HIMCAT
Newsletter No. 5 December 2009

# "Sustainable Land Management (SLM) Technologies and Approaches from the Mountain Region"


**Stream bank protection structures in Myanmar. Left: Stone-cement structure, Right: Bamboo and wooden structure. Photographs by M. Dhakal**

## Contents

## Coordinator's note

The HIMCAT extranet network is pleased to distribute the fifth HIMCAT newsletter on ***"Sustainable Land Management (SLM) Technologies and Approaches from the Mountain Region."***

Sustainable Land Management (SLM) is important for long-term productive potential of the existing natural resources, maintenance of environmental functions and for adaptation to climate change. HIMCAT network, which is an offspring of the global WOCAT initiative – is a virtual platform to enable its members to share their information and knowledge on soil and water management. The network promotes SLM in the Hindu Kush-Himalayas by testing, identifying, generating and disseminating appropriate mountain-specific, pro resource-poor SLM technologies and approaches. In partnership with other regional and national organizations, HIMCAT network is sharing several technologies and approaches through HIMCAT newsletters.

In the 5$^{th}$ issue of the newsletter, HIMCAT members from Nepal and Tibet (P.R. of China) have shared their experiences on activities and technologies on sustainable land management. Furthermore, find an interview with a HIMCAT member from Helvetas-Afghanistan.

Thank you to the members who contributed to this newsletter.

Enjoy the reading.

M. Dhakal– Assistant HIMCAT coordinator

## WOCAT / HIMCAT

The World Overview of Conservation Approaches and Technologies (WOCAT), is a network of Sustainable Land Management (SLM) specialists from all over the world. The WOCAT network facilitates the sharing of valuable knowledge land management and the efficient use of existing know-how www.wocat.org.
The Himalayan Conservation Approaches and Technologies (HIMCAT) is an offspring of this global initiative. The HIMCAT is primarily a network of sustainable land management and watershed management practitioners working for sustainable development of the Himalaya. The HIMCAT network welcomes discussion and experience sharing on issues related to soil, land and water management activities in Asia.

## ICIMOD

The International Centre for Integrated Mountain Development (ICIMOD) is an international, independent mountain learning and knowledge centre committed to improving the sustainable livelihoods of mountain peoples in the extended Himalayan region. ICIMOD serves eight regional member countries of the Hindu Kush Himalaya area: Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan as well as the global mountain community. Founded in 1983, ICIMOD is based in Kathmandu, Nepal, and brings together a partnership of its regional member countries, over 300 partner institutions, and committed donors. www.icimod.org.

ICIMOD is the focal point of WOCAT in the Himalayan region and is hosting the HIMCAT extranet site. http://www.icimod.org/?page=himcat

## Announcements

### 1. Training course on Low-Cost Soil and Water Conservation Techniques and Watershed Management

The International Centre for Integrated Mountain Development (ICIMOD) is pleased to announce its fourth International Training Course on Low-cost Soil and Water Conservation Techniques and Watershed Management Activities, which will be held from 15 March - 6 April 2010 at Godavari, Kathmandu, Nepal.

The course will enhance the theoretical and practical knowledge and skills of participants in low-cost soil and water conservation techniques and watershed management activities. In addition, participants will learn how to identify conditions of land degradation and the appropriate soil and water conservation techniques to address them, and will learn to analyse and design conservation measures within their own work context.

The course uses a participatory training approach throughout. Classroom lectures are complemented by intensive field work and practical desk planning exercises, field visits and demonstration, and action planning based on the participants' areas or field of work.

For more information and to request an application form, please contact:
Keshar Man Sthapit
Training Coordinator
Email: wsmtraining@icimod.org
Please see the link: http://www.icimod.org/?page=639 for detail information about the training.

## 2. New look of WOCAT web site


WOCAT has introduced the new look of the website during its 14th annual workshop and steering meeting (WWSM). There is a completely new section on the website which is called 'News & Events'. Within the news-section, WOCAT distinguishes global and regional news. Therefore, in case if you have any kind of news to announce on the global WOCAT website please let them know. Please see the link http://www.wocat.org to view the new look of WOCAT web site.

## 3. Announcement of 15th annual WOCAT Workshop and Steering Meeting in October 2010, in Central Asia

Since 1996, WOCAT has organized International Annual Workshops and Steering Committee Meetings (known as WWSM) with the goal (a) to bring together the main collaborating and funding institutions and the core collaborators, (b) to assess the progress and exchange experiences, (c) to further develop the programme and (d) to plan for the future including budgetary consequences. The 15th WWSM will be organised in Central Asia in October 2010.
Please check the WOCAT website www.wocat.org or contact the WOCAT secretariat wocat@giub.unbe.ch for further information.

