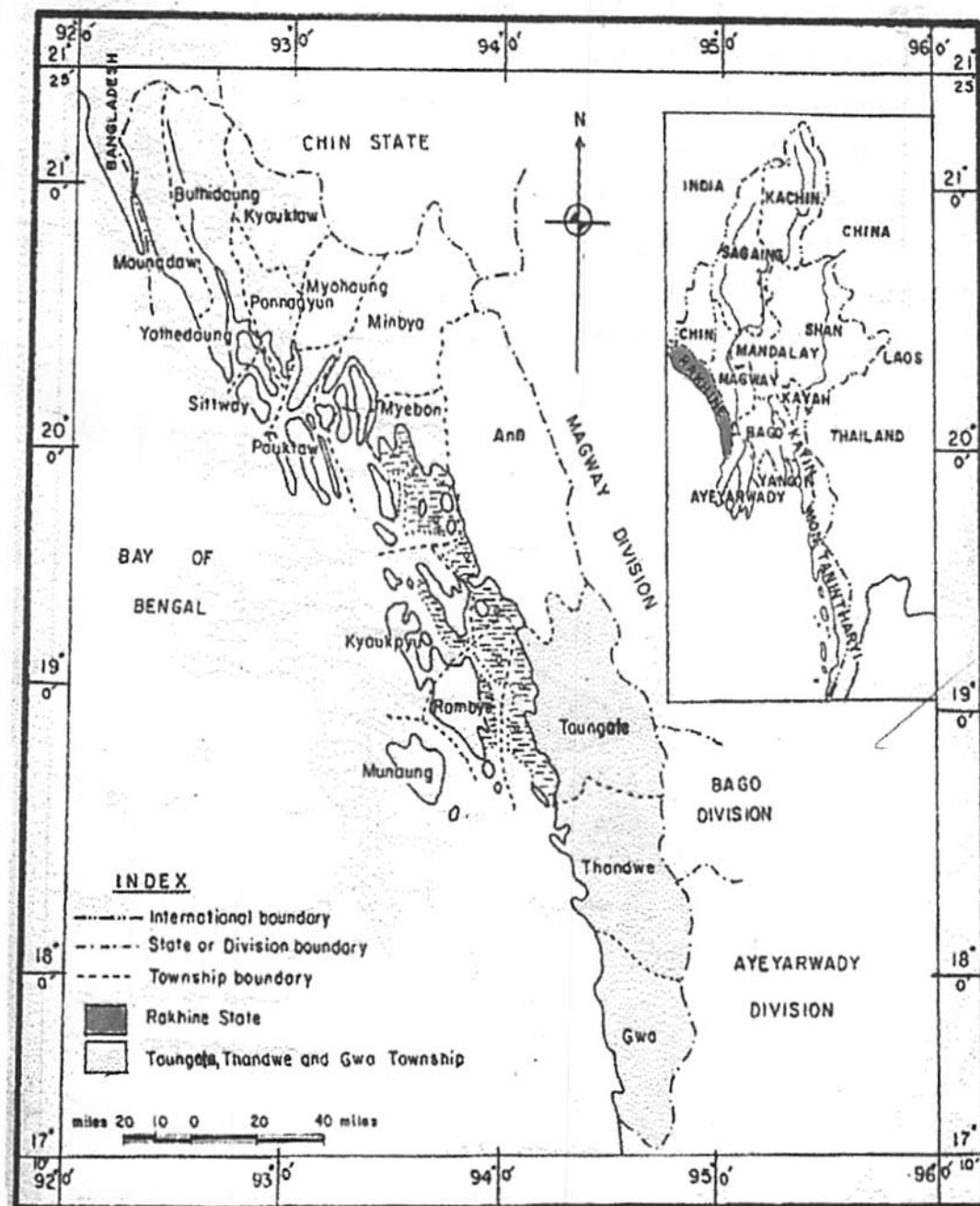
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Fig 1. Map Showing Taungote, Thantwe and Gwa Townships



Source: Myanmar Survey Department, Yangon.

Fish Resources and Fishery Systems in Rakhine State

OHNISHI Nobuhiro

Abstract

The fish resources of Gwa township were investigated in 2001-2003. A total of 155 species (51 families) were recorded from the market, fishermen, and fish traders. Gwa has a coastal area, a mangrove area, rivers and paddy fields. Thus, the diverse geographical configuration provides richness in fish species.

There are some fishery villages in Gwa, with Nga konenyo as one of the major products beginning from the 1970s. The traders deal in economically important fishes, most of which are shipped in the salted form or the salted dry form. The large-scale fishery enterprises provide employment opportunities and encourage internal migration of the people. Although large-scale fishery flourishes in Gwa, small fish dealers also sell minor fishes in the daily market. The richness of species provides opportunity for both large-scale fishery and small-scale fishery. Although some areas (ex. mangrove area) are not suitable for large-scale fishery the richness of species is high and these areas are good fishery grounds for small-scale fishery. Both large-scale and small-scale fishery depend on the richness of species in the area and provide employment opportunities for the people.

Introduction

The conservation of biodiversity is one of the important subjects in the world. Many conservation programs and researches are being conducted highlighting the present situation. This subject is also very important in the case of Myanmar, because Myanmar is famous for its richness in biodiversity. The richness of species is fundamental as resources for people and a variety of fishes are used for food resources in the coastal area. However, the use of biodiversity is not well understood. In general social systems always interact with resource use patterns. For example, there is much social cooperation in fishing, the processing of fish after landing, marketing and so on. Therefore, I try to clarify (1) the use of a variety of fish resources in a coastal region of Myanmar and (2) the relationship between socio-economic traits and the use of these fish resources.

Study Site and Study Methods:

This study was conducted in Gwa township, Rakhine State, Myanmar. Gwa is situated in the southern part of Rakhine State and faces the Bay of Bengal. The Gwa river runs into Gwa Bay. Mangrove forest occurs in brackish water areas. Thus, various water environment occur such as the marine area, the brackish water area and the fresh water area.

Field research was conducted from 25 November to 5 December 2001, 7-14 March 2002, 8-17 July 2003, and 18-20 December 2003. Interviews of fish sellers, fishermen and their

relatives were conducted and information regarding the fishes, fishery, their history and socio-economic traits were collected. Gwa, Yahaingato village, Magyeegu village, Gwa kannar village, and Aleywar kannar village were visited for the purpose of interviews. Fish specimens were collected for identifications and the specimens were preserved in 10% formalin solution. In most cases, photographs of specimens were taken just after fixation with formalin. Detailed identification is still in process. The local name is matched to the family name in this paper, the local name being obtained from the person who providing the specimen. The fish specimens were mainly collected from fish sellers in Gwa Myoma Ze. The names were collected from some fish traders and fishermen of the study areas. The method of nonparametric statistical analysis was used for all analysis.

Result and Discussion:

Fish Resources in Gwa

A total of 155 species (51 families) were collected during the survey (Table 1). The fishes consisted of marine fishes, brackish water fishes and fresh water fishes. There were 88 specie names for 132 species. Local names remained unknown for 23 species. For 64 species, the names indicated only one species. In 24 cases the fish names included two or more species (2.7 ± 1.1 ($n=24$), range 2-6). Perhaps the number of species included in a fish name is not correlated with the importance of fishes. The names Nga kyuwe, Nga tautoe and Nga bartar include 6, 5 and 5 species respectively. Nga kyuwe (Leiognathidae) is a small fish and is not an economically important specie; but Nga tautoe and Nga bartar (groupers, Serranidae) are valuable fishes because of their importance as export items to other countries (especially to China). Fishermen, fish traders and fish sellers are accustomed to use the common Myanmar name for some fishes but they use local names for other fishes (Mya Than Tun, 2001).

In the 'Check-list of fishes of Myanmar (1986)' and 'Marine fishes of Myanmar (2001)', 646 and 351 numbers of species are reported respectively. My research sources were restricted to fish traders and the daily fish market. Yet, 155 species were recorded during the short research period. This suggests that the species richness is high in Gwa.

Resource use in large-scale fishery activities

Brief history of the fishery in Gwa

According to the 'Burma Gazetteer Sandoway District Volume A', fishery was not a major occupation in this area previously. Some fishermen made fish products of Nga-nitu or Nga sitsali, but, the profit was very small, because the price of salted fish was low and the cost of upkeep of boat and nets was heavy.

Yahaingato village

In 1946 Yahaingato was the oldest fisherman village in Gwa. There were 120 households in the village during this period. The natives were Rakhine people and there were only 10 farmers in the village. The fishermen used to go to the sea by hand-propelled boats. Tan' was use for the fishing and Nga shwe, Nga yaw, Nga pani and Nga pie were caught by fishers.

