

SUMMARY REPORT

**The Third Regional Training Workshop on Land Degradation Assessment and Monitoring for
Sustainable Land Management and Climate Change Adaptation in South Asia
(TCP/RAS/3312)**

**S.L. Ranamukhaarachchi, Ph.D.
International Consultant, Sustainable Land Management**

**Venue:
Long Beach Hotel
Cox's Bazar, Bangladesh
14-18 July 2013**

**FAO Regional Office for Asia and the Pacific
Bangkok
Thailand**

1. Introduction

The Third Regional Training Workshop of the Project, “Land Degradation Assessment and Monitoring for Sustainable Land Management and Climate Change Adaptation in South Asia (TCP/RAS/3312) was held in Cox’s Bazar, Bangladesh from 14th to 18th July, 2013.

2. Background

The project Land Degradation Assessment and Climate Change Adaptation in South Asia (TCP/RAS/3312) commenced with the inception workshop held in Kunming, China during 16-18th March 2012. Four Regional Training Workshops were planned to provide Technical Training in sequence to technical persons engaged in the project to ensure project outputs are achieved, and capacity is built in the four project countries. The first training workshop was held in Kandy, Sri Lanka from 28-31 August 2012, and the second from 20-24th March 2013 in Kathmandu, Nepal. The third workshop was completed during 14-18 July 2013 in Cox’s Bazar, Bangladesh.

3. Objectives

The Objectives of the third Regional Training Workshop are to,

1. describe and impart the participants on the concept, parameters and methodologies of National (and local) Assessments covering site selection, data collection, up to preparation of local assessment reports;
2. describe and illustrate the methodologies of integrating National level data into land degradation assessment mapping;
3. provide the participants with hands-on experience of field level assessments, i.e., data collection from local situations, data analysis, identification of vulnerable spots and bright spots and contributing drivers, and preparation of location specific reports together with sustainable management requirements; and,
4. summarize best practices in combating land degradation and SLM.

In addition, the workshop also aimed to review the progress made in data collection and management, mapping and other activities in the four project countries, i.e. Bangladesh, Bhutan, Nepal and Sri Lanka, and to identify measures to accelerate project activities. The overall outputs of the third regional workshop were to 1) develop the ability to establish local level indicator systems for LD assessment, 2) compile a local LD assessment manual, and 3) develop and use methods for implementing local LD assessment.

4. Main activities

The following describes the main activities of the workshop.

a. Participation:

There were twenty seven participants at the workshop – three each from Nepal and Sri Lanka, and 21 from the host country, Bangladesh, Professor Zhang Kebin and Professor Nie Lishui, two experts from China LADA team, Dr. Sheikh Ahaduzzaman, Assistant FAO Representative and Ms. Halima Nyamat, National Consultant (Programme Monitoring and Data Management) at the FAO Office in Bangladesh, and Dr. S.L. Ranamukhaarachchi, International Consultant (Sustainable Land Management - SLM) from the FAO Regional Office of Asia and the Pacific, Bangkok. Dr. Mike Robson, FAO Representative (FAOR) of Bangladesh attended in the last two days of the workshop.

However, three participants from Bhutan were unable to attend this workshop due to unforeseen reasons in the country. The participant list is in Annex 2.

b. Opening Session

The meeting was held on 14th July 2013 at the Long Beach Hotel. The workshop programme is in Annex 1. Mr. Khoshed Alam, Director of Soil Resources Development Institute (SRDI) was the chairperson to the Opening Session, while Dr. S.M. Nazmul Islam, Secretary to the Ministry of Agriculture was the Chief Guest. Mr. Nazmul Hasan, National Project Coordinator welcomed participants on behalf of the Government of Bangladesh (GoBD). International Consultant (SLM) presented an overview of the project activities so far completed, and the remaining activities to be completed by the end of the project in November 2013. He requested fullest cooperation from the participants and higher officials who attended the inaugural session.

Prof. Zhang Kebin, an expert of the China LADA team presented in brief, the nature of training adopted in local assessments expected to be completed in the third regional training workshop Dr. Sheikh Ahaduzzaman, Assistant FAOR, Bangladesh presented the message of Dr. Mike Robson, FAOR, Bangladesh, who highlighted the past and present situations and future needs of Bangladesh, and FAO contributions made so far. He also mentioned the importance of LADA in identifying sustainable land management practices, which is vital for food security and livelihoods of the people of Bangladesh, Bhutan, Nepal and Sri Lanka.

Mr. Syed Ali Nasim Khaliluzzaman, Additional Secretary (Extension) to the Ministry of Agriculture as a special guest noted that Bangladesh has been experiencing land degradation (LD) and its impacts on the society, food security and livelihood of her people and GoBD has been working together with international organizations for reducing land degradation in order to rectify issues associated with land degradation. He also noted that the on-going project is timely and expressed his expectations to bring encouraging solutions.

Dr. S.M. Nazmul Islam, Secretary to the Ministry of Agriculture and the Chief Guest at the Opening Session welcomed all international participants to Bangladesh and Cox's Bazar. He reiterated the facts highlighted by previous speakers, while mentioning the heavy population pressure and on-going climate change inflicting upon the LD and poverty. Food security is threatened by LD caused by many drivers, which needs to be addressed with scientific approaches. He expressed the fullest support of the GoBD and his ministry. He declared the third Regional Workshop opened.

Mr. Ruhul Amin, Deputy Commissioner to Cox's Bazar as a special guest welcomed all participants to Cox's Bazar. He endorsed the facts presented by the previous speakers. From his view, land degradation is also high in Cox's Bazar, and extended his fullest support and cooperation to combat this issue.

Finally, Mr. Korshed Alam, Chairperson thanked Secretary and Additional Secretary for attending the workshop amidst busy work schedules, FAO for bringing a project for assessing land degradation and finding ways to combating it, Steering committee and FAO Bangladesh for organizing the workshop in Cox's Bazar, and all international and national participants for attending the workshop in Cox's Bazar. He requested everyone to extend fullest cooperation. The opening session ended with a group photograph with all members present at the third regional workshop.

c. Training Sessions and field assessments:

i) Training sessions commenced after the opening session. The first, representatives from Bangladesh, Nepal and Sri Lanka presented their progress achieved until June 2013. Following

that, Professor Kebin presented the framework, tools and approaches of LADA-Local Assessments. On the second day, Professor Nie Lishui presented LD assessments, impacts of LD on soil quality and productivity as well as assessment of natural resources, ecosystem services, livelihood and its analysis. These were the key presentations planned in the training workshop to impart LADA-Local assessment, and the main contents are presented below:

ii) **LADA-Local Assessment: Framework, Tools and Approaches**

Professor Kebin presented in detail, LADA-Local assessment, framework and approaches. He highlighted assessment planning, selection of sites for local assessments as well as area and plot selection. He also explained how DPSIR framework be used for preparation of reports following the site visit and site surveys.