## 4. Initiative for establishing Sustainable Land Management Institute (SLMI) in Afghanistan

Some of the challenges currently faced in implementing sustainable land management programmes in Afghanistan include:

- Difficulty in recruiting male and female staff trained on sustainable land and water management principles, concepts, approaches, practices, skills and knowledge who have the willingness to work in rural areas;
- Limited capacities of NGOs, line departments and local institutions to implement sustainable land and water management approaches and appropriate "low cost" soil and water conservation techniques;
- Lack of accessible and appropriate information on viable soil and water conservation options for arid and mountain regions of Afghanistan;
- Poor networking among community institutions, NGOs and government agencies working in the field of sustainable land and water management;
- Few tools and technologies for local level planning and implementing sustainable land and water management programmes in response to adaptation to climate change.

To address these challenges and work towards the achievement of sustainable land management in Afghanistan, starting with the Central Highlands, Aga Khan Foundation (AKF) including Programme for Professional Development (PPD), Bamyan University, Catholic Relief Services (CRS), Department of Agriculture, Irrigation and Livestock (DAIL, Bamyan), Helvetas, International Centre for Integrated Mountain Development (ICIMOD), Jesuit Refugee Service (JRS), Renewable Energies, Environment and Solidarity Group (GERES), Solidarites and United Nations Environment Programme (UNEP) have embarked on a collective initiative for establishing a formal Sustainable Land Management Institute (SLMI) to be located in Bamyan University.

The overall objective of SLMI is to enhance Afghan professional capacity to undertake sustainable and more effective local management of land and water resources. The Institute will engage in activities leading to the:

- Establishment and management of a sustainable and independent training and academic facilities which can provide a more formal and practical learning and teaching environment.
- Development of appropriate demonstration and action research sites for innovative technologies.
- Provision of paid services to interested institutions in the fields of energy saving technologies, medicinal and aromatic plants, herbal product development and market explorations.
- Development of Afghanistan Conservation Approaches and Technologies (AfCAT) knowledge sharing system (with strong links to WOCAT and HIMCAT).

An SLMI Constituent Board has been elected which will recruit and accompany an Afghan SLMI manager to prepare the legal registration, bye-laws, mid-term strategy, business plan and other required documents to start an autonomous SLMI during 2010. Swiss Agency for Development and Cooperation (SDC) has expressed interest in funding the start-up phase of SLMI.

For more information contact: khalid.azami@helvetas.org or sanjeev.bhuchar@helvetas.org

## News items

### 1. Participatory Integrated Watershed Management Training


A training on "Participatory Integrated Watershed Management" in Kathmandu, Nepal was organized by the International Centre for Integrated Mountain Development from 5 – 15 October, 2009. The training enhanced the conceptual and practical knowledge of participants in participatory integrated watershed management. In total 20 participants from 12 different countries attended the training. 14 resource persons including freelance consultants and partner organizations were involved in conducting the training. The training consisted of the following four modules: -

• **Module 1**: Introduction to participatory integrated watershed management. Analysis of the role, importance and issues of participatory watershed management and familiarization with conservation technologies and strategies.
• **Module 2**: Familiarization with the processes and issues involved while working with communities in participatory integrated watershed management.
• **Module 3**: Introduction to integrated watershed management planning with communities. Basic knowledge of different tools for the community-based integrated watershed management planning.
• **Module 4**: Introduction to the enabling framework for participatory integrated watershed management such as policy, local governance, and payment for ecosystem services.

ICIMOD is planning to organise the same training again in 2011.

## 2. 14th annual WOCAT (World Overview of Conservation Approaches and Technologies) Workshop and Steering Meeting

**Morocco, 12 – 19 October, 2009**


**Summary**

The 14th annual WOCAT (World Overview of Conservation Approaches and Technologies) Workshop and Steering Meeting (WWSM 14) was held in Rabat / Ifrane, Morocco and was organised by the UNESCO-GN Chair, Faculty of Human Sciences, University Mohammed V-Agdal, BP 1040, Rabat.

