VOICES FROM THE FIELD:

FIFTH ANNUAL SOCIAL FORESTRY WRITING WORKSHOP

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PREFACE

The papers in this volume were prepared during the Social Forestry Writing Workshop sponsored by the Program on Environment, East-West Center. The objective of the workshop was to give professionals working with social forestry programs in Southeast Asia an opportunity to step back from their work, to reflect on their experiences in the field, to learn from each other, to have access to current literature, and to articulate their ideas in a paper. These papers reflect the different problems, opportunities, and motivations for implementing social forestry in each of the participating countries.

The papers resulting from the 1992 workshop are focused on two inter-connected themes. The first theme concerns the institutional aspects of defining, designing, and implementing social forestry. The discussion focuses on traditional and new community institutions of forest conservation, and the changing structure and role of government institutions.

The second theme concerns spatial aspects of social forestry. Four of the participants used the geographic information systems (GIS) facilities at the East-West Center to analyze spatial data from their own projects and to produce maps. Spatial information is necessary for social forestry planning from micro- to macro-scale. It is most useful for identifying land-use opportunities and constraints based on a combination of social, economic, historical, and biophysical spatial data. The methodologies are expanding in ironic directions—high tech global positioning system (GPS) equipment is being used to verify oral histories, and simple sketch maps are one of the tools used by scientists for designing agroforestry systems. The resulting maps are an important communication tool to bridge the notorious gap between foresters, government bureaucrats, and villagers near forests. From many angles the spatial information links back to institutional issues.

The paper by M.V. Sabban is a timely description of the current process of decentralizing the implementation of the Integrated Social Forestry Program in the Philippines. Devolving powers to local government units involves structural change in the national Department of Energy and Natural Resources, as well as in the local government units themselves. The Philippines is exploring strategies for preparing for and implementing the devolution of powers to the local government units (LGU's) without losing momentum and capacity.

Two of the papers on Thailand also show a trend there toward increasing community initiative and autonomy in forest management. J. Amornsanguansin presents the latest results from a national inventory of community-managed forests existing in the Reserve Forest of Thailand. There is an emerging recognition by the Royal Forest Department of the unique capacity of villagers to manage and protect pockets of forests near their villages. Their motivation to protect the forests is tied to their expectation for benefits. However, at present they are legally prohibited from using the Reserve Forest even for minor products. A community forest act has been proposed to support communities to do both forest conservation and management.

S. Limchoowong describes the integrated development concept behind the Sam Mun Highland Development Project. This project emphasizes training and community organization and general development. The problem of deforestation is partly a symptom of other social

and economic ills in the highland areas. The solution therefore must involve health, education, communications, and organization.

China was represented in the Social Forestry Writing Workshop for the first time this year. Yang Yunhai gives a general overview of the Yangtze Shelterbelt Project and how the concepts and techniques of social forestry might improve the design and management of the shelterbelt. Cao Xiyun points out that although social forestry as a concept in international development circles is new in China, in fact local communities have long been involved in forest management in the forms of household forest farms and village forest farms. He discusses specific problems in shelterbelt forest management, and some possible solutions that arose out of a rapid rural appraisal in Yunnan Province.

The case studies presented in the three Indonesian papers are all set in outer island Indonesia. Here the large tracts of forest and low population densities present different problems, opportunities, and motivations for implementing social forestry from those of Java and other Southeast Asian countries. Djoko Widardjo sets the scene by using three case studies to analyze two important forest policy regulations and their effect on the practice or inhibition of community forest management. The regulations explicitly promote forest exploitation for the development of the national economy, and protection of the environment. The regulations recognize the existence of customary land tenure and anticipate conflicts between forest concessionaires and customary landholders, but in reality there are no effective mechanisms for resolving these land-use conflicts.

Sukirno Prasodjo begins the section on spatial perspectives with a case study in Kalimantan, Indonesia. His paper is an evaluation of forest land-use planning maps using GIS and GPS technology. A number of maps, of variable accuracies, are used to determine forest concession and nature reserve boundaries based on forest land-use classifications. In many cases conflicting claims between forest concessionaires, forest department, and customary landholders are based on differences between the maps and reality as seen in the field.

Martua Sirait presents the same case study from the perspective of the villagers who have been managing these forests. He uses map overlays to show the overlapping area of traditional village land uses (determined with GPS), the forest concession, the nature reserve, and the Forest Department's forest land-use classifications. By clarifying the overlaps of compatible and incompatible land uses, he is able to suggest management options that would help to resolve conflicts between land users.

Chanchai Sangchyoswat describes a methodology of using GIS to identify social forestry options for watershed management. By overlaying a map of existing land uses onto watershed classifications, it is possible to identify appropriate and inappropriate land uses and future options. He concludes that a simple analysis of the biophysical factors, as performed for watershed classification, is not always enough for the purposes of planning and that data should be incorporated that clarifies the social forces that drive land-use decisions, as well as particulars of the management practices. In this case, rather than categorically saying that paddy or cash crops are inappropriate in a certain watershed class, further spatial analysis showed that the specific location and size of the paddy fields are appropriate.

The availability of maps and remote sensing data varies for each country. Mouza maps, used in Bangladesh for recording landownership, provide a unique source of large-scale

information on land cover and land tenure. S.I. Ali and K. Ahsan show why spatial factors are so important in planning social forestry in land scarce Bangladesh. What lands are available for social forestry are fragmented and widely scattered, and often subject to conflicting interests of different users or jurisdictional authorities. The large-scale Mouza maps can be updated with remote sensing data and used to communicate with farmers and landless peasants who can help to identify potential locations for protection of sal forest, for reforestation efforts on road and stream banks, and for forest plantations.

Readers of this collection of papers should gain insight into some of the important issues and current trends in social forestry in Asia as perceived and expressed by those working in the field.

MANAGING DECENTRALIZATION IN SOCIAL FORESTRY: A REVIEW OF ISSUES AND STRATEGIES IN THE PHILIPPINES

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INTRODUCTION

In most developing countries today, there is increasing pressure to decentralize the implementation of rural development projects. The demand to decentralize arose either from the dissatisfaction with national planning and administrative policies or due to the severe economic and financial problems faced by the nation. Decentralization was also viewed as one of the approaches that could increase the effectiveness of local people's participation in decision-making, planning, implementing, and evaluating projects that directly affect them.

Since the 1970s, experiences of several developing countries have showed varying degrees of successes and failures in implementing decentralization. A review of these experiences reveal that decentralization is not necessarily the solution to all of the problems faced by these countries.

For instance, in Thailand's Rural Employment Generation Program (REG), results showed that it was very successful in Lampang province. The decentralized REG project not only provided work for about 5,000 people but also offered a training opportunity for local officials on project design and management. Local projects were chosen in open meetings of *tambon* councils. In other provinces, the same program was not as successful. There were *tambon* leaders who were not totally committed to the program and did not seek the participation of the villagers (Rondinelli et al. 1984). Notwithstanding such experiences, a number of successful cases have maintained the utility of decentralization.

In the Philippines, decentralization has long been an administrative policy that has been pursued in several forms. Recently, the country's congress passed on September 1991 a new local government code (Republic Act No. 7160) that aims to give "genuine and meaningful local autonomy" to provincial, municipal, city, and barangay government units through the transfer of more powers, authority, responsibilities, and resources. It also gives the private sector and non-government organizations (NGOs) the opportunity to participate in local governance.

The code encompasses a vast area of devolved functions in agriculture, community-based forestry, health, public works, social welfare, housing, telecommunications, and tourism services. Among these devolved functions and projects is the Integrated Social Forestry Program (ISFP), a program implemented by the national government since 1982.

In the case of the Philippine social forestry program, decentralization of its administrative structure was recommended as early as 1987 (Aquino et al. 1987). It was seen as a strategy that could improve response to the diverse needs and conditions of the local people, especially in the uplands.

Although there have been several attempts and experiences in decentralizing management of similar development projects, there is yet to be established a clear set of guidelines to follow. This paper examines the process of decentralization in the ISFP: its strengths and weaknesses, and the factors and issues that affect implementation. It will also discuss emerging strategies in the field that could be of some help to other countries planning on similar schemes for decentralization.

DECENTRALIZATION IN THE PHILIPPINE SETTING: A REVIEW OF NATIONAL POLICIES

Historical perspective. From the late nineteenth century to the present day, Philippine history is replete with events involving the central government's efforts to initiate local autonomy. It is ironic that during the pre-Hispanic period in the Philippines, governance was by *barangays*,[1] preceding the Spanish-imposed structure of towns, cities, and provinces. The Spanish colonizers used the latter structure to facilitate the collection of taxes from the people (Marco 1992, citing Ocampo and Pangamban). Changes on governance in the form of political decentralization and local autonomy began only in the late nineteenth century when the first Philippine Republic (1898–1902) was declared. These changes were said to be limited to structural and procedural reforms (Marco 1992, citing De Guzman). But during the American regime (1902–1946), the country reverted to a highly centralized government considered as part of the preparatory stage for independence.

The Philippine congress in the succeeding decades enacted laws which increasingly gave more powers and autonomy to local governments. The first of these laws was Republic Act (RA) 2264 (1959), increasing autonomy of local governments and reorganizing provincial governments. This was followed by RA 3590 (1963) and 5185 (1967), which further provided for local autonomy measures. The process was temporarily halted when congress was abolished upon the declaration of martial law in 1972. During the period 1972 to 1983, decentralization was likewise instituted, albeit at a slower pace, with the division of the country into 13 regions and the establishment of regional offices of national agencies. Administrative authority was delegated to these regional offices, together with some powers to local governments which enabled them to perform some general development functions. But this delegation of authority was criticized to be merely ministerial and regulatory in nature since the President continued general supervision over the local government units through the then Ministry of Local Government (Marco 1992, citing Brillantes). Thus, the clamor for genuine local autonomy continued.

Enactment of the 1991 local government code. In September 1991 the new Philippine congress passed RA 7160, known as the Local Government Code of 1991, marking the start of the massive decentralization process in the country. It was later signed into law

[1] A barangay is a village composed of 30 to 100 households. It is headed by a village leader who exercised legislative, executive, and judicial powers.

by the President on October 10, 1991. The law seeks to transform local government units (LGUs) at the provincial, municipal, and barangay level into "self-reliant communities and make them more effective partners in the attainment of national goals" (Section 2, RA 7160). This policy was to be instituted through a system of decentralization.

The code introduces radical changes in the local governments' taxing powers and the national tax-sharing scheme. Local governments can get as much as 40% share of charges on mining, forestry, and fishery industries within their locality. The LGUs can likewise impose taxes on real property. Other significant reforms introduced by the code are in the areas of personnel and fiscal administration. Among the basic services and facilities devolved to LGUs were agricultural extension and on-site research; community-based forestry projects; field health, hospital, and other tertiary health services; public works and infrastructure projects financed from local funds; social welfare services; tourism promotion and development; and housing projects.

Scope of devolution in the environment and natural resources sector. Pursuant to the subsequent executive orders (EO 192 and 503) implementing the local government code, the Department of Environment and Natural Resources (DENR) came up with a set of guidelines on the devolution of DENR functions to LGUs (DAO 30, Series of 1992). Under the administrative order, major policies governing the devolution of functions state that:

"(1) DENR shall remain as the primary government agency responsible for the conservation, management, protection, development and proper use of the country's environment and natural resources and the promotion of sustainable development;

"(2) LGUs shall share with the national government ... the responsibility in the sustainable management and development of the environment and natural resources within their territorial jurisdiction;

"(3) implementation of the devolved functions ... shall be pursuant to national policies and subject to supervision, control and review of the DENR" (Sec. 1 of DENR Administrative Order No. 30, Series of 1992; underscoring supplied).

Devolved DENR functions, programs, and projects in the various environment and natural resource sectors include:

1. Forest management

    a. community-based forestry projects including Integrated Social Forestry Projects and other community forestry projects (areas with completed family and community reforestation contracts, Forest Land Management Agreements, Community Forestry Program) that are not assisted by foreign financing institutions;

    b. management and control of communal forests (with an area not exceeding 50 km^2/ha or 5,000 ha);

c. management, protection, rehabilitation and maintenance of small watershed areas identified by DENR;

d. enforcement of forest laws in areas covered by a to c.

2. Protected areas and wildlife—establishment, protection, and maintenance of tree parks, greenbelts, and other areas identified and delineated by DENR; regulation of flora outside protected areas (except those for export purposes); implementation of the rehabilitation and conservation activities identified and delineated by DENR.

3. Environmental management—enforcement of pollution control and environmental protection laws, rules, and regulations for projects and businesses under Kalakalan 20 (an enterprise employing less than 20 persons); implementation of solid waste disposal and other environmental management systems and services; abatement of noise and other forms of nuisance; implementation of cease-and-desist orders issued by the Pollution and Adjudication board.

4. Mines and geo-sciences development—enforcement of small-scale mining laws; issuance of permits, verification, adjudication of conflicts, collection of fees and charges for extraction of quarry resources, sand and gravel extraction.

5. Land management—conduct of cadastral, lot, isolated, and special surveys.

A closer examination of these devolved DENR functions indicates that they are not of notable consequence to decentralized resource management. Implementation of these devolved functions is conditional, usually subject to DENR control and supervision. The devolution has also been criticized as not substantial since foreign-assisted programs and projects are maintained by DENR (Penaflor 1992). These programs constitute the bulk of the National Forestation Program.[2] Basically because of the limit in scope of the devolved functions, DENR retains the structure of its field offices (regional, provincial, and community environment and natural resources offices).[3]

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[2] The National Forestation Program (NFP) was launched by DENR in 1986 in response to the need to rehabilitate denuded forestlands and at the same time provide livelihood opportunities for upland dwellers. It is an umbrella program of projects and activities mostly funded by the Asian Development Bank and the Overseas Economic Cooperation Fund of Japan. Until the end of 1991, among the major activities under NFP were the Contract Reforestation Program, Forest Land Management Agreements, Community Forestry Program, some components of the Integrated Social Forestry Program, timber stand improvement, watershed rehabilitation, and industrial tree plantations.

[3] In 1986 DENR's field offices were reorganized into 14 regional offices, known as Regional Environment and Natural Resources Offices (RENROs). The RENRO, headed by a Regional Executive Director, is responsible for the coordination and implementation of all policies, regulations, programs, and projects on environment and natural resources development and conservation in the region. Under the RENRO are provincial and community environment and natural resources offices (PENROs and CENROs). The PENRO, led by the provincial environment and natural resources officer, provides technical and support services to CENROs within the province in the implementation of DENR policies,

ISFP functions devolved to LGUs. There are eight major functions that were devolved to LGUs. These include (1) conduct of program information drive, (2) identification of target participants, (3) preparation of community development and individual agroforestry plans, (4) extension services in agroforestry development, (5) community organization, (6) implementation of farmer-training programs, (7) provision of livelihood support and other program assistance, and (8) participation in project monitoring and evaluation (M&E) activities initiated by DENR. On the other hand, DENR retained the following powers and functions: (1) identification and delineation of Integrated Social Forestry (ISF) projects; (2) conduct of perimeter and parcel surveys; (3) processing and issuance of land tenure instruments; (4) monitoring and evaluation; (5) production and dissemination of information and education campaign (IEC) materials; and (6) implementation of training programs for farmers and devolved ISF personnel.

Some of the functions are shared by both LGU and DENR. These functions include program information drive, processing of land tenure instruments, preparation of development plans, agroforestry extension services, and monitoring and evaluation activities. DENR is expected to provide technical support to LGUs in the aforementioned activities.

Compared with the other environment and natural resources sectors, the devolution of ISF functions appears to be more substantive. Although the code provides for the participation of municipal governments in the implementation of community-based forestry programs, DENR was constrained to turn over ISF functions to provincial governments. This scheme had to be adopted because of the lack of field personnel[4] and the weak financial base of municipalities to support ISF operating expenses.

Despite these constraints, the municipal environment council still has a role in the processing of ISF land tenure instruments. Endorsements from the municipal environment council will have to be secured prior to the issuance of stewardship certificates. Given due attention by local officials, stewardship certificates and their corresponding development plans may be integrated in provincial/municipal development plans. This process may be significant toward achieving genuine participation of the people in resource management.

The succeeding sections of this paper shall mainly discuss the issues related to the Integrated Social Forestry Program (ISFP). Although there are plans to integrate the management and implementation of other community forestry programs in the country, these have been excluded to simplify the presentation of this paper.

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regulations, programs, projects, and activities. The CENRO, supervised by the community environment and natural resources officer, operates the five field sectoral units (previously under different field offices) of land management, survey, forestry, environment, and national parks. There are 73 PENROs and 179 CENROs covering the 75 provinces, 60 cities, and 1,538 municipalities in the country.

[4] Most social forestry implementors cover more than two ISF projects, sometimes in different municipalities.

CHANGING ROLES AND FUNCTIONS UNDER THE ISFP: THE PROCESS OF DEVOLUTION

Pre-devolution Issues and Activities

DENR preparations. A series of preparatory activities had to be undertaken by DENR prior to the actual turnover of functions. Among these activities were the inventory of program resources (personnel, records, materials, and equipment), preparation of guidelines and the LGU operations manual for the systematic turnover of projects, and the orientation of LGUs on the present status of projects to be handed over.

The first half of 1992 was devoted to the inventory of the ISF projects and their resources. This task was carried out by the regional, provincial, and community offices of DENR. The inventory yielded the following results: as of the end of 1991, 3,604 ISF projects covered 635,333 ha (representing 9.5% of total forestland);[5] 173,366 certificates of family/individual stewardship were issued; 21 communal stewardship agreements covered 69,966 ha managed by a total of 14,684 members; and more than 1,100 full-time social forestry personnel were fielded in ISF projects nationwide. Of this total, 3,531 (98%) ISF projects and 955 (87%) CDOs and CDAs (community development officers and assistants) were devolved to 73 provinces (Metin and Bacalla 1992).

At the central office of DENR, initial drafts of guidelines for the devolution, the operations manual to be used by LGUs, and ISF briefing materials were also prepared. These drafts were circulated not only within the central office but also in the field offices of the department for comments. Foremost consulted were ISF field personnel, including CDOs and CDAs, who were to be directly affected by the devolution.

A planning workshop was also organized for regional ISF division chiefs to discuss strategies and mechanisms that could assist in the smooth transition during the devolution process. The division chiefs were likewise tapped to help formulate appropriate ISF structures, define new roles and functions that would likely be assumed by DENR's field offices after devolution. By July 1992, the orientation of LGU officials and formal turnover of the ISF projects from DENR to provincial governors began. The orientation seminars were conducted by regional ISF divisions and gave information about ISFP goals, objectives, and activities. Included also were brief status reports on the ISF projects to be turned over to the province. Formal ceremonies were sometimes held after the orientation to mark the turnover of ISF management and supervision.

Private sector/NGO preparations. The private sector in the country was also in the forefront during the pre-devolution phase of activities. The academe, non-government and people's organizations (NGOs and POs) conducted similar orientation workshops on the new local government code. A network of non-government organizations, the Upland NGO Assistance Committee, also held regional workshops for other NGOs and POs to discuss issues and implications of the code on the NGO's future services to its clientele. DENR

[5] The remaining forest area in the country is estimated to be 6.69 million ha (DENR, 1990).

representatives were invited during these workshops to answer or clarify matters concerning the devolution.

Some expressed apprehensions before the ISF devolution. During these orientation and consultation workshops, both the affected DENR personnel, LGU officials, and NGOs expressed some of their apprehensions over the inadequate period for the execution of the devolution. The new law and subsequent guidelines provided that the devolution process begin June 1992 and end by December of the same year. What DENR-ISF personnel feared most was a vacuum of services during the transition period mainly due to the LGUs' lack of capacity to immediately implement new projects and services. ISF personnel to be devolved also expressed their concerns that they would find themselves without jobs in the next few months.

LGU officials expressed reservations about accepting responsibility for managing several projects which they thought would not be adequately funded by the province's financial resources. NGOs and people's organizations involved in upland development feared the added "red tape" they would have to go through after devolution. In applying for a stewardship contract alone, documents of interested applicants will be shuttling between the concerned DENR and LGU offices.

Most of these doubts and apprehensions were noted by key officials at DENR's central office and some were subsequently used as inputs to succeeding department circulars and guidelines for devolution. As an example, the worry over the "red tape" for securing stewardship contracts was partially responded to by DENR who decided to retain the surveying (perimeter and parcel) activities instead of assigning it to LGUs.

Organizational Changes After Devolution

DENR structure. It was envisioned that after the process of turning over functions to the LGUs, DENR's remaining ISF personnel would undergo some restructuring to respond to the changes at the field-level. Some of DENR's regional offices have started reorganizing under the advice of their own "streamlining" committee (Tamayo, pers. comm.). Initial reports reaching the Social Forestry Division indicate that there are at least two regional offices[6] that will only have a social forestry section under the forestry division. Thus it is expected that in the near future, the thirteen regional offices will still retain their basic social forestry units but with different staffing patterns. Despite the variation in structural elements, the regional social forestry units are expected to carry out the same functions nationwide.

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[6] In 1990 a department administrative order provided for the establishment of interim social forestry units at the regional- and community-level offices (DENR Administrative Order No. 53, S. 1990). The interim Social Forestry Division in each regional office was placed under the supervision of the Regional Technical Director for the Ecosystem Research Sector. At the CENRO, an interim Social Forestry Section under the forestry sector was also created to provide administrative and technical support in the implementation of ISF policies, plans, and projects. The Regional Executive Director is given the authority to designate social forestry officers-in-charge at the regional and community offices. The appointment of other social forestry field personnel is the responsibility of the Community Environment and Natural Resources Officer.

The fit of these structures to local social and political conditions will be fully known when operations at LGU have stabilized.

In terms of personnel complement, DENR's field offices will not be able to maintain their "casual" or contractual employees. Due to the national government's freeze-hire policy in all departments, DENR officials have instructed the reassignment of personnel from other sectors or divisions to assist in social forestry functions.[7] Each regional office will maintain a set of one CDO and one CDA for each province (internal ISF personnel).[8] CDOs retained by DENR are to coordinate, monitor, and support activities of devolved CDOs and CDAs (external ISF personnel) in the LGUs. The retained CDAs will be assigned to former ISF "model" sites converted into Environment and Natural Resources Service Centers (ENRSCs). ENRSCs are envisioned to serve as learning laboratories for other ISF participants in the province to facilitate the transfer of technologies.

At the central office, the Social Forestry Division will also undergo streamlining, with the down scaling of its sections. First, it will be renamed the "People-oriented forestry division" in anticipation of the eventual absorption by the division of other community-based forestry programs (i.e., forest land management agreements, Contract Reforestation Program, and the Community Forestry Program) . The division's future role will involve policymaking in the various components of community-based forestry programs. Second, the three sections of the division to be retained are (1) community organizing, (2) community resources management planning, and (3) extension, education, and support services. The social forestry divisions in regional offices are usually encouraged to follow the same structure at their level as they are assigned a similar set of functions.

LGU structure. Under the new local government code, LGUs are given the option of organizing their own Environment and Natural Resources Office (ENRO) or to attach the absorbed ISF functions and personnel to some other existing unit in the provincial government. Initial reports from the field indicate that provincial governors plan to create an ISF unit within the Provincial Planning and Development Office (PPDO) or the Provincial Agricultural Office (PAO). It is clear that at the start of the turnover, many of the LGUs are in a quandary how to handle the devolution of ISF projects and their resources. As of the end of September 1992, three months after the mandated start of devolution by RA 7160, only one region reported the completion of its turnover to the governors. In the case of the Southern Luzon region, DENR field offices presented possible ISF-unit structures to governors to facilitate the turnover of functions. The implications of any of these LGU-ISF structures in the field will not be immediately known until the devolution process is completed.

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[7] The detail of personnel from other divisions has long been practiced within the department. Section IV-B of DENR Memorandum Circular No. 17 (1992) authorizes to Regional Executive Directors to identify and assign at least five personnel from other units to support existing ISF personnel.

[8] Based on 1991 figures from the Social Forestry Division, Forest Management Bureau, and the assumption of one DENR-retained CDO per province, close to 35% of the CDOs will be working with 3 to 20 ISF projects, 19% with 21 to 40 projects, 16% with 41 to 60 projects, 10% with 61 to 80 projects, and 20% with more than 80 projects.

PROBLEMS AND IMPLICATIONS FOR IMPLEMENTATION

Unresolved Administrative and Operational Issues

There are several unresolved issues, both administrative and operational, from before and after the devolution process began. Among these are the assignment of devolved social forestry personnel, the monitoring and evaluation of devolved projects, the mode for delivering extension and support services to LGUs, and budgetary constraints in provincial governments. These issues are briefly discussed in the next section.

Assignment of devolved social forestry personnel. Although the implementing guidelines for devolution (DAO 30, S. 1992) and the government's civil service regulations clearly protect the tenure of devolved social forestry personnel, apprehensions and the declining morale of field implementors persisted. During the consultative workshop for regional ISF chiefs, 10 out of 13 reported that there were indeed incidents of LGUs which refused to accept the ISF personnel to be devolved. The major reason cited for the refusal was the uncertainty of the LGU's budget for the salaries and wages of the CDOs and CDAs.

The loss of CDOs and CDAs to lowland agricultural extension work and other work areas determined by the local officials is another potential problem. With the absence of a clear mandate for local officials to fully support the ISFP and a definitive structure to implement the program at the provincial level, field personnel can be ordered to do tasks not related to social forestry. Reports such as the assignment of CDAs to man provincial forestry checkpoints (Metin and Bacalla 1992) are indeed alarming and should be appropriately acted upon.

Provision of DENR extension and support services. The capability of DENR to monitor and evaluate devolved projects needs to be strengthened before it could adequately provide support services to LGUs. Based on DENR's guidelines delineating functions after the devolution (DENR Memo Circular No. 17, S. 1992), the monitoring of devolved projects will be limited to checking on the project status, whether ISF is included in planning and budgeting activities of the LGUs. Retained ISF projects will benefit from the more intensive M&E activities as there will only be between one to three projects left in each province.

With a minimal work force of at least five people per DENR regional office or one field monitor for each province, it is virtually impossible to visit all projects at least once a month. CDOs retained by DENR assigned in each province will be expected to double their efforts as supervisors of DENR-retained projects, monitors of the devolved projects, and at the same time as the key support figures for LGU-ISF implementation. Added to this are their administrative duties to report to DENR's provincial and regional offices, and their coordinating functions with the LGU offices. The major implications of these shortages in field personnel will either be a delay in responding to the needs of program participants or the neglect of some of the CDO's duties and functions.

Other operational problems. Aside from support services, DENR will have to address other operational problems in the next few months. One of the foreseen problems is

coordinating the processing of land tenure instruments. Although screening of applicants for stewardship contracts goes through both the DENR and the municipality's environment and natural resources council, apprehensions from the former's ISF personnel still persist about the accommodation of unqualified participants through the intercession of local officials. At this stage of the decentralization process, DENR field offices are reluctant to antagonize local officials and would likely accept application endorsements from the local environment and natural resources council. NGOs working with indigenous upland communities, on the other hand, are concerned with the process of coordinating with both DENR and LGU offices. There are doubts about the effectiveness of the new system for processing stewardship certificates and delivering social forestry-related services.

Eliciting Support and Interest of LGUs for ISF

Constraining factors in LGU implementation. With the voluminous work the LGUs have to take on with new functions and projects after devolution, the major question would be which activity will be prioritized given the budgetary constraints. In a preliminary study on priorities of LGUs, environmental concerns did not rank uppermost in the local officials' list (Metin and Bacalla 1992, citing Brillantes). One of the major factors that will constrain ISF implementation under the LGUs is their fiscal capacity to maintain the salary compensation of devolved DENR personnel and the field operating expenses. Salaries of personnel from national offices are generally higher than that of LGUs.

The problem of sustaining community participation. With the much-publicized transfer of power from DENR to the LGUs, minimal attention has been given to the group that will be most affected by decentralization—the upland people. Very few sectors in the country today have forwarded the interests of the local people affected by the "changing of guards." No specific fall-back measures have been drawn in case LGUs are not able to assume the role of chief ISF implementors. When a high-ranking DENR official was asked what is the policy response to such a situation, he replied that all DENR can do is to document such events and report them to the chief executive of the land.

Major questions such as how to strengthen the ISF community's resource management capabilities and how community-level inputs can reach local policymaking bodies remain relegated at the bottom rung of discussions. It appears that these questions will only be answered once the major administrative and operational bottlenecks are removed, and realities from the field are finally confronted by the ISF implementors.

But this delay may prove to be costly for newly started social forestry projects or in areas where community organizations are still weak. Local people's interest in development projects generally wane if they feel that government is inconsistent with their promises of program support (both logistical and moral support). Since the majority of ISF projects in the country are composed of individual/family stewards, the bulk of the work in organization building in these communities remains. An organized community is still a prerequisite to the development of community resource management. Consequently, the quality of work by field implementors in these communities has to be improved if the goal of people empowerment is to be realized.

The next step for organized ISF communities is the exploration of representation in local community boards (e.g., local development council, local pre-bid and awards committees, local health board, local environment and natural resources council) and the exercise of their power of recall and initiative. Being physically detached from the actual centers of local governance, uplanders usually encounter these opportunities through communication with outsiders.

EMERGING STRATEGIES: FORGING COLLABORATIVE SCHEMES

DENR-LGU coordination. To the credit of social forestry officers throughout the country, DENR has begun exploring alternative coordinating mechanisms between its field offices and the local government units. It is expected that these schemes will vary in each province, with the LGU officials' management styles and the nature of partisan politics in the area as key determinants. Nevertheless during the ISF consultative workshop, regional ISF division chiefs were advised to inform their CDOs and CDAs to immediately establish links with the provincial governor's office. To facilitate these coordinating functions, a social forestry provincial coordinator (assigned at the PENRO) and a social forestry desk officer (assigned at the CENRO) will be identified as key players in ISF implementation. Among the major functions of these coordinators are (1) prepare ISF work plans in coordination with the LGUs and (2) provide technical assistance and other support services to ISFP participants, in coordination with the LGU. The ISF work plan will include activities that require DENR intervention to assist LGU implementation.

An advantage that could be cited with the decentralization is that it will provide DENR more opportunities to coordinate with other agencies which could improve delivery of services to the people. With DENR field offices' constant contact with LGUs, coordination with other government service sectors (previously housed in different field offices) will be facilitated.

The Upland Development Program's outreach program for people-oriented forestry (OPPOF). With news that the ISFP will be most affected by the devolution, the working group and technical committee of the Upland Development Program (UDP) embarked on an outreach program to assist in the orderly transfer of ISF functions. UDP is composed of a multidisciplinary group from the private sector (NGOs and the academe) and key officials from DENR and the Forest Management Bureau. It has been supporting DENR's social forestry program since its inception though research, training, and extension work in selected sites throughout the country. With the outreach program, a continuing program of assistance will be implemented in building the technical capability of social forestry (and later to include other people-oriented programs) implementors within DENR and the LGUs. Key activities of the program include regular training courses and orientation seminars for LGU implementors; extension and support services in land tenure, agroforestry farm production and marketing, community organizing, and forest resources management; and regional-provincial review and planning workshops. The outreach program's success would largely depend on the support from DENR and LGU officials.

Tapping private sector/NGO support. As demonstrated in the most recent events of decentralization, the private sector (NGOs and POs) has taken the initiative to study and communicate the implications and consequences of the new code to its target groups. The most significant provisions in the code are representation in local special bodies, participation in the delivery of basic services, joint undertakings with LGUs, mandatory consultation, and the exercise of recall and initiative. With these provisions institutionalizing participation of the private sector, more inputs can be expected in the areas of policymaking, planning and implementation of local development projects, and support in the delivery of basic services to the people.

Inasmuch as government services cannot reach all sectors most of the time, NGO/PO presence can supplement LGU efforts in community organizing and agroforestry extension. Currently a number of NGOs are active in these service areas of social forestry. The new code can be considered an added incentive for their sustained or greater participation.

Implications of strategies. It can be gathered from the above strategies that decentralization presents opportunities for improving social forestry implementation despite the initial problems it will cause. But in order to effectively implement the decentralization process, emphasis has to be given in establishing a link between various offices at the appropriate time. With LGUs still at the early phase of absorbing several devolved functions at the same time, DENR field offices should continue with the initiative of strengthening collaborative links between different agencies and ensure that social forestry is included among the development projects to be prioritized.

The role of the private sector, on the other hand, is to bridge the gaps in services left by local governments. Some NGOs and POs have been into social forestry far longer than most LGU implementors. Their knowledge and experience could be an important resource for ISF projects. What remains important is using strategies that could facilitate the learning process for LGUs. And at this early stage of decentralization, gains in social forestry could be preserved with initiative and ingenuity from "veterans" in the field.

CONCLUSIONS

As the process of decentralization is just starting in the country, surely there will be more issues to deal with, and more solutions have to be thought of. There are still plans to further devolve the other functions and projects related to community forestry. The implementation of such plans can benefit from the lessons generated thus far from the ISF devolution. Future plans of action should consider the following if participation of the people in resource management is to be maintained:

(1) **The provision of sufficient period for consultation and other preparations for those who will be directly and indirectly affected by administrative and operational changes.** The abrupt change in the working environment can be better dealt with if most of the field implementors' apprehensions on effects on their career plans, compensation, and other benefits are allayed before any transfers are made. Planning decentralization with

human elements as one of the key considerations will result in a more motivated group at the field-level. Administrative support from both the relinquishing (DENR) and receiving (LGU) ends will determine future performance of affected personnel.

(2) **Clear delineation of roles and functions to be transferred to counter the adverse effects of temporary disruptions in project implementation.** Confusion at the field-level is often the product of general statements of decentralization policies. Though some field offices venture into giving their own interpretation of vague implementing guidelines, others are hesitant and would rather wait for further instructions. These situations can be avoided with the foresight of possible scenarios under devolution and the appropriate resources required for different conditions.

(3) **Allowance for some amount of flexibility in following the implementing guidelines for devolution should be provided.** Sensitivity to the needs of the people, initiative in finding solutions for transitory problems, and being creative in situations least expected to happen are important. There was one provincial governor who formally requested that the devolution process be deferred for a month for his office to study and prepare appropriate action on the matter. National agencies should be prompt in responding to similar instances and exercise flexibility so as not to disrupt the delivery of services to their target participants.

(4) **The advantages and disadvantages of the process of decentralizing powers and authority should be carefully weighed.** There are instances that the process should be gradually carried out to have more time to scan social, political, and economic conditions in the area. In the case of the Philippines, local politics and social conditions vary in each province or island-group. These diverse conditions should be considered in the design of administrative and operational changes in project implementation.

Ultimately, both the national and local governments should draw decentralization policies that include not only the strengthening of administrative and political units, but also policies empowering the local people in governance and management of their resources and their future.

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TRADITIONAL COMMUNITY FOREST MANAGEMENT: ENHANCING FOREST CONSERVATION IN THAILAND

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INTRODUCTION

Forested lands in Thailand have decreased dramatically over this century. In response to rapid rates of deforestation, the Royal Forest Department (RFD) has come to recognize that successful forest management, and particularly reforestation projects, need the involvement of local people. This was written into the 1985 National Forest Policy. More recently, the RFD now sees the important role that rural communities play in forest conservation. Over generations, even as the forested land-base decreased, rural Thai and hill tribe communities have traditionally conserved an area of forest near their village for cultural and environmental reasons and for sustainable use. Community forest management systems evolved to ensure a sustained yield of both wood and non-wood products such as fuelwood, medicinal plants, edible vegetables and other products. Many community forests were established as sacred places, the home of forest or water spirits, or places for meditation. The management patterns of these traditional community forests vary according to the culture, economy, and ecology of the different geographical regions of Thailand.

Customary laws were developed by local organizations to regulate forest use by local people and to protect the forest from outsiders. Community members often share religious beliefs that engendered a common respect for the forest. As a result, these community forests have been maintained by the communities for many generations without over-use, encroachment by illegal logging, or expansion of agricultural practices.

The RFD is now promoting traditionally managed community forests as part of the strategy for conservation of the remaining forests of the nation. The RFD has made an inventory of the number, area, and distribution of community forests in the Reserve Forest, and is continuing to study management practices in more detail and the community motivations for maintaining forest. The best examples are being used as demonstration forests to promote forest conservation in other rural communities.

However, a legal obstacle to be overcome is that communities that are sustainably managing forests within the Reserve Forest are not legally allowed to extract forest products. Recognizing the important role communities can play in protecting forests, and that local people need incentive to do so, the RFD has proposed a new Community Forest Act to give legal recognition and allow sustainable use of the community conserved forests.

This paper presents the current knowledge of the extent of traditional community forest management in Thailand. Nine major patterns will be described. A discussion follows on the emerging recognition of its diversity throughout the country, and ways that the RFD is using to support and further promote community forest conservation in Thailand.