1955: A fisherman from Dawei (Tanintharyi) took six skilled fishers to Yahaingato village. These fishers trained fishers in the village in many skills of fishing. Nga kuinsha-pai and Myo-pai were introduced in this period. Nga kuinsha, Nga maelon and Nga kyigan were caught with Nga kuinsha-pai. Nga nima, Nga unlon and Nga man were caught with Myo-pai. Nga leikya (ray) was caught with Tansakyar (trawl). The fish products were carried to Pathein by sailing boat between 1940 and 1955.

The voyage taking seven days. In 1956 a few motor boats were introduced. Forty fishermen worked in these motor boats. Fish light was introduced for Nga konenyo fishery. Four or five fish lights named Me-shuu were used as fish light, the Me-shuu being made of bamboo. The light was put on the tip of a bamboo 6 feet in length and one person on the boat held one Me-shuu. This method was contrived from the experience that Nga konenyo came to candle light during night fishing.

During the 1960s there was plenty of fish in the sea. However, sale was slack because consumption was low and fish was used as fertilizer for coconut trees. The price of fish was about 1kyat/10viss. The fishermen made a list of the customers requirements before sailing to the sea for fishing. Tan and Myo-pai were the major fishing equipment in this period. Nga konenyo was still a minor product. Nga pie, Nga shuwe, Nga yaw, Nga tautoe and Nga pani were caught. There were 5-10 boats in the village.

During the 1970s the fishing of Nga kuinsha and Nga konenyo became a major activities as these fish became major items with the introduction of trade with Yangon. The fishermen were able to catch large quantities of fish during this time. Sometimes, the fish was trapped in all the meshes of the nets and the net could not be seen because of the fish. Some fishermen tried to use Nga nyna-pie for Nga konenyo catching. Nga thalauk fishing was started in Sathwa. The fish was processed into salted form, because there was no ice factory and no ice was available.

In 1976 the fishermen started to send Nga konenyo in salted dry form to Yangon. Only a few fishermen traded Nga konenyo in this period. There were two transportation routes. In one, the fish was first sent from Yahaingato to Taungup by motor boat and then from Taungup to Yangon by car. In the other, the fish was sent by car via Thandwe. There were 40 boats with a crew of 4-5 persons on each. There were 200 households in the village. The increase in population was due to the immigration of fishermen who were encouraged by the existence of good fishery grounds here. Many Bamars immigrated from Ngathaingchaung during the period 1970-1985 and some immigrants invited their friends to Yahaingato. This ultimately resulted in the increase of population in this village.

After the 1980s fishes like Tan-Nga, Nga kuinsha, Nga konenyo and Kyaw-Nga were caught. Nga konenyo-pai was made with cotton in the 70s-80s, but, fishermen started to use the nylon net from 1992. The Gwa-Ngathaingchaung road was constructed in 1990. As a result they could send fishes more easily. An ice factory was constructed by the government in 1992. Ice factories were constructed in Gwa, Aleywar, and Kantharya and some groupers were shipped in frozen form. From 1995 fishermen started to ship Nga tautoe in alive form. Some fishermen started to use Thoung-tar-pai in 1998 and some Nga thalauk-pai in 2000. They were immigrants from Ayeyarwady division. At present there are 100 boats at their disposal.

Fishers recognize that fishery is not stable, however, sometimes fishers can get big money from fishery. Compared to fishery the farming is stable but farmers have to wait for a prolonged period for harvesting. Thus they are forced to select fishery as their jobs. This recognition may be depended on that most fishers landless or land lost persons.

Magyeegu village:

In 1985 there were 60 households in the village. Most of them worked as fishermen and there were 30-40 boats. However, fishery was not the main occupation in this period, because most of the villagers worked as general workers. The village was also not called a fishery village.

Between 1986 and 1990 there occurred several changes in Magyeegu village. The fishermen used Tan with the rowboat. They made Nga kyaw (dried fish) with Nga pani and Nga tautoe. Fishermen changed from their earlier fishing method to Nga konenyo-pai during this period. Nga konenyo was caught and shipped to Yangon in salted form. The price of salted Nga konenyo was 40 pya/viss. Light fishery was started after 1990. Light fishery was thought of as being introduced from Thailand. The method was introduced by Kyeiton (Thandwe) fishermen who learned the method in Myeik, Tanintharyi Division. There are over 200 households in the village at present.

Gwa kannar and Aleywar kannar villages

Fishes like Nga sessary, Nga nitu and Nga tagon are processed to a dried form in Gwa kannar and Aleywar kannar villages. However, these villages are not old but developed after 1990s. Only two fishermen stayed in these villages before 1988.

The major fish resources are marine fishes, such as, Nga konenyo, Nga thalauk, Nga sessary, Nga nitu, Nga tagon, Nga nyou, Nga kyigan, Nga shuwe and Nga tautoe in Gwa. These fishes are caught by large nets and/or Tan (trawl) with the help of a motor boat. These fishes are processed after catching. Some are salted, others are salted and dried, and others were frozen. This large-scale fishery activity provides employment opportunities to many unemployed persons. Adult men could get jobs as fishermen and adult women and children could get jobs in fish processing like making salted fish and salted dried fish after bringing the fish from the sea. This encouraged seasonal migration of workers into this area. The quantity of catch of the Nga konenyo and Nga thalauk largely increased after 1970s. These could not all be processed by Gwa people and many workers of Ngathaingchaung depended on fish processing for their jobs. As mentioned in the brief history, some of the workers settled and married in Gwa. Formerly Yahaingato was a Rakhine village. However, Yahaingato village is now inhabited by natives as well as migrants. As a result, most of the fishermen are not native people. People who are landless or have lost their land became fishermen. This suggests that large-scale fishery will work as a safety net for people's livelihood. After the construction of the ice factories, some fish was shipped in a frozen form. Preparing the frozen fish involved few processes because of it just meant storing in ice. If there is a shift to ship fishes in frozen form, the opportunity of women's jobs must be considered.

The contract system of employment also occurs in large-scale fishery activities (Table 2). There is a difference between old settlers and new settlers in the form of the contract. The old settlers work with the traders on an oral agreement, while the new settlers have to make a written contract on paper with the traders. If the workers did not keep the agreement, the traders could not take legal action in the case of an oral agreement. Although the traders faced defaulting of the contract, they did not make a written agreement. Moreover, workers could

sell fishes to other traders in the old settlement. The reason for these differences is not clear, but it suggests that social rules interact with resource use patterns.

Resource use in small-scale fishery activities

Large-scale fishery activities play an important economic role in Gwa. However, the fishes caught by large-scale fishery are not major fishes in the Gwa Myoma Ze. In the market, many other small species are available for the local people. The fish sellers sell 4.2 ± 3.3 ($n=26$) species of fishes in fresh form. The variety is richer in marine and brackish water fishes than fresh water fishes in both the dry and the rainy seasons (Table 3). The number of species also becomes different during the dry season and the rainy season.

Farmers catch fresh water fishes around the paddy areas. The fresh water fish is only Nga ku in the dry season. It should be mentioned that fresh water fishes can be sold even in the dry season. This shows that the farmers can generate additional income from fresh water fishery throughout the year.

The structure of the mangrove forest provides a habitat for fishes and the mangrove area is known as a nursery ground of young fishes. Fish eaters like *Platycephalidae*, *Serranidae* and *Sphyraenidae* also exist in the mangrove area. Thus, the fish species is rich in the mangrove area. However, this area is not used for large-scale fisheries, because the mangrove forest has a complex structure. Usually small-scale fishermen use the mangrove areas. The mangrove area also provided good fishery ground for the mangrove crab and prawns.

These paddy area mangrove area suitable for the small-scale fishermen. The geographical diversity and biodiversity may provide rich environments for small-scale fishery. The fishermen went to fishing with their family members and /or friends by the rowing boat. Fish traps, Tan, hand nets, small nets and spears were used in the small-scale fishery. For these equipments, the sea shore area was also suitable for the fishery ground. A few persons participated in the fishing group. These equipments are cheap and easy obtain. So, if people can get some small fishing equipment, they can be a fisher on the day. This small-scale fishery also may act as the safety net for the landless and/or the land lost people.

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Case Study on Role and Potential of Periodical Market toward Rural Development in Bangladesh and Myanmar

Usami Koichi and Saw Pyone Naing

Introduction

Whenever the rural development is discussed, the importance of being endogenous as well as sustainable is focused without any exception. Looking back at agricultural development so far in the developing countries, many efforts have been made to modernize technologies and increase the yield and the productivity. In fact, such production has achieved to a certain level. However, the fruit of development efforts are not fully returned to the enhancement of livelihood in the rural society. One of the reasons is that the access to market itself (the economic participation in market) is limited, where a variety of socio-economic energies are encouraged so that the information and opportunities are transacted. In other words, rural market is to be a center of transaction so as to facilitate the economic vitality with the endogenousness specific to the locality.

