The environment in the Chittagong Hill Tracts (CHT) is under pressure. New methods must be developed, applied, and tested for sustainable management of the natural resources. A diverse group of people from international, national, and local level organisations working in the Chittagong Hill Tracts discussed sustainable management of natural resources during the Inception Workshop of the Chittagong Hill Tracts Improved Natural Resource Management (CHARM) Project, organized in Rangamati, Bangladesh. Participants included national level and local level policy makers, NGO's, representatives of tribal groups, natural resources management (NRM) experts, and representatives from ministries and line agencies. The workshop served as a platform to share information and views on the natural resource management issues of the CHT. Key issues were identified and suggestions for improving natural resources management are reported in this document.

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Proceedings of the National Workshop

15 - 16 February 2006

CHARM Project Report 1

Chittagong Hill Tracts Improved Natural Resource Management

Bangladesh

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Report on the Inception Workshop

of the Chittagong Hill Tracts Improved Natural Resources Management (CHARM) Project

Mantel, S. & Khan, Malik Fida A. (editors)

15–16 February 2006

Rangamati, Chittagong Hill Tracts

Organized by

Center for Environmental and Geographic Information Services, Bangladesh

Bangladesh Centre for Advanced Studies, Bangladesh

ISRIC - World Soil Information, The Netherlands

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List of Acronyms

BANCAT	Bangladesh Overview of Soil and Water Conservation Approaches and Technologies
BCAS	Bangladesh Centre for Advanced Studies
BFRI	Bangladesh Forest Research Institute
CBO	Community Based Organization
CEGIS	Center for Environmental & Geographic Information Services
CHARM	Chittagong Hill Tracts Improved Natural Resources Management
CHT	Chittagong Hill Tracts
CHTDF	Chittagong Hill Tracts Development Facility
CHTDB	Chittagong Hill Tracts Development Board, Bangladesh
DAE	Department of Agricultural Extension
DEM	Digital Elevation Model
DoF	Department of Fisheries
EU	European Union
FAO	United Nations Food and Agriculture Organization
GIS	Geographic Information System
GoB	Government of Bangladesh
GRAUS	Gram Unnayan Sanghaton- NGO based in the Chittagong Hill Tracts
HIMCAT	Himalaya Overview of Soil and Water Conservation Approaches and Technologies
HKH	Hindu-Kush-Himalaya
ICIMOD	International Centre for Integrated Mountain Development, Kathmandu, Nepal
IDRC	International Development Research Centre
ILO	International Labour Organization
ISRIC	International Soil Reference and Information Centre, Wageningen, The Netherlands
MoL	Ministry of Land
NRM	Natural Resources Management
UNDP	United Nations Development Programme, Dhaka
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
UNFPA	United Nations Population Fund
SDC	Swiss Agency for Development and Cooperation
SEMP	Sustainable Environment Management Programme (UNDP)
SRDI	Soil Resources Development Institute
WFP	World Food Programme
WHO	World Health Organization
WOCAT	World Overview of Conservation Approaches and Technologies, CDE, Berne, Switzerland

Summary

The environment in the Chittagong Hill Tracts (CHT) is under pressure. Demographic and environmental conditions are changing. Due to scarcity of suitable land, the traditional slash and burn farming system, locally know as *Jhum* cultivation, is becoming unsustainable. This, combined with other factors such as forest overexploitation, is the cause of increased land degradation, such as soil erosion, nutrient decline, and decreased biodiversity. Information on the status of the environment is required for the formulation of alternative strategies for sustainable management. The pressures on the environment and the causative factors and processes must be analysed. New methods must be developed, applied, and tested for sustainable management of the natural resources. Practical information is required at both the field and policy level.

A diverse group of people from international, national, and local level organisations working in the Chittagong Hill Tracts discussed sustainable management of natural resources during the Inception Workshop of the Chittagong Hill Tracts Improved Natural Resource Management (CHARM) Project, organized in Rangamati, Bangladesh. Participants included national level and local level policy makers, NGO's, representatives of tribal groups, natural resources management (NRM) experts, and representatives from ministries and line agencies. The workshop served as a platform to share information and views on the natural resource management issues of the CHT. Key issues were identified and suggestions for improving natural resources management are reported in this document.

Foreword

The Chittagong Hill Tracts is an indisputable development challenge due to the region's pervasive poverty, its prolonged isolation from the rest of Bangladesh, its topography and its ethnic complexity. In spite of these difficulties and impediments to development, there is a strong common commitment on the part of both the people and the institutions of the Hill Tracts to see a full scale resumption of development assistance. The European Commission is responding to this challenge seriously by ensuring long term commitment in the area through implementation of many projects with aims that converge around the theme of improving the social and economic situation of the people of the Chittagong Hill Tracts. Our biggest partner is UNDP, which in partnership with the Ministry of Chittagong Hill Tracts Affairs is implementing the "Promotion of Development and Confidence Building in CHT" project, but we also support a number of interventions in the area implemented by European and local NGOs with projects in the areas of education, safe water and sanitation, vocational training, horticulture and support to land tenure legal cases.

The Asia Pro Eco programme is also part of our broad commitment to Asia. This programme is a five-year European Union initiative whose main target is to adopt policies, technologies and practices to promote cleaner, more resource efficient sustainable solutions to environmental problems in Asia. Environmental issues have never been so urgent in CHT as they are now due to the severe threat facing the hills posed by traditional slash and burn Jhum cultivation under the immense pressure on the land resulting from increasing population. It would be fair to say that problems related to the environment lie at the heart of the long-standing development problems in the region. It is pleasing, therefore, to see that a group of technical institutions from Europe and Bangladesh are working together with Hill Tracts people to form the firm technical base from which sustainable development might flow. To be sure this is only the first step, but it is a good first step, which will now make it possible for development programmes and projects to be set up on a sound technical basis, making sustainability a possibility.

The sound technical information, which this project is expected to provide, should inform key decision making at both strategic and community levels. It will be part of the job of the project team to present their outputs in a clearly usable form. The Rangamati workshop was the first and essential step in bringing together major stakeholders to discuss needs and opportunities for sustainable management of the environment in the Chittagong Hill Tracts.

Dr. Stefan Frowein
Ambassador
Head of Delegation
Delegation of the European Commission
Bangladesh

1.0 Introduction

The objective of CHARM is to establish sustainable natural resources management in the Chittagong Hill Tracts. Specifically, it will provide sustainable natural resources management options for improving the environment and reversing environmental degradation. Also, it will test and promote a sustainable natural resources management (NRM) planning technology. The results will include institutional capacity building and an improved information basis for decision making, i.e. Decision Support System (DSS).

The Inception Workshop on the Chittagong Hill Tracts Improved Natural Resource Management (CHARM) Project was held at the Parjatan Holiday Complex in Rangamati, Bangladesh, on February 15-16, 2006. CHARM is a one-year project funded by EU Asia Pro Eco. The partners include: the Center for Environmental and Geographic Information Services (CEGIS), Dhaka, Bangladesh; The Bangladesh Centre for Advanced Studies (BCAS), Dhaka, Bangladesh; ISRIC World Soil Information, Wageningen, The Netherlands; and Lleida University, Lleida, Spain.

The Rangamati workshop was organized to bring together policy-makers, experts, and other stakeholders. The objective was to discuss the current issues in natural resources management in the CHT and to formulate needs and opportunities for sustainable management of the hill environment, specifically to:

- Assess and discuss the status of the environment
- Identify major environmental problems and their causes
- Identify drivers of environmental degradation
- Identify available knowledge and information gaps on environment and natural resources management
- Assess constraints and opportunities for sustainable land management
- Assess the potential role of communication and information exchange and/or extension in NRM improvement
- Present the objectives and methodologies of the CHARM project and receive feedback and assess priorities for project implementation and further collaborative work
- Assess limitations and opportunities to support NRM institutions and the formulation of enabling policies
- Provide a platform for dialogue between experts, policymakers, extension workers, and other stakeholders on NRM.

The CHT are part of the Hindu-Kush-Himalaya (HKH) region and differ in almost every aspect from the rest of Bangladesh. The traditional slash-and-burn system, locally know as *Jhum*, is sustainable if practised with long fallows but, due to an increased population and scarcity of suitable land, these fallow periods have shortened from 15-20 to 3-5 years. These changes

combined with other factors such as forest overexploitation- are the cause of increased land degradation, such as soil erosion, nutrient decline, and decreased biodiversity.

As a consequence, crop production has declined, and the potential for landslides, siltation of streams and reservoirs and declining water quality in downstream and urban areas has increased.

While the sustainability of farming methods is decreasing, more sustainable farming methods from the plains are not suited for the hilly topography of the Chittagong Hills. What then, are sound hill country management practices? The exchange of information between generations within CHT farmer communities and families has been an important mechanism in the development of sustainable land management systems that are adapted to the local environment. However, farmers' knowledge and experience may no longer be valid with changing demographics and environmental conditions, and/or migration to new areas. As a consequence new methods have to be developed and tried.

The inception workshop brought together representatives from government, non-government, and community-based organizations, journalists, and other stakeholders (Appendix 2). It served as a platform to share information and views on the NRM issues of the CHT. Workshop proceedings and recommendations are described in section 1.0.

2.0 Workshop implementation

The Inaugural Session was held in the morning of February 15 (see Appendix 1). The list of participants is presented in Appendix 2.

On behalf of the Executive Director of BCAS, Mr Khandaker Mainunddin welcomed the workshop participants and working partners of the project. He expressed concern for the enormous pressure on the ecology of the CHT, noting that sustainability depends on the current and future land use of the hills. He expressed the hope that all partners and stakeholders of the CHARM project will work closely together.