EMERGING GOVERNMENT INTEREST IN COMMUNITY FOREST MANAGEMENT

Changes of National Forest Cover

The high rate of deforestation in Thailand is primarily due to (1) conversion of an estimated 70% of forest land into agricultural land for commercial crop cultivation; (2) increasing demands for timber by industry and for fuelwood by local communities; and (3) insufficient efforts bye the government. Widespread deforestation has contributed to high rates of soil erosion, aggravated the effects of floods, and impacted the national economy.

In 1961, the first forest survey of Thailand using aerial photography showed a forest cover of 53% of the total land area. National forest policy stated that 50% of the land area be classified as Reserve Forest and the reserve could not drop under 40% of total land area. In 1973 a survey using LANDSAT showed that forest cover had decreased to 43% of the total land area. By 1989 forest cover had dropped to 27.95%, under the 40% officially targeted as Reserve Forest.

Status of Forest Policy and Community Forest Programs

The National Forestry Policy (1985) stated that of the 40% of national land classified as Reserve Forest, 15% would be kept as protected forests for nature conservation, recreation, and environmental protection, while 25% would be designated as economic production forest to produce timber and other forest products. To achieve the 40% goal, the policy called for reforestation efforts and forest conservation in the Reserve Forest by government agencies, private industry, and local communities.

In 1987 the government set up a national five-year Community Forest Program to collaborate with local organizations who would establish nurseries and community forests in areas outside the Reserve Forest. Seedlings were distributed to local communities to plant on public lands such as along roadsides, and around schoolyards and temples. The reforestation programs helped to slow the rate of deforestation, but not halt it. They were only a partial success because the goals seldom took into account the needs of the villagers who depend on the forest. Within the Reserve Forest the forest resources are still decreasing since there are land-use conflicts between government and local communities who depend on forested lands. Since the national logging ban in 1989, there has been a concerted effort to involve villagers in reforestation and forest conservation in the Reserve Forest.

In 1991 the forest policy was revised and the percentage of protected forest and of production forest was reversed, reflecting the increasing emphasis on forest conservation. In the Seventh National Economic and Social Development Plan (1992–1996), the government again emphasized forest development by the promotion, extension, and expansion of the role of local people and local organizations. A primary task of the RFD is to find innovative solutions to problems of illegal logging and migrant encroachment onto Reserve Forest lands (Pragtong and Thomas 1990). Giving local communities the responsibility to protect forests is one solution—thus, the RFD's efforts to understand and support existing traditional community forest management.

A CASE STUDY OF FOREST CONSERVATION BY A NORTHERN LOCAL THAI COMMUNITY IN BAN PHAE VILLAGE (Charoenrak 1988)

Ban Phae village is located in Chiang Mai province in the upper watershed of the Ping river. This village started protecting the forest in the 1940s within what is now Mae Uon National Reserve Forest. The community forest covers about 80 ha out of a total village land area of 160 ha. This natural forest includes zones of mixed deciduous and dry dipterocarp forest.

The villagers' main objective in conserving the forest is to protect their source of water for consumption and irrigation. The village water supply flows from two springs in the community forest, called Huay Oor pavilion and Huay Yoob or Huay Nam Roo pavilion by the villagers. Villagers of Ban Phae village believe that the two springs have guardian spirits that keep the water flowing. The water is considered holy water and is believed to cure illness. Local stories and traditional ceremonies are passed generation to generation telling about the sacredness of these places. Each August, villagers worship the spirits of the spring by offering chicken, pig head, flowers, and incense. They ask the spirits to provide the village with a dependable rainfall during the farming period.

Villagers collect wood and non-wood products from the forest. Dead and fallen trees are allowed to be cut for communal purposes such as for building and maintaining the temple and school. Branches of dead trees can be used for household firewood or charcoal. Each year, from April to September, villagers collect bamboo shoots, mushrooms, and vegetables for food. Medicinal plants are collected throughout the year. Cattle are grazed in the forest during the paddy cultivation period.

Villagers organized a forest protection group who are responsible for protecting the community forest. Activities in forest management are administered through an executive group that is chaired by the village headman and includes nine female members of the village development committee.[1] Each member is responsible for recruiting volunteers from ten households for fulfilling assigned tasks. The committee rotates two of its members as forest guards to prevent illegal logging and to watch for forest fire during the dry season. Each year, villagers clean the waterway to facilitate waterflow, clean the forest ground, prune trees and cut nearly dead trees. They also cut meter-wide fire breaks around the forest to prevent the spread of fires.

Villagers have enacted rules for protecting their forests from illegal poachers. Illegal logging must be reported to the village committee, which enforces the rules concerning the particular forest abuse. There is an $8 reward for identifying those involved in illegal logging. Illegal loggers are fined by the Village Development Committee $4 /inch of timber. If they refuse to pay the fine, they are brought to the district police office to face legal charges. The money acquired from fines is distributed by the village headman for use in community development such as maintaining the temple and school.

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[1] The Village Development Committee is part of the formal bureaucratic organization. Organizational pattern is similar to those of Tambon Council Committee but at village level. This committee is chaired by the village headman, with five to nine elected members. The number of members in each village Development Committee varies, depending upon the agreement of the district office.

PATTERNS OF TRADITIONAL COMMUNITY FOREST MANAGEMENT IN THAILAND

Traditional community forest management in Thailand varies by geographical region. This is due to the difference in social system, economy, culture, religious belief, and the degree of forest dependence of the rural people living in the four regions of the country—North, South, Northeastern, and Central. Based on many case studies on community forest management, the various systems have been categorized as follows:

1. ***Pa-Poo-Ta***[2] **- Ancestral Spirit Forest** (Northeast). This is a forest area preserved and managed by rural Thai communities as a place for their ancestors' spirit. When they establish their communities, they keep a small portion of dense natural forest adjacent to the village. Amongst the big trees, they construct small elevated living houses for their ancestors' spirit called *San-Poo-Ta*.[3] They believe that the ancestors' spirit will keep watch over their communities and make their lives peaceful. A *San-Poo-Ta* keeper, or *Cham*, is assigned through spiritual ceremony to take care of the ancestors' house and communicate with the ancestors' spirit.

Pa-Poo-Ta is a holy forest. Every member of the community is responsibile for protecting it, and they are prohibited from clearing it for farming, timber cutting, or even hunting. They can use the forest only for gathering minor non-wood forest products like mushrooms and edible plants, and to collect dead branches for fuelwood. But they must first ask permission from the ancestors' spirit.

A local organization is responsible for the management of the forest. The group may be formal, such as a Village Development Committee or informal such as a group of elders who are respected by village members. This core group issues regulations and enforces customary law to control forest use. Those who break the regulations are fined or punished.

2. ***Pa-Cha***[4] **- Funeral Forest** (North and Northeast). Rural Thai and hilltribe communities protect a small portion of natural forest near their villages as a place for cremations and burials. Some hilltribe people in the north, like the Karen, keep two patches of natural forest. One is the holy forest; the other is a funeral forest. The holy forest is the center of a Karen village. They believe that it is the center between human beings and god, and that the ficus tree represents the god image. Whenever anyone dies, his or her possessions are brought to a place near the ficus tree in the holy forest, so that they are sent with the deceased's soul. The body of the deceased is brought to the funeral forest for cremation.

To ensure proper management and conservation of the forest, the Karen people have regulations. From the holy forest, people can collect some forest foods like mushrooms,

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[2]Pa-Poo-Ta is Thai dialect. Pa means forest; Poo means paternal grandfather; Ta means maternal grandfather.

[3]San-Poo-Ta is Thai dialect. San means a small elevated house for the holy spirit.

[4]Pa-Cha is Thai dialect that means forest for funeral.

bamboo shoots, and greens, while timber cutting and hunting are prohibited. From the funeral forest, people collect firewood both for cooking and for cremations (Chantalert 1990).

3. ***Pa-Sab-Nam***[5] **- Headwater forest** (North). The rural Thai and hilltribe people have traditionally kept a patch of dense natural forest at the headwater of the village watershed to protect the quality of the village water supply. The villagers also derive benefits from this kind of forest in the form of wild foods, firewood, medicinal plants, and a place for recreation.

The forest management regulations are established by the Village Development Committee, or by a water user committee (*Kloom-Muang-Fai*). The water user committees are very strong local organizations in forest and water resources management. The committee is responsible for enforcing the regulations with fines and punishment.

In some communities, for instance Karen villages, the people believe that the spirit lives in the headwater forest, and that the forest is sacred. No one dares to destroy this forest in the belief that a disaster would happen to him or to his family (Tan-Kim-Yong 1990)

4. ***Pa-Hua-Na***[6] **- Soil conservation forest** (North). Rural Thai and hilltribe farmers keep a portion of natural forest above their paddy fields for preventing soil erosion. The Karen people protect *Pa-Hua-Na* around their villages with very strong management, including a good system of forest fire protection using firebreaks. Village regulations are formulated by the village committee to control and manage *Pa-Hua-Na* (Tan-Kim-Yong 1990).

5. ***Wat-Pa***[7] **- Temple forest** (Throughout Thailand). *Wat-Pa* are forests on temple grounds. Whenever a new village is established, the villagers invite a monk from another village to build the village temple. Temples are almost always located in the forest for religious reasons. *Wat-Pa* is a quiet and peaceful place where the monks can practice their meditation (Wetchakit 1989). The monks, in association with villagers, protect and maintain the trees around the temples by first marking the forest boundaries. Cutting trees and hunting are prohibited in the forest area. In some *Wat-Pa*, villagers can collect forest foods. The villagers and monks establish special committees to manage *Wat-Pa*. Customary law is set up to fine and punish those who abuse the temple forest (Rattanasuwan 1990).

Around the temples are religious trees such as *Bo, Sala,* and *Rang*; shady and wide canopy trees such as Ficus sp. and Eugenia sp.; and flowering forest trees such as Lagerstroemia sp., Delonia regia, Tabebuia sp., and Cassia sp. Fruit trees such as mango, jackfruit, and tamarind are likely to be planted near the monks' dwellings. Valuable timber trees such as Tectona grandis, Hopea sp., Dipterocarpus sp., Pterocarpus macrocarpus, Xylia kerrii, and other hardwoods are planted in the general area of the temple (Wetchakit 1989).

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[5]Pa-Sab-Nam is Thai dialect. Pa means forest; Sab-Nam means water catchment.

[6]Pa-Hua-Na is Thai dialect. Pa means forest; Hua means above; Na means paddy field.

[7]Wat-Pa is Thai dialect, Wat means Buddhist temple; Pa means forest.

6. ***Pa-Apai-Tan***[8] **- Wildlife sanctuary forest** (Almost throughout Thailand). This kind of forest is mostly found in or adjacent to the Buddhist temple grounds. Most Thai people are Buddhist. They follow the first precept of Lord Buddha's teaching which is to abstain from destroying living creatures. To practice kindness to all living creatures monks keep a portion of natural forest near the temple as a wildlife sanctuary. The monks encourage the presence of all wild animals and may try to feed them. When wild animals are captured by villagers, they are sometimes given to the monks to feed and release in the temple grounds (Wetchakit 1989).

One example of a buddhist village wildlife sanctuary is located in Saton sub-district, of Songkha province in southern Thailand. The villagers have protected this 412-ha forest for wildlife conservation for many generations. The village committee has taken the responsibility of managing the forest. The forest was eventually designated a Wildlife Sanctuary by the RFD at the request of the villagers (Manothamphitak and Panjamanon 1990).

7. ***Pa-Rong-Rean***[9] **- School forest** (Almost throughout Thailand). The school teachers and students, in association with villagers, protect and maintain a portion of natural forest in or near the school grounds for recreation, as a natural laboratory, and as a source of natural food for villagers and students (Sriwongwanna 1990).

8. ***Pa-Chai-Soi-Choom-Chon***[10] **- Multipurpose forest** (Almost throughout Thailand). A patch of natural forest is protected and maintained by local Thai adjacent to their villages for multipurpose use. They collect non-wood forest products like mushrooms, medicinal plants, wild greens, fruits, and firewood. They also graze cattle in the forest.

9. ***Pa-Hua-Rai-Plai-Na***[11] **- Fuelwood Forest** (Almost throughout Thailand). Villagers protect and maintain small patches of natural forest on either side of their cultivated fields for a source of firewood.

10. **Unclassified community forests**

In southern Thailand local people keep forests as a source of wild edible fruits such as rambuttan, durian, mangosteen, jackfruit, and mangos. They also collect wild edible plants such as *sataw* (Parkia speciosa), and *nian* (Archidendron jiringa) and medicinal plants used for tonics, toxin, and in spirit mediation. Southern Thai believe that all plants are both edible and medicinal. They rely heavily on wild edible plants as a food resource by taste preference

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[8]Pa-Apai-Tan is Thai dialect. Pa means forest; Apai means to forgive; Tan means to contribute.

[9]Pa-Rong-Rean is Thai dialect. Pa means forest; Rong-Rean means school.

[10]Pa-Chai-Soi-Choom-Chon is Thai dialect. Pa means forest; Chai-Soi means multipurpose use; Choom-Chon means community.

[11]Pa-Hua-Rai-Plai-Na is Thai dialect. Pa means forests; Hua-Rai-Plai-Na means the beginning and the end of cultivation land, cropping field, or paddy field.

and because it is part of their strong cultural identity. Traditional medicines are trusted by Southern Thai because of their efficacy and low treatment cost (Levin 1992).

On the east coast of central Thailand, some local communities preserve areas of natural mangrove forest as habitat for crabs, fish, and shrimps, which are collected for food.

In the Northeast some local communities keep small natural forests as a source of natural foods such as bamboo shoots, mushrooms, and wild edible plants.

FACTORS AFFECTING THE PERSISTENCE AND SUSTAINABILITY OF TRADITIONAL COMMUNITY FOREST MANAGEMENT IN THAILAND

Community forests management has existed for generations. Village people established community forests for their own needs and have protected them ever since from timber harvesting, swidden clearing, and poaching. Based on the case studies, it can be shown that there are several principal factors affecting the persistence and sustainability of community forests. They provide tangible and intangible benefits, and their sustainable use is supported by strong local organizations, animist beliefs, and customary laws.

Forests Provide Many Tangible and Intangible Benefits to Local People.

Natural forests have been managed and conserved by local people for the following benefits: **Clean water supply** - Local people, especially those living in the mountainous northern region, know that forests help to protect a clean water supply for household use and irrigation of their rice fields. **Environmental conservation** - Northern communities keep forests above and below their cultivated lands to help prevent soil erosion. Southern communities maintain mangrove forest as habitat for aquatic animals. Communities in the central region keep natural forests for wildlife conservation. **Source of energy** - Dead and fallen trees or branches are used as firewood for cooking and for heating during the winter. **Source of non-wood forest products** - Forest foods, including mushrooms, bamboo shoots, vegetables, and fruits, are especially favored and are part of the traditional cultures. People also collect medicinal plants from the forests. **Place for religious worship** - for example, the ancestral spirit forest, the funeral forest, and the temple forest. **Source of income generation** - Sometimes local people generate cash income by selling non-wood forest products such as mushrooms, bamboo shoots, and honey.

Strong Local Organizations Protect and Manage the Forest Resource

Local organizations play a crucial role in managing community forests. They control forest use to ensure continuous benefits to village members. There are formal and informal local organizations involved in forest management. Formal organizations are established by

legislation and include the Tambon Council Committee[12] and Village Development Committee. They may be directly involved in forest conservation, or they may support activities of informal forest management groups which are often made up of elders, water-user groups, or religious groups. In all successful cases of community forest management, one of these types of organizations has taken responsibility for preventing illegal logging, hunting, and encroachment of cultivators. They also take responsibility for fire control by organizing the cutting of fire breaks, and teams of fire fighters to extinguish forest fires.

In the past the government has recognized both formal and informal village organizations, but not their role in forest management. The forest planning tended to be top-down and emphasized the authority of trained foresters. It is now evident that forests are being well managed in areas where there are strong local organizations, and despite the lack of formal forestry training. However, in forested areas where there is no strong local organization, and land-use policies and programs have not responded to the needs of local people, the forests continue to be destroyed. Village organizations cannot achieve their objectives of sustainable use and conservation of village forests without the active participation of local people.

Cultural Beliefs

The animist belief system of some villagers provides motivation for protecting forests such as in the case of the ancestral spirit forest, the funeral forest, and the headwater forest. Villagers believe that some of the animate and inanimate components of the forest, such as water, certain trees, and animals, have either good or bad spirits and must be respected. Buddhist beliefs also contribute to sustainable forest management because it involves the belief that forests have souls.

Customary Laws

Customary laws are accepted and respected by all members of the community because they are part of the culture. Every village member has a role and function in taking care of forests. The laws may be enforced with fines and penalties, or with social pressures.

[12]Tambon Council Committee is part of the formal bureaucratic organization with explicit procedures as to the division of labor and authority. Village headmen and one elected senior person from each village are members of the Tambon Council. One local teacher is secretary and the community development worker or assistant district officer is appointed as an adviser by the district officer.

SUPPORTING AND FURTHER EXPANDING COMMUNITY FOREST MANAGEMENT IN THAILAND

Expanding the Knowledge of the RFD Through a National Inventory of Community Managed Forests

Community managed forests may make up a more significant area than previously thought, but the small, scattered protected natural forests and community forest plantations were never included in national forest inventories. In 1991, the RFD conducted an inventory to identify the number and total area of community forests in Thailand, both natural and planted.

To conduct the inventory, a questionnaire was designed based on case studies of traditional forest management and the results of the Community Forest Program. Both provincial and district level field staff administered the questionnaire to key informants in the communities. The questionnaire asked about (1) the type of community forest management—natural or planted, and which of the 10 categories above; (2) the location; (3) the area; (4) the year of establishment; and (5) the land classification—Reserve Forest or outside Reserve Forest.

As the data were collected from the field, it was manually analyzed by the staff at the Community Forestry Development and Extension Office at the RFD central office. The data will be continually updated to build a database on community forests of Thailand. Analysis of the data acquired to date, from 56 of 73 Thai provinces, shows a total number of 4,619 community forests covering an area of about 108,396 ha (Tables I-IV). There are reports from some provinces that they have no community forests.

Aside from conducting the inventory, the RFD aims to further enhance the knowledge of field staff stationed in regional and provincial forest offices. An investigation of traditional community forest management was initiated as one of the activities of the National Community Forest Development Program (1992-1996). The staff of provincial forest offices will do overview studies of the traditional community forest management of their area, while the staff of regional forest offices will do more detailed studies. Part of the objective is to identify examples of well-managed community forests to use as demonstrations for forestry extension. Starting in 1992, about 490 community forests are being studied by field forest officers from 49 provinces.

Successful community forests are being used as demonstration forests to encourage the development of similar management by other communities. Within each region, new community forest conservation areas could be established according to the system appropriate for that region. In addition, traditional forest management systems are being investigated for their potential as buffer zones around already protected national parks, wildlife sanctuaries, or production forests that are vulnerable to illegal loggers.

Table I. Total number and areas of community forests in the Northern region (data from 15 of 17 provinces)

Pattern of Community Forests	Total Number of Community Forests	Total Area of Community Forests (rai)
1. Pa-Poo-Ta	35	3,349.0
2. Pa-Cha	303	7,648.3
3. Pa-Sab-nam	35	22,091.0
4. Pa-Hua-Na	3	300.0
5. Wat-Pa	91	5,266.0
6. Pa-Apai-Tan	10	493.0
7. Pa-Hua-Rai-Plai-Na	13	868.0
8. Pa-Chai-Soi	165	94,144.0
9. Others	22	5,188.5
Total	677	139,347.0

Source: RFD (1991).

Table II. Total number and areas of community forests in the Northeastern region (data from 11 of 17 provinces)

Pattern of Community Forests	Total Number of Community Forests	Total Area of Community Forests (rai)
1. Pa-Poo-Ta	765	15,802.5
2. Pa-Cha	1,439	69,441.9
3. Pa-Sab-nam	47	14,903.6
4. Pa-Hua-Na	22	1,324.1
5. Wat-Pa	589	20,777.5
6. Pa-Apai-Tan	98	8,003.4
7. Pa-Hua-Rai-Plai-Na	90	19,119.5
8. Pa-Chai-Soi	684	212,844.6
9. Others	141	58,489.8
Total	3,875	423,706.9

Source: RFD (1991).

Table III. Total number and areas of community forests in the Central region (data from 21 of 25 provinces)

Pattern of Community Forests	Total Number of Community Forests	Total Area of Community Forests (rai)
1. Pa-Poo-Ta	3	51.2
2. Pa-Cha	43	749.0
3. Pa-Sab-nam	12	13,829.0
4. Pa-Hua-Na	3	1,170.0
5. Wat-Pa	219	9,839.7
6. Pa-Apai-Tan	81	11,504.4
7. Pa-Hua-Rai-Plai-Na	15	504.0
8. Pa-Chai-Soi	116	125,354.4
9. Others	66	14,407.3
Total	558	177,409.0

Source : Inventory of community forests in Thailand in 1991, RFD (unpublished)

Table IV. Total number and areas of community forests in the Southern region (data from 9 of 14 provinces)

Pattern of Community Forest	Total Number of Community Forests	Total Area of Community Forests (rai)
1. Pa-Poo-Ta	2	31.0
2. Pa-Cha	53	1,643.0
3. Pa-Sab-nam	26	5,227.0
4. Pa-Hua-Na	-	-
5. Wat-Pa	38	902.0
6. Pa-Apai-Tan	6	104.0
7. Pa-Hua-Rai-Plai-Na	3	2,936.0
8. Pa-Chai-Soi	42	11,671.4
9. Others	14	1,295.4
Total	184	23,810.6

Source: RFD (1991)..

The Proposed Community Forest Act

Even though traditional community forest management is recognized as a very important component of national forest management, its continuation and spread is restricted by forest legislation. Several clauses in the current forest laws of Thailand—the Forest Act (1941), Wildlife Management Act (1960), National Park Act (1961), and National Reserved Forest Act (1964)—do not support traditional community forest management. To address this problem, the RFD, in association with several agencies, has proposed a new Community

Forest Act to the Cabinet. The act would decentralize forest management, giving rights and responsibilities to local communities who are dependent upon forests. This act would give local communities the opportunity to participate in forest conservation and utilization.

The proposed Community Forest Act classifies "community forest" as Forest Land (Forest Act 1941) or Reserve Forest Land (National Reserved Forest Act 1964), which is adjacent to villages and can be allocated to one village. Local village organizations, in the form of Tambon Council Committee, Village Development Committee, or Village Committee, apply to the RFD for the use rights to Reserve Forest Land to be managed as a community forest. Under the act, villagers do not have ownership rights, and there are regulations. Cutting shrubs and trees, clearing land by fire, logging, or any activities that degrade the community forests are prohibited. Cutting trees for individual or community use are allowed in some cases, but not in community forests preserved for water catchment. The collection of non-wood forest products is permitted for commercial, household, or community uses. The Tambon Council Committee or Village Development Committee is responsible for controlling, maintaining, and protecting community forests from encroachment. The Director-General of RFD has the authority to revoke the use rights to community forests if the regulations are not followed.

CONCLUSIONS

Traditional community forest management has been practiced by rural communities in Thailand for many decades. The pattern of forest management varies region to region, depending on the needs and the cultural characteristics of the communities. The diversity of traditional community forest management is being studied and classified by the RFD. The persistence and sustainability of traditional forest management is attributed to several characteristics in the communities, including religious or animist beliefs, customary laws, strong local organizations, people's participation, and the receipt of tangible benefits from the forest. The government now recognizes that local people have the potential to manage and conserve forest. The Community Forest Act has recently been proposed to enhance the opportunity for rural people to be involved in local forest management.

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DEVELOPING LOCAL ORGANIZATION FOR WATERSHED MANAGEMENT IN SAM-MUN HIGHLAND DEVELOPMENT PROJECT

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INTRODUCTION

Over the last 50 years of forest development in Thailand, locally organized forest management has been given little recognition. The government is now recognizing that forest management in Thailand will not improve without people's participation and commitment and without issues of rural poverty being addressed. Indeed, the Seventh National Economic and Social Development Plan (1992–1996) emphasizes involving rural people in forest management. The Royal Forestry Department (RFD) has been directed to encourage local community participation, to identify and apply technological innovations, and to build on indigenous wisdom and institutions in managing natural resources for supporting the needs of society.

One of RFD's projects that attempts to accomplish that mandate is the Sam-Mun highland development project (SM-HDP). The project area is in Reserve Forest in northern Thailand. The objective is to reduce opium growing and to protect forest lands and watersheds through education and community development. The project is unique in its integration of forest conservation, watershed management, agricultural development, and community organization. A major component of the strategy is to increase the involvement of local communities in managing and protecting forest lands for watershed protection within the Reserve Forest. At the same time the RFD is working closely with other government agencies to improve health conditions, reduce opium trafficking and addiction, and increase food self-sufficiency through sustainable cropping systems.

Previous rural development projects in Thailand have created dependent communities by only giving material aid and some extension advice. People were not given training in local organization and control in decision-making. The problems and the solutions were defined by the agency implementing the project. The Sam-Mun project acknowledges peoples' indigenous wisdom, their capacity to think, to analyze their problems, make decisions, and to come up with solutions themselves. The project provides mostly training, facilitation, and small financial or material subsidies as needed.

This paper will discuss the general development concept of the project, and the strategies used to implement it. A case study of one sub-watershed will be presented as an example of local participation in decision-making about forest protection and watershed management. Finally, some of the successes and failures of the project will be evaluated.

BACKGROUND OF THE SM-HDP

SM-HDP is being executed by the Watershed Management Division, RFD, and is funded by the United Nations Fund for Drug Control Program (UNDCP). The budget is about $2.5 million for the 5-year Phase I. Phase II will operate until the end of 1994 with a budget of about $375,000.

The agencies involved in the implementation include Non-Formal Education, Provincial Primary Educational Office, Public Health Office, Department of Local Administration, Public Welfare, 3rd Region Army, Office of Narcotic Control Board, Northern Social Forestry Pilot Project at Chiang Mai university, and the private sector.

Description of the Area. The project site covers about 2000 km^2 of the Sam-Mun mountain range in Chiang Mai and Mae-Hong-Sorn in northern Thailand. The average elevation is 1000–2000 meters. The forest consists mostly of dense pines. The soil types are loam over granite and lime stone, on 35–80% slopes. The area includes the headwaters of Nam Pai and Nam Maetaeng rivers which flow into the Sarawin and Ping rivers, respectively.

Approximately 10,000 people live in the project area in 60 villages. The population is culturally diverse, made up of rural Thai and the hilltribes Karen, Lisu, Ahka, Hmong, and Unannese. Most of the Karen people migrated from Burma; the Lisu, Ahka, and Unannese came from the south of China. Most of the people hold animist beliefs while some are Christians or Buddhists.

Socioeconomic problems. Initial assessments in the project area revealed that the birth rate was increasing at a higher rate than elsewhere in Thailand. Health problems included widespread epidemics of typhoid and dysentery due to poor sanitary conditions, a lack of clean drinking water, and because the people had poor access to clinics for vaccinations. Children suffered protein deficiencies. There was a high level of opium addiction throughout the population.

Illiteracy was also a problem. Seventy percent of the population were uneducated. Many people only spoke local dialects. This contributed to their isolation and marginalization as they could not communicate with outsiders. The traditional agricultural production system consists of upland rice, cabbage, corn, opium, and wood for building materials and firewood. The baseline survey found the average income of hilltribe people was lower than $250/family/year. Furthermore the subsistence sector was not sufficiently productive and people often suffered rice shortages. The cash economy was undeveloped with poor access to markets due to the remoteness of the area and the consequent transportation problems.

Ecological problems. Deforestation is still the overriding ecological problem in the project area. Most of the inhabitants practice swidden cultivation, for growing upland rice, corn, and opium. Some of the hilltribes cut new swiddens every few years without returning to the same site; other tribes practice rotational swiddening. But as the population expands, more and more forest land is required. Swiddens are often made on very steep slopes, and only some of the tribes are using soil conservation techniques. Forest fires have destroyed large areas of grassland and natural forest, especially in the dry season. Forest fires are

started intentionally or accidentally by hunters, and are also caused by escaped swidden burns. The combination of deforestation and poor agricultural practices have caused serious soil erosion, especially during the rainy season. Agricultural productivity is reduced, and water quality is affected.

Commercial crops are grown in swiddens or in permanent fields if flat land is available. Chemical fertilizers and insecticides are used on the commercial crops, and due to improper use have contaminated streams.

THE DEVELOPMENT CONCEPT

Decentralization of Forest and Watershed Management

The ultimate objective of the project is to create self-reliance in the communities, and over time to give more and more power to the communities to make their own decisions. Government must trust the communities to take responsibility. However, before true decentralization can take place, the village people need to have the tools to organize, plan, and to communicate with each other and with the government.

Rural people need the internal strength in the community to deal with changes in their traditional economy. In the past the government acted as the central authority to identify and to solve their problems; therefore, the solution did not always meet the needs of communities. Eventually, that process caused conflicts between government officers and the communities. From the lessons learned, SM-HDP is attempting to lay the groundwork for decentralization by recognizing the communities' ability to make decisions, and to manage and regulate resource use.

Improving on Indigenous Wisdom

The project has a large component of training and education in forest management, agriculture, health and communications. For a variety of reasons, many of the current land-use practices are unsustainable. At the same time it is acknowledged that the people have a pragmatic wisdom. They are practicing the best land management system for the tools and knowledge that they have. They can identify their problems whether they have had formal education or not. But, with training and communication tools they are better able to understand the cause of their problems and prescribe their own solutions. They need to be made aware of the options for land management that are available to them, such as conservation farming systems, agroforestry, fuelwood forest management, chemical control, and appropriate technologies. Their wisdom will help them to implement the best option. The project provides information and the tools for planning and decision-making, and the villagers are trusted to decide.

Integrating Rural Development and Social Forestry

In Northern Thailand, forest conservation and sustainable management can only be achieved by addressing broader issues of rural poverty including health, education, landlessness, and lack of capital and credit. This is the first large project to integrate the efforts of several government agencies under the coordination of the RFD. Mechanisms were created to integrate the project at the administrative and the field level.

Incentive for People's Participation

The people are aware of the symptoms of their problems such as low crop yields, water shortage, flooding and landslides, health problems, and poverty in general. They are not always aware of the causes of those problems, nor how they themselves can solve, or ameliorate them. As people come to understand the reasons behind the problems that affect them directly, they also see more clearly how they themselves can solve some of the problems. When the problems are relevant to them and they see that the solutions and tangible benefits can be achieved by them, it is sufficient to motivate participation.

STRATEGIES FOR PROJECT IMPLEMENTATION

The following strategies are meant to ensure achievement of project goals. Besides working to achieve defined goals, there is a strong focus on the process itself of community organization and people's participation.

Developing Networks of Local Organization

The SM-HDP project seeks to develop cooperation between villagers and various government agencies to initiate change based on local organization. Some villages already had Village Development Committees or Tambon Councils. Others had no formal village organization. In that case, in order to legalize an organization the villagers held elections to select a village committee and a leader. (Traditionally, the leaders of the village were chosen on merit by the incumbent leaders. The election process has been introduced to the uplands). Ecological problems are not confined to one village. All the villages are located along rivers and are therefore connected with others within a watershed. So the project area was divided into sub-watersheds, and micro-watersheds according to topography (Figure 1). Depending on the landscape, 1–2 villages are located within each micro-watershed. Each village issues regulations for their own village, and sends a representative to meet with the sub-watershed committee in order to discuss the mutual problems that affect their village and others. Such an organizational structure helps all the people of the watershed to work together to analyze the problems that they share, and to seek solutions and set regulations. The network of village and watershed committees has increased people's awareness of their neighbors upstream and down.

The role of the sub-watershed committee is to (1) consider the problems and solutions of the sub-watershed; (2) issue regulations for resource use and enforce them with fines and penalties; (3) coordinate with the project and government agencies at a monthly meeting of the Tambon Council; and (4) collaborate with project staff on the planning and implementation of project activities.

Project staff train the villagers in community organization, particularly in communication and administrative skills so that they are able to coordinate with government agencies and the private sector. Through these organizations, communities are better able to make decisions, do community planning, and resolve conflicts.

Training and Facilitating Communications

The conflicts over state forest are frequently caused by misunderstandings between foresters who are responsible for forest management and villagers who use forest land. Both sides must understand each other's needs and objectives in order to work together to formulate mutually acceptable land-use plans and to explore collaborative management of forest resources. This means changing the role of villagers from encroachers to conservationists, and the project officers become advisors rather than forest police. This requires better understanding both ways. The villagers must understand the larger context of deforestation and the objectives of the RFD, starting by expanding their perspective from village to watershed. Project officers must recognize that the people are dependent on the forest for their subsistence needs and their cultural identity, and that they know how to manage natural resource according to their culture. Communication tools are needed to facilitate communication between villagers and between villagers and foresters.

The project conducts a **people's forum** aimed at providing a chance for villagers to discuss experiences and problems and to resolve conflicts. The project provides information, advice and support. A building for the forum was constructed with labor and materials supplied by the villagers.

Information is distributed about government policy, the master plan for highland development, marketing, agricultural information, public health information, and natural disasters. Information is disseminated by the various project line agencies in the form of pamphlets, articles, books, newspapers, radio, and television if available. The people's forum often uses the information to discuss issues.

Study tours are organized as a way for rural communities to gain broader experience. They visit government and private agencies to learn about administration and business organizations, and they visit other villages to learn about the administration of local organizations, or about successful resource management systems such as conservation farming, integrated cropping, and agroforestry.

The project uses **three-dimensional models, aerial photographs, and maps** to help the villagers understand landscape relationships of forest and swidden and how villages are connected on the same water system. The three-dimensional model was developed as a communication tool by social science researchers at Chiang Mai university for the Highland Social Forestry Pilot Project. In the SM-MUN project, leaders of community and youth groups were trained to make three-dimensional models of the watershed. The models are

made at a 1:5,000 scale following aerial photographs and topographic maps. The models are an effective way to display information about topographic patterns, settlement, land-use practices, slope, waterways, headwater, watershed classification, deforested areas, and micro-watershed boundaries. They make it easier to understand a particular village's relation to the broader landscape. The model can be used to illustrate problems and discuss solutions for the management of the watershed. As importantly, the models are used to collect information from the villagers about their knowledge of the landscape and their land-use practices. They are asked to show where they are cropping and where they collect forest products such as mushrooms, rattan, and medicinal plants.

Aerial photographs add extra information to the model. They provide a fast and effective way to collect detailed information about the landscape such as resettlement, land cover, vegetation cover, land-use practice, river, road. Even crop growing such as opium can be detected. A scale of 1:5,000 provides good detail and can be interpreted easily by the villagers by comparing with the three-dimensional model in the same scale. Topographic maps are more difficult for village people to understand because they are one dimensional and may include extraneous details. They should be at the same scale as the model to facilitate interpretation. After the villagers understand the model and aerial photographs, they find it easier to interpret the topographic map.

Integrated Rural Development

Implementation at the administration level. The RFD coordinates with other agencies at both the administration level and field level (Figure 1).

The education department organizes both non-formal education for adults and primary schools based on the national curriculum for children or adults. The adult curriculum consists of environmental issues, sports, and agriculture techniques.

The public health agency provides vaccination, a birth control program, public health services, nutrition education, child care education, and a drug addict rehabilitation program. An economic development program was implemented by project staff and involves introducing agriculture and horticulture systems (paddy field, alley cropping, agroforestry). A program of subsidy support was created in the form of revolving funds, rice banks, and fertilizer banks. Cooperatives were strengthened, and some infrastructure improvements were made in the form of networks of arterial roads. Involvement of the private sector is encouraged to help in marketing and in providing steady information distribution to the farmer.

The department of local administration at the district level is responsible for strengthening the administration in village committees and issuing national identity cards in accordance with regulations of the interior ministry.

The military and the Narcotics Control Board conducts activities to suppress opium growing and drug trafficking in the project area.

The project cooperates with the social forestry program conducted by Forest Reserve Management Division, RFD, and Faculty of Social Sciences at Chiang Mai University, which is aimed at developing practical field methods for RFD-community collaboration in resource management.

