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Co-Management of Protected Areas in South Asia with Special Reference to Bangladesh

Ram A. Sharma*

Abstract

Evolution of co-management practices for forests and protected areas (PAs) is presented for South Asian region in order to comprehend the present co-management scenario in the region in general and Bangladesh in particular. This follows a review of current patterns of co-managing PAs in six main South Asian countries (India, Nepal, Sri Lanka, Pakistan, Bhutan and Bangladesh) with a view to discern enabling co-management policy issues and challenges. The relevance of emerging lessons is examined for Bangladesh in order to help decide future co-management priorities for the PAs. Co-management approach is particularly found suitable for Bangladesh PAs that are intimately interspersed with local communities, who practice cultivation and depend on forests for their livelihood. The protection of PAs and constituent biodiversity against biotic pressure cannot be effectively checked without establishing gainful partnerships with local stakeholders. More natural forest areas should be brought under PAs where co-management practices for in-situ biodiversity conservation should be implemented.

1.0 Introduction

A protected area (PA) is defined by IUCN (the World Conservation Union) as, 'an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means'. Collaborative management - or co-management - is defined as a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources (Borrini-Feyerabend et al. 2004). An equitable sharing of benefits and costs of PA's protection and management among the stakeholders is, therefore, an important aspect of co-managing PAs. A PA may be co-managed for a variety of reasons including scientific research, wilderness protection, preservation of species and genetic diversity, maintenance of environmental services, protection of specific natural and cultural features, tourism and recreation, education, sustainable use of resources from natural ecosystems, provision of forest-based livelihood to local people, maintenance of cultural and traditional attributes, etc. The management of tropical PAs is one of the most significant issues in natural resources management today, for these areas are major global repositories for biodiversity but are often exposed to ongoing anthropogenic change (Baird and Dearden 2003). The protection and conservation of the forests of PAs are particularly important in view of significant loss of natural forests in South Asian region.

* Deputy Chief of Party, Integrated Protected Area Co-Management Project, Dhaka, Bangladesh.
Email: ram@irgbd.com

Different categories of PAs have been legally constituted in the South Asian countries under their respective national Wildlife Acts. For example, three categories of PAs (National Parks, Wildlife Sanctuaries and Game Reserves) have been established in Bangladesh under Wildlife (Preservation) (Amendment) Act, 1974 for their management by Forest Department (FD). In Sri Lanka six categories of PAs established under the Fauna and Flora Protection Act and National Wilderness Act are Strict Natural Reserves, National Parks, Nature Reserves, Jungle Corridors, Intermediate Zones and National Wilderness Areas. National Parks and Wildlife Sanctuaries have been constituted in India under Indian Wildlife Act, 1972. Similar notifications for the declaration of PAs have been made in other South Asian countries as well.

The paper reviews relevant co-management experiences at policy level in the notified PAs of six South Asian countries (India, Bangladesh, Nepal, Sri Lanka, Bhutan and Pakistan) in order to draw important lessons for future co-management initiatives to be implemented in the PAs of Bangladesh. An attempt has been made to analyse various emerging co-management challenges and lessons from the local peoples' perspective. In the process the evolution of co-management of PAs in South Asia has been traced mainly to provide an historical perspective on the participation of local communities in the co-management of forests and PAs. It has been argued that an active association of local people based on gainful partnership is essential for PA conservation in general and forests protection against illicit felling, forest fires, poaching and grazing in particular. The method adopted in developing this paper is based on empirical evidences and PA co-management practices in Asia.

2.0 Evolution of Co-Management of South Asian Protected Areas

Traditional and customary forest use systems in South Asia during ancient times were largely participatory and inclusive for meeting the livelihood needs of local communities (Sharma 1994a and Sharma, 1995). Ancient religious scriptures describe as to how forests were treated as sylvan abode for Rishis, who guided the society for enlightenment and salvation. Rivers and their catchments (mainly forested watersheds) played a pivotal role in the development of ancient Indus valley civilisation. The word Hindu is in fact derived from the river Sindhu around which ancient Hindu religion (three major religions - Budhism, Sikhism and Jainism - have their origin in Hinduism) flourished. Hindu and Budhist traditions of worshiping nature (e.g. worshipping ficus tree and wildlife) and animism developed around forests. Many sacred groves worshipped by local community are still found in countries such as India and Sri Lanka. Sacred groves are small patches of forests protected by local community to avoid the wrath and to seek the blessings of their resident deity. An important objective of declaring sacred groves seems to have been to exercise community control not only on the forests but also on individual behaviour for biodiversity conservation. In this way the customary use of biodiversity was governed by the traditional systems of resource use and conservation based on religion, culture and folklore. Sacred groves thus provided a regulatory mechanism for resource exploitation through a code of conduct that was based on religious taboos and cultural norms, instilling both fear and reverence.

The first documented forest management guidelines are found during the period of Hindu Rulers such as king Ashoka (early AD); the approach of forest management realised that the forests on which local people depended for their livelihood cannot be managed in isolation of the cultural and religious practices of neighbouring communities. This was the period when gathering food and biomass for subsistence consumption was the main occupation of local communities. As forests in this region were abundant the local people cremated/burned the dead bodies by using fuel wood from nearby forests. This tradition is still practiced in many Asian countries, where people use fuel wood for burning/cremating the dead bodies. Despite the prominence of agriculture and settlements during the Indus Valley Civilisation, the trees and forests were revered.

During early Moghul rulers of medieval period no restrictions were imposed on the use of forests by local people as forests were still abundant and population was much less. They respected local customs and so did not interfere with local practices that continued to be mainly of gathering of forest produce including hunting of wildlife. In many South Asian countries pastoral economy developed as forests were used as pastures by nomads, who grazed their cattle without any control. Regulatory mechanisms that could have been employed for controlling the use of forests by local community were not available during this period.

Later the clearing of forests for agriculture was encouraged in order to collect revenue for the state. The first formal attempt to exercise state control in the Indian subcontinent was taken in 1793 when permanent settlement of estates including forest land was done with local elites (designated as *Zamindars and Talukdars)*, who became hereditary collectors of the land revenue *in lieu* of a fixed annual royalty. This system of land tenure developed prominently in the eastern Indian subcontinent (the Permanent Settlement areas of the Bengal Presidency and the Madras Presidency; present day Bangladesh was included in the Bengal Presidency) as compared to *Ryotwari* system (ownership rights with farmers) of land tenure that developed in the western Indian subcontinent (the parts of present day Pakistan and western India). These differential land tenure systems were later reflected in the higher uptake of social forestry initiatives (during 80s and 90s) by farmers in *Ryotwari* regions of western India as compared to *Zamindari* regions of eastern India.

The *Zamindars*, who acted as commission agents, were given property rights in their estates including forests on a condition of payment of an annual revenue fixed permanently. Thus local communities/peasants, who were traditionally using forests for their livelihood and cultivation, were made tenants at the mercy of *Zamindars*. As the population pressure during this period was less and forests abundant, many forest areas remained under the nominal control of *Zamindars* except that wherever possible agriculture was encouraged by clearing forests in order to generate more land revenue from the cultivated lands. The client-patron relationship of *Zamindari* land tenure regime during this period gave rise to feudalism that later affected both agriculture and forest land-use systems adversely. Neither the impoverished tenants nor the *Zamindars* invested in forest land development and, therefore, forest land productivity suffered. On the other hand private ownership along with its consequent multipliers (e.g. market development, entrepreneurship) developed in western regions having *Ryotwari* system.

Though the clearance of forests was a concern of many Moghul rulers, the British gave this process a sharper edge and a fresh impetus as anything that stood in the way of higher land revenues was to be dealt with firmly (Saberwal et al. 2004). A comprehensive Forest Act in the Indian subcontinent was enacted in 1927 by modifying the first Forest Act of 1865 (and its subsequent revision in 1878). Some forests were earmarked as hunting reserves for royalties, a concept extended by British in their colonies (India, Bangladesh, Pakistan, and Sri Lanka) first by reserving commercially important trees (*e.g. teak* for royal navy) and subsequently by reserving forest lands (e.g. reserve forests and protected forests). Thus property rights were enforced on hitherto open access forests by enacting Forest Acts and establishing Forest Departments (e.g. Forest Department was established in 1865 in the Indian subcontinent). Although the legal status of forests thus got enhanced, an effective protection against biotic interference (e.g. shifting cultivation, illicit felling, forest fires, grazing and poaching) could not be ensured due mainly to lack of resources with the Forest Department. Main objective of forest management during this period was production of wood, mainly timber. In this process the traditional/customary rights of local people on the nearby forests were abandoned, thereby alienating local communities from hitherto open access forest resources. Forest Department exercised control over forests by awarding harvesting rights through purchase contract system based on a minimum guaranteed royalty under which a purchaser was allowed to fell any tree over and above a certain girth. Local community's needs for forest products were thus ignored.

After independence from British rule in late 40s, the *Zamindari* system was abolished by the emerging Governments of the subcontinent, and the State Acquisition and Tenancy Acts were enacted to bring private forests under Government ownership. Accordingly, the FDs of India and Pakistan took over the management of private forests (e.g. the present day Modhupur and Bhowal National Parks in Bangladesh) hitherto managed by *Zamindars* and native rulers. However, many such forests were depleted by the *Zamindari* before they were handed over to the respective forest divisions (it took some time for the forests to be handed over to FD after the promulgation of the Acts).

People-oriented forestry initiatives were taken up by some South Asian countries (e.g. India) since 60s through funding from the national and provincial governments. However, large scale social and community forestry projects, supported by donors, were taken up since early eighties when forestry programmes were increasingly linked with rural poverty alleviation efforts initiated by donor community in South Asia. For instance, in 1981 the World Bank supported social forestry projects in India and the Asian Development Bank (ADB) funded community forestry project in north Bangladesh. The environmental functions and services of forests and PAs were being increasingly recognised during this period, both nationally and internationally (as evident from a number of international conventions and conferences organised by many multilateral agencies).

The donor funded social/community forestry projects in South Asia were implemented mainly in areas outside the designated forests (e.g. reserved and protected forests under state ownership) in order to create tree resources on unutilised government and private

lands. The surplus labour was employed in these efforts on unutilised lands to reduce biotic pressure on state forests and provide gainful employment to unemployed and underemployed workforce (Sharma 1993). A negative impact of increased focus on creating tree resources outside natural forests including PAs was seen in reduced funding (and consequent forest degradation) for natural forest management. This was due to the fact that the national governments diverted funds for social forestry in order to utilise donor funds by providing their matching national contribution. In order to correct this inconsistency the next generation of forestry projects, started from early 90s, were taken up for forestry sector as a whole wherein social forestry was one of many components; the other important component being management of natural forests and PAs by associating local stakeholders. For instance, externally aided community/social forestry projects, started in Bangladesh in 1981, were phased out in favour of sectoral forestry development programmes. As a result, sector-wise forestry projects such as Upzila Afforestation and Nursery Development Project and Forestry Sector Project (FSP) were implemented in Bangladesh with the financial support from ADB. Bangladesh in this process witnessed a major policy shift in forestry sector towards a more participatory approach to the management of forests and PAs. Bangladesh Forestry Master Plan, completed in 1993 with the assistance from ADB, led to the promulgation of the people-oriented Forest Policy of 1994 wherein meeting peoples' needs through their gainful involvement in forest management was focused.

The World Bank supported Forestry Sector Projects were taken up in the Indian states of West Bengal and Uttar Pradesh since 1992. Joint forest management committees (for the protection of forests) and eco-development committees (for the conservation of biodiversity in PAs) were established under many donor funded forestry projects (Sharma 1994b). The World Bank funded sectoral forestry projects such as West Bengal Forestry Project and Uttar Pradesh Forestry Project started during 90s had an important component on co-management of PAs. Similarly, Andhra Pradesh Forestry Sector Project taken up in 90s had special components focusing on eco-development activities in and around PAs.

Wildlife protection legislations and acts were enacted by many South Asian countries during 70s. For example, India passed Wildlife Act in 1972, which was closely followed by other South Asian countries including Bangladesh Wildlife Preservation Ordinance in 1973. Different states in Pakistan enacted their state Acts during 70s (e.g. Balochistan Wildlife Protection Act, 1974; North West Frontier Province Wildlife Protection, Conservation and Management Act, 1973; Sindh Wildlife Protection Ordinance, 1972). The National Parks and Wildlife Conservation Act promulgated by His Majesty Government of Nepal in 1973 provided legal basis for establishing PAs. Bhutan Forest and Nature Conservation Act was enacted in 1995 wherein the role of local communities in wildlife conservation was emphasised. These Acts provided a legal basis for establishing PAs and so many National Parks and Wildlife Sanctuaries were declared by national governments under their respective Wildlife Acts.

A seven-year eco-development project supported by Global Environment Facility (GEF) was started in 1996 in the PAs spread in different Indian states (West Bengal, Rajasthan,

Madhya Pradesh, Kerala, Karnataka, Gujrat, and Bihar). The programme targeted conserving biodiversity in seven globally significant PAs by following eco-development approach of co-managing PAs. These PAs are designated as Tiger Reserves with special focus on the conservation of tigers: Project Tiger is an eco-system based conservation support project in which an optimum presence of tiger indicates that its habitat is in prime health. Eco-development in the project was defined as a strategy to overcome unsustainable and incompatible forest use by dependent communities for their livelihood in and around PAs through regulated use and alternatives. The strategy aimed to conserve biodiversity by addressing both the impact of local people on the PAs and the impact of PAs on local people. The project had five main objectives : i) improved PA management, ii) village eco-development, iii) development of more effective and extensive support for PA management and eco-development, iv) overall project management, and v) preparation of future biodiversity projects. As many as 572 eco-development committees, formed by covering 75,600 households in and around seven PAs, were provided livelihood support in order to reduce their dependency on the nearby forests. The successful experiences of the eco-development project have been carried forward by implementing an eco-development scheme ('Eco-development of National Parks and Sanctuaries') funded by the Govt. of India in more than 80 PAs spread in different states. However, the eco-development project can be criticised because of its over-emphasis on building expensive community assets whose maintenance could not be ensured after project expiry. Moreover, many of livelihood initiatives could not be effectively coupled with the conservation of biodiversity.

The development of Forestry Master Plans initiated in many South Asian countries in late 80s and early 90s (with financial and technical support from FAO/UNDP and other multilateral agencies such as ADB) dealt human issues including meeting the livelihoods needs of local communities. For example, the Forestry Master Plans of Bangladesh and Nepal recommended for people's participation in managing forests and PAs. Accordingly the newly promulgated Forest Policies of Bangladesh and Nepal emphasised people's participation. India did not participate in this initiative but subsequently prepared a national forestry action plan.

A number of Integrated Conservation and Development Projects (ICDPs) have been implemented in developing countries (the above-analysed Indian Eco-development Project is an example of ICDPs) through financial support from multinational development agencies such as World Bank and GEF. During 1991-2003 the total investment in biodiversity projects all over world by GEF funding has been USD 1638.4 million (GEF 2003). These projects focused on the conservation of biodiversity in PAs by attempting to meet the socio-economic needs of local communities, thereby reducing pressure on the habitats including forests. However, many critiques have been written extensively on the narrow focus of the ICDPs (DeCosse and Jayawickrama 1996) and over-emphasis on livelihood initiatives. This experience from ICDPs has lead to focusing on biodiversity conservation as the main objective to be achieved by implementing a multi-pronged approach with a number of components (including one on income generation activities to be implemented by actively associating local stakeholders). Other important learning of ICDPs include (World Bank 1996) : i) need for common

understanding of project objectives, ii) need to incorporate PA concerns into regional planning and regulation, iii) need for establishing appropriate linkages between conservation and development objectives, iv) need for active participation of beneficiaries, v) need to identify parties to disputes and involve them in conflict resolution, and vi) need to define project scope within realistic and achievable limits.

In the Indian subcontinent including Bangladesh the economies are primarily based on agriculture and so the well being of local people and the stability of life support systems depend on effective management of natural resources (Bahuguna 2000). Evidently all the six South Asian countries have experienced co-management of PAs, albeit in different forms and practices keeping in view their differing bio-physical and socio-economic environment. The traditional and community-based forest resource use systems, which gave way to centralised government systems during colonial times, are now increasingly being evolved in favour of co-management of forests and PAs. Some governments have enacted empowering policies and legislations, and also have established appropriate institutions (e.g. India and Nepal) for co-management of PAs whereas others are in the process of doing so. Conservationists recognise that many PAs have limited future prospects without the cooperation and support of local people, especially in developing countries (Wells and McShane 2004). New relationships and arrangements have evolved between PA managers and local stakeholders as the co-management approach of PA management is increasingly institutionalised. As a result, conservation benefits to local stakeholders have started flowing in those countries where co-management practices have been operationalised.

3.0 Protected Areas in Bangladesh

The geographical area of Bangladeah is nearly 144 thousand sq. km. with a population of nearly 135 million. It is the world's biggest delta landscape (situated between the foothills of the Himalayan massif and the Bay of Bengal), developed by huge amount of sediments deposited in their estuaries by three main transnational rivers - the Ganges, Brahmaputra and Meghna. The country is largely flat and riverine in nature, crisscrossed by a very high density of river systems that have great impacts on forest ecosystem and social system. The density of rivers is the highest in world whereas the density of natural forests is one of the lowest.

Of the total area of forest land of 2.53 million (m) ha Bangladesh Forest Department manages 1.53 m ha of forest land, mainly under the legal categories of reserved forest (RF) and protected forest (PF). The PAs under the management of FD, have been declared on RFs and PFs, mainly from 80s in all forest types in the 4 bio-ecological zones (tropical evergreen and semi-evergreen forests, moist deciduous forests, mangrove forests, and reedland and wetland forests). Presently there are 18 notified PAs (Table 1) under the management of Forest Department (covering an area of nearly 242,000 ha), under three PA categories - National Parks, Wildlife Sanctuaries and Game Reserve. This is the second lowest per capita area under PAs in any country. Other categories of PAs such as Ecologically Critical Areas (ECAs) established under Bangladesh Environmental Conservation Act, 1996 have not been included in the review.

Although the country's natural forests have severely degraded over the period, some PAs, particularly in north-eastern and south-western parts of the country, still have comparatively good evergreen forests. They are biologically rich and form important catchments of numerous water bodies with intense forest-water interactions that, as an important part of a network of transnational watersheds, also have regional implications. Socio-economic values of these PAs are important because a number of communities including ethnic minorities reside within and around the forests on which they traditionally depended for their livelihood opportunities. However, these PAs continue to be under severe biotic pressure, particularly due to forest land encroachment, forest fires and illicit felling. Forest fires have particularly affected the evergreen forests and their complexion is changing rapidly.

After enacting the Wildlife (Preservation) (Amendment) Act 1974, a Wildlife Circle was created in 1976 with specific responsibility for wildlife policy related matters. Unfortunately the post was abolished in 1983 until its revision in 2002. The management prescriptions for the PAs were included in the respective Working Plans under 'Preservation Working Circle'. Although separate Management Plans were subsequently developed for managing the PAs, they were not approved. In view of lack of resources most of the management recommendations contained in these plans have remained unimplemented. Five Management Plans (Sharma, 2006a, 2006b, 2006c, 2006d, 2006e), developed under NSP by following a landscape approach, have been approved and are being implemented by FD. Different categories of local stakeholders have been identified in the villages located in the core and landscape zones that are mapped in all the five pilot PAs (Lawachara National Park, Rema-Kalenga Wildlife Sanctaury, proposed Satchuri National Park, Chunoti Wildlife Sanctaury and Teknaf Game Reserve).

Table 1: Protected Areas of Bangladesh

Sl. no.	*Protected area*	*Forest type*	*Area (ha)*	*Year of establishment*
1	Bhawal National Park	Sal forest	5,022	1982
2	Madhupur National Park	Sal forest	8,436	1982
3	Ramsagar National Park	Sal forest	27	2001
4	Himchari National Park	Hill forest	1,729	1980
5	Lawachara National Park	Hill forest	1,250	1996
6	Kaptai National Park	Hill forest	5,464	1999
7	Nijhum Dweep National Park	Coastal mangrove	16,352	2001
8	Medha Kachapia National Park	Hill forest	395	2004
9	Satchari National Park	Hill forest	242	2006
10	Khadimnagar National Park	Hill forest	679	2006

11	Baryadhala National Park	Hill forest	2,934	2010
12	Khadigar National Park	Sal forest	344	2010
13	Sinra National Park	Sal forest	306	2010
14	Nabab Gonj National Park	Sal forest	518	2010
15	Kuakata National Park	Mangrove forest	1,613	2010
16	Rema-Kalenga Wildlife Sanctuary	Hill forest	1,795	1996
17	Char Kukri-Mukri Wildlife Sanctuary	Coastal mangrove	40	1981
18	Sundarbans (East) Wildlife Sanctuary	Mangrove forest	31,226	1996
19	Sundarbans (West) Wildlife Sanctuary	Mangrove forest	71,502	1996
20	Sundarbans (South) Wildlife Sanctuary	Mangrove forest	36,970	1996
21	Pablakhali Wildlife Sanctuary	Hill forest	42,087	1983
22	Chunati Wildlife Sanctuary	Hill forest	7,761	1986
23	Teknaf Wildlife Sanctuary	Hill forest	11,615	1983
24	Fasiakhali Wildlife Sanctuary	Hill forest	1,302	2010
25	Hazarikhil Wildlife Sanctuary	Hill forest	1,178	2010
26	Dudpukria Dhopachari Wildlife Sanctuary	Hill forest	4,717	2010
27	Sangu Wildlife Sanctuary	Hill forest	2,332	2010
28	Tangragiri Widllife Sanctuary	Mangrove forest	4,049	2010

The country's PAs have been an intimate interspersion of human habitations and cultivation through them with traditional dependency on neighbouring forests for their livelihood in a largely agrarian economy characterised by food deficits and natural calamities. In addition to development pressures on forest land, the traditional dependence of local communities on forests including PAs has historically been an important aspect of forests management in Bangladesh. Anthropogenic pressures including increased commercial extraction of forest produce, and forest land encroachment for habitations and agriculture, brought by manifold increase in human and cattle population, led to shrinkage and degradation of the country's forests and PAs. Illegal removals from the forests have increased off late, thereby jeopardising the very existence of biodiversity in many PAs. This has adversely affected the local communities as well as the conservation status of wildlife habitat. In the process the livelihood of the natural resources dependent people is affected adversely. Thus in Bangladesh (and also in

other South Asian countries) the biodiversity conservation priorities cannot be set in isolation from local forest resource use and development.

4.0 Co-Managing South Asian Protected Areas

The relevant policy level co-management initiatives are reviewed from each of the six South Asian countries in order to examine their applicability in future co-management programmes that are being designed for the PAs in Bangladesh.

India: India has the seventh largest area (329 m ha, nearly 2.5 per cent of the world's geographical area), second largest human population (more than one billion, nearly 16 per cent of the world's population), and the largest domestic cattle population (500 m, nearly 18 per cent of the world's cattle population). Her forests (nearly 1.8 per cent of the world's forests) are diverse, ranging from xerophytic in north-west, evergreen in north-east, mangroves in coastal areas, conifers of the Himalayan hills, dry deciduous forests of central region to alpine pastures in higher Himalayas. Natural habitats range from Palearctic Trans-Himalayan in the north to the Indo-Malayan region in the north-east, the Indo-Ethiopian region in the west, coasts and islands, and the Oriental region in peninsular India. The country, one of the 12 mega biodiversity countries in the world, has 597 national parks and wildlife sanctuaries (covering 154,574 sq km or 4.74 per cent of the country's geographical area) spread in 10 bio-geographic zones. More than 300 rivers originate in these national parks and sanctuaries that act as major water providers to Indian masses.

India has a history of PA co-management and a number of legislations have been enacted in order to take on board many evolving biodiversity issues of great importance. The Wildlife Protection Act 1972 provided for the establishment of national parks and wildlife sanctuaries, which have been established extensively throughout India. This federal Act has been amended a number of times (1986, 1991 and 2002), and the states have set up Wildlife Wings within FDs. More and more forests are being brought under PAs as effective means to retain adequate forest land under biodiversity through better protection under Wildlife Acts, and financial resources are being provided by both federal and state governments. For example, most of the good sal (Shorea robusta) forests along the terai region of the Indian states of Uttranchal, Uttar Pradesh, Bihar and West Bengal have been declared as PAs. The PAs along the terai (a Nepalese word meaning moisture) region covering India (e.g Katerniaghat Wildlife Sanctuary), Nepal (e.g. Bardia National Park) and Bhutan (e.g. Phiphu Wildlife Sanctuary) have transnational implications in view of their common landscapes across international borders.

The first Forest Policy for the Indian subcontinent was formally promulgated in 1894 wherein meeting the bonafide needs of local populace from nearby forests was emphasised. This people-oriented focus was, however, diluted in the Forest Policies of independent India and Pakistan wherein local level needs were subjugated by national needs for industrial timber. However, the National Commission on Agriculture (in 1976) suggested to earmark sufficient buffer zones at the boundaries of PAs and also implement social forestry programmes for meeting biomass needs of local people. Accordingly the

Indian Forest Policy of 1988 reversed the trend by focusing on meeting the needs of local people as first charge on neighbouring forests. As per this policy, the forests are treated as an ecological necessity, a source of goods and services for use by local population and a source of wood. Social forestry programmes initiated on large scale during 80s and 90s became popular, particularly in western India where agricultural markets were already developed (Ryotwari system of land tenure resulted in farmers taking active role in the production and marketing of agricultural produce). In eastern India (and also Bangladesh where Zamindari system evolved) donor supported social forestry projects were implemented mainly on government lands as private tree growing could not be encouraged on large scale due to lack of farmer initiatives and wood markets.

The diversion of land under forest and PA for non-forestry purposes (e.g agriculture and settlements) has been effectively checked after the implementation of Forest Conservation Act, 1980 (it prohibited diversion of forest land by state governments for non-forestry purposes without prior approval of Government of India). In case of absolute necessity, the Government of India approves a state government proposal for forest diversion with stipulation that equivalent land will be developed as forests by the concerned state Forest Departments. The forest health of PAs is monitored by preparing Forest Status Reports (by Forest Survey of India) to be placed before the Indian Parliament every two year. The participation of local communities in the co-management of forests and PAs has been formalised by formulating enabling policies and guidelines, both by the federal and state governments. The 73rd Constitutional Amendment of 1993 and the Panchayati Raj (Extension to Schedule Areas) Act of 1996 provided legal basis for jurisdictional claims over the forests covered under joint forest management and eco-development. Accordingly many states have issued administrative circulars for co-management of forests and PAs whereas other states have formed relevant rules under respective State Forest Acts. For long-term sustainability of resources it has been mandated that not less than 25 per cent of the revenue earned from final harvests should form the share of village community and deposited in the village development fund for meeting the conservation and development needs of forests and local community.

State Wildlife Wings are headed by Chief Wildlife Wardens of the rank of Principal Chief Conservator of Forest/Chief Conservator of Forest with fully operational circles and divisions. They receive budget allocations under specific wildlife financial heads, both under revenue and development budgets. Similarly, the Wildlife Wing of Federal Ministry of Environment and Forest, managed by professional foresters, allocates funds to state FDs for the co-management of PAs including eco-development schemes. Forestry sector is increasingly recognised as a service sector (like education and health sectors) wherein revenue generation is no more an important management objective in view of a variety of functions and services generated by forests and PAs. As a result, most of the wildlife divisions do get regular funds for specific co-management schemes (including technical orientations organised in national institutes such as Wildlife Institute of India (WII). Co-management planning guidelines including management zoning methods for developing participatory management plans are implemented by state FDs.

As an integral part of co-management programmes, self-help/user groups are formed at village level and a village development fund is set up and operated by the groups with seed money provided under different federal and state government funded schemes. The fund is used mainly for the creation of community assets but can also be used for providing loans to individual group members for taking up income generation activities. In some states such as Orissa, Andhra Pradesh and Harayana these groups have been registered as NGOs and cooperative societies in order to receive funds directly from state and federal governments for implementing various rural development activities. Public-private partnerships have been established in some states such as Rajashthan by creating Foundations/Trusts (e.g. Ranthambore Foundation, Ashoka Foundation) for taking up co-management activities in the PAs. Eco-tourism activities around important PAs such as Jim Corbett National Park (in Uttar Pradesh), Jaldapara Wildlife Sanctuary (in West Bengal) and Koeldeoghana Bird Sanctuary (in Rajashthan) are generating both forward and backward linkages, thereby triggering economic growth around the PAs. A part of revenue generated out of eco-tourism and other development activities is retained by state FDs (e.g. West Bengal and Madhya Pradesh) for investments in conservation and community development activities in and around the PAs.

Natural forests regeneration technologies have been prioritised for wildlife habitat restoration. Enrichment planting of indigenous species is suggested in identified gaps where existing rootstock cannot be regenerated. Mono-cultures of exotic tree species are gradually replaced (e.g. Buxa Tiger Reserve in West Bengal) through canopy manipulation required for encouraging natural regeneration. Most of the PAs have core and buffer areas identified both on the maps and in field. In buffer areas inhabited by tribal communities, separate funds are allocated, both by federal and state governments, under 'food for work programmes' being implemented by Forest Development Agencies under integrated tribal development schemes. Regular budget provisions, made for compensating local villagers, have alleviated their sufferings (loss of property and life due to wildlife attacks). Wildlife insurance schemes, initiated by FD (e.g. West Bengal) by paying annual premiums for insuring individual households in core and buffer areas, have become popular.

A recent amendment (2002) to the Wildlife Act has suggested two new categories of PAs - conservation reserves and community conserved areas - in order to bring more areas under conservation by involving local people. The Biodiversity Act 2002 provides for biodiversity conservation through participation of local people organised into biodiversity management committees. The Biodiversity Action Plan 2003 focuses on livelihood needs of local people while maintaining ecological security. Forest Right Act, 2006 has ensured customary tenurial rights of ethnic minorities living within PAs and other natural forests by emphasising a symbiotic relationship between forests and the forest dwellers.

Nepal: There are nine National Parks, three Wildlife Reserves, three Conservation Areas and one Hunting Reserve, covering an area of 27,874 sq km. (18.33% of the country's total land area). The Department of National Parks and Wildlife Conservation (established in 1980) is entrusted with the responsibility of planning and managing the PAs. Nepal has been a pioneer in forest co-management by handing over government

forests to Panchayats (local level councils of villagers) under Panchayat Forest Regulations and Panchayat Protected Forests Regulations, 1978 and the Decentralisation Act, 1982. The role of real users in forest management was recognised in the Forestry Master Plan approved in 1988. Accordingly the Forest Act, 1993 and Forest Regulations of 1995 provided for handing over community forests to Forest User Groups.