Mr Giasuddin Ahmed Choudhury, Executive Director of CEGIS, also welcomed and thanked the participants. He gave an overview of the geophysical environment of the CHT. He emphasized that CEGIS is already involved in various activities concerning the development of the CHT. Among these are the UNICEF-GOB funded *Perceptions of Hygiene Study in the CHT and in the Plain Lands Districts* and the *Para Water Source Mapping for CHT Area* projects. The speaker emphasized the relevance of the capacity of CEGIS in analyzing satellite imagery for different aspects of land use management and planning. He expressed confidence in the contribution of the local stakeholders and the hope for feedback that will help to prepare and implement effective plans for resource management in the CHT.

Stephan Mantel, CHARM project coordinator, outlined the framework of cooperation agreement between the European Union (EU) and the Government of Bangladesh (GOB). The Asia Pro Eco fund is designed to strengthen the environmental dialogue between Asia and Europe through the exchange of policies, technologies and best practices that promote more resource-efficient, market-driven, and sustainable solutions to environmental problems in Asia. The objective of the CHARM project is to contribute to improve NRM in the CHT through provision of improved access to knowledge and information on the environment and sustainable land management alternatives. In the CHT, soil erosion and forest degradation are widespread, causing loss of biodiversity, declining productivity, flash floods, landslides and declining water quality. Some of the causes of degradation are decreased vegetation cover and the shortened rotations in the slash and burn systems (*Jhum*) as practiced in the CHT, due to an increased population and scarcity of suitable land. Mr Mantel emphasized that appropriate natural resources management, in particular for soil and water resources, is critical for sustainable development in the CHT.

Mr Md. Firoze Kibria, Vice Chairman of the Chittagong Hill Tracts Development Board (CHTDB), spoke about the rapid changes that are taking place in the CHT: the ecosystem is becoming fragile and there is an urgent need to protect the bio-physical environment. Proper management of the environment is required to increase production of the cultivable lands. He emphasized the need for communities to live in a sustainable environment. Participatory action research should help achieve this goal. Policies must support social justice and equity. He stated that cooperation of all the stakeholders is vital for sustainable development and improvement of conditions for the people of the CHT.

Mr Ushatan Talukder, Member of the Chittagong Hill Tracts Regional Council thanked the organizers for arranging the workshop. He mentioned that a Canadian firm carried out the first CHT survey in 1964. He noted some unfortunate events of the past, and advised that a congenial environment, law and order, and good initiatives from the government are needed for effective development. He pointed out how the Regional and District councils are not functioning well at the moment and that historically there has been inadequate planning, evident in the continuing land degradation. The need for development partners to coordinate their planning efforts is apparent; he strongly advocated the preservation of the CHT culture and tradition.

Mr Khan M. Ibrahim, Secretary of the Ministry of CHT Affairs, noted the successful development work of the CHT in the last few years. He expressed a positive outlook towards future development activities. The regional council, a high-level body of 22 members from different communities with an elected chairman whose status shall be equivalent to that of a state minister, is supportive of the current work in the region. He is confident that CHARM will contribute effectively to the development of the CHT. A goal of the CHARM project should be to emulate the success of the ICIMOD projects in Nepal. He expressed confidence in the CHARM project and mentioned the support of (donor) agencies, including UNDP, EC, and the Government of Netherlands.

The chairman of the inaugural session, Mr Sukrity Ranjan Chakma, Chief Executive Officer of the Chittagong Hill Tracts Regional Council, thanked everyone for attending the workshop. This type of workshop is the first of its kind, and thus all participants should interact with open hearts and feel free to express their opinions.

2.1 Summary of Technical Session I

The approach and methodology of the project were outlined and discussed during Technical Session I (see Appendix 1). In addition, several papers were presented as summarized below:

Approach and Methodology of the CHARM Project

Stephan Mantel

The slash and burn system (*Jhum*), as practiced in the CHT, is sustainable if fallow periods are long enough. But due to an increased population and scarcity of suitable land, the fallow periods have shortened from 15-20 to 3-5 years (Borggaard *et al*. 2003). Soil erosion and forest degradation are common, causing loss of biodiversity, declining productivity, flash floods, landslides and declining water quality. Appropriate natural resources management, in particular for soil and water resources, is critical in the CHT.

The CHARM project aims to help make the livelihoods of the people of the CHT more sustainable through provision of improved access to knowledge and information on the environment and sustainable land management alternatives. The overall objective of CHARM is: '*To contribute to improved sustainable management of natural resources in the Chittagong Hill Tracts*'.

CHARM will provide sustainable natural resources management alternatives for improving the environment and decreasing environmental hazards. A sustainable NRM planning technology will be tested in a pilot area. The project aims at institutional capacity building and provision of an improved information basis for decision making.

These objectives will be achieved through the compilation of information on the natural resources, development of a user-friendly information system, and through reporting on the status of the environment. Possible management and policy interventions will be derived from an inventory of sustainable land management practices, both from field surveys and secondary sources. In this way, sustainable land management alternatives may be assessed and areas with potential for these methods may be specified in a Geographic Information System (GIS).

CHARM will draw upon a methodology that was developed and tested in a hilly and forested area in Indonesia (Berau Forest Management Project, 1996-2002) (Mantel *et al*. 2002; Tyrie and Gunawan 1999).

CHARM aims to achieve a better understanding of sustainable management through involvement and participation of target groups. Stakeholder meetings and trainings will be organized to draw upon the experiences gained within the CHT and in similar environments outside the CHT. A pilot-study will be conducted, in conjunction with local stakeholders, to apply a NRM planning methodology. Specific recommendations for improved NRM planning and management for a specific area within the CHT will be developed, based upon the outputs of the NRM survey and developed information system. The four main activities of the CHARM project are: 1) to provide baseline information and perform an environmental diagnostic survey, 2) inventory of stakeholder requirements for improved planning and management of natural resources, 3) inventory of resource management practices and sustainable alternatives, and 4) pilot study on improved natural resources management and planning.

The outputs of the project will be: 1) a spatial database on environment and resources of the CHT, 2) a knowledge base of resource management approaches, methods and tools, 3) capacity development of national NRM institutes, 4) effective partnerships between Europe and Asia and between Asian partners, and 5) enhanced capacity of governmental and non-governmental organizations working in CHT.

Current Environmental Situation and Stresses

Malik Fida A. Khan

Policies at the federal and district level set the guidelines for proper natural resource management. Some of the major policies that have affected and are currently affecting the environment and natural resources of the CHT include the following: Water Pollution Control (Amendment) Act 1973, Environmental Pollution Control Ordinance, 1977, Creation of Ministry of Forests, 1989, National Environmental Policy, 1992, National Environmental Management Action Plan (NEMAP), 1995, Forest Policy, Wildlife Conservation Policy, and Agricultural Policy.

The CHT has an area of 13,180 km^2, making up approximately 10% of the total area of Bangladesh. Compared to the low-lying floodplains that characterize most of Bangladesh, the topography of the CHT is quite steep, with over 70% of the land at a slope greater than 40%. The soils are characterized by low fertility. Kyokra-Dong, the highest peak of Bangladesh (1,230 meter) is located in the southern tip of the Rangamati district, near the borders of India and Myanmar.

The largest river in the CHT, the Karnaphuli River, was dammed in 1962 for development of hydroelectric power, flooding an area of about 68,000 ha, to become what is today Kaptai Lake. The Karnaphuli, Feni, Chengi, Maini, Kassalong, Sangu and Matamuhuri Rivers carve the six main valleys in the CHT.

The CHT has a sub-tropical climate, with annual temperatures varying from 10° to 35° C. The average total annual rainfall is 2,500 mm. Most rain (83%) falls during the wet season between May and September. The wind blows from a south-westerly direction during the summer and northerly during winter. The maximum agricultural water deficit is reached just before the monsoon in April.

Demographic changes have been considerable in the CHT in the recent past. For example, in 1901 the tribal people, or Pahari, made up 93% of the CHT population, while in 1991 they made up 51%. There are 13 distinct indigenous ethnic groups, consisting of Bengali (48% of total population), Chakma (25%), Marma (15%), Tripura (6%), Mro (2%), Tanchangya (2%), and others (2%) (Rafi and Chowdhury 2001).

Agriculture remains the main form of livelihood for CHT residents. Rice, with an agricultural yield of 0.90 Mt, is grown on 43.3% of the total cultivated land (0.19 M ha). A variety of fruits are grown with success, such as banana, pineapple, and jackfruit (Ullah 2002).

The main environmental issues affecting the CHT include forests depletion, soil fertility decline, soil erosion, landslides, flash flooding, sedimentation of reservoirs and lakes, loss of biodiversity, and fire spreading.

The above mentioned issues are caused by environmental stresses such as ecosystem fragility, increasing population pressure, encouraged encroachment of forest lands, increased use of wood for housing, furniture, and fuel wood for cooking, inadequate aftercare of planted forests, illegal felling of trees, monoculture plantation forestry, faster felling than plantation rate, unsustainable farming of marginal lands, lack of adoption of soil and water conservation, shortening of fallow period of Jhum cultivation, and uncontrolled *Jhum* burning.

Many of these issues and stresses are interrelated. For example, there has been a significant increase in population pressure in past decades, with an increase in population density from 29 person km^{-2} in 1961 to 96 person km^{-2} in 2001. This urbanization increase is correlated with pressure on land and forest resources. As trees are felled, there is an increase in erosion, landslides, and flash floods. Animal habitats are destroyed. At the same time, there is also less land for *Jhumias* to cultivate, which forces shortened fallow periods of the *Jhum* cycle. This

decreases agricultural productivity and farmer income. With poor agricultural management practices and lack of investment in the land, there is increased erosion and nutrient loss. As sediment and other pollutants enter water bodies, there is a decline in water quality, and settling of sediment on the river bottom (sedimentation), which can lead to increased flooding. The need for an integrated approach to natural resource management is evident.