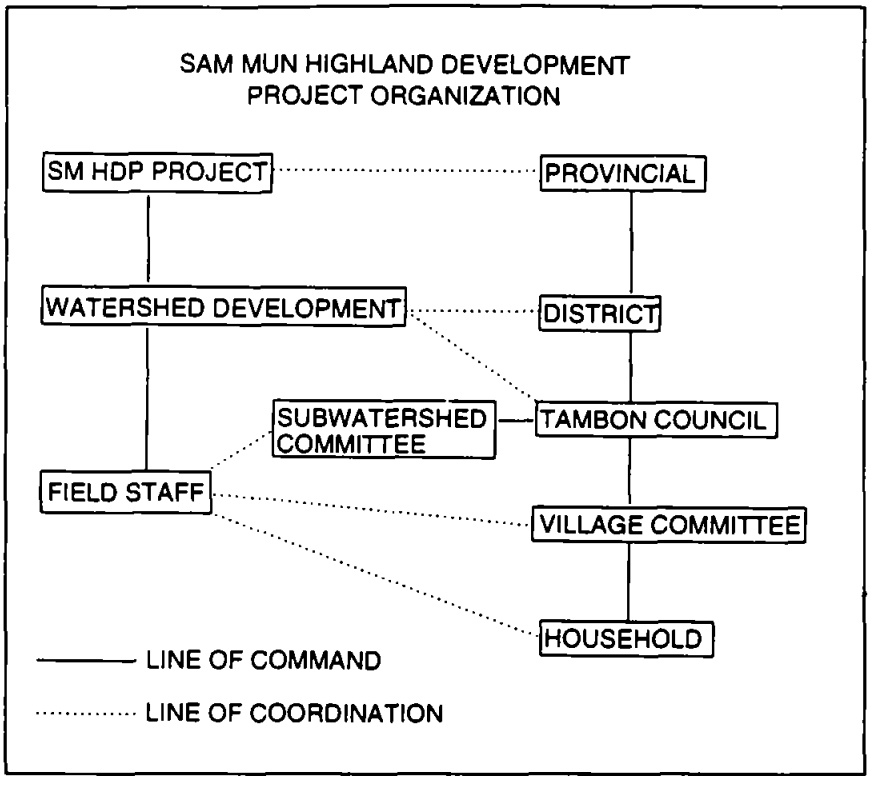

Fig. 1 Structure of the Sam-Mun Highland Development Project.

Implementation of the project at field level. There is also close collaboration with all agencies at the field level. The project area is divided into seven watershed development units for administrative purposes. Each unit is responsible for all the project programs in its area. Each unit has a field manager and staff to carry out the activities at the field level.

The project field team consists of agricultural extension officers, teachers, public health officers, district officers, private sector staff, and village headmen. The officers are graduates from agriculture vocational schools, teacher colleges, and universities. The project staff go through an intensive and continuous training program and each month they meet to discuss their progress, problems, and ideas. They must understand the project concept and all be ready to work with the people. They must know something about the way of life of the people, socioeconomic development, forest and watershed ecology, social forestry, communication techniques, land-use planning, and agricultural systems.

The field staff do initial surveys in the village collecting data on households, water, forestry and land use, and socioeconomic conditions. They analyze the data and identify the major problems. They help the community to organize a committee responsible for natural resource management. They use the land-use planning framework at the project level as a mechanism to work in the village. They conduct training and try to involve women and

youth. Field staff give technical advice, facilitate the people's forums, and do community organizing.

CASE STUDY OF THE NAM-SA SUB-WATERSHED NETWORK ORGANIZATION

Nam-Sa sub-watershed is located in Pai district, Mae-Hong-Sorn province. Nam-Sa sub-watershed consists of five streamlets and ten villages of the Karen, Lisu, and Hmong tribes. In cooperation with project staff, the villagers divided Nam-Sa sub-watershed into five micro-watersheds (Figure 2) by making boundaries following the ridge of mountains. Together the village committees established a sub-watershed committee to collaborate on natural resources management. The sub-watershed committee meets to consider all aspects of problems—economic, social, or environmental—affecting the sub-watershed area.

The project has constructed a public building, called the sub-watershed network center, at Ban Pong Sa. A people's forum is held monthly. The representatives from different villages in the same sub-watershed attend the meeting to consider the problems that affect their village and others. The project officer attends as an observer and advisor.

As a result of the forums, the villagers identified the following problems and solutions:

Problems and causes

Problem - Soil erosion, poor crop yield, poor water quality, and low water yield.
Cause - Shifting cultivation because villagers have never learned other management practices.
Problem - Forest fire destroying crops and forests.
Cause - Illegal hunting by outsiders and escaped swidden fires.
Problem - Chemical contamination in stream affecting health of down-stream settlers.
Cause - Poor chemical utilization practices in cabbage fields.
Problem - Crop damage from livestock.
Cause - Cattle raising without fencing or other controls.

Solutions for Nam-Sa sub-watershed management

* Divide each micro-watershed into management zones such as fuel woodlot, agriculture land, and headwater conservation.
* Form a village committee to regulate land use.
* Provide local education of impacts of fire and encourage people to make firebreaks around their field before burning to prevent fire escapes to the adjacent area.
* Get villages to agree to protect their headwater forest which will be monitored by members of the village committee.
* Control chemical use by decreasing the quantity of chemical used and prohibiting the washing of chemical containers in the stream. The containers must be burnt and buried in the ground.
* Implement erosion control on the steep slopes by terracing, and agroforestry systems.
* Cattle owners must control their cattle and fence their farms.

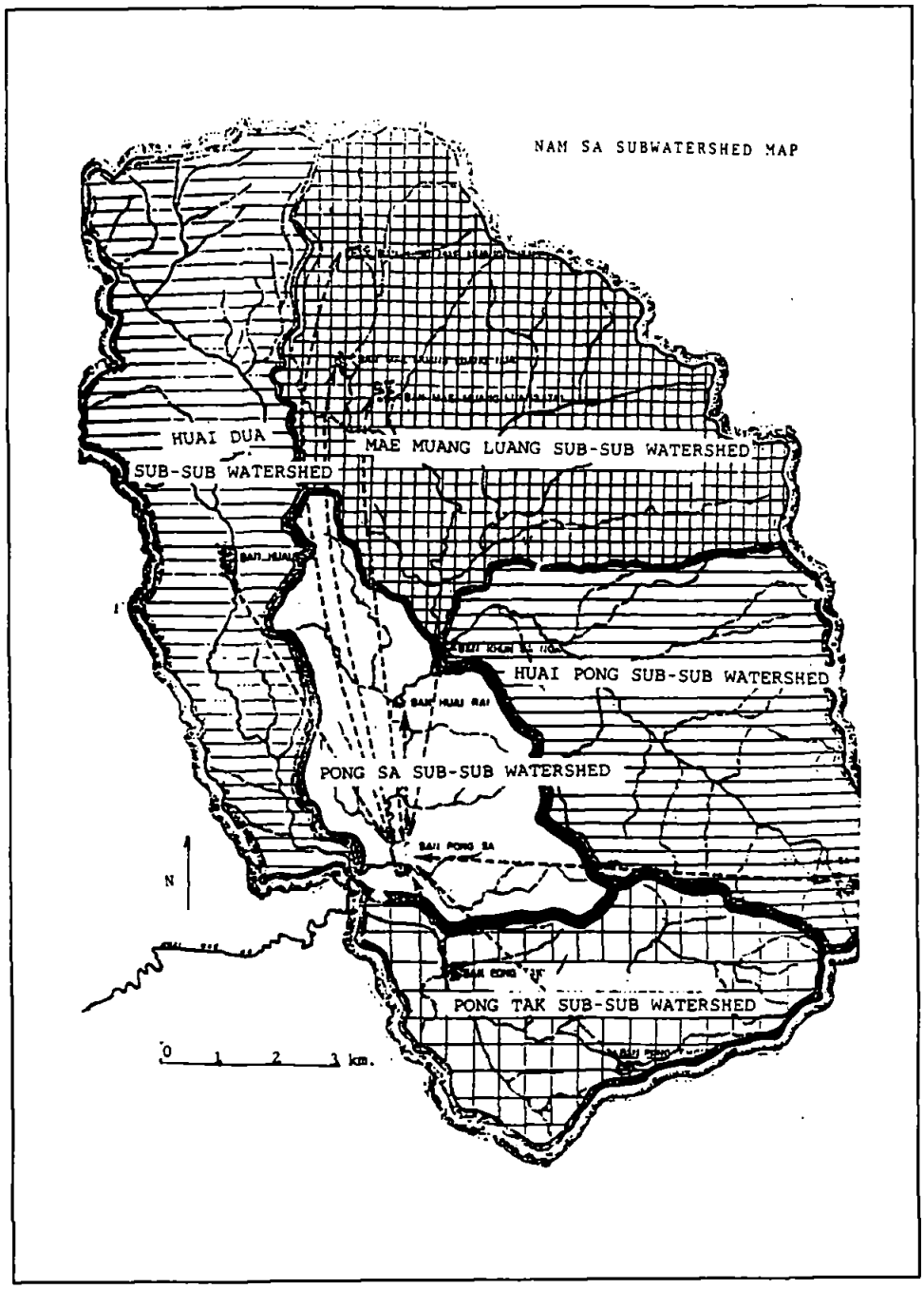

Fig. 2 Divisions of the Nam-Sa sub-watershed unit.

Beyond agreeing on the above solutions, the sub-watershed network committee issued the following regulations for Nam-Sa sub-watershed management:

Regulations for Nam-Sa sub-watershed management

1. Opening land for agriculture and forest fire control

1.2 Farmers are prohibited from opening agriculture land outside of their micro-watershed. Violators will be fined 2,000 baht/rai.

1.3 If agricultural land is not farmed for 2 years consecutively, the farmer will first be warned; then if he does not farm it, the village committee will allot the land to another farmer who has no agriculture land.

1.4 Farmers must build a firebreak before burning their swiddens. If fire escapes, the owner will be fined 2,000 baht per damaged rai.

2. *Building house* - The committee must be informed.

2.1 If villagers are caught selling timber, they will be fined two times the price of the wood and the wood will be seized.

3. *Illegal hunting* - Hunting is prohibited in Nam-Sa sub watershed. Violators will be punished:

3.1 500 baht fine for each jungle or domestic fowl shot.

3.2 2,000 baht fine for each wild or domestic pig shot.

3.3 10,000 baht fine for each domestic cow shot.

4. *Chemical use* - Committee formed to protect reservoir and allot water supply.

4.1 500 baht fine for every chemical container left around.

4.2 Farmers must grow pigeon pea or other trees as strip across slope to reduce chemical seepage into the water supply.

5. *Drugs (Opium and heroin)* - Village committee must educate people about the negative effects.

5.1 Drug trafficking is absolutely prohibited in the village. Violators will be sent to the police.

These regulations were decided on by the village committee and Nam-Sa sub-watershed network committee. The village committees are responsible for enforcing the regulations. The money from the fines will be put in the village development fund, which can used for village development as needed. If violators do not pay the fines, they will be sent to the district office.

The regulations are being enforced. There is one case at Ban Khun Sa Noi, when one farmer burned his swidden without informing the village committee and did not make a firebreak. The fire spread into the adjacent field and caused damage to fruit trees, vegetable garden, and the forest area. The village committee fined the farmer 2,000 baht. The farmer paid and the money was deposited in the village development fund.

This case study shows that local organizations can identify their problems and consider solutions. They do not need large subsidies from outside sources. They need education, training, information, and appropriate tools for communication to help them see the larger picture about their problems and solutions.

SUCCESSES AND FAILURES OF THE PROJECT

The SM-HDP project was evaluated mid-term in 1990 by a Mission from the United Nations Drug Control Program, and again in 1992 by an internal monitoring and evaluation process. The following is a synthesis of the UN Mission findings and the internal evaluation.

The Sam Mun Highland Development Project operates in mountainous terrain, where communication is often difficult, especially in the rainy season, and where many of the target population cannot speak the Thai language. In spite of these adverse conditions, the project made significant improvements in a relatively short time. The effectiveness of the project was due in large measure to an appropriate management structure, extensive decentralization of authority and responsibility, flexibility, and true bottom-up planning that encouraged local autonomy.

The relationship between the project and line agencies at the district level are effective. Overall the mission found that truly integrated development is being achieved and that the RFD is an appropriate implementing agency for hilltribe development projects in watershed areas. In the field, the assignment of a sufficient number of project field officers so that each one was responsible for no more than three villagers meant that each village in the project area received an equal level of project inputs and services. Training programs successfully prepared and supported project personnel and villagers to implement field activities.

Village committee, youth groups, and women's groups were established and gained experience and knowledge. Women's groups have been initiated in every village. Although in 1990 group activities were still limited and gains in women's literacy and fluency in the Thai language was slow, improvement was showing by 1992.

Good progress has been made toward rice self-sufficiency. Agricultural production has increased due to the introduction of improved irrigation systems and green manuring, and a revolving fund with rice banks for surplus, and seed and fertilizer banks has been established. There have been significant increases in incomes due to new cash crops and livestock improvement; in large part because the private sector was activated to play a role in marketing and production. The average income has increased from $250 to $600 per year per family. More than 80% of the population is educated and the birth rate is lower.

Opium cultivation has been reduced from 800 ha to 150 ha. But the number of heroin addicts has increased. This is partly caused by illegal tourists who trek into the project area and stop overnight at the village and hire a villager to show them how to smoke opium, or some may buy heroin. Thus the project provides some support to military and narcotic control officers to do drug searches throughout the project area. Project officers educate villagers, who may act as informants of drug activities.

Little progress had been made in securing land-use rights either for individual villagers or for self-help schools. Land title cannot be granted to the villagers in the Reserve Forest. RFD is working on giving community land-use permits such as S.T.K (SO, TOR, KOR) used in the forest village program. An exception is in watershed classification class I.

Land-use permits can only be given to Thai citizens. In the project area, very few residents have Thai citizenship. The project is collaborating with district officers to give them citizenship, but the process of fulfilling regulations set by the interior ministry can be

slow. In spite of project support for mobile registration efforts and a project-initiated special registration program, very few project area residents have been given Thai citizenship by provincial governors.

Villagers have learned to understand the importance of watershed protection, forest tree planting, and fire control. Villagers have voluntarily taken unofficial responsibility for the protection of watershed areas surrounding their village. During the project, 2000 ha of degraded land has been reforested through the promotion of social forestry programs such as headwater forest conservation, fuel wood, as well as conservation farming. Forest cover has been monitored using satellite imagery since 1991.

In 1992 a geographic information system (GIS) was set up as an efficient way to store, update, and display information about spatial relationships. GIS will be used to monitor migration, forest cover, land-use changes, land suitability, and crops. GIS can also be useful for planning and monitoring at the decision-maker level.

Before the termination of the project there is a focus on doing more training and strengthening local organizations in administration and natural resource management so that the people have the capacity to sustain the activities themselves.

USING THE PRINCIPLES AND METHODOLOGY OF SOCIAL FORESTRY TO MANAGE THE YANGTZE RIVER SHELTERBELT IN CHINA

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INTRODUCTION

The construction of the Yangtze River Shelterbelt is a giant ecological project of great national, even global, concern. The overall target of the first phase is to afforest 6.7 million ha of the Yangtze watershed within 10 years, from 1990 to 1999. The objective of the project is to better people's living environment, ameliorate conditions for agricultural production, and improve the comprehensive production ability of the rural areas in order to reduce poverty and bring economic development. The project relies heavily on farmers to contribute labor, while the national government provides some financial assistance. Due to the long production cycle of forest and little investment from government, reaching the projected target needs the commitment and effort of the people. Incentives must be created for the people. Their needs must be met while the ecological objectives of the project are fulfilled.

One way of harmonizing the ecological objectives of the Yangtze River Shelterbelt with rural development objectives and meeting local needs is to include principles of social forestry. Around the world, social forestry takes many forms, but in general it is concerned with maintaining the balance between the rural social system and the environmental system. For China, social forestry is an approach that might be able to meet local people's needs for forest products while simultaneously rehabilitating degraded forest areas (Baker 1990). There must be incentives for local people to directly participate in forestry production, and there must be cooperation between foresters and farmers. Social forestry is a practical activity, a learning process, and a process of harmonizing the relationship among national government, collective and individual. Farmers, foresters, and administrators must cooperate on aspects such as project design, management structure, and profit distribution.

Over the last 10 years, the Ford Foundation has supported the efforts of several Asian countries in developing a social forestry approach to forest management. This paper will discuss the potential of a social forestry approach to constructing the Yangtze River Shelterbelt based on the experiences of other Southeast Asia countries, and the unique ecological, political, and economic context of the Yangtze watershed.

BACKGROUND OF THE YANGTZE RIVER SHELTERBELT PROJECT

The Yangtze River is the largest river in China and the third largest in the world. It is 6,300 km in length and flows through 10 provinces, cities, and autonomous regions of China. The Yangtze watershed has a drainage area of 1.8 million km^2, amounting to 18.7% of the

national land area and is home to 358 million people, or 35% of the national population. There are 24 million ha under food cultivation, or 25% of the national total. It is a very important economic corridor in China.

The Yangtze River watershed has some serious environmental problems. The extremely high population density, governed by historically shifting national policies, has led to impacts from industrial growth, unsustainable farming practices, and overlogging. The forests and vegetation of the Yangtze River watershed have been shrinking at an alarming rate. High levels of soil erosion have aggravated the effects of natural disasters such as floods, droughts, and mud-rock flows. The frequency and severity of the disasters are increasing, having a devastating impact on the development of agriculture and industry, and on the security of people's lives and property. In 1981, for instance, disastrous floods in Sichuan province killed or injured 1,300 people, left 75,000 homeless, damaged 860,000 ha of crops, and 7,000 ha of cultivable land, costing a total of 2.5 billion yuan to the economy.

In the Seventh Five-Year National Economic and Social Development Plan, which was adopted in April 1986, it was stated that protective forests should be created on the upper and middle reaches of the Yangtze River. This area includes 145 counties in 9 provinces. Authorized by the State Council, the State Planning Committee approved the general design of Phase I of the Shelterbelt Construction Project.

SOCIAL FORESTRY IN YANGTZE SHELTERBELT DESIGN

Every year the Yangtze Shelterbelt Project Office establishes targets for the area to be reforested in each county. Foresters at the County Forest Bureau design the necessary projects to fulfill their reforestation target. The Yangtze Shelterbelt Office stipulates that 50% of the total area under forest planning must contribute to the construction of the shelterbelt; the other 50% can be economical forest for timber production, fuelwood, and fodder trees. Within that mandate, the county forester is left to decide what species and how many trees are needed. Species are selected on the basis of natural conditions such as soil type, slope, and elevation with some consideration of the economic value of the trees. Seeds are supplied to farmers, and the farmers are responsible for growing the seedlings, and then planting them, under the supervision of the forester.

The implications of this design process are evident. There is not enough flexibility in the reforestation target to allow counties to adjust the percentage of shelterbelt to other land uses according to the unique economic and ecological situation of each county. In addition there is not enough integration of the shelter forest with other economic forest types, and with agriculture and husbandry, industry and trade. Although the farmers are asked to contribute their labor, they do not fully perceive the benefit they get from the shelter forest. They still experience a lack of fuelwood. The shelterbelt is constructed with too many single purpose, slow-growing tree species and a lack of fast-growing, multipurpose tree species.

In the Yangtze Shelterbelt Project area, there is a large population, and limited amount of cultivable land, causing conflicts between forestry and agriculture. There could be better integration between the agriculture and forestry sectors. Farmers would prefer to use the land for more immediate economic benefits than trees can provide. They would prefer to

plant crops on forest land in some form of agroforestry system. However, the agriculture department and some farmers disagree with the practice of planting trees on agricultural land. They believe it will do more harm than good. Forestry also competes with the husbandry sector for rights to what was forest land before. In some areas minority herdsman want to graze their livestock in the forest land. Usually, if forests are not regenerated immediately after being cut, then grazing is allowed to take over.

Some types of agroforestry systems could be designed to integrate forestry and agriculture. "Agroforestry is an age-old land use that has been practiced for thousands of years by farmers the world over and has also been developed as a science that promises to help farmers increase the productivity, profitability, and sustainability of production on their land in recent years" (MacDicken and Vergara 1990). But agroforestry is not a panacea and will only be effective if it is designed well for the social, economic, and ecological context. Social forestry emphasizes the need to look at how the social, economic, and institutional structures can be incorporated into the agroforestry design in order to make it work. Local people must realize the benefits of the system in order for them to participate in it. The designer must be aware of the local institutions. An agroforestry system would need to be designed differently for a household farm or for village forest farm lands, because the system for distributing benefits is different.

The quality of the Yangtze shelterbelt design depends to a large extent on the degree to which the designer understands the local ecology, economy, culture, and farming systems of the area. He/she must use this understanding to look at the relationship between agriculture and forestry and farmers' needs. The designer must correctly diagnose key problems in the agroecosystem and the difficulties and opportunities that farmers face. With a project the size of the Yangtze shelterbelt the designer may need to identify priority areas to start the work based on the severity of the environmental problems or the opportunities provided by a particular set of economic and cultural factors. One major problem with the designing process is the lack of qualified technical personnel. Most counties have no more than 20 forest technicians, and the technicians have no knowledge of social systems.

KEY PROBLEMS TO BE CONSIDERED

Whether farmers can get concrete benefits from the project

Farmers are the main force in implementing social forestry. Relying on farmers, respecting their ways and their needs, and motivating them to participate are the basis of development of social forestry. Farmers are being asked to invest the most in the shelterbelt project. They contribute labor for afforesting, while the government contributes 300 yuan/ha. If farmers cannot get more benefits than their investment, they will have little incentive to participate in social forestry activities and to protect forests.

Whether community organizations have enough authority to make decisions

Social forestry implies community-based management. This may involve increasing local village control over forest resources. This involves shifting decision-making authority from national to local community organizations. Local organizations understand better the needs and demands of the members within the community. They should be helping to make decisions regarding what species to plant, how to regulate forest use, and how to distribute the benefits from a social forestry project to community members. In the practice of social forestry, forestry department and community both have responsibilities for making decisions.

Whether farmers have a sense of security to conduct forest management

In China, the past era of changing forest policies resulted in a dampening of farmers' initiatives for afforestation. Even now some people have misgivings about present forestry policies. Gaining the trust of the masses is important to encourage their participation. The national government should guarantee long-term security of benefits for the farmers in social forestry projects through deepening forestry reform and by keeping consistent policies. Mianyang prefecture of Sichuan province, for example, has carried out a forest insurance system, whereby collectives and cooperatives can insure their forest lands against disasters. As a result, the construction of the shelterbelt project progresses very well.

STEPS TOWARD IMPLEMENTING SOCIAL FORESTRY

Training for social forestry

Many other countries in Asia have years of experience in implementing social forestry programs. This experience could be tapped in two ways: by sending staff of the Yangtze Shelterbelt Project overseas as trainees and bringing them back to be trainers, or by inviting foreign specialists to China to train foresters and farmers. The training could then be expanded by the project as appropriate for the political and social context in the project area.

Training in social forestry represents a radical shift from traditional forestry training. Most foresters are trained in the natural sciences—soil science, tree physiology, botany, and ecology—and sometimes in forest economics. The foresters' view is that forests produce only timber. But people living in or near the forest have a very different perspective. For them, forests are for collecting food, firewood, and construction wood, and for grazing their livestock. Forests are also important in their culture and religion. Because of these differing perspectives, conflicts arise between local people who use the forest for various needs and foresters who are charged with protecting the forest. In fact, many cases have shown that the protection and good management of forest is very difficult to achieve without the support and participation of local farmers. Social forestry holds some promise to organize foresters and farmers to work together to manage forests.

Diagnosis and Design for Social Forestry

Diverse systems, whether they are natural or social, require equally diverse types of social forestry programs. Applying the same programs to villages with different social and/or natural characteristics will result in a poor fit. An effective development program must be designed to fit the specific characteristics of the agroecosystem (Baker 1990).

Because of the magnitude of the Yangtze Shelterbelt Project, new social forestry programs should be implemented gradually, and through pilot projects site-specifically. Pilot projects should be small and village-based, and designed to show results even in the short term. Sites should be chosen that are typical of the broader area so that the pilot project can serve as a realistic demonstration for other villages.

Rapid rural appraisal methods can be used to make an overall assessment of the project area, to identify priority areas for development, to identify appropriate sites for pilot projects, and to help in project planning. Rapid rural appraisal includes techniques such as sketch mapping of landscapes and agroecosystems, informal interviews with farmers, and observation.

Some of the priority information that needs to be collected to plan social forestry for the Yangtze Shelterbelt Project includes agroecosystems, traditional farming practices, local systems for forest protection, patterns of conflict and cooperation among villagers and between villagers and forestry departments, farmers' needs and preferences for species, the size of their family, their income, and how benefits are distributed now.

Interviews should be conducted with people from every sector, poor, rich, men and women, local administrators, and farmers. In the project area some of the farmers are reluctant to speak to the foresters and designers. Foresters must gradually build the trust of the farmers by being sincere and listening to the farmers.

Improving Local Organizations and Social Service Systems

In China, the only kind of local organization set up to manage forests is the village and cooperative forest farms. These organizations are responsible for forest management and forest protection on their allotted lands. They decide on the distribution of benefits to the members. Farmers in the Yangtze shelterbelt area volunteer labor to plant the forests, with some subsidy from the government, and each household must give some money to protect the forest. To develop a broad-reaching social forestry program, there needs to be community organizations to coordinate the activities of the collectives and to act as a better liaison between farmers and government.

Develop a research program for social forestry

In order to determine the most effective types of social forestry programs, a interdisciplinary group of experts in agriculture, forestry, and rural sociology should take on the task of doing research in the rural areas. Research results should feedback to farmers to be verified. Analysis of the natural system must be complemented by analysis of the social

system that interacts with it. Neglecting to analyze the social component of the agroecosystem will result in less effective rural development efforts.

Policy Research

Research is also needed to form and implement forest policies that motivate farmers to participate in forest management, accelerate the development of the local economy, guarantee that people benefit from managing the forest, and increase the area of productive and protective forests simultaneously.

There are a few areas where forestry policies could be improved, mostly relating to giving farmers more secure rights to land. There are cases where farmers have some national forest land adjacent to their family forest farm. These lands should be allotted to individuals rather than to the collective, and the farmer would do the management and derive the benefits by selling the products directly. There are large areas of wasteland that need to be reforested. Individuals should be able to contract to manage this land and to receive the benefits. Another policy improvement would allow farmers to individually contract collective forest land, taking the responsibility for management and afforestation. The farmers would receive 80–90% of the benefit, and 10–20% would go to the collective.

The forest products from the three scenarios above would not be under the national overall plan and could be used or sold according to regulations. So there may need to be policy research into the trading of forest products. Another policy affecting farmers' security and incentive to participate in forest management relates to the transfer and inheritance of land. This could be another area for research.

CONCLUSION

The key to sustainable forestry development in the Yangtze watershed is to build a partnership between the forest department and farmers. Social forestry focuses on meeting the farmers' needs for forest products and motivating their enthusiasm to participate in forest management by ensuring them tangible benefits from forestry production. The construction of the Yangtze River Shelterbelt Project requires integrating ecology and economy. Social forestry involves aligning project design and farmers' practices with supportive policies to deal with the relationship between ecological benefits and economic benefits. Planting trees on wasteland and improving the management of existing forest aligns the relationship between development, protection, and rational utilization to achieve the intended objectives of the Yangtze River Shelterbelt Project.

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IMPROVEMENT OF VILLAGE AND SMALL HOUSEHOLD FOREST FARMS THROUGH SOCIAL FORESTRY: CASE STUDY OF A PROPOSED SOCIAL FORESTRY PROJECT IN YUNNAN PROVINCE, CHINA

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INTRODUCTION

In the vast rural areas of Yunnan Province, forests are now largely managed by, what could be called, a social forestry system that includes cooperative, village, and household forest farms. The massive Yangtze Shelterbelt Project is working through these institutions to fulfill its mandate of afforesting the Yangtze river watershed. This paper will describe the existing form of social forestry in Yunnan Province, its successes and its problems based on a case study of a proposed social forestry pilot project.

The above types of forest farms emerged out of the Two Mountain Policy of 1980. The objective of the policy was to stimulate enthusiasm throughout the rural areas for reforestation. The Two Mountain Policy designated household land and responsibility land (collective land). The government allotted some of the barren mountain lands around villages to individual households who then had the task of afforesting the land. Forested mountain lands were allotted to villages for management-creating village forest farms. Because some of the household forest farms were too small for effective forest management, they pooled their lands together and formed what is called a cooperative forest farm. In cooperative forest farms, households maintain their own lands, but manage the forest resources as a cooperative. The benefits are distributed according to the proportion of land of each family.

In 1990 the Yangtze Shelterbelt Program (YSP) was established. This is a national ecological program with the objective of covering the upper and middle reach areas of the Yangtze River with trees. Over 40 counties along the river in Yunnan Province are involved in the program. The YSP is based on the principle that whoever plants a tree owns the afforested land. Villagers provide the labor, while the government supplies the seedlings. The role of YSP is to oversee the construction of an effective shelterbelt by ensuring that trees are planted on the lands of household, village, and cooperative farms. The YSP has created the opportunity for the counties to establish more forest farms.

This forest management system stimulates villagers' enthusiasm for participation in forestry activities by integration of responsibility, rights, and benefits. In some economically poorer areas villagers are satisfied with this system, for they are finding that their living environment and cash income are improving. However, this system does not work perfectly since it is still at the initial stage.

In many countries in southeast Asia, an increasing number of social forestry programs are starting. Yunnan Province has a similar natural environment to those countries but has very different politics. Nonetheless, Yunnan might learn from the experiences of social forestry elsewhere. To this end, the YSP office of Yunnan Forestry Department (YFD)

started a social forestry project supported by the Ford Foundation. In 1991 and 1992, two social forestry training classes were held in Kunming and experts from Thailand gave lectures. Officers from the YFD and County Forestry Bureaus, as well as personnel from the Rural Economy Institute of Yunnan Social Science Academy, were trained in RRA and SSA techniques. An RRA survey was made for the purpose of choosing pilot project sites, and three sites in the YSP area were chosen—one of them in Yaoan county. This paper will give a brief description of (1) the evolution of forest management in Yaoan county, (2) forest management problems that were observed in the study and, (3) conclude with some recommendations for improving social forestry.

BACKGROUND

The Evolution of Forest Management in Yaoan

Yaoan county has an area of 49,832 ha of forest land, accounting for 23% of its total area. However, the timber reserve in Yaoan county is being depleted because of the high demand for fuelwood and construction wood.

Since the Two Mountain Policy, 2% of the forest land is state-owned and 98% is village-or household-owned. In 1987 there was an effort to integrate the forest planning, afforestation, and forest management on family-allotted and responsibility or village lands. The YSP and the County Forest Bureau assess the amount of bare land to be planted each year. The administrative village (a council of 5–8 villages) assigns the planting task to each village. YSP facilitates the whole process by contributing to the county planning and contributing some funds. Villagers are obligated to contribute labor. According to the law, each citizen must grow 2–3 trees each year. The village leaders determine the work-days necessary for afforestation on the basis of the planting task for that village. The task of each individual is organized according to his/her role in the village forest farm or their own household forest farm.

Small Household Forest Farms. On allotted or contracted land, families have been encouraged by the government to run small household forest farms. These families are called specialized forestry households for the reason that they make a living completely or partially on forestry. Up to now, there are 834 households engaged in forest development in the county. They have established and are now running a total plantation area of more than 7,500 ha. Each household forest farm is about 5–8 ha in size.

Village Forest Farms. Land for afforestation, which was not allotted originally, belongs to the whole village. After completing the reforestation task set by the YSP, villagers organized a village forest farm to continue the management and distribution of benefits. Village forest farms are 60–200 ha, depending on the size of the village historically.

Demonstration plantations. are an institution that is common throughout the county. They are established by political leaders at many levels (county, township, and administrative village) with their staff. Politicians are obligated to complete a task of afforestation each year during their tenure of office. They plant on village lands of their choosing. The village has

the responsibility to maintain the forest and has the rights to the benefits. In the last 6 years, 108 demonstration plantations have been planted in Yaoan county covering 974 ha.

Despite the government drive for afforestation, results are slow. There has not been 100% enthusiasm from the villagers, mostly because of the amount of labor required of them. The YSP began to look toward the concept of social forestry as practiced in many forms in other countries. A group of Thai experts trained some of the YSP staff in RRA techniques to be used to select a pilot site for a social forestry project and to assess the present situation in sample villages. Before introducing a full social forestry program, a pilot project is planned. If the value of the project can be shown in one place, then it can be used as a demonstration to spread the concept and the techniques to other areas.

A Social Forestry Pilot Project

The RRA survey. Three survey groups went to three counties along the Yangtze River to choose sites for a social forestry pilot project. The team looked for a site that has typical problems that could be solved by applying social forestry concepts. The site would serve as a demonstration for other villages and as a learning experience for all involved.

In Yaoan county, the team first talked with persons of the Yaoan County Forestry Bureau to explain the objective of selecting pilot sites, and to collect general information about the county's forest management, and the social and economic pattern. The county put forward the names of four villages. The team then visited the four villages and chose one of them, Banlui village, for the project.

The team returned to Banlui village to do a more detailed survey. They interviewed village leaders about village agricultural and forestry management, and interviewed seven households from poor to rich about their income, forestation achieved, labor inputs, and their knowledge and feelings about forestry. The surveyor drew crop calendars to understand the monthly labor schedule and the pattern of income from agricultural crops and forests. He also drew a sketch map of the village land use, showing the spatial distribution of agricultural crops and forest plots (Figure 1).

Banlui village. Before 1958 the mountains behind the village were covered with dense forest. There were Holy Hills of the village as well. Since 1958, the forest has been destroyed completely. This has resulted in a shortage of fuelwood, soil erosion, and general environmental degradation. Over the past few decades, villagers have tried to afforest, mostly with pine trees, but they failed to succeed. For most households, the members could not contribute enough hours of labor, so the quality of the afforestation work was poor, survival was low, and the planted trees were not protected from grazing and theft.

The village leaders tried to unify the efforts for afforestation. In 1989, the village leaders organized people to plant a demonstration plantation of 32 ha. In 1991, YSP provided some funds for the villagers to establish a plantation of 27 ha by ordinary planting, and a plantation of 173 ha by engineering planting. Engineering planting is when trees are planted by digging furrows 0.8 meters deep and 0.4 meters wide, then refilling the furrow with loose soil and planting the seedling. Four people were appointed by the village leaders to protect a forest of 427 ha. They guard the forest on rotating shifts. Through these projects, the village leadership, as well as villagers, have gained enthusiasm for forestry.

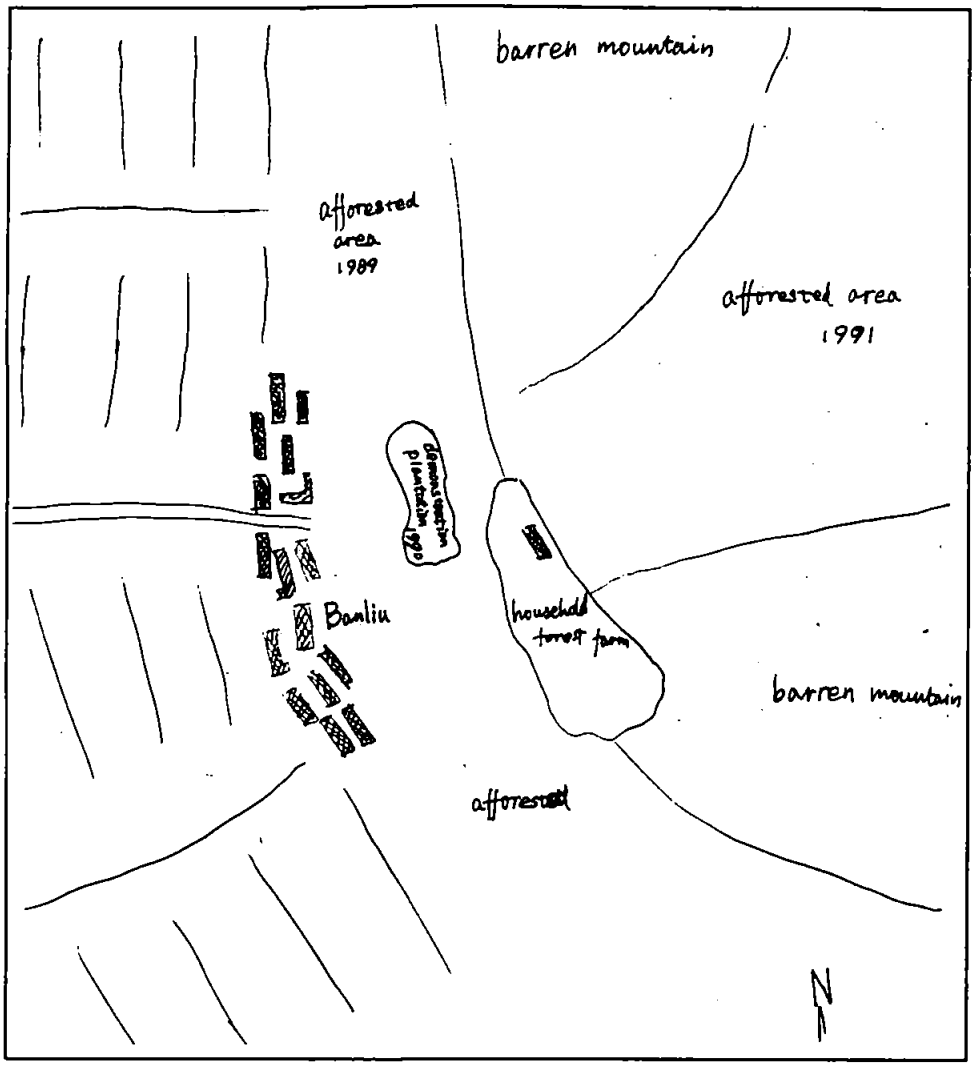

Figure 1 Sketch map of Banlui village.