The co-management of forests and PAs in Nepal has progressed rather well when compared to other South Asian countries, particularly in terms of establishing enabling policies, legislation and institutions. Since the establishment of the first National Park (Chitwan, gazetted in 1973), the country has enacted a number of policy and legislative measures for the operation of PA co-management. For example, one of the objectives of the Forestry Master Plan prepared for the conservation of ecosystems and genetic resources is 'to enhance education in resource and protected area management and people-park relations' (HMG 1988). Similarly the National Conservation Strategy for Nepal outlined consultative process for identifying management zones and meeting local peoples' needs.

A number of initiatives were taken by the Nepal government during 1992-2004 for the implementation of co-management practices in PAs. The National Parks and Wildlife Conservation Act, 1973 was amended in 1993 for formulating Buffer Zone initiative wherein Article 25(a) enabled the residents of buffer zone to receive 30-50 per cent of the annual revenue of a Park for local community and conservation development. A buffer zone is a designated area surrounding a PA within which the use of forests by local communities is allowed in lieu of their gainful efforts in biodiversity conservation. Its main objectives include minimising adverse human impacts on PAs by meeting livelihoods needs of local communities, supporting local communities to organise them into self-governed local institutions that are capable of undertaking conservation and community development activities.

The Buffer Zone Programme, focusing on gainful association of local people in the conservation of PAs through partnerships, was first piloted in Royal Chitwan National Park in 1995, followed by its implementation in other Parks. A public-private partnership has been established through King Mahendra Trust set up for Royal Chitwan Park. The Buffer Zone Management Regulations, 1996 and the Buffer Zone Management Guidelines, 1999 operationalised the relevant provisions of the Buffer Zone policy and legislation. Biodiversity Strategy, 2002 has strong commitment on participation of local stakeholders from the planning stage as a part of co-management of PAs and Buffer Zones. By 2002 the Buffer Zones (covering an area of 3,941 square km; nearly 14 per cent of the total PA area) have been declared in six National Parks (Royal Chitwan, Royal Bardia, Langtang, Makalu Barun, Sagarmatha and Shey Phoksundo) with relevant regulations and guidelines for their management through active participation of local communities and NGOs. A Buffer Zone Forum was launched in 2002 and Nepal Biodiversity Strategy was also endorsed in 2002. In addition to the revenue deposit allocated out of the share of communities (30-50%), the members deposit their savings in their user group account under a savings and credit scheme introduced with the user groups formed in buffer zone areas.

Sri Lanka: Wildlife in Sri Lanka was for the first time given legal backing through the Forest Ordinance of 1907, based on which Wildlife Sanctuaries were established at Yala and Wilpattu. Subsequently in 1938 five categories of PAs (Strict Natural Reserve, National Parks, Nature Reserves, Jungle Corridors and Intermediate Zones) were established under the Fauna and Flora Protection Ordinance. In 1987 a new category, National Wilderness Area, was added in the list of PAs by enacting National Wilderness Act. The National Heritage and Wilderness Areas Act of 1988 provided for specific provisions for the protection and conservation of unique natural areas.

There are 11 National Parks and, 56 Wildlife Sanctuaries and Reserves, covering an area of 0.65 million ha (nearly 10 per cent of the country's land area). These PAs are managed by the Department of Wildlife and Conservation, which functions under the Ministry of Public Administration and Home Affairs. National Policy on Wildlife Conservation was approved by Sri Lankan Government in 1990. A national review was taken up during 1990-96 (based on the recommendations of an accelerated conservation review conducted in the wet zone forests for ascertaining their conservation value). The National Forest Policy, 1995, formulated based on this conservation review, emphasised the need for allocating natural habitats for conservation and co-management. Appropriate guidelines were laid down in this policy for the establishment of a PA system in the country. Forestry Sector Master Plan, 1995 emphasised participatory management of forests and PAs, both for present and future generations. For instance, the policy stipulates that, 'the state, where appropriate, form partnerships with local people, rural communities and other stakeholders, and introduce tenurial arrangements'. For this purpose the forests were proposed to be zoned into four categories to practice co-management in different forms. Co-management practices have been implemented in Ritigala Nature Reserve, where 14 villages surrounding dry zone mountain reserve were associated. This Reserve was also included in a WorldBank/GEF funded biodiversity conservation project implemented in Sri Lanka. DeCosse and Jayawickrama (1996) provide a detailed review of co-management initiatives taken up for managing natural resources in Sri Lanka.

Pakistan: In Pakistan only 4 per cent of land area is covered under forests that are characterised by aridity (nearly two-thirds of the forests support scrub and thorn vegetation). Natural forests of coniferous species are found in the foothills and lower Himalayas whereas productive forests comprise irrigated plantations (in Punjab) and riverine forests (in Sindh). Although a number of PAs (10 National Parks, 96 Wildlife Sanctuaries and 84 Game Reserves, covering an area of 7.29 million ha) have been declared by the Government of Pakistan, many of them are in degraded condition due mainly to an accelerated trend of deforestation. Unplanned urban and industrial development and the civil unrest in neighbouring Afghanistan, have had adverse influence on the management of PAs in Pakistan. The restoration of natural ecosystems in the PAs have not been encouraging due mainly to lack of resources and adverse biogeography as characterised by less rainfall, poor soils and hilly terrain.

Wildlife policy is formulated and implemented through a federal agency (National Council for Conservation of Wildlife) but the management of PAs is vested with the state FDs except in Punjab and Sindh where Wildlife Department and Wildlife Management

Board have respectively been established. The National Conservation Strategy for Pakistan, ratified by the federal government in 1994, emphasised co-management of biodiversity. Similarly, the Provincial Conservation Strategies, Pakistan Biodiversity Action Plan, Wildlife Policy and Model Provincial Wildlife Laws focus on empowering local communities in co-management of PAs. A number of donor funded projects have been taken up for regeneration and protection of PAs by associating local stakeholders. An eco-tourism strategy focusing on local community participation has been developed for north Pakistan (a fixed percentage of the collected fee is used for local community development). The Mountain Areas Conservancy Project funded by GEF, UNDP and Government of Pakistan is working in North West Frontier Province and Northern Areas in conserving biodiversity by organising local communities. In Khunerab National Park nearly two-third of the new employment opportunities are earmarked for local people. Seventy percent of the proceeds from game hunting outside the park are given to local people. In Bar Valley the collaborative efforts of local communities and WWF for the conservation of Himalayan ibex have been successful and 50 per cent of the revenue from trophy hunting goes to local community. Participatory integrated conservation and sustainable development strategies have been developed in two districts of North Western Frontier Province with sustainable eco-tourism and mountain development as key ingredients.

Bhutan: Located in the eastern Himalayas of great biodiversity, the kingdom of Bhutan is flanked by India to the south and the Tibet region of China to the north. Sparsely populated (a population of 710,000, covering an area of 47,000 sq km) Bhutan is comparatively well placed in availing a unique opportunity for maintaining and developing its great biodiversity. The forests in Bhutan constitute a dominant land-use with 72.5 per cent of the total geographical area; the PAs that cover nearly 23 per cent of the forest area are comparatively large in area, varying from 273 sq km. to 4,200 sq km.

The royal government of Bhutan is following a middle path of development that focuses on reasonably well living standards of the population without jeopardising the nation's unique and fragile natural resources. The National Forest Policy recognises the PAs as necessary for the protection of flora and fauna. In addition to a comprehensive network of PAs (four national parks, four wildlife sanctuaries and one nature reserve), eight conservation areas have been established for the conservation of black-necked crane and the white bellied heron, and 12 biological corridors have been designated for linking the PAs. An important objective of establishing biological corridors is to link all PAs through a network of forest corridors in order to allow the continued transfer of genes between otherwise isolated populations of plants and animals. The PAs (national park, wildlife sanctuary and nature reserve), conservation areas, and biological corridors are collectively referred to as the Bhutan Biological Conservation Complex.

The co-management of PAs in Bhutan is being done by following the provisions of Forest and Nature Conservation Act, 1995, which reflects strong Bhuddhist conservation traditions. Both formal and informal rules, beliefs and norms have traditionally promoted the conservation of environmental resources including forests. The PA conservation strategy is based on partnership among local government, development agencies,

conservation organisations and local communities. Social welfare initiatives are designed and implemented based on a unique approach that focuses cultural and nature related development. Local communities are increasingly involved in the co-management of forests and PAs as in case of Nepal and India. For example, local communities manage pastures within the Jigme Dorji National Park through a system of rotational grazing and levying taxes on the grazing of yak herds (Kothari et al. 2000). In its efforts to conserve its unique environment Bhutan government created the Bhutan Trust Fund for Environmental Conservation (BTFEC) in 1991 with capital contribution from the government of Bhutan, the World Wide Fund for Nature (WWF), the Global Environment Fund and other donors. The BTFEC continues to provide a sustainable financial mechanism that enables Bhutan with self-reliance in environmental conservation.

Bangladesh: Relevant co-management developments and practices for the PAs of Bangladesh are discussed in detail in this section in order to visualise future co-management scenarios. The provisions of Wildlife (Amendment) (Preservation) Act, 1974 provided for enhanced protection to wildlife and biodiversity of gazetted PAs. However, these provisions were not invoked by FD field staff as most of the forest offence cases within PAs have so far been handled under the provisions of the Forest Act of 1927. With the promulgation of Forest Policy of 1994 the emphasis of forest management has shifted from timber production to ecological requirements, conservation of biological diversity, meeting bonafide consumption needs of local people, and other functions and services of forests. It is increasingly recognised that an important objective of the management of forests and PAs is to maintain perennial vegetative cover, necessary for various environmental and socio-economic functions and conservation of biodiversity. But past rural development efforts in Bangladesh have so far either been inadequate or failed to take into account relevant linkages between conservation of PAs and welfare of local people. Not only local people are getting less production and employment opportunities due to decreasing land fertility and reduced ground water tables but also degraded forests are not able to meet their bonafide consumption needs for forest produce. A gainful association of unemployed and under-employed rural mass, achieved by establishing appropriate partnership mechanisms is, therefore, essential for sustainable co-management of the country's PAs.

The country's natural forests including PAs have not in past attracted adequate funds for their proper management in view of strong emphasis on social forestry that was encouraged mainly on non-forest lands. As a result, adequate management of PAs was not taken up until 2000 when a conservation area management component covering seven PAs (Modhupur National Park, Lawachara National Park, Rema-Kalenga Wildlife Sanctuary, Chunoti Wildlife Sanctaury, proposed Hazarikhil Wildlife Sanctaury, Himchari National Park and Teknaf Game Reserve) was started under the ADB assisted Forestry Sector Project (FSP, 1996-2006). Although the outlay for conservation activities in the seven PAs was not significant under FSP, an important policy decision was taken by FD to associate local people in the conservation of PAs and natural forests based on the sharing of usufructuary benefits. Buffer plantations and enrichment plantations were planned in and around PAs by associating local communities. Local people and communities participated in developing, protecting and managing plantations in and

around the PAs in lieu of usufructuary rights granted as per benefit sharing agreements, signed between participants and land owning agencies (such as FD in case of reserved forests and protected forests). Local stakeholders organised into forest user groups had access and got usufructuary rights over plantations in return for increased responsibility for the protection and conservation of biodiversity. As a result, for the first time PAs in Bangladesh were brought under co-management initiatives under FSP.

Three main activities under the conservation area component of FSP were, i) buffer zone plantations to be established around the seven PAs, ii) core area activities including enrichment plantations in identified gaps, and iii) extension of PAs by declaring new PAs or extending the areas of existing PAs wherever feasible. This was followed by another co-management initiative for managing the PAs of world famous mangroves of the Sundarbans under Sundarban Biodiversity Conservation Project (SBCP, initiated with the ADB support in 1998). Although buffer plantations were raised in three PAs covered under FSP, an effective protection to core forest areas could not be ensured as the participants protected only the buffer plantations assigned to them. Moreover the targets for conservation area component were reduced substantially during the last three years of FSP, and the SBCP was closed due to complaints about irregularities. As a result, the co-management efforts suffered a set back until Nishorgo Support Project (NSP) was started in 2004.

There exists a close relationship between forests and forest dwellers and their knowledge of the forests can be used as a basis for increasing their involvement in biodiversity conservation programmes (Hegde and Enters 2000). In 2004 Forest Department developed a Nishorgo Programme by focusing on the co-management of the PAs. An appropriate form of access, control and management by the local stakeholders was thought to be necessary for the protection of biodiversity of PAs. So Nishorgo Programme focused on building equitable partnerships between the FD and key local, regional and national stakeholders, who could assist in PA conservation efforts. An effective implementation of the Nishorgo Programme would help FD to conserve biodiversity through facility development, capacity building, and gainful partnerships with key stakeholders. Under its partnership with the Government of Bangladesh, the USAID, Bangladesh through NSP is providing targeted technical support, aiming to protect and conserve the biodiversity by building gainful partnerships between the FD and main stakeholders, based on mutual trust and shared roles and responsibilities for biodiversity conservation.

The NSP (formerly Co-Management of Tropical Forests in Bangladesh) has been started since 2003 as a five-year pilot project for co-managing five PAs. The NSP is working closely with the FD and key conservation stakeholders to develop and implement a co-management strategy to help conserve the country's PAs, where gainful partnerships with relevant stakeholders are essential for PA conservation. Main objectives of the NSP are to : i) develop a functional model for formalised co-management of PAs, ii) create alternative income generation opportunities for key local stakeholders associated with pilot co-managed PAs, iii) develop policies conducive to improved PA management and build constituencies to further these policy goals, iv) strengthen the institutional systems and capacity of the FD and key stakeholders so that the improvements in co-management

under the Project can be made permanent, v) build or reinforce the infrastructure within the PAs that will enable better management and provision of visitor services at co-managed sites, and vi) design and implement a programme of habitat management and restoration for the pilot PAs.

The co-management model developed and being implemented under the NSP involves developing gainful partnerships of key stakeholders in the management of the five pilot PAs. Presumed benefits of environmental policy decentralisation depend in significant measure on broad participation in the programmes that governments create to decentralise decision-making related to resource management (Agarwal and Gupta 2005). A two-tier co-management institutional structure (co-management councils, each comprising nearly 50 representatives from various stakeholders, and a co-management committee of 19 members elected amongst the council members, responsible for overall management functions in a PA) has been developed and approved by the Government of Bangladesh (GoB) in all the five pilot sites. Accordingly eight co-management councils and their eight co-management committees are making important decisions in the all the five PAs. Local representatives included in the co-management councils and committees feel empowered to actively participate in co-management decisions. Community Patrolling Groups (CPGs), Forest User Groups (FUGs) and their Federations have been formed in the PAs and are represented in the co-management councils and committees. Equity, poverty and gender considerations have been incorporated while forming FUGs, CPGs, co-management councils and co-management committees. A total of 32 CPGs (with 1100 members) and 320 FUGs (each with 15-20 members) have been developed and are being provided livelihood skills and support under NSP. Youths have been organised by forming 25 Nishorgo Clubs in different PAs. A number of co-management events have been organised both at local and national level for creating awareness and motivation on biodiversity conservation. Six folk music teams and eight people's theatre teams, developed locally by organising FUG and CPG members, are proving useful in spreading co-management messages in the villages covered under landscape zones. Seventy Eco-Guides trained under NSP are helping in guiding eco-tourists visiting the five PAs. In addition, seventy community development schools have been developed where FUG and CPG members meet every week to discuss their local issues for their resolution with the help of NSP staff.

The costs and benefits of conservation have often been shown to be skewed in favour of the rich in developed countries and against the poor in developing countries (Brown 1998). Alternative income generation opportunities are, therefore, being made available to the local community to offset some of the losses incurred to local people due to biodiversity protection efforts through community patrolling. A strategy that has been embraced as suitable for attaining both economic and ecological success is eco-tourism (Marnie et al. 1998). Livelihood activities that make use of ecological services have strong linkages with biodiversity conservation (Salafsky and Woolenberg 2000). Biodiversity-based small enterprise development activities including eco-tourism and nursery development are being taken up by the local stakeholders. The stakeholders' rights (e.g. sharing of usufructs and revenue from eco-tourism activities) and responsibilities (e.g. protection of forests and conservation of biodiversity) have been

defined in co-management constitution and agreements. Small projects have been developed by co-management councils for funding under Landscape Development Fund established under the NSP. Steps are underway to register co-management councils under Society Act so that these organisations can receive funds for local community development and implement small scale rural development projects in and around the pilot PAs.

Main focus of forests management in PAs under the NSP is on conservation of forests and constituent biodiversity resources, sustainable use of specified areas where this can help achieve conservation on a broader scale, and involvement of local people and other key stakeholders in PA management. The co-management planning approach under Nishorgo Programme comprises, i) protection and conservation of all remaining natural forests and constituent biodiversity in the PAs, ii) conversion of monocultures of exotic tree species into natural and man made regeneration of indigenous species by gradually opening the canopy, iii) development of co-management agreements (by linking PA conservation with benefit sharing arrangements) with key stakeholders to reduce ongoing habitat damage by helping them achieve sustainable livelihoods through participatory forest use and alternative income generating activities, and iv) provision of support to better administration and management of the PAs including capacity development, facility/infrastructure development, training, and wider extension and communication. Two other main schemes on wildlife management being funded by GoB are on the development of Modhupur and Bhowal National Parks with main focus on providing protection and facility development. Other wildlife schemes focus on safari parks in Dulahazara and Sitakunda, mainly for eco-tourism purposes.

With the promulgation of progressive forest policies and legislations, the co-management of PAs in Bangladesh should focus on eco-restoration of the site and conservation of biodiversity to be achieved through local stakeholders partnerships. Management zoning by these objectives has been attempted in the management plans for all the five pilot sites. Given peoples' protection against illicit felling, poaching, forest land encroachment, forest fires and forest grazing, it is possible to naturally regenerate the country's PAs in view of favourable above-ground and below-ground biophysical and ecological factors.

5.0 Emerging Co-management Challenges and Lessons, and their Relevance to Bangladesh

A number of challenges, both generic and country-specific, are emerging in the process of co-managing the South Asian PAs. While several countries of South Asia have been pioneers in participatory conservation, a much needed foundation for political commitment is in want (Sharma and Yonzon 2005). Co-managing the existing PAs, connecting them through corridors, and earmarking new PAs as complexes that are representatives of an ecological biome or ecosystem are important for ensuring long-term viability in all the six countries. But there is a lack of adequate resources including funds and trained field personnel. Donor supported projects such as NSP in Bangladesh are supporting technical skill development but are not adequate in meeting the huge gap. India has developed some technical institutions (e.g. Wildlife Institute of India) that can

be used (under the SAARC, South Asian Association for Regional Cooperation) by the neighbouring countries by promoting research (and monitoring) on ecological and ecosystem processes, livelihood opportunities, eco-tourism and carrying capacity, habitat impacts due to climate changes, habitat fragmentation and wildlife viability, habitat degradation and wildlife diseases, genetic base and extinction of species, reintroduction and rehabilitation of endangered species, and ex-situ conservation. Rapid shrinkage of suitable habitats has resulted in man-animal conflicts with loss of life and property in the South Asian countries. Restoration of degraded forest landscapes by encouraging natural regeneration through community protection against illicit felling, poaching, forest fires, forest grazing and forest land encroachment is a challenge that is common to all the six countries. An important task to be immediately completed for the South Asian PAs is to cover them under participatory management plans. Establishing trans-boundary cooperation (as being done in case of India and Bangladesh) by developing suitable protocols is desirable for following a landscape-based approach of PA co-management in South Asian region.

Involving local people gainfully in PA co-management and sustaining their partnership would require special efforts, particularly in Pakistan and Bangladesh, where the evolution of people-based local organisations and enabling policy and legal environment will happen gradually. Checking further fragmentation of PAs and connecting existing PAs through corridors have emerged as big challenges for Bangladesh. Poaching of mega wildlife species such as tigers and elephants has been taken seriously by the Indian government and so a Wildlife Crime Bureau has recently been set up. But an effective control of poaching would require regional cooperation within South Asia and beyond. The control of forest grazing and fires is proving difficult without community participation in many Indian and Pakistani PAs that are located in the semi-arid and arid areas where pastoral practices offer livelihood opportunities in the absence of cultivable land. Local governance issues (such as encroachment of public lands including forests and PAs by elites in Bangladesh), ethnic conflicts (having impacts on PA management in Sri Lanka) and Maoist insurgency (in Nepal) are proving challenging in the absence of wide participation of local stakeholders. Co-managing PAs as integral component of forest landscapes is particularly challenging in Sri Lanka in view of different ministries having administrative jurisdictions on PAs and forests. Moreover ensuring adequate benefits to local community by establishing clear authority is important in Sri Lanka. Enabling policy and legal framework are required to be put in place in Bhutan.

Natural forests in South Asia in general and Bangladesh in particular have severely degraded, thereby disrupting the symbiotic relationship that existed traditionally between the livelihoods of local people and surrounding natural resources. The forest degradation in this situation adversely affects the livelihood opportunities of local people as economic value of the forest resources is due mainly to its continuance and consequent opportunities to benefit directly from biodiversity existence and use. A great challenge in front of FD is thus to restore this positive linkage by coupling biodiversity conservation with livelihood opportunities for local people. The NSP is attempting to address this important issue in a number of ways. Biodiversity dependent livelihood opportunities such as eco-tourism, nursery development, medicinal plants, homesteads management,

and non-timber based small enterprise development are being encouraged in order to create vested interests of local community in the sustainance of PAs and their constituent biodiversity. Main challenge of PA co-management planning in South Asian countries is to manage them in as natural and less disturbed conditions as possible, and to provide protection to their constituent biodiversity by establishing gainful partnerships with key stakeholders. Co-management of PAs as a part of biodiversity and forest land management strategy is necessary so that perennial vegetative cover is maintained. Biodiversity conservation is wrought with difficult decisions and how those decisions are made will, in many cases, affect the future existence of innumerable plant and animal species (Brechin et al. 2002).

A PA ecosystem creates its own micro-climate that is an integrated result of meteorological processes and the conditions within the space occupied by a forest ecosystem. Success of PA co-management would depend upon a number of factors including adequate site information, understanding of flora/fauna and local communities, nutrient availability, natural regeneration of flora and fauna, institutional capacity and commitment of field staff, facility development, gainful partnerships with local stakeholders and adequacy of resources. Management of biodiversity within PAs and generating forest functions and services while maintaining their environmental roles and multiple functions are necessary. Co-management of PAs is an important part of biodiversity and forest land management strategy so that perennial vegetative cover is maintained. A PA co-management system should be perceived as husbandry of renewable biodiversity with attention to the protection, conservation, recreational and other values in gainful partnership with local stakeholders. When local communities have a direct stake in the outcome of conservation projects, they are more likely to provide the political support necessary to balance development pressures that may arise for the diversion of PA land for non-biodiversity purposes (Chhatre et al. 1998). The value of PA functions and services such as socio-ecological security, regulation of steam flow, source of biological diversity and sink for carbon content is being increasingly recognised in PA co-management decisions in South Asia.

Maintenance and development of good quality forest cover with natural structure and composition, and the conservation of its constituent biodiversity are important considerations in PA co-management. As in case of India and Nepal, sustainable forest use practices need to be allowed to local forest dependent people of Bangladesh (particularly in identified landscapes) based on co-management agreements with specific roles and responsibilities. Benefit sharing agreements should be signed with local community based on the guidelines as specified in the Bangladesh Social Forestry Rules, 2004. Unlike India and Nepal, neither the grass root organisations have developed in Bangladesh nor government development organisations been active at village level. This vacant space has, therefore, been occupied by NGOs, some of which have off late become quite big and bureaucratic. As in case of India and Nepal, the Government of Bangladesh should provide legal support in the development of grass root community organisations in natural resources sector. Natural regeneration and eco-restoration are to be encouraged, and enrichment planting of indigenous species of shrubs and trees are to be taken in those areas where regenerative rootstock does not exist. The present practice of clear-felling in

buffer forests (e.g. Rema-Kalenga) is to be done away in favour of selection felling of exotic species for encouraging natural regeneration of indigenous species. Visitor use for outdoor recreation, research and educational purposes will be encouraged in designated areas/zones.

With the promulgation of progressive forest policies and legislations in many South Asian countries, PA co-management has focused on ecological requirements, conservation of biological diversity, and meeting bonafide consumption needs of local people by associating them in gainful partnerships. Management zoning by these objectives has been attempted in Bangladesh in the approved management plans prepared for five PAs covered under NSP. Such management plans should be prepared for other PAs also. There is a need for taking up applied research initiatives particularly on assessing socio-economic and other intangible benefits accruing from the PAs. In-situ biodiversity conservation measures including appropriate natural regeneration technologies to be implemented in Bangladesh PAs will be complemented by ex-situ conservation efforts by establishing botanical gardens and zoos. Given protection against illicit felling, land encroachment, forest fire and grazing (to be achieved through co-management initiatives), it should be possible to naturally regenerate PAs in Bangladesh in view of favorable above-ground and below-ground biophysical factors. Necessary capital resources for taking up natural regeneration technologies may be tapped from global initiatives such as GEF, Clean Development Mechanism (CDM, a mechanism developed under UN system for funding development projects on climate change in developing countries) and Carbon Funds. In addition, funds may also be attracted from Aranayak Foundation that has recently been set up in Bangladesh under Tropical Forest Conservation Act of USA. As in case of Nepal and India, a part of revenue earned from eco-tourism may be retained by co-management councils for the development of local community and the PAs. But maximising economic opportunities for local people will require diversification of income opportunities ands integration with the landscape economy.

The diversion of forest land, both formally and informally, is quite common in densely populated Bangladesh due mainly to immense biotic pressure brought on the remaining chunk of forest land mainly by industries, agriculture and settlement. For instance, the forest lands are being increasingly encroached by neighbouring cultivators particularly in sal forests of central and northern regions. Except in parts of Chittagong Hill Tract (CHT), most of the forest lands in Bangladesh are suitable for cultivation and so in the food deficit country there is great temptation to harvest remainder forests in order to release land for cultivation. Although this disturbing trend has been reversed in the countries such as India, the diversion of forest lands for cultivation and industries is still continuing in Bangladesh. The diversion of forest land for agriculture is further aggravated in Bangladesh due to the suitability of forest land for cultivation and a very high population depending on agriculture for their subsistence livelihood. The continuing trend of loss of forest land needs to be stopped by enacting appropriate legislation and government orders, and implementing them strictly as has been achieved in India. This will check the unauthorised use of forest lands for non-forestry purposes. Natural characteristics of a PA combine with the manager's enforcement activities and other

policy instruments to conserve the area's natural resources (Albers and Grinspon 1997). The present practice of giving forest land on leases by Bangladesh FD and revenue departments should be immediately done away with.

More and more natural forests are being brought under PA network in countries like India, Sri Lanka and Nepal, mainly to provide effective protection to biodiversity (through updated wildlife policy and legislations) but more importantly to retain forest land under vegetation cover and also to ensure enhanced budget provisions. As a result, the PAs in these countries have proved effective not only for retaining forest lands but also protecting remainder natural forests. The extension of PA network is particularly needed in Bangladesh as many PAs are too small and fragmented to be biologically viable. As proposed in the government approved management plans, the existing boundaries of the five PAs covered under NSP should be extended by re-notifying them. Some of these PAs should be linked by identifying suitable corridors for animal movement (as in case of Bhutan), including grasslands so that wildlife can survive genetically. Grasslands are not only suitable as breeding grounds of a number of avian species but also help conserve soil and moisture, thereby help maintain water regime and hydrological cycle. The identified corridors should be declared as Ecologically Critical Areas for their protection and maintenance the Environment Act of 1995.

Biodiversity in sea and wetlands can be an important means of expanding PA network in Bangladesh. In fact vegetation-water linkages are pronounced in Bangladesh and so need to be tapped by adopting a watershed approach of PA management, particularly in hilly areas (e.g. Lawachara National Park, Rema-Kalenga Wildelife Sanctuary and Teknaf Game Reserve). As many PAs in Bangladesh are source of important rivers and streams, their conservation is important for maintaining the country's water regime. The uptake of Joint Forest Management in the semi-arid and arid regions of India (e.g. Maharashtra, Gujarat, Rajasthan) has been positively influenced by the enhanced water yield being obtained by local people due to regenerating vegetation. There are a number of instances in India where local people have started protecting and regenerating forests (and indeed with preference for water retaining tree species such as oaks in the Indian Himalayas and sal in central and north India). This relationship between forest ecosystems and local hydrology, as evident to the British foresters, who designated and managed many forest blocks as headwater reserves (e.g. Matamuhari RF and Sangu RF in CHT), should be revived. It should be appreciated that vegetation checks i) the rapid runoff , ii) recharges aquifers, and iii) suffuses local atmosphere with moisture (thereby cooling micro-climate) through evapo-transpiration from vegetation. Forests are living sponges of water - holding vast amounts of water in the soil they shade, in their trunks, branches and leaves, and via transpiration, in the air around them. Therefore, water flow/yield from the PAs should be regarded as an important forest product, which provides a major rationale for the extension of PA network in Bangladesh.

New PAs can be established in Bangladesh, particularly by covering the remaining tropical evergreen forests (of Sylhet, Chittagong, Cox's Bazar, and CHT), where water conservation will be an important objective of PA management under approved management plans. As in case of India, there is scope for developing community

conserved areas and conservation reserves particularly on khas lands (government lands) and unclassed state forests in the CHT. Most of the remainder natural forests in Bangladesh are home to ethnic minorities and co-managing these forests as PAs may be last the hope for retaining the natural vegetation, forest land and tribal-forest association. However, unlike India, Bangladesh does not have community lands and so community conserved areas (on Indian pattern) can not be declared. But peoples' involvement should be sought in establishing and maintaining conservation reserves on khas lands.

The Bangladesh Wildlife (Preservation) (Amendment) Act, 1974 (and the gazette notifications for the PAs) does not define core and buffer area in a designated PA. Accordingly, buffer zones have neither been identified in field nor delineated on the maps of the notified PAs. In view of limited area and fragmented nature of PAs in Bangladesh, the concept of Buffer Zone (as practiced in Nepal) is not practically feasible. However, a landscape approach of PA co-management, encompassing both relevant eco-systems and human systems, is found relevant for the PAs in Bangladesh. Accordingly, appropriate landscapes (that include part of RFs, designated as buffer sub-zones) have been identified as a part of management zoning implemented around the five pilot PAs covered under NSP. A landscape approach of PA co-management necessitates an identification of surrounding landscapes that impact core areas. As in case of the pilot PAs, the demarcation of PA boundaries and landscape zones should be taken up in other PAs of Bangladesh. In view of smaller PAs, the entire gazetted area of a PA is earmarked as core areas for suitable management interventions under the approved management plans. The interface landscape zone delineated in each PA is being managed in partnerships with local stakeholders. Over-emphasis on building expensive community assets as seen in the ICDPs should be avoided by creating biodiversity-linked livelihood opportunities (e.g. eco-tourism, nursery development, homestead management as being done under the NSP) that have better chance of their sustenance after project funds stop. The control and management of buffer zones should be vested with the concerned DFOs of Wildlife Wing as has recently been done in case of Lawachara and Satchari National Parks.