Current Environment and Resource Management Practices

Shahidul Islam

The current land use practices and related environmental issues cannot be isolated from their historical context and biophysical conditions. The shortened rotations or even lack of rotation-in the *Jhum* cultivation as often practiced is causing increased erosion. Rubber cultivation causes soil erosion. Some of the sloping lands of the CHT may be suitable for horticulture but marketing and storage facilities for products are inadequate. The large fluctuations of the water level in Kaptai Lake create problems for agriculture. The CHT remains vulnerable to earthquakes and other geophysical hazards.

Effects of Jhum Cultivation in the CHT

Abdul Gafur

The traditional and widespread practice of shifting cultivation, known as *Jhum,* in small watersheds of the CHT is associated with profound changes in hydrological responses and soil quality. The overall on- and off-site impacts of intensified shifting cultivation are negative. They include soil nutrient depletion in the uplands and increased downstream flooding, erosion on the hill slopes and sedimentation downstream. Soil loss is especially high in the year of clearing and cultivation. In the following fallow period the erosion rate decreases significantly to about 3 Mg ha^{-1} y^{-1}, whereas soil losses during the year of *Jhum* cultivation are about six times higher (Gafur *et al.* 2003). Soil nutrients are lost through topsoil erosion and leaching to the deeper subsoil. Fire also affects the topsoil nutrients and increases runoff. Although sediment loss from cultivated plots in the uplands is high, much of the sediment remains in the depositional area of the catchment. Vegetative barriers in the catchments have a filtering effect for sediment (van Noordwijk *et al.* 1998). The sedimentation in the lower part of the catchment enhances the valley cultivation system of wet rice and home gardens (Ramakrishnan *et al.* 1994) provided the deposited materials are favorable for crop production.

Due to the high cost of cultivation, estimated at 380 US$ ha^{-1} yr^{-1}, economic return on *Jhum* activities remains negative as output amounts to 360 US$ ha^{-1} yr^{-1} (Borggaard *et al.* 2003). *Jhumias* in the CHT supplement their income in many ways, such as producing handicrafts to be sold in the marketplace. While watching their *Jhum* fields in their temporary hut, they prepare household items such as baskets, mats, furniture and other ornamental goods out of bamboos, cane, cotton and other diversified products. These durable handicrafts are attractive and have a good demand in the local and foreign markets.

The *Jhum* system in CHT is not sustainable in its present form. Farming system innovation and establishment of sustainable agriculture can only be achieved if valid land ownership is given to the *Jhumias*.

Innovative Farming Practices by Shifting Cultivators in the CHT

M. Khairul Alam

A change from *Jhum* cultivation to cash crop cultivation requires both technical support and improved market access for agricultural products. Such a transition will improve livelihoods. A few examples of successful interventions are:

- Citrus based horticulture by the *Murong* of Empu Para
- Pineapples, papaya and other perennial crop based production system in Sharon Para
- High valued cash crops cultivations by the Thanchangya in Ghagra
- Annual vegetables and tuber crops production by the Marma and Bangali in Manikchari

The shift to cash-oriented production systems has become sustainable, mainly due to increased access to markets through improvement of the road network. Although these are successful examples, one must be cautious before replication of these prototypes as their ecological and economic impact need to be evaluated and analyzed. Farmers are to be commended for their innovative and progressive outlooks. Tribal peoples should have increased access to education and trading with urban areas. Local knowledge is a valuable resource and must be properly safeguarded and utilized.

Conservation Approaches and Technologies: Lessons from Similar Environments

Sanjeev Bhuchar

In certain areas of the Hindu-Kush-Himalaya (HKH) region, of which the Chittagong Hill Tracts are part, the economic and ecological deterioration is almost irreversible through degradation of the environment. The natural resources of these areas, in particular the water, soils, forests, pastures, and biodiversity, are under threat and, in places, are being rapidly depleted. The causes of degradation and depletion are related to the unsustainability of the present land use systems in the face of growing populations without access to sources of income and gainful employment outside the agricultural and natural resources sector.

There is a lack of good biophysical baseline information for the region, and little long-term monitoring has been carried out on key processes leading to degradation. Furthermore, the long-term impacts of new systems of participatory natural resources management on physical processes have not been studied.

The ICIMOD-coordinated PARDYP project (People and Resource Dynamics in Mountain Watersheds of the HKH), which is funded by SDC, IDRC and ICIMOD, aims to provide a basic

understanding of the processes concerned with natural resources degradation, and to recommend proven strategies and programmes for community- and farm-based rehabilitation of the natural resources in the HKH region. The project is currently implemented in China, India, Nepal, and Pakistan. In these areas the major summer crops are rice and maize, while the winter crops include wheat and mustard. Flooding is not a major problem. However, irrigation is a concern due to low stream flow. Nutrient leaching and the subsequent loss of fertility is more of a concern than soil erosion. Microbiological contamination of drinking water is severe and increased use of fertilizers and pesticides is a growing problem. Gender imbalances and equity concerns are also prevalent. An integrated approach to water management is required. There must be a focus on reducing both demand and increasing availability. Options for improved water use efficiency and better productivity include: drip irrigation, pitcher irrigation, use of sprinkler, and 'eyebrow' terracing (trees planted on slopes in crescent-shaped pits).

Community-based water user groups also need to be strengthened; women are often overburdened with work as young men migrate to other countries for earnings.

Some examples of findings on improved farming systems and methods for improved agricultural productivity are: System of Rice Intensification (SRI), drip irrigation for cash crops, pisciculture, black plastic composting, vermi-composting, bio-fertilizers, improved terraces, improved varieties of seeds and livestock, and off-season vegetable cultivation.

Improved Farming Practices in CHT as promoted by Anando

Francis Halder

Homestead food production can make a significant contribution to increase the quality and diversity of the family diet, combating vitamin-A and micro-nutrient deficiency. The space utilization in homestead farming is efficient as it involves multi-layered plant and tree species. Homestead farming can raise a wide variety of fruits and vegetables throughout the year and it may integrate animal husbandry into other homestead food production activities.

Anando (meaning joy in Bangla) is a development organization for promotion of culture and youth resource development. It encourages homestead farming to improve household food security in Panchhari, Dighinala and Khagrachhari Sador Upazillas, in Khagrachhari District of the Chittagong Hill Tracts.

A homestead is a house and adjoining land and infrastructure occupied by a family, especially a farm. Homestead cultivation does not only refer to the front yard but also includes utilization of spaces in between and behind the houses, roofs, homestead boundary lines, cowshed, approach road, pond dike, its slopes, adjacent fallow low and high land, etc.

Homestead management includes the homestead area and its productive components for production purposes, health and nutrition, sanitation and home-upkeeping, and home management (Ninez 1984). In Bangladesh, the homestead covers on average only 0.03, 0.05, 0.07 hectares of land for small, medium and large farmers respectively. This sort of minimum holding is a significant reality in the context of Bangladesh. Because households are

estimated to cover 5% of the total acreage in Bangladesh, more than 30% net return against total farm-products is ensured. Optimal strategies have to be assessed for effective utilization of these small land spaces allowing households to maintain their minimum basic needs. It contributes to improving biodiversity, nutrition, family-income, and it creates self-employment for women.

House cleaves are the areas covered by the slight extension of the house around all four sides. The area could be used for growing crops such as papaya. Maximum utilization of borderlines refers to creating a bio-fence for growing productive trees, such as jackfruit, betel nut, and citrus. It is not uncommon to earn Tk 8000 12000 annually per homestead cultivating only the quick growing fruits (papaya, banana etc.). After 20-30 year the trees could be sold as timber with a potential income of over 20,000 Tk. The homestead is a vital resource that provides diversified economic benefit year round, especially for women. Optimal strategies have to be assessed for effective utilization of these small land spaces allowing households to maintain their minimum basic needs.

Best Farming and Environmental Practices documented from the CHT by UNDP-CHTDF

Sudibya Kanti Khisa

The peoples in the CHT have always demonstrated remarkable creativity in finding practical solutions to everyday challenges in their continuous development process. Their successes have been due to their own ingenuity, both as individuals and groups working together, developing better ways to make their livelihoods and improving their social and economic status.

The Chittagong Hill Tracts Development Facility (CHTDF) of the United Nations Development Programme (UNDP) is documenting best practices in the CHT. A Resource Database and Directory (RDD) is being developed by exploring, identifying and recording the best practices (BP) adopted by CHT peoples. The RDD includes sectors such as agro-forestry, crops, fisheries, livestock, environment, health and family planning, education, enterprise development and employment creation, and small infrastructure.

The main objectives of the RDD are the following: 1) enabling CHT communities, government institutions and NGO's to identify promising development options, and 2) facilitating local decision-making for selecting priority small projects to be financed by the 'Quick Impact Fund' (QIF) under the UNDP-CHTDF assistance, or by other sources of development funding. The RDD is developed and carried out through a partnership approach and in consultations with the stakeholders, NGO's, GoB-agencies at the local level and with technical support of the United Nations agencies -SEMP-UNDP, FAO, ILO, UNFPA, UNESCO, WFP, and WHO.

Best practices included in the RDD should be:

- Technically sound, appropriate and feasible;
- Relatively easy to manage;
- Cost effective and easily replicable;

- Address the priority needs of the community;
- Involve the participation of community people;
- Environmentally sound and friendly;
- Culturally adaptable and acceptable;
- Gender sensitive;
- Yield early results and benefits.

Some of the best practices include: bamboo plantation for riverbank protection and stabilization, preventing soil erosion through mixed crop cultivation on sloping land, community managed water supply systems, mulching of root and seasonal crops in flat land, bio-composting for nutrient enrichment in the soil, agro-forestry practice in steep sloping lands, floriculture in *Jhum*, ginger cultivation in sloping land with mulching, high yielding turmeric cultivation in foothills, pen fish culture, and homestead dairy farm *cum* bio-gas plant.