RESULTS OF THE RRA SURVEY IN YAOAN COUNTY

The survey in Yaoan county revealed some good forest management and some problems in village and household forest farms. The key problems are presented here.

Labor input and Distribution of Benefits

The villagers feel that they must contribute too many work-days per family to afforestation. Every family member must contribute the equivalent of 8.5 work-days of labor, including the children and seniors who cannot work. Depending on the size of the family,

this leaves some people of working age doing 25 days of work per year. In addition to their other daily farm and household work, and communal labor obligations, this is a considerable burden for no immediate reward.

The number of work-days is determined according to the size of the task or area to be planted and then divided by the number of inhabitants. The result is that people in a village with much barren land will do more work than those in another village.

The villagers are allowed the benefits from planted trees, and in a relatively short term as the trees are all fast-growing eucalyptus. However, the cash income from the plantation is small, and they say that most is used for financial obligations for village development (i.e., irrigation systems and construction materials).

A common goal of most social forestry programs is to satisfy local economic needs. In this case, if villagers can't get enough cash income, or other tangible benefit, from the village forest farm they are working in, forest management will not be successful.

Timber Sale and Forest Products Free Market

Villagers, as well as the leadership, are very concerned over timber sales. If they want to, they can sell wood products. However, the free market system is not very well developed. There is always uncertainty about whether there is a buyer for their products. It is difficult to find the buyers, as there is no central marketplace or specialist traders. They cannot afford to advertise and market their products. There is also no infrastructure to transport their products to trade and prices fluctuate.

Training and extension might offer a solution. Villagers can be trained in how to refine semifinished eucalyptus oil. This sells at a much higher price than leaves do. People need training in marketing and business.

Transfer of Household Forest Farm

There is a case in Yaoan county: After 5 years of managing his small household forest farm, the owner is now 60 and cannot do the forest management any longer, but his son doesn't want to continue to run his father's farm. According to the Forest Law, the owner is not allowed to cut all the trees down and sell them. He can only do selective cutting and must plant a tree for every one cut. He would like to sell the whole parcel of trees to relieve himself of its management, but accounting for his costs over the years, very few people could afford to buy it.

This is a typical problem concerning household forest farms, and it evolves out of the lack of a pricing system for land and products. Labor has had a very low price (or no price) for many years. The laborer only has tenure of the land and cannot sell it. If this problem could be solved, farmers might have more incentive to put in labor, for they will have some security that they will enjoy some of the benefits. The solution lies in economic policies that are slowly beginning to change, but the changes will take a long time to reach the village level.

Legal Agreements and Contracts

Some agreements and contracts between farmers and administrative village or township governments have no legal effect. This is partly because the legal system does not reach the village. The result is that farmers have no security that the agreements will be upheld in the future and, therefore, no incentive to invest labor or capital into a project.

The biggest household forest farm in the county is faced with such a problem. Several years ago, a family was contracted to run the townships' village forest farm, bare mountain land. An agreement was made that as long as the family covers the land with trees, the township government will pay 2 yuan (about $0.40) for each tree. Unfortunately, the farm is now covered with several hundred thousand trees but the township government does not have enough money to pay, and the family has no recourse, legal or otherwise.

Monocultures of Eucalyptus

Another problem that should be taken seriously is the practice of planting monoculture. Most of the species chosen in the county are eucalyptus trees. There are already serious problems with fungus outbreaks and risks of insect infestations. Farmers still say they like eucalyptus because it is a fast-growing tree and they can receive immediate benefits. Previously they grew pine and fruit trees, but the fruits were of poor quality and the pine was single-purpose and too slow-growing. The risk of eucalyptus monocultures is that if an infestation occurs in a farmer's whole crop, they may lose their motivation for tree planting completely.

A solution to this problem is to research and introduce other multipurpose, fast-growing species that meet many of the needs of the farmers for fuelwood, construction wood, fodder, fruits, and soil-conservation and water-reservoir protection. After immediate needs are served, other higher-value, slower-growing species could be used.

SOCIAL FORESTRY RECOMMENDATIONS

Establishment of Social Forestry Organizations

The four major problems identified in Banlui village seem to be typical throughout Yaoan county. The Yaoan County Forestry Bureau is aware of the problems. However, most of these problems are rooted in economic policies formed by the national government, and top-down planning at the provincial level.

There needs to be better feedback channels created going from the village to the county, to the province. One way to open a better channel is to build more effective community organizations to serve as liaison between villagers and the various levels of government. With better feedback from the communities, the local government and forestry bureau can adopt more relevant and flexible policies. For example, the government may further improve the timber and forest products free-market system in order that farmers can

gain benefits in free competitions. Such policy changes could lighten the burden on the forestry department by heightening community independence in managing their resources.

Strong community organizations will help villagers work together and coordinate relations between individual villagers, collectives, and households. Whenever there is a dispute about distribution in a village forest farm, there could be a community organization to serve as a mediator to balance the needs of the village and individual. Also, these organizations could supervise and urge both sides of the agreement makers to fulfill their obligations and to take responsibilities, respectively.

They could also provide legal services and help villagers go through legal procedures when necessary. There should be a lawyer on the community forest organization, at least at the county level, to deal with legal disputes.

Training

The objective of social forestry training is to enhance a community's ability to manage their resources. Many villagers have very little education. Especially in minority areas of the county, most villagers only receive primary school education. In view of this situation, there needs to be special mechanisms through which they can directly participate in making decisions and in planning and designing the project. Furthermore villagers need knowledge of how to safeguard their own interests according to the law. Through social forestry training, the villagers can be introduced to a new role in forest management, in which they need to be more aware of their rights and responsibilities.

It is also necessary to train them in some practical techniques for better soil conservation and appropriate use of fertilizer and pesticides. Improved systems for tree and crop cultivation can be taught. A variety of agroforestry systems can be developed to suit particular districts or villages, according to the ecological and economic need. Villagers can also be trained in developing markets and new products, and selling their products.

The training should start with members of social forestry organizations at different levels and then be offered to all members of the village including women. Different training courses could be designed for different purposes such as forest management techniques, conflict resolution, legal rights, marketing products, and communications.

The county foresters themselves also need training in the objectives of social forestry—that forestry is not only about planting trees. Foresters need motivated people to get their job done, so they must be concerned with local people's needs for cash income, fuelwood, lumber, and a clean living environment. Foresters need training in communication and interviewing techniques in order to work with the villagers to discover their needs.

When necessary, specialized planning and designing personnel could be invited to make investigations about soils, vegetation, and economics. They can decide, together with community organizations, on suitable species and how to grow a mixed forest together.

IMPLICATIONS OF FOREST POLICIES TO SOCIAL FORESTRY PRACTICES IN INDONESIA

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INTRODUCTION

In the last two decades, the concept of social forestry has been widely discussed and promoted as a way to achieve sustainable forest management in developing countries. Briefly, social forestry can be defined as forest or land management that involves local community participation. In Indonesia, the main incentives for promoting social forestry are (1) a lack of forestry staff and budget constraints so that the state forest institutions are unable to effectively enforce forest management guidelines and (2) a recognition that community groups living in forested areas can be partners with the forestry department in implementing forest management guidelines. The success of social forestry depends on the acceptance and participation of local communities. This, in turn, depends on factors at the local level such as cultural homogeneity, local historical events, and incentives; and also on factors at the state level, such as government regulations and policies.

The Indonesian Constitution and the Basic Forestry Act (BFA) accommodate the rights and obligations of rural communities on forest lands, as stated in Article 33 of the Indonesia Constitution:

> "Land, water, and natural resources contained therein should be controlled by the state and used for the welfare of the people."

and Article 9 of the Basic Forestry Act:

> "Forest management should aim at obtaining the greatest benefits, for multiple purposes, and in a sustainable manner, directly or indirectly, in the effort to develop a prosperous Indonesian Society."

To guide the implementation of the BFA, the government issued several regulations. The first was the government regulation on Forest and Forest Product Exploitation License PP21/1970. The issuance of PP21/1970 initiated the era of commercial logging in natural forests, which eventually led Indonesia to be a major tropical timber exporter.

In 1990, anticipating the forest industries, need for a long-term log supply, the government launched an industrial timber plantation program in which 6.1 million ha of industrial forest will be established by the year 2005. To guide the ambitious program, the Government Regulation on Industrial Timber Plantation, PP7/1990, was released.

The objective of this paper is to explore the influence of government regulations PP21/1970 and PP7/1990 on the implementation of social forestry. The paper is descriptive and analytic, based on a literature study. First, a brief overview of social forestry practices in Indonesia will be presented, and, second, the content of Government Regulation PP21/1970

and PP7/1990. The implications of these forest policies to social forestry will then be discussed using examples from three case studies.

SOCIAL FORESTRY PRACTICES IN INDONESIA

Social forestry in Indonesia takes several forms. The nature and extent of the community participation vary in each. Communities may be involved in one or many of the phases of forest management including planning, implementation, or evaluation of projects.

In Indonesia, most of the forests and natural resources are "owned" and controlled by the state. In this situation, social forestry in practice must meet the needs and objectives of both the state and the communities. To sustain a social forestry program, the state and the community must perceive the benefits. Based on the experiences in several case studies, the needs of farmers (community) and foresters (the state) can be identified (Fox 1990). From the perspective of the state, a social forestry program might be adopted if it (1) fulfills production or conservation objectives, (2) maintains clear rights and responsibilities, (3) does not question the state's ownership of land, (4) follows existing organization and planning procedures, and (5) creates minimal trouble. From the community perspective, a social forestry program might be adopted if it (1) provides food, (2) generates cash income, (3) does not take too much time, (4) does not take too much money, (5) can change quickly in case of change in weather or market, (6) does not require too much paperwork, (7) has clear rights and responsibilities, (8) creates minimal risk, and (9) secures rights to products.

Social forestry, as practiced in Indonesia, involves two general categories of management systems.

The Management of Non-timber Forest Products

Non-timber forest products, such as resin, *tengkawang* (illipe nut), rattan, and *jelutong* (latex), have been traditionally managed by communities living in or near the forest. In some areas people may gather the products from state forests, in other areas they may develop management systems for the products on their own farmland or on customary communal lands. For example, local people in Sanggau area, West Kalimantan, plant *tengkawang* in their homegardens. A local community in the district of Pasir, East Kalimantan, established a rattan plantation in their farmland.

Agroforestry Systems

Simply defined, agroforestry systems combine annual and perennial crops on a parcel of land. The land may be private or state owned. In a discussion of social forestry, we are most interested in the institutional arrangements for practicing those systems on state lands. Some examples of agroforestry systems in Indonesia include:

***Tumpang Sari*, or *Taungya*,** which is a practice that combines food crops and trees during the establishment of a new forest plantation. Local people plant the tree seedlings and for the first few years plant food crops on the site as well. The common crops chosen by the

people for this scheme are paddy, corn, bean, and peanut. *Tumpang Sari* is widely practiced in Java by the State Forest Corporation and in some reforestation sites in the outer islands.

Silvofishery, which is a combination of coastal forest management and aquaculture, is commonly practiced by local people in the coastal areas of Sulawesi and Java. These coastal communities keep mangrove stands around their fish ponds in order to protect the ponds from direct sea waves. The mangrove forests are also habitat for young fish and shrimp that are gathered and then grown in fish ponds. This practice has gradually decreased since the fishery intensification program was introduced to the area. Intensive fish-pond management requires a totally cleared area, for a high production of fish or shrimp.

Silvopasture, which is a combination of forest and pasture management. This form of agroforestry has been practiced for a long time by local communities, mainly in Timor and in South Sulawesi. They use fire periodically to produce young grass shoots. In Timor island, this practice results in a specific forest cover, which consists of a single species of Eucalyptus alba.

So far, there are no reliable data on the area, number of people involved, and total production of these and other social forestry practices. In 1993–94 a National Census on Agriculture (and forestry) will be conducted in Indonesia. Hopefully, the results will provide some insights on the nature, extent, and distribution of social forestry practices in Indonesia.

THE DEVELOPMENT OF FOREST POLICY IN INDONESIA

Institutional Development

State forest management in Indonesia has been established since the colonial period. In 1808 Governor General Daendels created the government forest service (The Diens van het Boschwezen) which was given rights to control land, trees, and labor. In the beginning, the Forest Service was part of the Department of Interior, but this was moved to the Department of Agriculture, Industry and Trade. Indonesia declared independence in 1945. After the establishment of the Directorate of Forestry in 1957, the provincial managers were given responsibility to make autonomous decisions concerning the marketing of forest products, forest management, forest exploitation (including labor practices), and forest protection. Policy formulation was still done by the national office, and regional decisions had to concur with national policies (Peluso 1990). In 1969, the New Order Government of Indonesia established the Directorate General of Forestry as part of the Ministry of Agriculture. As forestry developed into an important sector of the national economy, a Ministry of Forestry was then established in 1983.

Policy Development

Forest land in Indonesia is classified according to function. The 144 million ha of forest land is divided into protection forest (21%), park and reserve forests (13%), limited production forest (21%), production forest (24%), and conversion forest (21%).

Until the 1960s scientific forest management was practiced mostly in Java, as a continuation of Dutch forest management systems. Logging and replanting were also done in the outer islands, but in a less intensive manner. Logging of natural forest on the outer islands was previously done for local wood consumption only. Non-timber forest products were also a relatively important source of national revenue. In 1940, for example, non-timber forest products accounted for approximately 45% of all revenue generated from the forestry sector in Indonesia (Poffenberger 1990).

Starting in the early 1970s, however, there was a significant change in natural forest management practices. With the issuance of Government Regulation PP7/1970, natural forests in the outer islands started being logged commercially under the Indonesian selective cutting and replanting principle. Up to 1986, forest concessions were awarded to 537 companies, covering an area of 55 million ha, located in 19 provinces throughout the country (Tarrant et al. 1987).

Commercial timber exploitation of the 1970s and 1980s led Indonesia to be one of the most important tropical timber-exporting countries in the world. However, in 1980, log exports were progressively restricted until totally banned in 1985. This policy significantly increased the domestic processing of logs in the country. All log production is now exported as higher value sawn timber, veneer, and plywood. However, in the 20-year period of forest exploitation, the production potential of natural tropical forests decreased both in the quantity and quality of timber products. World Bank statistics based on industry figures showed a peak log-production level of 31.1 million m^3 in 1978, decreasing to a 1984 level of 28.8 million m^3 (Tarrant et al. 1987). There is a possibility that the decline in log production in this period can also be attributed to the decreased world prices for all timber products.

Concerned about the possible decrease in yields from natural forests, and wanting to maintain a future supply of raw material for timber industries already existing in the country, the government of Indonesia established the Industrial Timber Plantation Program. This program is expected to supply up to 90 million m^3/year of timber in a sustainable manner. A balance of raw material input from natural and plantation forests will be maintained. To support this program, Government Regulation PP7/1990 was released.

The BFA provides general guidelines for forest management in Indonesia including forest protection, forest inventory, forest land use, forest exploitation, and regreening. According to Article 13 BFA, the "objective of forest exploitation itself is to increase the yield of forest products for the development of the national economy and for the prosperity of the people." Article 13 also states that "forest exploitation, which includes the activities of planting, tending, harvesting, processing and marketing of the products, is to be based on the principle of sustained yield and is to be profit-oriented."

Two Important Regulations in Forestry Sector Development: PP21/1970 and PP7/1990

PP21/1970 is a legal instrument to implement the BFA. The particulars of regulation PP21/1970 that may influence social forestry are stated in Chapter 2, entitled Requirements for Application of Forest Exploitation License, and Chapter 3, Obligations of the Holder of Forest Exploitations and Forest Products Exploitation License. These chapters state that the

forest concessionaire is obligated to honor customary law (if any) in his working area and to compromise in the implementation of the regulation.

Chapter 3 of the regulation contains who is eligible to apply, limitations, and the institution responsible in issuing the license. Forest Exploitation Licenses are issued only for selective cutting practices based on a sustained yield principle, and the license holder must maintain forest cover by either natural or artificial regeneration and must take care of the stands (Article 8). The Forest Exploitation License is effective for 20 years, but can be extended (Article 11) and is granted to state corporations, private enterprises, or a combination of them (Article 9). This Article has been revised (by PP18/1975) to include only state-owned companies and private national companies.

The Forest Products Exploitation License gives the licensee the rights to fell forest in accordance with their own capability, up to a maximum area of 100 ha and for a maximum period of 2 years. The licensee also has the rights to collect wood and other forest products in the amount stated on the license for a period of 6 months (Article 1), but prohibits the exploitation of protected animals and plants. Forest Product Exploitation Licenses can only be granted to Indonesian citizens and Indonesian legal institutions (Badan Hukum, Indonesia). Instead of the Minister of Agriculture, who is responsible for issuing Forest Exploitation Licenses, the Forest Products Exploitation License is issued by the governor.

PP7/1990. The policies underlying regulation PP7/1990 on Industrial Timber Plantation (ITP) are (1) Forest is a potential renewable resource that should be used optimally and sustainably for continuous national development to the greatest benefit of the people; (2) In order to increase the productivity of unproductive forests, the quality of the environment, and to maintain a continuous supply of raw material for forest industries, it is necessary to develop plantation forests on a sustainable basis using intensive silviculture practices.

The objectives of the establishment of ITPs are to support forest industry development in the country in order to increase added value and foreign revenues, to increase land productivity and environment, and also to provide job opportunities and business opportunities (Article 2). ITP should be managed professionally for multiple benefits, on sustained yield principles, and by profit-oriented companies (Article 3). The silviculture system employed is clear cutting and replanting (Article 4). Areas eligible for ITP are unproductive permanent production forests (Article 5) of a maximum of 300,000 ha per unit ITP for pulp and 60,000 ha per unit ITP for construction wood (Article 6). ITP licenses can be granted for a state-owned company, private company, or cooperative (Article 7) and for a period of 35 years plus the cutting cycle of the main stands (Article 8). The cost for application of the license and operational cost for industrial timber plantation establishment should be paid by the company, and the government may bear a part of the cost in the form of equity (Article 7).

THREE CASE STUDIES DEMONSTRATING THE IMPLICATIONS OF FOREST POLICY TO SOCIAL FORESTRY PRACTICES.

This section to presents three case studies that demonstrate implications of forest policy to social forestry practices. Two of the studies were conducted by Indonesian researchers, and the other by a non-Indonesian researcher.

1. Tabbeyan and Sentosa Villages in Jayapura, Irian Jaya (Tirtajaya 1991)

The Tabbeyan and the Sentosa villagers subsist on a forest-based economy involving sago extraction, food gathering, gardening, and hunting. The forest land surrounding the villages is held under customary law whereby a person gains access to forest resources belonging to his or her clan, mother's clan, grandmother's clan, and wife's or husband's clan. Access to forest can also be gained by outsiders through a use permit granted by the head of the clans. In the old days, the clan members could severely punish those caught as trespassers, but now punishment of trespassers has been banned by local government authorities.

Tabbeyan and Sentosa were officially established as administrative villages in 1978. The villages at that time consisted of several nearby scattered clan settlements of about 50 to 75 people or 15 to 20 nuclear families. Under the tribal community welfare assistance project, launched by the Department of Social Affairs in 1983–84 and 1984–85, the families were resettled in two main village settlements. The Tabbeyan village settlement was built on a former clan settlement area called Taja, and the Sentosa settlement on an area known as Jadam. Many families, however, refused to be resettled because it would make their gardens, sago, and forest lands farther away and access more difficult. Only after they were guaranteed access to extracting sago palms and opening gardens in the surrounding forest in the area were they convinced to resettle in the new village settlement.

The logging contractor, PT YLS, began operations in 1989 in the forest area claimed by the Sentosa and Tabbeyan. The logging activity caused conflicts between the villagers and PT YLS. Most villagers perceived that PT YLS was trespassing on their property. The villagers expressed their anger individually to PT YLS officials, and collectively to the local military representative. These conflicts never developed into violent actions of the villagers due to the presence of the local military.

To try to overcome the conflicts, a meeting was held between PT YLS officials and six clan leaders in the presence of commanders of the local military post. In the meeting, PT YLS officials asked for the villager's approval to open the road and start logging in the forest area claimed by the villagers. In response, the clan leaders demanded that PT YLS build a road connecting the logging road to the village settlement and pay monetary compensation to the village. PT YLS agreed to these demands and promised to fulfill them later when PT YLS began operations. This agreement, however, was ineffective because PT YLS started cutting the villagers' forest without paying monetary compensation (Tirtajaya 1991).

*2. **Parieri Land Dispute in Biak, Irian Jaya*** (Rumansara 1991)

Parieri is a village on the island of Biak, also in the province of Irian Jaya. In this area, customary land rights are held communally while rights to planted plants, especially annual crops, are held individually. The people of Parieri practice two complementary systems of land management: swidden cultivation in the secondary forests, and managing *ser*, a permanent forest of sago and fruit trees. The *ser* is located in the lower part of the hill below what is known as the Agathis complex. The villagers collect resin from the Agathis complex. Logging of the Agathis complex can affect the ecosystem and destroy the possibilities of growing sago in the *ser*.

Initially Agathis resin, or *copal*, was collected by the owners and then sold to Chinese traders. Later, in order to improve and standardize quality, the Dutch government decided that tapping of the Agathis trees and the collection of *copal* should be done by workers hired by the Dutch Forestry Department. An agreement was made with land owners in 1959 giving over the management of *copal* production for 25 years to the Dutch and requiring the Dutch government to pay royalty to the owners of the trees. Falling resin prices, a dwindling budget, and a change in government, however, led foresters to abandon their side of the agreement by the mid-1960's.

The disputes between local people and the government started in 1977 when, without warning, PTJ started logging in the Agathis complex. PTJ was contracted by PTSP who held the logging concession to 50,000 ha. The logging left behind destroyed *ser*. The conflicts arose again in 1985 when the Provincial Forest Service of Biak District planned to convert 2,200 ha of Agathis complex and the surrounding land, a total of 13,000 ha, into an Industrial Timber Plantation. Even though 13 people of Biak Timur signed an agreement supporting the use of the area as Industrial Timber Plantation, some other members of the community refused and wanted their forest to be returned as the agreement, originally made with the Dutch government, terminated in 1984. They made protest statements and wrote letters to the government and parliament members. In 1991, the Provincial Forest Service decided to maintain the Agathis complex as protection forest (Rumansara and Rumwaropen 1991).

*3. **Local Management and Extraction of Ironwood in Sungai Bongkang Village, West Kalimantan*** (Peluso 1992)

Sungai Bongkang village is located in the midst of a large timber concession. The people of the village have traditional ways of managing their resources. The villagers subsist by combining dryfield agriculture with the management of planted forests, swidden fallows, and mature dipterocarp forests. These agroforestry systems provide them with timber, fuelwood, rattan, resins, rubber, fruits, and medicinal plants for local consumption or trade.

Except for occasions of severe food stress, there was little commercial collection of ironwood within the customary forest territory. Sungai Bongkang villagers do not plant ironwood, but they do protect it from escaped swidden burns. Individuals gain rights to the protected trees not only because they laid claim to the land surrounding the tree, but also they invested additional labor in its protection. When someone needed ironwood from the forest reserves or from the perimeter forest, they would mark a claim on the tree. An outsider

wishing to extract forest products is required to pay a "tax" in kind to the village as a common property owner, or to a claimant who had been vested with private rights by prior claim and management.

The suspension of Forest and Forest Products Exploitation License (HPHH) for small holders in 1975 made illegal virtually all ironwood cutting for commercial purposes. The concession holder (HPH), in addition, has not been willing to organize local villagers to collect and trade ironwood. Increasing local demand caused by depletion of ironwood in other parts of the district has made illegal trading of ironwood flourish in the Sungai Bongkang area. This situation, combined with increasing requests by outsiders to buy the villagers' rights to trees, led to competitions among the villagers themselves. Villagers began to apply only the individual or private aspects of their customary tenure systems for controlling access and transferring rights to ironwood trees. As a result, no one manages ironwood either to maintain stocks or to benefit the long-term needs of the community.

IMPLICATIONS OF FOREST DEVELOPMENT POLICY TO SOCIAL FORESTRY PRACTICES: PRELIMINARY ANALYSIS

The proceeding three case studies reveal certain implications of forest development policies to social forestry practices. The implications can be analyzed from three angles: the efficiency of resource use (land, forest products, and labor), impacts on the environment, and institutional aspects. Each case study involves some conflicts between local communities and the government or concession holder as the result of the implementation of Government Regulation PP21/1970 (Table I).

Table I. Types of conflicts manifested in the three case studies.

Source of conflict	Case 1	Case 2	Case 3
Land	*	*	
Forest Products	*	*	
Labor	*		
Environment		*	
Institutions			*

In case study 1, the conflicts arose because of the overlap of customary lands with the concession area, and the fact that logging operations began without compensation to the villagers. To aggravate the situation, there were also conflicts between villagers resulting from the competition for a limited number of jobs with the logging company.

Potential conflicts between forest concessionaires and local communities was, in fact, anticipated in the formulation of Government Regulation PP21/1970 (Article 6). It mentions that any conflict should be overcome by a consensus meeting between the concession holder and the customary landholders under guidance and supervision of the provincial forestry service. It is important that the provincial forestry service acts as the mediator and the

meetings are held in a neutral place, rather than the local military office as was the case with Tabbayan and Sentosa villages. Negotiations between local communities and a concessionaire, however, might not favor the local communities. The concessionaires are usually richer, better educated, and, in most cases, supported by the local authority. Therefore, in order to empower the local community in the bargaining process, it is important that the community gets support from the local law assistance institute (Lembaga Bantuan Hukum).

In case study 2, the landownership by the local communities had already been recognized by the Dutch government and a 25-year agreement was made. The root of the problem was that the new government did not consider existing community ownership of the forest in the forest management plan for the area. Conflicts arose as the communal forest was logged by the concessionaire without warning. Villagers also opposed a government plan to establish an industrial timber plantation in the disputed area. This refusal was not only based on landownership considerations, but also for environmental reasons.

In this case study, the decision of the provincial forestry service (1991) to maintain the disputed area as a protection forest was a good start in resolving the conflict. The Basic Forestry Law does permit extraction of forest products in protection forests if it does not decrease the function of the forest. It means that the local community in the area can continue tapping resin from the Agathis complex and simultaneously maintain the ecosystem for the *ser*. Such arrangements, however, need intensive forestry extension to help villagers understand the objectives of forest policy under the new government.

Case study 3 shows a totally different influence of forest policy on social forestry practices. There was no conflict over land, forest, or forest products, as the concessionaire recognized the local customary rights. However, the traditional way the villagers managed their ironwood has changed as a result of increasing external pressures. These external pressures were accommodated by the penetration of a logging road in the village area. The pressures resulted in a trend toward privatization of communal property.

Customary tenure systems tend to weaken gradually as a result of external pressures. Those pressures can be market force, increasing accessibility (roads), or government policies. Villagers in Sungai Bongkang realize the environmental and economic costs of their accelerated cutting of ironwood. However, for them the short-term benefits outweigh those costs. We may not be able to stop the changes in indigenous people's property institutions, though if we could recognize these institutions from the beginning we could anticipate preventions.

In this case, possible solutions might be to strengthen local community organizations by activating the village community board, LKMD, and to improve marketing systems for ironwood. Both solutions need government supports, and a well-designed social forestry program seems to be the most appropriate way to implement them.

Government regulations PP21/1970 and PP7/1990 are basic legal instruments for the management of forest resources in Indonesia. The regulations were issued with the understanding that forest, as a renewable resource, should be managed optimally and sustainably for continuous national development for the greatest benefit of the people. The objective of the regulations is to increase the productivity of unproductive forests, maintain

the quality of the environment, and maintain a continuous supply of raw material for forest industries.

The regulations could accommodate implementing some social forestry practices in forest management. Previously, local communities could be granted a Forest Products Exploitation License (HPHH) issued by the governor. Unfortunately, the rights to HPHH licenses were then suspended by the Minister of Home Affairs due to uncontrolled practices of forest product exploitation. This suspension means that any timber exploitation done by a local community is illegal and local people are unable to sell logs.

On the other hand, the practice of timber exploitation done by an HPH license holder continues uninterrupted. Even though local customary rights have been legally recognized in PP21/1970, in practice they are not respected by the concessionaire in the process of logging. As a result, many conflicts arise between local communities and concessionaires.

The lack of consideration of local community rights in forest management policy is even worse in the policy of Industrial Timber Plantation. None of the articles in PP7/1990 mention the existence of local community rights. As a result, conflicts between the concessionaires and local communities should be anticipated in the establishment of industrial timber plantations.

CONCLUSIONS AND RECOMMENDATIONS

Forest policies can be seen as a direct or indirect external pressure on local customary resources management, in line with such forces as markets, roads and communications, and modernization in general. In order to avoid the negative impacts of these pressures to customary resource management practices, the local community institutions need to be strengthened. Forestry extension workers or community facilitators are needed in this case.

Conflicts are mainly over resources, environment, and institutions. From the three case studies discussed in this paper, two conflicts on land and forest products, and a conflict on the environment, labor, and institutional aspects were identified. Possible conflicts between local communities and forest concessionaires have been anticipated in Government Regulation PP21/1970. However, local communities need further support to equalize their bargaining power with the concessionaire.

There is an urgent need to identify and delineate local customary forest land in the country. In the case that forest concession areas overlap with local customary land, that area should be treated differently, and a legal basis for the treatment should be provided by the government.

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EVALUATION OF FOREST CONCESSION MAPS: A CASE STUDY USING GPS AND GIS

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INTRODUCTION

The Department of Forestry in Indonesia uses maps from several sources as a basis for determining forest land use classifications and forest concession boundaries. The range of maps available in the outer islands is more limited than in Java, in terms of themes, quality, and scale. The Department of Forestry is working to upgrade the maps using remote sensing, ground surveying, geographic information system, (GIS) analyses, and most recently a global positioning system (GPS).

Particularly in the outer islands, some land use conflicts arise partly from the level of accuracy and detail of mapped information. Forest concession areas are identified according to their potential for timber production. The boundaries of such areas can be highly irregular and are not always based on natural boundaries that can be easily identified on air photos, satellite imagery, on the ground, or on other maps. Furthermore, the scale of most maps that are used is too small. The location of rural communities may be drawn incorrectly on the maps or even omitted. As a result, forest concession areas as depicted on the maps may overlap with other land uses. This has led to conflicts between concessionaires, the forest department, and local communities claiming customary land rights.

The objective of this paper is to evaluate the base maps used for forest concession management in Indonesia. Two new mapping technologies, GIS and GPS, will be reviewed. Finally, a case study from East Kalimantan will be presented in which a GIS was used to overlay and compare five maps and field data from a GPS.

BACKGROUND

Available Maps

Five sets of map data are available to the forestry department for identifying and planning forest concession areas. Variation in the maps occurs because the maps were created at different times, by different methods, and at different scales. Knowing projection and ellipsoid reference is critical when comparing maps, and that information is not available for every Indonesian map. Parts of Indonesia have almost permanent cloud cover, making the use of remote sensing data difficult. Scale plays a role in the accuracy of a map, depending on the surveying methods. Large-scale maps (1:25,000–1:2,000) need very accurate instrumentation, while small-scale maps less so. Cartographic error can also be introduced; the size of the drawing pen, whether

manual or mechanical, makes a large difference depending on the scale. For instance, at a scale of 1:500,000 one millimeter on the map is equal to 500 meters on the ground.

The maps used by the Forest Department of Indonesia are as follows:

1. Joint Operational Graphic (JOG) Map. 1967. U.S. Scale 1:250,000–1:500,000.
2. Topographic Map. 1936–1938, and revised 1946. U.S. Army. Scale 1:100,000–1:250,000. Polyeder.
3. Peta Rupa Bumi (topographic map). 1978. Bakosurtanal (National Coordination Survey and Mapping Board). Scale 1:50,000 in Java and 1:100,000–1:250,000 in outer islands.
4. Topographical Map. 1944. Directorate General of Topographic, Department of Defense, Indonesia. Revised map scale 1:25,000; selected areas 1:50,000 in Java, 1:100,000 - 1:250,000 on outer islands.
5. REPPROT Map. 1986. Department of Transmigration, Indonesia. Scale 1:250,000 (source: JOG map and revised with Landsat MSS and spot imagery).
6. BAPPEDA Map. 1987. Source: East Kalimantan Planning Agency (BAPPEDA Kaltim), in cooperation with German Technical Agency for Transmigration Development (GTZ-TAD).

Forest Land Classification

Based on the Basic Forestry Act of 1967, the Department of Agriculture classified Indonesian forests into protected forests, production forests, nature reserve forests, and recreational forests. In 1970 the government developed a master plan for forest land use as an official response to the increasing pace of development in forest lands and increasing land use conflicts. The Consensus Forest Land Use Plan (TGHK) classified forest land as above, based on the three criteria of soil erodibility, rainfall intensity, and slope. A value index was derived for these criteria and three range classes were identified, more than 175, 125–175, or less than 125. All the areas with greater than 45% slope and a certain soil type or high soil erodibility were categorized as protection forest. The following system of six classifications was established:

1. Nature Reserve and Conservation Areas (>175)
2. Protection Forest (>175)
3. Limited Production Forest (125–175)
4. Normal Production Forest (125–175)
5. Conversion Forest (<125)
6. Unclassified Forest (<125)

Also, in 1970 the Department of Agriculture divided some of the forest land into concession areas based on potential timber production. The area boundaries were mapped roughly and at a scale of 1:500,000.

In 1984 the TGHK land use map was legalized and regulations were implemented stating that concession areas must be outside protection forests.

Conflicts arose for a few reasons. Protection forests must be taken out from the forest areas with the addendum process. Some of the problems with this process are related to the accuracy of the maps used to identify both concession and land classification boundaries. The TGHK classifications were mapped at a small scale and not ground checked, thus small areas were not clearly classified so that lands at an index of 150 were sometimes included in protection forests. When the Department of Forestry tried to extract the protection forests from the concessions according to the TGHK maps, more than 80 concessionaires applied to have such areas rechecked claiming a lower index rating. The inventory department performed ground surveys on some concessions to check the land suitability criteria—soils, slope, and rainfall. Others were rechecked using 1990 SPOT satellite imagery. To date, the Department of Forestry has rechecked and approved the boundary of only 16 concessions, others are in process, or pending policy decisions regarding protection forests. Starting in 1992 there will be no new forest concessions given because the protection forest is very important for protecting the environment. The department is also concerned that disagreements between concessionaires might come up with the re-evaluation process.

SURVEY AND MAPPING TECHNOLOGY: BASIC TECHNOLOGIES

Terrestrial surveying and photogrammetry are two methods commonly used for mapping in industry. These techniques can be used to make topographic maps, orthophoto maps, and thematic maps.

The basic equipment required for terrestrial mapping includes measurement instruments—theodolite, level, and staff; and recording book, ruler, protractor, and drawing pen. In the field, measurements are taken of the height of the instruments, azimuths, distances and heights of objects. In the office, the data are calculated and analyzed and fixed as coordinates on the maps. Terrestrial surveying is done by the Directorate General of Forest Inventory and Land Use (INTAG) for determining forest concession boundaries.

Photogrammetry can also be used in mapping. Aerial photographs are usually of a scale 1:20,000–1:50,000. Air photo interpretation is done using coordinate control points data, paired photos, and a stereoplotter. The photos are oriented and plotted. Air photos are most useful in determining topography, landform, geology, and vegetation cover.

To recheck forest concession boundaries, the Forest Department uses air photos at a scale of 1:20,000, mosaic photos at 1:25,000, vegetation/forest cover at 1:25,000, and line/topographic maps at 1:25,000. INTAG prepares aerial photographs, but the Directorate General of Forest Utilization (PH) ultimately decides on the location of the forest concession boundary.

By 1992, 80% of all the forest concessions in Indonesia have been mapped from air photos at a scale of 1:25,000. However, these maps were not available for the case study presented below. The Department of Forestry has also begun updating TGHK forest land use classification maps for all of Indonesia by enlarging them to a

scale of 1:250,000 and using Landsat imagery and ground checking. These maps are not yet legalized.

SURVEYING AND MAPPING: USING GLOBAL POSITIONING SYSTEMS AND GEOGRAPHIC INFORMATION SYSTEMS

Global Positioning Systems (GPS)

Historically, navigation was accomplished by reading the position of the stars in relation to the earth. Celestial navigation can only approximate position, even with the best instrument (sextant). And, of course, measurements could only be taken at night—and only on a clear night. Electronic navigation systems were then developed, but they had their own problems with variation in readings because of electrical interference and geographic variation.