Adequate trained staff need to be posted in the PAs as per the recently approved organogram. Separate institutional facilities and funding mechanisms are to be developed within FD (with separate budget heads both for development and revenue heads) as being done by the federal and state Governments for PA management in India. Public-private partnerships as developed in India and Nepal are required in Bangladesh as well. A good start in this direction is already made by the recently set up Aranayak Foundation (with the assistance of USAID). Separate Wildlife Departments (as in case of Sri Lanka and Nepal) are not advised for Bangladesh presently in view of early stage of co-management development. However, separate Wildlife Wing may be set up within FD as being practiced in India. As in case of Sri Lanka, there is a case for formulating a separate Wildlife and Protected Area Policy for institutionalising co-management model in Bangladesh. However, while developing policies it should be kept in mind that community mobilisation is a process and so takes time. Moreover, local people have rights for sustainable use of local resources and their management, and so there is a strong case for them being partner in public resource management and decision-making. As in case of Nepal, the association of local stakeholders and benefit sharing should be legally formalised by including relevant provisions under the revised Act. Co-management models and approaches being developed under NSP for pilot areas need to be replicated in other PAs of Bangladesh.

Biodiversity conservation in South Asian countries is mainly a peoples' function and so control of illicit felling, forest fires, forest land encroachment and grazing is only possible by involving local communities through co-management. The decentralised political and democratic set up in the countries such as India (and Nepal) have helped the uptake of people oriented policies and programmes including joint forest management and eco-development schemes. Such initiatives need to be revitalised in Bangladesh, which as a part of Indian subcontinent experienced such democratic and conservation traditions for quite sometime. For instance, the rights of local people were well recorded in the Forest Act, 1927 wherein a special section was included for earmarking village forests for meeting the bonfide needs of local community for subsistence consumption. Although such village forests have in fact been declared in India, no such attempt was taken in independent Pakistan and Bangladesh.

The Indian experience of decentralised natural resource management through local communities is worth emulating in Bangladesh with positive outcomes. However, the empowerment of local stakeholders will require development of village level institutions, and revolving funds to be operated by local communities themselves (as is the case in Nepal and India). This approach of decentralised co-management matches closely with Bangladesh experience of developing user groups and community operated funds (e.g. ADB supported Forestry Sector Project and UNDP supported Fishery Project). Appropriate linkages with biodiversity conservation and livelihoods programmes through self-help groups and village development funds as mandatory in India and Nepal should be replicated for PA co-management programmes in Bangladesh. Similarly the Vulnerable Group Development concept (being implemented by the Government of Bangladesh) should be used in the identification of user groups of poor, who are in need of livelihood support under co-management activities. NSP has a provision of setting up a landscape development fund for which seed money has been provided by USAID. However, adequate flexibility and adaptability are critical to establishing cooperative partnerships that can advance both conservation and development (Mcpeak 2004).

International surge on biodiversity conservation as reflected in enhanced funding for environmental functions and services of forests and PAs has brought co-management issues in mainstream international discourse. Enabling policies and legislations compatible with relevant international conventions and protocols are being increasingly adopted by countries such as India and Nepal. With Kyoto Protocol coming in force, the value of PAs as carbon sink will increasingly attract funding from different funding mechanisms such as CDM and Carbon Funds. An effective tapping of such funding will require careful planning. India has moved ahead of other South Asian countries in designing and developing a portfolio of future projects for such funding under Kyoto protocol. Valuation of both tangible and intangible benefits from co-management of PAs, as being attempted in India, need to be taken up in Bangladesh as well.

As in India, there is a strong case for making provisions for the compensation to wildlife victims by Bangladesh FD. Similarly by insuring the local villagers for their life and property, FD can develop co-management linkages with local stakeholders. Such provisions can be included in the draft Wildlife Act that is now under revision process.

However, a wide public consultation is necessary for finalising the revised draft Act in order to take on board co-management approach. As in case of the Indian Wildlife (Amendment) Act 2002, the applicability of community conserved areas and conservation reserves may be examined while revising the Bangladesh (Preservation) (Amendment) Act, 1974. The traditional and customary rights of ethnic minorities living in and around the PAs should be respected (the recently enacted Indian Forest Right Act, 2006 may be referred to in this regard). Other important issues including provisions for zoo upkeep rules and co-management rules, retention of FD revenue for PA improvement, and a separate budget head for wildlife management, should also be considered while revising the Act.

6.0 Conclusion

Co-management practices have historically been implemented in forests that were open to local communities as common pool natural resources for their livelihoods. State property rights were established by colonial rulers as a result of which community-based forest use and management weakened. However, off late appropriate co-management practices have evolved in many South Asian PAs, where local communities have taken collective efforts in the face of degrading forests and environment. Such initiatives have been further strengthened under donor funded participatory forestry and biodiversity projects. A number of co-management initiatives have proved successful in South Asian countries such as Nepal, India and Sri Lanka. In the process many relevant lessons have been learnt for co-managing PAs in other South Asian countries including Bangladesh.

Sustainable biodiversity protection and use practices are to be increasingly allowed to the forests dwellers, particularly in interface landscapes, based on co-management agreements with specific roles and responsibilities for their gainful partnerships. Natural regeneration and eco-restoration are to be encouraged by associating local community. Enrichment planting of indigenous species of shrubs and trees may be taken in those areas where regenerative rootstock and/or mother trees do not exist. Visitor use for outdoor recreation, research and educational purposes will be encouraged in designated zones, classified according to specific co-management objectives.

The future success of co-management of PAs in Bangladesh would depend on successfully implementing such lessons in developing gainful partnerships with key stakeholders, who are empowered by enacting and implementing enabling policies and institutions. Socio-environmental functions and services from forests and PAs in Bangladesh need to be adequately appreciated by policy makers. Earmarking new PAs and better co-managing the existing PAs in Bangladesh are necessary for in-situ biodiversity conservation, and also for checking loss of forest land and degradation of vegetation cover. Putting in place relevant institutional and financial mechanisms, and sustainability tools are equally important for sustainable biodiversity conservation in Bangladesh.

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Developing Organic Agriculture and Its Effect on Sustainable Livelihood Improvement of Small Farmers in Bangladesh

Md. Asaduzzaman Sarker* and Yoshihito Itohara**

Abstract

The promotion of organic farming in developing countries is a challenging and time-consuming task, and few non-governmental organisations (NGOs) are rising with this challenge in some countries such as Bangladesh. The aim of this study is to assess the impact of the Organic Agriculture Extension Programme, as implemented by PROSHIKA (a well-known Bangladeshi NGO), in improving the sustainable livelihoods of small farmers involved in (non-certified) organic farming in Bangladesh. A random sample of 150 small farmers in Tangail District, among them 90 were active members of the PROSHIKA's programme, were selected for present study. Empirical data were collected through personal interviews with the respondents. A conceptual framework was developed to measure the improvements in sustainable livelihood, and an econometric analysis of improvements in the sustainable livelihood of the respondents was performed using a binary logit model. Twenty-six per cent of the respondents have experienced on having improvements to their sustainable livelihoods. The researchers also found that a combination of social, human, and physical capital is important in improving the sustainable livelihood of small farmers. While these classes of capital assets, along with financial capital, are important in improving smallholders' livelihoods, a combination of natural, social, and human capital is important in improving sustainability of livelihoods.

1.0 Introduction

Agriculture is the single largest sector of the Bangladesh economy, contributing about 21 per cent of the country's Gross Domestic Product (GDP) and employing around 52 per cent of the total labour force (BER 2008). In recent years, the main challenges of Bangladesh are to achieve sustainable food production, reduce poverty, and foster economic growth in the agricultural sector. To meet these challenges, the Department of Agricultural Extension (DAE) adopted a new agricultural extension policy in 1996 to provide extension support to all types of farmers (DAE 1999); however, it has eventuated that small farmers are who make up 88.5 per cent of the country's farming community (BBS 2008), have been neglected in the major extension efforts (FAO 2005).

Of those in Bangladesh who live in rural farming communities, about 43.8 per cent exist below the poverty line, as do 28.4 per cent of those in urban areas (BER 2007).

* Assistant Professor, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh-2200, Bangladesh. Corresponding author. Email: miltonagext@gmail.com
** Professor, Faculty of Agriculture, Yamaguchi University, Yamaguchi City, Japan.

The current trend of poverty reduction in rural Bangladesh is slower than that in urban areas. It remains a difficult task for 'Bangladesh Government' to achieve the Millennium Development Goal (MDG) of halving the poverty rate to 26.5 per cent by 2015, which requires an annual growth rate in the agriculture sector of at least 4.0 per cent (IFI Watch Bangladesh 2009).

Because of their vulnerability to various risks and shocks, resource-poor farmers in Bangladesh face many problems in attempting to realise the potential of agriculture to enhance their livelihoods. In addition, the prices of farming inputs (e.g., fertilisers, pesticides, high-yielding seeds, and diesel for irrigation machinery and power tillers) have been increasing in recent years (BBS 2007). Thus, increasing farm costs and leading small farmers into debt (Sarker 2002), as farmers in Bangladesh struggle to obtain a fair price for their crops due to unbalanced marketing systems in which any increase in profits is usually enjoyed by the middle-men. Consequently, the incomes of small farmers have declined in recent years. In this context, the issue of improvements to the sustainable livelihood of small farmers is currently central to the ongoing debate regarding rural development, poverty reduction, and environmental management in Bangladesh.

Eco-friendly organic farming can be a good choice in terms of cost effectiveness and curbing pollution, and has been demonstrated to be the best form of agriculture in overcoming the harmful impacts of agro-chemicals on soil, air, water, produce, and humans (Christian et. al. 2005). Thus, both governmental organisations (GOs) and non-governmental organisations (NGOs) in many developing countries are seeking to improve the livelihood of smallholders by introducing organic agriculture programmes. Unfortunately, the Department of Agricultural Extension (DAE) and other GOs in Bangladesh have no initiatives to promote organic agriculture to the farming community (Rahman & Yamao 2007), and few NGOs are currently working to promote organic farming. Among the NGOs, PROSHIKA (in Bangla, pro means 'training,' shi means 'education,' and ka means 'action') is a pioneer in the field, having been promoting ecological agriculture since 1978.

PROSHIKA's Organic Agriculture Extension (from now OAE) operates with the aim of improving the sustainable livelihood of smallholder farmers in Bangladesh. The present study sought to assess the success of OAE in this regard. This assessment is important because it will provide information regarding which strategies and activities are most helpful in promoting organic farming to small organic farmers and extension workers. Thus the study was carried out based on the following specific objectives:

- Determine the socio-economic status of small organic farmers in the study area;
- Examine the contribution of PROSHIKA's OAE programme in improving the sustainable livelihood of the small farmers; and
- Identify those factors that influence improvements in sustainable livelihood as well as livelihood and sustainability outcomes of the small farmers.

2.0 PROSHIKA's OAE Programme

PROSHIKA has started Ecological Agriculture Programme (EAP) to improve the sustainable livelihoods of the poor in farming communities in 1978 and began to encourage ecological practices among its group members by growing varieties of seasonal vegetables. The name of this programme has changed to the Organic Agriculture Programme (OAP), which involves around 800,000 smallholder farmers engaged in organic cultivation across 220,000 acres of land in Bangladesh. Of these farmers, 220,000 (on 80,000 acres of land) have switched to organic farming in the last 5 years (PROSHIKA, 2004). PROSHIKA has 220 Area Development Centres (ADCs) throughout Bangladesh, among which they are promoting organic farming in 89 ADCs.

As part of OAP, smallholder farmers from a village are initially organised to form a group. The farmers are then trained in preparing quick-compost and herbal pesticides from locally available inputs and in cultivating organic crops (especially vegetables). After completion of the training programme, each farmer is assigned an identity card identifying him/her as an organic farmer.

PROSHIKA has employed one technical worker (TW) with a 4-year diploma in agriculture (not a Bachelor's degree from a university) to promote organic farming in three villages within the Madhupur sub-district in Bangladesh, under the supervision of the OAP coordinator. Given the limited number of technical workers, Proshika is focusing on identifying key communicators (progressive group members) among existing organic farmers to disseminate information on organic agriculture among other farmers (Sarker & Itohara, 2008a). PROSHIKA's TW and key communicators use extension teaching methods such as training, group discussions, methods-and-result demonstrations, farm and home visits, and phone calls, and their service is provided free to smallholder organic farmers. PROSHIKA encourages the organic farmers to use quick-compost, cow dung, and farmyard manure in place of chemical fertilisers to supply essential plant nutrients. Organic farmers are also encouraged to use cultural, mechanical, and biological methods of controlling insect pests and to use herbal pesticides such as nimidicide (made from Azadiracta indica) and garlic pesticides as a last resort (Sarker & Itohara 2008b). The TWs promote the use of crop rotation, which is an important component of organic cultivation. In addition to extension services, PROSHIKA provides credit facilities to smallholder organic farmers and purchases organic vegetables, at a premium price, from the organic farmers twice a week directly from their farm, retailing the produce to urban consumers via their own marketing channel in the Mirpur area of Dhaka City. PROSHIKA also uses mobile shops (vans) to sell organic vegetables directly to consumers in some areas, including those in apartment complexes, and to supermarkets and departmental stores. As part of OAP, 5.94 million BDT (BDT is the currency of Bangladesh; as of September 2009, 1 USD = 69 BDT) in the fiscal year 2006-2007 was disbursed to 520 organic agriculture projects, and BDT 2.18 million was disbursed to 203 organic homestead gardening projects (PROSHIKA 2007).

3.0 Theoretical and Conceptual Framework of Sustainable Livelihood

In 1992, the United Nations Conference on Environment and Development (UNCED) first raised the concept of sustainable livelihoods as a broad goal in eradicating poverty. Chambers & Conway (1992) defined 'a livelihood' as the capabilities, assets (including both material and social resources), and activities required for a means of living. A livelihood is sustainable when it can 'cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.' Based on this concept of sustainable livelihoods, Department for International Development (DFID) developed the Sustainable Livelihood Framework as a tool for improving our understanding of livelihood, particularly the livelihood of the poor (DFID 2000) that emphasises on five capital assets: human, social, physical, financial, and natural capital.

In addition to DFID, many researchers (e.g., Scoones 1998; Bebbington 1999) have proposed that household and individual livelihood strategies may also be thought of in terms of access to different types of capital assets. Consequently, it is apparent that various capital assets are required by small farmers to improve their livelihood through implementing a strategy such as organic farming. PROSHIKA's OAE programme provides a number of capital assets to small farmers operating organic farms, with the aim of improving their sustainable livelihoods (Table 1).

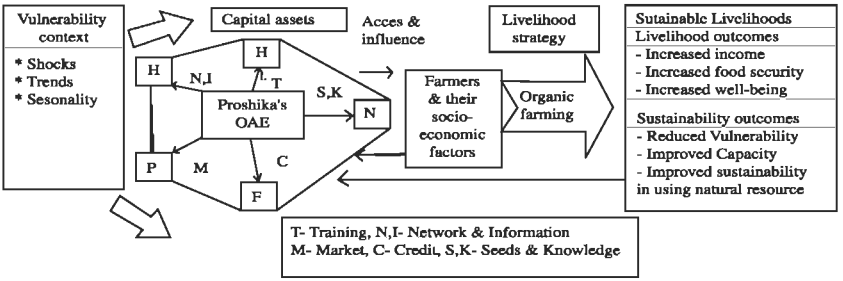
Table 1: Capital Assets required for Organic Farming and PROSHIKA'S Contribution (PROSHIKA Madhupur ADC, 2008)

Asset type	Capital assets required for organic farming	Capital assets provided by PROSHIKA's OAE programme
Natural	Land, water, biodiversity, seeds, environmental resources, and knowledge on the balanced use of natural resources	Seeds, knowledge on the sustainable use of natural resources
Human	Knowledge, skills, and human labour	Training, providing knowledge and skills regarding organic farming
Physical	Equipment and farm machinery, transport, roads, energy, and marketplace	Access to markets
Social	Help from families, friends, and networks; membership of groups and access to the wider society; and information on organic agriculture	Membership of groups and access to the wider society, and information on organic agriculture
Financial	Cash, savings, and access to credit	Access to credit

PROSHIKA's OAE programme provides credit, training, seeds, information on organic agriculture and the sustainable use of natural resources, and access to the market (Table 1), with a premium price offered for the produce of smallholder organic farmers (PROSHIKA farmers) to ensure the smooth operation of their organic cultivation. By making use of capital assets provided by PROSHIKA's OAE programme, in addition to their own resources, PROSHIKA farmers are engaged in organic farming to emerge from

poverty and to achieve improvements in their sustainable livelihoods, as depicted in the conceptual framework in Figure 1.

Figure 1: Conceptual Framework of the Study



Small farmers in Bangladesh are especially vulnerable in this regard, and they possess inadequate capital assets to pursue a strategy designed to improve their livelihood. To address this problem, the OAE programme provides farmers with various types of capital assets, and PROSHIKA farmers' practice organic farming as a means of improving their livelihood.

Organic farmers without any affiliation to PROSHIKA also lack capital assets, and they have no access to aid institutions such as PROSHIKA. These farmers are engaged in organic cultivation while relying solely on their own socio-economic resources. However, although such independent farmers are not active members of PROSHIKA, they are encouraged by PROSHIKA's OAE programme to adopt organic farming and they have access to technical advice from PROSHIKA's key communicators when required. Moreover, independent farmers also sell organic vegetables to PROSHIKA at times when the group members fail to meet their targets. Thus, independent farmers also benefit to some degree from PROSHIKA's OAE programme. In the present analysis, however, independent organic farmers are treated as the control group.

4.0 Methodology

4.1 Study Area

This study focuses on three villages (Pirojepur, Kuragasa, and Lokdeo) within PROSHIKA's Madhupur ADC which is a sub-district of Tangail District. This area was chosen because PROSHIKA has been promoting (non-certified) organic farming among the smallholder farmers of this area for around a decade. The people in these villages are mainly farmers who grow a variety of vegetables and rice using both conventional and organic methods, with many growing organic vegetables as part of the PROSHIKA scheme.

4.2 Design

The main aim is to assess the influence of PROSHIKA's OAE programme in improving the sustainable livelihoods of small farmers. Because the outcome variable is dichotomous, thus the researchers employed a binary logit regression model.

4.3 Population and Sample

The study population consisted of all small organic farmers (landholdings of less than1 ha) in three villages who grew organic vegetables or rice in 2007. Four hundred farmers met these criteria, among whom some were associated with PROSHIKA and some were independent farmers. Lists of PROSHIKA organic farmers were collected from PROSHIKA's Madhupur ADC, from which 90 organic farmers (30 from each village) were randomly selected to be interviewed. Similarly, lists of independent organic farmers within the three villages were collected from the relevant sub-assistant agricultural officers (SAAO) of the DAE, from which 60 farmers (22, 18, and 20 farmers from Pirojepur, Kuragasa, and Lokdeo, respectively) were randomly selected to be interviewed. In total, the researchers selected 150 smallholder organic farmers for this survey. Prior to data collection, researchers pre-tested the questionnaire by performing a pilot survey of 10 smallholder organic farmers who are not later interviewed.

4.4 Data Collection and Analysis

The empirical data analysed in this study were collected through personal interviews with the respondent small farmers, conducted between 10 December 2007 and 12 January 2008. The interviews were performed by researchers and three trained assistants. The survey data were later edited, coded, and entered in a computer database. The data were then verified for consistency and completeness and analysed using the software SPSS (Version 17).

4.5 Details of the Empirical Model

The dependent variable was measured as a dichotomous variable: farmers who had achieved or not achieved an improvement to their sustainable livelihood via the adoption of organic farming. Thus, the dependent variable can take a value of 1 with a probability of success θ, or a value of zero with a probability of failure 1-θ (i.e., a Bernoulli (or binary) variable). The logit regression equation is as follows:

$$\text{logit}[\theta(x)] = \log\left[\frac{\theta(x)}{1-\theta(x)}\right] = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_i x_i$$

Where α is a constant, β is the coefficient of the predictor variables, and θ is the logistic regression function, defined as follows:

$$\theta = \frac{e^{(a + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_i x_i)}}{1 + e^{(a + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_i x_i)}}$$

In the logit regression model, the Wald test is used to test the statistical significance of each coefficient (β) in the model. The Wald test calculates a Z statistic: this is then squared, yielding the Wald statistic with a chi-square distribution.

$$z = \frac{\hat{B}}{SE}$$

However, several studies have identified problems in using the Wald statistic. For example, Agresti (1996) reported that the likelihood-ratio test is more reliable than the Wald test when dealing with small sample sizes. Thus, the researchers also employed the likelihood test in the present analysis.

The likelihood-ratio test uses the ratio of the maximised value of the likelihood function for the full model (L_1) to the maximised value of the likelihood function for the simpler model (L_0). The likelihood-ratio test statistic is as follows:

$$-\ 2\log\left(\frac{L_0}{L_1}\right) = -\ 2[\log(L_0) - \log(L_1)] = -\ 2(L_0 - L_1)$$

This log transformation of the likelihood functions yields a chi-squared statistic.

This binary method was selected because of its convenience in terms of collecting and authenticating the data. Because the interviewees had a low level of education, most of the questions in the survey required answers in the form of 'yes' or 'no.'

4.6 Calculation of the Dependent Variable

The dependent variable had two parts: one related to livelihood and the other to sustainability. Thus, improvement in sustainable livelihood was measured based on the following indicators proposed by DFID: increased income, increased food security, increased well-being, reduced vulnerability, increased capacity, and increased sustainable use of natural resources. Here, the first three indicators were related to livelihood outcomes and the last three to sustainability issues. To measure the degree of improvement in sustainable livelihood, interviewees were asked whether they had experienced of getting any improvements in income, food security, well-being, capacity, balanced use of natural resources, and reduced vulnerability following the adoption of organic farming.

A positive response to all six indicators was considered to indicate an improvement in sustainable livelihood due to the adoption of organic farming, and was assigned a score of 1 (otherwise, zero). Similarly, improvements in livelihood and in sustainability were each measured based on the three indicators detailed above. In the case of measuring improvements in livelihood, a positive response to all three indicators (i.e., increased income, increased food security, and improved well-being) was considered to indicate an improvement in livelihood, and was assigned a score of 1 (otherwise, 0). Similarly, in the case of measuring sustainability, a positive response to all three indicators (i.e., improved capacity, reduced vulnerability, and improved balanced use of natural resources) was considered to indicate an improvement in sustainability, and was assigned a score of 1 (otherwise, 0). Table 2 provides definitions of the explanatory variables used in the binary logit model.

Table 2: Description of Variables used in the Binary Logit Model

Variables	*Type*	*Description*
Dependent variable		
Y_i	Binary	Assigned a value of 1 if the smallholder farmer has experienced an improvement in sustainable livelihood (otherwise, 0)
Explanatory variables		
Age (X_1)	Dummy	Value of 1 if farmer's age is < 35 years (otherwise, 0)
Gender (X_2)	Dummy	Value of 1 if farmer is male (otherwise, 0)
Education (X_3)	Continuous	Number of years of formal education
Farm size (X_4)	Continuous	Amount of land under cultivation (ha)
Number of workers in family (X_5)	Dummy	Value of 1 if 3 or more workers in the family (otherwise, 0)
Years involved in organic farming (OF) (X_6)	Continuous	Number of years involved in OF
Proshika membership (X_7)	Dummy	Value of 1 if an active member of PROSHIKA (otherwise, 0)
Access to training (X_8)	Dummy	Value of 1 if trained in OF (otherwise, 0)
Access to information (X_9)	Dummy	Value of 1 if farmer has received OF-related information (otherwise, 0)
Access to credit (X_{10})	Dummy	Value of 1 if farmer has received credit to undertake OF (otherwise, 0)
Access to market with a premium price (X_{11})	Dummy	Value of 1 if farmer has received assistance in marketing organic produce (otherwise, 0)
Access to information on the sustainable use of natural resources (X_{12})	Dummy	Value of 1 if received information on the sustainable use of natural resources (otherwise, 0)

The probability of an improvement in sustainable livelihood (SL_i) is specified as a function of economic and social factors relevant to the smallholder organic farmers as well as capital assets provided by PROSHIKA's OAE programme:

$SL_i = f(X_1, X_2, \text{------}, X_n) + e_i$ --------- (1)

Similarly, the probability of improvements in livelihood and sustainability are respectively represented as

$L_i = f(X_1, X_2, \ldots\ldots, X_n) + e_i$ ---------- (2) and

$S_i = f(X_1, X_2, \ldots\ldots, X_n) + e_i$ ---------- (3)

The perceived capital assets provided by PROSHIKA's OAE are expected to show a relation to improvements in sustainability, livelihood, and/or sustainable livelihood. Theoretically, small farmers with access to capital assets should be able to significantly change their livelihoods in a sustainable manner. Therefore, it is hypothesised that improvements in sustainable livelihood are positively related to PROSHIKA's OAE programme.

5.0 Results

5.1 Objective 1: Socio-economic Status of Small Organic Farmers

The average age of the respondent organic farmers was 40.47 years (Table 3), and 44 per cent of farmers were aged less than 35 years (47 per cent for PROSHIKA farmers compared with 40 per cent for independent farmers). Seventy-six percent of farmers were male, and the average household size was 5.19 persons. The farms in both groups were small, with all having less than 1 ha of cultivated land. Each household had an average of 3.44 active members (15-60 years in age) and 1.75 dependents (aged < 15 years or > 60 years). The average number of years of farming experience for household heads was 22.37 years. None of these variables showed a statistically significant difference between the two groups (PROSHIKA and independent organic farmers). The researchers found the following differences between the two groups at the 5 per cent level of significance: PROSHIKA organic farmers had more years of formal education and more experience in growing crops using organic methods.

Table 3: Comparisons between PROSHIKA and Independent Farmers regarding Socio-economic Status (Madhupur ADC of PROSHIKA, Bangladesh, 2008) (n = 150)

Explanatory variables		*All farmers*		*PROSHIKA farmers*		*Independent farmers*		*t-statistic*
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	
Individual level variables	Age (dummy)	0.44	0.50	0.47	0.50	0.40	0.49	0.88
	Education of household head (yrs)	3.87	3.96	4.65	4.02	2.7	3.58	3.16**
	Gender (dummy)	0.76	0.43	0.73	0.44	0.80	0.40	-1.0
Household level variables	Total land holdings (ha)	0.24	0.19	0.23	0.13	0.24	0.12	-0.75
	Three or more workers in family (dummy)	0.26	0.44	0.28	0.41	0.23	0.47	0.63
	Years involved in OF	4.25	1.50	4.55	1.64	3.88	1.69	2.82**
Variables related to capital assets (dummy)	Access to training in OF	0.31	0.46	0.38	0.49	0.20	0.40	2.25**
	Access to credit	0.44	0.49	0.49	0.50	0.37	0.49	1.5
	Access to market with a price premium	0.62	0.49	0.91	0.29	0.20	0.40	11.8***
	Access to information	0.48	0.49	0.63	0.46	0.43	0.49	2.5**
	Access to information on the balances use of natural resources	0.38	0.49	0.49	0.46	0.22	0.49	3.86**

Note: *** significant difference between the two groups at the 1 per cent level; ** significant at the 5 per cent level

More importantly, PROSHIKA farmers had better accesses to training, credit, information, and information on the balanced use of natural resources, with all these differences being statistically significant at 5 per cent level. While, PROSHIKA farmers had better accesses to market with premium prices that was also statistically significant at 1 per cent level. The overall socio-economic conditions of both groups of organic farmers were similar, except for access to various capital assets.

5.2 Objective 2: Influence of PROSHIKA's OAE Programme in Improving Sustainable Livelihood of Small Organic Farmers

The main objective of this study was to assess the influence of PROSHIKA's OAE programme in improving the livelihoods and sustainability of small organic farmers. We assumed that PROSHIKA's OAE programme provides various capital assets that influence the sustainability and livelihood of the respondent organic farmers, as well as improvements in their sustainable livelihood.

Results reveal that 26 per cent of the respondent small farmers experienced improvements in their sustainable livelihood by adopting organic farming (Table 4).

Table 4: Improvements in Sustainable Livelihood of Small Farmers following Adoption of Organic Farming (Madhupur ADC, 2008) (n = 150)

	Livelihood improvement				*Sustainability improvement*				*Sustainable livelihood improvement*			
	Not improved		*Improved*		*Not improved*		*Improved*		*Not improved*		*Improved*	
	f	%	f	%	f	%	f	%	f	%	f	%
All farmers	74	49.3	76	50.7	104	69.3	46	30.7	111	74.0	39	26.0
PROSHIKA farmers	38	42.22	52	57.78	58	64.44	32	35.5	663	70.0	27	30.0
Independent farmers	36	60.00	24	40.0	46	76.67	14	23.33	48	80.0	12	20.0
x^2 statistic	4.0*				2.53^{NS}				1.87^{NS}			

Note: * Significance difference between the two groups at the 5 per cent level; NS - Not significant

Table 4 also shows that the incidence of improvement in sustainable livelihood is higher among PROSHIKA farmers (30%) than among independent farmers (20%), although this difference is not statistically significant. However, more PROSHIKA farmers (57.78%) experienced improvements in livelihood through organic farming compared with individual farmers (40%); this difference is statistically significant. These results demonstrate that PROSHIKA's OAE programme is contributing to improvements in the livelihoods of small farmers in rural Bangladesh, but not to improvements in their sustainable livelihood.

5.3 Objective 3:Identification of Determinants that Influence Improvements in Sustainable Livelihood of Small Farmers

Another important objective of this study is to identify those determinants that influence improvements in the sustainable livelihood, as well as the livelihood and sustainability outcomes, of small organic farmers. Accordingly, the researchers developed three binary logit regression models (Models 1-3); the modelling results are listed in Table 5.