Therefore, the present study aims at investigating the state of rural market, especially import/export of goods and distribution channels etc., so that the rural market can be institutionally developed with a harmony with the endogenousness. Though the objectives are slightly different, the case study of Bangladesh is attached as Appendix I.

1. Methodology

The present case study was conducted in Gwa township and the neighboring villages of the southern Rakhine State (Figure 1). As a matter of fact, two coastal villages of Magyeengu and Yahainggato and one lowland/*Taunya* village of Ywathitgone were purposively selected.

The simple complete survey was conducted in Magyeengu and Ywathitgone (Table 1 and Table 2). The survey on market (which is held every morning) was conducted in Gwa township and Yahainggato. Besides, we interviewed with the shop-owners in Ywathitgone, Yahainggato and Magyeengu

2. Regulation for Market in Town Municipal Area

Gwa market is managed by Gwa Township Development Committee. Market in-charge, cleaning staff

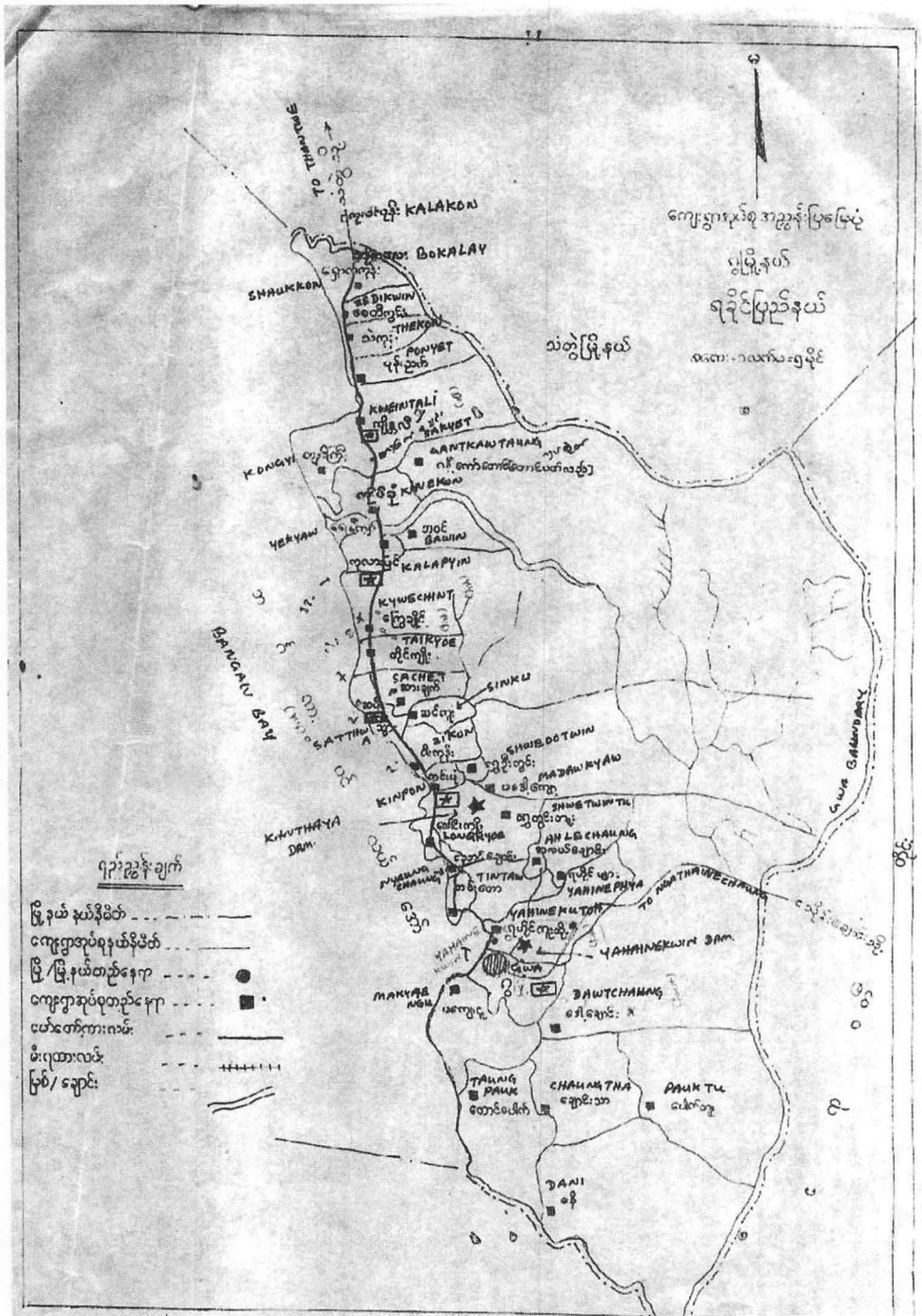
Table 1 Number of Households by Occupation* in Ywathitgone
(unit: household)

Occupation	No. of Households
Farming	39
<i>Taunya</i>	23
Fishery	5
Non-farming	17
Other	12

Note 1) *: regardless of main or secondary occupation.

2) Number of total sample households is 71.

Figure 1 Location of Gwa Township and Neighboring Villages



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Table 2 Number of Households by Occupation in Magyeengu
(unit: household)

Occupation	No. of Households
Fishery	119
Farming/Garden/Taunya	20
Laborer	10
Service	22
Trade/Merchant/Sale	31
Others	8

Source: Field Survey in 2003.

Note 1) *: regardless of main or secondary occupation.

2) Number of total sample households is 153.

Laborer are appointed by the Committee to inspect and maintain the facilities, manage the security and collect taxes from shop owners and vendors. According to the notification from Department of Development Affairs, several articles are AS follow:

- (1) Open at 6:00 a.m. every morning and close at 5:00 p.m. every evening.
- (2) The Committee should allocate the space to sell commodities inside or outside the building.
- (3) Shops, except meat shops (pork and beef), are allowed to rent for 1 year. If any shop owner wants to continue the present location, he/she can apply for another one year and use in the same rent if he/she does not violate the regulations.
- (4) If the applicant for one shop is more than one person, the Committee should prepare the auction.
- (5) Rent and tax are collected by market in-charge.
- (6) The Committee should define the spaces for vendors in a suitable place and should collect taxes from vendors.
- (7) The Committee can prepare the auction for the tax collection.

According to the interview with market in-charge, the vendor pays the tax of *Kyat* 30-50 per space while the shop owner pays the rent of *Kyat* 350-600 per month.

3. Vendors at Market

The morning market is an important supply source of perishable and fresh products like vegetable, fish and meat. The case studies in Gwa township and Yahainggato have found two types of vendor at the morning market. One is a vendor who practices the small shop (like 4 feet², 5 feet² and 10 feet²) on the ground without any shelter/roof. The other is a vendor who practices the small shop with a space rented in the building.

(1) Case of Gwa Township Market

We interviewed 55 vendors in November 22 and 37 vendors in November 23, 2002. Eighty nine two of the 89 sample vendors reside in Gwa Township. The other vendors come from the neighboring villages like Thauggyi, Chaungthagy, Kangyoo, Yinchaung and Aleywa within the distance of 40 minutes on foot or 30 minutes by boat. As a whole, their tenure is not proportional to their age. They are not always producer cum vendor. It is explained by the fact that they can procure products/goods from producers (like farmers and fishermen) and also from the wholesalers in the locality (Table 3). It is likely that some of them practice a Shop as a vendor at other

markets in Myomazay and Yahainggato, and operate a small retail shop at home or vend around neighboring villages.

Table 3 Sources of Goods Procurement by Vendors
Case of November 22
(unit: person)

Source	Vendor	Source	Vendor
Self	12	Big market	10
Yard/Garden	3	Wholesaler	12
Farmer	3	Retailer	1
Producer	14	Store/Houseshop	2
Fisherman	2		

Case of November 23
(unit: person)

Source	Vendor	Source	Vendor
Self	2	Producer	12
Farmer	3	Wholesaler	16
Gardener	3	Yangon	1

Source: Field Survey in 2002.

Note) Self: own production.

(1) Case of Yahainggato Market

It was established in 1996 when vendors were the main providers of foods etc. to consumers in Yahainggato. Later, the facilities were newly improved in 2002. It is managed by the Village Administration. Though no permanent shops, the tax is levied on the use of space (ground or facility), for instance minimum Kyat 10 to maximum Kyat 30. We interviewed 56 vendors in November 24, 2002. Thirty four out of the 56 sample vendors reside in Yahainggato. The other vendors come from the neighboring villages like Kyaungkon, Sapin, Gwa, Kwinyache, Aungchanthar, Kyaukkyi, Ngataichaung and Yahaingkywin within the distance of 15 minutes to 1 hour on foot or 2 miles. As a whole, their tenure is not proportional to their age. They are not always producer cum vendor. It is explained by the fact that they can procure products/goods from producers (like farmers and fishermen) and wholesalers in the locality (Table 4). It is likely that a few vendors practice a shop as a vendor at other markets in Gwa and Yahaingkywin.