The U.S. Department of Defense developed the global positioning system (GPS), a navigation system based on a constellation of 24 satellites in high orbit and ground receivers. The satellites orbite high enough to avoid the problems encountered by land-based systems. GPS gives accuracy within 2–3 meters on the ground, 24 hours a day. Originally, the system was restricted to military use. As the system became available to civilian users, the possible applications grew—especially in cartography, earth sciences, and natural resources management.

GPS works by measuring the distance from three or four satellites to a receiver on the ground. The exact position of the receiver can then be determined by triangulation. The distances are measured by clocking the time it takes for a coded radio signal to travel at the speed of light from the satellite to the receiver. Extremely accurate clocks are needed, so atomic clocks are used on the satellites. The receiver clocks do not have to be as accurate because the coding of the signal reduces the error.

The accuracy of the GPS system is a function of the sum of several sources of error: satellite clock error (2 ft), error (2 ft), receiver errors (4 ft), and atmospheric/ionospheric interference (12 ft). The contribution of each source varies depending on atmospheric conditions and the equipment used. In addition, the accuracy of GPS is purposely degraded by the U.S. military by periodically jamming the frequencies and creating what is called selective availability. Selective availability, when applied, is the single largest component of GPS error.

To calculate position accuracy, the sum total error is multiplied with the PDOP (position dilution of precision which ranges from 4 to 6). In general the position accuracy that can be expected with a good receiver is 60–100 ft; in the worst conditions, it is 200 ft; and with selective availability on, it is 350 ft.

Some of this error can be reduced by using two receivers. One is kept at a fixed point as a base station; the other is moved to the locations that you want to determine the position of. Both receivers record the radio signal. Differential

calculations are performed on the two sets of data. This reduces the error significantly, and positions can then be fixed within 2–3 meters of accuracy.

GPS units give the position in longitude, latitude, and elevation. They also have the capability of referencing the points to standard grids such as UTM (universal transverse mercator), TM (transverse mercator), or Lambert Conical; or to datums such as Bessel spheroid or WGS/84 (World Geoid Spheroid/84).

Geographic Information Systems (GIS)

A geographic information system is an organized collection of computer hardware, software, geographic data, and personnel designed to efficiently capture, store, update, retrieve, organize, manipulate, analyze, and display spatial information (Burroughs 1986). Paralleling the advancements in GIS computer technology is the expansion of its applications for high-quality cartography and analyses for research in the earth sciences, ecology, and demography. We face pressing global environmental problems such as tropical deforestation, acid rain, rapid urbanization, overpopulation, hunger, and impacts from changes in our global climate. GIS is promising to be an effective tool to deal with the large volumes of data that help us to understand the spatial relationships related to some of these problems. For natural resource management and land use planning, GIS provides a means to integrate many layers of spatial information, to develop dynamic models, to analyze trends over time, and to simulate scenarios. With these capabilities, GIS can be an effective tool for land use decision-making.

There are two basic types of map data. Spatial data describe the location and shape of features and their spatial relationship to other features. Spatial data are represented as point, line, or area. Descriptive or attribute information describes other characteristics about the feature. Spatial information is stored in the computer as digital data in a vector or raster format. Vector data are represented as point, line, or polygon referenced to an x,y coordinate system. In a raster format, data are stored as a grid, where each grid cell has an attribute value.

A GIS project has four major steps: determining the objective, building the data base, performing the analysis, and presenting the results of the analysis. Building the database involves identifying what kind of data is required and how it will be acquired. Data may be acquired in the form of paper maps at various scales, or field data collected by coordinate points, or remote sensing data such as photos or digital satellite images. Maps and photos must be converted to digital format in order to enter them into the system. This can be done by manually digitizing or by scanning. The point and line area features are converted to x,y coordinates. A point is represented by a single coordinate, a line by a string of coordinates, and a combination of one or more lines, or polygon, with an identifying label point inside.

Then the data must be organized into layers according to the storage parameters of each attribute and the types of analyses that you want to do. The layers must be registered together. This is done by choosing known points on the earth's surface for which real-world coordinates are known. A common set of registration

points is used in each layer so that they register to each other and to adjacent map layers. Registration points are also used to ensure that a single map layer is oriented properly. It is important to digitize tie points accurately and at least 4 points must be digitized for each layer.

Once the data are digitized, there will always be some error with lines not meeting and slivers between polygons. Corrections can be made by using construct topology—identifying digitizing errors, fixing the errors, and reconstructing the topology. The attribute data can then be added, for example, identifying which polygon represents which forest concession. Attribute data are stored in a table, and each spatial feature on the layer has corresponding data in the attribute table.

Finally, all the layers must be converted to the same coordinate system, longitude, latitude, or UTM. Since the earth is a spheroid, a mathematical conversion must be used to create a flat map sheet from the spherical surface. This mathematical conversion is commonly referred to as a map projection. Usually UTM projection can be applied.

CASE STUDY

This case study was done in East Kalimantan in the village of Long Uli, which is bordered on one side by the Kayan Mentarang Nature Reserve, and on the other side by a forest concession (Pt Sairana Trirasa Bhakti). The objective was to use GPS to evaluate the relative accuracy of the four base maps available.

Field Data Collection

Two Trimble Navigation receivers were used, one as a base station and one as a mobile unit. Sampling sites were selected around Long Uli village. GPS recordings were taken along Bahau river every 50–100 meters, and at high points. A river was chosen as a feature for comparison because it is common to all the maps, easy to locate on the ground and by remote sensing, and several points can be taken. The data were stored directly in the GPS unit and later downloaded to the GIS and analyzed.

GIS Analysis

The case study maps were first assessed individually for the significance of scale and source data to accuracy. Then, to analyze the relative accuracy of the base maps, they were entered into a GIS (PC ARC/INFO) as separate layers. The base maps included Topographic map (1:250,000), HPH Forest Concession map (1:500,000), TGHK Forest land use plan map (1:500,000), and BAPPEDA/AERIAL maps (1:100,000). A series of polygon overlay operations were performed to compare the four layers together and in pairs (Appendix, Maps 1-6).

These maps are all on the same projection (UTM) and the reference marks match. They were originally at different scales and were reduced or enlarged to perform the overlay. This scale transfer does not in itself introduce error, but because each map was made at a different scale, and features were added with different levels of accuracy, error in the features might be added, particularly when enlargements are done.

Results

MAP #1 (Topographic + BAPPEDA + HPH + TGHK). The purpose of this overlay was to get the overall picture of how the maps compare to each other. This overlay revealed that features of the TGHK and the topographic map were almost matching. The BAPPEDA map was consistently different from the TGHK and the topographic map. The HPH map was inconsistently different from all the others.

MAP #2 (TGHK + topographic). The topographic map was reduced to the TGHK map scale of 1:500,000. Reduction of scale should not introduce error. In addition, both maps were printed with a quality process and stored on quality, stable paper, thereby eliminating significant shrinkage and distortion. The features on these two maps match closer than any of the other maps.

MAP #3 (BAPPEDA + topographic). This overlay shows consistent error between the two maps of up to 2 kilometers difference in the position of the river. The reference marks match up. The consistency of the difference between the maps might indicate some kind of systematic error such as instrument error. It cannot be determined from this overlay which map is correct. The BAPPEDA maps were originally made at a scale of 1:100,000 from 1:50,000 air photos and checked by ground surveys, while the topographic maps were made at a scale of 1:250,000.

MAP #4 (HPH + topographic). The river on this map shows consistently irregular error. HPH maps were made by hand drawing the concession boundary on the TGHK maps at a scale of 1:500,000. In this case, it was drawn with a wide marker pen. The boundary then could be +- 1.5 km. When enlarged, this error would be exaggerated further. Error could also be introduced in the copying process or because HPH maps are stored on paper maps susceptible to shrinking and distortion.

MAP #5 (GPS). GPS data were plotted using four different datums. Each datum has a different x Axis, y axis, z axis, and f (flattening).

1. Bessel datum (Gunung Segara datum) 1941
2. Geodetic Reference System (GRS) 1967
3. World Geodetic System (WGS) 1972
4. World Geodetic System (WGS) 1984

These four datum layers of GPS points line up exactly. Because the study area is about 0 latitude, there should not be much variation in the maps of different datums. From this map, it can be concluded that the error in the case study maps cannot be attributed to the datum.

MAP #6 (GPS + BAPPEDA + Topographic). This map shows consistent error between the BAPPEDA map and the topographic map. The BAPPEDA map is closest to the GPS map. Of all the government maps, the BAPPEDA series is derived from the most accurate process.

CONCLUSIONS AND RECOMMENDATIONS

From this case study, it could be concluded that the BAPPEDA map is the closest to the ground truth because it fits most closely to the GPS points measured, and it is made with air photographic mapping which is most suitable for comparing with GPS field data in the case study.

It can be concluded that GPS is a suitable survey system for checking and revising the maps used for forest planning in Indonesia, and in particular those used for delineating forest concession boundaries. GPS is more accurate than the field surveying done in Indonesia at medium-accuracy standards.

GIS with ARC/INFO software is useful for analyzing error in the existing maps, and for efficiently updating the maps for better accuracy. GIS, together with GPS, has the potential to make a better fit of the maps to the ground. The Department of Forestry should use GPS and GIS to evaluate forest concession maps and improve the quality of maps in Indonesia.

For better forest planning, especially for forest operations and monitoring, and delineation of forest concession boundaries, medium-to large-scale maps are needed (1:100,000–1:25,000). Base maps can be made from air photo interpretation and ground checked with GPS. Improving the accuracy of the maps will be a long process that in the end will help to solve conflicts about forest concession boundaries between forest concessionaires, and between forest concessionaires and customary land holders.

REFERENCE

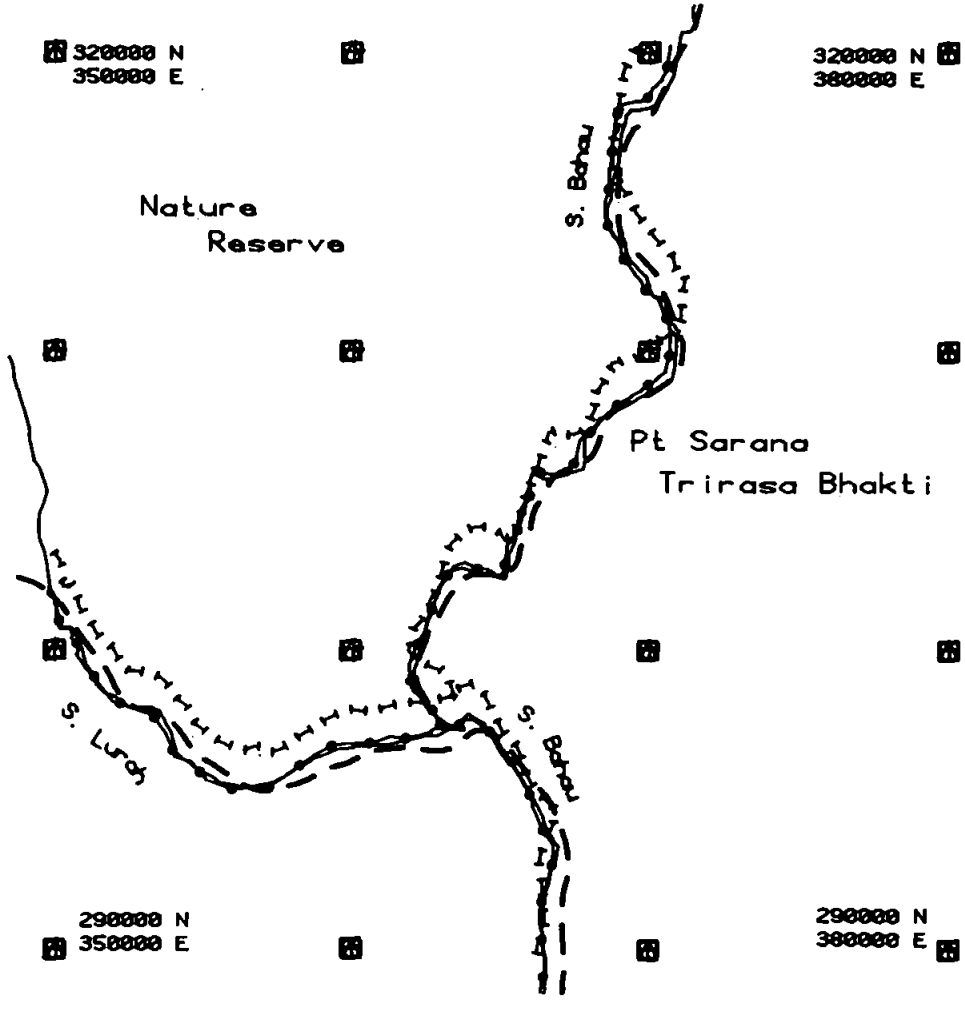
Burroughs, P.A. 1986. Principles of Geographical Information Systems for Land Resources Assessment. Oxford, London: Clarendon Press.

Map 1.

Topographic, Bappeda, HPH and TGHK Maps

Confluence of Bahau and Lurah Rivers

East Kalimantan



Rivers, Topographic Map

Rivers, Bappeda Map

Rivers, HPH
Forest Concession Map

Rivers, TGHK
Forest Land Use Map

UTM Grid, Topographic Map

UTM Grid, Bappeda Map

UTM Grid, HPH
Forest Concession Map

UTM Grid, TGHK
Forest Land Use Map

N

Kilometers

6 4 3 2 1 0 5 10 15

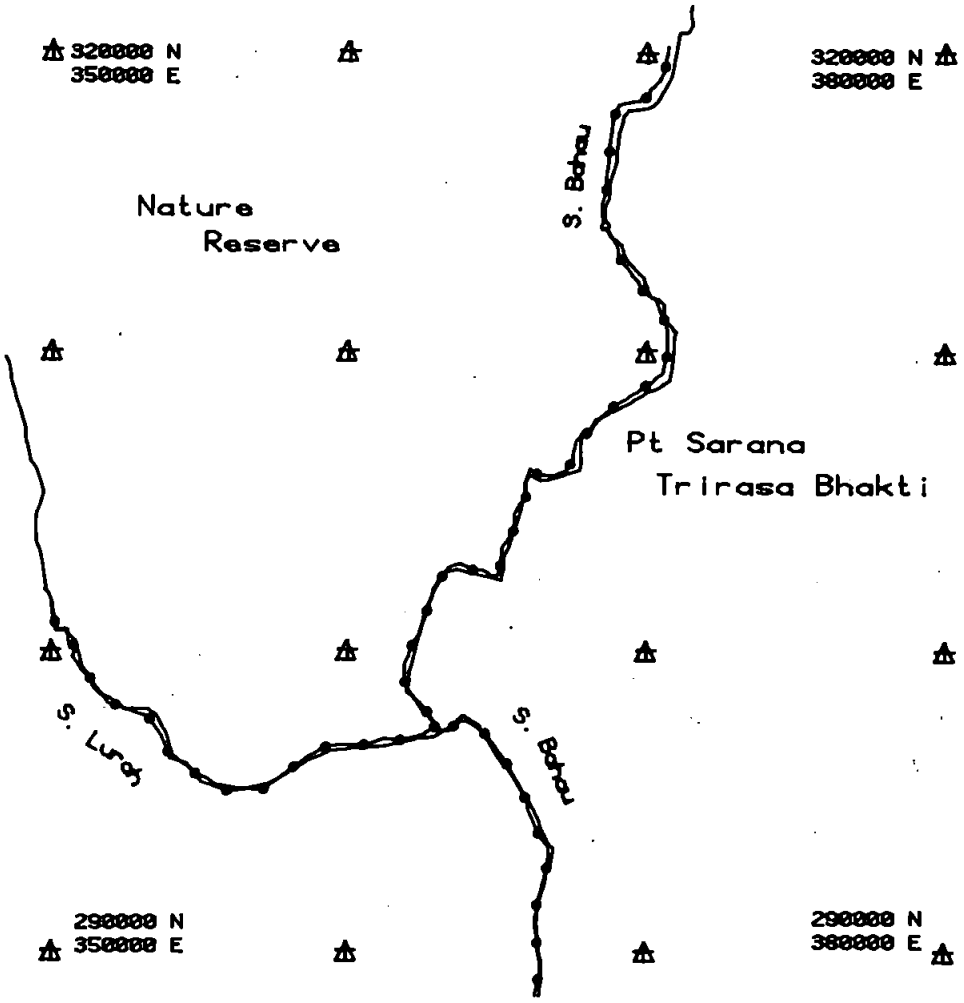
Projection - UTM, zone 50

Scale 1:250000

Compiled by: Department of Forestry, Indonesia
East West Center, Honolulu, HI USA

Map 2.

Forest Land Use Map (TGHK) versus Topographic Map
Confluence of Bahau and Lurah Rivers
East Kalimantan



Rivers, Topographic Map

Rivers, TGHK
Forest Land Use Map

UTM Grid, Topographic Map

UTM Grid, TGHK
Forest Land Use Map

N

Kilometers
5 4 3 2 1 0 5 10 15

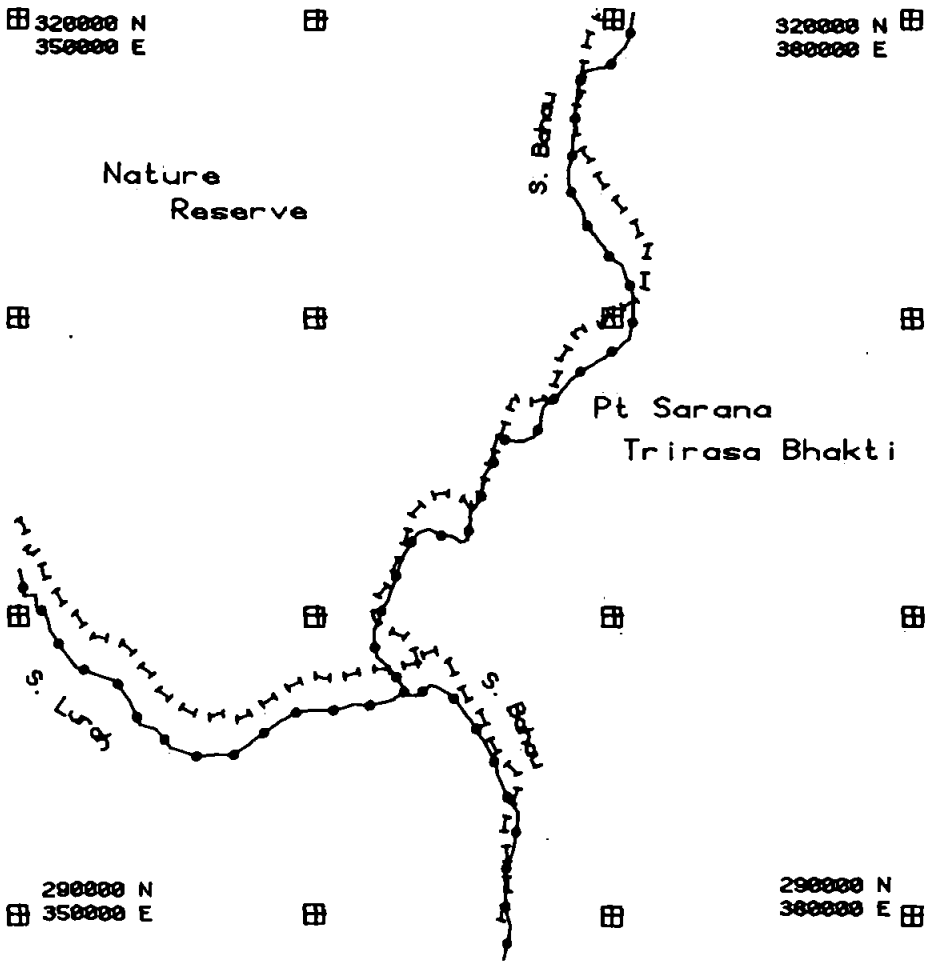
Projection - UTM, zone 50

Scale 1:250000

Compiled by: Department of Forestry, Indonesia
East West Center, Honolulu, HI USA

Map 3.

Bappeda versus Topographic Map
Confluence of Bahau and Lurah Rivers
East Kalimantan



Rivers, Topographic Map

Rivers, Bappada Map

UTM grid, Topographic Map

UTM grid, Bappada Map

N

Kilometers

5 4 3 2 1 0 5 10 15

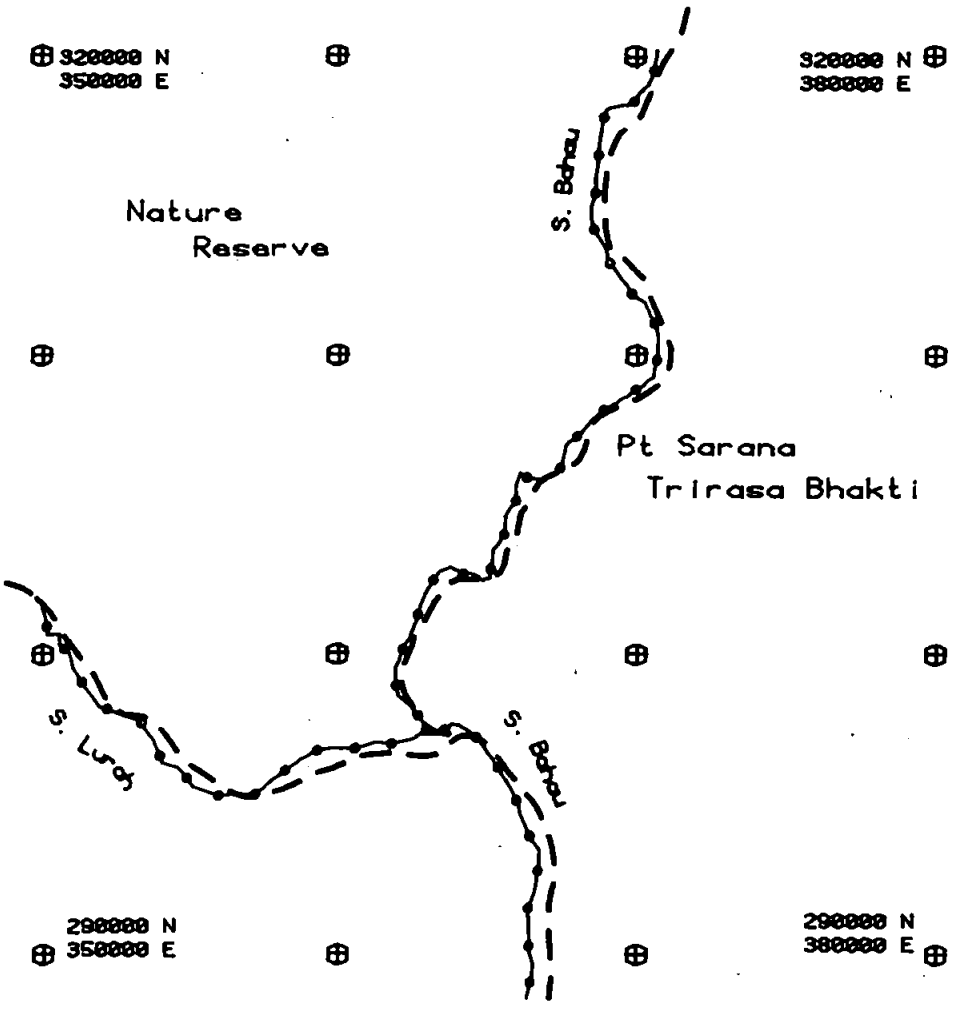
Projection - UTM, zone 50

Scale 1:250000

Compiled by: Department of Forestry, Indonesia
East West Center, Honolulu, HI USA

Map 4.

Forest Concession Map (HPH) versus Topographic Map
Confluence of Bahau and Lurah Rivers
East Kalimantan



Rivers, Topographic Map

Rivers, HPH
Forest Concession Map

UTM Grid, Topographic Map

UTM Grid, HPH
Forest Concession Map

N

Kilometers
6 4 3 2 1 0 5 10 15

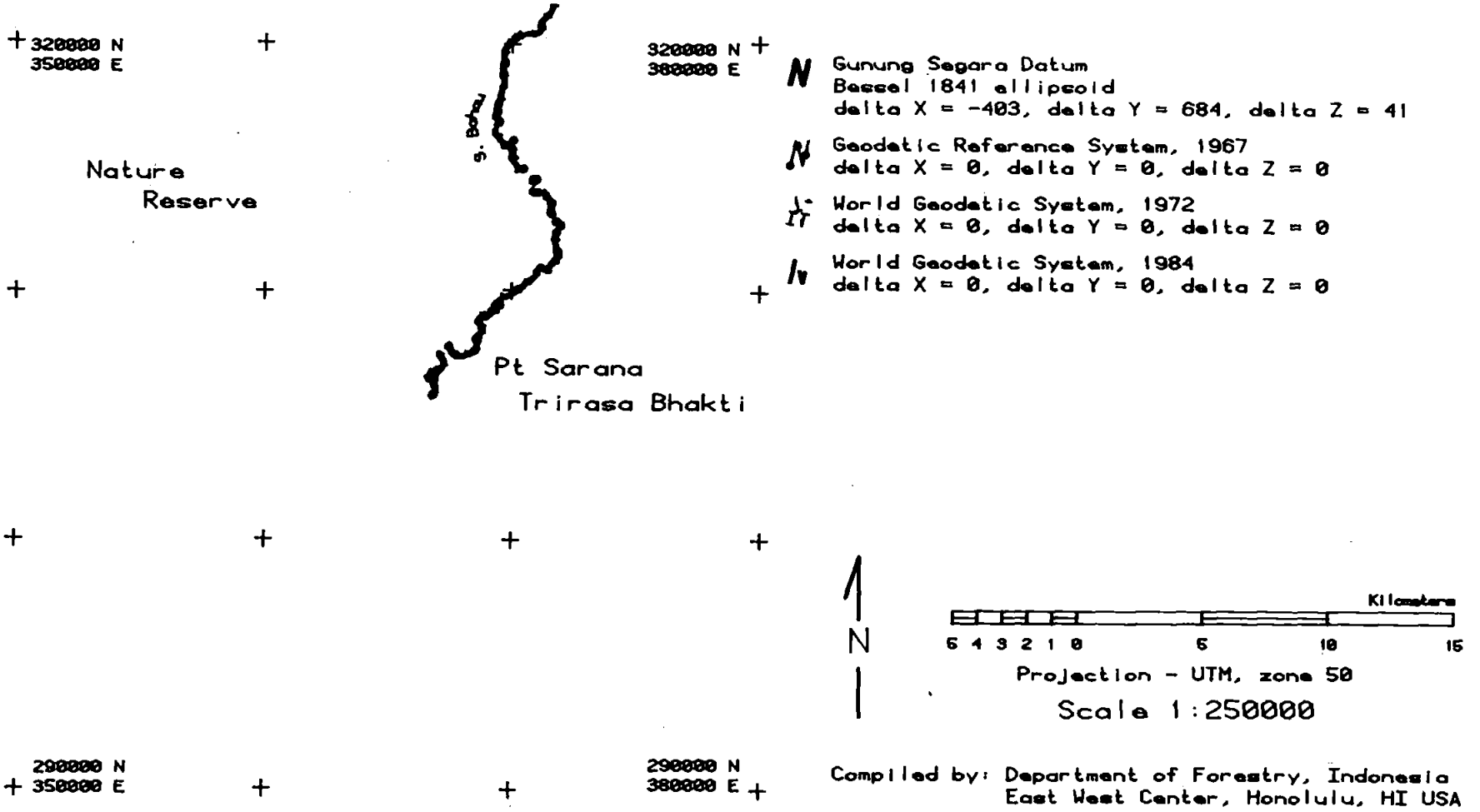
Projection - UTM, zone 50

Scale 1:250000

Compiled by: Department of Forestry, Indonesia
East West Center, Honolulu, HI USA

Map 5.

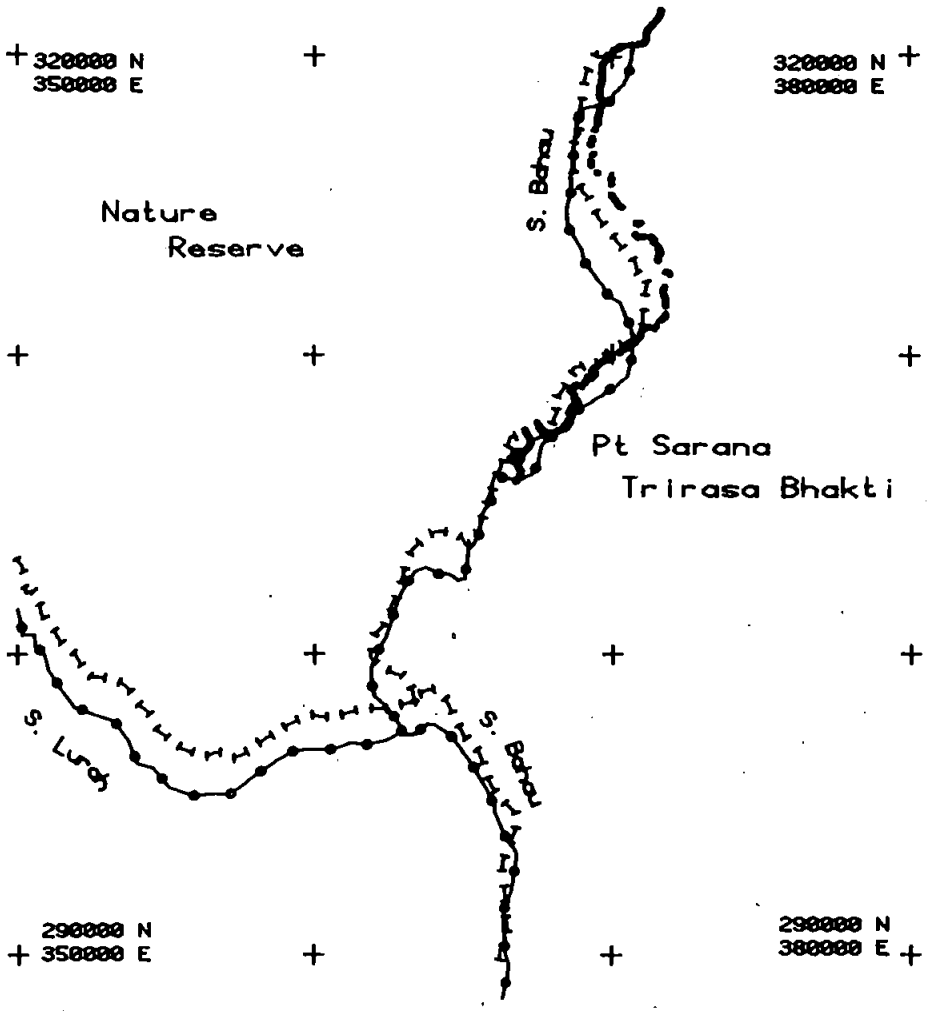
GPS Mapping of the Bahau River
Displayed using Various Datums
East Kalimantan



Compiled by: Department of Forestry, Indonesia
East West Center, Honolulu, HI USA

Map 6.

GPS Mapping of the Bahau River versus Bappeda Map and Topographic Map East Kalimantan



Rivers, Topographic Map

Rivers, Bappeda Map

Rivers, GPS survey
Gunung Segara Datum

N

Kilometers
5 4 3 2 1 0 5 10 15

Projection - UTM, zone 50

Scale 1:250000

Compiled by: Department of Forestry, Indonesia
East West Center, Honolulu, HI USA

MAPPING CUSTOMARY LAND: A CASE STUDY IN LONG ULI VILLAGE, EAST KALIMANTAN, INDONESIA[1]

Martua Thomas Sirait
Kayan Mentarang Project-WWF

INTRODUCTION

In the outer islands of Indonesia, tribal peoples practice traditional resource management systems that reflect a diversity of ecosystems and cultures, and a relatively sparse population. Typical management practices include rotational swidden cultivation and collecting non-timber forest products. Tribal peoples manage their land based on local knowledge of the ecosystem, regulated by cultural traditions, and a system of customary land tenure. Land tenure is influenced by a complex history of settlement migration that is remembered in oral histories. Land rights may apply by household, clan, village, and/or by tribe. Customary land boundaries are defined by natural features, and remembered by stories and historical events.

As logging operations, transmigration projects, and mining expand into the outer islands of Indonesia, conflicts arise with local people who have been living near and managing the forest for generations. Although Indonesian forest policy acknowledges the existence of customary land rights, for a variety of reasons these rights tend to be ignored in the initial stages of forest planning. This is partly because the maps used for forest planning are of such small scale that they often do not even include the locations of the villages, let alone the customary land boundaries.

This paper presents a case study of a mapping project, made in Long Uli village, Bulungan district, East Kalimantan province, Indonesia. Part of the village land is inside a designated Forest Concession area and the other part is inside the Kayan Mentarang Nature Reserve. The Forest Department designated both the Forest Concession and the Nature reserve using the TGHK land use map (1980), and the Forest Concession map (SK HPH 1990). The scale of the maps was too small to show the exact village boundary. The villagers claim it is their customary land, that they have lived there for generations and managed the forest resources sustainably according to their traditional knowledge.

The objective of the case study was to map the Long Uli village customary land using oral history, traditional knowledge, sketch maps, and verified with a global positioning system (GPS). A geographic information system (GIS) was used to overlay the village maps with other official land use maps in order to clarify the land boundary conflict. This paper will present: 1) the methodology used to work with the villagers to produce sketch maps of the village boundary and land use and the use of GPS; (2) the use of GIS to compare the village

[1] A cooperative project with the Forestry Department (Directorate General of Forest Production & Directorate General of Natural Forest Protection & Preservation), East-West Center (Program on Environment), WALHI, Institute of Dayakologi, World Wildlife Fund (Kayan Metarang Project), and Long Uli villagers.

maps with the legal forest department maps; (3) the implications of the overlapping boundaries; and (4) the identification of management options that could meet the objections of all land users.

BACKGROUND OF THE CASE STUDY

Location

Long Uli village is located in Pujungan Sub-district, East Kalimantan Province, about 800 km Northwest from Samarinda, the capital of East Kalimantan, and about 25 km from Sarawak (Eastern Malaysia). The village is located on the Bahau River, a branch of the Kayan River; which is a river with many rapids but navigable to the coast.

Long Uli is a village of Kenyah Uma Lung people. It is surrounded by other Kenyah villages. In the subdistrict there are also 18 Kenyah, 1 Kayan, and 2 Punan villages.

History

There has been no written history of the area. To understand the pattern of migration, land use, and customary land tenure, it was necessary to record the oral history from villagers, especially elders. The oral history is complex and can be difficult to record. Stories must be checked and cross-checked with several informants. The pattern of migrations and the relationships between neighboring Kenyah groups substantiates the results of mapping the land boundary and land use.

Movements over the years of the Kenyah Uma Lung of Long Uli were generally due to disease, access to facilities, disputes between aristocrats, and for job opportunities in Sarawak. The people of Long Uli were the last to move down from the Usun Apau plateau to the Bahau River after the war. They have been gardening and using the forest around Long Uli for 52 years. The Bahau River area is now divided by two chiefs: Kepala Adat Besar Pujungan (Kenyah Uma Alim) and Kepala Adat Besar Ulu Bahau (Kenyah Lepo Ma'ut). The following is a chronology of events in Long Uli village showing the migration pattern (Figure 1) and significant government decisions affecting the community:

Oral History

Pre-1932	Lived in Apau Urung (Usun Apau) near Sarawak border.
1932	Moved to Long Lurah. Lead by Imung Alang, obtained permit to buy the land from the Kenyah Badeng of Long Peleiran and the Chief of Pujungan.
1932–40	Lived closely with the people of Long Peleiran sharing the land for cultivation, and dividing the forest land—Lutung River for Uma Lung aristocrats, and Lurah River for Badeng aristocrats. Made a boundary to the north along the Nggeng Iut river and to the south along the Benang River.
1940–44	Gradually moved their cultivated area to Long Uli.
1944	Moved settlement to Benato lead by Imung Alang.

1948	Finished building long house at Benato. Chief of Kenyah Lepo Tau of the Upper Baram River in Sarawak, Malaysia, came and made a peace treaty with Chief Pujungan and Chief Ulu Bahau.
1948–60	Many people moved to the upper Baram for work.
1950	Moved settlement from Benato to Long Uli because of epidemic.
1960–67	No movements to Malaysia because of effect on Indonesia—Malaysia confrontation.
1967	Chief Ulu Bahau traveled to Sarawak and made a peace treaty with Chief Lepo Tau. Many people moved to Bayangkara, led by Imang Bilung, and some moved to Malinau (Batu Kajang).
1967–92	Many people left for work in Malaysia (Sabah, Sarawak) and Brunei.
1968	Kenyah Lepo Ke' moved from Ngiam River and settled in Long Tebulo on the northern part of Long Uli land. The new border between Long Uli and Long Tebulo is Batu Lu'ung.