For assessment planning, he defined LD as the reduction or losses of biological and/or economic productivity of rainfed and irrigated cropland or range, forest and woodlands, resulting from single or multiple forces. LD includes soil erosion caused by wind or/and water, and associated deterioration of physical, chemical, biological and economic characteristics. Wind, water, gravity and artificial erosion, soil fertility reduction, soil salinization/alkalization, soil pollution, loss or reduction of vegetation and biodiversity, and land use conversion were highlighted as types of LD. Under each form of LD, he described types of impacts in terms of losses and effects to the ecosystem, as well as for the people engaged and living within the system. Knowledge of these impacts is essential for assessing the degree of LD and monitoring impacts in local situations.

Seven steps in site specific assessments - i.e. study area characterization, reconnaissance visit and transect walk, vegetation, soil, water resources and livelihood assessments together with data collection measures – groups and land user interviews were described. Furthermore, how to plan LADA-Local assessment were described in detail under seven headings: 1) assessment outputs and stakeholder interests, 2) core assessments, 3) important decisions on study area and focus, 4) duration and scheduling needs, 5) tools and equipment, 6) secondary information, and 7) mapping and images.

He mentioned that the main emphasis of the local LD assessment approach lies in understanding direct and indirect causes (or drivers) of LD/SLM and impacts of LD/SLM on the environment and local people's /stakeholders' lives and livelihoods. The DPSIR framework provides a structure for integrating different parts of this assessment. The Ecosystem Services and the Sustainable Livelihoods frameworks help conceptualize LD/SLM impacts in a structured and systematic way. State of resources (and LD status and trends), Drivers and Pressures on land resources/ecosystems, the Impacts of LD on productivity, livelihoods and ecosystem services, actual and potential loss of goods and services, and Sustainable land management and Responses to improve the situation described under DPSAIR framework were highlighted.

iii) **LD assessments, impacts of LD on soil quality and productivity as well as assessment of natural resources, ecosystem services, livelihood and its analysis.**

Professor Nie described LD assessments, impact of LD on soil quality and productivity, natural resources, ecosystem services, livelihood and its analysis. The presentation covered soil assessment, vegetation assessment and water resources assessment. Three tiered area assessment strategy, i.e. local assessment area (Tier 1), study area (Tier 2) and transects and detailed assessment Sites (Tier 3) was presented to provide a standard methodology and tool-kit for the assessment of land degradation processes, i.e. causes, impacts, and determine the SLM practices. For each assessment, a scoring system was described. This would be applicable for all levels of assessments. As indicated during preparatory planning stage, the background in soil science was highlighted as a pre-requisite,

as soil characterization needed very detailed information collection. Even some of the critical measurements requiring the use of instruments and laboratory facilities were imparted during the presentation. As described in the LADA-Local Assessment Manual, participants observed how useful the manual is, yet mentioned that such types of information are routinely monitored in the current activities of the work. In the local assessments of soil, a complete characterization based on in-depth soil physical, chemical and biological was described. The detailed presentation also covered soil erosion in all aspects as a cause of land degradation. The vegetation assessment included forest and woodlands, pasture and rangelands, as well as in croplands and productivity estimations together with species composition. In all situations, monitoring the causes affecting vegetation and ground cover and productivity was highlighted. Water resources covered gathering data from sources of water availability with hydrological information, water quantity and quality assessments, causes of deterioration of water resources, yield and quality, as well as assessing degradation and management of wetlands and irrigation systems.

iv) Field assessments

On the second day following the above presentation, there was a preparation of the participants for gathering site level observations by visiting Bandarban hill tracts located about 130 km from Long Beach Hotel, Cox's Bazar. The visit was planned on the third day. However, the NPC of Bangladesh informed that there would be a country-wide disturbance to normalcy by a few political parties on 16th July, i.e. the third day of the workshop which coincided with the day planned for Bandarban field visit. The activity is referred to "*Harthal*" which indicates complete disturbance to routine work of the day combined with potential physical harassments, if not supported or attended any unaccepted activities against. Under such circumstances, participants were advised not to travel on 16th. However with the information received from reliable sources, it was learnt that the organizers have decided to continue the *Harthal* for three more days, which covered the remaining period of the workshop. This movement appeared to interfere with the activities and expected outputs of the workshop.

Therefore alternative arrangements were made to continue training activities. It was decided to 1) change the site for field visit from Bandarban to a representative site in Cox's Bazar, 2) modify the field assessment programme as well as the rest of the programme to fulfil the training requirements, and 3) seek necessary protection from security forces through contacts of FAO and the Ministry of Agriculture.

An alternative site was selected in Cox's Bazar, after visiting the site with NPC of Bangladesh, an officer as well as a participant from the Department of Agriculture (DOA) to the workshop who has worked in Cox's Bazar, International Consultant (SLM) and the Agricultural Extension Officer serving in Cox's Bazar from the DOA, Cox's Bazar. The new location in Rahamatpur, Uttaran Sombay Residential area located 1.5 km from the Long Beach Hotel was identified after a detailed examination of site and its characteristics, on-going activities, agricultural fields, forest area and visible land degradation situations. In the meanwhile, Mr. Ruhul Amin, Deputy Commissioner in Cox's Bazar provided security personnel for the safety of participants. Therefore, pre-planned third and fourth day activities were swapped and evening programme of the fourth day was extended to facilitate all the programme activities. The closing session was held in the morning of the fifth day. These changes helped completion of all the workshop activities on time, even with the time lost on the third day.

For field assessments, participants were grouped in to three activities: Group A) Site characterization, Group B) Resource Compilation, and Group C) Household status and best land management practices compilation. Each group consisted of nine members and was led by an NPC of a country. Three groups surveyed in the same area of transect, but for different tasks assigned. A few villagers assisted with providing data required by the group members.

Different tools were adopted for field surveys by the three groups. The group engaged in site characterization carried out conventional soil survey methodologies in the site, such as, opening of peat, describing the profile, soil texture, structure, permeability, organic matter content (visual observation), land use, slope percentage, erosion hazards, and best practices adopted to resolve the problem. Soil texture and types were determined by digging soil pits, making visual observations as well as sensory analysis. To get the complete picture of present and past land use, nature and extent of soil erosion, landslide and causes of erosion, afforestation and deforestation, water sources for drinking and household and irrigation, and the best practices employed to prevent soil erosion, the farmers (ranging from ultra-poor to marginal) were interviewed. Discussions were held with villagers to understand the possibility of improving soil and crop productivity.

The resource compilation group examined the same sites for resources that included water availability, vegetation (ground cover and types of trees, i.e. perennial, bushes and grass patches, crops, etc.), livestock, and housing. Digital photography was used to record available resources. Based on observations and collected information about the land degradation situation and farmer's perceptions on sustainable land management being practiced, information was extracted for the report.

The third group attended the compilation of household status and best land management practices. A benchmark survey for assessment of socio-economic status and related information catering to pressure on the land use system and land use type, past and present trends of sustainability, deterioration or amelioration of biophysical condition of the land (particularly leading to soil erosion) in the study area were gathered.