Table 5: Modelling Results of Improvements in the Sustainable Livelihoods of Small Organic Farmers (n= 150)

Variables	*Sustainable livelihood improvement (Model 1)*		*Livelihood outcomes (Model 2)*		*Sustainability outcomes (Model 3)*	
	Estimator	*Wald*	*Estimator*	*Wald*	*Estimator*	*Wald*
Age of household head (X_1)	-1.707	1.060	1.917	2.189*	-4.822	8.700***
Gender (X_2)	0.597	0.163	3.134	8.967***	0.136	0.021
Education of household head (X_3)	0.189	1.382	0.443	5.921	0.297	4.485
Farm size (X_4)	12.722	5.335**	6.509	2.667*	4.775	1.885*
Family labour (X_5)	0.684	0.476	3.015	6.082**	-.902	0.980
Years involved in OF (X_6)	1.223	6.732***	0.259	0.595	0.556	2.644
Proshika membership (X_7)	1.820	2.389*	0.323	0.087	-.053	0.004
Access to credit (X_8)	0.049	0.002	3.105	9.422***	0.483	0.318
Access to market with premium prices (X_9)	1.419	1.830*	2.802	3.518**	0.864	0.742
Access to information (X_{10})	2.138	3.071**	1.072	1.597*	1.392	2.091*
Access to training (X_{11})	1.497	2.468*	1.864	2.571*	1.908	4.913**
Access to information on sustainable use of natural resources (X_{12})	-.954	0.938	-.468	0.232	1.754	5.452**
Constant	-6.623	3.157	-11.259	7.402	2.895	0.856
-2 log likelihood	51.50		56.91		71.78	
Cox and Snell R^2	0.552		0.634		0.530	
Neglekerke R^2	0.809		0.846		0.747	
Chi-square statistic	120.32		150.6		113.13	

Note: Significance of the parameter estimate: *** significant at the 1 per cent level; ** significant at the 5 per cent level; * significant at the 10 per cent level

The results of model (1) in terms of sustainable livelihood improvement reveal a -2 log-likelihood value for the model of 51.59 and a likelihood ratio (x^2) of 120.32, greater than the critical chi-square (x^2) values ($x^2.01,16$) of 32.0 and ($x^2.05,16$) of 26.3 at the 1 per cent and 5 per cent levels of significance, respectively. The binary logit model revealed that among the capital assets, access to information, access to training, and access to the market with premium prices were the most important capital assets for improvements in sustainable livelihood. Similarly, model 2 yielded a -2 log-likelihood value of 56.91 and a likelihood ratio (x^2) of 150.60, greater than the critical chi-square (x^2) values ($x^2.01$, 16) of 32.0 and ($x^2.05$, 16) of 26.3 at the 1 per cent and 5 per cent levels of significance, respectively.

Model 3 yielded a -2 log-likelihood value of 71.77 and a likelihood ratio (x^2) of 113.15, greater than the critical chi-square (x^2) values ($x^2.01$, 16) of 32.0 and ($x^2.05$, 16) of 26.3 at the 1 per cent and 5 per cent levels of significance, respectively (Table 5). These results confirm that the explanatory variables in the model are collectively significant in explaining improvements in sustainability for small farmers in rural Bangladesh. Determinants such as access to knowledge on the sustainable use of natural resources, access to training, and access to information show a significant positive relation with improved sustainability.

6.0 Discussion

The results shown in Table 5 reveal that among the household-level variables, the number of years spent in organic farming and farm size are important factors in terms of improvement in sustainable livelihood. Partap (2006) and Sarker & Itohara (2008c) reported similar findings that due to adoption of organic farming, the average household income declines in the first few years before increasing thereafter. Thus, any improvement in sustainable livelihood is linked to the number of years since adopting organic farming.

The explanatory variables were collectively significant in explaining the improvement in livelihoods of smallholder organic farmers. Among the capital assets, access to credit, access to the market with premium prices, access to information, and access to training showed significant positive relations with improved livelihood for small farmers (Table 5). These determinants represent financial capital, physical capital, social capital, and human capital, respectively.

PROSHIKA's OAE programme has created the opportunity for small farmers to sell their organic products at premium prices to PROSHIKA's marketing outlet; this directly contributes to an increase in income and improved livelihood. This finding is supported by Rosegrant & Ringler (2005), who reported that organic farming leads to higher profits because of a price premium and reduced production costs.

The results of model 2 revealed that among farmers' individual-level variables, the age of the household head and gender showed significant positive relations with improved livelihood. In addition, young farmers (aged 18-35) have a greater opportunity to improve

their livelihoods by adopting organic farming, as young farmers have the strength to work hard and they have good relationships with PROSHIKA's technical workers and key communicators. Gender is also strongly associated with livelihood improvement. Due to cultural, religious, and social factors, women in Bangladesh are engaged mainly in household work; consequently, their income is less than that of males. Thus, households with a female head are more vulnerable to poverty, as also reported by Barros et. al. (1997). Nielsen (1997) stated that women in Bangladesh have extremely limited access to and control over resources (i.e., information, extension services, financial services, land inputs for production, outputs, and income), the direct marketing of produce, and exchange of information. Thus, households with a female head generally fail to attain the level of livelihood improvement obtained by households with a male head.

Among the household-level variables, model 2 revealed that farm size and number of workers in the family are influential in terms of improving the livelihood of small farmers. This result reflects the fact that larger farms and families with more workers can devote more land to organic farming, thereby ensuring greater income for the household and improved livelihood (Sarker & Itohara 2009).

Model 3 established that resources (i.e., natural, human, and social) are strongly associated with improved sustainability for organic farmers. It was expected that sustainability would be related to combinations of human, social, and natural resources; this finding is also supported by the sustainable livelihood model developed by DFID.

7.0 Conclusion

The findings of this study indicate that PROSHIKA's OAE programme has not played a significant role in improving the sustainable livelihood of the small organic farmers in rural Bangladesh, although it has contributing to some extent to improving their livelihood. Many of the small farmers increased their income after switching to organic farming, which considerably contributed to improved well-being. In terms of attaining an improved livelihood, PROSHIKA's OAE programme provides farmers with various capital assets, among which social capital (access to information and networks) and human capital (access to training in organic farming) meet the farmers' information needs related to profitable organic farming. Similarly, access to the market with premium prices, as provided by PROSHIKA, is helping the farmers to earn additional income, thereby leading to an improved livelihood. Those with larger farms earn more from organic farming than do those with small farms. The researchers also found that farmers who adopted organic farming many years ago have experienced greater improvements to their sustainable livelihood compared with those who adopted organic farming in recent years. Thus, the number of years spent in organic farming is an important factor in achieving an improved sustainable livelihood through organic farming.

Likewise, social, human, physical, and financial capitals (access to credit) are significant factors in improving the livelihood of smallholders. Young, male farmers (aged 18-35) are more likely to improve their livelihoods than are female and aged farmers. Significant factors in terms of improved sustainability are natural capital (knowledge of the balanced

use of natural resources), and social and human capital. Older farmers (aged 35 or older) attained greater improvements in sustainability compared with younger smallholders.

8.0 Implications and Recommendations

A major implication of the present results is that public policy should support and maintain growing enterprises such as organic farming, particularly in the case of small farmers. In addition, public sector extension organisations, as well as NGOs, may develop special programmes to encourage entrepreneurship in terms of organic farming among well-educated but unemployed young people, as this may contribute to reducing the high unemployment rate in Bangladesh. Thus it can be recommended that, small organic farmers should be explicitly considered in public policy regarding expansion of the agricultural sector and in terms of anti-poverty extension activities, which are currently lacking in Bangladesh. It is also essential to develop a separate national policy for organic farming in Bangladesh, in which farmers are provided with various types of capital assets. Given that larger farms earn more from organic farming, NGOs should promote organic farming among all types of farms to ensure the sustainable development of agriculture in Bangladesh. Based on the present findings, the researchers recommend that Youth Training Centres, managed by the Department of Youth Development of the Ministry of Youth and Sports, incorporate a special training programme on organic farming, in addition to other agricultural training programmes. Given that, young farmers have a greater chance of improving their livelihood through organic farming compared to old farmers, Youth Training Centres should provide training in organic farming to both educated and uneducated unemployed youth. At the end of the training programme, it would be important to provide the graduates with capital in the form of credit, as done in other programmes. Finally, more research is required into organic farming and small farmers in Bangladesh to ensure the successful extension of organic farming. It is especially important to consider how production and marketing information related to organic farming can be made more accessible to small farmers and to consider how organic farming can be more cost effective and profitable, thereby resulting in improved income and eventually a sustainable livelihood in rural settings.

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Impact of Crop Diversification on Income Generation of Beneficiaries under Rice Based Irrigated Farming System of Myanmar

Thanda Kyi* and Werner Doppler **

Abstract

The study was undertaken to assess the efficiency of resource use and profitability of crops under diversified rice-based farming system in Myanmar. Herfindahl index was used to justify diversification and Linear Programming (LP) approach was applied to maximise the return for the existing rice based farming system in the study area. The results of the study show that rice-rice is the predominant pattern (48.78%) and 31.71 per cent of farmers cultivated rice-chickpea-rice. Forty-one per cent of the farmers produced onion and 24.39 per cent of farmers grew chilli. Framers with low diversification depended more on rice, onion and chickpea while those with high diversification equally put stress on rice and other crops. Average annual farm income was significantly higher in high diversification than in low diversification group in which onion was the major contributor to farm income. To take advantage of diversification opportunities, it is necessary to support adequate infrastructure, access to information, credit and other technical know-how. The study concludes that the government needs to invest more in researches to cover emerging issues of diversification under different farming systems in Myanmar.

1.0 Introduction

Agriculture is the mainstay of rural economy of Myanmar. It employs about 61.2 per cent of rural labour and accounted for 55 per cent of GDP (MoAI, 2006). Rice is the staple food and is cultivated about 7 million hectares and contributes 58.62 percent to the net sown area. Crop diversification is defined in this research as growing more crops. It can generate income of rural household which is linked to commercialisation. The existence of substantial agricultural risk poses severe implications for farmers in the study area. Those farmers that are heavily dependent on few crops are much more vulnerable to the negative effects of agricultural risk relative to the more diversified farmers. There are different factors that motivate farmers to diversify the portfolio of their crop choice. The possible factors are market orientation or subsistence, income diversification, heterogeneity of farmers' land resource, resource endowment like education, labour, and wealth, farmers' concerns of preference, risk and labour shortage. Farm income is considered central to this study as it constitutes the most significant source of income in the study area. Farming represents a major source of employment in the study area. In Myanmar, it is quite interesting to know the questions of (1) how much diversification

* Deputy Director and Associate Professor, Department of Agricultural Planning, Ministry of Agriculture and Irrigation, Myanmar. Corresponding author. Email: thanda2010.kyi@gmail.com
** Professor, Institute of Agricultural Economics and Social Science in the Tropics and Subtropics, University of Hohenheim, Germany.

takes place? (2) is there any difference between the diversifying groups in the use of resources? (3) how can farmer maximise the return with limited resources in rice base farming system?

2.0 The Objectives

The objectives are:

- to assess the efficiency of resource use by diversified groups in rice based farming system
- to evaluate the profitability of the crops and income of the household by diversification groups in rice based farming system
- to give policy implication which provides better strategy in improving the income generation of resource poor farmers in rice based farming system

3.0 Concepts of Crop Diversification

Crop diversification is an agricultural development concept that intensively utilises the land in cultivating suitable multiple crops in order to generate higher return of farm incomes. The emphasis of focusing rice production by government is encouraged but it is necessary to grow gradually to remunerative crops such as sesame, onion, chickpea and greengram.

The term 'diversification' has been used to describe an increase in the number of sources of income and balance among the different sources in the analysis of household income. Thus, a household with two sources of income would be more diversified than a household with just one source, and a household with two income sources, each contributing 50 per cent of the total, would be more diversified than a household with one source accounting for 90 per cent of the income (Joshi et al. 2003).

Other definition of diversification concerns switch from subsistence food production to the commercial agriculture. A farmer may move from producing rice and vegetables for own consumption to specialising in one or a few cash crops.

Others focus on turning from low-value crop production to higher-value crops, livestock, and non-farm activities. Although 'low-value crops' are sometimes defined in terms of the value per unit of weight, it is probably more useful to define them as crops that generate high economic returns per unit of labour or land. This definition focuses on diversification as a source of income growth and a potential means for poverty reduction.

Another way to classify definitions of diversification is by specifying the sectors that are becoming more important as sources of income. Income diversification is often used to describe expansion in the importance of non-farm income, including off-farm wage labour and self-employment in small enterprises (Reardon 1997; Escobal 2001).

Diversification can occur at the micro, regional, and macro level (Taylor 1994). At the micro level, the individual household diversifies in order to strengthen and broaden its sources of farm and non-farm income. Horizontal diversification involves growing of new agricultural commodities while vertical diversification includes non-farm activities such as marketing, storage, and processing. At the regional level, regions pursue agricultural activities in which they have comparative advantage. For both households and regions, diversification may involve specialisation, as for example rainfed rice farmers becoming specialised onion producers. At the macro level, diversification implies the structural change from agriculture into non-farm activities, either in rural or urban areas, or in rural towns (Otsuka 1998).

Alternatively, agricultural diversification can be defined as the shift from crop production to livestock, fisheries, and forestry activities. Similarly, crop diversification refers more narrowly on shifts in the composition of crops grown. In contrast to non-farm diversification, crop diversification defined in terms of the number of crops is often greatest among poor subsistence farmers in rainfed agriculture.

Farming is risky because it deals with uncertain factors such as weather and market conditions. This uncertainty can result in variable returns to the decisions that farmers make in a particular year. Therefore, farm income variability is a problem of the farming household to deal with making decision of crop choice. Enterprise diversification is one method of reducing income variability. Farmers and farm managers, faced by price and yield variability, may wish to select a combination of enterprises to reduce the variability of farm income. Diversification is a frequently used risk management strategy that involves participating in more than one activity. It has the added advantage of mitigating price risk as well as fluctuations in outputs.

4.0 Methodology of the Study

4.1 Selection of Study Area and Data Collection

In order to study crop and income diversification Kyaukse township was purposively selected where various kind of crops are cultivated extensively with irrigated water. After consultation with experts, Kyaukse township (a highly diversified area) was included in the survey. These major diversified crops producing area represent a considerable portion of the predominant production technologies. A more detailed plan was then worked out with local agricultural extension officers who assisted in selecting the village tracts where the survey was carried out. Non-probability sampling was used since probability sampling is not practicable in this study. Specifically purposive sampling technique was used to select the sample rice based diversified crop area and farmer-respondents. Kyaukse is a township located in central dry zone where water is scarce. Irrigated farming is more central to livelihoods as a source of income. Seven crops namely rainy season rice, summer season rice, chickpea, sesame, onion, chilli, greengram and turmeric were grown in this study area. The soils, weather conditions and irrigation facilities are favourable for the cultivation of these crops. Under irrigated cultivation, farmers are able to produce more than two crops in each of the season. In addition farmers in selected

villages have grown onion as a commercial crop. Nine villages were selected to conduct the survey within the township based on area cultivated with rice based farming system. Although more than 70 farmers were interviewed using a structured questionnaire to collect information regarding the farming system, only a sample of forty one household respondents were entered to understand the diversification in Kyaukse township.

4.2. Analytical Methods

Descriptive analysis is applied to determine the socio economic environment of rice based farming system. Gross margin analysis was used to know the return per unit acre of land, labour and capital for crop activity. By using data on output and price of crops for the time being made by the survey, gross return was calculated and from this, the variable expenditure which includes expenses on seed, fertiliser, farmyard manure, pesticides and insecticides, machines and implements hired, hired labour and bullocks, is deducted to arrive at gross margin. In addition, Linear Programming (LP) approach was applied to maximise the return above variable cost for the existing rice based farming system in Myanmar. The general structure of the linear programming model has the following mathematical form.

$$\text{Max } Z = \Sigma P_i X_i - C_i X_i \quad (i = 1 \text{ to } n)$$
$$\text{Subject to } \Sigma a X_{ij} \leq b_j \quad (j = 1 \text{ to } m)$$

And $X_i \geq 0$

Z = objective function

X_i = level of activities

P_i = price per unit of i^{th} output activity

C_i = cost per unit of i^{th} input activity

a = technical coefficient

b = amount of i^{th} resource available

4.2.1 Measurement of diversification

Herfindahl index (Simpson 1949) was used to justify the diversification of the farmers. It is defined as: Herfindahl index of diversification (HID) = $\Sigma (X_i/\Sigma X_i)^2$ or HID = ΣP_i^2

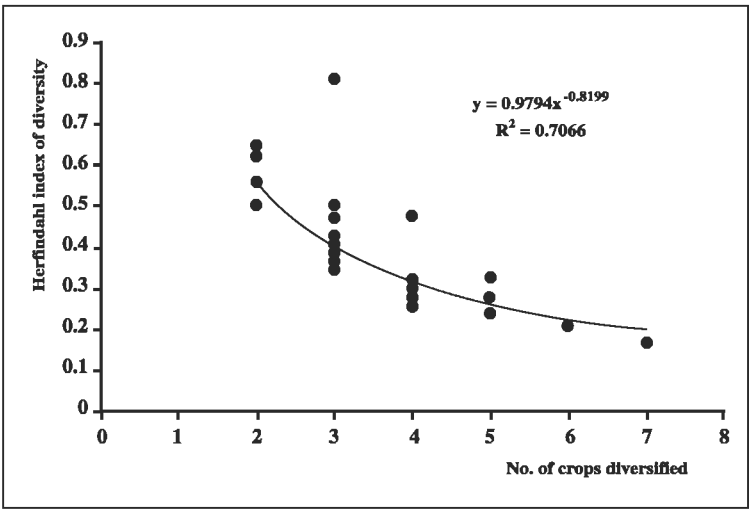
Where HID = Herfindahl index of diversification

X_i = Area of i^{th} crops

P_i = Share of the crops allocated to total land

The Herfindahl index (HID) is the sum of squared shares of area planted to each crop, which is essentially the weighted average of the proportional area of each crop, with the weights being the shares themselves. The value of HID falls between 0 and 1. If there is just one crop, P_1=1, so HID = 1. As the number of crop increases, decrease the sum of the squared shares, so that HID approaches 0. Using HID farmers were grouped into two by high and low diversification to see the difference between two groups. HID was significantly related with number of crops grown by farmers in the study area (Figure 1).

Figure 1: Relationship between Diversification Index and Number of Crops grown by Farmers (Own Survey 2007)



5.0 Results and Discussion

5.1 Analysis of Rice Based Farming System

5.1.1 Average size of farm operation

Average farm land and per cent area allotted to different crops in study area was mentioned in Table 1. In Kyaukse, 47.31 per cent area of total land was occupied by rainy season rice while 35.88 per cent of total land area was under summer rice. About 18.58 per cent and 17.49 per cent each of land were allotted to growing of chickpea and onion while 12.11 per cent, 8.11 per cent and 2.99 per cent of land were under the crops of sesame, chilli and greengram respectively.

Table 1: Average Farm Land and Area (%) Allotted to Different Crops in Rice Based Farming System

Crops	*Total area grown (ac)*	*Average area (ac)*	*% area allotted to total land*
Rainy season rice	177.78	5.27	47.31
Summer season rice	131.83	3.99	35.88
Chickpea	68.50	3.59	18.58
Greengram	11.00	2.20	2.99
Sesame	44.50	2.97	12.11
Onion	64.25	3.38	17.49
Chilli	29.80	2.29	8.11
Turmeric	1.90	0.95	0.52

Source: Own Survey 2007

Among the diversification groups, average size of farm producing crops were relatively medium during 2006 and 2007 in Kyaukse where rice based farming system is practiced. The average holding size by low diversification group was about 5.81 acre and that by high diversification group was 10.26 acre as shown in Table 2. The average cultivated areas of rainy and summer season rice were relatively larger in high diversification group than in low diversification group. Framers with low diversification group depended more on rice, onion and chickpea. However, farmers with high diversification equally stressed not only on rice but also on other crops.

Table 2: Average Holding Size and Cultivated Crop Area by Two Diversification Groups in Rice Based Farming System

Crop	*Average area per farm in acre*	
	Low diversification	*High diversification*
Rainy season rice	3.51	5.61
Summer season rice	3.00	4.91
Onion	8.00	2.91
Sesame	-	3.13
Greengram	-	2.17
Chickpea	3.00	4.13
Chilli	-	2.83
Average land holding size (ac)	5.81	10.26

Source: Own Survey 2007

5.1.2 Cropping pattern

Farming systems vary depending on the soil, availability of irrigation water, rainfall pattern, farmers' knowledge, financial capability and marketing facilities. Rice is basically grown in Kyaukse under irrigated condition due to scarce water even though the season was rainy. It is cultivated during summer season as well, depending on the availability of water in the reservoir and control by the authority of Irrigation Department. Rice-rice is the predominant cropping pattern (48.78%) in this study area (Table 3).

Table 3: Cropping System Practised by Farmers in Survey Area of Irrigated Land

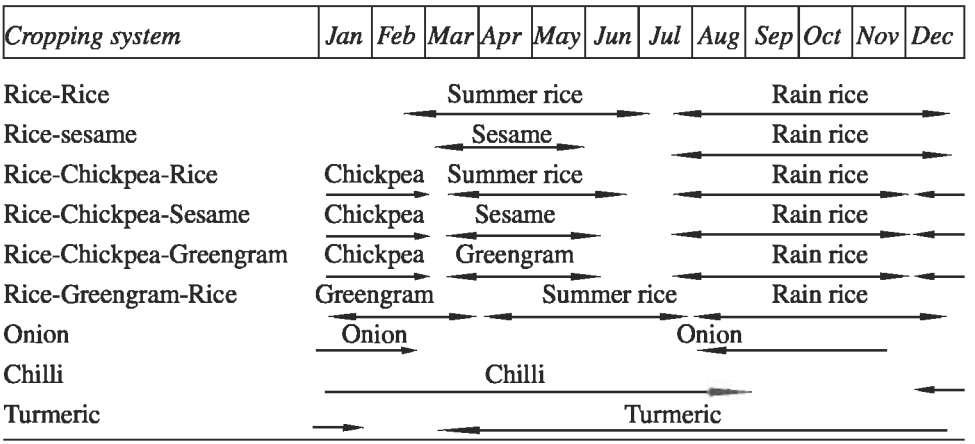
Cropping system	*Frequency*	*Farmers (%)*
Rice-rice	20	48.78
Rice-sesame	9	21.95
Rice-chickpea-rice	13	31.71
Rice-chickpea-sesame	6	14.63
Rice-chickpea-greengram	3	7.32
Rice-greengram-rice	1	2.44
Onion	17	41.46
Chilli	10	24.39
Turmeric	1	2.44

Source: Own Survey 2007

Other crops were planted during winter and summer. At time when the water is inadequate for rice, farmers cultivated other crops such as chickpea, greengram and chilli. Chickpea is cultivated in Winter which is in December and carried to February. Most of the farmers cultivated onion as a cash crop if they have availability of land and capital. Within the same township, there may be difference in soil heterogeneity and water availability so that depending on the situation farmers had to allocate the land to suitable crops even though crops were profitable.

As shown in Figure 2, in Kyaukse area there were six kinds of cropping pattern in which onion, chilli and turmeric were additionally included in this cropping system. It was found that 31.71 per cent of farmers cultivated rice-chickpea-rice cropping pattern while 21.95 per cent of them grew rice-sesame pattern. Rice-chickpea-sesame and rice-chickpea-greengram patterns were observed at 14.63 per cent and 7.32 per cent of farmers respectively in that area. Forty one percent of the farmers produced onion and 24.39 per cent of farmers took part in production of chilli.

Figure 2: Predominant Cropping System of Study Area in Rice Based Farming System



Respondents reported the occurrence of crop losses and partial abandonment of rice and other crops due to flood, drought and heavy rain. Sesame and chilli mostly happened to be in this way. The cultivation of secondary crops is a viable option to overcome such kind of risk as such crops required less water. The development and introduction of quick maturing, drought tolerant and disease resistant crop varieties will provide a better option to overcome risk.

5.1.3 Farm productivity

The average rainy season rice yield of sample farmers by high diversification group was about 72.84 basket per acre while that by low diversification groups kept the amount of 64.15 basket per acre. Farmers with high diversification group kept higher yield in both rice than those with low diversification group but opposite was found in onion and chickpea (Table 4).

There has been a considerable increase in the productivity in rice primarily due to improved crop establishment methods and intensive application of fertilisers in Kyaukse. The onion yield obtained by low diversification group have been impressive, amounting to about 3166.67 viss per acre compared to that obtained by high diversification group which is about 2115.08 viss per acre. Nevertheless, farmers expensed more on onion under irrigated condition through which they were provided with improved seed available in the market.

Sesame, greengram and chilli were not grown by low diversification group but these crops were cultivated by high diversification group and average yields achieved were 6.99, 4.11 and 221.11 basket per acre respectively. The average yields obtained in respect to these crops have been considerable low compared to potential yield as the majority of farmers grow local variety, utilise poor quality seeds and poor crop management practices. The majority of farmers plant seeds of unknown variety obtained from shop.

Table 4: Average Yield of Crops by Diversification Groups in the Study Area

Crop	*Unit*	*Farm productivity*	
		Low diversification	*High diversification*
Rainy season rice	Basket/acre	64.15	72.84
Summer season rice	Basket/acre	77.73	96.79
Onion	Viss/acre	3166.67	2115.08
Sesame	Basket/acre	-	6.99
Greengram	Basket/acre	-	4.11
Chickpea	Basket/acre	15.00	8.11
Chilli	Basket/acre	-	221.11

Note: 622 viss = 1 ton

Source: Own Survey 2007

Detailed cropping practices for each crop are given in Table 5. There are differences in resource use between low and high diversification groups. Most of the farmers were using improved varieties but still there exists a gap between potential yield and actual yields obtained by farmers. Improve irrigation facilities, the introduction of appropriate crop production technologies would definitely enhance the productivity of crops grown by farmers. The development and introduction of appropriate crop production technologies are essential to raise productivity and reduce the yield gap under irrigated farming conditions.

Table 5: Management Practices for Individual Crops Grown in Rice Based Farming System in Kyaukse

Crops and management practices	*Unit*	*Low diversification (0.5-1)*	*High diversification (0-0.49)*
Rainy season rice			
Area	Acre	3.51	5.61
Seed rate	Bskt/ac	2.89	2.48
Farmyard manure	crt/ac	2.18	3.66
Urea	kg/ac	72.27	93.18
Compound fertiliser	kg/ac	22.07	29.44
Diesel	Gal/ac	3.07	2.43
Summer season rice			
Area	Acre	3.00	4.91
Seed rate	Bskt/ac	3.05	2.57
Farmyard manure	crt/ac	5.11	5.43
Urea	kg/ac	83.33	100.56
Compound fertiliser	kg/ac	33.00	43.33
Diesel	Gal/ac	2.50 1.91	
Onion			
Area	Acre	8.00	2.91
Seed rate	Bskt/ac	0.16	0.15
Farmyard manure	crt/ac	0.00	5.17
Urea	kg/ac	100.00	91.20
Compound fertiliser	kg/ac	50.00	58.28
Diesel	Gal/ac	15.00	4.11
Chickpea			
Area	Acre	3.00	4.13
Seed rate	Bskt/ac	1.50	0.81
Rhizobium	pack/ac	0.00	2.10
Diesel	Gal/ac	0.00	1.38
Chilli			
Area	Acre	-	2.83
Seed rate	Bskt/ac	-	0.16
Farmyard manure	crt/ac	-	9.30
Urea	kg/ac	-	104.17
Compound fertiliser	kg/ac	-	50.00
Diesel	Gal/ac	-	5.67

Sesame			
Area	Acre	-	3.13
Seed rate	Bskt/ac	-	0.15
Fertiliser	kg/ac	-	35.00
Diesel	Gal/ac	-	1.75
Greengram			
Area	Acre	-	2.17
Seed rate	Bskt/ac	-	0.25
Fertiliser	kg/ac	-	10.00

Note: Bskt = Basket; Gal = gallon i.e 1 gal = 6 litre; crt = cartload of bullock cart
Source: Own Survey 2007

5.1.4 Cost revenue structure, farm profitability and labour use

The average cost of cultivation as well as the returns from rainy season rice, summer season rice, sesame, chickpea, greengram, onion, and chilli reported by the respondents under irrigated condition are summarised in Table 6 with supportive data presented in Annexes (1-4). The cost of production by high diversification group was relatively higher in both of rice than that by low diversification group. Farmers with low diversification group spend more in growing of onion and chickpea than those with high diversification group.

Farmers with low diversification group obtained relatively higher net return from onion (1138583.3 ks/ac) and chickpea (176500 ks/ac) compared to high diversification group because of high yield and better prices during this season. Net return was significantly higher for onion (751173.8 ks/ac) followed by chilli (569549.3 ks/ac), summer season rice (206602.3ks/ac), rainy season rice (157426.4 ks/ac), sesame (126705.8 ks/ac), greengram (42572.2 ks/ac) and chickpea (38574.3 ks/ac) in high diversification group.

Table 6: Costs and Returns of Rice and Other Secondary Crops by Diversification Groups in Kyaukse

Crop	*Cost of production (ks/acre)*		*Net return (ks/acre)*		*Unit cost of production (ks/unit)*	
	Low	*High*	*Low*	*High*	*Low*	*High*
Rainy season rice	117986.7	125919.2	118264.0	157426.4	1839.2	1728.7
Summer season rice	112418.9	138703.7	170699.2	206602.3	1446.3	1776.6
Onion	294750.0	254119.9	1138583.3	751173.8	93.1*	120.1*
Sesame	-	39002.5	-	126705.8	-	5579.7
Greengram	-	38650.0	-	42572.2	-	9403.9
Chickpea	63500.0	38574.3	176500.0	38574.3	4233.3	4756.4
Chilli	-	234339.6	-	569549.3	-	1059.8

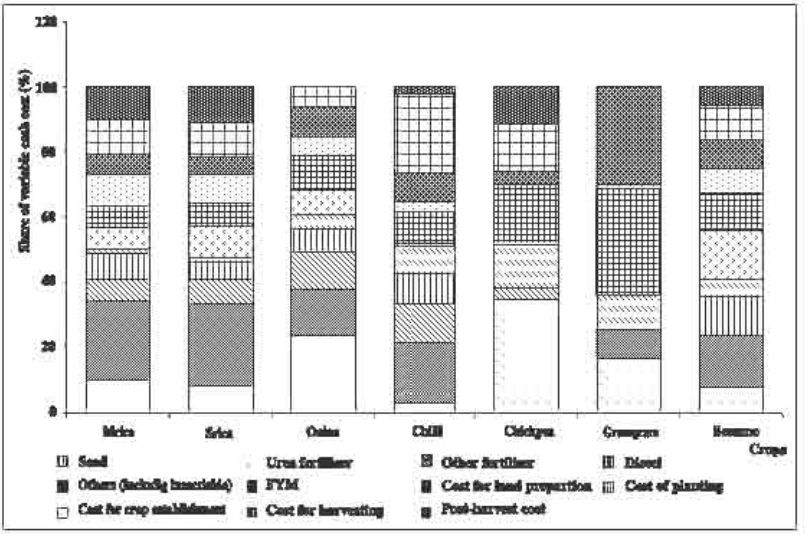
Note: Ks (Kyat) is currency of Myanmar; 1 US$ = 1230 Ks in market exchange rate as of June 2007. * indicates ks/viss and the rest are ks/bskt
Source: Own Survey Data 2007

The cost of production of onion is high owing to the planting of improved seed varieties and applying different kind of fertilisers, which are costly (Figure 3). The cost of chilli production is relatively high primarily due to use of fertilisers and labour hiring for harvest.