Significant Government Decisions Affecting Long Uli

1972	The Forest Department stopped the *banjir kap* logging system,[2] in which the villagers were sometimes employed. The villagers went back to collecting non-timber forest products.
1979	Indonesian government legislates the Village Administration Act. This act standardized the administrative structure and dissolved the traditional leadership structure.[3]
1980	Sungai Kayan Mentarang was designated as a nature reserve by the Forestry Department, connecting several watershed protection areas.[4]
1990	Forest Concession given to Sarana Trikarya Bhakti.[5]
1990	WWF/Kayan Mentarang Project established.[6]

[2] *Banjir kap* is a system of selective logging along river sides to facilitate the transport of logs.

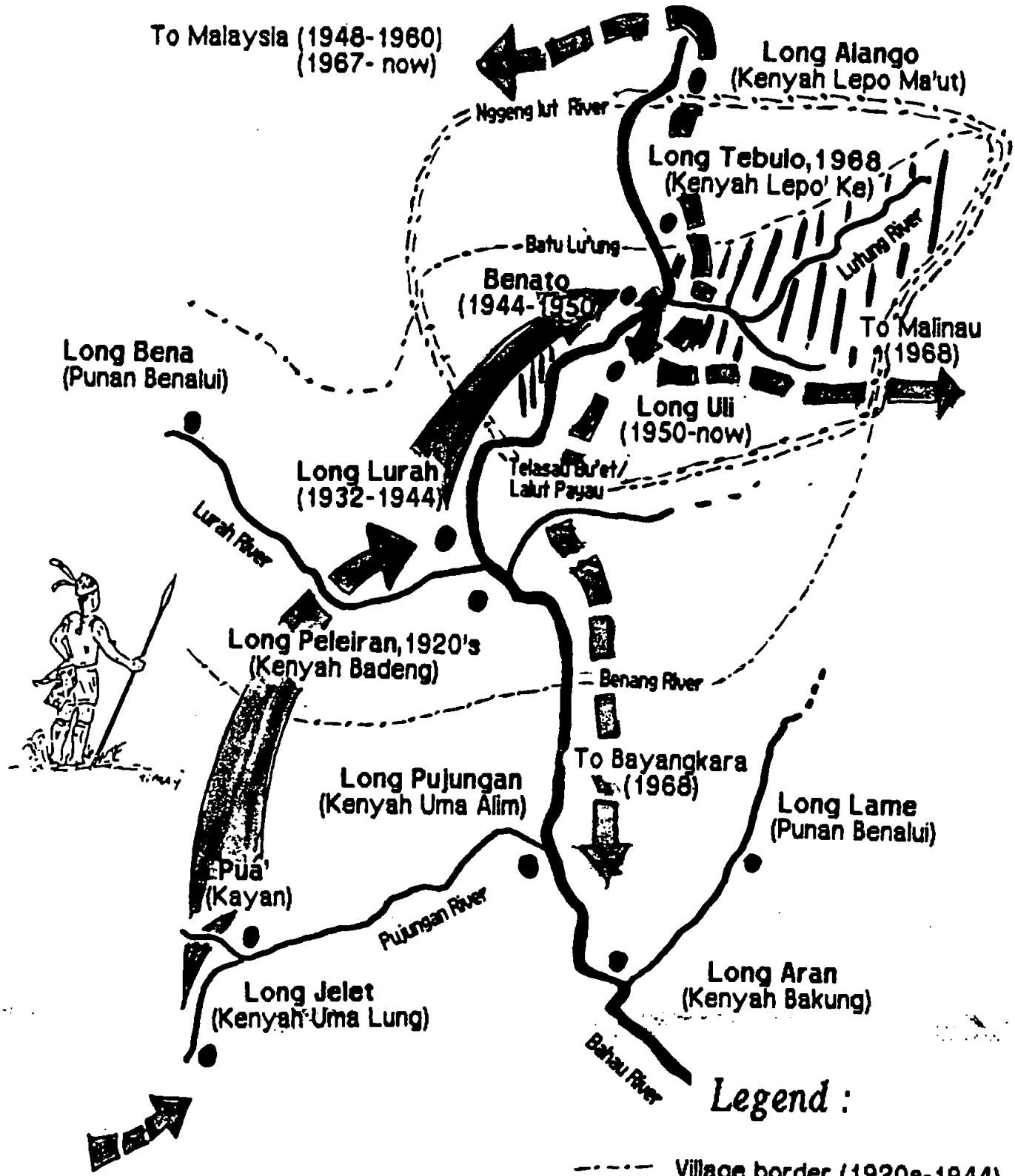
[3] Weakening the power of the customary *(adat)* chief tends to weaken traditions such as resource management systems.

[4] Sungai Kayan Mentarang Nature Reserve has an area of 1.6 million ha and includes the western part of Long Uli village. It was established by Forest Department letter number 847/Kpts/Um/11/1980.

[5] Sarana Trikarya Bhakti Ltd. was given the Forest Concession by Forest Department letter number 20/Kpts-II/1990. This concession includes Long Uli village, Long Peleiran land, Long Pujungan land, and Long Aran village. The concession has not yet started operations but may begin next year.

[6] The Kayan Mentarang Project is a collaborative research project conducted by WWF, WALHI, and academic researchers from various universities. Studies are being done on the flora, fauna, anthropology, and traditional resource management in the Kayan Mentarang Nature Reserve.

Figure I.
Customary Land & The Migration of the Kenyah Uma Lung



Kenyah Resources Management System

The Kenyah Uma Lung manage their customary land for a diversity of uses. They designate land for settlement, for cultivation, for forest protection, for fishing, and for hunting. The Kenyah designate areas for protected community forest or *tanah ulen* (Lahjie 1991; Sirait 1992). They have local regulations (*hukum adat*) for collecting forest products from *tanah ulen*. They meet to decide on the opening time for the protected land (*buka ulen*). The owner of the *tanah ulen* is the village community. No one can cultivate there, and the forest products harvested are for the benefit of the community. Long Uli has two separate areas of *tanah ulen*. Products from one are reserved for the village council to be used for village development, and those from the second are reserved for orphans and widows.

Most decisions about resource use are made communally. For example, every pig season they have a meeting to discuss regulations for the wild pig hunt that season. They also meet to plan the schedule, personnel requirements, and location for cultivation for the next year. However, villagers have individual rights to cultivated land. The first person to open the primary forest establishes use rights. Every family has more than one cultivated area (*ladang*) every year. They have *ladang* for planting short-term dry rice (*padi sangit*), one for planting vegetables, and some families make wet rice fields (*sawah*). If someone wants to use another piece of land, he or she must ask permission of the owner.

Villagers collect rattan and *gaharu* (aloe wood) in the forest surrounding Long Uli, especially along the Batu-bala, Telao, Tuan, Pata Lung, and Lutung rivers. In a 0.4 ha plot, researchers have found 70 rattan plants, of 10 local species (*Uvey Seka, U. Semole, U. Ayeng, U. Beloko*) from five genera (Calamus, Daemonorops, Korthalsia, Plectocomiopsis, and Ceratolobus).

Because of the demand for forest products in early 1970, especially *sega* rattan (Calamus caesius) and *gaharu* (Ausilaria sp.), many traders came to the area and brought workers to collect rattan and *gaharu* in the customary land. This caused many conflicts between villagers and outside collectors/traders. The villagers wrote customary regulations including sanctions for intruders; if outsiders did not contribute to the village community, they could not enter the Long Uli land.

Studies done by the University of Gadja Mahda researchers in several villages in remote areas near the East Malaysia border show that subsistence food production provides villagers with about 2,887 calories and 50.5 grams of protein/capita/day. This is more than villages in the coastal areas that cannot provide the minimum standard of 1,809 calories and 13.4 grams of protein/capita/day (Sulistyo 1990).

The Kenyah people living in the region have tremendous knowledge of useful wild plants. Their understanding of habitat and propagation requirements for edible fruit-bearing trees would be of particular value to crop breeders. Furthermore, indigenous forms of shifting cultivation such as those practiced in the Kayan Mentarang area might serve as useful models for the development of sustainable agroforestry systems elsewhere.

MAPPING CUSTOMARY LAND

The objectives of this case study were (1) To map the customary lands of Long Uli village using oral history, traditional knowledge, sketch maps, and GPS; and (2) to use GIS to overlay this information with official land use maps in order to clarify land boundary conflicts and to identify management alternatives.

The Mapping Process

Villagers' participation. The process of mapping customary land needs the participation of many members of the community. Some villagers know more about aspects of their history than others. As younger people attend school and spend less time on the land with the elders, they do not learn the important cultural sites and subtleties of the traditional resource use or tenure pattern. Some families know certain areas within the village lands better than others.

Depending on how it is done, the mapping process can aggravate boundary disputes with neighboring villages or it can resolve them. In this case, meetings were held and a consensus was reached.

Literature search. Background research was done on anthropology, ecology, and traditional resource management. Some statistical data were obtained from the district office.

Sketch maps and interviews. The villagers worked most closely with WWF researchers to record traditional resource management and customary boundaries on a sketch map. On the ground, the villagers showed the researchers the important sites relating to resource use and land boundaries. The researchers first located the sites on a topographic map using compass triangulation and altimeter. Additional data about resource management were recorded in field notes. The oral history of migrations was also drawn on a sketch map (Figure 1). This process involved interviews with individuals and groups. An initial survey helped the researchers to understand village dynamics and to select the research assistants and informants. Information was recorded and cross-checked with other informants.

Surveying with Global Positioning System (GPS). Villagers acted as guides to take researchers to the places marked on the sketch map. GPS positions were recorded at the protected lands, the village road, several swidden areas, along rivers, at the mouth of rivers, and at important cultural sites. Because the outer boundary of the village is too large to walk around, GPS positions were taken at key points and the topographic map was used to extrapolate. Altimeter readings were also taken at each point. Over a period of 10 days, 117 GPS positions were collected.

GPS Accuracy. The amount of positional error of a GPS reading at any one point depends on several effects that can be ameliorated in the field with the right timing and equipment. There must be 3–4 satellites overhead to fix a position, and the geometry of those satellites is important. The receiver gives readings of the precision error (GDOP and

PDOP), which gives an indication of the accuracy of the reading. A satellite almanac can be used to plan the timing of the readings. Because of the steep terrain, readings in the valleys were sometimes impossible or had to be carefully timed to get a good 3-dimensional reading. Readings are difficult to get under dense tree canopy. A 30-meter cable and a 5-meter pole were used to raise the antenna to a clear spot in the canopy. Most of the errors come from selective availability (i.e., when the satellite signal is scrambled by the U.S. Dept. of Defense). In this case, the effects of selective availability were reduced by using a base receiver and a remote receiver and performing differential equations on both sets of data.

GIS Operations. The GPS data was input to a GIS (PC ARC/INFO software), and a map was plotted that could be overlayed with a variety of land use maps used by the Forest Department[7] (evaluated by Prasodjo, this volume). The objective of the GIS analysis was to identify the position of the customary land boundary, and the amount of overlap with the Forest concession, the nature reserve, and with other land classifications. The amount of area under the three main village land uses was calculated—protected community forest, unrestricted forest, and cultivation land (Table I). To determine the areas of overlap with other land use classifications, several overlays were performed (Appendix): GPS village map (Map 1) over topographic map (Map 2), TGHK land use map over GPS village map (Map 3), Kayan Mentarang Nature Reserve map over forest concession Map over the GPS village map (Map 4), TGHK land use classification map over nature reserve map over forest concession map over GPS village land use map (Map 5). The overlapping areas were quantified from the maps and are shown in Tables II–IV. Finally, the village map was displayed as a perspective map for easy interpretation by the villagers and other decision-makers (Map 6).

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[7]***Source of Data***

a. *TGHK Land use map (TGHK 1980)* Scale 1:250,000. This is a legally recognized map used by the Forest Department to determine, for instance, where forest concessions can be let, and where villagers can legally perform certain land use activities. The map does not show any villages. Land use classifications are based on an index of slope, rainfall, and soil type, and include Protected Forest, Production Forest, Limited Production Forest, and Conservation Forest. We digitized the rivers and the border of each type of land use that intersects with the Long Uli boundary.

b. *Forest Concession map (HPH 1990)* Scale 1:500,000. This is the map that will be used to make the 20-year logging plan. This map did have the village marked with a point outside the concession area and named. We digitized the contours, rivers, and boundary of the forest concession.

c. *Topographical map (Jantop/Dittop–AD 1977)* Scale 1:250,000. This map showed contours and natural boundaries. We digitized the contour lines and rivers in order to be able to create a perspective map of the village area for future use with the villagers.

d. *River map (Bappeda 1987)* Scale 1:100,000. This is the largest scale map available of the area, and the most complete map in terms of including villages and names. However, Long Uli was drawn in the wrong location. We digitized the boundary of the subdistrict to clarify jurisdiction, and also the rivers.

e. *Nature reserve map (S.K CAKM 1982)* Scale 1:1,000,000. We digitized reserve boundary and rivers.

f. *GPS Village map* (Terrestrial Measurements Data by GPS-). A map was created by plotting the GPS points that were taken in the field according to the previously made sketch map of oral history and land use. The map shows the customary land boundary between Long Uli village and other villages. The map also shows pig migration routes, protected community forest, unrestricted forest, rattan cultivation, and the 1992 cultivated area. The village area and area of each land use were calculated from this map (Table 1).

CLARIFYING BOUNDARY CONFLICTS

Long Uli Land Use

Long Uli village has a total land area of 18,231 ha. The outer boundary follows the ridges on either side of the Bahau River valley.

The settlement and the cultivation land is situated in the relatively flat Bahau River valley. Land under rotational swidden cultivation, including the fallow, covers an area of 631 ha (3.46% of the village land) stretching along 400 M of the Bahau River near the settlement. On this land the villagers clear *ladang* and plant fruit tree groves (*pulung bua*) and rattan.

The people of Long Uli manage several sub-watersheds that feed into the Bahau River. Two sub-watersheds are designated by the villagers as *tanah ulen* covering a total of 12,174 ha (67% of the village land); 9,698 ha at Sungai Lutung River and 2,476 ha at Sungai Tuan-Batubalo-Telao rivers. The ridges dividing the sub-watersheds are used as land use boundaries. The villagers consider the rivers and valleys as important resource units. They get fish from the river, rattan along the riverbanks, hunt along the river, and maintain a full tree cover to protect the quality of the village water supply.

The rest of the village land (5,425 ha, or 29.8%) is unrestricted forest used to collect firewood, construction wood, resins, fruits, and other non-timber forest products.

Significance of the Boundary Overlaps

In 1980, the western side of the Bahau River was designated as the Kayan Mentarang Nature Reserve (SK CAKM 1980). In 1984, the TGHK land use map was completed, and the Pujungan and Lurah valleys and a large area on the west bank of the Bahau River was classified as conversion forest. That land was taken out of the nature reserve designation. This allowed the villagers to resume swidden cultivation on those lands; however, they were never notified of the change in land status.

In 1990, the eastern part of Bahau River (some of the conversion forest and some of the limited production forest) was given as a forest concession. Now the Bahau River is a natural border between nature reserve and forest concession. Essentially the village is divided in the middle by two external land users/holders, covering a total of 50% of Long Uli land. Both the Sarana Trirasa Bhakti (STB) forest concession and the nature reserve were established roughly according to the land suitability criteria used by TGHK. However, the nature reserve also includes some conversion forest in the Bahau valley.

Now, 31.2% (5,679 ha) of Long Uli village land is overlapping with the nature reserve. This includes the cultivated area at the Telao River, which is 55.9% of the total cultivation land for the village. It also includes the *tanah ulen* on the west bank of the Bahau river, which is 20.5% of all the total *tanah ulen*. The rest of the land is unrestricted forest (52.2% of the unrestricted forests). The forest concession on the east bank of the Bahau overlaps with 19.6% (3,574 ha) of the village land. This includes 277 ha or 49% of the village cultivation land. A very small amount is *tanah ulen* and unrestricted forest. This

means that all of the village cultivation land is either in nature reserve or in the forest concession.

Looking for a moment just at the TGHK classifications as a representation of land suitability, the tables show many areas where the traditional land uses overlap with compatible TGHK classifications. According to the TGHK map, 22% of Long Uli land overlaps with the nature reserve. Most of that overlap is already kept by the villagers as *tanah ulen.* In addition, 26% of Long Uli land is in protected forest on the east bank of the Bahau, which is designated for water catchment protection. Thus, the villagers are prohibited from using it for cultivation or for collecting forest products. Most of that overlap is also designated as *tanah ulen* by the villagers and they use it for collecting non-timber forest products and only for certain members of the village. As long as the customary regulations already in place are adhered to, this might be an appropriate land use activity in the protected forest, if not the nature reserve. Looking at the land areas another way, within their village boundary the people of Long Uli are protecting 12,173 ha of land in total, while the amount of land classified as nature reserve and protected area is only 7,154 ha.

Conversion forest officially covers 36.2% of Long Uli land. Conversion forest is where the Long Uli villagers would be allowed to clear the forest for cultivation, and indeed all of their cultivation land falls within the conversion forest. However, only 7.2% of Long Uli land is both conversion forest and outside the nature reserve or the forest concession; and the villagers claim that available land is too far from the river and the village and too steep.

Limited production forest covers 14.1% of Long Uli land, which means that area could be given as a forest concession for selective cutting in the future.

Not all the villagers knew their land is overlapping with other land users. This is due to a lack of communication between villagers and foresters. Better communication could be achieved with the help of maps, a visual reference that can be easily understood by both. The sketch map helps the villagers to present their point of view, and the government maps show the foresters' perspective.

RESOLVING BOUNDARY CONFLICTS

Management Options

TGHK land classifications represent the legal management options for the land. Some of the village land has already been designated to specific managers for specific users (i.e., STB manages the forest concession and the Parks Department (PHPA) of the Forest Department manages the Kayan Mentarang nature reserve). For the villagers, these lands represent a severe limitation on their traditional land use. When looking for management options that are satisfactory to the villagers and the Forest Department, these lands also have the greatest restrictions because of their legal status. The lands outside of the Kayan Mentarang reserve and the forest concession also have land use restrictions on them which are slightly more flexible for the villagers.

Basically, the villagers' land use is compatible with the overall objectives of the Forest Department. Their traditional practices are shown by this study to be compatible with TGHK

land classifications for the area. The traditional management of the *tanah ulen* seems to meet the objectives of the TGHK designated protected forest. Villagers do not clear the area nor cut trees for construction; they only collect non-timber forest products for their own use or for sale to support poorer sectors of the village. They appear to have internal regulations that prevent over-harvesting of forest products. In their selection of sites for *tanah ulen*, they themselves have chosen steep forested watersheds, which suggests that they probably have followed similar reasoning as the TGHK designation. But because it was their choice they would be more likely to accept their own regulations.

Working from this foundation, a few management options become evident. A first option would be to change the status of the Kayan Mentarang Nature Reserve to National Park or Biosphere Reserve. Under either of these designations, the management plan could identify a core reserve area and a support zone for sustainable traditional use. Under this arrangement, both conservation and development objectives can be achieved and customary lands can be partially recognized. A plan for the Kayan Mentarang protected area could include the following goals:

- Conserve a large track of natural primary forest.
- Set aside old secondary forest for research and eventual incorporation in the primary forest track.
- Provide a support zone for traditional resource use.
- Develop environmentally appropriate agroforestry systems based on traditional methods and knowledge of cultivated and wild species.
- Develop other economic activities such as ecotourism, which pose minimal threats to natural forest.

This option would require extremely good communication and cooperation between the Parks Department (PHPA), other forest departments, and the villagers. The success of this option also depends on factors outside the reserve. Half of the villagers' cultivation land and much of their unrestricted forest are in the forest concession. When the concession begins logging, villagers will inevitably put more land use pressure on the Kayan Mentarang Reserve.

Thus a second option might be to cancel or change the boundaries of the forest concession. That would leave the conversion forest for the villagers' use and reduce their need for forest products in the Kayan Mentarang Reserve and the protection forest.

A third option would be for the villagers, the forest department, and the concessionaire to reach an agreement on the best land-use management for the area. According to forest policies the concessionaire is obligated to recognize the existence of customary land and to reach a consensus with the villagers about the management of it (Widardjo, this volume). It would be necessary for the villagers to have legal advice and organizational support from NGOs in this process. The negotiations must achieve agreements that recognize villagers' customary land rights, which should include having some control over logging operations, and having a say about the rate and exact location of logging. Compensation to the villagers should be seen as rent for temporary use of the land. It is the villagers that will have to live and manage the land when the concessionaire is gone. To accomplish this level of planning

and negotiation, detailed maps are essential—maps of oral history and traditional land use, as well as the forest department maps based on scientific assessments of land suitability. Under this third option the management of the Kayan Mentarang Nature Reserve would take form as in the first option above. The present ongoing collaborative research by NGOs and villagers about their land use, culture, and historical migration patterns will provide the basis for the management plan. Putting the plan into effect will also require a collaborative effort between the villagers and PHPA.

A common objection to management options that recognize traditionally sanctioned resource regulations is that the systems break down under population pressures; that the land cannot sustain the population. It should be noted that in this case, the population of the sub-district Pujungan is very small, with a density of 0.4 person/km^2 and a growth rate of 1.6%. In Long Uli village there is a population density of 0.8 person/km^2; 136 people for 631 ha of cultivation land. In a study with the Kantu people of Kalimantan, Dove (1982) calculates the territorial needs of swidden cultivators to be 100 persons per 640 ha. Of course, this will depend to some extent on soil fertility and other factors, but population density in Long Uli is approximately the same as that recommended by Dove.

To implement any of these options, there needs to be a strong community organization that can maintain the local resources management and can act as a liaison between the villagers, government, and other land users. NGOs can play an important role in facilitating community organization and acting as liaison.

How these map can be used from now on

Just the process of recording the villagers' knowledge of their land and their history on a map is empowering for the villagers. The villagers quickly understood why the map is needed and how it can be used. The village map can be used by villagers for managing their natural resources, selecting cultivation sites, and planning developments. It can be used to clarify the oral history and resolve boundary disputes with neighbors. The map can also be used to discuss land issues between themselves for resolving internal disputes. Besides being useful for land management, the maps are a permanent record of traditional knowledge and oral history that is at risk of being lost as traditions and land use changes.

This research does not mean anything in the end unless it is taken back and used by the villagers. The maps give the villagers some means of communicating with other land users, and some negotiating platform if there are conflicts. In this case, the village maps can be used in writing the management plan for the Kayan Mentarang Reserve. The concessionaire could use the information to design a logging plan that works around and does not disrupt the sacred sites, and important resource areas of the villagers. Mapping needs to be done with other villages[8] in and around the Kayan Mentarang Reserve in order to identify support zones, core zones, and appropriate land uses and protection activities for the villagers.

[8] In the next few years it will be possible to use APHI (Forest Industry Association) concession maps which are being made using aerial photographs at a scale of 1:20,000 to 1:50,000. In East Kalimantan, the BPN (National Agrarian Agency) also has a Land Use Planning and Land Use Mapping (LUPAM) ^Project, which will be another map source.

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Table I. Long Uli Village Land Use

Village Land Use	Area (ha)	Percent of Village Land
Protected Community Forest (PCF)	12,173	66.78
Unrestricted Forest (UF)	5,425	29.76
Cultivation Land (CL)	631	3.46
Total Village Land	18,229	

Table II. Areas of Overlap Shown by Overlay of TGHK Map and Village Map

Land Classification	Village Land Use									Total Village Land	
	Protected Community Forest			Cultivation Land			Unrestricted Forest				
	Area (hectares)	% of Village Land	% of Land Use Area	Area (hectares)	% of Village Land	% of Land Use Area	Area (hectares)	% of Village Land	% of Land Use Area	Area	% of Village Land
Nature Reserve	2,340	12.8	19.2	4	0.2	0.6	1,632	9.0	0.1	3,976	21.8
Conversion Forest	2,648	14.5	21.8	627	3.4	99.4	3,329	18.3	61.4	6,604	36.2
Limited Production Forest	2,186	12.0	18.0	0	0	0	456	7.5	8.4	2,642	14.5
Protected Forest	4,814	26.4	40.0	0	0	0	04	0.02	0.07	4,818	26.4

Table III. Areas of Overlap Shown by Overlay of Village Map, Nature Reserve Map, and Forest Concession Map

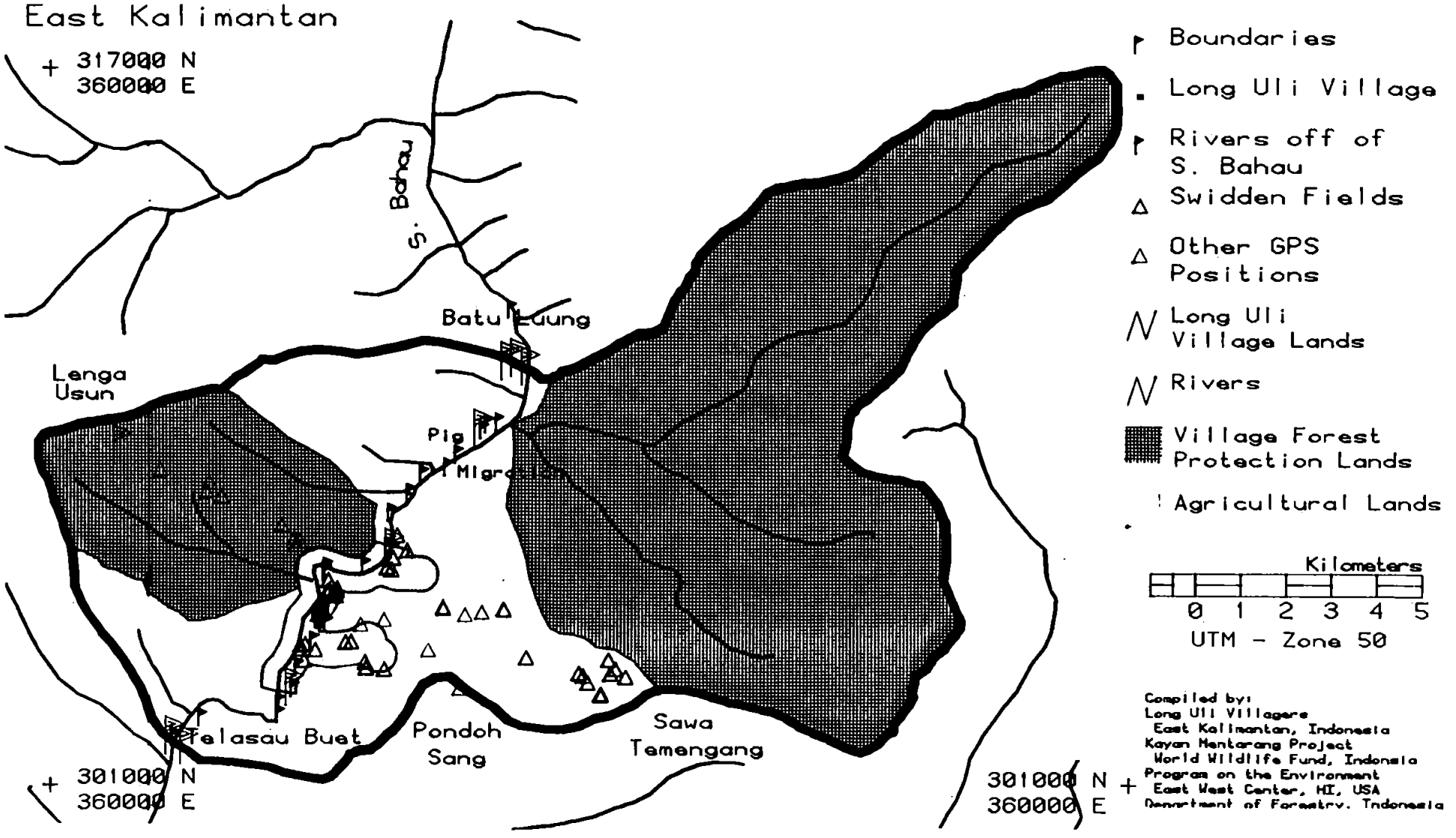
Land Designation	Village Land Use									Total Village Land	
	Protected Community Forest			Cultivation Land			Unrestricted Forest			Area	% of Village Land
	Area (hectares)	% of Village Land	% of Land Use	Area (hectares)	% of Village Land	% of Land Use	Area (hectares)	% of Village Land	% of Land Use		
Kayan Mentarang Nature Reserve	2,476	12.6	20.3	854	1.9	56.1	2,831	15.5	52.2	5,661	31.1
STB Forest Concession	1,577	8.7	13.0	277	1.5	43.9	1,742	9.6	32.1	3,576	19.6
Total	4,053	22.3	33.3	1131	3.4	100.0	4,573	25.1	84.3	9,237	50.7

Table IV. Areas outside designated STB Forest Concession and Kayan Mentarang Nature Reserve

Land Classification	Village Land Use									Total Village Land	
	Protected Community Forest			Cultivation Land			Unrestricted Forest				
	Area (hectares)	% of Village Land	% of Land Use Area	Area (hectares)	% of Village Land	% of Land Use Area	Area (hectares)	% of Village Land	% of Land Use Area	Area	% of Village Land
Nature Reserve	0	0	0	0	0	0	0	0	0	0	0
Conversion Forest	936	5.13	7.69	0	0	0	387	2.12	7.13	1,323	7.26
Limited Production Forest	2,041	11.20	16.77	0	0	0	455	2.50	8.39	2,496	13.69
Protected Forest	4,814	26.41	39.55	0	0	0	4	0.02	0.07	4,818	26.43
Total	7,791	42.74	64.01	0	0	0	846	4.64	15.59	8,637	47.38

Map 1.

Long Uli Village Lands
and
GPS Survey
Scale 1:125000



Map 2.

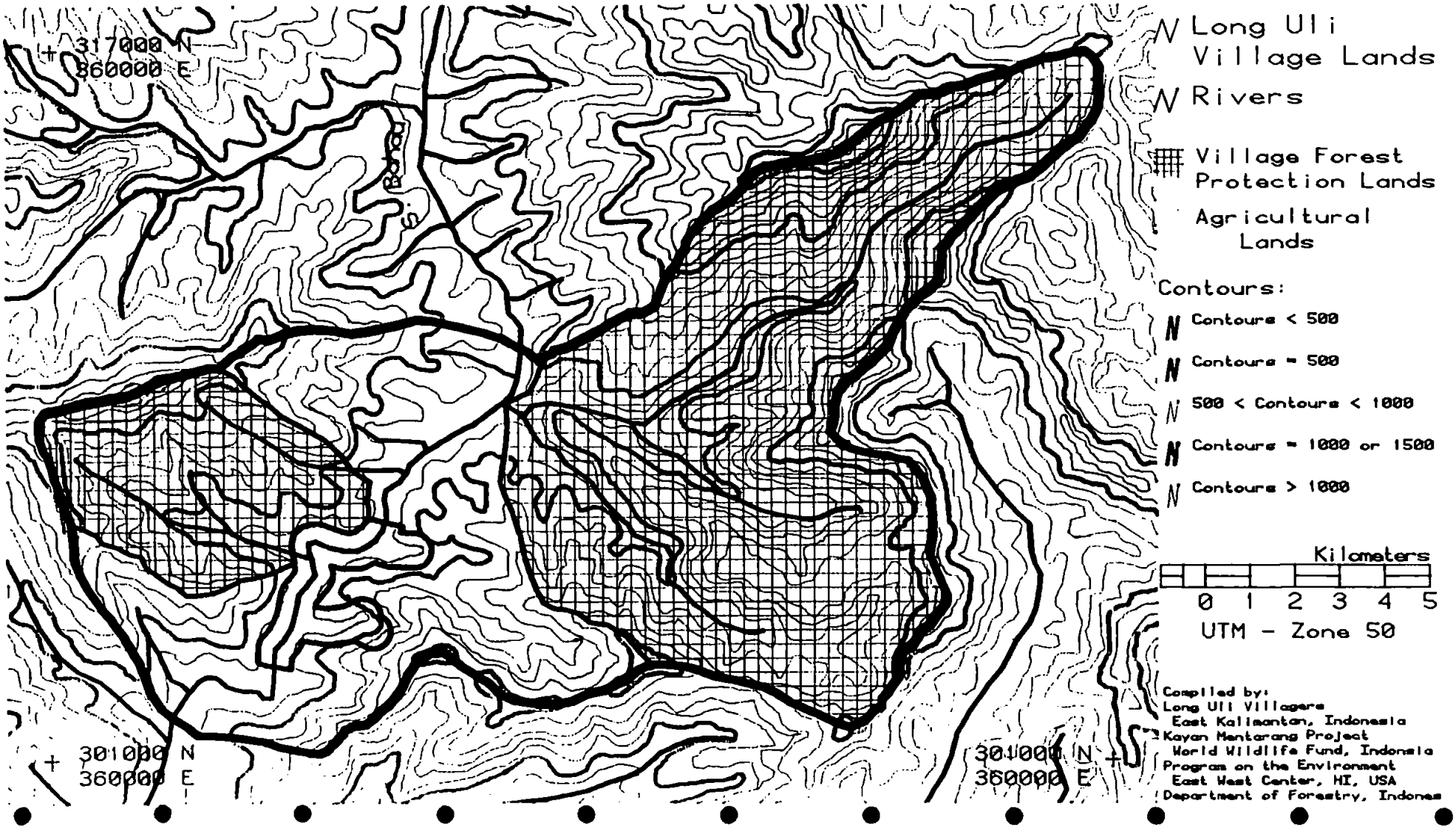
Boundary of Long Uli Village Lands

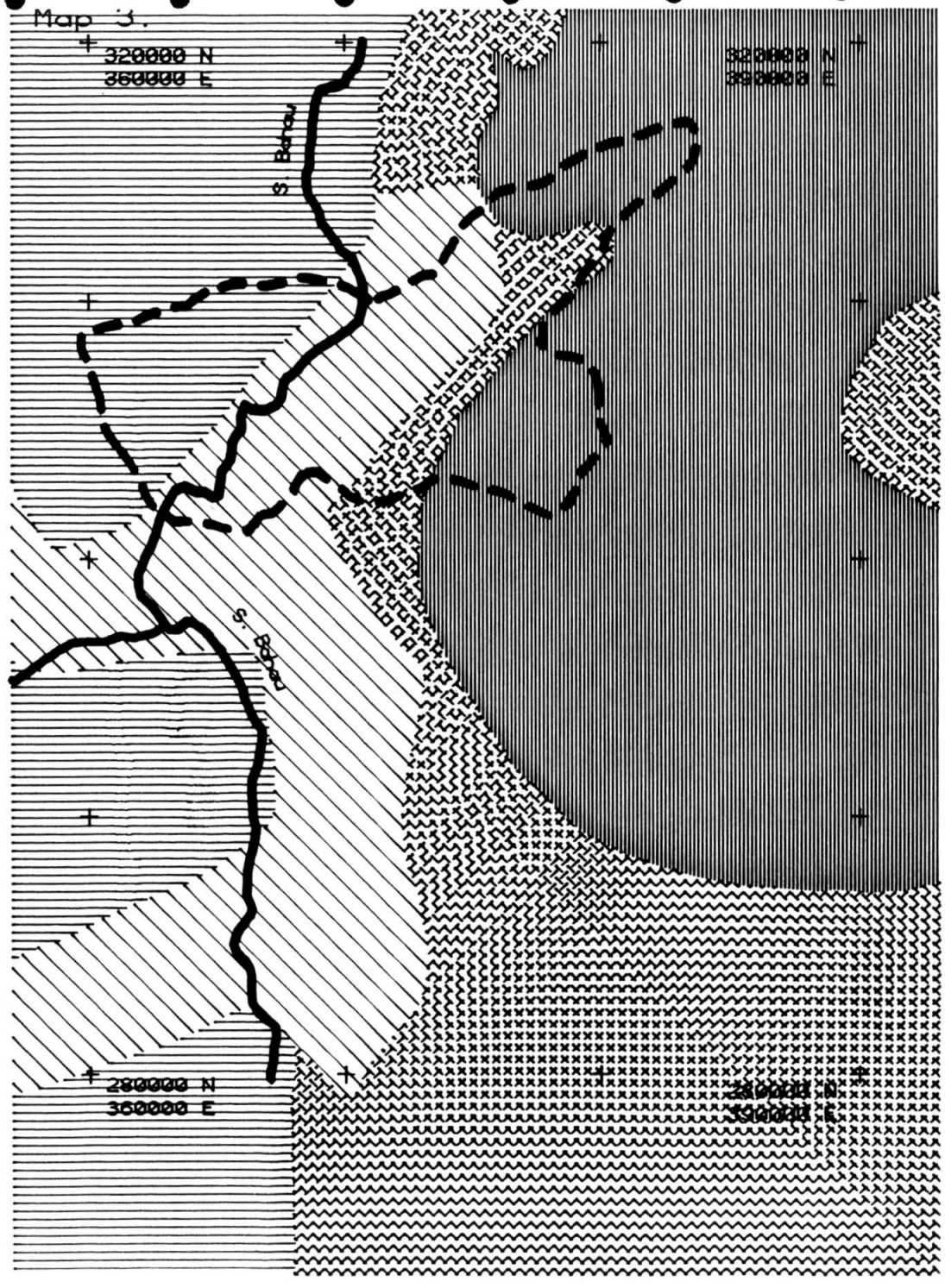
and

Topographic Map

Scale 1:125000

East Kalimantan





Forest Land Use Classification and Long Uli Village Lands East Kalimantan

Hutan Produksi Konversi (HPK)
Conversion Production Forest

Hutan Suaka Alam-Wisata (HSA-W)
Nature Reserve Forest

Hutan Lindung (HL)
Protected Forest

Hutan Produksi Terbatas (HPT)
Limited Production Forest

Boundary of
Long Uli Village Lands

Rivers

N

Kilometers
5 4 3 2 1 0 5 10 15

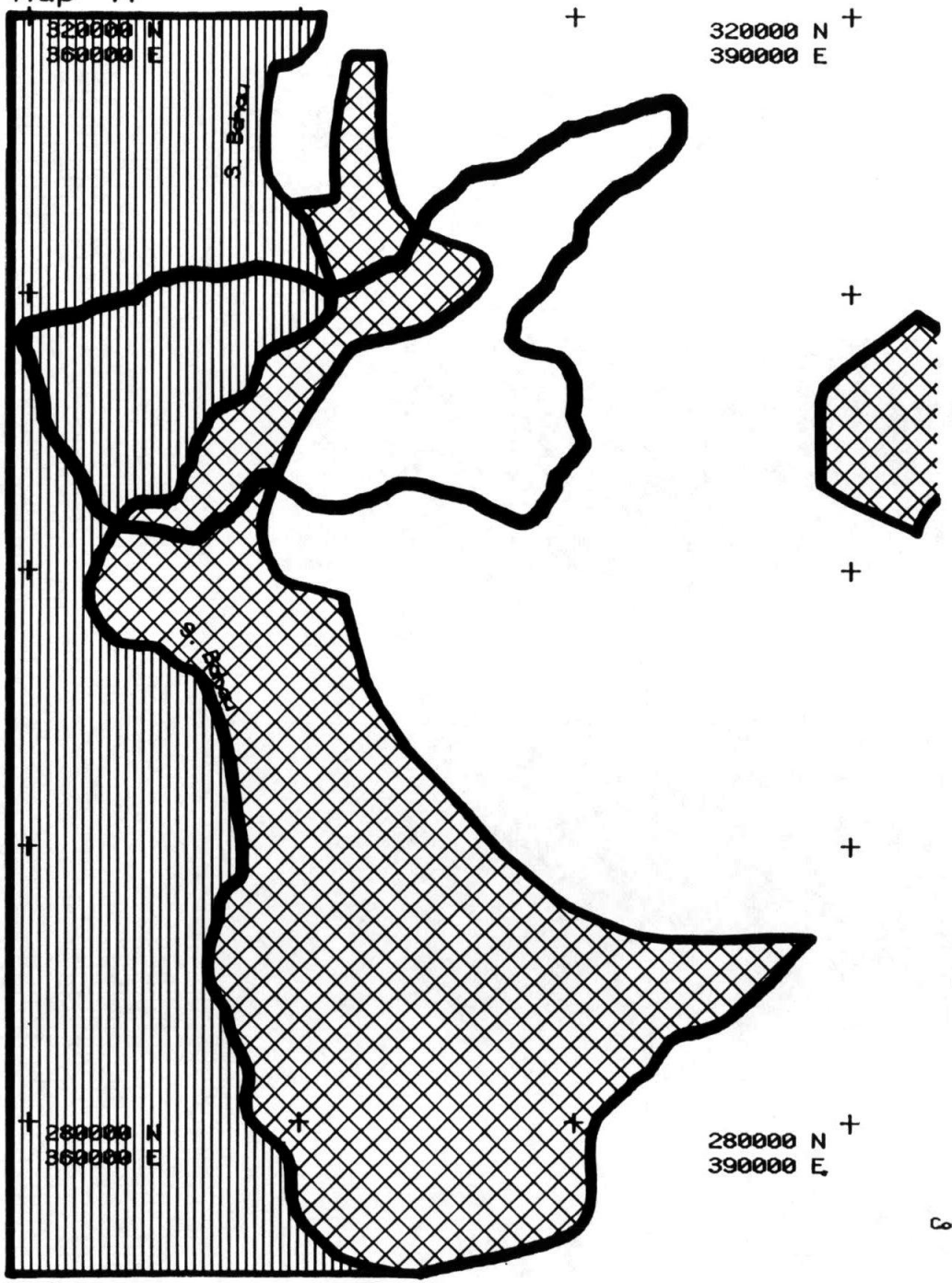
Projection - UTM, zone 50

Scale 1:250000

Data Source for Forest Land Use Classification:
Peta Tata Guna Hutan Kesepakatan (TGHK)

Compiled by: Long Uli Villagers, East Kalimantan, Indonesia
Department of Forestry, Indonesia
Kayan Mentarang Project, World Wildlife Fund, Indonesia
Program on the Environment, East West Center, Honolulu, HI

Map 4.