The documentation of the best practices is a tribute to the people of the CHT in shaping their own future, sometimes under difficult circumstances and limited resources. It is dedicated to sharing their development story over many years of hardship, and to serving as a means of spreading their many models of best practices and their example of determined effort as a guide for self-reliant development in the future.

Conservation Approaches and Technologies documented from the CHT under BANCAT

Jalal Uddin Md. Shoaib

BANCAT is a national network of soil and water conservation (SWC) specialists that works within the global network of the WOCAT project (World Overview of Conservation Approaches and Technologies) that aims to document and disseminate information on soil and water conservation methodologies.

The mission of BANCAT is: 1) Networking with national and international institutions (WOCAT and HIMCAT, the WOCAT regional network for the Himalayas) for sharing of conservation approaches and technologies (CATs), 2) Identification and documentation of CATs that are practiced in the CHT, 3) Facilitation of SWC specialists in documentation of CATs in partnership with SWC practitioners, 4) Monitoring and evaluation of the CAT documentation processes, 5) Ensuring funding for BANCAT activities and providing logistic support.

In 2004 and 2005, BANCAT organized technical sessions with field descriptions of technologies and approaches for sustainable natural resource management. To date, nine approaches and technologies have been extensively documented in the BANCAT database. During the expert group meeting in 2004, four CATs from Matiranga, Khagrachhari Hill District were documented: hill agro-forestry, valley floor paddy cultivation, conservation of traditional *Jhum* practices and farm pond in the valleys. The second group meeting in March 2005 reported the following conservation approaches and technologies in the Bandarban

district: banana-teak-fruit gardening, valley floor paddy cultivation with seepage water, seepage water harvesting for domestic use, village community forest and homestead mixed fruit gardening.

Concluding Remarks

The chair, Mr Sukrity Ranjan Chakma, emphasized that while many development agencies are currently working in the CHT, consideration of ecological balance and biodiversity are often ignored. As the global consciousness towards the geo-physical environment is increasing, planning in the CHT must take an integrated approach to achieve sustainable development.

2.2 Summary of Technical Session II

This session involved stakeholders and was chaired by Mr Sultan Ahmed. Participants were split into four groups, each group containing members with a diverse subject matter and experiential background. The session involved problem-oriented discussions on specific issues:

Group A: What are the major environmental problems in CHT and their causes?

Group B: What are the limiting factors in land management in agriculture/forestry? Prospects for improvement?

Group C: Are the existing institutions capable for natural resources management support and are policies adequate? What are limitations?

Group D: What could be the role of communication/information exchange/ extension in natural resources management improvement in CHT?

The respective group leaders presented documented results of the group discussions, prepared by the facilitators.

Group A: What are the major environmental problems in CHT and their causes?

Elected group leader: Dr Abdul Gafur; Facilitator: Mr Ehsan Hafiz Choudhury

Suggested issues for the discussion were:

- Deforestation
- Loss of biodiversity (loss of plants/animals)
- Water pollution and siltation
- Soil erosion (loss of soil fertility)

The following is a summary of the ensuing discussions (see Appendix 4 for documented results):

Jhum cultivation, deforestation, and urbanization contribute to soil erosion, which is a serious problem on the sloping lands of the CHT.

Inadequate policies, lack of awareness and information, and low institutional capacities have contributed in the past to forest and land degradation and biodiversity loss.

There is nationwide high and increasing demand for timber. Pulpwood factories and brickfields are examples of industries that demand high quantities of wood. Deforestation is caused by over extraction and illegal logging combined with a slow afforestation rate. Unplanned settlement, encroachment and inadequate forest management are part of the problem. *Jhum* cultivation contributes to deforestation. There is a general lack of information on forest status and forest management.

Several recommendations were formulated. Afforestation should be increased in reserve forests and in unclassified state forest land. To decrease deforestation caused by *Jhum* cultivation it was recommended to: ensure land ownership, build awareness, promote alternative land uses, supply improved seeds and create alternative employment opportunities. Community and social forestry can contribute to reforestation and forest conservation. Existing laws on forest harvesting should be enforced.

The continual decrease in forest cover impacts biodiversity, not only through the decrease of tree and plant species but also through the decrease of fauna habitat. The white-winged wood duck (*Cairina scutulata*), for example, used to be common but the population has declined in past decades, due to systematic clear-felling of primary forest and its replacement with mono-culture timber plantations, and because of over-hunting using dogs (Khan 1986).

To increase biodiversity in *Jhum* cultivation (with shortened rotations) a patch of land should be kept on top of the hill. Biodiversity is better maintained in mixed plantations than in monoculture cropping. The local communities, NGO's, and CHTDB should encourage the use of indigenous species in multiple cropping systems throughout the CHT.

Access to clean water is important in daily life and impacts on community health. Water quality decline is caused by several factors, including the following: the use of agro-chemicals, open defecation and unplanned sewage and sludge disposal, leakage of fuel from boats, soil erosion, seasoning of (hidden) timber in water bodies around the saw mills. Increased enforcement and awareness creation was recommended to better control the open discharge to water bodies. Appropriate land management techniques applied in the sloping lands will contribute to improved water quality through reduced flows of sediment and agro-chemicals to the waterways. Research institutes such as SRDI, BARI, FRI, and governmental departments such as DAE, and CHTDB, and NGO's can have an important role in contributing to improved management of the sloping lands.

Group B: What are the limiting factors in land management in agriculture/forestry? Prospects for improvement?

Elected group leader: Mr Nikhilesh Chakma; Facilitators: Mr Mozaharul Alam and Ms. Farhana Ahmed

Suggested topics for the discussion were:

a) Agriculture

- At farmers level
- At planning level (CHTDB, DC, DAE, DoF)

b) Forestry

- At farmers level
- At planning level (CHTDB, DC, DAE, DoF)

Farmer's level

Local decision-making on land management methods is influenced by certainty on land use rights and land tenure. The lack of recognition of customary land rights forced farmers to reduce the fallow periods of their land use systems. Government policies and implementation of regulations regarding tenureship are important for sustainable management of the natural resources and the subject involves many different parties including: the Ministry of Land, the Ministry of Chittagong Hill Tracts Affairs, the Deputy Commissioner, the Hill District Council, and the Headmen.

Crop production declines due to lack of quality inputs, such as seeds, fertilizers, and irrigation. Through support of governmental institutions and NGO's improved access to inputs will favor a more sustainable and productive farming. Improving access to information and enhancing information exchange assists in the development of sustainable land management systems that are adapted to the local environment. Community radio and TV broadcasts and availability of a mobile telephone network are important media for exchange of information. Learning and exchanging knowledge and information is favoured by community organisations through the formation of farmers groups and education through farmer field schools initiated by NGO's. The role of middlemen is important; they provide farmers with secured market access, however they also control prices. If producers were able to receive market prices information through media such as radio/TV broadcasts, newspaper, and mobile telephone messages, they would be in a better position to negotiate with middlemen. Access to low-interest loans with longer repayment schedules, facilities for storage of harvested goods, and access to roads are crucial for the marketing of agricultural produce.

The Chittagong Hill Tracts Forest Transit Rules were originally designed to control illegal felling from government forests. They proved to be ineffective and instead have constrained tree planting on farmland (Rasul 2005). The transit rules should therefore be revised.

The scarcity of fodder, lack of grazing land, and animal diseases are limiting factors in

livestock management. This could be improved by developing land for community-based grazing and local service provision for healthcare of livestock and poultry birds with the help of the Department of Livestock and development NGO's.

The importance of aquaculture can be further enhanced by timely water level control, construction of water control dykes, inventory of suitable creeks for fish culture, conservation of natural breeding grounds, provision of training for pen culture, and stakeholder consultations on planning of fish culture.

Planning level

Stakeholder consultations should be held to improve farmer participation at the planning level. The information baseline for planning is inadequate and there is a lack of coordination in planning due to overlapping authorities and regulations.

Group C: Are the existing institutions capable for natural resources management support and are policies adequate? What are limitations?

Elected group leader: Mr Zuam Lian Amlai; Facilitators: Mr Malik Fida A. Khan and Mr Khandaker Mainuddin

Suggestions for the discussion included:

The institutional capability and limitations at different levels:

- At farmers level (karbari, headman, circle chief)
- At planning level

Limitations:

Lack of access to NRM information, lack of alternative practices, lack of knowledge of improved NRM, insufficient/unclear mandate, lack of skilled staff.

There is a lack of capacity of local institutions for natural resources management. Recommendations for improvement include the following: create awareness and understanding of natural resources management in the CHT through a capacity building programme that provides education on NRM, develop relevant acts, laws and policies affecting NRM, and improve information dissemination. Institutional capacity can be improved by enhancing the coordination between traditional and governmental institutions. Information should be disseminated in local languages so that local people will be more involved.

Policies on the management of natural resources should be developed with the involvement of people whose livelihoods depend on these resources and who are or can be instrumental in their sustainable management. The Chittagong Hill Tracts lack regional cross-sectoral planning for land use and management. A natural resources management plan should be

developed in participation of relevant stakeholders.

Policies can only be effective if they are implemented. A review, and revision if required, of existing policies, such as the land policy, should be conducted. Also, the Land Commission that was established in 2001 for resolving land issues should finally be made active.

Group D: What could be the role of communication/information exchange/ extension in natural resources management improvement in CHT?

Elected group leader: Mr Maung Seing Phru; Facilitator: Mr Mir Abdul Matin

Suggestions for the discussion included:

- What information is needed?
- What is the appropriate format for the required information (Internet, digital, maps, reports)?
- Who should manage the information?

Communication

Roads are important for regional development. A road network exists up to the upazilla level, but it is not linked to the union level. Maintenance is poor and should be improved. By extending roads to farming places, marketing and (alternative) cash crop cultivation is facilitated. Rivers are also important for transportation, but access is limited in the dry season and permanent landing stations are absent. With the installation of permanent river landings stations, better access to markets is provided for agricultural goods. Access to markets is a necessity for cash crop cultivation.