The cost of producing rice is seemly high because of more use of fertilisers, labour hired for harvest and threshing machine hired for post harvest. The cost of producing sesame, greengram and chickpea is low compared to other crops due to the use of low application rate of fertiliser and management practices.

Net returns are reasonable as the family cost is considered as a component of the cost of production. Farmers are able to sustain production of these crops mainly through the use of family labour. Boosting productivity and promoting crop processing at the cottage level is essential to raise the income from these crops and to alleviate poverty in the rural areas.

Figure 3: Variable Cash Cost Component of Crops in Rice Based Farming System

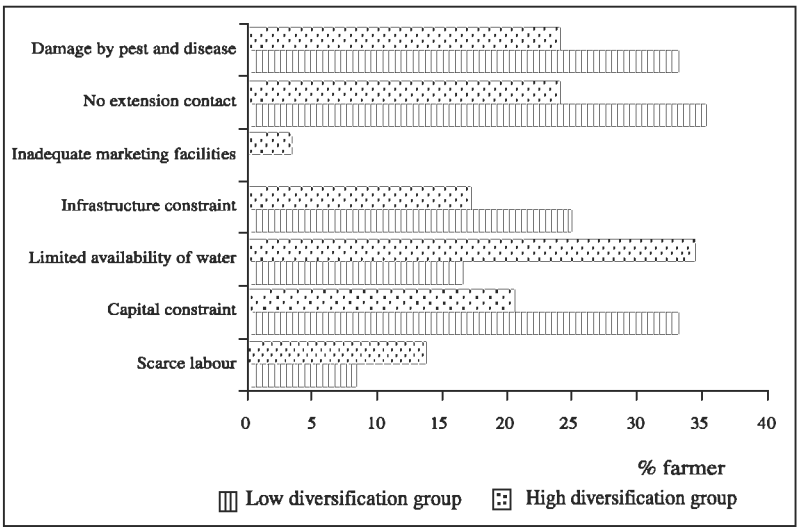


5.1.5 Constraints to farm production

At farm level there are various factors that constrain crop production. Some of the problems expressed by the respondents are presented in Figure 4. Even though majority of the crops are grown under irrigated condition farmers were facing risk and uncertainty involved in obtaining high yields and profits. Thirty three per cent each of farmers with low diversification group were found to have a problem of lack of investment capital and damage by pests and diseases. Some of the low diversification group (35.3%) did not have any contact with extension services. Some of those (16.7%) had limited availability of water in growing of crops. The most important problems for high diversification group were limited availability of water (34.5%), damage by pest and disease (24.1%), no extension contact (24.1%), lack of investment capital (20.7%) and labour shortage during crop season (13.8%). Development of diversion irrigation facilities and dissemination of

appropriate technology package under irrigated conditions are vital to increase the extent and improve the productivity of these crops.

Figure 4: Production Constraints expressed by the Respondents to Cultivation of Crops in Rice Based Farming System in Kyaukse

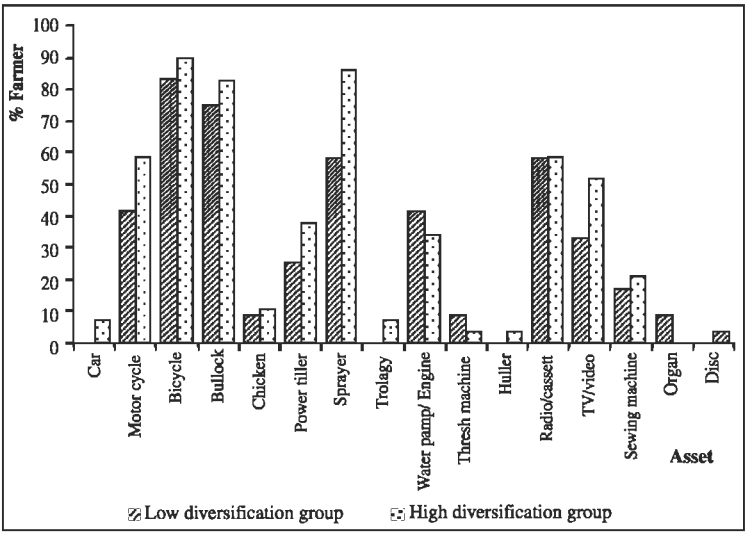


5.1.6 Farm and household assets

Farm and household assets help to explain the investment ability of the farmers to carry out their farming activities. Farm operations are conducted by farm assets which include bullock, farm equipment and machineries and water pump. Household assets include car, motor cycle, bicycle, radio, cassette, sewing machine and television. They provide the overview of the household living standard and food security in study area. Farm and household assets owned by two diversification groups are reported in Figure 5. Farmers with high diversification group owned more farm and household assets than those with low diversification group. But the percentage of farmers belonging to water pump and threshing machine was observed to be higher in low diversification group (41.6% and 8.3%) compared to high diversification group (34.5% and 3.4%).

The vehicles used for the farm and household like car, motor cycle and trolergy were taken into account as transport means. Evidently these vehicles were mostly used by high diversification group. It can be explained by the high incomes of those farmers obtained from profitable farming in this study area. In the low diversification group there was limited availability of household assets compared to high diversification group.

Figure 5: Percentage of Farmers owning Different Farm and Household Assets by Two Diversification Groups in Rice Based Farming System



5.1.7 Farm and family income

Average annual family income of respondents and the source of income are presented in Table 7. The main sources of income by low diversification group were crops income (rainy season rice, summer season rice, onion and chickpea), wage income, and non farm income. Those by high diversification group were similar but more crops such as sesame, greengram and chilli are involved in the farm income. Additionally non farm income was low in high diversification group compared to low diversification group.

The average annual family income of low diversification group was around 2,977,484.4 Ks compared to 4,199,655.03 Ks in high diversification group. It is obviously evident that average annual farm income was significantly higher with farmers in high diversification group than those in low diversification group. Onion was the major contributor to farm income in both farming systems (Figure 6) providing 63 per cent and 36 per cent of farm income of low and high diversification groups respectively.

Since farming is the main source of food and income for the farmers, there is a need to expand production and income generated through such kind of crop in order to improve food security and alleviate poverty in rural areas. But it is necessary to consider how the economic environment is in the long term to keep this kind of crop in Kyaukse. Considering the overall situation, both types of rice played a significant role in total farm income for two diversification groups whereas chilli, chickpea and sesame contributed in some amount in high diversification group.

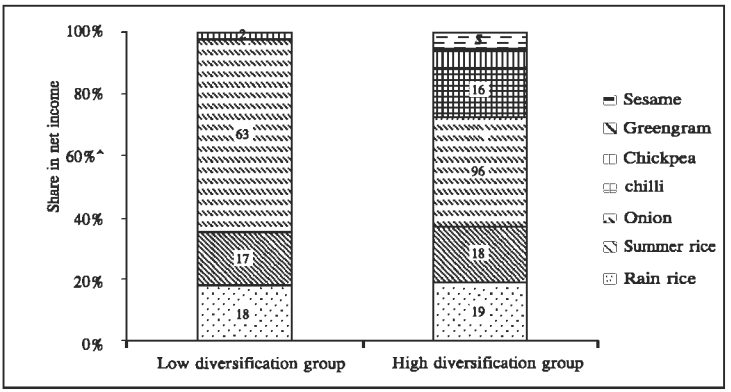
Table 7: Average Annual Household Income (Ks per Household) of Respondents by Diversification Group, Kyaukse

Source of income	*Low diversification group (0.5-1)*	*High diversification group (0-0.49)*
% of farmers	29.27	70.73
Average net farm income (Ks)	2323817.74	4001723.99
Average off farm income (Ks)	15500.00	27586.21
Average non farm income (Ks)	638166.67	170344.83
Total annual household income (Ks)	2977484.40	4199655.03

Source: Own Survey 2007

Farmers involved in cash crop production like onion, sesame and chilli were generally better off on various dimensions than similar households that were more subsistence oriented. On the other hand, commercialisation combined with inappropriate policies or institutional failures can result in adverse effects for poor households.

Figure 6: Contribution of Crops in Farm Income by Two Diversification Groups in Rice Based Farming System



Agro-ecological conditions of Kyaukse are favourable for the cultivation of a wider range of crops. However, inadequate water during winter and summer season affects the expansion of rice and other crops in the area. The populations in the study area depend on agriculture for their employment, income and livelihood. It is important to introduce appropriate farming systems as well as production and processing technologies to boost productivity and income of the farmers in the study area.

6.0 Income Maximisation by two Diversification Groups

6.1 Resource Allocation in Actual Survey and the Model

The results of land area allocation by linear programming are presented in Table 8 to keep the higher incomes of the household for low and high diversification groups. The

simulation results of area cultivated for crops were reasonable estimates compared with the actual survey. In low diversification group, the model allocated more land of 5.81 and 3.11 acre respectively to summer rice and chickpea compared to 3 acre each of similar crops in the actual survey. However, the model reduced the land allocated to rainy season rice and onion production from 3.51 and 8 acre of actual survey to 3.11 and 1.91 acre respectively.

In the high diversification group, the model allocated more land to onion and sesame of 6.14 and 7.33 acre respectively in comparison to 2.91 and 3.13 acre of the same crops in the actual survey. However growing areas of rainy season rice, summer season rice, chickpea and chilli were reduced due to profitable growing of onion and sesame in the study area.

Table 8: The Comparison of Resources Use of Land between Actual Survey and Basic Model by Two Diversification Groups

Crops (acre)	*Low diversification*		*High diversification*	
	Actual	*Basic model*	*Actual*	*Basic model*
Gross cropped area	17.43	14.73	30.78	22.98
Rainy season rice	3.51	3.11	5.61	4.12
Summer season rice	3.00	5.81	4.91	1.28
Onion	8.00	2.69	2.91	6.14
Sesame	-	-	3.13	7.33
Greengram	-	-	2.17	-
Chickpea	3.00	3.11	4.13	2.47
Chilli	-	-	2.83	1.65

Source: Own Survey 2007

6.2 Family Income in Actual Survey and the Model

In order to maintain higher return from the farm in the basic model, the model allows hiring labours in two diversification groups to compensate for lack of labour when the crops are growing and for providing work on the farm. The optimal solution helps farmers to reduce dependency on external resources, such as external capital.

Comparative analysis of family income between basic model and actual survey was done to judge the ability of the model to predict actual farmer behaviour. The basic model showed differences in the family income which is higher (3996350 ks and 4633570 ks) than the actual survey (2977484 ks and 4199655 ks) in both diversification groups but off farm work has not been done due to more concentration of farm work and profitability of farming itself (Table 9).

Table 9: The Comparison of Family Income (Ks) between Actual Survey and Basic Model by Two Diversification Groups

Item	*Low diversification*		*High diversification*	
	Actual	*Basic model*	*Actual*	*Basic model*
Farm income	2323817	3358364	4001724	4463225
Off farm income	15500	-	27586	-
Non farm income	638166	638166	170345	170345
Family income	2977484	3996530	4199655	4633570

7.0 Conclusion and Policy Implication

Agriculture plays a critical role to reduce the poverty in Myanmar mostly because agricultural activities are rural in nature and poverty incidence is highly concentrated in rural area. But policy biased on rice has reduced profitability, detracted investment, and dampened growth in the agricultural sector. Crop diversification can help to reverse these trends by making more profitable as it becomes flexible in meeting the local and international demands and enables poor people to obtain remunerative within their scope of competencies and resources.

At the farm level, diversification represents the farm system in which farm practices and products are more aligned with the social, environmental, and economic contexts, as well as the constraints and opportunities that exist. Farm-level specialisation happens because of biased public policies toward certain crops based on non economic considerations, such as food self-sufficiency is not categorised as diversification in the context of market-based decision making. Similarly, the distorted use of certain inputs, such as fertiliser and water, during the green revolution period is also not considered diversification in the market context.

Recent developments in the agricultural sector have created diversification opportunities, but there are constraints that can hamper the ability of farmers, especially poor and marginal farmers, to take full advantage of these opportunities. Lack of adequate infrastructure, poor access to information, credit, and other assets (land, water, and technological know-how), can severely constrain the scope of diversification.

Diversification requires a multi-component approach involving many specific investment areas. Policy and institutional environment, irrigation and drainage, science and technology, and rural infrastructure are a few examples. All these investments will not come from the public sector. Government has to create the enabling environments for the private sector to provide inputs and services to farmers necessary for diversification; however, the government needs to invest to widen the scope of research institutes to cover emerging issues of diversification, improve the analytical capabilities of farmers to synthesise the diversification opportunity, and develop the efficient knowledge and information systems.

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Annex 1: Gross Margin Analysis for Producing Rice with Irrigated Water in Kyaukse Township

Output and input	*Rainy season rice (n=34)*	*Summer season rice (n=27)*
Average yield (Basket/ac)	71.26	90.93
Average producer prices (Ks./bsk)	3796.43	3495
Gross revenue	270533.60	317800.40
Total variable cash cost	140808.38	163367.54
Hired Labour	60884.49	69725.37
Cost for land preparation	9525.90	11550.59
Cost for uprooting and transplanting	13477.42	13975.00
Cost for crop establishment	8481.73	8650.37
Cost for harvesting	15260.97	18113.16
Cost for threshing, drying and transportation	14138.47	17436.25
Material cost	79885.03	93642.17
- Seed	13589.71	13055.96
- Urea fertiliser	34803.53	41140.67
- Other fertiliser	8827.65	12071.43
- Diesel	11377.47	8635.71
- Others (including insecticide)	1870.00	2553.40
- FYM	9416.67	16185.00
Gross margin per acre	129764.08	154432.86
Gross margin per unit of capital	1.92	1.95
Gross margin per unit of labour	3619.64	4376.11

Annex 2: Gross Margin Analysis for Producing Onion and Chilli with Irrigated Water in Kyaukse Township

Output and input	*Onion (n=17)*	*Chilli (n=6)*
Average yield (viss/ac)	2238.80	221.11
Average producer prices (Ks./viss)	486.76	3750.00
Gross revenue	1089758.29	829162.50
Total variable cash cost (Ks/acre)	295645.01	260357.08
Hired Labour	94347.18	125396.66
Cost for land preparation	31965.43	25400.00

Cost for planting	16188.24	8000.00
Cost for crop establishment	27885.69	23330.00
Cost for harvesting	18307.82	63833.33
Cost for drying	4833.33	
Material cost	201297.83	134960.42
- Seed	69588.24	7072.92
- Urea fertiliser	41842.35	47500.00
- Armo fertiliser	33431.11	32000.00
- Diesel	21635.00	23666.67
- Others (including insecticide)	12925.63	22083.33
- Inferno	21875.50	2637.50
Gross margin per acre	794113.28	568805.42
Gross margin per unit of capital	3.69	3.18
Gross margin per unit of labour	8795.14	6137.96

Annex 3: Gross Margin Analysis for Producing Chickpea and Greengram with Irrigated Water in Kyaukse Township

Output and input	*Chickpea (n=15)*	*Greengram (n=3)*
Average yield (Basket/ac)	6.41	4.11
Average producer prices (Ks./Basket)	16613.33	19833.33
Gross revenue	106491.45	81514.99
Total variable cash cost (Ks/acre)	42275.83	49041.67
Hired Labour	20467.5	31516.67
Cost for land preparation	7695.00	16250.00
Cost for crop establishment	1750.00	500.00
Cost for harvesting	6260.	14766.67
Post-harvest cost	4762.5	-
Material cost	21808.33	17525
- Seed	14648.33	8000.00
- Fertiliser	-	4400.00
- Rizobium fertiliser	1400.00	-
- Others	5760.00	5125.00
Gross margin per acre	64215.61	32473.31
Gross margin per unit of capital	2.52	1.66
Gross margin per unit of labour	3047.72	635.73

Annex 4: Gross Margin Analysis for Producing Sesame with Irrigated Water in Kyaukse Township

Output and input	*Sesame (n=8)*	*Turmeric (n=1)*
Average yield (Basket/ac) (viss/acre)	7.00	450.00
Average producer prices (Ks./Basket)	23500.00	520.00
Gross revenue	164500.00	234000.00
Total variable cash cost (Ks/acre)	61250.94	119633.00
Hired Labour	26970.94	64133.00
Cost for land preparation	7183.33	21333.00
Cost of planting	4533.33	3200.00
Cost for crop establishment	5340.00	14100.00
Cost for harvesting	6628.57	20500.00
Post-harvest cost	3285.71	5000.00
Material cost	34280.00	55500.00
- Seed	4420.00	35000.00
- Fertiliser	10000.00	7500.00
- FYM	9250.00	13000.00
- Others	3360.00	-
- Diesel	7250.00	-
Gross margin per acre	103249.06	114367.00
Gross margin per unit of capital	2.69	1.95
Gross margin per unit of labour	5434.16	2006.43

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Contribution of Community Tourism to Poverty Alleviation in Vietnam: A Case Study

P.X. Phu*[a], V.T. Anh*, N.T.B. Tran*, P.H.T. Van* and P.N. Duyen*

Abstract

The study was carried out in two of Tinh Bien and Tan Chau Districts including Van Giao and Chau Phong in order to understand the real situation to develop community-based tourism; identify factors affecting the development of this type of tourism and contribution to poverty alleviation in study side. The results of the study show that community-based tourism activities in the study areas are in initial period, and tourism has not developed effectively. Although, community tourism has contributed to poverty reduction in the poor households participating in the activities, but this contribution is not much and it is unsustainable in the long run. The findings of the study can be the basis of scientific and practical attempts to make community-based tourism efficient and sustainable.

1. 0 Introduction

Community-based tourism has many definitions and different understanding. 'Community-based tourism is tourism that takes environmental, social, and cultural sustainability into account. It is managed and owned by the community, for the community, with the purpose of enabling visitors to increase their awareness and learn about the community and local ways of life (Rest 1997).

Poverty alleviation is of a major concern for many developing countries. Poverty can be alleviated mainly through achieving higher sectoral growth and ensuring that the poor have a share in that growth. There is evidence that tourism contributes a lot to the economic growth of even countries with poor economies through foreign exchange earnings, creation of employment opportunities and provision of public revenues. Therefore, Tourism is one of the most important sources of foreign exchange earnings and has been one of the world's biggest and fastest creators of employment. In fact, it is the only service industry where there is a consistent positive balance of trade flowing from industrial to developing countries. For this reason, Vietnam is promoting community-based tourism (CBT) to improve the linkages between poor producers of tourism products and services and international tourists.

Tourism is one of the most important sources of foreign exchange earnings and has been one of the world's biggest and fastest creators of employment. In fact, it is the only service industry where there is a consistent positive balance of trade flowing from industrial to developing countries. For this reason, Vietnam is promoting CBT to improve the linkages between poor producers of tourism products and services and international tourists. Along with the development of science and technology, the idle time of people

* An Giang University, Long Xuyen City, An Giang, Vietnam.
[a] Corresponding author. Email: pxphu@agu.edu.vn

more than before, the demand of human travel and the growing basic needs become indispensable in the cultural life - of human society. In many countries around the world, tourism activities developed into an important economic sector of the country. In Vietnam, tourism though young but has developed rapidly both in quantity and quality, contributing to significant achievement for the national economy. Strategy of economic development is to make tourism a key economic sector of Vietnam by 2020. Therefore, the important tasks of Vietnam's tourism activities are to be efficient and integrated with the development trend of the region and the world (Vietnam General Department of Tourism 2008).

However, the tourism development will be pulled by the economic impact - social and ecological environment at tourist destinations. Therefore, tourism development depends not only on economic growth but also on the sustainability of ecological, social and economic sustainable development to meet current needs without reducing the ability to meet the needs of future generations. According to Le Huy Ba (2006) community tourism is a new form of tourism to protect and manage natural resources in a sustainable manner. What is tourism community? Tourism is community tourism and to be made creative by the community. Form of travel applies three main strategies: to further economic benefits to the poorest communities; increase the non-economic impacts, and facilitate participation of these communities (Phan Trung Luong 2003).

In the South of Vietnam, it can easily be recognised that residents and workers from busy cities such as Ho Chi Minh City and Can Tho are seeking rest and relax in the serene environment in rural areas. Furthermore, international visitors coming to Vietnam express their interest in touring the countryside and seeing 'rural Vietnam' or 'real Vietnam', including the Mekong Delta. In recent years, many provinces in the Mekong Delta evolved homestay tourism such as Vinh Long, Tien Giang, Ben Tre (www.dreamlandtravel.com.vn). Homestay tourism not only attracts foreign tourists but also receives local tourists. It considers specific tourism products of the Mekong Delta (Thuy Trang 2008) with diversified natural recourses and cultural life; An Giang is seen as a centre of tourism in the Mekong Delta. The province has 39 sites and 6 different types of tourism such as: Community-based tourism, cultural tourism, belief tourism, natural tourism, festival tourism etc. According to the Seventh Party Congress of An Giang Province, the economic structure in An Giang will be changed, where the most important emphasis of agriculture sector will be replaced by tourism and service sector. However, although tourism is 'the world's biggest industry ever, it is poorly managed for the environment' (www.oceansatlas.org). So, the aim of this study is to look for promising rural tourism styles that are most suitable for the poor in An Giang Province.

1.1 Research Objectives

- To understand the real situation to develop community-based tourism in Van Giao and Chau Phong *s* of An Giang Province.
- To identify the factors that affect the community-based tourism and contribution of the community tourism for poverty reduction tourism in Van Giao and Chau Phong *s* of An Giang Province

- To suggest recommendation on appropriate policies for the development of rural tourism community (for policymakers, local authorities and also for the households themselves) that can be used for developing sustainable rural tourism in the future.

1.2 Research Questions

- Why do poor participation in the community-based tourism in Van Giao and Chau Phong?
- In what ways do the poor participate in the community-based tourism economy?
- What are the factors influencing community tourism?
- What is contribution of community-based tourism to poverty alleviation?
- Is community-based tourism a good use of poverty alleviation?

1.3 Scope and Limitation

The research also has the following limitation:

- This research did not have the objective of studying in deep analysis indicators of environmental impact of community-based tourism.
- This research is only study in two *s* in Chau Phong and Van Giao, Tan Chau and Tinh Bien District, An Giang Province.

2.0 Research Methods

Based on the research objectives and research questions, this study combined qualitative and quantitative methods which include the following:

Face to face interview method is the main method that has been used throughout the research. First, key informant interview is used. Key people who know well about the situation of community tourism in An Giang Province were interviewed at three levels: *at province level* (Department of Culture - Sport - Tourism, Department of Planning and Investment, Department of Natural Resource and Environment, Centre of Travel - Service - Investment); *at district level* (Committee, Office of Natural Resources and Environment, the agency of tourism, travel and hotel), and *at other level* (committee, centre of community based tourism information). Secondly, group interview (Participatory Rural Appraisal) is done to get general information at levels. There are four meetings that have been held at two *s*. The participants are around 5-7 poor local people joining in each target group as (i) people who are directly involved in the community-based tourism, (ii) who participate indirectly in the tourism services community.

Table 1: Tools Used in Collecting Information for Study

Order	*Tools*	*Participants*	*Aims*	*Collected information*
1	Resource mapping	Researchers, offices and selected local people	General information about the natural and physical capitals at the *s.*	Map is drawn by local people showing about the natural and physical capitals of the area and also includs information about the tourism sites.
2	Times line	Researchers, offices and selected local people	This tool taps informants' memories to recall important events that have been taken place in the area. This can be important in highlighting the causes of certain problems and how changes have occurred.	Time line tool was used to record changes over a period of historical development of community tourism.
3	Ranking	Researchers, offices and selected local people	It is useful in discovering and prioritising problems. It can also bring out the perceived seriousness of tourism households' problems.	This tool was used to assess problems/challenges of the tourism households.
4	Problem tree	Researchers, offices and selected local people	Problem tree analysis helps to find solutions by mapping out the anatomy of cause and effect around an issue in a similar way to a Mind map, but with more structure.	It was used to discuss the problem or issue to be analysed and identify the causes of the focal problem.
5	Venn diagram	Researchers, offices and selected local people	The diagram shows and indicates the contact and cooperation between groups, institutions, organisations, and important individuals with tourism households.	Venn diagram was used to describe the administrative structure of the villages. The participants were asked to list the names of institutions which play an influential role in the community and to rank the relation and the impact of the institutions in the community.

6	SWOT	Researchers, offices and selected local people	It helps planners focusing on respective key issues of the area. SWOT stands for strengths, weaknesses, opportunities, and threats. Strengths and weaknesses are internal factors. Opportunities and threats are external factors	In this study, SWOT Matrix helped identify some strengths, weaknesses, opportunities and threats considered to be important by the local people in the study sites.

Finally, information collected from the previous steps was used for designing questionnaire; it was tested, edited and then ready to be used widely. In the research areas, 69 households participating indirectly in the tourism services community in 2008 were used, and the interviewees were selected randomly from 180 households of two *s*. Besides, there are only 12 households directly involved in the community-based tourism in 2008 of two *s*; the researchers have chosen 2 households in case study research. In addition, after the finishing of PRA exercise and household interviews, the researchers identified main issues that need to be studied through in depth-interviews. Microsoft Excel was used to analyse the data to write the report. The report content must be in accordance with the research objectives. All the information collected at these steps above has been represented in different ways in the report.

3.0 Results and Discussion

3.1 Real Situation to Develop Community Tourism in An Giang Province

Implementing Committee (176/QD-TCDL) on 20 April 2007 decided to develop tourism based on community service projects by Mekong Asian Development Bank (ADB) confessional lending. The project in An Giang Province was supposed to be implemented in one of the locations of the project beneficiaries - My Hoa Hung of Long Xuyen City, Van Giao of Tinh Bien District, and Chau Phong of Tan Chau District. Investment objectives of building this model were to meet the requirements of tourism development based on tourism for poor communities and create infrastructure-related activities under tourism development community to contribute to poverty reduction, creating employment opportunities, increasing income, improving the natural heritage, culture, promoting the development of sustainable tourism, and attracting the active participation of local communities (Report Tourism Sports 2007).

According to Bui Thi Hong Ha, Director of Cultural and Tourism of Department in An Giang Province (2009) the community-based tourism for the poor belongs to Mekong tourism development projects and is funded by ADB. The objectives of this project were to meet the requirements of tourism development in community-based services for the

poor, improving the infrastructure related with tourism activities. Tourism activities create employment opportunities, increase income, and improve the prevention of natural heritage and culture which attracts the participation of local communities for developing tourism sustainability and poverty alleviation.

The PRA results (Table 1) show that local people participate in community-based tourism due to choice of travel companies in the province of An Giang. Local people do not know anything about community tourism in local authority and criteria for selecting households.

Table 2: Local People's Participation in Community Tourism

Items	*Percentage of respondents*
Do you know community-based tourism for poverty alleviation by your local authority?	100 per cent of respondents do not know
Do you know the criteria to be selected to participate in community-based tourism in your local authority?	100 per cent of respondents do not know

3.2 Real Situation to Develop Community Tourism

3.2.1 Community tourism in Chau Phong, Tan Chau District

According to Sa Yet, Chairman of the Community-based Tourism Information Centre in Chau Phong, the Cham people often lived in the cluster along rivers. The men caught fishes, the women were confined to the house, so their job was suitable with weaving. The young women of about 10-12 years have to know the easiest task of weaving. Textile products of the Cham people are being presented in most Southeast Asian countries such as Cambodia, Laos, Thailand, Myanmar, Malaysia, Indonesia, and India, and weaving village in Chau Phong is prosperous. According to survey results (PRA, interviewing households) since 2000 the tourists, researchers have visited the weaving village of Phum Xoai to find out the life, customs and practices of Cham people.

In 2008, to implement the Mekong sub-region tourism development project supported by ADB, the community tourism information centre in Chau Phong was built. This was an initial step of community tourism activities in Chau Phong. The aims of the centre are: Cham village popularisation; introduction, discussion and exchanges of national culture; contribution with homestay 'being Cham people in one day'; the most important things are to give a chance doing tourism for Cham people to improve their living with traditional embroidery and weaving.

3.2.2 Real situation and potential community tourism development in Van Giao commune, Tinh Bien District

Van Giao is a poor and highland of Tinh Bien District, An Giang Province. Most of people in Van Giao (77.63%) are Khmer people. They cultivate rice, raise animal (cattle, pig, duck and chicken) and have traditional sugar palm process and weaving.

Based on the idea of Nederland Farmer Organisation, three provinces - Tien Giang, Lao Cai and An Giang were chosen as pilot sites to deploy rural and ecotourism project by Vietnam Central Farmer Association in three years (2006-2009). Van Giao, Tinh Bien District is one of two *s* in An Giang Province chosen as a pilot site. In Van Giao, there are six of ten households participating in serving tourist as: homestay (2 households), horse-drawn carriage (2 households), sugar palm process (1 household) and weaving (1 household).

One of homestay is located in Sray Skoth hamlet, Van Giao. This hamlet has traditional weave of Khmer people. According to the result of household interview and observation of research group, any tourist has not come to this homestay and stayed, except for some traders from Cambodia who came to collect weave products. The homestay is a halt site for the tourists to visit the traditional weave. The other is in Mang Ro hamlet; this homestay has got some tourists.

When the project started, the households participating in this community-based tourism got training to develop skills for serving, cooking and visiting homestay in Long Ho District of Vinh Long Province.

According to Pham Van Lanh, Chairman of Van Giao, tourism based on community is the new model of tourism and development in recent years. Mr. Chau Kim Sary, Chairman of Farmers Council in Van Giao, said that since the community-based tourism is present in Van Giao, the houses and road traffic have been upgraded. So lifestyles, ways of communication, and awareness of environmental protection in the community have been changed.

3.3 Advantages and Disadvantages, Opportunities and Challenges in Developing Community Tourism in Two *S* of Study Sites

Table 3: Advantages, Opportunities and Challenges in Developing Community Tourism in Two *S* in Study Sites

SWOT	*Strengths (S)*	*Collected information*
	S1. Favourable natural conditions. S2. Attachment to community life, with bold Kinh culture. S3. Tourist information centres and new establishment. S4. A number of festivals and traditional events.	W1. Road traffic is not good. W2. Tourist information centre was established a year back. W3. There are no specific tourist products. W4. Lack of staff professional guide.