Long Uli Village Lands

overlayed on

Forest Concession

and

Nature Reserve

East Kalimantan

Long Uli Village Lands

Pt Sarana Trirasa Bhakti
Forest Concession

Cagar Alam Kayan Mentarang (CAKM)
Kayan Mentarang Reserve

N

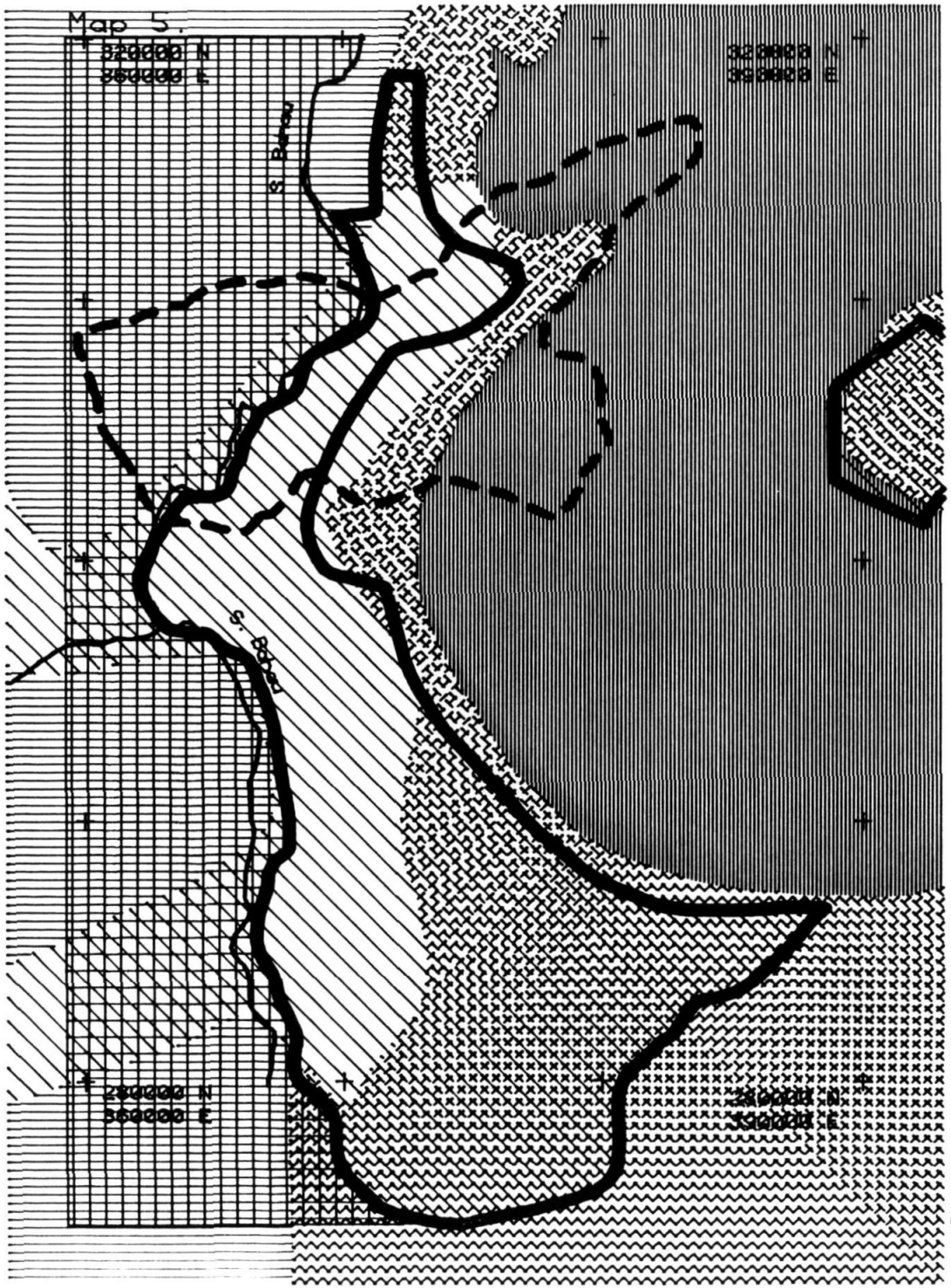
Kilometers

5 4 3 2 1 0 5 10 15

Projection - UTM, zone 50

Scale 1:250000

Compiled by: Long Uli Villagers, East Kalimantan, Indonesia
Department of Forestry, Indonesia
Kayan Mentarang Project, World Wildlife Fund, Indonesia
Program on the Environment, East West Center, Honolulu, HI



Composite of Overlays of Land Uses

East Kalimantan

Boundary of Long Uli Village Lands

Pt Sarana Trirasa Bhakhi Forest Concession

Cagar Alam Kayan Mentarang (CAKM)
Kayan Mentarang Reserve

Hutan Produksi Konversi (HPK)
Conversion Production Forest

Hutan Suaka Alam-Wisata (HSA-W)
Nature Reserve Forest

Hutan Lindung (HL)
Protected Forest

Hutan Produksi Terbatas (HPT)
Limited Production Forest

Rivers

N

Kilometers

5 4 3 2 1 0 5 10 15

Projection - UTM, zone 50

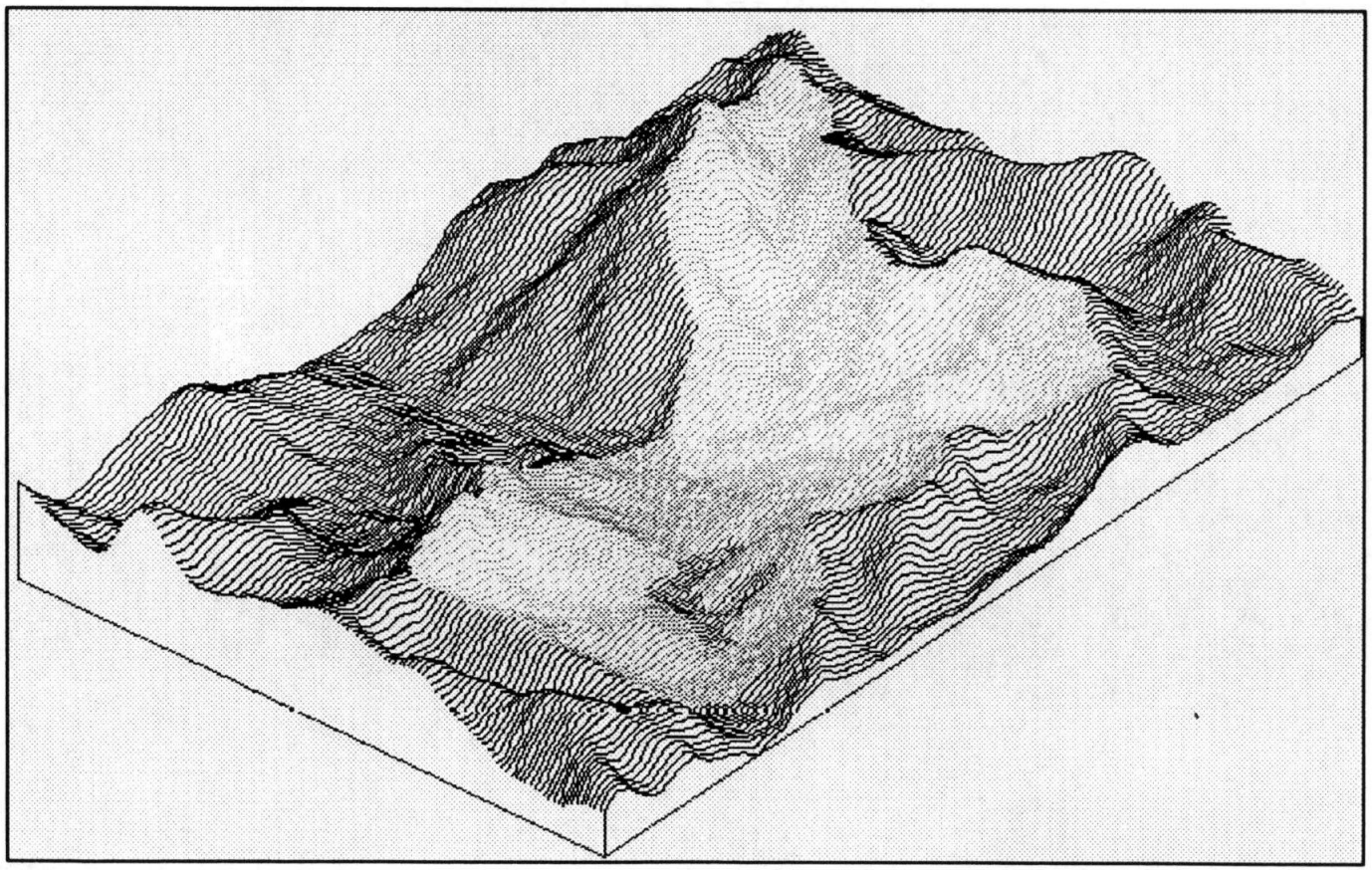
Scale 1:250000

Compiled by: Long Uli Villagers, East Kalimantan, Indonesia
Department of Forestry, Indonesia
Kayan Mentarang Project, World Wildlife Fund, Indonesia
Program on the Environment, East West Center, Honolulu, HI

Map 6.

Three Dimensional Perspective

Long Uli Village Lands



Legend:

Protected Community Forest

Unrestricted Forest

Agricultural Fields

GIS APPLICATION FOR SOCIAL FORESTRY PROGRAMS: A CASE STUDY OF WATERSHED CLASSIFICATION FOR SOCIAL FORESTRY PLANNING

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INTRODUCTION

Deforestation is a major problem in Thailand. In the post-war period between 1945 and 1975, forest cover declined at a rate of 300,000 ha per year, from 61 to 34% of the nation's land area. A major cause of the rapid rate of deforestation is the expansion of permanent cash crop cultivation and swidden cultivation into the reserve forest.

Since 1985 the Royal Forestry Department (RFD) has focused on developing social forestry programs. Social forestry involves collaboration between the Forest Department and rural communities in the design and implementation of reforestation and forest conservation on private, community, or government land. Social forestry is a promising approach to solving problems of deforestation.

Most villagers understand the objectives of the RFD to stop or reduce the rate of deforestation. But, because of increasing population density and decreasing agricultural productivity, some farmers have little choice but to grow crops in less than suitable areas, such as steep forested slopes. The RFD is looking for solutions. One solution is to move the farmers to areas more suited to crop growing, and provide extension services to assist them in adapting their techniques, possibly to a system of agroforestry. But it is critical that suitable sites are chosen for the farmer to move to; for if not, the farmers will move again to more productive and available sites—which are usually in forested areas.

The objective of this paper is to discuss the use of a geographic information system (GIS) as a tool for social forestry programs. A case study is described which analyzes watershed classification and land use suitability in a highland area of Chiang Mai Province, Northern Thailand. A 1991 land use classification map was overlayed on a watershed classification map to provide insights for planning a social forestry program.

Using a GIS we can select appropriate sites for improved crop growing. We can produce a watershed classification map of the area, identify the key land use problems, and list alternative crops and farming or agroforestry systems for each class of watershed area. Foresters and extension officers can use this map to discuss options with the farmers, to help select sites for farmers to move to, and to advise farmers about farming and forest management systems.

GIS AND WATERSHED CLASSIFICATION

Geographic Information System (GIS)

A GIS is a powerful tool for collecting, storing, retrieving at will, transforming, and displaying spatial data from the real world for a particular purpose (Burrough 1986). GIS differs from computer graphics because the latter are largely concerned with the display and manipulation of visual images only. Furthermore, computer graphics systems do not have the capability to analyze large volumes of non-graphic attributes. The data in a GIS, when coded on the surface of a magnetic tape, should be thought of as representing a model of the real world. Because these data can be accessed, transformed, and manipulated interactively they can be used to study environmental processes or to analyze the results of trends, or anticipate the possible results of a planning decision. Basic knowledge on the location, quantity, and availability of natural resources is indispensable for rational land use planning. A GIS can be used to assist decision-makers to analyze various alternatives in development and conservation planning, and to model a variety of scenarios.

The Multiple Cropping Center, at Chiang Mai University, has already worked with GIS for 6 years. By 1986, researchers began to use a simple GIS as a tool for spatial analysis in farming systems research. By creating thematic maps of single subjects, for example, the yield of soybeans in Chiang Mai Province by district, researchers were able to select the most suitable area for conducting field experiments according to yield. It is then easy to extrapolate the adopted technologies into an area having the same conditions as the test site.

In the case study presented in this paper, several thematic maps are overlayed to show where the current land uses are in relation to classified watersheds. PC Arc/Info was the software chosen for digitizing, cleaning the maps, and managing the database. The data were entered in vector structure, then transformed into raster data structure using IDRISI software for analyzing the watershed classification map.

Principles of Watershed and Land-Use Classification

A watershed can be thought of as the natural counterpart of a reservoir formed by the construction of dams. Both a watershed and a man-made reservoir operate by receiving water, holding it in storage and releasing it for flow to a lower level. The term watershed also refers to the landform and biota that are related to the area of water flow. The size of a watershed area depends on the objectives of the water resource manager. Just as rivers, tributaries, and streams have a hierarchy, so do watersheds and sub-watersheds.

As an ecological unit for resource management, watersheds are comprised of: physical resources (rocks, soils, and landform), biological resources (forests, livestock, crops), and human resources (farmers, markets, culture, and institutions). Watershed management involves understanding the relationships between all of these resources.

For the purposes of land use planning, watersheds can be classified according to many criteria. A common criterion and one used in Thailand is the soil erosion factor, which in turn is a function of rainfall erosivity, slope gradient and length, soil type, and amount of

vegetative protection on the surface. An important part of watershed planning and management involves identifying areas of high surface erosion hazard.

In this case study, the parameters used to classify watersheds are:

Slope - Erosion varies with the steepness and length of the slope.
Elevation - In general, high elevations are characterized by steeper slopes and heavy rains over longer periods than low elevations. Together, these factors give a high erosion hazard.
Landform - There are many kinds of landform such as peaks, foothills, escarpment, and flat-top hills. Soil type and erosion hazard can be related to landform.
Soil characteristic - There are several properties of soil that affect the land use capability of watersheds: soil fertility (related to soil depth, structure, and nutrient capacity) and soil erosivity (related to depth, parent material, soil structure, and water permeability). Crop suitability and crop productivity are related to soil fertility, while soil erosivity is an environmental limitation for any land use.
Geology - Rock type affects soil properties.

Watershed classification is used in land use planning. Watershed or land use classification is usually done by looking at the biophysical capability of an area. For agriculture one might look at soil fertility, soil productivity, physical properties, erosivity and soil depth, and slope. But a successful agricultural crop depends on more than the physical factors. Socioeconomic and infrastructural factors should be looked at also, such as distribution of land per capita, income, distance to market, and road access.

The Watershed Classification System in Thailand

Thailand has developed a 5-class system for watershed classification according to land use suitability based on erosion hazard.

Watershed Class I. Forested, steep slopes, very high erosion hazard. Reserved for water protection.
Watershed Class II. Forested area, steep slopes, and moderately high erosion hazard. Suitable for forest production with soil conservation techniques.
Watershed Class III. Grassland cover, steep slopes, moderate erosion hazard. Suitable for tree plantations with soil conservation techniques.
Watershed Class IV. Steep slopes with grasslands. Suitable for tree plantations, or swidden cultivation with soil conservation techniques.
Watershed Class V. Flat topography. Suitable for paddy field and other field crop without soil and water conservation.

CASE STUDY

Background

This case study was done in Watershed Development Unit 3 (Mon-Ang-Kei) in Mae Taeng District, Chiang Mai Province. Three villages were selected as examples to test a model of watershed classification—Khun Sa Nai, Pang Khum, and Kiu Thuai.

Physical characteristics. Khun Sa Nai village is situated in a steep watershed at 1,200–1,600 meters of elevation. The narrow valley runs east to west. The village covers an area approximately 26 km^2. Pang Khum village is situated in a watershed at 1,000–1,500 meters of elevation. There is sloping land to the north and east, a valley and flat area to west and south, and stream flow is north to south. The village area is 6.5 km^2. Kiu Thuai village is in a watershed at 1,000–1,600 meters of elevation with sloping land to north and south and a narrow valley and flat land to the west and east. Stream flow is west to east. The village area is 10 km^2. The annual average rainfall in the area is 1,831 mm. Annual minimum temperature, maximum temperature, and average temperature is 15.1, 23.9, and 19.4 degree Celsius, respectively.

Social and demographic characteristics. Khun Sa Nai village has been established for 35 years and is home to 409 people of three ethnic groups: Hmong, Local Thai, and Yunanese. Pang Khum village has been established for 300 years and is home to 801 people of 3 ethnic groups: Karen, Lisu, and Local Thai. Kiu Thuai village is home to 175 people of 2 ethnic groups: Local Thai and Karen.

Land use characteristics. In this area the traditional crops are rice, maize, and opium. Rice is grown for home consumption, maize for fodder, and opium for consumption and sale. In rice production, the upland fields are usually planted only once or twice before yields begin to decline. As a result, new fields are constantly being cleared and the old abandoned. Maize is usually planted at the beginning of the rainy season (May–June); opium and vegetables are planted later in the same field. Vegetables such as cabbage are grown in fields as large as 400–600 rai. Twenty percent of the field crops are grown in the vicinity of villages, but 80% are planted on steep slopes and some in the fallow land. Paddy rice is planted in the middle of the wet season (July–August) in flat areas. Traditional Thai tea (*miang*) is grown by Karen and Local Thai in Kiu Thuai village. The *miang* shrubs grow well at an elevation of 700 m or more. Since they are perennial shrubs, *miang* production is a permanent highland agricultural system. There is also some dry dipterocarp forest and hill evergreen forest in the study area.

Methods for Processing the Watershed Classification by Using GIS

The base data used in this case study was originally analyzed by researchers at Kasetsart University. They ground-checked topographic and geological maps by taking 120 to 200 samples throughout Chiang Mai Province. They created unit maps with numerical values

assigned to 5 variables: slope, elevation, soil, landform, and geology. Each type of landform was given a value. In this study, multiple regression analysis was used to determine the relationship between the set of independent variables (slope, elevation, soil characteristics, landform, and geology) and the dependent variable (watershed classification).

The general equation used for multiple regression for watershed classification is
WSC = a + bSLOPE + cELEVATION + dSOIL + eLANDFORM + fGEOLOGY

After analyzing, the equation is:
WSC = 1.93 – 0.048(SLOPE) – 0.04(ELEV) + 0.107(LANDFORM)
+ 0.116(GEOLOGY) + 0.193(SOIL)

R^2 = 0.9682 (Kasetsart University, 1988)

If WSC is <1.50, then it will be in Watershed class I.
If WSC is in the range 1.50–2.21, then it will be in Watershed Class II.
If WSC is in the range 2.21–3.25, then it will be in Watershed Class III.
If WSC is in the range 3.25–3.99, then it will be in Watershed Class IV.
If WSC is >3.99, then it will be in Watershed Class V.

To perform the equation each spatial data set was digitized separately into the computer from several different map sheets. A vector format in PC Arc/Info software was used because it is easy and accurate for digitizing. Soil characteristics, landform type, and rock type were digitized from their respective thematic maps. From the contour map, a digital elevation model (DEM) was generated, producing an elevation map (in meters). From the digital elevation map, a slope gradient map was created. Then the maps were transformed from vector to raster format because the raster data structure is better for doing statistical and mathematical manipulations. IDRISI software was used to analyze the images by using command OVERLAY and ADD option, following the linear equation calculated by the multiple regression equation.

The resulting watershed classification map (Appendix Map 1) shows that the case study area is divided into 4 classes: I, II, III, and IV. The area in each class of watershed was calculated as:

Watershed class I	=	11,527.1 ha
Watershed class II	=	914.2 ha
Watershed class III	=	4,654.8 ha
Watershed class IV	=	525.5 ha

Additional information was needed to interpret the watershed classification map for the purposes of social forestry planning. For social forestry planning, it is necessary to know how the land is currently being used, as well as the land suitability according to the watershed classification. Thus, the land-use map 1991 was digitized (Appendix Map 2) and then overlayed on the watershed classification map. To fine-tune the analysis, a road map

and a stream map were overlayed (Appendix Maps 4 and 5) in order to see the distribution of land use along the roads and streams.

Results of the Case Study

The map overlays showed a few significant land use problems that should be considered in planning a social forestry program:

1. There are three types of inappropriate land uses located in Watershed Class I (reserved for forest area and water sources): perennial crops, field crops, and paddy.
2. Some abandoned swidden fields (fallow) are located in Watershed Class I.
3. No crops are being grown in Watershed Class II and IV where crops are most appropriate.
4. Twenty-five percent of all the paddy was being grown in Watershed Class I.

These land use distributions can be quantified and presented in table format (Table I). The total land area in the case study is 459.4 ha. The major group of crops grown in the study area are perennial crops covering an area of 202.3 ha; 88.2% of which was grown in Watershed Class I, and 11, and 11.8% grown in watershed class III. The second major group of crops grown are field crops covering an area of 150.2 ha, 44.2 percent of which was grown in watershed class I and 55.8 percent grown in watershed class III.

Table I. Area of Land-use Type in each Class of Watershed in Hectares

Crop	Watershed Class I	Watershed Class II	Watershed Class III	Watershed Class IV	Total
Perennial crop	178.4		23.9		202.3
Dry Season crop	66.3		83.9		150.2
Paddy	27.0		79.9		106.9

Land-use options

In Watershed Class I 65% of the land is under perennial crops. The perennial crops, Thai traditional tea, coffee and fruit trees are suitable to be grown in Watershed Class I because they have almost the same function as forest. A social forestry plan could adopt these crops as the best option for those sites, provided extension services are available to ensure good soil conservation techniques are being used.

Watershed Class I, 10.0% of the land use is wet rice or paddy growing. According to the watershed classification, this is an unsuitable land use. But when the road and stream map are overlayed, it becomes clear that most of the paddy fields in Watershed Class I are located near a road and/or stream, which are necessary factors for growing paddy. It is known that paddy is grown in small, terraced fields that are not subject to soil erosion. Given those known management practices, the paddy fields should be found to be an appropriate land use for the area. In Watershed Class I, 22.4% of the land use is swidden cultivation of field crops (opium, cabbage, dry rice, corn, barley). Depending on how it is practiced, this is

not a suitable land use. There are three options a social forester might consider: (1) let farmers grow the same staple crops in that area but try to stabilize any shifting cultivation and ensure that good soil conservation techniques are being used; (2) move the farmers to an area in Watershed Classes III or IV closer to roads, streams, and markets; (3) introduce agroforestry systems that include perennial cash crops; (4) convert abandoned fields into improved fallow, commercial woodlots, or fuelwood forests.

Evaluation of the watershed classification model

In this model, multiple regression analysis was used to classify the watersheds. The parameters that were used—slope, elevation, and land formation—had a high auto-correlation (i.e., a high R square value). Including other parameters in the model, such as rainfall data and vegetation cover data, would fine-tune the watershed classification in terms of land suitability. For complex issues of resource management and environmental protection, more detailed data are needed on water quality, water quantity, forest cover, sediment level, and socioeconomic factors.

The classification of different land uses is also not fine enough. That is, some land uses that are categorically indicated as unsuitable may be suitable if they include certain practices (e.g., soil conservation techniques or improved fallow).

GIS could be an effective tool for planning social forestry programs. However, there may be a shortage of trained staff in some programs. Data acquisition can be expensive, and data input by digitizing is very labor intensive. A solution would be to have a central research institute that manages a database and could provide services to other government programs.

SOCIAL FORESTRY PROGRAMS AND WATERSHED CLASSIFICATION

This study shows that GIS analysis of watershed classification and current land uses can be a useful tool for diagnosing land use problems and identifying land use options. After understanding the problem, the forester can work together with the farmer to reach a solution. In this case, a simple analysis of the biophysical factors, as performed for watershed classification, is not enough to understand the social forces behind land use. Adding social and economic data can give a better understanding of the real situation. For example, an important crop for subsistence in this area is permanent field paddy located in Watershed Class I. By overlaying the road and stream maps, it became clear why it occurs in that particular location; and in small fields it is a suitable land use. Tea and coffee plantations are grown in Watershed Class I, showing that the farmers can choose appropriate land uses. In terms of extension, the foresters can work with farmers for making recommendations about soil conservation techniques and forest conservation.

This study shows that GIS can be a tool for planning social forestry programs at the medium or macro level (i.e., using 1:100,000 maps). With GIS capability of combining spatial data and non-spatial data we can analyze data at many levels and display them on a

map. The output can be presented in many ways to help understand the particular area better. Such maps can be used as communication tools between social foresters and policy makers.

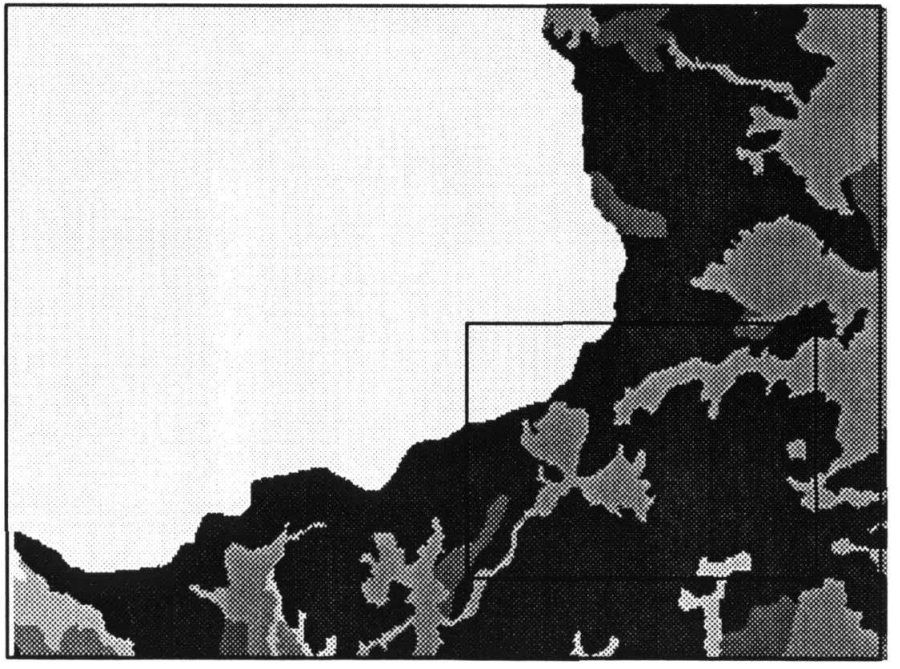
The type of overlay analysis performed in this study can also be used for planning at the micro level (i.e., using 1:5,000 scale maps). Maps from a micro-level are more easily extrapolated to adjacent watershed areas than macro-level maps. At the micro-level, maps are especially useful as a visual communication tool between foresters and villagers.

REFERENCE

Burrough, P.A. 1986. Principles of Geographical Information Systems for Land Resources Assessment. Clarendon Press, Oxford. London.

Map 1.

Watershed Classification

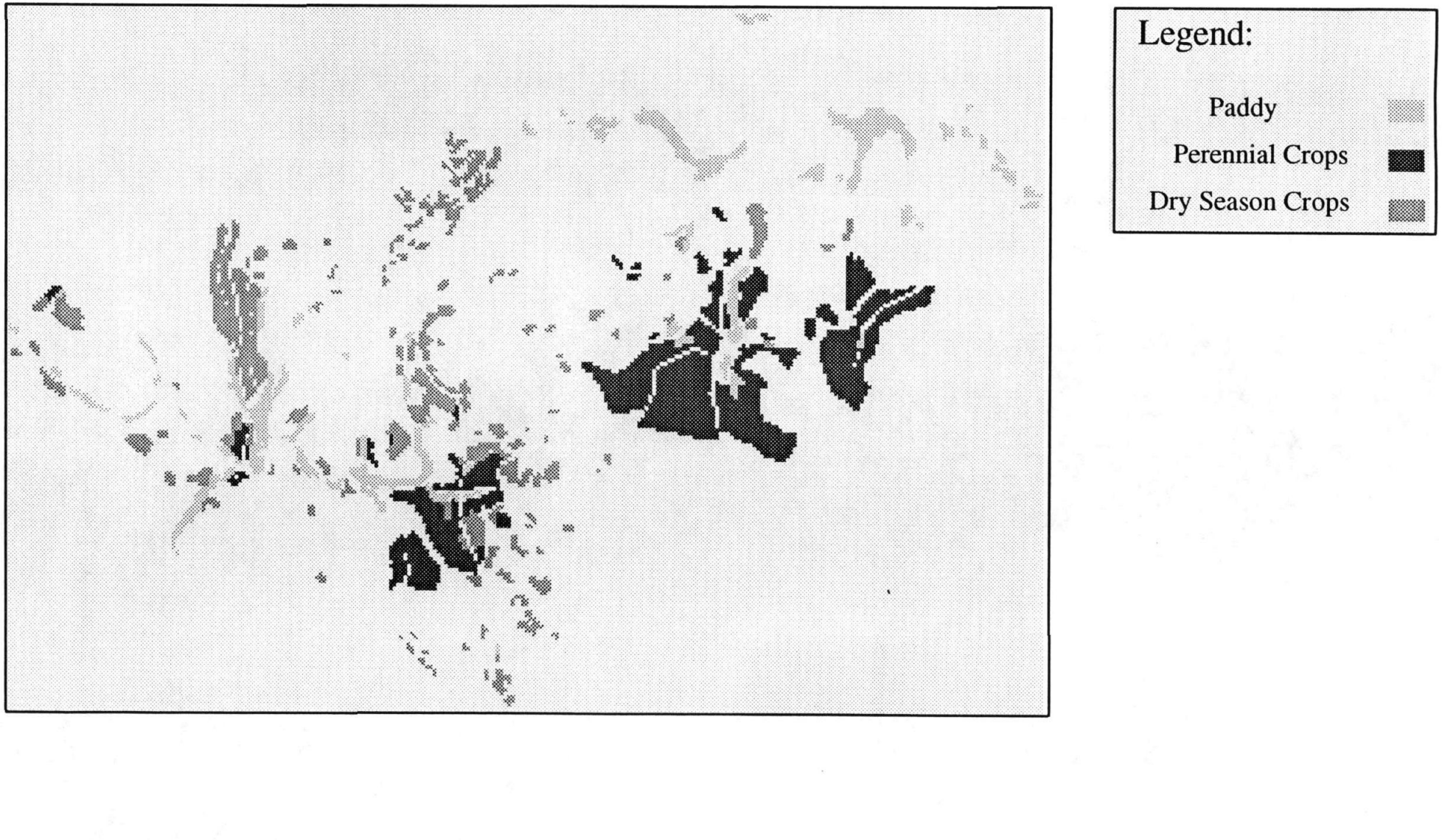


Legend:

- Watershed Class I
- Watershed Class II
- Watershed Class III
- Watershed Class IV

Map 2.