Field surveys by the three groups sufficiently covered the transact area. Their findings are shown in section v: Field Assessments..

d. Closing Session

The Closing Session was combined with certificate distribution to participants in the morning of 18th July, for which Mr. Anwarul Islam Sikder, Additional Secretary, MOA attended as the chief guest together with Mr. Khorshed Alam, and the latter was the Chairperson to the closing session. On behalf of the participants, Dr. Dharmakeerthi Wickramasinghe, NPC/Sri Lanka highlighted what was learnt during the third regional workshop and what needed to be done for completion of the project activities by due date. He thanked resource persons, fellow participants from Bangladesh for their hospitality and cooperation throughout, and for FAO Bangladesh, Regional Office in Bangkok and country offices for facilitating with logistics.

The International Consultant (SLM) summing up the training activities indicated the need to expedite the work in order to complete all activities, and requested to communicate at any time for any assistance needed. He thanked for both Chief Guest and Director/SRDI for their interests and presence at the closing session amidst country-wide disruption for administration activities, travel and people's day to day life; FAO Bangladesh for organizing the workshop together with the steering committee and NPC, Bangladesh; FAO offices in Bangkok, Nepal and Sri Lanka for facilitating the participants with all necessary support; and the Deputy Commissioner of Cox's Bazar for his presence in the opening session, his interest in the project and facilitating the organizers and FAO to conduct the local assessments in Cox's Bazar during *Harthal* by providing special protection to participants and resources persons throughout the workshop period. Further, he thanked the NPC/Bangladesh, Mr. Pijus Kanti Sarker and Agricultural Extension Officer of Cox's Bazar for helping the selection of a new field site within Cox's Bazar, which helped complete the local field level assessments within the duration of the workshop period.

The Chief Guest mentioned that current project is vital to Bangladesh as land degradation and land productivity decline impacting food production and food security of the country. Being a part of the audience in the previous afternoon session listening to presentations of findings following the field assessments, he mentioned that he was impressed of the nature and mode the training was provided and active participation of all participants. Finally, he thanked organizers for providing the opportunity to attend the last two days, and everyone for their effective contribution, assured of his personal and official support for remaining activities, as well as any further activities that would be planned for the future.

The certificates were distributed to participants by the Chief Guest with the assistance of Director/SRDI, and FAO Representative, Bangladesh.

Dr. Mike Robson, FAOR (Bangladesh) mentioned that he was fortunate to be a part of the workshop on third and fourth days, during which many key activities were explained and implemented. By visiting the field site together with participants and actively observing the activities carried out during interviews and field investigations, FAOR thanked everyone for the exercise he experienced.

Chairperson, closing the workshop thanked for everyone for making the workshop productive, effective and successful.

International participants departed at 11:30 hrs to the Domestic Airport, Cox's Bazar while local participants were to leave in the afternoon.

5. Findings:

i) General observations of the overall participation

The participants showed their interest, and were very corporative for the presentations and came up with many questions for clarifications.

Several questions were raised by the participants with their experience at the field level.

Referring to many questions, Prof. Zhang responded when a suggestion came up for the use of random selection instead of stratified sampling for study and sample sites, that both methods could be used depending upon the purpose of assessment, the first indicates whether there would be LD and to what extent, while the latter gives you the opportunity to assess even already known sites that are vulnerable for LD. The former looks more unbiased, but the latter is applied to the sites of interest of the assessment team. Both sampling methods would include continuous monitoring, except the difference in site may come into the output.

Another question was regarding methods to identify sampling spots in the selected sampling area, especially with a pre-determined interval of 100 meters or 500 meters in the rest of the transect, or throughout the transect regardless of any pre-determined intervals. However, depending upon the size of the location, the sampling points could be determined to provide a more realistic output.

Another question was raised about the frequency of collecting data (i.e. every week, every month or six months or once a year, every climatic season etc.) This was a more complicated question, as year round occurrence of LD need to be assessed with more frequent sampling. It was agreed that these suggestions be incorporated into the manual for wetlands or humid areas as the current manual has been developed based on information from dry land where climatic seasons are not much different and annual rainfall periods are very short and rainfall volumes are small.

ii) Difficulties encountered and measures adopted

The unexpected disturbance called “*Harthal*” that occurred on 16 July onwards affected the use of pre-identified site in Soil and Water Conservation Institute (SWCI) and its vicinity in Bandaraban for field visits and local assessments due to the risk involved during travelling an approximate distance of over 120 km. This made to change already planned and preparatory work in the local assessments. In particular, the availability of instruments required for determination of soil physical and chemical parameters, GPS (for making transect diagrams), etc., and some planned demonstrations of specific soil erosion monitoring methods set up in the field and that have been used for a long period and having already gathered data under different land use models in the SWCI had to be abandoned. The selection of a new site in Rahamatpur, Cox’s Bazar in the event of continuing the *Harthal* for 3-4 more days facilitated the conduct of field assessments, without the use of many needed instruments. On the other hand, the new site was neither known to any of the participants nor to resource persons, nor had any information already recorded. By identifying this site by a team comprising the International Consultant (SLM), NPC of Bangladesh, an officer from the Ministry of Agriculture who has served previously in Cox’s Bazar and the Agricultural Extension Worker in Cox’s Bazar, the opportunity was provided for the participants to gather information on site specific characteristics, resources and household information and best practices from a new area where there were no records of anything available at the time of the assessments. However, participants used their field level experience for soil characterization and household surveys, and gathered most of the required information.

The new location was visited on 17th instead of 16th July, and hence 16th July was fully utilized with modified programme, participants were separated to three groups and assigned three areas of local assessments, a) site characterization, b) resource survey and 3) household survey and best management practices. Each group had nine participants, of whom two members were from those three country level participants with soil science and GIS specializations, and the other was the NPC who was given the responsibility to lead the discussion. Every group discussed and identified the type of information that would be collected once they reached the new site on 17th July. To make the activities uniform, a common format for preparation of the report was provided.

In the modified programme, the participants visited the site in the morning hours on 17th July and returned with their observations by noon. In the afternoon, data analysis and report preparation were done. The leader of each group made a presentation of their findings, analysis and recommendations with respect to the activities conducted in the field site. There was a great interaction among the three groups during discussion after presentations, mainly with individuals’ observations in the sites with respect to areas assigned for other groups.

iii) Comments and overall impressions of the participants

The participants indicated that LD is very high in the region. According to participants in Bangladesh, LD in the country is usually associated with the mountainous nature combined with *jum* (slash and burn cultivation) cultivation, heavy soil erosion and the monsoon rains. This puts the country into food insecurity and poverty. The project of this nature is appreciated by the participants, as most of the Bangladeshi participants have enormous experience of land degradation and are directly or indirectly working in areas related to land degradation and soil and water conservation. This provided very effective dialog during the workshop.