Opportunities (O)	O1. Attract more investment for tourism development in two z. O2. Government, agencies involved are concerned, supporting the development of community based rural tourism. O3. Two z are of many tourists' attractions. O4. Tourist activities with diverse communities and a wide range of tourist services.	S1 + O1 + O2: Improve landscape attraction. S1 + S2 + S4 + O4: Diversify the services to visitors. S3 + O3 + O2: To promote the role of information centre of community based rural tourism.	Strategy O + W1 + O1 + O2: To improve traffic tourist attraction. W4 + O2: Training to improve tourism. W3 + O2 + O4 + O1: The parties involved find featured products to attract tourists. O2 + W2: Centre will mount travellers with local people.
Challenges (T)	T1. Tourists are unknown about model of community based tourism in two z. T2. Competition with many similar models of tourism in Vinh Long, Tien Giang, Cambodia. T3. Parties on tourism are not really linked together. T4. Many participants travel abroad as tourists; very few domestic tourists participate.	T1 + T2 + S1 + S3: Information Centre promotes tourism. S1 + S2 + S4 + T3: Community based tourism development. S1 + S2 + S3 + S4 + T4: Promotion, marketing to visitors to the community tourism.	T1 + T2 + W1 + W2 + W3: Developing the facilities, to locate sources of tourists. T4 + W4: Advanced level foreign language, communication. T3 + W2: To promote the role of information centre of community based tourism, mount the parties involved.

Source: PRA 2009

3.4 General Information of Households interviewed in Van Giao and Chau Phong of Tinh Bien and Tan Chau District

Household interview results showed that (Table 4) the average age of the head of households varies from 41 to 55. The educational level of the heads of households was distributed as following; ninety-one per cent have illiteracy level- seven per cent are at primary levels, near two per cent are at secondary level and nobody at high school and university level. Results showed that although most of the household members are at working age, but their educational level is still low; for this they are facing difficulties in finding jobs, in taking decision on mode of production to contribute to increase income.

Table 4: Age, Gender and Education of Heads of Households

Content	*Frequency*	*Percentage*
Gender		
- Female	63	91,3
- Male	6	8,7
Age (years)		
- From 18 to 40	35	35,00
- From 41 to 55	46	46,00
-Under 18 and above 55	19	19,00
Educational level		
- Illiteracy	63	91,3
- Primary education	5	7,2
- Secondary education	1	1,5
- High school education	0	0,0
- University	0	0,0
Total	100	100,00

Source: Interviewed Households 2009

The result of AusAID study (2004) showed that in the rural areas of Mekong Delta, a majority of poor households have difficulties in accessing new technology and new doing because of their low educational levels. The poor lack necessary skills and knowledge to respond in a flexible and active way in order to adapt to the new market environment. Decisions regarding in production are often copied from neighbours. Besides, there are 91.3 per cent female participation in community based tourism activities. This is a great advantage in developing tourism to attract tourists. This finding is similar to the study of Susan Dunn (2007).

3.5 Contribution of Community Tourism and Hindering Factors

3.5.1 Natural elements

The PRA results show that potential and strengths of natural beauty, historical, cultural traditions of a land of traditional villages in Van Giao and Chau Phong have created attractive features for many tourists to visit; but the investment and exploitation is not adequate.

3.5.2 Elements of infrastructure

The PRA results show that in Van Giao and Chau Phong, the means and facilities at points serving community tourism also have many limitations- lack of association, cooperation in development assistance; monotonous products; insufficient entertainment

facilities for the tourists. In addition, operating characteristics of this model of tourism are seen as a closed cycle: Only the travel companies are doing business; the poor do not have access and opportunity to participate in tourism business. Transport system is relatively convenient to create conditions for tourism development in general and tourism development community in particular in study side. The main road has been upgraded and repaired for the lives of people in the town. But a road leading to visit community spots is not in a good condition; therefore, conditions are essential that the study side is relatively complete and sufficient to meet demand for tourists to visit. In an in-depth interview (2009), it is found 100 per cent of households involved in community tourism models are using electricity, clean water, and other media contacts. However, to make service better, to meet diverse needs of visitors, and more importantly, to entice visitors, the points of services should be equipped with some means of modern information and communication such as digital television, internet connection. But it is important not to disrupt rural characters of the countryside.

3.5.3 Elements of human resources

In the group discussions, it is found that human resource activities are weak in the field of tourism. No guides are local; English level is low; the class is open to vocational training; training skills for participants are not high; online information is not sufficient; the role of the tourist information centre community has not been promoted. According to the results of in-depth interview (2009), the management tourism information centre in Van Giao did not really promote the potential availability of it; until now the centre point only works as a consignment on displaying traditional villages, providing some information about rural tourism. The staff having high school degree were 50 per cent and secondary degree were 50 per cent. Therefore, management staff have low educational level; to express foreign language with foreign guests, they have to depend on the guides of the company in travelling with foreign visitors. Therefore, in future, the centre staff should take some training classes on specialised professional travel by An Giang tourism organisations, attend classes to improve foreign language communication and gain knowledge about the tourists' spots.

In any form of tourism, the local guides should be trained to guide the tourists. It is very important because this will make the intermediate link between the tourists and locals and the local culture. The local guides have deep understanding on culture, lifestyle activities, and transportation. As the centre is not taking any initiative in this regard, this tourism is being hampered.

Box 1: Difficulties of Foreign Language

In an interview Mr. Chau Khiem, tourism information centre of community based tourism at Van Giao, Tinh Bien District, said that at present in the centre there is no high level tourist guide; only one member has secondary school and high school education. Absense of efficient team has limited professional guiding and is hampering tourism.

3.5.4 Elements of financial resources

The PRA results show that for want of capital, the most of natural resources are not being developed, no specific products have been created to attract tourists; and this finding is similar to the study of Susan Dunn (2007). According to Pham Van Than (Chairman of Chau Phong in 2009, tourism is based on new community development. But now there is no policy support for the loan of these households. Local authorities are encouraging people here to develop this form of tourism for economic development, better infrastructure and restoring traditional villages here. As he said, this type of tourism has attracted many tourists. Besides, he said that the tourism community-based model helps reduce poverty locally, create jobs, and generate income for the people. In addition, it restores village and preserves ethnic cultures. But this model is not operating efficiently, not attracting tourists becacause of weak infrastructure, professional training to the staff and scarcity of resources; resources depend on tourist travel companies.

3.5.5 Elements of social capital

The PRA results show that the link of tourist destinations is weak; there are no computer links, no cafes and no community features. It does not bring peace of mind about the order and security for tourists; there is no competition in activities: households do not need tourism investment and development to attract tourists. There are no signs and instructions, maps of referral points to provide community based tourism, or table whole tourist guide in Vietnam; there is no desire to expand the scope of marketing and promotion of tourist areas, so that guests can know much about study side; There are no policies to support the development of this tourism model. According to Chau Kim Sary, safety should be enhanced at the point for community tourism, because most of the tourists are foreigners. Therefore, the tourist information centre of community tourism should have provisions for members of the participating centres to provide travel services for the community to preserve the property of guests, maintain and secure places to visit. If this is good, then many foreign guests might come again with their friends.

3.5.6 The difficulties of people involved in community tourism activities in Van Giao and Chau Phong, Tinh Bien and Tan Chau District

Figure 1: The Difficulties of People involved in Community Tourism Activities

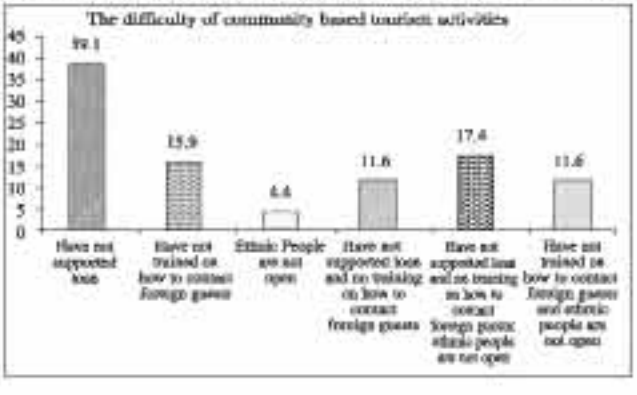


Figure 1 shows that the difficulties of the people involved in tourism activities are: a source of community capital, next to that they do not know how to contact with tourists - especially foreign guests and finally the ethnic characteristics are not comfortable to bring more confidence to the tourists. Due to lack of capital, they cannot invest to develop models and procure supplies, increase facilities to serve customers better, and even they cannot expand production to create many unique tourism products. These findings are similar to the study of Pham Thi Mong Hoa and Lam Thi Mai Lan (1999).

3.5.7 Sources of production from households in Van Giao and Chau Phong, Tinh Bien and Tan Chau District

Figure 2: Sources of Production from Households in Van Giao

Figure 3:Sources of Production from Households in Chau Phong

Figure 2 and Figure 3 show types of production in the two *s*, mainly textiles (over 70%). Other productions are very little. In particular, the number of households which are directly involved in tourism activities and constitute community is very low, only 8 per cent in Chau Phong, 15 per cent in Van Giao. These findings are similar to the study of Pham Thi Mong Hoa and Lam Thi Mai Lan (1999). But these findings are also different from the findings of Pham Thi Mong Hoa and Lam Thi Mai Lan who said that community-based tourism has not really contributed to poverty reduction.

3.5.8 Views on promoting and marketing tourism

Support of tourism in An Giang Province and the Asian Development Bank has completed construction of the tourist information centre community in Van Giao and Chau Phong in 2009; it is an important facility in order to promote tourism marketing. The results of focus group discussions show that this centre will connect tourism with traditional local people. Besides, introducing the country food, visiting floating market on the river bring attraction to the tourists. But the centre still has no map or guiding instructions for the tourists to visit different communities. This is a limitation to promote this type of tourism model.

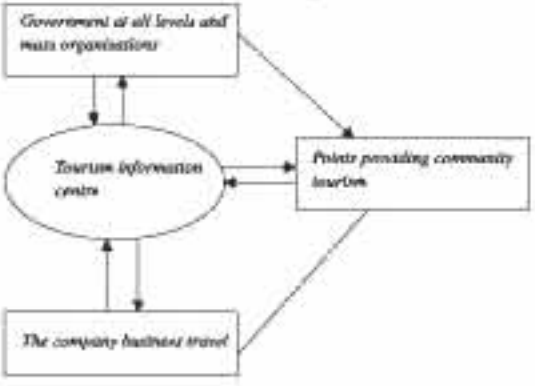
Box 2: Promotion and Marketing of Tourism in Community in Van Giao

In an interview Mr. Chau Kim Sary of tourism information center of community based tourism at Van Giao, Tinh Bien District, An Giang Province, he said that currently, tthere is no initiative for the promotion and marketing of community-based tourism in the local community. Therefore, Community tourism should have promotional activities and marketing and make ensured both types of visitors- foreign and domestic, about the facilities the communities are offering.

3.5.9. Skills training and financial support to serve tourists

Through research findings and PRA results, it is observed in the area of tourism development in the communities of study side, most households engaged in this business are not maintaining any coordination or contact with each other in services. Because of lack of the capital, they are unable to expand business and transportation system. it is necessary to have the combination and cooperation, links with the organisations through a travel management agencies.

Figure 4: Model of Tourism Development Community in Van Giao and Chau Phong



3.6 Effect of Community Tourism on Poverty Alleviation in Study Sites

According to PRA results and self-assessment procedure during PRA exercise, community-based tourism is a vital source of foreign exchange and employment and an important feature of the government's poverty-alleviation strategy. Although local people said that community tourism can indeed alleviate poverty and develop financial and cultural capital, private sector tourism enterprises also have an important role in poverty alleviation. Although, it has contributed to poverty reduction for the poor households to participate in community tourism activities, this contribution is not high and unsustainable in the long run.

Although, Chau Phong and Van Giao have potentials for tourism development- traditional trade villages, ethnic with special culture, religion, house, food, living style, and mosques or pagoda, the number of tourists coming to and staying at these sites is still low.

According to summary report of Van Giao Farmer Council, it is a initial period of the project; this project supports the households to repair the house, build hygienic toilet,

equip materials for serving tourists, and train serving skills. In 2009, households, who participate in tourism, receive and serve some groups of visitors; their incomes are increased a bit. Particularly, poor households that have carriage have more chance for improving their income than before, they can carry other goods when they are not carrying the tourists. In order to develop this tourism, Mr. Chau Kim Sary said that this tourism should combine visitors with the households in eating, working and playing. Mr. Pham Van Lanh, the Chairman of Van Giao, Tinh Bien District, said that, this tourism model in Van Giao has not attracted more visitors. Because of monotonous landscape and tourism products, lack of activities for keeping tourists, a good number of tourists depend on the travel company. However, this tourism has not contributed to reduce poverty in local area; it has just only contributed to improve environment.

Chau Phong has potentials to develop this tourism like Van Giao as it has ethnic groups and traditional trade villages. However, it cannot attract more tourists to visit. The community tourism established the community information centre in Chau Phong in a floating boat. It is used for broadcasting picture of Cham village and showing weave products from weaving co-operatives. Since inauguration of the centre, the community got few visitoes; they could not sell their products. The centre became a loss-making concern and has existed only one year. From the observation of research team, it is found, the tourists come to Phum Xoai just to visit weaving village and see the mosque, and then return to Chau Doc.

Pham Van Than, Chairman of Chau Phong People's Committee, said that community-based tourism is a model that helps to reduce poverty in some areas, it creates jobs, generates income for the local people and restores and preserves the traditional trade, national culture. But in Chau Phong, the activities of this model are not efficient. The reasons that it cannot attract the tourists are because of weak infrastructure, lack of entertainment areas, deficient cultural officials, and the tourists who depend on the travel company. In addition, bureaucracy of administrative formalities in management of foreign visitors is another reason. As the tourists are not allowed to stay at local houses, so they have to stay at Chau Doc town.

One of the successful experiences in Sapa showed that community tourism cannot survive if there are no clientele (Nguyen Minh Thu and Nguyen Van Lam 2003). So that, tourism stakeholders in Sapa are not only looking for availability of natural potentials, ethnic traditional manner and customers, they and local officers try to attract and keep the visitors. They try to find out how to obtain target customers, what are the visitors' perspectives of products and how to bring products to them. Besides, visiting the view, visitors are also participating with the tourism stakeholders in conservation activities and community development. These activities are the way to help villagers develop tourism in their community and make them feel the project is live, exciting and beneficial.

In summary, the establishment of community tourism in Van Giao and Chau Phong is based on traditional trade village of ethnic people. It is also initial period of tourism activities; tourism stakeholders and local officers are not efficient and have lack of experience for action and management. So it is not contributing to poverty alleviation in the study sites.

3.7 Case Studies of People involved in Providing Tourist Services

Box 3: Households directly involved in Community Tourism (Income is based on night services and display of traditional wearing)

Name of household: SaRi Dah
Address: Ph m Xoài, Chau Phong , Tan Chau District, An Giang Province
Gender: Male
Education level: Secondary level
Source of family income: from agriculture and community-based tourism

Spending on providing tourist services: Nearly 10.5 million (the amount from the tourism development project of the Netherlands; with this amount, households can improve facilities; facilities for transportation to tourism; support amount will be deducted in each serving tourists).

Members of the family involved to provide tourist services: 4 members

Facilities for tourism services: A tourist information centre displaying products, accommodation, eating and drinking services. Per month on an average 35-37 tourists visit, but it is always uncertain.

Information about the ability to provide tourist services:

Family is participating in business services: The traditional wearing and resting place for travellers, catering, overnight stay for travellees.

To provide these services, the family was fully equipped with basic facilities and fully equipped with the facilities to meet the needs of the tourists.

Models provide tourist services in tourist programmes and projects of the Netherlands, and began to participate in 2008 project, the project has not organised many trips, has not organised training to improve education (language learning, how to communicate, how to develop leisure, catering, decorating for tourists to visit)

Service providers to tourists, a total of 10.5 million families, received the same funding. This funding was spent in decorative purposes, building the display of traditional wearing, repairing toilets and repairing new house.

Difficulty to develop tourism in local communities: Creating a unique but different attractions to visit is a very difficult task. Very few households have large land areas. Lack of diversity in the types of services to the tourists is another problem.

The proposals to develop community tourism: Household members need to visit model spots to promote tourism to all communities, equipment facilities creating excellent services to the visitors (such as telephone, internet). They should be associated with the travel company for active guests.

Development strategy: The family is based on the existing facilities; business services visit wearing, and spend the night service. By tourism industry it will be a future career development, and family continues to maintain the development of this model.

Box 4: Households directly involved in Community Tourism (income is based on horse-drawn carriage)

Name of household: Chau My
Address: Mang Ro, Van Giao , Tinh Bien District, An Giang Province
Gender: Male
Education level: Primary level
Source of family income: From agriculture and community-based tourism

Spending on providing tourist services: Nearly 10.5 million (the amount from the tourism development project of the Netherlands; with this amount, households can improve facilities; facilities for transportation to tourism; support amount will be deducted in each serving tourist).

Members of the family involved to provide tourist services: 5 members

Facilities for tourism services: A tourist information centre displaying wearing products, service to visitors in a carriage around town. Tourists to visit: average per month, 35 to 37 tourists.

Information about the ability to provide tourist services:

Family is participating in business services: Service to visitors in a carriage around town.

Models provide tourist services in tourist programmes and projects of the Netherlands, began to participate in 2008 project; the project has not organised many trips, has not organised training to improve education (language learning, how to communicate, how to develop leisure, catering, decorating for tourists to visit)

On funding for services to the tourists, a total of 10.5 million families, received the same amount, and this funding was used in decorative purposes and in building the display of traditional wearing, and taking visitors in a carriage visiting around town.

Difficulty to develop tourism in local communities: Most of the visitors come from the travel company. Local people have to depend on the company to get visitors and tourists as the company guides the tour. Local people do not directly communicate with visitors; the relationship between the visitors and the local people does not grow. In addition, there is no linkage with the places to visit, no attachment to support each other. Beside, the source of customer participation is very low; in many cases service charges to the customer is usually higher than the charge of the company.

Development strategy: The family is based on the existing facilities; business services visit wearing, and give company to the visitors in a carriage around town. Tourism industry has a future career development, and family continues to maintain the development of this model. There is a need to link the points for travelling together to facilitate the support and help each other. In addition to consolidating, strengthening communication and close contact with visitors, a friendship between the service providers and the visitors should be developed.

4.0 Conclusion

Although, Van Giao and Chau Phong have potential natural landscapes, traditional villages and support of the Departments of An Giang Province and the Netherlands project, community based tourism development in Chau Phong and Van Giao is in the early stage. There are no surveys assessing potentialities, specifically to make a planning. Therefore, the number of tourists to visit tourist sites in this is not high and is not bringing revenues to the community people in tourist areas. The community tourism in Van Giao and Chau Phong still has some limitations:

- The project has not participated with local people in the investigation, survey assessment of strengths, weakness, opportunities and challenges for appropriate planning of tourism development.
- Monotonous products.
- The activities for visitors (food, rest, travel ...) depend on the travel companies. Tourist spots (especially in Chau Phong) where tourists come to visit, are not suitable to stay.
- The infrastructure is weak; roads, traffic have not been upgraded, and sanitation is not also good.
- Therefore, community based tourism activities in Van Giao and Chau Phong have not contributed to poverty reduction for poor tourism households which participate in community tourism activities.

5.0 Recommendations

- For community based tourism information centre in Van Giao and Chau Phong, Tinh Bien and Tan Chau District, An Giang Province
  - Increased operation is needed to provide information about community and to integrate the tourist points.
  - Staff should have full knowledge of community tourism, command of foreign languages, and ability to communicate with foreign visitors.
  - Travel company's active source of tourists should be linked with services at community and promotion of marketing of the products of the community.
- For the local authorities in Van Giao and Chau Phong, Tinh Bien and Tan Chau District, An Giang Province
  - Need for more encouragement policies to get people interested to participate in this form of tourism. This will contribute to creating jobs, increasing incomes and reducing poverty in local government.
  - More points are needed to ensure order and safety for the tourists to visit and sleep at night.

- For tourism business in An Giang Province
  - Promotion and marketing tourism community in Van Giao and Chau Phong to visitors in all forms: fliers, leaflets, posters, radio, television and on the website of the company.
  - Supporting knowledge, helping the tourist information centre and community services at the service of tourists, a bridge between visitors and the places to visit.
- For the service providers at community-based tourism in Van Giao and Chau Phong, Tinh Bien and Tan Chau District, An Giang Province
  - The service providers should be fully equipped with the facilities, so that they can give excellent services to the tourists.
  - Strengthening knowledge equipment about tourism and community capacity and people should have the capacity to directly communicate with tourists in English.
  - Linking the points to create a convenient support, sharing experiences and helping each other to operate community-based tourism.
  - Households' tourist activities should be based on community need. Investment should be increased to develop a household family into a model for the tourists. The visetors should have varieties to choose on their interst. Then they will enjoy to stay with the families and to buy the products. This way the households will be able to keep the tourists for longer time and inprove their economy.

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Economic and Ecological Consequences of Charcoal Production in Oyo State, Nigeria

A.A. Aiyeloja*[a] and U.D. Chima*

ABSTRACT

The study was carried out to evaluate the economic and ecological consequences of charcoal production in Oyo State, Nigeria. Fifty production sites from five Local Governments Areas known for charcoal production selected through a multistage sampling procedure were used for the study. Tree enumeration was also carried out in forests around selected production sites to ascertain the impact of the charcoal enterprise on the populations of tree species preferred for charcoal making. The average cost of producing a bag of charcoal was N235.71 (aboutUS$1.60) while it was sold at an average price of N464.29 (about US$3.00). Both production and sales were on the increase for the three-year period of the study with 87 per cent, 89 per cent and 97 per cent of the total production sold for 2005, 2006 and 2007 respectively. Rate of Return on Investment (RORI) was 71.12, 76.22 and 90.10; for 2005, 2006 and 2007 respectively. Mean change indices computed for each of the species preferred for charcoal making reveal that Vitellaria paradoxum is the least depleted (39%) followed by Terminalia superba (40%), Nauclea diderrichii and Heliea ciliata (42% each), Afzelia bipindensis and Afzelia africana (45% each), and Anogeissus leiocarpus (47%). Although, charcoal making in the study area is profitable, the current practice is unsustainable. Sound policies and appropriate regulatory laws are suggested to ensure the sustainability of the enterprise.

1.0 Introduction

Charcoal production to supply the urban markets and households provides a source of income for large number of rural and urban people (Rahji 2005). This, coupled with increasing populations and incessant outrageous increases in the prices of other energy sources, especially kerosene, has given prominence to the charcoal business which is now spreading rapidly in different parts of Nigeria (Chima 2006).

Consumers attraction to and preference for charcoal, have been attributed to several reasons. These include among others, its cheapness, higher energy content than wood, ability to burn with little flame and without smoke, and its ability to resist termite attack and that of other agents of decay (Kammen and Lew 2005).

On the other hand, charcoal production tends to be destructive because life-trees and branches are cut instead of the dead ones. Yet these trees are what most rural people depend on to supply their own needs (Earth Scan 1986). Trees provide food such as fruits and nuts; building materials and medicines for local uses; reduce soil erosion, improve soil fertility and play a key role in the regulation of the climate. Rahji (2005) observed

* Department of Forestry and Wildlife Management, Faculty of Agriculture, University of Port Harcourt, Rivers State, Nigeria.
[a] Corresponding author. Email: aiyeloja@yahoo.com

that lack of adequate control over the exploitation of wood resources and the zero or near-zero cost of obtaining the wood used for charcoal making tends to have damaging consequences.

Given the importance of trees to both individual and social welfare, there has been much concern during the past two decades over declining wood stocks in the developing countries (Patel et al. 1995). Openshaw (1978) building on projection of population growth and the then current per capita charcoal consumption, predicted a massive wood fuel 'gap' or excess demand emerging in the near future. The present escalating demand for charcoal, no doubt, validates this thirty-two year old forecast.

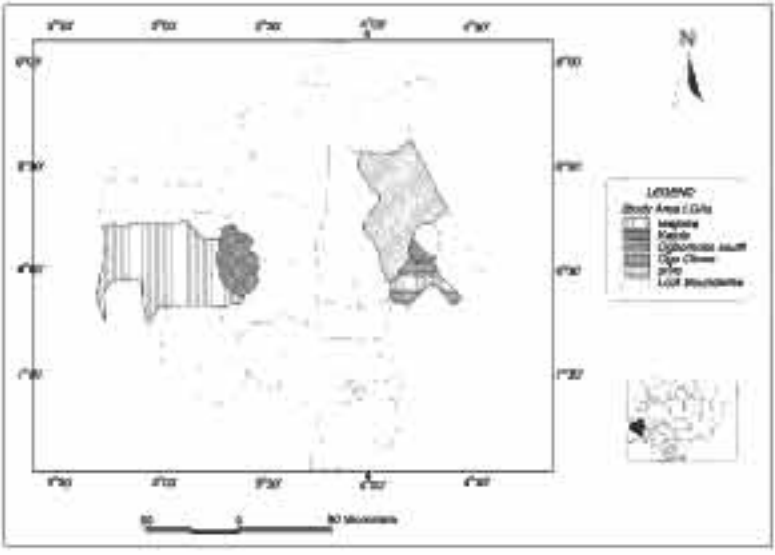
While it is acknowledged that the charcoal enterprise is capable of yielding economic returns, the ecological consequences of charcoal production and trade have often been ignored. This paper presents a quantitative account of both the economic and ecological consequences of the charcoal enterprise in Oyo State, Nigeria.

2.0 Materials and Methods

2.1 The Study Area

The study was conducted in five Local Government Areas (LGAs) - Iwajowa, Ogo-Oluwa, Kajola, Orire, and Ogbomoso South - of Oyo State. In these areas, the charcoal trade has thrived for several years with significant number of people from within and outside the areas taking part in it. Oyo State lies between latitude $07^0\ 00^1$ N and longitude $03^0\ 00^1$ E. It is bounded by Kwara State in the north, Osun State in the east, Ogun State in the south and the Republic of Benin in the west. Figure 1 is the map of Oyo State showing the study area.

Figure 1: Map of Oyo State showing the Study Area



2.2 Economics of Charcoal Production

A multistage sampling procedure was used in collecting the data on the economics of charcoal production. In the first stage of sampling, an area of Oyo State where charcoal business has become prominent was purposively chosen for the study. The area was chosen such that it contained five LGAs known for charcoal making as a second stage of sampling. In the third stage of sampling, ten production sites were randomly chosen in each LGA. This provided a sample size of fifty production sites in the five Local Government Areas.

Data on tree species preferred for charcoal making, number of days it takes to complete a production cycle, average cost of producing a bag of charcoal, average selling price per bag of charcoal, number of bags produced and sold for each of the years 2005, 2006 and 2007, average weight of a bag of charcoal and the average number of bags contained in a lorry load of charcoal, were collected.

2.3 Floral Composition

Tree enumeration was carried out in twenty production sites; taking four from each of the five LGAs. Plots of 35 x 35 m size were made (Salami 2006) and woody plants of erect posture with a minimum breast circumference of 7cm and a minimum height of 1.5m (Adesina 1989) were enumerated and identified up to species level following Keay (1989) and with reference to a control. The number of individuals preferred for charcoal making was recorded in each plot. Descriptive and inferential statistics were used to analyse the data collected following Oloyo (2001) and others.

2.4 Benefit-Cost Analysis

Benefit-Cost Analysis was performed over a period of three years with a discount rate. The Central bank of Nigeria (CBN) has pegged interest rate on agricultural loans at 14 per cent since March, 2006 (CBN 2006). Therefore, 14 per cent discount rate was used in the analysis. Tools and equipment below US$500 are not usually depreciated; those according to the New Zealand Department of Inland Revenue are known as low value-assets (http://www.depreciationrate.htm).

$$B/C = \frac{\sum_{t=0}^{t=n} \frac{R_t}{(1+r)^t}}{\sum_{t=0}^{t=n} \frac{C_t}{(1+r)^t}}$$

Where: B/C = benefit - cost ratio
R_t = revenue over time t
C_t = cost over time t
r = discount rate
1 = constant
t = 3 years

2.5 Rate of Return on Investment (RORI)

RORI was used to measure the profitability of the charcoal enterprise with respect to the amount that could be realised on the money invested at a point of time.

RORI = TR - TC / TC x 100
Where: TR = Total revenue
TC = Total cost

2.6 Change Index

Change Index (%) was used to measure the extent of change in the populations of the individual tree species preferred for charcoal production.

The change index was computed according to Salami (1998); Islam and Weil (2000); and Chima et al. (2009). The calculation of the change index was based on the assumption that the enumerated less degraded forest away from the production sites is the ideal vegetation cover in the area. The number of each tree species in the forest away from the production sites was taken as an approximation of the optimal number. Consequently the index of change was derived from the difference between the number of an individual tree species in the forest away from the production sites and that of each of the plots around the charcoal production sites. The computed difference was then expressed as a percentage of the number in the less degraded forest away from the charcoal production sites.

3.0 Results

3.1 Production and Sales

Table 1 presents production and sales data for the charcoal enterprise in the study area. The average cost of producing a bag of charcoal was N235.71 (about US$1.60) while it was sold at an average price of N464.29 (about US$3.00). Both production and sales were on the increase for the three-year period that the study was conducted with 87 per cent, 89 per cent and 97 per cent of the total production sold for 2005, 2006 and 2007 respectively.

It takes about two weeks (14 days) for a charcoal production cycle to be completed. *Anogeissus leiocarpus, Vitellaria paradoxum, Nauclea diderrichii, Terminalia superba, Hallea ciliata, Afzelia bipindensis, and Afzelia africana,* were identified as the tree species preferred for charcoal production.

Table 1: Production and Sales Data for the Charcoal Enterprise

No. of bags produced	
2005	5846.17 – 5846
2006	6066.78 – 6067
2007	6639.51 – 6640
No. of bags sold	
2005	5078.72 – 5079 (87%)*
2006	5427.64 – 5428 (89%)*
2007	6407.63 – 6408 (97%)*
Production cost (per bag)	N 235.71
Selling price (per bag)	N 464.29
Weight (per bag)	50kg
No. of bags (per lorry)	140
Production cycle	14 days

Note: *Numbers in brackets are percentages of the quantities produced that were sold for the respective years

3.2 Profitability

The profitability analysis of the charcoal enterprise is presented in Table 2. The Rate of Return on Investment (RORI) was 71.12, 76.22, and 90.10; for 2005, 2006, and 2007 respectively, while the cost-benefit ratio was 1.80.