Access to telecommunication is poor in the CHT. There exists no TV, radio, land telephone, mobile network, and Internet network beyond the district headquarter. A range of national and local newspapers is available in the CHT, however, they should remain uncensored and unbiased, in order to favor the development process.

Information exchange

Information on natural resources exists but is often not available and seldom distributed in digital format (Table 1); for details see Annex 4.

Research information and results should be shared among institutions and stakeholders. Establishing an institutional network for information exchange can enforce institutional capacity. Such a network should formulate a data dissemination policy and protocol. There is a lack of capacity to compile and maintain data, which is an issue that needs to be addressed. Differences in language and educational background are to be taken into account in information dissemination strategies.

Table 1: Data availability issues and responsible organizations.

Themes	Data types	Format/issue	Organization
Soil information	Soil properties, soil type distribution, soil degradation	Reports and maps, convert to digital format	SRDI
Topography	Elevation, slopes, aspect	Outdated, restricted access. Can be derived from DEM's freely available from internet	SOB, SRDI
Water	Water availability, surface water quality, ground water, natural drinking water sources, sanitation practices	Compile, convert to digital format, provide access	Geological survey, DPHE, UNICEF, NGO's
Land use and land cover	Settlements, forest cover and classification, land use change, land suitability	Convert to digital format, update information	DoF, District administration, SRDI, DAE, CEGIS
Agriculture	On technologies and approaches in agricultural management and market price information	Data not shared. Allow information access.	DAE, Dep. of Marketing, NGO's, donor agencies
Climate data	Rainfall, evapo-transpiration	More frequent and accurate data collection required	BMD, SRDI, BARI
Environmental hazards	Cyclones, earth quake, land slide hazard, extreme seasonal winds (nor' wester), massive rat infestation (bamboo flowering)	Data not shared. Allow information access.	BMD, Geological survey, CEGIS, SRDI
Biodiversity	Species distribution, aquatic species diversity, endangered species	Lack of systematic inventory; information is poorly accessible	DoF, Fisheries research Institute, BFRI, Universities
Socio-economic information	Settlement, migration, population distribution by ethnic groups	Convert to digital format, provide access;	BBS, NGO's, donor agencies

2.3 Concluding Session

This section presents a synthesis of the concluding remarks made by various speakers.

Address by Dr Manik Lal Dewan, Honorable Chairman, Rangamati Hill District Council, Rangamati

The speaker expressed his happiness for being able to attend this inception workshop, which is the first of its kind in CHT. Sustainable management of resources is a prerequisite for any country's development. The resources of the CHT include the hills, fertile soils, beauty, forests, springs, and most important of all, its human resources.

In the CHT, the resources under the ground have not been tapped. The production of land resources should be increased, but only with caution and the proper expertise. There are many examples of where unplanned activity is taking place in the name of development. One example is the recent disastrous burning of the Tengratila gas field of Sylhet, which had serious environmental impacts. In addition, in the northern Philippines, development of mining fields by multi-national companies are causing displacement of many indigenous people and causing serious health hazards. The hope is that through stakeholder discussions of advantages and disadvantages of development activities, constructive solutions will emerge, leading to productive outputs.

Address by the Chief Guest, Mr Mani Swapan Dewan, Honorable Deputy Minister, Ministry of Chittagong Hill Tracts Affairs, Government of the People's Republic of Bangladesh

The CHT, with its mountains, lakes and natural beauty, has seemingly endless resources and a rich cultural heritage. There are many opportunities to take advantage of its resources, such as using Kaptai Lake for fisheries development. There are also many possibilities to develop the tourism industry. A model for tourism development could be the islands near Kota Kinabalu in the state of Sabah, Malaysia where tourism is thriving and earning foreign currency. The link being created between Myanmar, Laos, Cambodia, and Thailand through the development of the Asian highway will help in the exploration of resources.

We are living in the digital age, in which investment is taking place in areas where resources (natural and human), infrastructure, political stability, and advanced technology exist. These are required for investment to take place in the CHT. Vision of politicians is required for proper investment planning in this rapidly changing time.

Micro-level and macro-level planning is required to ensure balanced development in all sectors of society. The problems of the hard core poor need to be addressed. The capacity of human resources of the CHT must be developed. A model for this development could be the Philippines where balanced development has taken place by the investment of multinational companies and proper utilization of resources of the indigenous people.

Reduction of poverty and increase of income-generating activities is required, as well as the establishment of a peaceful environment. Bangladesh is a multilingual and multi-racial country. Therefore, a specific strategy should be followed to deal with different areas of the country and sectors of society. For the CHT, the path to sustainable development must still focus on poverty reduction and education.

Restructuring is required for effective socio-economic development. For this reason, planning and development of natural resources is required. A number of development projects have been undertaken in the CHT, such as infrastructure development funded by ADB, and socio-economic development activities taken up by UNDP. Government initiatives need to be taken in a coordinated and planned manner. There is need for integration of policy.

The Chief Guest concluded by stating that he is looking forward to witnessing the cooperation and creation of synergy between all stakeholders, including the local people and resource persons.

Address by the Chairman, Mr Gazi Mohammad Julhash, Deputy Commissioner, Rangamati

The Chairman began his speech with reference to the seventh goal of the UN Millennium Development Goals: Ensure environmental sustainability. He hoped that all the necessary data and information will be collected and compiled from the workshop and will be used to ensure proper utilization of the limited resources. Therefore, the inception workshop on management of natural resources is a timely gesture, which is needed to ensure the sustainability of the environment.

3.0 Recommendations and follow-up

Deforestation, soil erosion, and loss of biodiversity are of great concerns for the environment in the Chittagong Hill Tracts. There are relatively few reports and maps about the natural resources of the CHT. Information on the status of the environment is required for the formulation of alternative strategies for sustainable management. The pressures on the environment and the causative factors and processes must, therefore, be analysed. Stakeholders expressed a need for practical information at both local and policy level.

It was recommended that local institutional capacity for natural resources management, including the compilation and maintenance of data, be improved. Establishing an institutional network for information exchange that formulates and implements a data dissemination policy and protocol can enforce institutional capacity.

There is a need for regional cross-sectoral planning that stimulates sustainable development and proper resource utilization by local land-user groups. A natural resources management plan should be developed in participation with relevant stakeholders.

There is a need for information on appropriate natural resources management methods. Activities in documentation and dissemination of successful land management approaches and technologies, both indigenous/traditional and scientific/newly acquired knowledge, should be supported. Access to such information in a readily understood format will allow land managers to select viable options for specific locations. In this way, the experience of others in similar environments can support farmers in coping with continually changing conditions.

The hope is that through collaboration and integration, the bonds will be tightened between all those whose life and livelihood is tied to the CHT. With the shared aspiration of sustainable development, future generations will continue to be charmed by the beauty and bounty of the hills.

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Appendix 1: Workshop programme

Programme of the Inception Workshop on
Chittagong Hill Tracts improved nAtural Resource Management (CHARM) Project
Date: 15–16 February 2006
Venue: Rangamati, Bangladesh

WEDNESDAY, 15 JANUARY 2006

Inaugural Session	09:30 – 11:30
Chair	Mr Sukrity Ranjan Chakma, Chief Executive Officer, Chittagong Hill Tracts Regional Council
09:30 – 10:00	Arrival and registration
10:00 – 10:05	Address of Welcome by Executive Director of BCAS
10:05 – 10:15	Overview of Resources Management in Chittagong Hill Tracts by Executive Director of CEGIS, Dr Giasuddin Ahmed Choudhury
10:15 – 10:40	Overview of the Project by Mr Stephan Mantel, ISRIC, Coordinator CHARM Project
10:40 – 10:50	Address by Special Guest, Mr Md. Firoze Kibria, Vice-chairman, Chittagong Hill Tracts Development Board
10:50 – 11:00	Address by Special Guest, Mr Ushatan Talukder, Member, Chittagong Hill Tracks Regional Council
11:00 – 11:10	Address by the Chief Guest, Mr Khan M. Ibrahim, Secretary, Minister, Ministry of Chittagong Hill Tract Affairs, Government of the People's Republic of Bangladesh
11:10 – 11:15	Address by the Chair
11:10 – 11:30	Tea Break

TECHNICAL SESSION 1

WEDNESDAY, 15 JANUARY 2006

Technical Session: I	Project Overview and Current Situation (11:30 – 13:00)
Chair	Dr Saiful Islam, Conservator of Forest, Rangamati Circle, Forest Department
11:30 – 12:00	Approach and Methodology: CHARM Project by Mr Stephan Mantel, ISRIC, Coordinator CHARM Project
12:00 – 12:20	Current Environmental Situation and Stresses by Mr Malik Fida A. Khan, CEGIS
12:20 – 12:40	Current Environment and Resource Management Practices in the CHT by Dr M. Shahidul Islam, BCAS
12:40 – 13:00	Open Discussion (Q&A)
13:00 – 14:00	Lunch Break

Technical Session: I	Project Overview and Current Situation (11:30 – 13:00)
14:00 – 14:20	Innovative Farming Practices by Shifting Cultivators in the CHT by Dr M. K. Alam, Divisional Officer, Bangladesh Forestry Research Institute, Chittagong
14:20 – 14:40	Conservation Approaches and Technologies/ People's and Resources Dynamics in the HKH Region: Lessons from Similar Environment by Dr Sanjeev Bhuchar, ICIMOD, Nepal
14:40 – 15:30	Open Discussion
15:30 – 15:45	Tea Break
15:45 – 16:15	Improved farming practices in the CHT promoted by Anando by Mr. Francis Halder, Anando
16:15 – 16:30	Best Farming and Environmental Practices Documented from CHT by UNDP-CHTDF, Mr Sudibya Kanti Khisa, Programme Support Consultant, UNDP-CHTDF, Dhaka
16:30 – 16:45	Conservation Approaches and Technologies Documented from CHT under BANCAT by Mr J.U. Shoaib, Principal Scientific Officer, Soil Resources Institute (SRDI), Dhaka
16:45 – 17:00	Introduction of next day Programme and form break out groups
17:00 – 17:15	Concluding Remarks by Chair