Participants in general indicated the usefulness of the sequence of training starting from global assessment, then national and finally to approaching the local assessments. Although a complete assessment was expected during local assessment, achievements were hindered by the unavailability of certain key instruments such as GPS, Electrical conductivity meter, infiltration meters, and many others mentioned in the LADA-Local manual, almost every participant had the

knowledge and experience of using such equipment. The training imparted what would need to be adopted, and the participants were able to overcome such shortcomings with their knowledge and experience. In this respect, although there was a shift in the site for local assessments, main objectives appeared to have been achieved in the workshop. One additional comment that could be made is that the full presentation made by Mr. Md Delawar Hossain Molla provided all watershed management activities that have been adopted by the Soil and Water Conservation Institute in Bandarban. This presentation covered the nature of LD in the hilly region in Bangladesh, its continuous monitoring and work done so far to arrest LD by identifying SLM practices, as well as dissemination of such technologies through field demonstrations for implementation.

Participants noted that they have knowledge and experience in using almost all monitoring tools and measures at the field level, particularly soil testing and characterization, soil surveys and procedures, etc. But they appreciated the introduction of methods and tools being used in local to national and global level LD assessment and monitoring.

iv) Suggestions of parameters for the LADA-Local Assessment Manual

China LADA experts reiterated that land degradation assessments were first developed and adopted to dry land areas in the world. China was one of the key countries experienced intense land degradation and its impacts, and hence LADA manuals have been developed to assess LD under such conditions. The annual rainfall has been around 140 mm in the country. Due to large land extent exposed to prevailing year-round dry weather key drivers of LD became deforestation, agricultural use and wind erosion, while during intense rains concentrated during short periods caused by atmospheric depressions massive soil erosion due to runoff resulted. Therefore, LD assessments were developed to meet these situations.

However, the four project countries climatically fall into humid or wet regions as these countries receive annual rainfall above 2500 mm or even greater. Therefore, LD is mainly associated with water erosion, deforestation for agricultural purposes, ground cover reduction and wind erosion occurring in some areas during seasonal dry months. Therefore, the LADA-Local manual needs to be modified to facilitate the following locational characteristics as per the opinion of participants:

- Selection of areas for assessments in the humid regions – As the LD is mostly intense in wetter parts of the countries; such areas should be included for local assessments in the LADA-Local manual.
- Identification of sampling transects and sampling sites along the transect – Since the areas are not extremely large as in countries for which LADA-Local assessment manual was developed, manual needs to facilitate the use of smaller transects. Accordingly, sampling point selection along the selected transect may be facilitated with either random or stratified sampling site selection.
- The timing of LADA-Local assessments needs to be identified subjected to drivers and durations in which such drivers are present. In particular, humid regions usually experience LD during monsoon rain seasons as well as some specific inter-monsoon period depending upon the geophysical conditions, and such periods should be included into LADA-Local assessment manual. In the meantime, dry seasons occurring during dry-monsoon periods cause wind erosion. Therefore, the options should be left for selecting the suitable time period for LADA-Local assessment depending upon the area and characteristics of the location or region.
- An obvious experience would be water erosion in humid regions. Therefore, LADA-Local assessment manual should include more details on soil erosion caused by water erosion.

- One last, but not least the requirement would be the type of land use systems, vegetation characteristics and species composition determining the extent of ground cover variations in the selected areas. The farming systems as well as land use systems come under resource-poor and smallholder systems, many mixed vegetation types ranging from very short term (such as two to three months ground cover with vegetable, cereals like crops) to several years with perennial crops like coconut, rubber, oil palm, fruit orchards, agro-forestry systems, etc. resulting variations in ground cover should be recognized for LADA-Local assessments in the manual.

As local assessments are made in real situations in countries, many more suggestions may be made for improvement of land degradation assessments.

v) Field Assessments

The findings of the field visit are shown below:

a) Location and characteristics

The site is located in Jail Gate in Rahmatpur Union of Cox's Bazar, Sadar Upazila Under Cox's Bazar District. The place is in the South eastern part of Bangladesh. It is 1.5km East from the sea. The latitude and longitude of the area are 21°25'57" and 91°59'55", respectively. The geography comprises of low hills and a valley.

There is a stream between the hills and the valley, which flows throughout the year. Water in the stream is slightly brownish in colour because of siltation. This stream is the main source of irrigation water for agriculture. Stream water is also used for household consumption, except for drinking purposes. There is no permanent source of water in the upper part. Some bamboo plants are found in the bank of the stream.

Vegetation, which includes grasses, shrubs and a very few trees, are found in the hills and slopes. Species-wise, hills and sloping area include perennial trees like acacia, chandul, gamari, borogashi, durian, mango, jackfruit, banana and some bushes. Crops are cultivated in the valley. Farmers also collect fodder and forage for their livestock from this area. Settlements are located at the foot of the hills.

Annual average temperature of the area is - maximum 32.5°C and minimum 13.5°C. Average annual rainfall is approximately 3000 mm. The rainy season starts in June with south-west monsoon rains and lasts up to September.

b) Status and Activities of the area

- People have been living in the village for 10-40 years, and most of them are farmers cultivating as sub leasers of the land. They have cleared deep forest for agriculture and settlement.
- There are about 100 households in the location, and the average landholding size ranges from 20 to 100 decimals/households. The people do not own lands; they instead live and farm on leased lands. The people take care of the lands for owners.

- Primary means of livelihood is agriculture, livestock farming, poultry, fishing and non-agricultural activities such as day labour. The income level is categorized as very low to medium. Of the total population, about 75% is illiterate.
- The stream provides water for irrigation of paddy and other crops. Farmers irrigate crops using temporary dams across the stream and low lift pumps with polythene and plastic tubing. Improved and efficient irrigation techniques have not been used, and farmers are not aware of these techniques.
- On the lower part, paddy fields are located by the side of the stream. Farmers grow vegetables and paddy. Several small fish ponds are also located in the valley and lotus plants are grown in these fish ponds. Both winter rice (called “*boro*” rice) and summer rice (called “transplanted *aman*” rice) are usually grown. Cropping intensity in the valley is around 200%. The rice yield is almost equal to the national average of 3.8 ton/ha.
- The whole area is threatened by erosion and landslides, despite the plentiful conservation efforts taken by the villagers. Sheet, rill and gully erosion and landslides can be seen from top to bottom of the area. There is a large gully in the middle part of the village. This is partly due to the fact that villagers are cutting hill slopes to build houses in the absence of suitable lands in the lower part. Much less attention was given to the homestead area, particularly for soil and water conservation. Occupants have directed waterways to the main drain, which is occupied as the footpath to houses.
- Farmers have tried some land conservation measures like planting deep rooted grass crops, and sing sand bags (along the ditches) to reduce soil erosion, and construction of siltation tanks to collect silt and soil particles.
- Since land owners do not cultivate the land, they pay little attention to conservation measures. Farmers cultivating land cannot afford the cost of soil conservation. Therefore, special intervention from the government needs to be implemented, such as enforcement of the Land Protection Act, rules for land owners, and providing long term contracts to farmers for cultivation, which may motivate them to invest in land conservation efforts.
- The dwellers in this area are migrants from neighbouring country, and have no citizenship certificates. Therefore, they face a multitude of problems dealing with government agencies and even with the landlords.

c) Special problems

Apart from the observations above, participants identified a number of key problems that directly or indirectly induce or influence land degradation in the village covered in the transect study.