Table 2: Profitability Analysis of the Charcoal Enterprise

Year	*Cost*	*Benefit*	*Annual profit*	$(1 + r)^t$ *14%*	*Discounted Cost*	*Discounted benefit*	*ROR*	*B/C*
2004	0	0	0	1.14	0	0	-	
2005	1378000	2358000	980000	1.299	1790022	3063042	71.12	
2006	1430000	2520000	1090000	1.480	2116400	3729600	76.22	
2007	1565000	25975000	1410000	1.690	2644850	5027750	90.10	
Total	4373000	7853000	3480000	5.609	6551272	11820392		1.80

3.3 Changes in Populations of Tree Species preferred for Charcoal Production

The number of individuals of each species preferred for charcoal production in production sites and the forest outside production sites, and their indices of change are presented in Table 3. The changes range from 32-61 per cent for *Anogeissus leiocarpus*, 29-48 per cent for *Vitellaria paradoxum*, 33-53 per cent for *Nauclea diderrichii*, 24-48 per cent for *Terminalia superba*, 30-56 per cent for *Hallea ciliata*, 27-52 per cent for *Afzelia bipindensis* and 32-56 per cent for *Afzelia Africana*; with sites in Ogbomoso South and Iwajowa being the least and most depleted respectively.

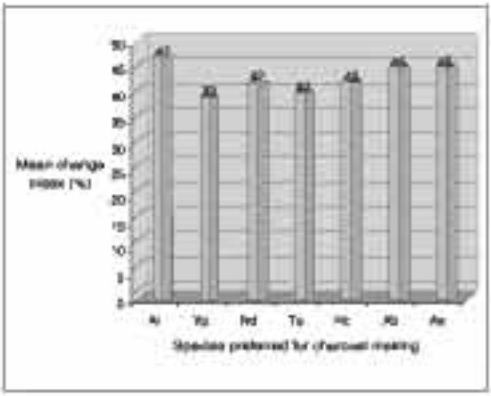
Mean indices for each of the species (Figure 2) show that Vitellaria paradoxum is the least depleted (39%), followed by Terminalia superba (40%), Nauclea diderrichii and Hallea ciliata (42% each), Afzelia bipindensis and Afzelia Africana (45% each) and Anogeissus leiocarpus (47%).

Table 3: Tree Species preferred for Charcoal Making and Number of Individuals encountered in Production Sites and Forest outside Production Sites

Species	*Site*	*No. of individuals**	*Change index (%)*
Anogeissus leiocarpus	FOCPS	38	-
	Iwajowa	15	61
	Ogo-Oluwa	24	37
	Kajola	18	53
	Orire	19	50
	OgbomosoSouth	26	32
Vitellaria paradoxum	FOCPS	52	-
	Iwajowa	27	48
	Ogo-Oluwa	31	40
	Kajola	29	44
	Orire	35	33
	OgbomosoSouth	37	29
Nauclea diderrichii	FOCPS	40	-
	Iwajowa	19	53
	Ogo-Oluwa	24	40
	Kajola	22	45
	Orire	27	33
	Ogbomoso South	25	38
Terminalia superba	FOCPS	33	-
	Iwajowa	17	48
	Ogo-Oluwa	20	39
	Kajola	17	48
	Orire	19	42
	Ogbomoso South	25	24
Hallea ciliata	FOCPS	27	-
	Iwajowa	12	56
	Ogo-Oluwa	17	37
	Kajola	15	44
	Orire	15	44
	Ogbomoso South	19	30
Afzelia bipindensis	FOCPS	44	-
	Iwajowa	21	52
	Ogo-Oluwa	26	41
	Kajola	20	55
	Orire	23	48
	Ogbomoso South	32	27
Afzelia africana	FOCPS	57	-
	Iwajowa	25	56
	Ogo-Oluwa	31	46
	Kajola	28	51
	Orire	35	39
	Ogbomoso South	39	32

Note : *Values are means for the four sites enumerated in each Local Government Area
FOCPS = Forest Outside Charcoal Production Site

Figure 2: Mean Change Indices for Populations of Species preferred for Charcoal Production



Al = *Anogeissus leiocarpus;* Vp = *Vitellaria paradoxum;* Nd = *Nauclea diderrichii;*
Ts = *Terminalia superba;* Hc = *Hallea ciliata;* Ab = *Afzelia bipindensis;*
Aa = *Afzelia africana.*

4.0 Discussion

The Benefit-Cost ratio and the Rate of Return on Investment reveal that the charcoal enterprise in the study area is a profitable venture. This is as a result of low production cost. Our results reveal that a bag of charcoal sells at a price almost double the cost of production. Rhaji (2005) also observed that the main input in charcoal production - wood, is obtained at a near-zero or zero financial cost.

The increasing trend in the quantity of charcoal produced and sold for the three-year period of the study could be attributed to an increasing demand for charcoal because of unstable and upward prices of kerosene; unavailability and adulteration of kerosene; high initial capital requirement and cost of other energy sources like gas; and the erratic and low voltage electricity supply in Nigeria.

However, meeting the increasing demand for charcoal and sustaining the profitability of the enterprise will not be realised with zero ecological consequences. According to FAO (2006), unsustainable charcoal production can degrade or exhaust the supply of certain species. The populations of the preferred species for charcoal production have dwindled to some extent in all the sampled sites with the change indices being more than 50 per cent in some cases. This has grave implications considering the important roles trees play in ensuring environmental stability. The lack of adequate control over the exploitation of wood resources may be responsible for damaging environmental consequences (Rhaji 2005). The fact that most of the wood used for charcoal production is of low cost also means that there is little incentive for charcoal makers to invest in methods of maximising its use. Neither is there any point in farmers planting trees to meet the needs of the charcoal market since the charcoal makers will not be prepared to pay for specially grown wood when they can obtain what they need for nothing (Earthscan 1986). Charcoal production in the study area is economically profitable but ecologically unsustainable, and then a need is envisaged for the establishment of a regulatory system of planting and harvesting trees for charcoal production.

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Socio-economic Impact of Cyclone Sidr on Rural Livelihoods - A study of select villages in Barguna District, Bangladesh

Badal Chandra Hawlader*

Abstract

This study is exploratory. It examines the impact of Cyclone Sidr, which took place on 15 November 2007, on the affected people as well as their conditions of livelihood after three years of that tragic incident. Finding out the measures taken by affected people for their livelihoods after the disaster and sorting out the external assistance that comes into their help was the main focus of the study. Interview and focus group discussion were used as methods for collecting data and information. The results of the study reveal that most of the families in the study villages were not able to regain their livelihoods in the way as it was before Cyclone Sidr. Because of the Cyclone Sidr, many families were bound to change their occupation for livelihood recovery. Government and non-government's recovery activities helped the affected people in short term but did not ensure long-term security or sustainable livelihood.

1.0 Introduction

Bangladesh is a country quite vulnerable to natural disasters. Almost every year it experiences small or high frequency cyclones, which seriously disturb livelihoods of village communities. Worst hit by these cyclones are the coastal poor people of the southern part of Bangladesh. Nineteen coastal districts of Bangladesh covering an area of 47,201 sq. km. with an estimated population of approximately 46 million are vulnerable to cyclones (Karim 2005). Bagerhat, Barguna, Barisal, Bhola, Chandpur, Chittagong, Cox's Bazar, Feni, Gopalganj, Jessore, Jhalokati, Khulna, Lakshimipur, Narail, Noakhali, Patuakhali, Pirojpur, Satkhira and Shariatpur are the districts that bear most of the brunt of cyclones.

Historical evidence shows that Bangladesh has been hit by cyclones many times. Before cyclone Sidr, it was hit by devastating cyclones in November, 1970 with an estimated death toll of 300,000, and later on, in May, 1985 another severe cyclone hit Bangladesh with a death toll of 11,069 (Jyotirmoy Talukder 1992). The most destructive cyclone, Gorky, hit Bangladesh in April 29 -30, 1991 with an official estimate of death being 138,868 (ibid). These cyclones resulted in thousands of coastal people being uprooted from their village home and increased poverty level among them.

On November 15, 2007, Super Cyclone Sidr wreaked havoc across the communities of coastal area of Bangladesh with surging floods and savage winds affecting 8 million

* Research Intern, CIRDAP. Email: badalindu@yahoo.com

people in 30 districts of the south and southwest. It utterly disrupted village livelihoods and made many people homeless. Twelve districts were overwhelmingly affected by the Sidr which are: Bagerhat, Barguna, Barisal, Bhola, Gopalganj, Jhalokati, Khulna, Madaripur, Patuakhali, Pirojpur, Satkhira, and Shariatpur. According to a report published in 2008 by the Ministry of Food and Disaster Management (MoFDM), Government of Bangladesh (GoB), an estimated 3,409 people were killed from these most affected districts, millions of homes were damaged, assets and livestock were lost, crops flooded, trees were uprooted, and wells and ponds got contaminated (MoFDM 2008).

After the cyclone, coastal people were faced with extreme dearth of food and clean drinking water. All of a sudden, they found themselves to be shelter less while the provision for their livelihoods was in great danger. GoB, Non-Governmental Organisations (NGOs) and Local Organisations quickly responded to the primary needs of the people.

1.1 Rationale and Study Area

For reducing the impact of cyclone Sidr and improving the livelihoods of the affected people, some recovery activities were initiated by the government agencies as well as NGOs. One such programme was conducted by Save the Children- USA in Galachipa and Kalapara Upazilas in Patuakhali District. Another study had been conducted by Dhaka Ahsania Mission in M. Baliatoli Union adjacent to Naltona Union in Barguna District on Risk and Vulnerability Analysis and Capacity Assessment. Bangladesh Red Crescent Society has also conducted many household surveys for livelihoods recovery programme in Barguna, Bagerhat, Patuakhali and Pirojpur districts. However, compare to the damages cyclone Sidr caused, these studies are very less in number. Therefore, more research activities are needed for reducing impact in future.

Figure 1: Barguna Sadar Upazila and the Study Area

Source: http://www.banglapedia.org/httpdocs/ht/b_0303.htm

For assessing the impact of cyclone Sidr and measuring the effectiveness of livelihood recovery activities, two worst affected villages- Aga Padma and Gora Padma- in Naltona

Union of Barguna District have been selected. Along with these villages, the overall focus has on Naltona Union.

The area of the union is 44 sq. km. with an estimated population of about 25000. The study villages, Aga Padma and Gora Padma, are the two big villages of the Union. Over 1375 families are living in these two villages comprising around 7000[1] people. The villages have been selected on the basis of the extent cyclone Sidr caused to them. These two villages are very remote in nature and also share borders with the Bay of Bengal and are quite vulnerable to natural disasters.

It is important to mention here that Barguna is the most affected district of cyclone Sidr with its 1292 casualties being the highest of all the districts and the number of affected people in the district is 843669 (MoFDM 2007).

As mentioned earlier, some research activities have been conducted in Sidr affected areas as well as in Barguna, however, these research works were conducted on an immediate basis mainly for relief activities. But for livelihood recovery no major study is yet to be initiated. More importantly in the study select villages no such study has been conducted yet.

1.2 Objectives

The objectives of the study are:

1. To analyse the impact of the cyclone Sidr on rural livelihoods of the two villages in Barguna District.
2. To examine the livelihood opportunities of the rural people in the study villages.
3. To assess the effectiveness of recovery activities and suggest measures to improve the socio-economic conditions of the affected people.

1.3 Focus of the Study

Research focus of the study is to find out the impact of cyclone Sidr on rural livelihoods and effectiveness of the recovery activities in the study villages. For achieving the objectives following research questions have been addressed:

- What measures do people take to recover their socio-economic conditions after any natural disaster?
- What has been done by external sources to improve the socio-economic conditions of Sidr victim communities?
- Do NGOs and government activities really play pivotal role in livelihoods recovery process?

[1] This figure was estimated by Naltona Union Parishad Members in 2010.

2.0 Research Methodology

To achieve the objectives, both primary and secondary data have been used. Secondary data have been collected from Bangladesh Bureau of Statistics (BBS), Disaster Management Bureau (DMB), Disaster Management & Relief Division (DMRD), Bangladesh Red Crescent Society (BRCS), and Upazila and Union level governmental and non-governmental organisations. Various reports, books, and online sources regarding cyclones published by governments and NGOs have also been consulted and given proper citation.

For acquiring primary data, focus group discussions and individual interviews have been conducted for getting information on socio-economic conditions of the cyclone Sidr affected people. Discussions with government officials, NGOs, local elites and community leaders have been held for getting required information.

For collecting primary data, communities who have been identified and interviewed were: farmers, fishermen, daily wage labourers, private & public service employees, small businessmen, and landless people.

In the study villages, there are total 1375 households with an estimated population of around 7000. For the focus group discussions and interviews, a total 90 households were selected randomly with forty-five households from each village. The number of the interviewee consisting of farmers (45), fishermen (15), daily wage labourers (15), private & public service employees (5), small businessmen (5), and landless people (5) were interviewed for the purpose. In terms of percentage, it comprises 7 per cent of the total households in the study villages.

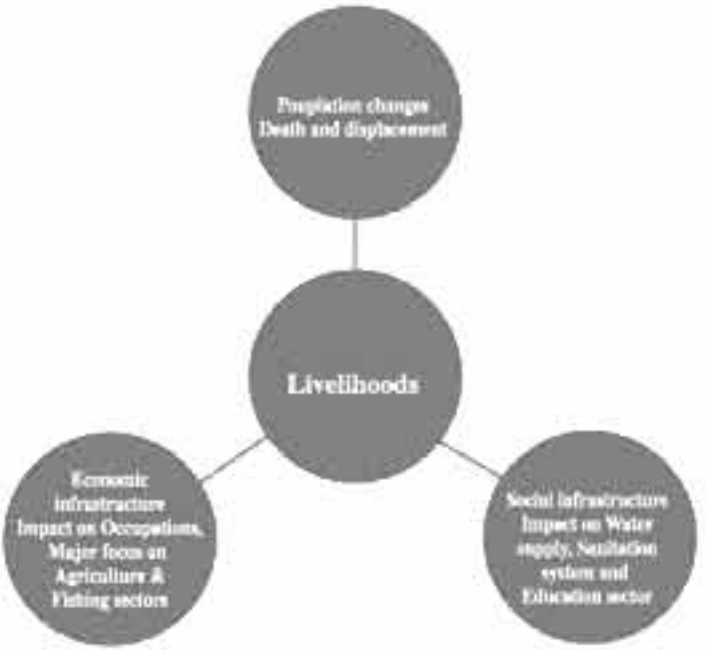
Data, both quantitative and qualitative, collected from the survey was then analysed manually and through the application of Microsoft excel programme. Then it was presented in the article graphically using Microsoft excel programme.

2.1 Limitation of the Study

Budget and time-constraint are the two main limitations to the study. Keeping these limitations in mind all the section of the people of the study villages could not be engaged in the field survey. As the study has been conducted in a small scale, the study result may not be applicable for all the affected communities and places.

Another major limitation of the study is the lack of availability of relevant literature. Only few academic or research studies have been conducted so far and reports published on cyclone Sidr and rural livelihoods are very scant. So, this limitation also impeded to get a proper view of the situation and to analyse the conceptual and theoretical aspects of the aftermath.

2.2 Framework for Analysis of the Socio-economic Conditions of Cyclone Sidr Victim Communities[2]



Livelihoods' of people living in the southern part of Bangladesh depend on mainly agriculture and fishing. In the research study major focus has been given on agriculture and fishing sectors, while focus to a lesser extent has been given on commerce, daily wage labour, and wage employment.

For measuring the conditions of the affected people, some indicators of socio-economic factors have been used which have categorised as demography i.e. size of the population; economic infrastructures, such as agriculture and fisheries; and social infrastructures which include water supply, sanitation system, and education sector.

3.0 Facts and Figures of the Study Area

The study area is in the Barguna District that is situated in the southern part of Bangladesh under Barisal Division. This district has an area of 1271sq. km. with an

[2] For preparing this framework two papers have been consulted. One is: CJ Meintjes, *Guidelines to Regional Socio-economic Analysis* Development Bank of Southern Africa, Development Information Business Unit, Development Paper 145, 2001.
Another is: Mary M. Edwards *Community Guide To Development Impact Analysis* Wisconsin Land Use Research Programme, Programme on Agricultural Technology Studies University of Wisconsin-Madison, 2000

estimated population of 984,323 (GoB 2008). It is surrounded by Barisal, Jhalokati, Patuakhali, and Pirojpur districts in the north, by Patuakhali district in the east, by Bay of Bengal and Patuakhali district in the south, and in the west by Bagerhat and Pirojpur districts. The district comprises of 5 upazilas (sub-districts), 38 union parishads, and 560 villages. The upazilas (sub-districts) are Amtali, Bamna, Barguna Sadar, Betagi, and Patharghata.

3.1 Naltona Union

Being situated in one of the natural disaster prone areas of Bangladesh, Naltona Union was one of the worst affected unions hit by Cyclone Sidr. Cyclone Sidr was one of the destructive experiences for them in history. The Union is situated in the South of Barguna district. It is about 20 km away from Barguna Sadar Upazila. The Union is surrounded in the south by the confluence of Bishkhali and Burishwar (also known as Payra River) rivers next to the Bay of Bengal, by Nali Canal in the north, by Bishkhali River in the west, and in the east by Nali Don River (Figure 1). So, it is nothing but a tiny island surrounded by rivers.

The Union has 12 villages, 7 mouzas, and 9 wards with 5220 families (Table 1). The land area of the union is about 44 sq. km with an estimated population of 25000 (approximately)[3] . The villages are: Aga Padma, Amtala, Azgorkathi, Garjonbunia, GaziMahmud, Goalbunia, Gora Padma, Kumirmara, Naltona, Nisanbaria, Shialia, and Sonatala. The following table shows the number of wards and number of families in each ward.

Table 1: Number of Ward and Family in Naltona Union

Ward	*Number of family*
1 No.	512
2 No.	455
3 No.	580
4 No.	593
5 No.	615
6 No.	760
7 No.	471
8 No.	605
9 No.	629
	5220

Source: Naltona Union Parishad 2009

In Naltona Union the number of educational institutions is quite few, and most of the schools are in bad conditions. All the institutions are run by very insufficient number of

[3] Estimated by Naltona Union Parishad in 2009.

teachers. It is observed from the field survey that after completing primary education most of the students stop going school. The Table 2 shows the number of different types of schools the union has.

Table 2: Educational Institutions in Naltona Union

Category	*Number*
High schools	3
Primary schools	8
Registered primary schools	5
Secondary schools	2
Minor school	1
Madrasas	4

Source: Naltona Union Parishad 2010

Cyclone Sidr caused huge damages to the people of the Naltona Union. It is a small area, where most of the people live below the poverty line. Sidr, therefore, came as a double blow for them. Table 3 shows the damages caused by Sidr in Naltona Union.

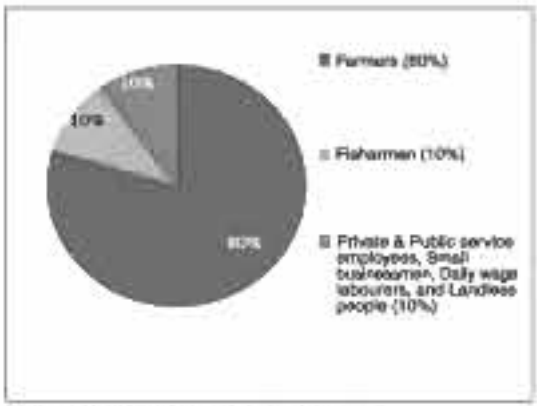
Table 3: Damage occurred by Cyclone Sidr in Naltona Union

Number of Death	146
Damaged Crops (Acre)	5502
Damaged Households	
Full	500
Partial	1500
Number of Livestock Death	
Cows	1500
Goats	2400
Poultry	10000
Damaged Embankment (km)	4

Source: Naltona Union Parishad 2010

One of the main focuses of the study was to find out how people lead their lives i.e. what are the sources of livelihoods. The field survey found that farming is the main source of income and occupation of the people in the study villages (Aga Padma and Gora Padma). They are engaged in different types of farming such as- mixed farming, commercial farming, and subsistence farming. The main income is generated through rice cultivation. However, many people of villages are engaged in other professions such as, fishing, daily wage labour, and small business etc. for maintaining livelihoods. The Figure 2 shows the percentages of different communities living in Naltona Union.

Figure 2: Percentages of Different Communities in Naltona Union



Source: Naltona Union Parishad 2010

Communication system of the villages is not well developed. All the roads being earthen have been damaged entirely by cyclone Sidr. Some roads have been repaired, but not to the full extents; and in rainy season people have to face lot of hardship in maintaining the communication. There is no other means of communication in the villages except walking.

While inquired on the role of local government in mitigating the impact of cyclone Sidr and other problems of the villages, most of the respondents showed negative attitudes towards the activities of local government. According to the respondents, local government's role or activities are very slow and have very limited capacity to solve the problems. In fact, in the view of village people, local government is not apt enough of creating any livelihood opportunities for the Sidr victims.

4.0 Findings of the Study

4.1 Impact of Sidr on Rural Livelihoods

According to the findings of the study, in the Union and the study villages, people's livelihoods mainly depend upon agriculture and fishing. Eighty per cent people are engaged in agricultural activities mainly in rice cultivation. People continue harvesting rice through November to January. Unfortunately, Sidr struck the area in November 2007 at the onset of the ripening season of *Aman*[4] paddy; and because of that over 80 per cent of aman production got completely destroyed. Thus people of these areas have fallen in a trap of food insecurity. Other than is rice cultivation, there is little or no other opportunities for sustaining livelihoods. The farmers start aman cultivation in July and remain engaged in up to the month of January.

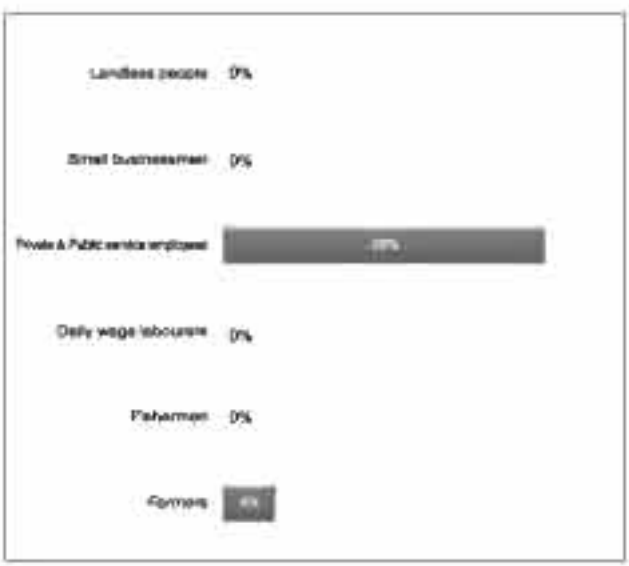
[4] *Aman* is one of the hugely cultivated paddy in Barguna and other southern districts, which is cultivated during July to January.

The fact is that, Sidr not only destroyed the aman crop but also brought saline water with tidal surge which reduced fertility of the land and because of that farmers had to remain idle for almost one year. As a result, poor farmers of the villages, over the period of one year, were fully dependent upon the relief materials provided by the GoB and NGOs. But the question that arises is- whether people have succeeded in recovering their livelihoods using government and NGOs' help in the way it was before the Sidr after three years.

The study was directed towards finding out various issues related to people's livelihoods. It is found that only 4 per cent famers are able to recover their livelihoods in the way it was in pre-Sidr period (Figure 3). Farmers of villages tried to improve their conditions and livelihoods by taking different measures, for example, fishing in the rivers and Bay, taking daily wage labour and vegetable cultivation, cutting palm tree for sweet, and taking seasonal businesses. However, the recovery has not taken place in the way it was supposed to be.

From the focus group discussions and individual interviews, one major finding chalked out is that almost every farmer took loan from microcredit organisations and individuals for improving livelihoods which helped them to survive but did not improve their conditions, rather it deteriorated their situations. The farmers are now facing difficulties to pay the instalments as they do not have enough income opportunity to pay back the instalments. For paying instalments they borrowed money from individuals and other NGOs and thus they have fallen into the trap of microcredit.

Figure 3: Percentage showing Livelihood Recovery among Different Communities in Post-Sidr Period



Source: Field Survey, October 2010

In 2010, after three years of Sidr, farmers of the villages expected high cultivation of aman, but incessant rainfall in October 2010 inundated their paddy field that created water logging and destroyed the crops. Thus, farmers of the villages had to suffer another brunt of the natural disaster and hope of recovery from the previous brunt of cyclone Sidr and Alia has remained far from being certain.

Fishing is the second earning source of the people in the study villages. Nearly 10 per cent people of the villages live on fishing. Fishermen live near the bank of the rivers. Therefore, they are the first casualty to be hit by natural disaster like cyclone and their families and houses always remain vulnerable to natural calamities. Most of the fishermen lost their fishing boats and net in Sidr. Survey found to date, not a single fisherman has been able to recover from the type of loss cyclone Sidr caused to their families (Figure 3).

Initially after the cyclone Sidr, they got some relief from GoB and NGOs which helped them but did not improve their livelihoods. For improving livelihoods of the fishermen, one NGO provided boats free of cost, yet that did not help them because those boats were not fit for fishing in the Bay. The fishermen, therefore, were not able to use those boats for fishing.

In the study villages some people are engaged in daily wage labour. They live in very poor conditions, and any natural calamities come as massive havoc for them. Cyclone Sidr damages their houses and till now many families of them have not been able to repair their houses.

Some governments (Bangladesh government, Saudi government, etc.) and some NGOs (Caritas Bangladesh, etc.) provided money for making houses but the percentage of getting money was very inadequate in number.

Daily wage labourers of the villages work in the agricultural field owned by someone else. However, after Sidr condition of other communities also deteriorated as a result, daily wage labourers did not get work as frequently as they were used to get beforehand. Consequently, after Sidr they started doing different types of works in different seasons for livelihood recovery. They went for fishing in the Bay and explored other places for works. They also took loan from NGOs and individuals for recovering livelihoods.

From the GoB and NGOs, daily wage labourers like others got some relief assistance such as, rice, biscuits, and blankets which did not give them livelihood security as there is little work opportunities for them in the villages, and only relief materials provided were not sufficient for improving livelihoods.

Government and NGOs, to date, have not created any such kind of work opportunities where daily wage labourers could give their labour. Only a few minor initiatives, such as road repairing have taken place on behalf of one or two NGOs which were insufficient for long term solutions. Besides, roads repairing works that took place were very short time basis and only some selected people got opportunity over there.

Number of private & public service employees in the study villages is not very high. Only 1100 people who are engaged in different types of jobs live in the whole Naltona Union. The majority of them are school teachers and NGO workers. Their conditions are better

than others, Figure 3 shows that 29 per cent private and public service employees are able to recover their livelihoods back to that standard it was in pre-Sidr period. It is because they have fixed and assured monthly income. However, loss that Sidr brought in their families is same as others and full recovery will not be possible, yet they have at least, livelihood security.

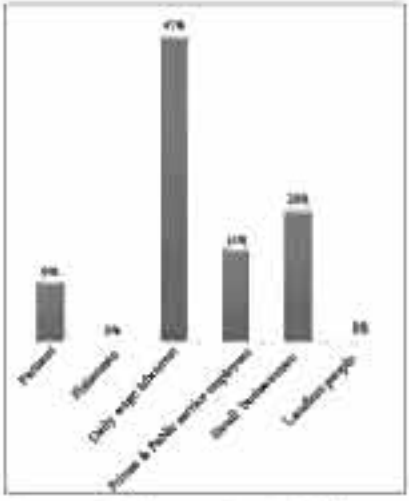
In Naltona Union, there are only 450 small businessmen who are engaged in different types of businesses such as grocery, saw mill, rice mill, tea stall, fish selling, hardware and stationary, and drug selling etc. During the study some of them were interviewed for getting information regarding the impact of cyclone Sidr on their families.

The study found that they did not manage to recover the loss that cyclone Sidr inflicted on their families and businesses. They, however, were able to generate their income through businesses. One benefit they enjoyed was that NGOs provided them with money for running their businesses which helped them to reestablish their businesses. Nevertheless, the money they earn from the businesses has to be spent on paying instalments.

There are 1500 landless people in the Naltona Union whose main occupation is daily wage labour. 80 per cent of them are engaged in daily wage labour. As they do not have their own land and houses, they take protégé in others land mainly in government land erecting makeshift houses. As there is little work opportunities in the villages, they move from place to place for work.

Sidr has huge impact on livelihoods of different communities of the study villages. Due to the Sidr huge changes occurred in choices for occupation. Figure 4 shows the changes of occupation among different communities. Through these, it is understandable how much impact Sidr has on the communities who tried to lead their lives through changing and acquiring different occupations.

Figure 4: Change of Occupation due to Sidr among the Communities



Source: Field Survey, October 2010

Among the respondent of farmers 9 per cent were in different occupations before Sidr. The majority of them were in small businesses such as, cow selling, house and furniture making while others were in fishing business. Sidr halted their businesses and reduced livelihood opportunities. Because of lack of asset they could not able to re-establish businesses and consequently changed their occupation to agriculture. They took farming as occupation because they have their own agricultural land.

The interesting thing is that not a single fisherman has changed their occupation (Figure 4). The equation here is simple, as from the focus group discussion it was found that most of the fisherman can take money from *Dadon*[5] businessmen and can engage in fishing. They take money from dadon and buy boats and other fishing materials and in return they need to give all the fishes they catch. Fishermen cannot sell the fish in the market for their own benefit. This helps them to live in hand to mouth but does not improve their situations. Being traditionally fishermen having no other skills, they could not able to take new occupation. Rather, cyclone Sidr made them more dependent on Dadon businessmen. Although, Dadon system is not new as it was there before cyclone Sidr, many fishermen had their own boats and net, and had control on the fishes they used to net in and were able to run their own business. But, after the Sidr this situation has changed and the conditions of the fishermen deteriorated opening the door for Dadon businessmen for exploitation. Here government and NGOs intervention is needed.

The changes of occupation remain high among daily wage labourers. From the Figure 4, It can be seen that 47 per cent daily wage labourers were in different occupation before Sidr. They worked mainly in agricultural sectors but Sidr and later on cyclone Aila and flood destroyed that opportunity.

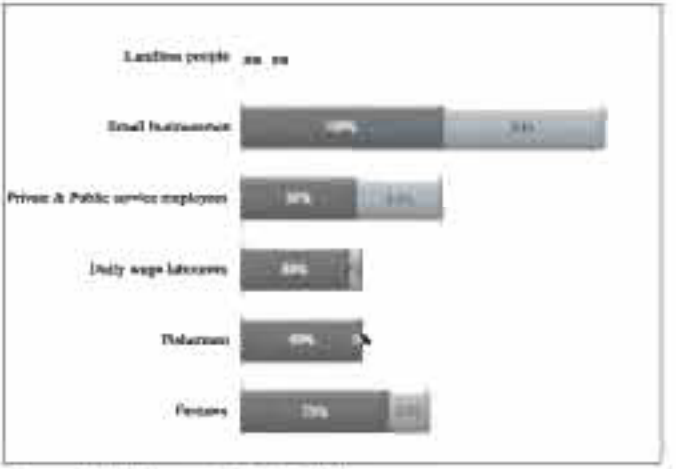
From the Figure 4, it can also be seen that the changes of occupation among private and public service employees are 14 per cent, while changes among small businessmen and landless communities are 20 and 0 per cent respectively, and 20 per cent businessmen who have changed occupation were engaged in agricultural activities before Sidr.