Table 4 Sources of Goods Procurement by Vendors

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(unit: person)

Source	Vendor	Source	Vendor
Self (farming)	22	Fish	
Farmer		Fisherman	5
Yahainggato	6	Husband/Father/Brother	7
Yahaingkwin	5	Wholesaler	
Sintoe	1	Ngathaingchaung	1
Yahaingpya	5	Gwa	4
Aleywa	1	Yahaingkwin	1
Modwe	3	Yangon	4
Kwinyashe	3		

Source: Field Survey in 2002.

4. Import into and Export from the Locality

(1) From the viewpoint of livelihood

Hereinafter, using the data collected by the complete surveys in Magyeengu and Ywathitgone, the spatial expanse of market in the locality can be described from the viewpoint of sale and purchase activities in the livelihood.

In case of Magyeengu, being fishery village, agricultural products (for instance, rice, coconut, tobacco, groundnut, chilli and vegetable as minor and less goods) are exported by outside buyer, sold at the local market/shops or vended in the locality on one hand. On the other hand, fish (including dry fish) as major goods are mainly exported by local *Dais* (broker, merchant, agent etc.) (Table 5). The miscellaneous fish are marketed by vendors. Looking into the consumption, it is needless to say that is a core place of procurement Gwa which is located at the opposite bank. Besides, it is of interest that not a few residents procure goods at houseshops.

**Table 5 Places of Sale and Purchase to Residents in Magyeengu
(unit: household)**

Place	Number	Place	Number	Remark:
<Purchase> Gwa Depot	1	<Sale: fish> Gwa	16	sale of agricultural products Houseshop/vendor/buyer rice, coconut, tobacco, groundnut, chilli, vegetable Gwa Chaung <i>Dai</i> <i>khamauk</i> (hat) Vending/Gwa Market fish, prawn Gwa Depot/ <i>Dai</i> rice Vending vegetable
Gwa Market	80	Gwa Depot/ <i>Dai</i>	35	
Gwa	42	Magyeengu	30	
Gwa Caung	1	Depot/ <i>Dai</i>	18	
Magyeengu	23	Gyattaw	1	
Magyeengu Market	8	Army Society	1	
Houseshop	56	Yangon	10	
Vendor	5			
Thantwe	1			
Yangon	7			

Source: Field Survey in 2002.

Note) Number of total sample households is 153.

Table 6 Places of Sale and Purchase to Residents in Ywathitgone
(unit: household)

Place	Number	Place	Number	Place	Number
<Purchase>		<Sale:fish>		<Sale:agricultural products >	
Village	2	Yahainggato Dai	2	Dai (paddy)	1
Houseshop	18	Yahainggato	6	Ywathitgone	21
Vendor	4	Gwa	3	Village	2
Farmer	2	Kyaukkyi	1	Houseshop	1
Ywathitgone	30	Gatoe	1	Vendor	2
Ale Chaung	3	Ywathitgone	3	Yahainggato	34
Yahainggato	32			Gwa	11
Gwa	26			Ale Chaung	9
Gwa Market	3			Kyaukkyi	3

Source: Field Survey in 2002.

Note) Number of total sample households is 71.

In case of Ywathitgone, being far from Gwa Township (for instance, 1 hour by bus or 3 hours on foot), agricultural products from farmland and *Taunya* are exported to Yahainggato and market in Ywathitgone on one hand. On the other hand, the goods for consumption are procured not only from Ywathitgone but also from Yahainggato (Table 6). Besides, being similar to the case of Magyeengu, houseshops are the important places of purchase.

The frequency of sale and purchase in both villages is shown in Table 7 and Table 8. It is likely that their access to market is not so frequent as a whole and there is no clear tendency. For instance, a total of 81 households of Magyeengu who purchase from Gwa Market, Gwa, Magyeengu, Margyeengu Market or houseshops. Especially, it is 41 households who purchase daily at houseshops because that are the most convenient market in the locality. Besides, in case of Ywathitgone the most frequent purchases are daily to Ywathitgone (20 households), once a month to Yahainggato (5 households), once a month to Gwa (10 households). Similarly, in case of sale in Ywathitgone such frequencies are 2 in a week to Ywathitgone (3 households), 3 in a week to Ywathitgone (3 households), 3 in a week to Yahainggato (4 households), once a week to Yahainggato (4 households), 1 a month to Ale Chaung (3 households) and once a month to Gwa (4 households).

Table 7 Frequency of Purchase by Destination in Magyeengu
(unit: time)

Magyeengu	Magyeengu Market	Gwa Market	Gwa Depot	Gwa	Gwa Chaung
Daily (17)	Daily (6)	Daily (11)	1 to 2 a month (1)	Daily (6)	1 a week (1)
A few times (1)		3 a month (5)		2 a week (7)	
Sometimes (1)		2 to 3 a month (3)		1 a week (6)	
1 a week (1)		2 a month (9)		3 a week (2)	
2 a week (1)		1 a month (13)		1 a month (4)	
		2 a week (4)		Sometimes (4)	
		Sometimes (4)		2 a month (2)	
		1 a week (4)		1 a 2 weeks (1)	
		1 to 2 a month (2)		1 a 3 days (1)	
		1 a 2 days (3)		1 to 2 a week (1)	
		3 a week (2)		2 to 3 a year (1)	

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Houseshop	Vendor	Thantwe	Yangon
Daily (41)	Daily (2)	Sometimes (1)	1 to 2 a month (1)
1 a 2 to 3 days (2)	2 to 3 a day		1 a week (1)
1 a week (2)	Seasonal (1)		Not regular (2)
4 to 5 a day (1)			1 a year (2)
3 to 4 a week (1)			3 a year (1)
1 a month (1)			
4 a week (1)			
Sometimes (1)			
2 a week (1)			
1 a 2 days (1)			

Source: Field Survey in 2002.

Note 1) Figures in parentheses are numbers of relevant households.

2) Frequencies, of which the number of relevant households is 1, are not shown.

Table 8 Frequency of Sale and Purchase by Destination in Ywathitgone
(unit: time)

<Sale>				
Ywathitgone	Yahainggato	Ale Chaung	Kyaukkyi	Gwa
2 a week (3)	3 a week (4)	1 a month (3)	Daily in rainy seasons (1)	1 a month (4)
3 a week (3)	1 a week (4)	3 a week (2)	3 to 4 a month (1)	1 a 4 days (2)
Sometimes (2)	3 a month (3)	Daily (1)	1 a month (1)	1 a week (1)
2 to 3 a month (1)	1 a month (3)	2 a month (1)	3 a week (1)	2 to 3 a year (1)
3 to 4 a week (1)	Sometimes (2)	1 a week (1)		3 a week (1)
2 to 3 a week (1)	5 a week (2)	1 a 5 days (1)		2 a month (1)
3 a week in winter (1)	4 a week (2)			
Daily (1)	Seasonal (1)			
1 a week (1)	Summer (1)			
1 a 3 days (1)	Winter (1)			
1 a month (1)	6 a month (1)			
10 a month	Daily (1)			
	1 a 2 days (1)			
Sattwar	Vendor	Dai (rice/paddy)		
Buyer comes	1 a 2 months (1)	1 a month (1)		
	(to nearby villages)	1 a year (1)		

<Purchase>					
Ywathitgone	Ale Chaung	Yahainggato	Gwa	Vendor	Farmer
Daily (23)	2 a week (1)	1 a month (5)	1 a month (10)	Sometimes (2)	Sometimes (1)
2 a week (5)	3 a week (3)	Sometimes (2)	1 a week (3)		
3 a week (5)		3 a month (2)	2 a month (3)		
1 a 3 days (2)		5 a week (1)	1 or 2 a year (2)		
2 to 3 a month (1)			1 to 2 a week (1)	Sometimes (2)	
1 a week (1)		1 to 2 a month (1)	3 a week (1)		
2 to 3 a week (1)			3 a week (1)	1 a 2 weeks (1)	
1 a 3 days (1)		1 a 2 weeks (1)	1 a year (1)		
1 a 2 weeks (1)		Daily (1)	2 a year (1)		
5 a week (1)		1 or 2 a year (1)	1 a 5 days (1)		
Sometimes (1)		1 a week (2)			
Frequently (1)		2 a month (1)			

Source: Field Survey in 2002.