- Ongoing in-migration of people from Myanmar increases the pressure on land. This is yet unresolved and increasing the population in the area.
- There is very little land available for housing, and hence the farmers cut and level hill slopes for constructing houses. This practice increases soil erosion and the risk of land-slides. There is no alternative to cutting hills for housing.
- Land ownership is not with the current villagers, and hence land is exploited rather than adopted for proper development activities. This affects sustainable land management activities.
- Erosion is accelerated due to inappropriate land management practices and lack of awareness about erosion control.

- Crop cultivation requires frequent irrigation, at least once a week for rice, because of sandy clay loam soils having low water holding capacity. Although stream flow continues year-round, seasonal fluctuation of water level limits water availability for year-round cropping.
- There is a fertility decline in the area, affecting crop yields. This is due partly to decreasing soil organic matter content, lack of awareness of soil test-based fertilizer application, and weak financial capacity of farmers to purchase fertilizers.
- Financial limitation of the farmers restricts the adoption of at least semi-permanent soil conservation practices.

d) Best practices:

Although farmers experience many problems noted above, successful adoption of some appropriate measures were found to arrest soil erosion in the residential and farming areas. These are listed below:

- Runoff water around the houses has been directed to the foot path, which happened to be the drainage channel, and leading to formation of deep gullies and taking off huge amounts of soil. However, the villagers have successfully protected the footpath as well as vulnerable points of the stream bank and other key areas using sand bags.
- There is a sizeable siltation pond in the centre the housing area that retains sediment transported by runoff, thus minimizing sediment loads added to the stream.
- Use of cattle manure for vegetable production was observed in integrated farming systems in the village. This improves soil organic matter content.
- Most of the farmers are cultivating seasonal crops only in the lower part of transect; fruit and perennial crops are cultivated in the hill slopes. In addition, rotation of vegetables in slightly higher lands was found.

e) Suggestions by participants to overcome problems

The following suggestions were made by the participants to rectify the problems identified above, in the long-run.

- There is a need to restrict in-migration to reduce pressure on the land.
- Afforestation should be promoted in the hill slopes to develop permanent ground cover.
- To control gulley erosion and minimize landslides, some engineering structures should be constructed.
- Runoff in the footpath should be minimized by developing safe waterways in the vulnerable area.
- Hill cutting to construct housing should be discouraged, and construction should be restricted to the lower part of the village.
- Establishment of a retaining wall in the sloping area should be enforced to reduce landslides after cutting the land for house construction; and where appropriate suitable soil conservation measures using agronomic measures such as grass strips, strip cropping, alley cropping, contour farming, and planting erosion resistant crops should be promoted.
- In order to improve soil fertility and crop yields, incorporation of both organic matter and balanced fertilization should be promoted.
- There is a need to create awareness among farmers about best land management practices.

- Introduction of alternate income generation activities along with micro-credit facilities will enhance livelihoods of villagers and reduce pressure on land.
- As the lack of legal rights/ownership affects proper adoption of land and soil management and suitable soil and water conservation measures, it is vital to provide suitable legal ownership at least for a considerable period.
- In order to reduce land degradation, awareness raising programs on land degradation and sustainable land management should be introduced.
- The current land use system promotes land exploitation rather than sustainable land management; hence there is a need to introduce and implement proper land use systems based on land capability.

The participants further suggested the implementation of modalities to ensure appropriate land management. As this requires active engagement of multiple sectors, including technical, material and financial resources, preparation and submission of sound technical proposals involving a package of best practices, including conservation measures, be submitted to the government and higher authorities seeking implementation and provision of subsidies to the beneficiaries. In this regard there is a need for regulation between the user group and the institutions, institutional bylaws for SLM, and to follow conservation practices which can also generate incomes for the people.

vi) Review of current progress and planning for remaining activities

In the absence of Bhutanese participants, current progress of activities was recorded from other three project countries. In brief, Bangladesh had nominated Steering Committee (SC), but has never met so far. The work has so far been progressing smoothly as per NPC and two team members. The NPC noted that a Steering Committee Meeting (SCM) and a Technical Working Group (TWG) meeting will be held towards late July or early August. In Nepal, one SCM for organizing the first regional workshop in Kathmandu and three TWG meeting have been held. NPC mentioned that there was no training for TWG members conducted so far, but is planning to hold training in mid-August. In Sri Lanka, the NPC mentioned that one SCM and two TWG meetings were already held, and the third TWG will be held in August. NPCs of all three countries mentioned that they are planning to hold a National Training Workshop in the second half of August.

Referring to the timing of completion of project activities, NPCs mentioned activity-wise completion dates (Table 1). However, due to the absence of participants from Bhutan, their expected completion dates could not be recorded.

With respect to procurements, NPC Bangladesh mentioned that the team needs to look at the types of equipment provided by other projects, so that important items required for remaining work as well as future LADA activities could be decided. The time frame mentioned for procurement is August by the NPC, Bangladesh. NPC of Sri Lanka noted that the prices of equipment identified for procurement have gone up and hence he is seeking the assistance to obtain around USD 2,000 to match with the current market prices. He was informed to submit a request together with current prices of such equipment.

Table 1. Expected completion of project activities

Activity	Type of data and Expected completion dates			
	Bangladesh	Bhutan +/-	Nepal	Sri Lanka
Data collection	LU data collection on going, completed by Mid-August	No information	Data collection is going on, and completed by mid-August.	-National data in the end of September -Local data collection - end of October
Data processing	September end	No information	On-going	On-going
Mapping	October	No information	September end	October end
Draft Report preparation	October end	No information	October end	October end
Procurements	August	No information	Already received	Under Processing

+/- Bhutan participants did not attend the third regional workshop

The members from Nepal were seeking the approval for hiring a GIS expert and an assistant for data processing, but noted that this will be only for a very short period. One question that may arise is that the mentioned GIS expert and the assistant has not attended any of the training programmes and hence both would have to undergo the training provided so far by the LADA experts before starting the data processing and mapping work. On the other hand, the currently participated members are expected to provide training for TWG members. Therefore, these training activities should be conducted at the earliest to meet the project objectives.