Landuse
1991

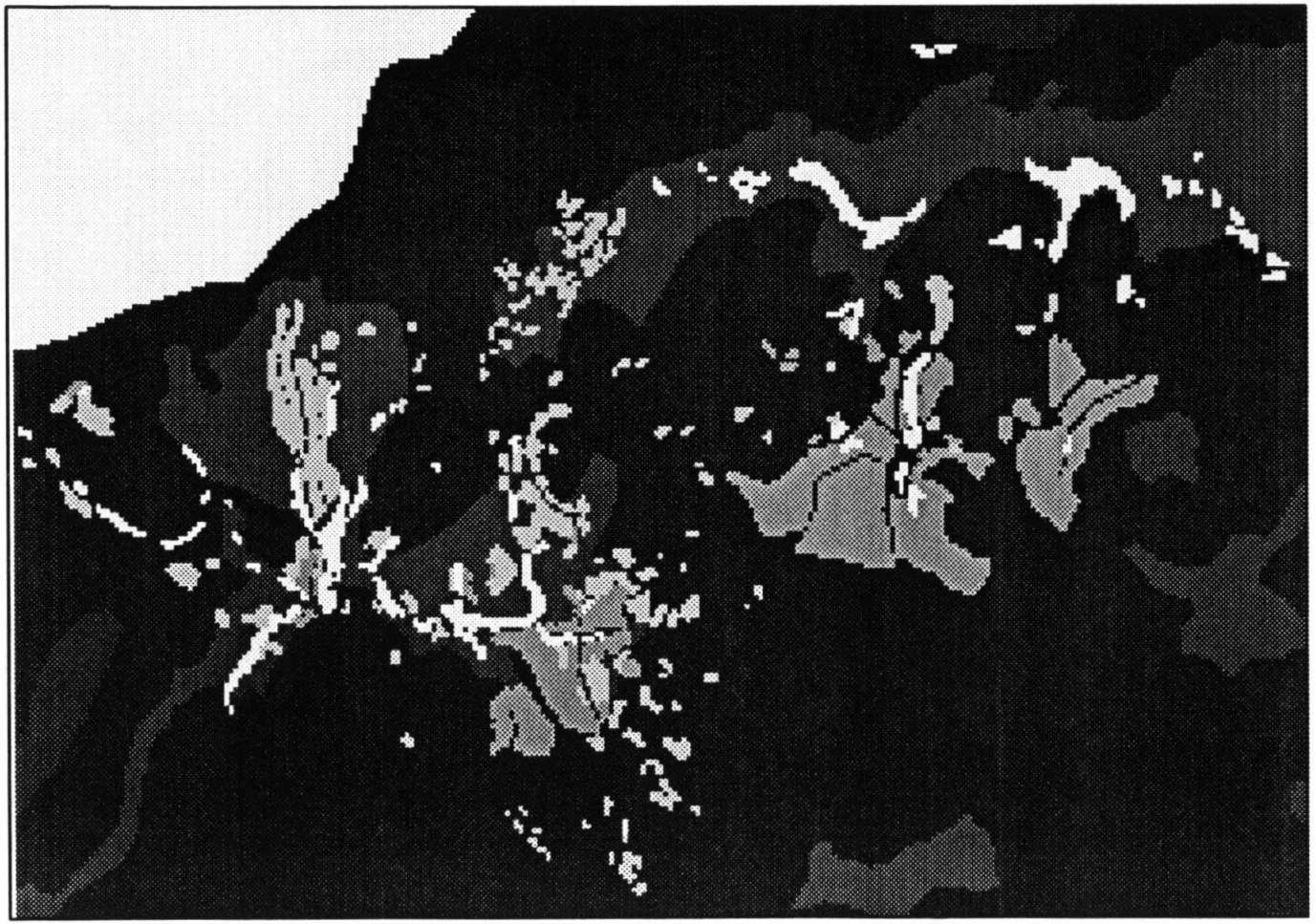


Map 3.

Landuse 1991

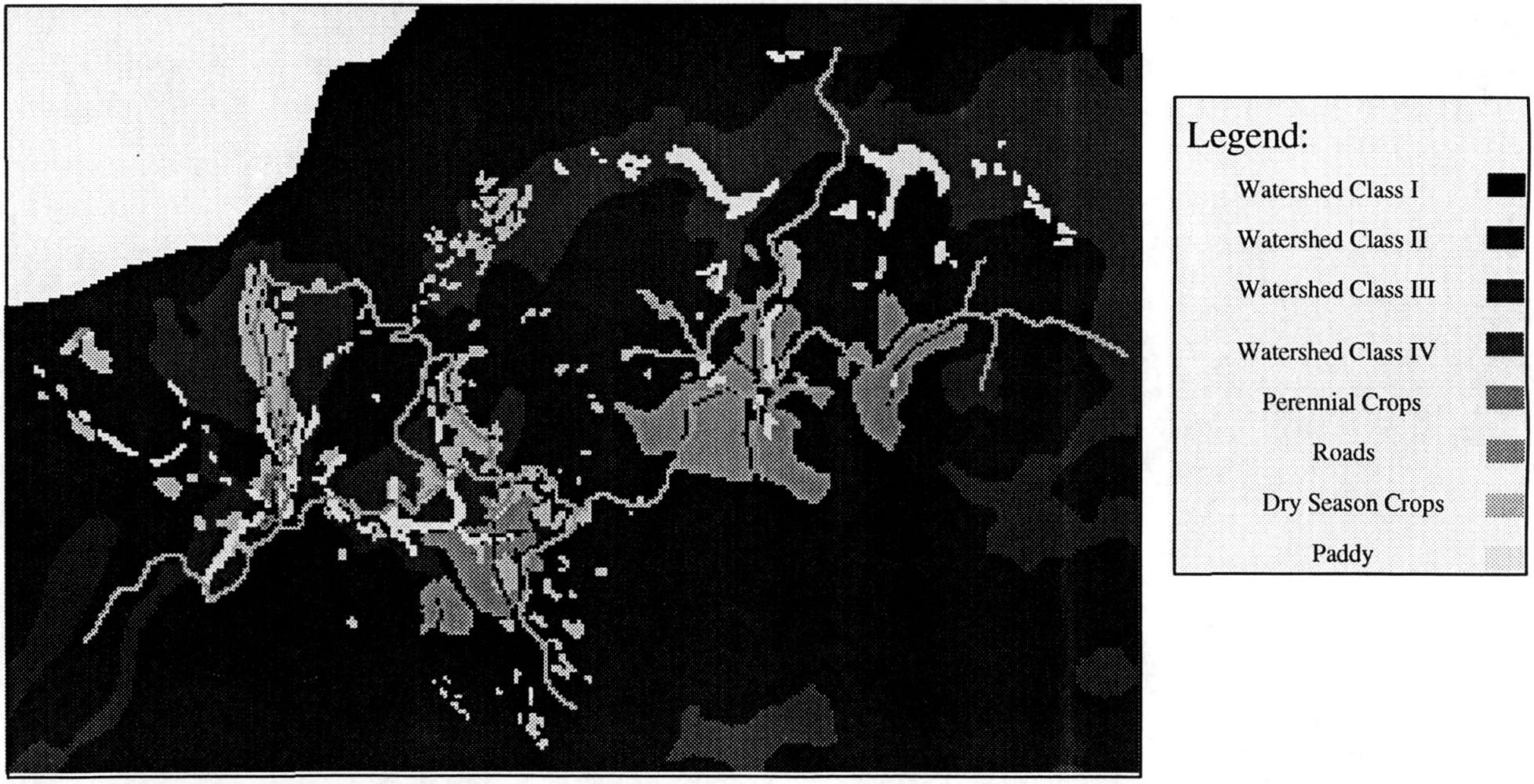
overlayed on

Watershed Classification



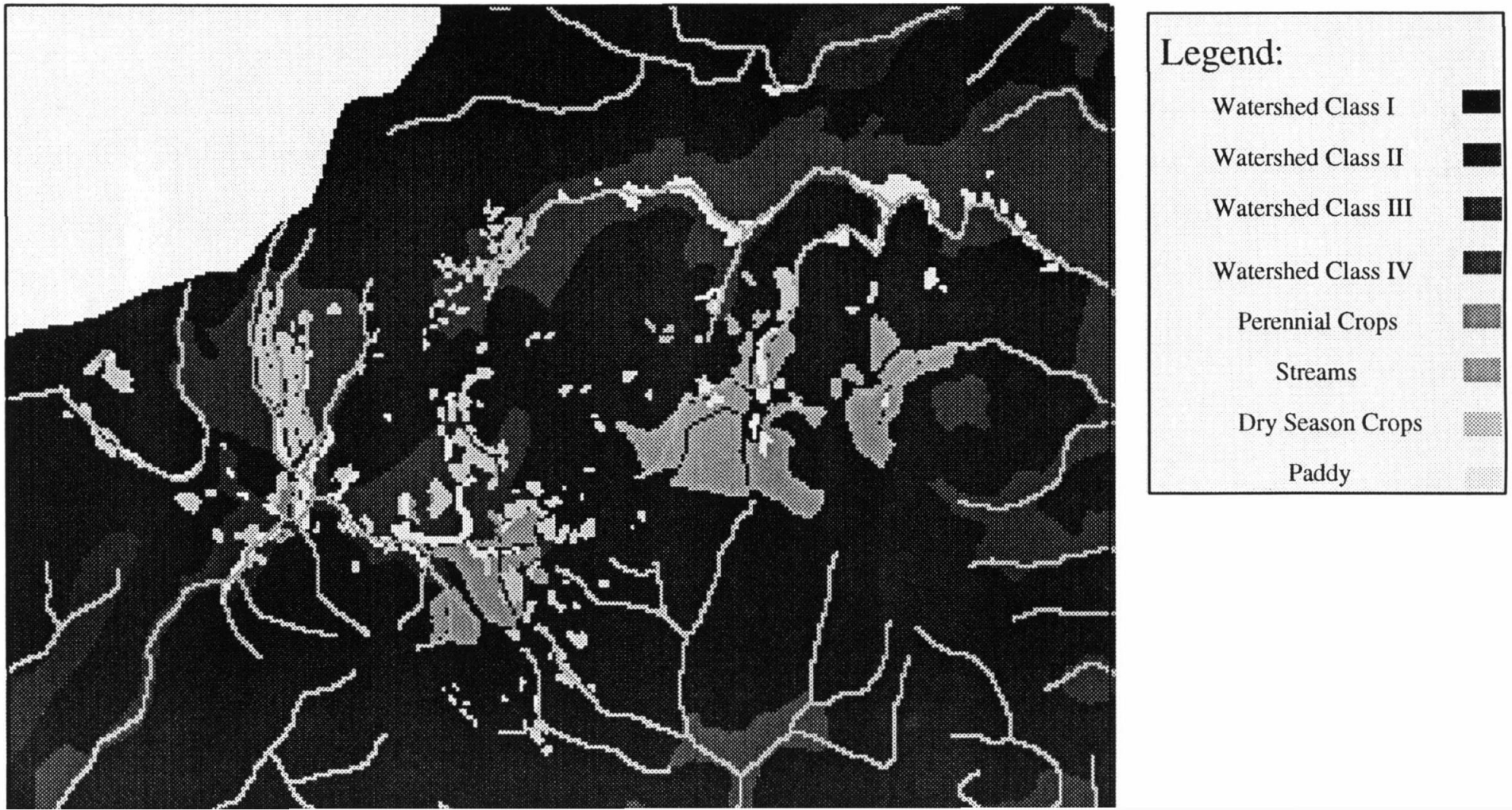
Map 4.

Roads
overlayed on
Landuse 1991
overlayed on
Watershed Classification



Map 5.

Streams
overlayed on
Landuse 1991
overlayed on
Watershed Classification



DIAGNOSTIC TOOLS FOR SOCIAL FORESTRY IN BANGLADESH

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INTRODUCTION

Researchers and foresters working in Bangladesh view social forestry as forest management that implies a gradual policy change from traditional top-down management activities to more participatory management of forest resources. Successful planning and execution of social forestry programs depends on, among other factors, an appraisal of spatial parameters affecting a project site. A social forestry program planned without sufficient spatial information may result in unsatisfactory performance and high economic risks for participants.

Diagnostic tools generate the spatial information required for planning and executing successful social forestry programs. These tools involve the participation of project beneficiaries and vary according to location, availability of secondary information, and the level of cooperation extended by the government and other agencies involved. These tools are continuously being improved through the practical experience gained by using them in a variety of situations.

BACKGROUND

Forestry Sector of Bangladesh

The contribution of forestry to the gross domestic product of Bangladesh is insignificant (4%), but it does play a vital role in providing essential supplies and products for both household and industrial uses. Per capita consumption of forest products is among the lowest in the world. An FAO study estimates per capita fuelwood consumption at 2.97 ft^3 and timber at 0.4 ft^3. By the year 2000, if the present consumption trend remains constant, the demand for fuel and timber will be 310 and 115 million ft^3, respectively (GOB 1989).

Recent Forest Department statistics (Ghani 1990) show that 2.45 million ha of the country is forested, of which 1.46 million ha is managed by the Forest Department, and 0.72 million ha is unclassified state forests under the control of the Ministry of Land and managed by the respective deputy commissioners of the districts in which the USFs are located. The rest, 0.27 million ha, is privately owned rural woodlots.

Bangladesh experienced considerable depletion of forest cover during the period 1960–1987. In the 1960s, forest covered 20% of the total land area; now it covers only 9% (Dean and Treygo 1989).

There are three major types of forest in Bangladesh:

Evergreen Forest: Located in the hilly areas of Sylhet, Chittagong, Chittagong Hill Tracts, and Cox's Bazaar districts. The total area under these forests is 15,153 square miles.

Moist deciduous or Sal forest: Located in the districts of Dhaka, Mymenshing, Tangail, and Jamalpur (in the central and in Dinajpur district) in the northern part of the country. The estimated total area of this forest is 1,197 square miles.
Mangrove forestry: Located in the coastal areas of Bangladesh. The Sundarbans is one of the largest mangrove ecosystems in the world.

These forests are mostly owned by the government, but the tree cover of Bangladesh also includes village forests located in a scattered manner around privately owned homesteads and farm lands. Village forests account for 20% of the tree cover of the country. These forests play an important role in supplying food, fuel, materials for construction, and agricultural implements. The estimated total volume of village forests ranges from 75 to 82 million m^3, and supplies 70 to 80% of the country's fuelwood and timber requirements (AST/CIDA 1985).

Social Forestry in Bangladesh

The concept of social forestry is relatively new in Bangladesh, but it has been practiced traditionally, in some form, for many years. The people of Bangladesh traditionally plant groves of trees around their homesteads and farm lands, creating intensive agroforestry production systems.

The first government-sponsored social forestry program was initiated by the Forest Department under its forestry extension service in 1980. From 1982 to 1987, the Community Forestry Project, which involved landless groups in different activities, was implemented with the financial assistance of the Asian Development Bank. Table I summarizes the achievements of this project (Asaduzzaman 1989).

Table I. Targets and Achievements of the Community Forestry Project from 1981 to 1987.

Components	Target	Achievements
1. Homestead plantations (# of villages)	4650	4060
2. Strip plantations (km)	4800	4280
3. Block fuelwood plantations (ha)	4800	4892
4. Agroforestry (ha)	20	124

On the basis of the success of the Community Forestry Project, the government has initiated another social forestry program called the Upazilla Afforestation and Nursery Project. Objectives of this project include (1) establishment of strip plantations along 11,038 miles of roads, railway lines, and embankments to be executed by local government agencies with technical assistance from the Forest Department; (2) rehabilitation of 4,000 acres of sal forest to be executed by the Forest Department; (3) rehabilitation of degraded sal forest by working with landless encroachers to establish agroforestry plantations; (4) creation of plantations in 2,000 acres of land outside the coastal embankments; and (5) participation of landless groups

on a benefit-sharing basis, to be organized by non-government organizations (NGOs) (GOB 1989).

NGOs currently play a major role in implementing social forestry programs in Bangladesh. Approximately 100 NGOs (Huq 1990) have initiated and implemented extensive and successful social forestry programs focusing mainly on alleviating poverty. Most of these programs have been designed on the basis of locally felt fuelwood and timber needs. Consequently these programs concentrate mostly on marginal lands such as homesteads, tank banks, and lands owned by rural institutions.

CONSTRAINTS ON SOCIAL FORESTRY IN BANGLADESH: SPATIAL ASPECTS

Land Scarcity

Whether social forestry programs are planned on public or private land, land scarcity is a major consideration in their planning and execution. With 104 million people living in 19.6 million households on an area of 143,000 kilometers, Bangladesh has a very small man-land ratio. This constrains the expansion of forest cover even through social forestry programs.

The 1986–87 land use statistics show that there is little land available for social forestry programs. The net area of cultivated land is 218.7 million acres, current fallow land is 0.97 million acres, cultivable wasteland is 0.66 million acres, forests cover 4.9 million acres, and area not available for cultivation is 0.81 million acres. Some marginal lands, however, can be brought under social forestry programs for the production of short-and long-term crops such as food, fodder, timber, and fuelwood. Alim (1984) estimated that the land available for social forestry in Bangladesh totals over 4 million ha (Table II).

Table II. Land Available for Social Forestry in Bangladesh

Land Type	Ha
1. Land along roads and railways	97,650
2. Land along embankments and canals	26,200
3. Farm ridges and banks of tanks	2,660,000
4. Wastelands	20,750
5. Land under various institutions	60,000
Total	2,864,600

Another constraint to the implementation of social forestry in Bangladesh, that is related to land scarcity, is the fragmentation and scattered distribution of potential social forestry lands and associated problems of jurisdictional authority. While most of the lands available for social forestry projects are officially under the control of a public department, as often as not that department cannot exercise its authority because the de facto ownership of

land lies with peasant farmers—by occupation. This, and the fact that many of these lands are available in small patches in widely scattered places, creates problems for planning and operating a social forestry program.

NGOs have also had trouble accessing waste and degraded land in different public departments because these departments do not want to weaken their authority over those lands. The government recently ruled that public lands will be made available to NGOs for introducing social forestry programs. Time will see if the public departments respond to this ruling.

Despite land scarcity, social forestry programs in Bangladesh are expanding, and due to land scarcity they take a certain form. Spatially these programs have expanded in three directions: (1) horizontally on public and privately owned wastelands, fallow lands, and degraded lands including deforested lands; (2) linearly along roads, embankments, and canals, most of which lie in various public domains; and (3) vertically through multistory forest gardens on homesteads, pond banks, farm lands, and community places like mosque, markets, and schools.

Land use competition and conflicts

In a land scarce environment, competition for available land between different land uses is intense. Sectoral priorities set at the policy level influence land use options including social forestry. The current policy emphasis on the production of food grains will result in the use of marginal lands for agricultural purposes.

In addition to competition with government programs, competition with other users sometimes constrains social forestry programs. For example, a strip plantation was planted by the Forest Department along a 10-mile stretch of national highway in the district of Manikganj. The road shoulder, totaling 25 ha of land, was distributed among ten groups of landless farmers for planting fodder and fruit trees, and vegetables. The project was initially successful but ultimately failed because it did not take into account the land use needs of the groups who remained outside of the project. These groups used the road shoulder for grazing their cattle, particularly during floods when the road shoulders provide dry land for humans and livestock (Ali 1987).

Land Settlement and Survey

The importance of providing tenurial rights to social forestry participants has been emphasized elsewhere (Ali 1987; Farook 1990; Asaduzzaman 1989). But de jure tenurial rights do not necessarily provide immediate tenure security. There is often a delay in mapping the boundaries of the project and/or of the individual plots. The process of delineating land can be slow due to legal complications such as litigations filed in court by claimants of the settled lands, or to jurisdictional conflicts between the public departments involved in the process of surveys and settlement of lands. Such delays often discourage farmers from planting long-rotation trees and may even persuade them not to participate in social forestry projects. The Betagi-Pomora Community Agroforestry Project is a case in point.

Betagi and Pomora are two villages that are both located in the hilly region of northeastern Bangladesh (Ali 1990) but are legally administered under different government departments. Betagi is on Khas land legally under the Ministry of Land, and Pomora is located on protected forest lands under the jurisdiction of the Forest Department. In both villages the Community Agroforestry Project gave landless families 1-year leases to four acres of land to raise agroforestry products according to a given model. In 1987 the Betagi settlers were given permanent leases, as the Ministry of Land has the authority to lease out land under its jurisdiction. Individual plots were surveyed and mapped by the appropriate authority and records of right (*porcha*) and maps of the plots (*naksha*) were distributed to the allottees.

Farmers in the Pomora settlement continued with 1-year verbal leases, as the Forest Department does not have the authority to lease out protected forest lands for long periods. As a result project and plot boundaries remained unsurveyed and unmapped, and tenure rights remained insecure. Betagi farmers have now planted long-rotation tree crops while earning cash incomes from short-rotation agricultural crops. Pomora farmers, however, still have not invested in long-rotation trees and prefer growing short-rotation crops. Pomora farmers say that because their plots were not demarcated and mapped, they fear to plant long-rotation tree crops because of the possibility of the plot being reallocated to others or the boundary of the plot being changed arbitrarily. In this case, a lack of tenure created a disincentive for these farmers to grow long-rotation tree crops.

SPATIAL APPRAISAL FOR SOCIAL FORESTRY PLANNING IN BANGLADESH

Planners need to understand the spatial aspects of social forestry and need appropriate methods for collecting and analyzing spatial information in order to plan successful programs. Managers of social forestry programs need tools for communicating with both community members and government agencies about land use opportunities and constraints, land management options, preventing land use conflicts, and conflict resolution.

Semi-structured interviews, aerial photographs, and sketch mapping are diagnostic tools that have been used in social forestry planning (Fox 1989). While these tools have not yet been widely used in Bangladesh, there are a few examples that demonstrate the usefulness of these tools for social forestry in Bangladesh.

Using mouza maps as a diagnostic tool

Mouza maps, long used in Bangladesh for recording land ownership, provide a unique source of large-scale spatial information about land cover and land tenure. Mouza maps are mapped at 16 inches to a mile; they show boundaries of individual plots with their identification number and they show major land uses and physical features. Unfortunately, these map were prepared long ago and are updated irregularly, approximately every 20 years. The following case study demonstrates the use of mouza maps for a social forestry program (Lai and Ali 1990).

Encouraged by the success of a strip plantation project in the Sirajganj area, PROSHIKA, a national NGO, wanted to implement a similar program in a sal forest in the central part of the country. However, they had difficulty identifying suitable strips of land along roads or embankments. Instead, an informal verbal agreement was made between local forest officials and local forest-protection groups. The groups are to protect sal coppice within a forest stand from poaching, and in return they have permission to collect forest products like leaves and twigs. The sal coppice responded well to protection and grew substantially in height during a 2-year period.

PROSHIKA then sought to design a more formal program where group members would protect regenerating sal coppice in degraded areas and plant agroforestry species on deforested lands. It became necessary, therefore, to identify areas suitable for these social forestry opportunities.

A diagnostic survey was done using mouza maps as the base for recording information on current land cover and land use. Mouza maps of the area were collected from the Directorate of Land Records. A team of investigators went to the field with a set of mouza maps and a group of participating farmers. The team first updated the mouza maps by identifying each plot and recording the present land cover in color. Major features such as mosques, schools, markets, roads, ponds, protected sal forests, degraded forest areas, and encroached forest areas were clearly demarcated.

The updated land cover maps were then mounted on boards alongside the original maps. Local surveyors (*amins*) and NGO staff acted as facilitators. They explained the location of major features on the maps such as roads, canals, and rivers to individual farmers and to groups of farmers. After the farmers were oriented to the maps, they were able to identify and attach attributes such as ownership, land use, and productivity to each plot. The farmers were asked to locate, within each mouza, government lands that were under no conflicting claims, areas with potential conflicts, and areas with opportunities for forest protection and agroforestry. After intensive discussions among participants, the areas suitable for social forestry programs were identified. These methods provided a powerful tool to enhance the constructive interaction among group members for the purpose of clarifying patterns of land use, land ownership, and land conflict. Refined maps were later prepared and used to communicate with forest officials and for proposing a collaborative forest management program to the Forest Department (Lai and Ali 1990).

Using satellite images as a diagnostic tool

Satellite images can also be used as a diagnostic tool in social forestry programs. The following example demonstrates how SPOT images were used to identify suitable locations for a tree plantation (Ali 1992).

The Royal Swedish Institute of Technology (KTH) and the Bangladesh University of Engineering and Technology (BUET) collaborated on a project to identify ways for involving local people in the management of water resources. The study was made in Tangail district at a small-scale water development project built by the Water Development Board in the early 1970's. Fifteen kilometers of embankment and a few hydraulic structures were constructed to protect about 1,500 ha of land from flash flooding. The embankment and the structures were

subjected to flooding and erosion during the floods of 1987/88 and there were breaches in portions of the embankment.

None of the maps (mouza, topographic, etc.) available for the project site showed the locations of the embankment, hydraulic structures, or the homesteads of landless people living around the embankments. Hard copies of SPOT panchromatic images (1:50,000) and multispectral images (1:20,000) were acquired and used to prepare an updated map. After field checking, this map was enlarged to 1:5,000 scale and the location of relevant features such as sluice gate, portions of the embankment subjected to severe erosion, and trees on the embankment were clearly shown. Families dislocated due to the construction of the embankment and homesteads of homeless families living around the embankment were also mapped.

With the help of the field workers who conducted the land use survey and village leaders, a meeting of prospective participants (landless people living on the embankment) was organized. The 1:5,000 scale map was mounted alongside the 1:20,000 multispectral SPOT image. Facilitators oriented the farmers to the map and the image, and then focused their attention on the location of sharp bends, eroded portions of the embankment, breached portions, sluice gates, drainage channels, and their homesteads. Facilitators then asked the farmers to locate suitable portions of the embankment where they could grow trees with other crops if permission was given. The group discussed together and then identified areas which they considered to be suitable for planting trees. The main criteria they used were: (1) the areas should be near their homes so that the trees can be protected from theft and cattle; (2) the areas should have low erosion potential; and (3) the areas should not conflict with the interests of others.

These locations were drawn on transparent sheets and later on final maps showing potential areas for people's involvement in tree planting.

Using GIS as a diagnostic tool

The use of mouza maps for mapping land use and land cover has already been discussed. Because of the age of the original maps, it is also possible to use these maps to study changes in land use and land cover through time. This section discusses the use of GIS technology for analyzing two mouza maps.

Rasualpur mouza is located on the northeastern border of Modhupur National Park. There is substantial sal forest in the area with no forest plantations, degraded forests, or fallow lands. The northeastern part of the mouza has been deforested and the lands turned into agricultural fields and homesteads by encroachers.

The second mouza is located to the south of Modhupur. Only small and scattered patches of sal forest remain as most forest lands have been converted to agricultural fields and homesteads. A large section of the mouza was recently reforested by the Forest Department, leaving only some patches of fallow and degraded forest lands.

Land cover and land use data for these two mouzas were computerized at IIESDM in Dhaka using Dbase IV software. The base maps for these two mouzas were digitized and the databases merged with the mapped features using GIS software (PC Arc/Info) at the East-

West Center in Honolulu, Hawaii. A map of land use in 1991 was produced. By comparing this map with the original data from 1914, it is possible to quantify changes in forest cover.

In addition, the GIS was used to explore several options for improving the management of degraded sal forests. Degraded sal forests and Forest Department plantations could be protected by involving landless families who live near the forest. Landless families (encroacher) could be encouraged to manage agroforestry on fallow lands owned by the Forest Department, and/or they could plant trees around homesteads and on community lands.

An important aspect of protection activities is the distance group members have to travel. The previous study found that villagers would prefer not to travel more than 500 meters from their homesteads for collecting fuelwood (women and children are the collectors). Therefore, a 500-meter buffer zone was designated around the homesteads. Within the buffer zones, existing sal forests are to be protected, degraded forest areas are considered potential locations for regeneration of sal; fallow areas are considered to have agroforestry potential, and forestry plantations are considered as areas where landless encroachers can be employed.

Lands shown as homesteads and community lands such as schools and markets are also considered to have plantation opportunities for landless groups. The roads in the mouzas are owned by local government agencies. The 1.5-meter shoulder along either side of the roads was identified by participants as a possible area for strip plantation.

Computer-generated maps were prepared showing the range of opportunities for social forestry activities (Appendix Maps 1 and 2). Such maps provide a tool for interacting with different players in the process of social forestry planning and for soliciting their inputs regarding the spatial organization of different social forestry opportunities. For example, in the social forestry opportunity map of Rasulpur mouza, the forest land within the 500-meter buffer, shown as the potential forest area for community protection, can be readjusted by group members if they consider the road in the south and the baid (serpentine lowland feature) to be more convenient boundaries. Alternatively they may prefer to plant only those portions of the road that lie outside the settlement areas. Similarly the Forest Department might have its own preferences that can be analyzed with GIS tools.

CONCLUSIONS AND RECOMMENDATIONS

The importance of spatial information collection and analysis in social forestry planning can hardly be overemphasized. This is particularly true in Bangladesh in light of land scarcity, and the fragmentation of available lands for social forestry programs. The above examples demonstrate that mouza maps are a useful tool for collecting spatial data while GIS is an excellent tool for analysis and for preparing final maps. We recommend, therefore, that more studies be conducted to explore the potential of these tools for community resource management in Bangladesh.

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Social Forestry Opportunity Map Mouza : Pagaria

Map Projection - UTM, Zone 46

Meters

- Homesteads
- Homesteads on Forest Department Lands
- Possible Fallow Lands for Community Protection
- Road Corridors for Community Planations

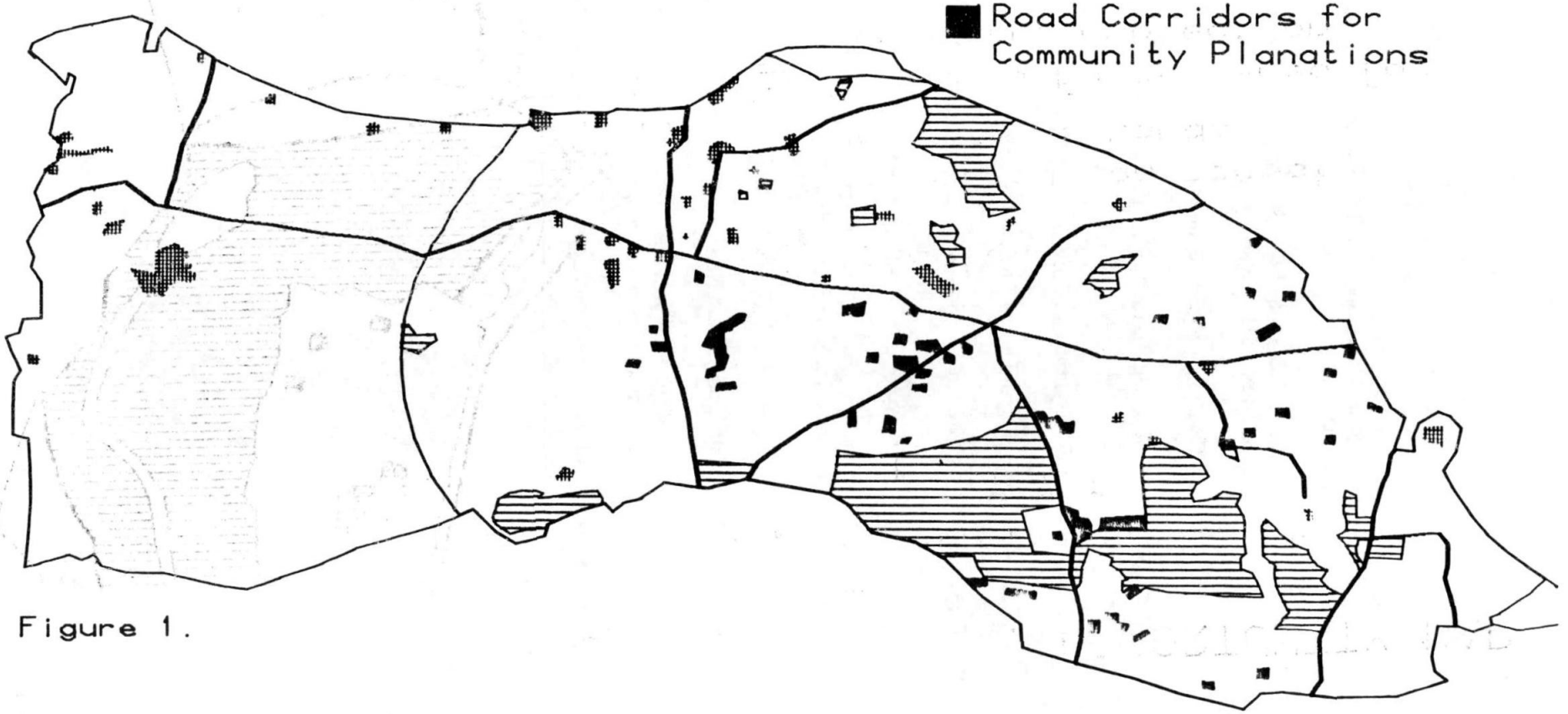
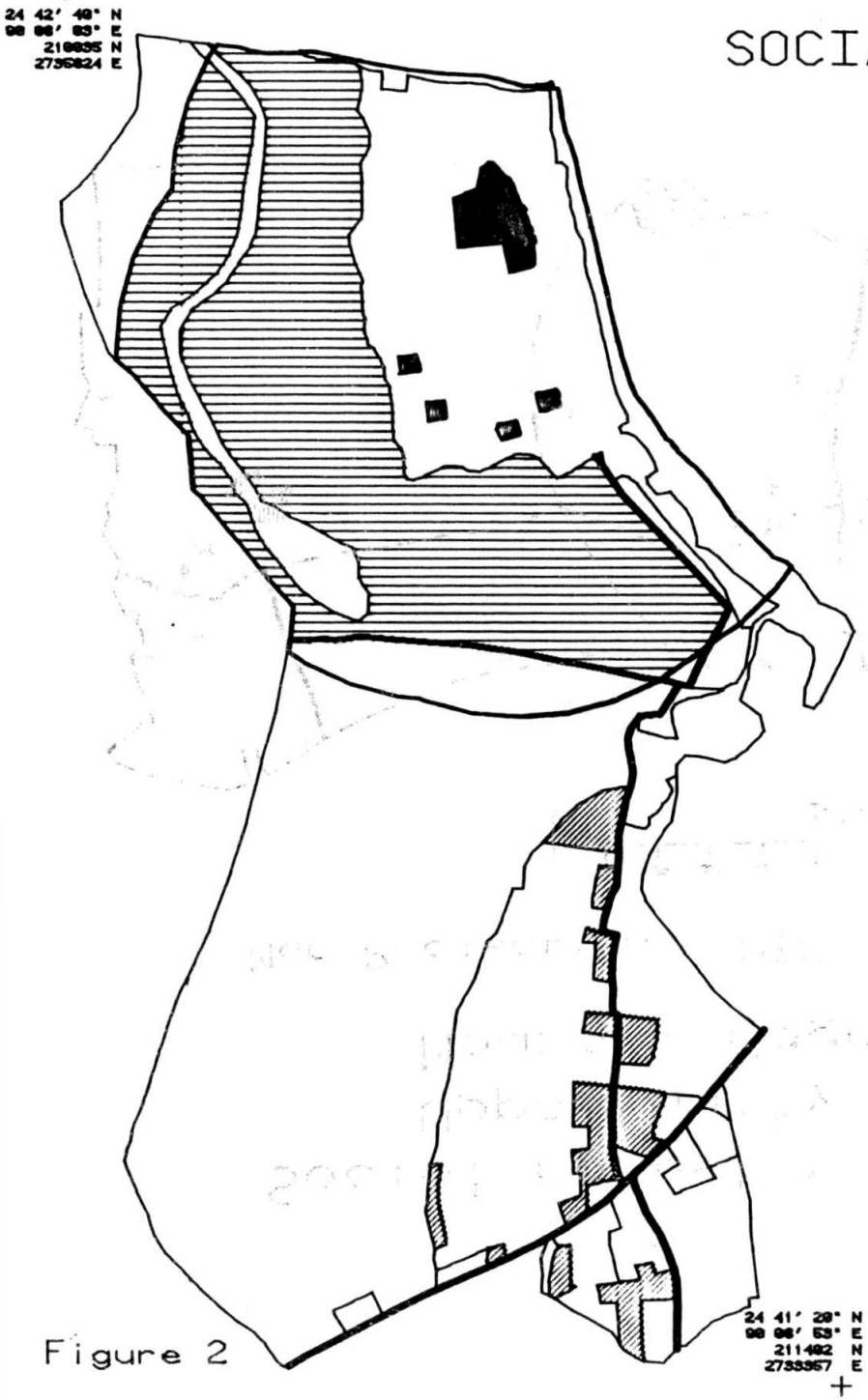


Figure 1.



SOCIAL FORESTRY OPPORTUNITY MAP

MOUZA - RASULPUR

Map Projection - UTM, Zone 46

Meters

- Homesteads
- Homesteads on Forest Department Lands
- Possible Forest Area for Community Protection
- Road corridors for Community Plantation

Data Source : Sal Forest Landuse Mapping Project, Case Study - 2
IIESDM, Dhaka, Bangladesh

Compiled By : IIESDM, Dhaka, Bangladesh
EWC, Honolulu, Hawaii USA

Figure 2