Note) Figures in parentheses are numbers of relevant households.

(2) From the viewpoint of houseshop (retail shop) and producer

Herein, a few cases of procuring goods by houseshops and a case of sale and purchase of *taunya* farmer are described based on data collected by interviews so that the linkage to Gwa and furthermore Yangon as well as neighboring villages can be seen.

<Case 1: grocery shop in Ywathitgone>

Fish-paste, oil, onion, pulses, medicine, soap, candle, battery, notebook, clothes and shirt etc. are sold by Mr. (farmer) and Mrs. (school teacher). If necessary, they give an order for goods with merchants through a car owner/ driver in Gwa Township, since the prices are cheaper in Yangon than in Gwa. Agricultural products like groundnut and sesame etc. are procured in own village as well as neighboring villages within the distance of 3 to 4 miles. However, they procure rice in the rainy season from Ngathaingchaung.

<Case 2: vegetable shop in Yahainggato>

Though Mrs. used to sell at the morning market and vend around, Mr. and Mrs. started the business of vegetable shop one month ago. They procure vegetable from *Taunya*, Aleywa and Gwa. In other words, producers go and sell products to him in the former two cases, while procuring vegetables (for instance, radish and eggplant etc.) in the earlier morning in Gwa.

<Case 3: grocery shop in Yahainggato>

A variety of goods (rice, egg, dry noodle, cosmetics, shampoo, tea leaf and medicine etc.) are sold by Miss. Except tobacco and egg that are procured in Gwa, she gives a order to the larger grocery shop that is kept by her relative. It is needless to say that the larger grocery shop procures most goods from Yangon.

<Case 4: *taunya* farmer>

His *taunya* is located in the distant forest by 1 hour on foot. Rice and maize are consumed at home and the surplus of rice is sold in Ywathitgone. Sesame is collected by persons of Ywathitgone, neighboring villages and Gwa and shipped to Ngathaingchaung and Yangon. Roselle, lady's finger and pulses are collected by vendors of Ywathitgone, Yahainggato and Aleywa. Similarly, vendors and retailers from Yahainggato, Chauchi and Lejong buy chilli, eggplant and cucumber. Meanwhile, consumption goods like fish paste and salt are bought from vendors or in Aleywa and Chauchi and onion, garlic, vegetable, oil and clothes from vendors or in Gwa. Some consumption goods like candle and chilli are procured from houseshops in Ywathitgone.

Conclusion

Being compared to the mostly complete channels of distribution for high value-added fish/ dry fish to Yangon and its international market, the distribution of agricultural products is lying in the beginning of development. Though it plays a role of collection within a limited distance, the morning markets in the present case study, indeed, is convenient to consumers (in terms of freshness, variety and choice etc.) rather than producers, comparing with the past times when agricultural products and miscellaneous fish used to be vended around.

Now, a few institutional improvements are worthy of being taken into account so that producers can smoothly transact with wholesaler or retailer in the place of "market". In

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case of Gwa the morning market is a center of collection from and shipment to the neighborhood. Therefore, it is well worth development strategy to establish periodical markets as growth centers in the spatially proper locations so that the more persons could be involved in economic activities as well as more goods can be collected and shipped within the locality. As a result, the linkage among such markets within the further/wider locality could be built up and especially, all of producers, consumers, brokers and vendors can reduce their heavy transaction cost, although transportation infrastructure is really underdeveloped.

Appendix 1

Note: Role of Rural Bazaars in Agro-marketing in Chittagong Hill Tracts, Bangladesh - a case study of Bandarban Sadar Upazila, Bangladesh -" was already published in the Journal of Rural Problem, Vol.39 No.1. June, 2003.

Appendix I

**Role of Rural Bazaars in Agro-marketing in Chittagong Hill Tracts, Bangladesh
- A case study of Bandarban Sadar Upazila, Bangladesh.**

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Introduction

Chittagong Hill Tracts (hereinafter, CHT) is located in Chittagong Division, the southeast of Bangladesh, bordering India and Myanmar. In terms of ethnicity, the majority of Bangladeshi is Bangalee but in CHT the majority is the ethnic groups. Until the recent there have been the long-run ethnic political troubles and the development efforts could not be given at the required level in CHT. It is said that CHT has become economically worse than the rest of Bangladesh and for instance, more than 45% of the people live below the poverty level in CHT. It follows that the sustainable and endogenous rural development is to be realized in such remote CHT.

Looking back at the agricultural development so far in Bangladesh, the efforts have been made to modernize and increase the productivity as well as the yield. Though such results have been achieved to a certain level, the development efforts are fully returned yet to the people. One of the reasons is the access to the market itself, the function of the market and market information etc. However, as a matter of fact, there is not lack of rural markets but are found such rural markets, what is called, bazaar and *hat* (periodical market) in Bangladesh, not excepting CHT. Such markets are the center of transaction of agro-products in the locality and the key to facilitate the rural economic vitality, especially sustainability and endogenousness.

Therefore, this study was conducted with the objectives to investigate (a) management of bazaar, (b) operation of *hat* and (c) distribution channels (from producers to consumers).

1. Methodology

For administrative purpose, Bangladesh is divided into 6 Divisions (regions), 64 Districts (prefectures), 464 Upazilas (townships) and 4,500 Unions. Union is the lowest tier of the local government of Bangladesh. Chittagong Hill Tracts consists of 3 Districts, namely Rangamati, Khagrachari and Bandarban. This case study was conducted in Bandarban Sadar Upazila of Bandarban District. There were 15 bazaars in Bandarban Sadar Upazila. Data and information were collected through the observation at two bazaars, that is, Bandarban Bazaar and Semidolupara Bazaar, and the interview with key informants like producer/seller, middlemen, Bazaar Chowdhury, Bazaar Managing Committee and government officials with use of the structured checklists during March and April, 2001.

2. Definitions of bazaar and *hat*

Bazaar can be defined to be a place like commercial complex where there are permanent and/or temporary shops and people dispose of products and buy necessary goods/services. Permanent shops are operated in the permanent rooms (structures) where commercial goods etc. are kept, while temporary shops are operated under the sky and the commercial goods are transferred to the storage after the business is over.

Hat called "periodical market" is held under the sky on the specific days of the week at the bazaar. At the day of *hat* a large number of sellers and buyers come together for economic and commercial transactions.

Table 1 Comparison between public bazaar and private bazaar

Item	Public bazaar	Private bazaar
Land owner	Government	Individual
Controller	Bazaar Fund Administration	Individual
Supervisor	Bazaar Chowdhury	None
Number of Permanent shops	72 in Bandarban Bazaar	Very few
Temporary shops	43 in Bandarban Bazaar	Some
Hat	Twice a week	None

Source: Field Survey, 2001

3. Management of bazaars

Bazaars are found to be of two types, that is, public and private. The former is established on the government-owned land. Plots of the land are leased out to the interests. In fact, the leaseholders are not necessarily the shop owners. There are many permanent and temporary shops. On the other hand, the latter is established on the private land. Permanent shops built by the landowner or plots are rented out to the interests on a commercial basis. There are less permanent and temporary shops. Another remarked difference is whether or not *hat* is held. Comparison in detail between the public bazaar and the private bazaar is given in Table 1. In the case of Bandarban Sadar Upazila, out of the relevant 15 bazaars 4 bazaars only were found to be public and the rest 11 bazaars to be private. Bandarban bazaar, being a public bazaar, has 72 permanent shops and 43 temporary shops. Semidolupara Bazaar, being private bazaar, has 34 permanent shops and 6-7 temporary shops.

Public bazaars were controlled by Bazaar Fund Administration (hereinafter, BFA) which was established in each District of CHT, while private bazaars were under the individual control. BFA is a special arrangement in Chittagong Hill Tracts by the government in response to the desire of the ethnic people for management and improvement of bazaars and *hats*. There is no such arrangement in the rest of Bangladesh. BFA in Bandarban District is located at the district headquarter only and none at the level of Upazila and Union. Bazaar Chowdhury (hereinafter, BC) as a staff of BFA is the person in fact who supervises the maintenance and improvement of the public bazaars.