As the project ends by the end of November 2013, participants were encouraged to expedite project activities. Many of the requests from countries have been provided by the project. In the meantime, the three country members informed their expected dates of the project activities which are shown in Table 1. Due to the absence of participation from Bhutan, the information of the progress of Bhutan was not reported. However, it is expected that Bhutan would participate in the fourth regional workshop progress, even though it would not be hosted by Bhutan. More information on this would be received within the next two week period.

vii) Fourth Regional Workshop

As per revised planning made to the decisions taken up during the first regional training workshop held in Sri Lanka, the fourth workshop has been scheduled for late September-early October period in Thimpu, Bhutan. However, due to unforeseen circumstances, NPC of Bhutan informed his inability to host the fourth regional workshop. The NPCs of the rest of the project countries noted that that the fourth regional workshop could be hosted by their countries. In the meantime, the two Chinese experts noted that the fourth workshop could also be hosted in China. It was agreed by everyone to first inform Bhutan participants to seek the opportunity for hosting the upcoming workshop in Thimpu, Bhutan. If the decision remains unchanged, then a prompt decision to identify an alternate location needs to be made.

The fourth regional workshop has been planned to adopt the programme of local assessment, integration, reporting and analysis of national and local work, which is expected to be conducted for five days with one day field work. In addition, each country is required to prepare and present one case study prior to the workshop.

viii) Final Workshop of the Project

It was mentioned to the participants that the final workshop is planned to be held during late October-early November, 2013 in Bangkok, Thailand. As the workshop is expected to review the draft reports of each country, which needs to be circulated to members and selected reviewers, International Consultant requested mapping to be completed and draft report to be prepared and forward to the FAO office in Bangkok. Participants were informed that further information will be circulated among them and their concurrence to the dates would be required.

6. Summary and recommendations

The following is the summary and recommendations from this five-day workshop.

- It was stressed or realized by the participants that the LADA-Local Assessment Manual needs to be improved by adding or revising the tools suitable for humid regions, due to differential effects of drivers prevalent in humid regions compared to arid regions on LD, and the needs for identifying SLM practices.
- Develop clear guidelines for the selection of areas for LADA-Local assessments, size of the assessment area and transects, selection of sampling points, and timing of sampling in the selected sites. Compared to dry lands with undulating topographies in countries with large land masses, in humid tropics land masses are more hilly with varying slopes, and hence the selection of transects with respect to its extent and length needs clear guidelines highlighted in the manual. Two aspects are to be considered in the site selection; 1) selection of sites from any location on a random basis and determine whether LD is taking place, and 2) stratified selection of sites in areas prone to land degradation and carrying out LD assessments. Depending on the objectives of the LD assessment, either criteria would be applicable, but to different situations. This needs to be clarified.
- Guidelines for the selection of sampling spots within a selected transect should be included in the manual. In countries with large land masses having low topographic variability, there is a possibility to select sampling spots in a particular distance apart, i.e. 500 or 1000 meters. In humid tropics with highly variable topography and multitude of land use activities and hence subjecting to variable levels of LD, guidelines should be given in the manual for selection of sampling spots across relatively shorter distances in the transects to represent realistic LD information.
- There was a question by participants regarding timing of LD assessment, which needs to be included in the manual with suitable guidelines. LD is connected with time and prevalence of drivers, and most of these drivers are found on a seasonal basis rather than annual basis. For example, participants mentioned that soil erosion in the hill tracts in humid regions is connected with monsoon rains, while in dry regions, soil erosion is high in the dry seasons due to wind. On the other hand, crop cultivation enhances LD, and that usually occurs when cropping seasons coincide with rainy weather. Therefore, clear guidelines for selecting suitable time of the year for local LD assessments should also be included.
- Participants from Nepal noted that their delays in project activities are caused by many official activities entrusted to them. There are several projects simultaneously running and often the same officers are moving from one meeting to another. This seemed to be a major constraint to completing project work. Nepal participants requested the approval to hire a GIS consultant and an assistant for a period of one month to process data and complete mapping. Due to the objectives of the project, capacity building is one of the three main outputs expected. On this ground, the same three participants were given the opportunity

to attend all three completed workshops. Therefore, hiring a consultant and an assistant will deviate from this objective and will also require specific training, as the two persons have not participated in previous workshops, and hence not recommended. It is suggested that at least two technical members from the TWG be selected and assigned the responsibilities of looking at the data available, processing, mapping and maintaining quality. The role of three-participants who attended all three Regional Training Workshops is vital in order to complete the project in November.

- According to NPC of Bangladesh, no steering committee meeting has so far been held since inception of the project activities. Therefore, it is stressed that the steering committee meeting should be held immediately after the workshop and all activities and future programme and work needed be discussed.
- The budget for project activities has been identified by all countries. These budgetary requirements have already been provided to the country-level FAO offices for disbursement. It is suggested that the NPCs communicate with the country FAO Offices and obtain funds for project activities.
- Procurement of equipment for data collection has only been provided to Nepal. Yet Nepal has been seeking approval to procure further equipment. Therefore, NPC of Nepal should submit a list of additional procurements needed at the earliest.

Both Bangladesh and Sri Lanka have not made any procurement so far. Therefore, both NPCs should provide a list of equipment needed, in order to provide such equipment at the earliest to attend to necessary project work.

- The fourth regional workshop was initially planned to be held in Thimpu, Bhutan. As Bhutan participants have informed their inability to host the fourth regional workshop due to unforeseen reasons, identification of an alternative location together with a suitable field site would require additional time. As the time for organizing the fourth workshop will be short, cooperation will be required to organize the fourth regional workshop from all parties concerned sooner the decision on the location is made.
- Since the project is coming to an end in November 2013, cooperation will also be required from all participants for completing project activities, LD Maps and reports in time. Therefore, NPCs are requested to communicate and cooperate with FAO country offices for procurement and use of funds.

7. Acknowledgments

The FAO RAP is thankful to the to the Ministry of Agriculture of Bangladesh and FAO Bangladesh for overall arrangements of the workshop, and to Mr. Ruhul Amin, Deputy Commissioner, Cox's Bazar for his support in a complex situation caused by unexpected and extended disturbances erupted during the workshop, affecting the major activity of field assessment, and for providing protection for participants while attending field visits to Rahamatpur, Cox's Bazar. Furthermore, continued support and cooperation by FAO Nepal, Bhutan, Sri Lanka and China during the workshop planning process, communication with participants, and organizing logistical support. Finally, the FAO RAP is also thankful to Ms. Halima Nyamat at the FAO Office in Bangladesh, FAO Nepal and Sri Lanka and Ms. Kanchana Archvaniyut at the FAO Regional Office, Bangkok for continuous and relentless assistance provided throughout and for the participants for their cooperation during the time of crisis and for effective participation that made the third regional workshop a success.