TECHNICAL SESSION

THURSDAY, 16 JANUARY 2006

Technical Session II	Breakout Group Discussions (09:30 – 13:00)
Chair	Sultan Ahmed, Institutional Expert, CEGIS
09:30 – 13:00	3 break out group will discuss on three selected issues
13:10 – 14:00	Lunch Break
14:00 – 15.45	Presentations by Groups A-B-C-D
14:45 – 15:00	Open Discussion
15:00 – 15:30	Tea Break

Concluding Session	15:30 – 16:45
Chair	Mr Gazi Mohammad Julhash, Deputy Commissioner, Rangamati
15:30 – 16:00	Presentation on Summary of the two-day discussion by Project Partners
16:00 –16:15	Address by Dr Manik Lal Dewan, Hon'ble Chairman, Rangamati Hill District Council, Rangamati
16:15 – 16:35	Address by the Chief Guest, Mr Mani Swapan Dewan, Hon'ble Deputy Minister, Ministry of Chittagong Hill Tracts Affairs, Government of the People's Republic of Bangladesh
16:35 – 16:45	Address by the Chair

Appendix 2: List of participants

Organisation	Name	*Designation*
Anando, Dhaka	Frances Halder	Project Coordinator
Association, Rangamati	Tushar Kanti Dewan	Headman
Bahmong Circle	Saw Hla Prue Jimmy	Bahmong Raja Representative
BCAS	B.M. Faruque Ahmed	Technical assistant
BCAS	Md. Abdul Alim	Research Fellow
BCAS	Md. Sohel Pervez	Technical assistant
BCAS	Mozaharul Alam	Senior Research Fellow
BCAS	Olena Reza	Senior Research Fellow
BFRI	Dr.M.Khairul Alam	Principal Scientific Officer
BFRI, Chittagong	M. Mohiuddin	Senior Scientific Officer
BFRI, Chittagong	Sharmila Das	Senior Scientific Officer
Bangladesh Observer, Rangamati	Shanti Moy Chakma	Correspondent
Bangladesh Rural Development Board (BRDB)	Ramesh Chandra Shaha	Deputy Director
Bangladesh Television (BTV), Rangamati	Md. Mostafa Kamal	Correspondent
Bawm Social Council	Zuam Lian Amlai	
Betbunia	Aungsui Pru Chowdhury	Chairman
CARITAS	Md. Salim Uddin	Project Manager
CARITAS	Topon Kumer Das	Field Officer, SFP
CEGIS, Dhaka	Abu Md. Ibrahim	Soil and Agriculture Expert
CEGIS, Dhaka	Ehsan Hafiz Choudhury	Database Expert
CEGIS, Dhaka	Farhana Ahmed	Regional Planner
CEGIS, Dhaka	Giasuddin Ahmed Choudhury	Executive Director
CEGIS, Dhaka	Malik Fida A. Khan	Head, Database/IT Division
CEGIS, Dhaka	Mir Abdul Matin	GIS Expert
CEGIS, Dhaka	Shaheen Afroze	Logistic Officer

Organisation	Name	*Designation*
CEGIS, Dhaka	Sultan Ahmed	Institutional Expert
CEGIS, Dhaka	Yacoub Raheem	Research Fellow
CHTDB	Md. Safiqul Islam	Project Director
CHTDB	Shambhunath	
CHT VCF Samity	Kamalendu Dewan	
CIPD	Bimalendu Chakma	
Cotton Research Station, Bandarban	A.K.M.A. Rouf	
DAE	Kazal Talukder	Horticulturist
DAE	Md. Abdul Maleque	Crop Production Specialist
DAE	Md. Abul Kalam Azad	Deputy Director
DAE	Md. Shahidullah Sarkar	Deputy Director
DoF	Indu lal Chakma	Upazilla Fisheries Officer
DoF, Bandarban	Md. Neazuddin	District Fisheries Officer
Fisheries Research Institute	Md. Alamgir	Senior Scientific Officer
Gram Unnayan Sanghaton (GRAUS)	Maung Seing Phru	
HDC, Bandarban, DPHE	Feiroz Alam Chowdhury	Representative
Hope-87, Dhaka	Abul Kashem Sheikh	Project Coordinator
Integrated Hill Farming Project, CHTDB, Rangamati	Mong Mong Chak	Project Director
ICIMOD, Nepal	Mr. Sanjeev Bhuchar	Assistant Programme Coordinator
ISRIC - World Soil Information, The Netherlands	Stephan Mantel	Project Coordinator, CHARM
ISRIC - World Soil Information, The Netherlands	Vincent Van Engelen	Soil Scientist
KMKS	Kajal Baran Tripura	Administrative Officer
Lleida University, Spain	Jose Ramon Olareta	Land Use Expert
Mrochet	Mr. Ranglai Mro	

Organisation	Name	*Designation*
NGO-Forum for Drinking Water Supply and Sanitation (DWSS)	Rafiqul Islam Majumder	
Rangamati Hill District Council, Rangamati	Mr. Sujit Dewan	Member
Rangamati Press Club	Sunil Kanti Dey	President
Shamokal	Satrong Chakma	Staff reporter
Social Advancement Society (SAS)	Lalit L Chakma	Executive Director
Social Advancement Society (SAS)	Milon Chakma	
SRDI	Dr. Abdul Gafur	Senior Scientific Officer
SRDI, Dhaka	Jalal Uddin Md. Shoaib	Principal Scientific Officer
Sustainable Environmental Management Program, United Nations Development Programme (SEMP, UNDP)	Krajai Chowdhury	
T.K.F	Sagarika Roaza	Advisor
TAUNGYA	Nikhilesh Chakma	
TAUNGYA	Rajib Chakma	Treasurer
TAUNGYA	Suvashis Chakma	
The Daily Star, Rangamati	Monirul Alam	Journalist
UNDP, CHTDF	Mr. Sudibya Kanti Khisah	Programme Support Consultant
Union Parishad	Naieu Prue Marm	UP member
World Vision	Zir Kung Shahu	

Appendix 3: Synopsis of Plenary Discussion, Day 1

In the plenary discussion at the end of Technical Session I, workshop participants were given an open forum to ask questions and give comments (Q/C) to the Technical Session I Panel. Below a synopsis is given:

Q/C: Gender issues were not properly addressed in the UNDP CHT project.

A: A wide range of people at the community level participated in the project.

Q/C: Why is drought in the Rajshahi region of Bangladesh more severe than the HKH region, even though the rainfall patterns are similar?

A: Relative to the Rajshahi region, the evapotranspiration (ET) in the HKH is very low. Also, the HKH region has less of a crop water demand due to low temperatures and other climatic factors.

Q/C: Why are some crops successful and profitable in some areas but not others?

A: This is because of differences in access to markets.

Q/C: How can we best help the *Jhumia* through this CHARM Project?

A: This matter will be taken up through the stakeholder consultations.

Q/C: Consultation with the ethnic community and sensitivity towards gender balance is needed to maximize outputs of this project.

A: Agreed. These issues will be discussed by the stakeholders.

Q/C: What is being done concerning conservation measures of *Jhum* cultivation?

A: *Jhumia* practices along with other hill forest agriculture will be discussed by stakeholders. The Department of Agricultural Extension and some NGOs are currently studying and documenting innovative alternative cultivation technologies for the *Jhumias*.

Q/C: What is the future of *Jhum* cultivation?

A: There are significant changes observed, which are to be documented and facilitated.

The following suggestions were made by the participants:

- Fishery resources should be considered in natural resource management planning. Fluctuation of the lake water is damaging agricultural fringe crops.
- Education is vital for sustainable development of the CHT.
- Tea transplantation is being tested and has been found to be sustainable. Like in many other countries, even small farmers have the ability to grow tea. Also, rubber plantations often come with high employment opportunities.

Appendix 4: Summary of Technical Session II

Group A

What are the major environmental problems in CHT and their causes?

Facilitator: Mr. Ehsan Hafiz Choudhury

Group Members:

M. Mohiuddin, Md. Salim Uddin, Abu Md. Ibrahim, Shambhunath, A.K.M.A. Rouf, Kazal Talukder, Indu lal Chakma, Md. Alamgir, Feiroz Alam Chowdhury, Dr. Abdul Gafur (elected leader group A), Suvashis Chakma, Zir Kung Shahu.