BFA keeps the records of bazaar land, transfer of plots (leases), tax collection (from shop and/or plot) and auction of *hats*. The relationships among the interests in tax and rent collection etc. are shown in Fig. 1. Plot holders and permanent shop owners of the public bazaars pay tax annually to BFA through BC and in return BC gets part of such collected tax

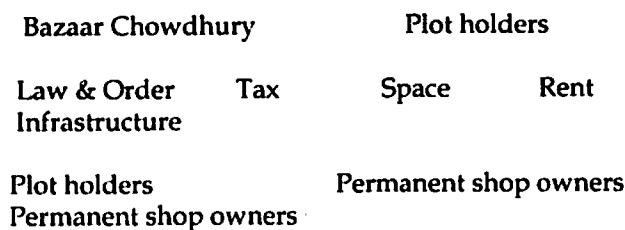


Fig. 1 Tax and Rent Collection

Source: Field Survey, 2001

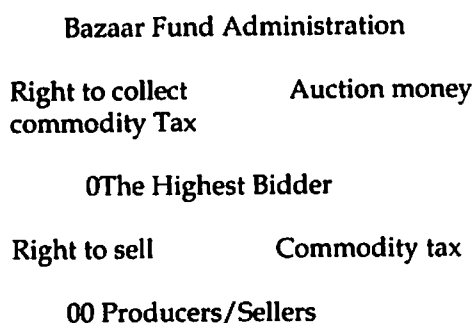


Fig. 2 Relationships among Bazaar Fund Administration, the highest bidder and sellers
Source: Field Survey, 2001

as commission and maintains the law and the order at the bazaars and supervises the infrastructure and the premises at the bazaars. In the case of Bandarban Bazaar, the revenue of tax from permanent shops (Tk.1.8 per square feet for the year) was Tk.416,600 in 2000-2001. Besides, BC has to collect the land tax of Tk.0.30 per 0.01 acre for the year. In return, BC receives part of the collected tax as commission. For instance, BC got 9.95% of the collected tax in 2000-2001 and the rate was lower than the official one since he could not collect the tax perfectly, that is 100%. It was much interesting that most of the permanent shops were operated in the rooms rented in. The permanent shop owners were not necessarily the plot holders.

4. Operation of *hats*

Hats are usually held at the public bazaars and operated by the highest bidders (*Izradars*) through the procedure shown in Fig. 2. Bazaar Fund Administration (hereinafter, BFA) auctions out the right of commodity tax collection through open bidding. The highest bidder pays auction money to BFA. For instance of Bandarban Bazaar, the highest bidder paid Tk.357,000 in 2001-2002 (Tk.496,700 in 1997-1998). In return he can get the right to collect the commodity tax from agro-product sellers on every *hat* day for the year in accordance to a chart of rates of commodity tax declared by BFA. Rates of commodity tax for 8 major agro-products at the *hat* in Bandarban Bazaar are shown in Table 2. The rates of

Table 2 Rates of commodity tax for 8 major agro-products at *hat*

Kind	Average price (Tk.)	(A)	Commodity tax imposed (Tk.)	(B)
Commodity tax collected (Tk.)	(C)	(B)/(A)(%)	(C)/(A)(%)	
Banana	100.4/chari	2/chari	1/chari	1.9 0.99
Potato	6.53/kg	0.10/kg	0.05/kg	1.5 0.76
Brinjal	8.97/kg	0.10/kg	0.05/kg	1.1 0.55
Green Chilli	17.41/kg	0.10/kg	0.05/kg	0.57 0.28
Tobacco leaf	100/kg	0.50/kg	0.50/kg	0.50 0.50
Turmeric	27.73/kg	0.20/kg	0.05/kg	0.72 0.18
Long bean	8.97/kg	0.10/kg	0.05/kg	1.1 0.55
Water melon	14.50/piece	0.05/piece	0.10/piece	0.34 0.68

Source: Field Survey, 2001

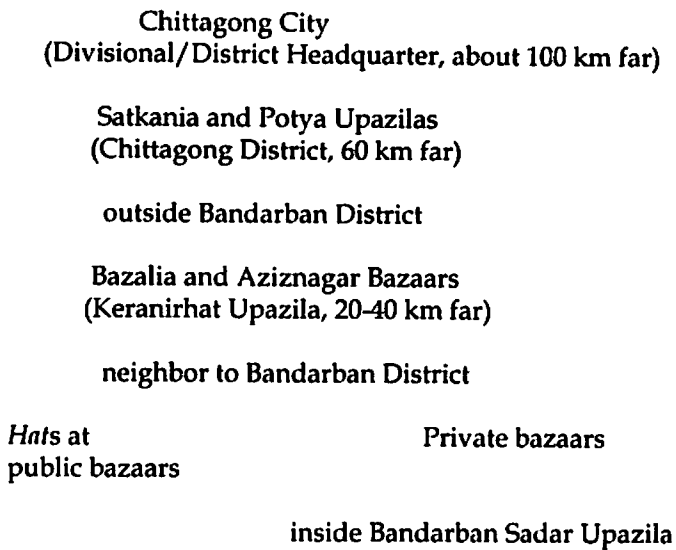


Fig. 3 Flow of agro-products

Source: Field Survey, 2001

official commodity tax to price range from 0.3% to 1.9%, compared with 0.2% to 1.0% for the practical rates. The rates of commodity tax collected by the highest bidder were lower than those imposed by BFA.

As to *hats* held twice a week in Bandarban Bazaar, on an average 48 kinds of local agro-products were transacted per *hat*. The estimated transaction amounted to Tk.41,591 per *hat*. In April, 2001, on an average 86 agro-commodity sellers came from 50 to 60 villages within the distance of 25km. Most of them were Marma (61%), followed by Bangalee (25%), Tonchonga (8%) and Chakma (4%).

5. Distribution of agro-products

In a sense *hats* operated at the public bazaars are the centers of shipment as well as collection of agro-products. There were consumers, retailers and middlemen who bought agro-products at *hats*. There were found middlemen, what is called "*Farias*" and "*Beparis*", at *hats* of both public and private bazaars. Bangalee middlemen were dominant. Middlemen perceived *hats* to be the collection points of various agro-products toward 6 terminal markets outside Bandarban Sadar Upazila. Particularly, the main terminal market was Chittagong City, being 100km distant from Bandarban Sadar Upazila. Considering the price gap between public bazaars and private bazaars, the distribution channels can be shown in Fig. 3.

According to the observation of the *hat* at Bandarban Bazaar in April, 2001, 15 *Farias* played a role of distribution of 18 agro-products to the terminal markets (Table 3). They procured agro-products of Tk.88,253 and sold them by

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Tk.113,742. The margin ratio was 22.4% in rough. Besides, comparing the prices of 48 agro-products between Bandarban Bazaar in Bandarban Sadar Upazila and Reaz Uddin Bazaar in Chittagong City, the margin ratio was calculated to be 36% on an average. In practice, the higher margin ratios of medicinal leaf, medicinal brinjal and maize were 65%, 60% and 56%, while the lower ones juice of date tree (7.4%), turmeric powder (12%) and kakon (13%).

Table 3 Major terminal markets of 7 agro-products and their margins

Kind	Terminal market	Price at Bandarban Bazaar	Price at terminal market
Ratio of margin (%)			
Banana	Chittagong city and Keranirhat	100.41/chari	140.00/chari 28
Potato	Chittagong city	6.53/kg	8.00/kg 18
Green chilli	Chittagong city	17.41/kg	30.00/kg 42
Turmeric	Chittagong city	27.73/kg	37.00/kg 25
Long bean	Chittagong city	8.97/kg	15.00/kg 40
Papaya	Chittagong city	6.29/kg	10.00/kg 37
Sweet guard	Chittagong city	11.53/kg	16.00/kg 28

Source: Field Survey, 2001

Conclusion

Hat (periodical market), which is held at public bazaars, is the heart to distribute agro-products through a limited number of channels. Functional role of *hat* stimulates centrifugal flow of agro-products from farmers and private bazaars and centripetal flow of agro-products towards terminal markets. Middlemen are the key to intra-Upazila, inter-Upazila and inter-District distribution of agro-products through *hat*. On the other hand, private bazaars have not only commercial but also economic function like *hats*, that is, by way of agro-products being collected at a small scale every morning or afternoon.

The government is likely to have no concern with such private bazaars. Introduction of *hat* mechanism to private bazaars might lead to the improvement of distribution of agro-products in CHT

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**Anthropogenic Characteristics of Taungya Cultivation
in Chiphwi Mountainous Region**

Seng Aung

Introduction

This paper is part of my Ph.D. dissertation and focuses on *taungya* cultivation using data based on my field observation from 2000 to 2002. *Taungya* cultivation is the traditional way of earning a living for the majority of native people in Kachin mountainous region and this area is considered to be the area of origin of wild rice. But the study of *taungya* cultivation in this region is a new field. Studies of *taungya* cultivation have been made with the following approaches.

- Area: studies of physical patterns of landscape, soils, crop variety.
- Economy: studies of crop yield, labour force, capital resources.
- Culture: studies of community groups, population, customs and way of life (language, religion)
- Technology: studies of tools, techniques, and systems.
- History: studies of sequential development or land use process.