Annex 1. Workshop Programme

Third Regional Training Workshop of Land Degradation Assessment and Monitoring for Sustainable Land Management and Climate Change Adaptation for South Asia (TCP/RAS/3312)

Workshop Programme

**Chorus Meeting Room
Long Beach Hotel, Cox's Bazar, Bangladesh
July 14th – 18th 2013**

Day & Date	Time	Topic	Speaker/Resource person	
Day 1 14 July 13 Sunday	Session 1 09.30 hrs	Inaugural Session Chairperson: Khorshed Alam		
		<ul style="list-style-type: none"> • Welcome and introductions by NPC, Bangladesh 	Nazmul Hasan	
		<ul style="list-style-type: none"> • Review of project activities 	S. Ranamukhaarachchi	
		<ul style="list-style-type: none"> • Overview of LADA and LADA-L approach 	Zhang Kebin	
		<ul style="list-style-type: none"> • Address by FAO Representative 	Mike Robson	
		<ul style="list-style-type: none"> • Address by Additional Secretary (Extension), Ministry of Agriculture 	Syed Ali Nasim Khaliluzzaman	
		<ul style="list-style-type: none"> • Address by Secretary, Ministry of Agriculture 	S.M. Nazmul Islam	
		<ul style="list-style-type: none"> • Address by Deputy Commissioner, Cox's Bazar 	Ruhul Amin	
		<ul style="list-style-type: none"> • Address by Chair Person 	Khorshed Alam	
		Group Photograph		
		Refreshment		
		Session 2 11.30 hrs	Session Chair : Zhang Kebin <ul style="list-style-type: none"> • Presentations on land degradation and natural resources management in participants' countries • Discussion 	Participants 1. Bangladesh 2. Nepal 3. Sri Lanka
		13:00 hrs	Lunch & Prayer	
	Introduction to LADA-Local			
	Session 3	Session Chair : Nie Lishui <ul style="list-style-type: none"> • Assessment planning 	Zhang Kebin	

	14.00 hrs	<ul style="list-style-type: none"> • Selection of sites for assessment (hot/bright spots) • Selection of assessment areas and plots • Outline of the Report: DPSIR framework 	
Day 2	Review of LADA-Local manual		
15 July 2013 Monday	Session 1 9:00 hrs	Session Chair : S.L. Ranamukhaarachchi	
		<ul style="list-style-type: none"> • Above ground LD assessment (erosion) 	Nie Lishui & Zhang Kebin
		<ul style="list-style-type: none"> • Assessment of LD impacts on soil quality (below ground) 	
		<ul style="list-style-type: none"> • Assessment of LD impacts on productivity 	
		<ul style="list-style-type: none"> • Assessment of water resources degradation-vegetation/ and pasture assessment 	
		<ul style="list-style-type: none"> • Assessment of ecosystem services 	
	<ul style="list-style-type: none"> • Livelihoods assessment & analysis 		
	12:00 hrs	Lunch	
	Session 213:30 hrs	Session Chair : S.L. Ranamukhaarachchi	
		<ul style="list-style-type: none"> • Soil Conservation and Watershed Management in Bandaraban Field activities 	Mr. Delware Hossain Mollah
	<ul style="list-style-type: none"> • Trainees: Review manual and prepare suggestions on content, sequence/use of tools, their integration and reporting for assessing impact of LD on productivity, ecosystem services and livelihoods. 	Zhang Kebin Lishui Nie	
	<ul style="list-style-type: none"> • Training team to visit the target area and identify potential transects, sites and arrange with local informants for interviews 	Zhang Kebin, Local Soil Expert & S. Ranamukhaarachchi	
Day 3	Preliminary preparation for the field trip		
16 July 13 Tuesday	Session 1 9:00 hrs	Session Chair : S.L. Ranamukhaarachchi	
		<ul style="list-style-type: none"> • Methodology for field level data collection for local assessment and report preparation 	Zhang Kebin
		<ul style="list-style-type: none"> • Identification of group members 	Zhang Kebin, Nie Lishui & S. Ranamukhaarachchi
		<ul style="list-style-type: none"> • Planning for field-level data collection for local assessment 	Participants
	12:00 hrs	Lunch	
	Session 2 13:30 hrs	<ul style="list-style-type: none"> • Groups – working on identifying the type of data gathered and methodologies, prepare 	

		checklist, questionnaires, etc.	
	15:00 hrs	<ul style="list-style-type: none"> Progress review and Future work plan 	Resource persons and country-level teams
Day 4:	Field Session: Transect selection and survey		
17 July 13 Wednesday	09:00 hrs 09:15 hrs	<ul style="list-style-type: none"> Assemble at the Hotel front Departure from Hotel to Rahmatpur, Uttran Somobay Residential Area in Cox's Bazar, Chittagon Division, Bangladesh for field survey 	
	09:45 hrs	Begin field activities Group 1 - Site survey Above ground land degradation and crop productivity assessment; soil assessment.	Nie Lishui
		Group 2 - Resource Survey Water/vegetation/pasture/range assessment	S. Ranamukhaarachchi
		Group 3- Household survey and best practices Livelihoods & land resources	Zhang Kebin
	12:45 hrs	Return to Long Beach Hotel in Cox's Bazar	
	13:00 hrs	Lunch Break	
	15:00 hrs	Data analysis and preparation of the Local assessment report by each group	
	17.00 hrs.	Presentation of findings during local assessment Group 1 – Site Survey Group 2 – Resource survey Group 3 – Household Survey & best practices	Group 1 Leader Group 2 Leader Group 3 Leader
	18:30 hrs	Reception Dinner	
Day 5 18 July 13 Thursday	9:30 hrs	Closing Session	
		Chairperson : Mr. Khorshed Alam	
		<ul style="list-style-type: none"> Remarks by a National Project Coordinator, Sri Lanka 	D. Wickramasinghe
		<ul style="list-style-type: none"> Summing up of Workshop Activities, International Consultant, Sustainable Land Management 	S. Ranamukhaarachchi
		<ul style="list-style-type: none"> Distribution of Certificates 	Chief Guest, FAO Representative and Chairperson
		<ul style="list-style-type: none"> Address by FAO Representative, Bangladesh 	Mike Robson
		<ul style="list-style-type: none"> Address by Chief Guest, Additional Secretary, Ministry of Agriculture, Bangladesh 	Anwarul Islam Sikder

		<ul style="list-style-type: none"> • Closing remarks by Chairperson 	Khorshed Alam
	11:30 hrs	<ul style="list-style-type: none"> • International participants, resource persons and FAO officials depart to Cox' Bazar Airport • National participants depart from Cox's Bazar 	

Annex 2. List of Participants

Third Regional Training Workshop of Land Degradation Assessment and Monitoring for Sustainable Land Management and Climate Change Adaptation for South Asia (TCP/RAS/3312)

List of Participants

Chorus Meeting Room
Long Beach Hotel, Cox's Bazar, Bangladesh
July 14th – 18th 2013