4.2 Impact on Sanitation

Sanitation is another socio-economic factor which has seriously undermined by Sidr. In the study villages, Figure 5 shows that huge damages occurred in sanitation system due to the cyclone Sidr. Most of the families of different communities have not been able to repair their damaged sanitation till now. Government and NGOs assistance in this sector is very limited. This situation has increased health risk among the people.

[5] Businessmen who give money and take all the catch. Fishermen cannot sell a single fish in market; thus they have zero share of fish.

Figure 5: Pre- and Post-Scenarios of Hygienic Sanitation among the Communities



Source: Field Survey, October 2010

In the pre-Sidr period, there was 73 per cent hygienic sanitation system among farmers where now they have only 20 per cent. Sanitation system is in dire status among fishermen, before Sidr they had 60 per cent where now they do not have any hygienic sanitation. According to the fishermen, Government and NGOs have not come to provide them help in this sector because their place is very remote and segregated from other villages and of the poor road communication.

Conditions of private and public service employees and small businessmen in hygienic sanitation are better compared to other communities. Now, 43 per cent private and public service employees, and 80 per cent small businessmen have hygienic sanitation. They themselves have repaired their interrupted sanitation.

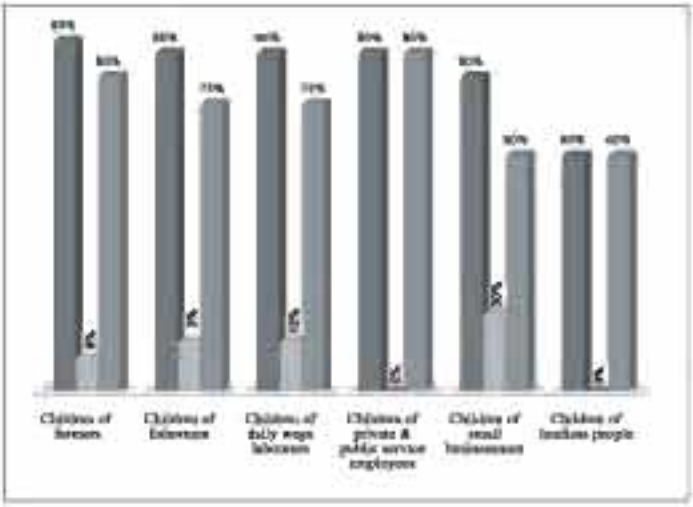
Another serious problem, the villagers are facing, is the shortage of fresh water. There is no tube well in Aga Padma while in Gora Padma there are only 8 tubewells. Most of the people of the villages use rain and pond water for drinking and other purposes. Tube well in the study villages is not suitable because of the saline ground water. Therefore, alternative sources of drinking water are the urgent need for the people for alleviating the intrusion of different types of water borne diseases.

4.3 Impact on Education

Most of the children of the study villages, usually, stop going to school after primary education. Cyclone Sidr has increased the dropout rate of school going children among different communities. Figure 6 shows the percentage of school going children before Sidr, dropout rate from school during post-Sidr period, and present rate of school

going children among different communities. Dropout rate is prevalent among the children of farmers (9%), fishermen (13%), daily wage labourers (13%), and small businessmen (20%). Dropout rate is nil among the children of private and public service employees and landless communities.

Figure 6: Percentage of School Going Children before Sidr, Dropout Rate from School during Post-Sidr Period, and Present Rate of School Going Children among Different Communities



Source: Field Survey, October 2010

Government of Bangladesh has taken initiatives after the cyclone Sidr to improve the educational infrastructures, and they successfully did it. However, GoB as well as NGOs did not take any initiatives to reduce the children dropout rate from school. It is a complex issue because it entails many things. Most of the children in the villages get engaged in work for the need of family after finishing primary education, and Sidr has increased this rate many fold. So, government and NGOs have to ensure livelihood security or have to create livelihood opportunities among the senior members of the families.

4.4 Impact on Psychology

Cyclone Sidr caused huge psychological impact on village communities. After Sidr, cyclone Aila hit the communities on 25 May 2009 followed by heavy rain in October 2010 which flooded the area and increased the magnitude of fear among the communities. The study asked the communities whether they have apprehension of future disaster or not. Every community showed their apprehension for future disaster which has been shown in Figure 7.

Different types of news on the issues of climate change, global warming, and sea level rising have raised the fear among the communities. Regarding sea level rising, it has been discussed with the village communities, and in this issue, they disclosed some facts

which indicate that sea level rising is really taking place. According to the people of the villages, now, tide brings more water which increased, according to them, the water level almost one foot which was not the case before thirty to forty years back.

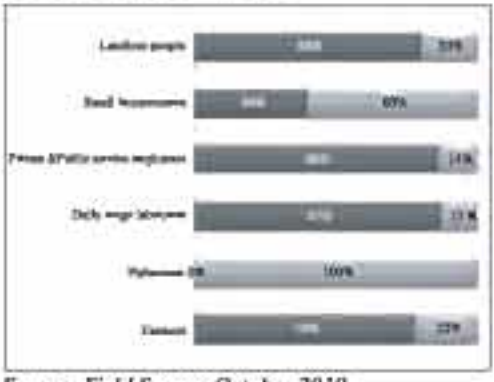
Figure 7: Apprehension of Future Disaster among the Communities

Source: Field Survey, October 2010

The study has also sought to find out whether this apprehension has led to change in their occupation or dwelling place. Study found that almost every community except fishermen wants to change their occupation and place if provided with better opportunities (Figure 8).

Fishermen do not want to change their occupation being habituated with the adverse nature of environment and other than fishing they do not have any other option and skills. Percentage who wants to change occupation is also less among small businessmen (40%). It is because they somehow can generate income through small businesses and do not need to find out other livelihood opportunities.

Figure 8: Percentage showing who wants to and does not want to change occupation and place due to natural disasters



Source: Field Survey, October 2010

For reducing the fear, government and NGOs have not taken any initiatives yet in the study villages while more cyclone shelter is needed for the fear reduction.

5.0 Conclusion and Recommendations

5.1 Conclusion

Because of the geographical location people of Naltona Union are quite vulnerable to natural disasters. Most of the families in the union live in abject poverty and any natural disasters increase their poverty level many folds. Field study shows that after three years of cyclone Sidr, not a single family is back in normal status they used to live on previously. Most of the interviewees told that it would not be possible for them to recover the losses incurred by them in 20 years.

Discussion found that people of the villages have already started shifting their place and occupation to other parts of Bangladesh for better livelihood opportunities. It also found that after cyclone Sidr many people left their businesses and jobs and moved to Dhaka.

Natural calamities force people to change their traditional occupation as well as force to leave their forefather's living places. Thus, their lives always remain instable. However, every human being wants to live with stability and for that they make their own survival strategies. After cyclone Sidr, people of the villages also made their own strategies to lead their lives.

It is true that people have their own strategies for coping with natural disasters, but external help accelerates implementation of their strategies. Without the external help, it would be very difficult for them to survive. In Sidr, GoB and NGOs assistance extensively help people tackling emergency period of the disaster. Their assistance helped people and communities from any further major epidemic.

But after few months of the cyclone Sidr, question of livelihood recovery came into the fore. GoB and NGOs helped people in the early recovery phase; however, they were reluctant to the next important phase. The next phase, livelihood recovery, is the most important phase because it has linked to maintaining the families where permanent source of income is feasible. This phase is expensive and time consuming. Although, some agencies took some initiatives in this regard but number is not substantial enough. Only a nominal percentage of Sidr victims got the opportunities and benefits out of these initiatives. Most of the cases, people took their own initiatives for regaining or maintaining livelihoods.

It has found that most of the people of the villages have taken loan from micro-credit organisations for livelihood recovery, but this strategy did not help them as much as they expected, rather it has increased their problems. Most of the farmers in the villages are

now in grave debt with micro-credit organisations as they are unable to pay their installments regularly. They are taking various measures to return the installments which in turn create negative pressures on their livelihoods. However, micro-credit somehow helped small businessmen, because after taking loan they were able to restart their businesses and able to generate income. Nevertheless, they are yet to come out of the damages Sidr caused.

5.2 Recommendations

For improving livelihoods of the rural people after any natural disaster, along with relief assistance, government and NGOs should consider medium and long term initiatives.

For improving the conditions of the Sidr affected people in the study villages as well as other affected villages of Bangladesh, the following measures may be considered appropriate by NGOs and policy makers of various governments.

- Because of the salinity and economic hardship, the farmers of the study villages, as well as other villages of the southern part of Bangladesh, can cultivate their land only for one season of a monsoon. However, it is possible to use the land in other seasons by arranging tractors, water pumps. If they are granted some loans or provided with the materials which they cannot arrange themselves as they are not economically stable, they could change their present agricultural pattern.

- For mitigating the water logging in the study villages, government and NGOs may take initiative of canal dredging which would not only solve the water logging but also would create some work opportunities for the daily wage labourers. Along with canal dredging, a box sluice gate as opined by the Union Parishad members, teachers, and common villagers can be a great solution for reducing the water logging and improving agricultural activities.

- Because of the inimical nature of environment, many farmers are willing to change their occupations as shown in Figure 7 and want to start small businesses; in this regard money lent with less interest can help them. They can also be provided with money or livestock such as cows or goats for income generating activities, but monitoring mechanism along with these is to be incorporated.

- The present interest rate and pay back timing are not favorable to farmers and other communities. As in the case of farming, it is not possible to get the result overnight, therefore, manageable interest rate and flexible pay back timing need to be introduced.

- Saline and deep water resistant rice cultivation can help the farmers. Bangladesh Rice Research Institute (BRRI) and International Rice Research Institute (IRRI) have

developed these technologies. Therefore, proper dissemination of these technologies could solve the problem of the affected coastal people.

- For improving the conditions of fishermen, large boats and fishing materials can be given to groups comprising five or six fishermen in each. But, it should be appropriate to their needs i.e. it is necessary to ensure that fishing materials provided should be useable for them. Fishermen can also be provided money with less interest, so that they can catch and sale fish by their own. As fishing is not taking place all the year round and income is also not very high, it is not possible for them to give large amount of interest within a short span.

- Small businessmen such as, poultry and grocery, etc. can be donated or given money with flexible interest rate for regaining and restarting their businesses and livelihoods.

- For tackling the food shortage or to ensure the food security, GoB may consider reintroducing the Vulnerable Group Feeding (VGF) for the most vulnerable Sidr affected families.

- For reducing fear of the people more shelters are required as in the study villages there is only one cyclone shelter. There is no animal protection center in the Naltona Union, so animal cyclone shelter or killa can be constructed.

- The most important thing to be taken into consideration is that the local government system in the study villages is not strong enough to deal with the problems but it has the closest affinity and proximity with the local people. Had local government been strong many problems relating to disasters would have been locally solved. Therefore, GoB may consider strengthening the local government system.

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Utilisation of Monkey Fruit - *Dactyladenia barteri* in Indigenous Agroforestry Practice in Ideato South Local Government Area of Imo State, Nigeria

H.M. Ijeomah[*a], U.D. China[*], A.A. Aiyeloja[*] and E.A.U. Ofodile[*]

Abstract

Difficulties in achieving sustainable mass adoption of new agroforestry technologies in the face of high soil erosion, environmental degradation, land use pressure, habitat destruction, consistent crop failures due to climate change, and economic melt-down have called for the evaluation and improvement of existing indigenous and traditional agroforestry systems in eastern Nigeria. The study evaluated the utilisation of Dactyladenia barteri in indigenous agroforestry practice in Ideato South Local Government Area of Imo State, using personal interview, questionnaires and focus group discussion. The results reveal that Dactyladenia barteri is a multipurpose species well-known, planted and widely utilised in the study area. It is a source of fuel wood, staking stick, fencing material, fodder, income, durable and termite-resistant wood for farmers. It enriches the soil, provides fruits for animals and restores micro-habitats. The role of D. barteri in traditional agroforestry practice in Ideato South Local Government Area cannot be over emphasised; hence, its use has been sustained. It is recommended that farmers should always endeavour to leave D. barteri permanently in some parts of their farms to serve as seedbank; and that farmers should be encouraged to intensify the planting of the species in their farms. In addition, practitioners should endeavour to initiate empirical studies that will provide insight into the nature of the interactions that exist between D. barteri and soil, and the various arable crops planted in the study area.

1.0 Introduction

Every species apart from playing important roles in the maintenance of its ecosystem, could also contribute positively to the well being of people living in that environment if the potentials are discovered and properly utilised. The use that species are put to greatly depends on the indigenous knowledge of the locals about the species, ease of species' adoption, and the abundance and availability of such species. According to Ajaegbu (1997), indigenous knowledge are what the people know, the knowledge they have acquired over time, often tested and proven over the years and handed on from one generation to another.

Such knowledge includes the basis for the local people's fears, beliefs, hopes, expectations and modes of operations particularly in agriculture.

It is on the background of indigenous knowledge that livestock in rural communities of Ideato South Local Government Area of Imo State are fed with 'abortive' plant species

* Department of Forestry and Wildlife Management Faculty of Agriculture, University of Port Harcourt, Rivers State, Nigeria.
[a] Corresponding author Email: henryijeomah@yahoo.com

after parturition to eject afterbirth. Through indigenous knowledge, tree species such as *Newbouldia laevis* is used for the demarcation of sacred sites (shrines), boundaries, and for fencing in most parts of Ibo speaking areas of Nigeria, due to its high coppicing ability and survival rate. On the same background, *Dactyladenia barteri*, a multipurpose shrub is used in feeding livestock particularly purging ones because of its anti-purgative qualities. Through indigenous knowledge also, pregnant women among the Ibo speaking areas of Nigeria are disallowed from consuming *Xylopia aethiopica* (wild ginger) to avoid premature contraction of the uterus, hence abortion. However, *Xylopia aethiopica* is consumed on regular basis by women immediately after delivery because of its efficacy in post natal medication and enhancement of milk let down.

With indigenous knowledge, rural people combine trees and trees, crops and trees, crops and crops, shrubs and trees on the same piece of land purposely to increase yield. Even though the combinations may be wrong at times, they indicate a pre-knowledge of the interaction between/among crops and trees before the scientific era of agroforestry. This is why the term 'agroforestry' has been described as a new name for an old practice. The knowledge of the inhibition of seed germination and plant growth as a result of tree/crop or tree/tree combination, confirms rural knowledge of allelopathy. It also acts as a guide in tree combination because of expected yield which could be affected by tree/crop interactions.

According to Nair (1993), Agroforestry is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economical interactions between the different components (Lundgren and Raintree 1982). The science of agroforestry seeks to improve positive interaction and check negative interaction among trees and crops.

Arguably, many species of plants in Nigeria add nutrients to the soil and interact favourably with one another. However, much emphasis is only laid on leguminous species. The slow growth and unknown nutrient addition quotient of most local species possibly led to the introduction of fast growing exotic agroforestry species such as *Leauceana leaucocephala* in agroforestry. The introduction of these exotic species has several implications as many of them are unpopular among rural farmers and may be multi-purposely used. This therefore, calls for the evaluation of local knowledge and usage of agroforestry potentials of indigenous species. Young (2002) states that the capacity of trees to maintain or improve soils is shown by the high fertility status and close nutrient cycling under natural forest, the restoration of soil fertility under forest fallow in shifting cultivation, and the experience of reclamation forestry and agroforestry. About 100 species are known to fulfil soil-improving functions and *Dactyladenia barteri* has been listed among the principal trees and shrubs that have been employed for soil improvement (Young 1989; 2002).

Imo State, having land area ratio of 0.31 - the least in Nigeria after Lagos State (FORMECU 1998), 81% of the women engaged in farming (FOS 1984; Longe 1988;

Aina and Salau 1992), about 1,962 persons/hectare dependent on a forest reserve (Agbeja 2003), most wildlife species threatened due to habitat destruction, and every adult male expected to own a house by culture irrespective of intense land scarcity worsened by erosion menace; is facing a serious land hunger. If there is any state that is in need of agroforestry practice especially the type that is technologically indigenous, Imo State, particularly Ideato South Local Government Area is it.

2.0 Description, Distribution and Ecology of *D. barteri*

D. barteri (commonly called monkey fruit) is a multipurpose shrub (Udo et al. 2009) that belongs to the family, *Chrysobalanaceae*. It is a climbing shrub (small tree) that may grow up to 12m tall; bole fluted, often multiple, crooked, up to 25-40cm in diameter, bark brittle, slash thin and watery white turning reddish; crown dense spreading. The fruit is a single-seeded drupe, compressed-ovoid, 2.5cm x 3.5cm x 5cm. It naturally occurs in lowland forest with at least 1200mm annual rainfall; and in the savanna transition zone, it occurs along river banks, sometimes on the inland side of mangrove.

It is a native of Cameroon, Gabon, Ghana, Liberia, Nigeria and Sierra Leone. *D. barteri* is well adapted to leached, acid and infertile soils and can survive occasional flooding (Agroforestry Tree Database, undated).

2.1 Agroforestry Qualities of *D. barteri*

Established plants coppice well even after pollarding or burning and are fire resistant. When planted in espacement of 4m x 4m, it can produce 6 ton/ha prunnings, 4 ton twigs and 9 ton wood within 8 months with a nutrient yield of 85kgN, 5kgP, 43kgK, 18kgCa and 46kgMg (Agroforestry Tree Database, undated). The shrubs have an extensive root system that holds the soil. It produces large amounts of litter and recycles appreciable quantities of nutrients through its deep root system and the dense canopy aids in weed suppression. The slow decomposition rate of the leaves makes it a good material for mulching.

The study was conducted based on the following objectives:

- To evaluate farmers' knowledge of *Dactyladenia barteri* in Ideato South Local Government Area.
- To ascertain farmers' reasons for using *Dactyladenia barteri*.
- To evaluate farmers' efforts to sustain the use of *Dactyladenia barteri*.
- To document problems encountered by farmers in using *Dactyladenia barteri* as an agroforestry plant species.

3.0 Methodology

3.1 Study Area

The study was conducted in Dikenafai, Umuobom, Ntueke and Ogboko communities of Ideato South Local Government Area of Imo State, Nigeria. Ideato South is located between longitudes 6^{o} 55^{1} E and 7^{o} 10^{1} E and latitudes 5^{o} 40^{1} N and 6^{o} 00^{1}. It is bounded in the East by Okigwe Local Government Area, in the West by Orlu Local Government Area, in the North by Ideato North Local Government Area, in the South by Nkwerre Local Government Area and in the South-east by Okwelle Community in Onuimo Local Government Area; all in Imo State (Ijeomah and Ogara 2006).

3.2 Method of Data Collection

Dikenafai, Umuobom, Ntueke and Ogboko were randomly selected from Ideato South Local Government Area. Data were collected through Focus Group discussions, interviews and questionnaire administered on indigenes of the communities who have lived there for a minimum of five years. Questionnaire was administered to 50 respondents in each community. On the whole, 200 copies of questionnaire were administered. Group discussions were conducted with eight persons separated by generation and gender in each community as was done by Ijeomah (2007). In all, four group discussions were conducted. Results obtained were analysed using descriptive statistics in the form of percentages, and frequency of counts.

4.0 Results and Discussion

4.1 Awareness and Utilisation of *D. barteri*

All respondents were able to identify *D. barteri*; claimed to have used; and planted it (Table 1). This implies that Monkey fruit is well known, valued and widely utilised in the study areas. The species serves different purposes of local nature in these communities (Table 1). The fact that all the respondents use *D. barteri* for soil conservation and weed suppression shows that it is well recognised by indigenous knowledge, as an agroforestry species. The transfer of this knowledge from generation to generation is sustained by the effectiveness of the species in nutrient restoration. It is for this high level of awareness on the nutrient retention qualities of *D. barteri* that the species is consciously retained, planted (scattered or as hedgerows) in traditional cropping system. This could be the reason all respondents are willing to plant *D. barteri* (Table 1).

All parts of the species are utilised. The stem and roots are used for fuel (when dry). The stem of a single plant can be used for fencing or staking of yam vines for two seasons and finally be used as fuelwood. This cannot be unconnected with the fact that the species resists attack by termites and burns smoothly. The leaves are used as fodder and manure. Though, the respondents are not aware of the use of *D. barteri* for medication, Agroforestry Tree Database (undated) documented that the bark and roots are used medicinally as a purgative against variety of ailments in Nigeria. Shade formed by the species is a common hiding place for wildlife species.

Table 1: Knowledge, Utilisation, and Respondents' Willingness to Plant *D. barteri*

Respondents' knowledge of *D. barteri* in the Study Area	
Variable	*Percentage*
Well known	100
Not known	0
Can identify D. barteri	100
Has planted D. barteri	100
Has used D. barteri	100
Utilisation of *D. barteri* as identified by the respondents	
Uses	*Percentage*
Fuel wood	100
Staking stick	100
Fencing stick	100
Fodder	100
Soil conservation/enrichment	100
Weed suppression	100
Source of income	100
Respondents' willingness to plant *D. barteri*	
Variable	*Percentage*
Willing	100
Not willing	0
Do not know	0

Source. Field Survey 2009

The holes formed by the fibrous roots serve as hibernating places for giant rats *(Cricetomys gambianus)* which become an attractant to *Python sabae*, an endangered species. Stems of *D. barteri* are sold to generate revenue for farming households. The leaves can freely be harvested as fodder.

4.2 Sustainable Utilisation of *D. barteri* and Challenges

Efforts made by all respondents to sustain the utilisation of *D. barteri* include deliberate planting of the seed, non destruction of young plants in the farm, sustainable harvesting of stems and land fallowing (Table 2). However, all respondents indicated slow growth of the species, indiscriminate bush burning by unidentified hunters and poor germination of seeds, as major challenges (Table 2). Fire does not destroy the species but can dry parts of the stem which can then be used only as fuel wood. Burning of seeds can also affect germination.

Table 2: Respondents' Efforts to Sustain the Use of *D. barteri* and Problems Encountered

Respondents' efforts to sustain the use of *D. barteri*	
Variable	*Percentage*
Deliberate planting of the seeds	100
Non destruction of young plants in farms	100
Sustainable harvesting of stems	100
Maintenance through land fallowing	100
Problems encountered by farmers in using *D. barteri* in the Study Area	
Variable	*Percentage*
Slow growth rate	100
Inability of many seeds to germinate	100
Indiscriminate bush burning	100

Source: Field Survey 2009

4.3 Availability and Marketing of *D. barteri*

Table 3 reveals that *D. barteri* is most abundant in Umuobom, followed by Ogboko. Respondents from Umuobom have vast arable land. The fallow period in Umuobom and Ogboko is still long (though gradually being reduced). It therefore, allows time for stems of the species to grow and mature to marketable and utilisable sizes for fencing and staking of yam vines. The farmers can then have enough to use and sell the remaining. Many farmers in Dikenafai and Ntueke can only harvest for use or little sales. In some cases the annual output may not be enough for the farmers' utilisation. This can be ascribed to intense land use pressures which have reduced fallow periods from ten years to three or two years. This period is not enough for growth that can guarantee multipurpose utilisation of *D. barteri*. Umuafai is the only village in Dikenafai that sells *D. barteri* in large quantities, because of less pressure in their farming areas (Ikpa).

The stem is mainly utilised *ex-situ* in the four communities. The leaves are used *ex-situ* as fodder but rearing of goats and sheep is declining in the study area. The roots are left intact where they hold the soil. Even when stems are harvested on-farm, the litters are left *in-situ* to recycle nutrients. Discussants have observed decreases in stem sizes of the species (Table 3). It was predicted by respondents that the decrease in the stem size marketed will likely continue as what affects the quantity of *D. barteri* stem harvested is neither stem demand nor stem market price but land fallow periods and use pressures.

Table 3: Availability and Marketing of *D. barteri* in Selected Communities of Ideato South by Focus Group Discussants

Parameter	*Variables*	*Communities*			
		Ogboko (n = 8)	*Dikenafai* (n = 8)	*Umuobom* (n = 8)	*Ntueke* (n = 8)
Availability of *D. barteri*	Abundant	5 (62.5)	4 (50.0)	8 (100)	
	Rarely available	0	0	0	
	Decreasing	3 (37.5)	4 (50.0)	0	
	No idea	0	0	0	
Part mostly harvested	Stem	8 (100)	8 (100)	8 (100)	8 (100)
	Root	0	0	0	0
	Leaves	1 (12.5)	1 (12.5)	1 (12.5)	0
Assessment of sizes of stem harvested	Decreasing	6 (75.0)	8 (100)	4 (50.0)	8 (100)
	Not decreasing	7 (87.5)	0	4 (50.0)	0
Will decrease be experienced later or continue?	Yes	8 (100)	8 (100)	8 (100)	8 (100)
	No	0	0	0	0
Part of *D. barteri* sold	Stem	8 (100)	8 (100)	8 (100)	8 (100)
	Leaves	0	0	0	0
	Root	0	0	0	0
Place of sale	On-farm	8 (100)	8 (100)	8 (100)	8 (100)
	Off-farm	1 (12.5)*	1 (12.5)*	2 (12.5)*	0
Does price affect harvest?	Yes	0	0	0	0
	No	8 (100)	8 (100)	8 (100)	8 (100)
What affects when to harvest	Land rotation and pressure	8 (100)	8 (100)	8 (100)	8 (100)
	Indiscriminate bush burning	1 (12.5)*	1 (12.5)*	0	0
	Market price	0	0	0	0

Note: * Numbers in brackets are percentage values; * Multiple responses from respondents

Source: Field Survey 2009

5.0 Conclusion and Recommendations

D. barteri is popular among households in the study area because of its multipurpose uses particularly in agroforestry. Its survival in leached acid soils makes it effective in soil reclamation in the study area and the entire eastern part of Nigeria; where there is always heavy nutrient loss due to leaching and erosion. The dense canopy apart from being effective in weed suppression plays important role in habitat restoration for wildlife species. Planting of monkey fruits in farms is an effective, cheap and easily adoptable indigenous agroforestry technology, which ensures enhancement of nutrient quotient and

soil environment for production of arrays of products beneficial to both man and wild animals. It is recommended that farmers should always endeavour to leave *D. barteri* permanently in some parts of their farms to serve as seedbank; and that farmers should be encouraged to intensify the planting of the species in their farms. The fruit of *D. barteri* is consumed by wild animals particularly monkeys. Seedlings survive better when raised in nursery bags before planting out. Farmers therefore, should be encouraged to raise their seedlings in the nursery before planting out. In addition, practitioners should endeavour to initiate empirical studies that will provide more insight into the nature of the interactions that exist between *D. barteri* and soil; and the various arable crops planted in the study area.

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Note to Contributors

1.0 Aims

The Asia-Pacific Journal of Rural Development (APJORD) is an interdisciplinary journal devoted to issues and discussions on rural development primarily in the Asia-Pacific region. APJORD focuses on poverty issues and rural transformation, keeping in view the four programme priorities of CIRDAP, namely (1) Agrarian Development; (2) Institutional/Infrastructural Development; (3) Resource Development including Human Resources; and (4) Employment.

2.0 Submission of Articles

Articles are accepted for publication provided they are submitted to APJORD only. If there is more than one author, a statement to the effect that the article has been approved by all the authors must accompany it. It is the responsibility of the author(s) to obtain permission for the use of previously published or unpublished materials including tables and figures. All articles are subject to peer review and may be revised if necessary. The editor's decision regarding articles submitted for publication is final. Copyright rests with CIRDAP.

Authors are entitled to three complimentary copies of the issue in which their articles appear. Articles written between 4,000-5,000 words are preferred. Both the hard copy and soft copy of the write-up must have to be submitted to the editor. The soft copy either may be given in pen drive/CD or can be sent as an attachment to the e-mail address: infocom@cirdap.org.

Typescripts should be submitted in duplicate, on A4 size paper, typewritten on one side, in double space, with margins of at least 2.54 cm. (one inch). Statistical tables, illustrations and charts should be submitted on separate sheets, and their positions should be indicated in the text.

3.0 Style and Presentation

APJORD mostly follows the Chicago Manual of Style for preparing articles. Authors should, as far as possible, adhere to the following basic requirements of style:

i. The name and institutional affiliation of the author should appear as a footnote on the first page together with acknowledgement, if any.

ii. An abstract of approximately 100 words should precede the text on the first page. It should be titled 'Abstract' indented, italicised and centred.

iii. British and 's' spellings should be used. Numbers from zero to ten should be spelled out, and numerals should be used for all other numbers.

iv. Where references are made without any comment, they should be inserted at the appropriate places in the body of the text in parenthesis giving the surname of the author(s) and year of publication of the work under reference, e.g. (Shama 1915: 41), (Mayco and Santalines 1991: 18), (Jupitar 1985; 21; Razia 1999: 66).

v. Where references are made with detailed notes/comments, they should appear as Notes, numbered sequentially throughout the article by superscripting in raised Arabic numbers and the corresponding notes appearing as footnotes or listed sequentially at the end of the article.

vi The reference list should appear after the Notes. For books give author's surname, other name(s) and/initial(s), year of publication, title of publication, place of publication, and publisher, e.g.

Syed, Shireen Kamal. 1992. Women in Post-harvest Loss Prevention. Dhaka: Centre on Integrated Rural Development for Asia and the Pacific.

Tamanga, A., N Shrestha., K. Sharma, and S. Kathi. 1994. Case Studies of Women with Abortion Experiences. Kathmandu: IDS.

Acharya, Meena. 1994. Political Participation of Women in Nepal. In Nelson, Barbara and Chowdhury, and Norma edited Women and Politics Worldwide. London: Yale University Press.

For Journal articles, give the author's surname, other name(s) and/or initial(s), year of publication, title of article, volume and issue number, and inclusive pagination, e.g.

Quarantelli, E.L. 1992. Can and Should Social Science Disaster Research Knowledge and Findings from Developed Societies be Applied in Developing Societies? Asia-Pacific Journal of Rural Development, Vol. II, No. 2, December. Pp. 1-14.

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Director, Information and Communication Division (ICD)
CIRDAP
17 Topkhana Road, GPO Box 2883, Dhaka 1000, Bangladesh
Tel : (880 2) 9564776, 9556131; PABX : (880 2) 9558751, 9559686, 7169824-5; Fax : (880 2) 9562035
E-mail : infocom@cirdap.org
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