I. Physical Background

The study area is situated between latitudes 25° 35' N and 26° 51' N and longitudes 97° 54' E and 98° 47' E (GIS measurement) (98°-98°45'E and 25° 30'-27°N: Office data). The area of Chiphwi township is 1,324.09 square miles. According to my field observation, the whole region is composed of mountain ranges. Narrow valleys are found along the stream channels. Drainage networks are influenced by the height and the trend of mountains. Mountain systems vary from 800 to 14,000 feet in elevation.

Kachin State is rich in biodiversity and the catchment area of the Ayeyarwaddy River, the artery of Myanmar, is home to four Kachin ethnic groups. In the study area there are subtropical deciduous and evergreen temperate forests, and also bamboo forests. These forest types change abruptly within the same latitude area according to altitude. There are six varieties of pine. *Taiwania Cryptomerioides* and *Rhododendron* are found in places of over 4,000 feet in elevation, especially in Pan Wa and Htagaw region.

The Tamu Hka area has soil of high quality because of mature forest cover and is highly productive.

According to data from the Chiphwi Township Agriculture Service, the monthly rainfall in the study area is as shown in Table 3.

II. Characteristics of Taungya Cultivation

The term *taungya* cultivation is used in Myanmar for shifting or highland cultivation. *Taungya* cultivation is traditional subsistence farming system practiced by the hill people in Kachin State. The crop yield is low and for home consumption only. In some hilly regions it is not sufficient for the whole year and highlanders depend on edible root crops such as taro and yam, and on maize, millet, etc. Perishable vegetables which cannot be stored or reserved are sold in the nearest local market. Hill paddy is the staple crop in highland cultivation although in areas of over 7,000 feet in elevation millet and other cereals are grown as the principal crops.



Figure 1. *Taungya* plot

The plot is abandoned after harvesting and there is an absence of ownership of the land, which is a unique feature of highland cultivation. After leaving the plots to fallow for a relatively reasonable period of 8 to 25 years, the first cultivator can work the piece of land again only if it is not being worked another family. Virgin land or primary forest is the most suitable for *taungya* cultivation because there is good soil fertility and no need for weeding. The reason why a *taungya* plot is left to fallow is to allow time for trees to regrow. The distance between *taungya* and village is also an important factor in the selection of sites.

The rotation cycle depends on population pressure. In areas of sparse population with extensive forest area, the period of fallow is long, but in areas of thick population with limited forest area, the period of fallow is short. If the rotation cycle is short, forest regrowth is not well developed. As a result the soil is not adequately developed to support crops and the weed is very thick.

The procedures of *taungya* cultivation are: (1) site selection, (2) clearing the jungle, (3) setting fire, (4) sowing seeds, (5) weeding, and (6) harvesting. These procedures are carried out step by step and the time required is lengthy. Guidelines for the procedure of site selection are:

- the fertility of the soil, judged by trees growing very well
- the presence of furrows and trails of earthworms
- distance from the village
- slope, receiving plenty of sunlight, and configuration of the plot (with such elements as irregularity, rockiness, and drainage lines down or across the slope).

Clearing is carried out in the second week of January and completed by the first week of February. First, small trees or undergrowth are felled by using an axe. Then the jungle trees or canopy are cut down; some of the tree is left, only the branches being cut. The undergrowth is cut by women and big trees by men. The village works communally in clearing the jungle. The branches and trunks of the trees that have been felled are spread out and left to dry for one or two months.

When they are dried, they are set on fire in April in the midday sunshine. The burning is undertaken by women. Wind direction is carefully studied before setting fire, the fire being started in the upwind direction so that the fire spreads downwind. After two days of burning, the women collect the unburnt branches and timber and set them on fire again.

Sowing seeds begins with the first fall of the rain in the first and second week of May. All the villagers, both men and women, take part in sowing seeds, but it is done especially by women using dibbles made of wood. Paddy sowing is also a collective work with the villagers joyously engaging in reciprocal labour, exchanging agricultural lore and experience.

Before sowing the seeds, a hut is built in the *taungya* at a spot where the greater portion of the *taungya* plot can be seen, and people live in the hut to frighten away wild animals.

Weeding is also carried out by women when the paddy plants are about a foot high, about 20 to 30 days after sowing.

The harvesting season begins in the second week of October and ends in November. Reaping paddy is also a joyous communal work just like the sowing of seeds. It is a tradition of the local (Kachin) people, villagers helping one another in various ways without taking cash or kind for their labour. Widow families are provided for by this tradition so that they do not need to spend money or employ wage labor.

The activities of the *taungya* end in December with a harvesting festival called "N'lung n'nan sha poi".



Figure 2. Taungya ready for harvesting



Figure 3. Nursery established on abandoned *taungya*.

Terrace cultivation is mostly practiced along the Ngawchang Hka valley and Chiphwi Hka valley where water is easily available and the soil fertile.

Agro-biodiversity is a key component in maintaining the life and culture of the people. Animal husbandry (pig, cattle, buffalo, goat and chicken) is mainly carried on to provide food. In some villages like Lupi, there is also bee-keeping and silk worm culture.

IV. Culture Relevant to *Taungya* and Gender Awareness

1. Culture relevant to *taungya* cultivation

The Lachid people have been practising paddy cultivation and animal husbandry since they settled in Loo Khoo Moay. The rich biodiversity of their physical environment is matched by the rich traditions of their culture (choosing the village site, building, choosing the *taungya* site, marriage customs, religious ceremonies, etc).

There are no historical records of early Lachid culture but the folk stories and songs recited by the *dumsa* or shaman provides a knowledge of some Lachid traditions. The Lachids have ancestral family names and, when introduced to one another, mention their lineage; if they are of the same lineage, they count the generations and call each other brother, sister, uncle, etc as the case may be.

The names of villages depend upon their situation and the surrounding flora and fauna, e. g. Man Dung (pleasantly located village), Chang Yin Hku (pleasant place), Law Hkaung (rocky place), Chiphwi (abundance of fish), Lan Jaw (abundance of snails and slugs), Chyin Htung (abundance of sour leaves), Minaw (abundance of *minaw* poisonous plants). Some villages are also named after founders of Lachid ancestral lineages, such as Hpare and Lagwi.

The Lachid people have a long history of cultivating rice and a deep knowledge and cultural expression concerning highland paddy cultivation. They note the time when they should plant the rice by the seasonal singing of certain birds. They clear the weeds when gibbons cry.

Capital resources are not important in the traditional *taungya* system because in the major activities of *taungya* cultivation there is the custom of helping each other in the work that is to be done. On these occasions there is also a sharing of knowledge and experiences regarding the *taungya*. They have their superstitions in such things as selecting a site for cultivation; they believe the predictions made by the *dumsa* and follow his instructions. The Lachids were animists and have started converting to Christianity since 1922, but there are still animists.

2. Gender and conservation awareness

The study area is a sparsely populated area. The local people have no barriers of caste, class or gender. The majority of women are farmers, and they are important in every stage of *taungya* cultivation. They are influential within the group; they can be the head of the household in the absence of men or when the men work outside the village, and they have the power to make decisions. The women of local farmers are accustomed to spending almost the whole of the day in the forest for various purposes, such as collecting medicinal herbs, mushrooms and rattan, gathering fuel wood and fodder, fishing, and looking for other produce of the forest.

Women have a key role to play in keeping the agricultural heritage alive. In the field, men and women work side by side, but often in different roles. When harvesting time comes, it is the women who are entrusted with making the key decisions as to what portion shall be stored for seed, what portion eaten and what sold, and what shall be put to cultural and welfare use.

Women are often responsible for deciding how agricultural resources will be used to satisfy the various needs of their families.

Even elderly women in the community still engage in upland rice cultivation or cultivate home gardens. The home gardens, generally managed by women, contain the highest levels

of plant genetic diversity in the *taungya* system. A recent study found about 45 different species of crops sheltering in 60 home gardens in Chiphwi and Zanaung Yang, with each garden containing between 26 and 45 varieties. These gardens are often home to traditional varieties and may serve as experimental plots for testing and adapting plants and crops for specific uses.

Women have a unique knowledge about plants and crops gained over generations through gathering wild plants in the forest, and collecting and selecting seeds for different dietary and cooking qualities and how different parts of a plant can be used for food, medicine, shelter and animal feed.

Thus, the activities of women are not isolated but are part of the social relations of production. In particular, elderly women have a vast knowledge regarding indigenous technology, a knowledge which has been distilled from their long experience and which can contribute to sustainable management. Moreover, many of the women are interested in a substantial cash crop rather than in a long-term crop. In that case, woman's role in contributing to a permanent agriculture is becoming dominant. With most of the women, the conservation sense tends toward collecting indigenous and primitive varieties of rice and maize, while almost all the men are interested in high yielding varieties. Most of the indigenous varieties have survived because they have been preserved by women.