Participants	Agency	Contact Information
Bangladesh		
1. Mr. Md Nazmul Hasan	Principal Scientific Officer and Head of Central Laboratory National Project Coordinator Central Laboratory Soil Resource Development Institute Ministry of Agriculture KrishiKhamar Sarak, Farmgate, Dhaka-1215, Bangladesh.	hasanmn1957@yahoo.com; hasanmnazmul@gmail.com +8801815407897
2. Dr. Moqbul Hossain	Project Director Soil Resource Development Institute Ministry of Agriculture KrishiKhamar Sarak, Farmgate, Dhaka-1215, Bangladesh.	moqbul.hossain84@gmail.com +8801815407897
3. Mr. A F M Manzurul Hoque	Senior Scientific Officer Soil Resource Development Institute Ministry of Agriculture KrishiKhamar Sarak, Farmgate, Dhaka-1215, Bangladesh.	manzur_hq@yahoo.com
4. Dr. Abu Wali Raghieb Hassan	Project Director, Disaster and Climate Risk Management in Agriculture (CDMP-II/DAE Part) Dept. of Agricultural Extension, Khamarbari, Farmgate, Dhaka-1215, Bangladesh	hassan58_dae@yahoo.com +8801711224573
5. Dr. ASM Mahbubur Rhaman Khan	Principal Scientific Officer On Farm Research Division, Bangladesh Agricultural Research Institute, Joydebpur, Gazipur, Bangladesh	mahbubur.bio@bari.gov.bd +8801712598035

	Participants	Agency	Contact Information
6.	Dr. Md Abdul Bari	Project Director, EFLR Project Soil Resource Development Institute Ministry of Agriculture KrishiKhamar Sarak, Farmgate, Dhaka-1215, Bangladesh.	barimona@yahoo.com
7.	Mr. Bidhan Kumar Bhandar	Principal Scientific Officer Soil Research Development Institute Ministry of Agriculture KrishiKhamar Sarak, Farmgate, Dhaka-1215, Bangladesh.	bidhansrdi@yahoo.com
8.	Mr. Md Delawar Hossain Molla	Principal Scientific Officer Head, Soil and Water Conservation Institute Soil Research Development Institute Bandaraban, Bangladesh	delawarsrdi@yahoo.com
9.	Ms. Farhana Iris	Senior Assistant Secretary Ministry of Agriculture Bangladesh Secretariat Dhaka 1000 Bangladesh	farhanairis@yahoo.com +881712730838
10.	Mr. Gobinda Roy	Deputy Conservator of Forest Forest Department Monitoring and Evaluation Unit, Forest Department, Ban Bhaban, Agargaon, Dhaka, Bangladesh.	gobinda_dcf@yahoo.com +8801718688937
11.	Mr. Khandker Moyeenuddin	Project Director, FSSFC Project Soil Research Development Institute Ministry of Agriculture KrishiKhamar Sarak, Farmgate, Dhaka-1215, Bangladesh.	pdfssf@gmail.com
12.	Ms. Lutfе Ara Begum	Chief Scientific Officer Soil Research Development Institute Ministry of Agriculture KrishiKhamar Sarak, Farmgate, Dhaka-1215, Bangladesh.	shirincso@gmail.com

	Participants	Agency	Contact Information
13.	Mr. Md Mohsin Ali	Principal Scientific Officer Bangladesh Agriculture Nuclear Institute	mohsinbina@yahoo.com
14.	Mr. Md Zakir Hasnat	Information Officer (Plant Protection) Agric. Information Service Ministry of Agriculture, Khamarbari, Dhaka-1215, Bangladesh.	zhasnat@yahoo.com
15.	Mr. Pijush Kanti Sarker	Deputy Director (Inputs) Department of Agricultural Extension Khamarbari, Farmgate Dhaka-1215 Bangladesh	Piyushsarker@yahoo.com +8801711782362
16.	Dr. Md Rafiqul Islam	Principal Scientific Officer Bangladesh Rice Research Institute Regional Station Sonagazi, Feni, Bangladesh	rafiqbrri@yahoo.com +8801725395749
17.	Mr. Sikder Mohammed Marnes Rasel	Senior Scientific Officer Soil Resource Development Institute Ministry of Agriculture KrishiKhamar Sarak, Farmgate, Dhaka-1215, Bangladesh	marnesraselitc@gmail.com
18.	Dr. Sohrab Ali	Deputy Director Department of Environment	sohrab@doe-bd.org
19.	Dr. Shaikh Mohammad Bokhtiar	Chief Scientific Officer (Addl. Charge) Bangladesh Agriculture Research Council	bokhtiarsm@yahoo.com
20.	Ms. Selima Akter Banu	Deputy Secretary Ministry of Agriculture	Selima.akter@gmail.com
21.	Dr. Shameem Hassan Bhuiyan	Meteorologist, Agromet Division Bangladesh Meteorological Department Meteorological Complex, Agargaon, Dhaka-1207 Bangladesh	shameem_dd@yahoo.com +880-1750000456

	Participants	Agency	Contact Information
Nepal			
22.	Mr. Surendra Prasad Srivastava	National Project Co-ordinator SSD, Nepal Agricultural Research Council Ministry of Agricultural Development Nepal	gappu.brj@gmail.com
23.	Mr. Tej Bahadur Subedi	Senior Soil Scientist (Climate Change and Soil Expert Soil Management Directorate Ministry of Agricultural Development Nepal	subeditb@yahoo.com tbsubedi@gmail.com
24.	Mr. Mahendra Nath Poudel	Senior Agric. Economist GIS Expert Ministry of Agricultural Development Kathmandu, Nepal.	mnpoudel2012@yahoo.com
Sri Lanka			
25.	Dr. W M A D B Wickramasinghe	Director Natural Resources Management Centre National Project Co-ordinator Department of Agriculture P O Box 52 Peradeniya, Sri Lanka	wickey56@ymail.com
26.	Mr. M A K Munasinghe	Research Officer/Land Use Specialist Natural Resources Management Centre Department of Agriculture P O Box 52 Peradeniya, Sri Lanka	munasinghe_kapila@yahoo.com
27.	Dr. Harsha Kumara Kadupitiya	Research Officer/GIS Specialist Natural Resources Management Centre Department of Agriculture P O Box 52 Peradeniya, Sri Lanka	kadupitiya@gmail.com

	Participants	Agency	Contact Information
	China		
28.	Dr. Zhang Kebin	Professor Beijing Forestry University China National Training Center on UNCCD East Tsinghua Road 35 P.O. Box 160, Beijing 100083 China	ctccd@126.com
29.	Dr. Nie Lishui	Professor Beijing Forestry University P.O. Box 160, Beijing 100083 China	nielishui@sohu.com, nielishui@bjfu.edu.com
	FAO Bangladesh		
30.	Dr. Sheikh Ahaduzzaman	Assistant Representative FAO Bangladesh	Sheikh.Ahaduzzaman@fao.org
31.	Ms. Halima Neyamat	National Consultant (Programme Monitoring and Data Management) FAO, Bangladesh.	Halima.Neyamat@fao.org
32.	Dr. Mike Robson	FAO Representative FAO Bangladesh	Mike.Robson@fao.org
	FAO-RAP		
33.	Dr. S.L. Ranamukhaarachchi	FAO Regional Office for Asia and the Pacific 39 Phra Athit Road Bangkok 10200, Thailand	Senaratne.Ranamukhaarachchi@fao.org ranamuka@gmail.com