Results:

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Deforestation	*Jhum* cultivation	Ensure land ownership Awareness building Alternative land use Supply Improved seed Employment opportunity	GOB; CHTDB, GOs & NGOs; Traditional Institutions.
	Nationwide increased demand of timber & local population pressure	Afforestation in RF and USF land Community/ Social forest Availability of saplings during the plantation period Raring and intensive monitoring of new plantation Implementation of existing forest laws regarding harvesting cycle	Forest Department; CHTDB, LGED; DAE; NGO`s , local community & other concerned organizations
	Over extraction/ illegal logging	Awareness building and implementation of laws for harvesting for forest product	Forest Department, CHTDB, law & enforcement agencies
	Slow afforestation rate	Afforestation rate should be increased	
	Management problems	Good seedlings, timely plantation and maintenance	
	Insufficient data and information	Proper documentation and database development	Research Institutions and Universities

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Biodiversity and agro-biodiversity losses	*Jhum* cultivation	A patch of land should be kept at the top of the hill	Local community
	Forest fire	Awareness building	Forest Department, CHTDB, NGO, Community people
	Monoculture	Promote mixed plantation	
	Exotic plant	Indigenous species encourage	
	Population pressure	Planned urbanization and facilitates of farm activities	
	Insufficient data and information	Proper documentation and database development	Research Institutions and Universities
Water pollution and sanitation	Fertilizer, pesticides and herbicides application in agriculture land	Awareness building and rational application of the chemicals	DAE, CHTDB, NGOs and farmer's
	Open defecation and unplanned sewage/ sludge disposal	Awareness and motivation building Hygienic sanitation Open discharge to water bodies must be stopped	DPHE, Pourashava, NGOs and local administration
	Leakage of fuel from boat	Awareness build up Environment friendly water vehicles should be encouraged	
	Soil erosion	Measures to be taken to reduce soil erosion	Action research by Research Institute (SRDI, BARI, FRI)
	Seasoning/ hidden timber in the water bodies around the saw mills	Awareness building among the saw mills owner and timber users Enforcement of laws by relevant authorities	Law enforcing agencies and forest department
	Insufficient data and information	Proper documentation and database development	Research Institutions and Universities

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Soil erosion and siltation	*Jhum* cultivation	Ensure land ownership Awareness building Alternative land use Improve seed and other inputs Employment opportunity	GOB; CHTDB, GOs & NGOs; Traditional Institutions.
	Deforestation	Illegal felling should be stopped Afforestation in RF and USF land Community/ Social forestry in the catchment areas should be strengthened Availability of good quality planting material Maintenance of new plantations Implementation of existing forest laws regarding harvesting cycles, shipment and marketing of forest produce	Forest Department; CHTDB, LGED; DAE; NGO`s , local community & other concerned organizations
	Urbanization	Planned urbanization without major soil disturbance and facilitates of farm activities	HDC, CHTDB, LGED, Pourashava etc.
	Faulty cultivation	Cultivation in sloping uplands should be conducted taking proper soil conservation measures and considering soil & land qualities.	SRDI, CHTDB, BARI, DAE,
	Insufficient data and information	Proper documentation and database development.	Research Institutions and Universities

Group B

What are the limiting factors in land management in agriculture/ forestry? Prospects for improvement?

Facilitators: Mr. Mozaharul Alam, Ms. Farhana Ahmed

Group Members:

Frances Halder, Tushar Kanti Dewan, Dr.M.Khairul Alam, Md. Mostafa Kamal, Topon Kumer Das, Kamalendu Dewan, Md. Abdul Maleque, Sanjeev Bhuchar, Mong Mong Chak, Kajal Baran Tripura, Rafiqul Islam Majumder, Rajib Chakma, Sudibya Kanti Khisa, Nikhilesh Chakma (elected leader group B).

Farmer Level

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Land tenureship	Government policy	Revision of Govt policies	MoL, MoCHTA, DC, HDC, Headman
		Recognition of customary rights	
		Permanent tenureship	
Declining Productivity	Lack of quality inputs (seeds, fertilizers, irrigation facilities etc)	Ensure availability of quality inputs	DAE, BADC, NGOs
Lack of information	In-accessibility of local service provider	Community Radio/TV service	Radio/TV
	Networking	Easy access to local service providers	Local service providers
	No Farmer Group	Formation of farmer groups	NGOs
	Education	Field Farmer School	
Marketing	Communication	Ensure better communication (Road)	LGED, R&H, Local Government, Marketing Department
	Lack of marker information	Provide market information	Radio/TV
	Middle man	Transit rules should be revised	Government (Forest Department)

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Credit	Lack of Storage Facility	Provide storage facility	Government, Private Sector
	High interest rate	Lowering interest	
	Land Records/ document	Collateral free	
	Quick repayment	Longer period payment schedule	Bank, GOB, NGOs
	Awareness	Training on awareness building	
	Health Service	Adequate health service	
	Sanitation/Safe drinking water	Provide safe drinking water and adequate sanitation facilities	Public Health Engineering, Health Department, NGOs
	Lack of inputs	Provide support service	Local government/ line agencies
	Scarcity of fodder	Community-based grazing land development	Department of Livestock and NGOs
	Disease	Develop local service providers in healthcare of poultry birds and livestock	
	Decrease of grazing land		
	Sedimentation	Survey of suitable creek for fish culture	BFRI and DOF, NGOs, CBOs, BFDC
	Untimely water level fluctuation by PDB	Timely water level fluctuation management	
	Inadequate dykes	Construction of water control dykes	
	Destruction of natural breeding grounds	Training for pen culture	
	Lack of consultation with farmers	Stakeholder consultation	Local council/local government, DAE, DoF, Department of livestock (DoL), FD, CHTDB

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Top-down Planning	Lack of related information	Generation of information and database	RC/HDC/CHTDB/
Poor information database	Access to IT System	Easy access to ITC at all level	RC/HDC
	Multiple Authority (lack of integration)	Definite line of authority	
Poor coordina-tion at planning level	No organized mechanism/ system	Strengthening of local authority	

Planning Level

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Top-down Planning	Lack of consultation with farmers	Stakeholder consultation	Local council/local government, DAE, DoF, DoL, FD, CHTDB
Poor information database	Lack of related information	Generation of information and database	RC, HDC, CHTDB
	Access to IT System	Easy access to ITC at all level	
Poor coordina-tion at planning level	Multiple Authority (lack of integration)	Definite line of authority	RC/HDC
	No organized mechanism/ system	Strengthening of local authority	

Group C

Are the existing institutions capable for natural resources management support and are policies adequate? What are limitations?

Facilitators: Mr. Malik Fida A. Khan, Mr. Khondoker Mainuddin

Group Members:

Zuam Lian Amlai (elected leader group C), Ramesh Chandra Shaha, Md. Abul Kalam Azad, Md. Neazuddin, Ranglai Mro, Sujit Dewan, Milon Chakma, Krajai Chowdhury, Satrong Chakma, Sagarika Roaza, Naieu Prue Marm, Saw Hla Prue Jimmy.

Results:

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Existing institutions are not capable of NRM	Lack of awareness and understanding of NRM and its applications to CHT (including laws, acts, and polices) by governing institutions	Arrangement of capacity development program and education of governing institutions about NRM and relevant laws, acts, and policies	Traditional Institutes: Para Karbari, Mouza Headman, Circle Circle chief or Raja Formal Institutes: Union parishad, Upazilla parishad, District administration, Zilla parishad/Hill district council, CHT Regional council
	Lack of regular elections for Zilla parishad and CHT regional council	Arrangement of election for Zilla parishad and CHT regional council	
	Lack of awareness and information about natural resources	Improved information dissemination	
	Lack of basic education	Improved educational institutions	
	Lack of good coordination between traditional and GO institutes	Strong and effective coordination between traditional and GO institutes	
	Language barrier	Involvement of local people in natural resource management Dissemination of information in local languages	

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
	Existing Forest Policy and plan is not conducive to socio-economic condition of CHT	Revision of forest policy and plan	
	Lack of free movement of agricultural products	Free movement of agriculture production	
	Lack of interaction between local people and different institutes	Involvement of local people in natural resource management	
Policies are not adequate	Peace Accord not properly implemented	Implementation of Peace Accord 1997 (Land and other natural resources)	
	Existing land policy is not suitable for CHT region	Land policy needs to be revised for CHT region Land Commission should be active immediately	
	Lack of land use plan for CHT area	Development of land use plan	
	No participatory natural resource management plan	Development of participatory NRM plan	

Group D

What could be the role of communication/information exchange/ extension in natural resources management improvement in CHT?

Facilitator: Mr. Mir Abdul Matin

Group Members:

Shanti Moy Chakma, Aungsui Pru Chowdhury, Sharmila Das, Yacoub Raheem, Md. Safiqul Islam, Bimalendu Chakma, Md. Shahidullah Sarkar, Maung Seing Phru (elected leader group D), Abul Kashem Sheikh, Sunil Kanti Dey, Lalit L Chakma, Jalal Uddin Md. Shoaib, Monirul Alam.

Results:

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Communication: Infrastructure	Road network exists up to upazilla level, but NOT linked to union level	Improve road infrastructure so that transportation costs can be reduced	
	Road infrastructure inadequate and not well managed		
	Road infrastructure is costly		
	Road infrastructure is not linked to farming places	Link roads with farming places, so that marketing will be made easier for farmers, and so that eventually they may be interested in cultivating newly suggested crops	
	River network accessible up to village level, but NOT during dry season		
	River transportation hindered because there is no permanent river landing station	Install permanent river landing station. With increased possibility of alternate income sources, and access to market for these goods, pressure on natural resources may be reduced	

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
Communication: Telecommunications	Radio/TV available up to district level, but no network beyond district headquarters		
	No electricity in most upazillas		
	Land telephone/ Internet network NOT available beyond district headquarters		
	No mobile network	Extend telecommunication facilities to the farm level	
	Slow internet	Improve internet service and speed so that easy technology change will be possible	
	Only Bangladesh Telegraph and Telephone Board (BTTB) provides Internet service		
Communications: Press	Though both national and local newspapers are circulated, information is often not reliable	Press should be unbiased	National and local newspapers
	Information in the press is often restricted	There should be less censorship of the press	
Information Need	Soil information available in hardcopies and digital format, however digital information is not distributed	Convert information to digital format. Allow access to the following information: soil characteristics, watershed characteristics, land suitability.	SRDI
	Topography information is restricted and needs to be updated.	Update information using recent data. Allow access to the following information: elevation, topography.	SOB, SRDI

Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
	Water availability information is only partly available in hardcopies.	Convert information to digital format. Allow access to the following information: surface water, ground water, geology.	Geological survey, DPHE
	Land cover/land use information is only available in hardcopy and needs updating.	Convert information to digital format. Update information using recent data. Allow access to the following information: land cover, settlement, cultivable land, cropping pattern, changes in crop composition due to soil quality change	Department of Forest (District Administration), SRDI, DAE, CEGIS
	Agriculture data is scattered and not shared.	Allow access to the following information: introduction of improved variety, appropriate technology, irrigation, availability of seed, market price.	DAE, Department of marketing, NGOs, Donor Agencies
	Availability of climate data is not regular.	More frequent and accurate data collection. Installation of more monitoring stations. Allow access to the following information: rainfall, evapotranspiration.	BMD, SRDI, BARI
	Disaster/famine information is not available.	Acquire/allow access to the following information: cyclone, earthquake, Nor' wester, flash flood, rat exposure, bamboo flowering	BMD
	Socio-economic information is only available in reports and is not well circulated.	Convert information to digital format. Allow access to the following information: settlement, migration, and population distribution by ethnic group.	BBS, NGOs, Donor Agencies

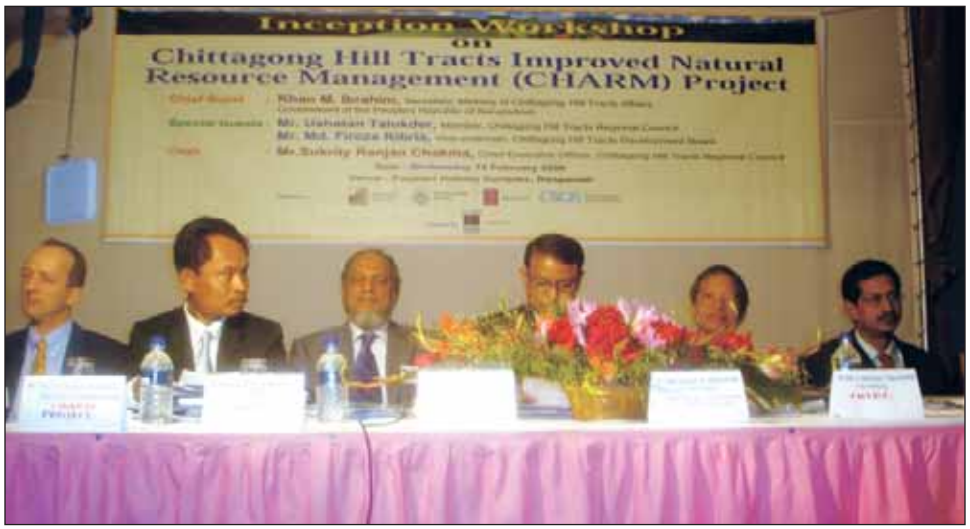
Issues	Limiting Factors/Causes	Recommendations	Partner Organizations
	Biodiversity information is not well surveyed.	Acquire/allow access to the following information: species distribution, aquatic species availability, list of endangered species, monoculture	Department of forest, Fisheries research institute, Bangladesh forest research institute, Universities
	Land management information is only available in hard copy and is not properly shared.	Convert information to digital format. Allow access to the following information: forest owned, gov. owned, community owned; distribution of reserved forest and unclassified state forest	District Administration, Department of Forest
	Drinking water information is available in reports but is not well circulated.	Convert information to digital format. Allow access to the following information: natural drinking water source, surface water quality, ground water availability, sanitation practices.	DPHE, UNICEF, NGOs
Information dissemination	Poor institutional linkages	Research findings should be shared among institutions and stakeholder	
	Accessibility	A reliable information flow needs to be built	
	Lack of proper dissemination policy and protocol	Dissemination policy and protocol needs to be established	
	Poor institutional network	Institutional network needs to be established to exchange information	
	Capacity to handle information	Capacity to handle information needs to be enhanced	
	Language difference	Mode of dissemination should be -multilingual in the dialect of target population, pictorial, poster format, fact sheet, popular theatre, drama, village fair, demonstration.	

Comments on other issues

Issues	Limiting Factors/Causes
Group A: Environmental issues in CHT	Stone quarry causes landslides
	Use of fire wood in brick fields
	Deforestation for pulp wood
	Loss of aquatic biodiversity due to mismanagement in Kaptai lake
	Infilling of lake Kaptai due to sedimentation
	Sedimentation in river bed
	Virginia tobacco cultivation effect on soil fertility
	Soil erosion due to unplanned plantation
Group B: Limiting factors in good land management in agriculture/ forestry	Appropriate technology
	Skilled extension workers
	Lack of improved seed
	Agroforestry
	Horticulture
Group C: Capability of existing institutions for NRM/adequacy of existing policies	Farmer level: training needed on natural resource management
	Planning level: the reality is not well considered
	Planning level: lack of coordination among planning institutions
	Planning level: does not follow the organizational mandate

Appendix 5: Photo Gallery

Inaugural Session



Inaugural Session Panel. From left to right: Mr Stephan Mantel, Project Coordinator CHARM; Mr Sukrity Ranjan Chakma, CEO, CHT Regional Council (chair); Mr Giasuddin Ahmed Choudhury, Executive Director of CEGIS; Mr Khan M. Ibrahim, Secretary, Ministry of CHT Affairs; Mr Ushatan Talukder, Member, CHT Regional Council; Mr Md. Firoze Kibria, Vice Chairman, CHTDB. (Mr Khandaker Mainunddin, Senior Research Fellow, BCAS, was also a panel member.)

Technical Session I

Technical Session I Panel. Left, from left to right: Dr M Shahidul Islam, Professor Geography, Chittagong University; Mr J. U. Shoaib, Principal Scientific Officer, SRDI, Dhaka; Dr Abdul Gafur, Senior Scientific Officer, SRDI; Mr Malik Fida A. Khan, Project Leader, CHARM Project, CEGIS (Missing panel member: Mr Stephan Mantel, Project Coordinator, CHARM Project). Right, from left to right: Mr Sudibya Kanti Khisa, Programme Support Consultant, UNDP-CHTDF; Dr M. K. Alam, Divisional Officer, BFRI, Chittagong; Dr M Shahidul Islam, Professor Geography, Chittagong University; Mr Sanjeev Bhuchar, Assistant Program coordinator, ICIMOD, Nepal; Mr Jalal Uddin Md Shoaib, Principal Scientific Officer, SRDI, Dhaka; Mr Francis Halder, Project Coordinator, Anando, Rangamati.

Technical Session II

Group A

Group B

Group C

Group D

Concluding Session

Dr. Manik Lal Dewan, Honorable Chairman, Rangamati Hill District Council, Rangamati

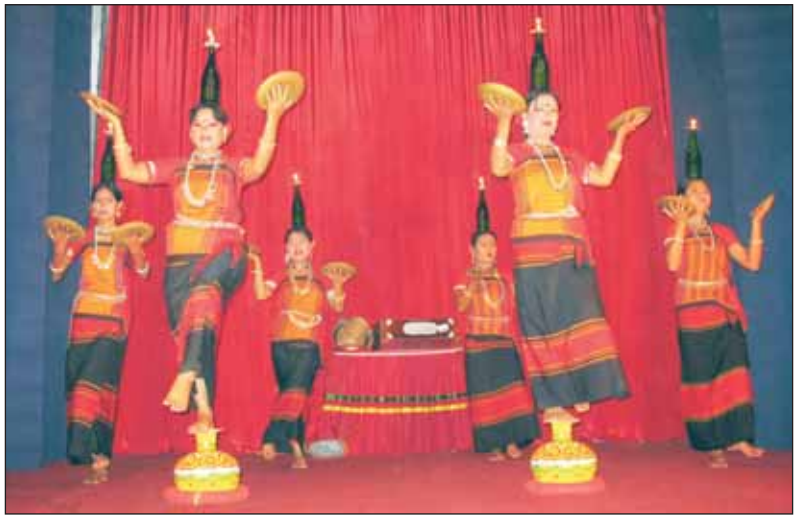
Mr. Mani Swapan Dewan, Honorable Deputy Minister, Ministry of CHT Affairs, GOB

Mr. Gazi Mohammed Julhash, Deputy Commissioner, Rangamati

Workshop Organizers and Participants

Clockwise, from top left: CHARM Workshop facilitators; Group photo of workshop participants; Tea break conversation; Audience during Inaugural Session; Group B brainstorming during Technical Session II

Cultural Show



Top: Cultural Show (traditional Chakma dance performance); Bottom: Cultural Show (Manipuri dance performance by Ms. Farhana Ahmed, Regional Planner, CEGIS, CHARM Workshop facilitator)

Appendix 6: Cooperation between EU-GOB and aims of Asia Pro Eco fund

The co-operation agreement between the European Union and the People's Republic of Bangladesh on Partnership and Development, which entered into force on 1 March 2001, covers aspects of development, trade and economic co-operation reflecting the changes and challenges of the new global world order (EC 2002).

The EU aims to positively impact the CHT peace process through support of sustainable water management and environmental conservation, as a way to develop the economic, social and environmental potential of the region. This responds to the request of the GoB to the donors community seeking assistance in formulating a long term development plan for the CHT region, and it is coherent with the priorities (environment) set in the new EC/BGD Cooperation Agreement and matches the water policy of the government. Complementing this core activity, the EC seeks to extend ongoing sector wide programmes in the health and education sectors to the Chittagong Hill Tracts (EC 2002).

The Asia Pro Eco fund is part of the external assistance programmes of the European Union, 'Europeaid'. The Asia Pro Eco fund is designed to strengthen the environmental dialogue between Asia and Europe through the exchange of policies, technologies and best practices that promote more resource-efficient, market driven, and sustainable solutions to environmental problems in Asia. The programme aims to support a series of preventive and corrective actions, which materialize in technical solutions that contribute to both quality of life and economic prosperity in Asia (APE 2006). The CHARM project is co-funded by the European Union through the Asia Pro Eco-I fund (EU Development) under the component of "diagnostic studies".