Thus, when we talk about the participatory process, women's awareness of the traditional agro-ecosystem should be taken into consideration as a key factor for ensuring long-term conservation and the safeguarding of genetic sources.

Discussion and Conclusion

Discussion

Chiphwi mountainous region, where the local people have practised *taungya* cultivation for 25 generations, is affected by climatic conditions, and a meteorological station is needed to serve the region.

As the study area is part of the watershed area of the Ayeyarwady River, attention should be given to the question of protecting the river channel from becoming shallower.

The local people need to be enlightened concerning the value of conserving the ecosystem and helped for the improvement of their quality of life.

Efforts should be made to improve the local people's access to health and educational facilities. A systematic survey of crop-diversity should be carried out to develop a more sustainable farming system and mountain sustainability, and traditional technical knowledge should also be investigated and documented.

Gender roles and responsibilities as they influence the choice of crops, labour and seed management, should be studied, as also people's behaviour, the variation of culture, and the change over time in income and education.

There is a critical need to educate the local people to improve their sense of conservation regarding biodiversity and natural resources development by means of a participatory approach.

The authorities should seriously make efforts to replace the *taungya* system with locally adapted long-term cash crop cultivation, and create alternative means of earning a livelihood for *taungya* cultivators.

Conclusion

Taungya cultivation, chiefly carried out by peoples of a simple culture and by fragmented groups living in isolation in mountain regions, provides some temporary benefits during the cultivation period: burning kills the bacteria and fungi that are harmful to crops and encourage plant growth, and also causes nitrogen fixation and prevents the soil from becoming acidified.

But *taungya* cultivation, destroys the mountain resources and biodiversity which are important for the future. It results in soil erosion on steep slopes, deforestation, climate change, loss of biospecies, poverty, an unsound ecosystem, and environmental unsustainability. The soil eroded from innumerable *taungya* on steep slopes is carried away as sediment by running rain water and deposited in stream channels which, choked with sediment, become shallower. The shallow channels can affect river transportation during winter and summer, especially downstream in the Ayeyarwady River.

Taungya cultivation is not carried out in isolation, but in relation to other systems of more intensive subsistence activities such as hunting, gathering and fuel wood collecting. There are differences in socio-economic impact between *taungya* cultivation and terrace cultivation, and the consequences have an effect on socio-economic development and environmental stability. If *taungya* cultivation cannot be related to a sustainable way of life, then change to a more appropriate cultivation system should be considered.

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Appendix

Table1. *Taungya* cultivation in Kachin State (2003)

Township	Taungya acres	Villages	Households	Population
Myikyina	2,140	177	9,779	63,643
Waingmaw	6,350	21	4,644	39,630
Mugong	157	34	1,711	3,215
Munyin	422	8	53	293
Hpakan	700.5	20	258	1,291
Danai	390	8	553	1,109
Chiphwi	2,324	9	1,348	3,173
Hsawlaw	846	44	800	8,121
N jangyang	278	25	143	6,032
Bamaw	1,080	24	502	2,565
Momawk	378.5	9	304	1,430
Mansi	1,995.5	17	1,011	5,008
Shwegu	519.5	15	284	1,331
Putao	2,610	16	2,019	12,031
Machan Baw	3,393	17	553	3,191
Sumpra Bum	5,528	88	2,051	11,659
Hkawnglanghpu	4,979	25	1,604	10,935
Nawngmun	2,585	19	793	5,079
Total	36,676	576	28,410	179,736

Source: Kachin State Peace and Development Council, Myitkyina

Table 2. *Taungya* cultivation in Chiphwi 1991-2003

	Cultivated acre	Yield	Yield/acre
1990-91	2,516	57,637	23.25
1991-92	2,112	29,870	26.25
1992-93	1,045	26,470	25.00
1993-94	1,184	29,808	25.24
1994-95	1,000	29,613	29.63
1995-96	1,259	37,835	30.05
1996-97	1,200	36,060	30.05
1997-98	1,200	35,696	29.75
1998-99	1,541	41,607	27.00
1999-00	2,119	52,380	27.00
2000-01	2,119	59,586	28.12
2001-02	2,120	62,264	29.37
2002-03	2,324	69,721	30.00

Source: Township Agricultural Department, Chiphwi

Table 3. Monthly rainfall in Chipwhi (1993-2002)

Month	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993
January	1.5	1.3	1.03	1.03	2.89	0.25	0.77	0.51	0.96	2.4
February	0.73	1.22	0.48	0.52	2.49	1.66	1.53	1.77	1.85	4.53
March	2.94	0.45	4.41	0.44	8.14	4.33	8.09	5.26	9.8	3.07
April	2.93	1.6	3.31	4.15	5.64	2.95	3.93	6.67	3.86	3.03
May	10.5	9.84	17.43	14.18	17.9	15.33	12.87	16.3	2.87	10.35
June	23.03	31.22	35.08	23.13	35.37	20.82	25.28	49.5	27.17	22.24
July	31.65	17.86	22.58	21.47	32.7	33.48	33.44	53.8	44.72	37.99
August	13.03	9.43	16.74	30.77	24.11	24.65	24.75	32.4	34.41	36.77
September	10.6	6.79	5.81	7.03	3.92	7.31	6.06	25.5	23	27.01
October	8.63	7.61	7.55	6.53	7.2	9.06	14.57	3.86	2.44	9.76
November	2.6	1.92	0.56	2.19	1.63	1.42	1.84	1.47	1.81	0.71
December	0.78	0.6	0.4	0.47	0.8	0.5	0.8	0.16	0.59	0
Total	108.92	89.84	115.38	111.91	142.79	121.76	133.93	197.2	153.5	157.9
Mean	9.08	7.49	10.08	9.33	11.08	10.15	12.08	16.43	13.08	13.16

Source: Township Agriculture Department, Chipwhi

Table 4. *Taungya* crops (supplementary food) in Chipwhi

Botanical name	Vernacular		Locality	Collect- ing time	Use
	Wild	Cultiver			
<i>Dioscorea alata</i>	Nai	yes yes	all area	Jan-Apr	rice substitutional main crop, animal feed
<i>D. persimis</i>	Nai n'hkrun		all area		rice substitutional main crop, animal feed
<i>D. bulbifera</i>			all area		
<i>D. barmanicamm</i>	Nai htingkyu	yes	all area		vegetable, animal feed, light food
<i>Angiopteris Spp</i>	Nai kadung	yes	all area		rice substitutional crop, sweet, liquor
<i>Amorphophallus bannaensis</i>	Nai	yes	all area	Jan-May	rice substitutional crop, sweet,
<i>A. ximengensis</i>		yes	all area		vegetable, animal feed
<i>A. yuloensis</i>		yes	all area		
Taro	Nai	yes	all area		vegetable
<i>Xanhossoma sagittifolium</i>	Nai sam/ Nai kong	yes	all area		vegetable, animal feed, light food
<i>Canna edulis</i>	Nai hpagoi	yes	all area		vegetable, animal feed, light food
<i>Ipomoea batatas</i>	Nai kong (galu)	yes	all area		vegetable, animal feed, light food
Reptans	Nai kong (gadun)	yes	all area		vegetable, animal feed, light

Table 4. *Taungya* crops (supplementary food) in Chiphwi

Botanical name	Vernacular		Locality	Collect- ing time	Use
	Wild	Cultiver			
<i>I.Reptans</i>	Nai kong (gadun)	yes	all area		vegetable, animal feed, light food, Potato
Gala nai/ ahlu nai	Pan Wa				vegetable, food
Rice <i>Oryza indica</i>	Mam	yes	all area	Oct-Nov	staple food
Rice <i>Oryza japonica</i>	Mam	yes	all area	Oct-Nov	staple food
<i>Oryza sativa glutinous</i>	Mam	yes	all area	Oct-Nov	liquor, traditional ceremonial, animal feed
<i>Zea mays</i>	Mam	yes	all area	Oct-Nov	cereal or staple food, cash-crop, animal feed, liquor
<i>Coix Lachryma</i>	Sanibau	yes	all area	Dec	animal feed, liquor, food
<i>Eleusine</i>	Yagyi	yes	all area	Dec	substitutional crop, liquor, traditional essential
<i>Coracana</i>	Shagyi wild	yes	all area	Dec	substitutional crop, liquor, traditional essential
<i>Setaria italica</i>		yes	all area	Dec	substitutional crop, liquor, traditional essential
<i>Sorghum vulgene pers</i>		yes	all area		vegetable, like rice
<i>Fugo pyrum</i>	Muyaw	yes	all area		vegetable, like rice
Maize	Hkainu		all area		substitutional crop, liquor, traditional essential

Source: Field observation (Oct: 2000)

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