The goal of the WOCAT workshop was (a) to bring together the main collaborating and funding institutions and the core collaborators, (b) to assess the progress and exchange experiences, (c) to further develop the programme and (d) to plan for the future including budgetary consequences. ICIMOD is the focal point of this global network for the Himalayan region. One member from the Integrated Watershed Management Action Area, Dr. Isabelle Providoli and two NEPCAT members participated at the WWSM 14, Ms. Sabita Aryal from Kathmandu University and Mr. Bishnu Dhital from SSMP Nepal. ICIMOD and the NEPCAT members got the opportunity to actively participate in sessions, task force meetings, and were networking with other WOCAT members.


Some highlights of the WWSM 14 were:

1. **Special focus on taskforce (TF) group work** including the following TF's: 1) decision support tool, 2) questionnaires module, 3) impact monitoring, and 4) mapping.
2. **Progress reports** and planning
3. **A field trip** was organised to Moroccan study sites
4. A **Symposium** was jointly organised with the DESIRE project and was open for the broader Moroccan and international professionals and institutions and held on October 19th.

## 3. International Workshop on *Land Management in Marginal Mountain Areas: Vulnerability and Adaptation to Global changes*, North-Eastern Hill University

**November 9-11, 2009 in Shillong, Meghalaya, India**

Within the framework of the United Nations University (UNU) network "Sustainable Land Management in the Mountainous Region of Mainland Southeast Asia" (SLM-MMSEA), Jawaharlal Nehru University (JNU) and UNU in cooperation with Centre for Environmental Studies, North-Eastern Hill University (NEHU) jointly organized an International Workshop on ***Land Management in Marginal Mountain Areas: Vulnerability and Adaptation to Global Changes***. The international annual workshop was for members of SLM-MMSEA as well as participants from other countries to share experiences in sustainable land management.

For a long time, MMSEA and many other marginal mountain areas remained remote, highly inaccessible and isolated from external markets and interventions. Over generations of isolation, local communities of different cultures developed land management systems, with maximization of adaptation to biophysical variability of environments largely at local scale without much cross-scale interactions. With improvement in accessibility, the traditional land management systems are being increasingly impacted by external forces of economic globalization (development policy, market, etc) along with the global environmental changes (climate change, biodiversity depletion, biological invasion, land degradations). Integration with market and global environmental changes offer new opportunities as well as constraints and risks to local communities. Adapting to these external and new forces is becoming a pressing challenge for local communities to manage their land resources sustainably. A comprehensive review of multiple and interconnected dimensions of vulnerability and adaptation to global environmental and socio-economic changes in different regions of the world would be helpful in building the capacity required for coping the future changes.

The main objectives of this international workshop were:

- Review and share experiences in how and why local communities succeeded or failed to adjust the existing or innovate new agricultural/forest land management systems in response to external drivers, including development/ conservation policies, economic integration and market shifts, new off-farm livelihood options, global climate change, loss of biodiversity and land degradation.

- Acquaint members of SLM-MMSEA and other participants with the current issues in sustainable land management through a study visit to some field sites in Northeast India.
- Promote international collaborations and cooperation for enhancement of scientific knowledge and more informed policies and ground actions enabling adaptation of existing land management practices to global environmental change
- Document and disseminate knowledge available on adaptation and vulnerability to global changes and knowledge gaps
- Design Plan Forward for SLM-MMSEA

ICIMOD was invited to attend the workshop. Dr. Isabelle Providoli from the Integrated Watershed Management Action Area attended the workshop and made a presentation on "*Sustainable Land Management knowledge sharing network (WOCAT) in the HKH region, adaptation to environmental change*". Participants were made aware of the WOCAT / HIMCAT network and the WOCAT overview book and the NEPCAT fact sheets were promoted.

## Interview with HIMCAT member

**Interview with Mr. Mohammad Khalid "Azami"**
**Deputy Program Director and Disaster Risk Mitigation Project Manager, Helvetas-Afghanistan**

**Q: How did you get to know WOCAT and since when are you member of WOCAT network?**
**A:** I participated in the Low Cost Soil and Water Conservation Techniques and Watershed Management activities training which was conducted by ICIMOD Nepal in March 2008. One of the sessions was about "the introduction to WOCAT" in which we got information about WOCAT and WOCAT tools which are useful for documentation. In addition to that we also had a practical exercise in entering data into the WOCAT database. I am a member of WOCAT network since 2008.

**Q: According to you what are the most important land management issues in the HKH region?**
**A:** I have work experience in Afghanistan and of course Afghanistan is one of the countries of the HKH region which has similar problems like other regional countries. Land degradation is the key issue in Afghanistan, uprooting of shrubs, cutting of trees, overgrazing, plowing of upland areas for rained wheat production during the war (bad time), lack of management structure and climate change (prolonged drought and increasing frequency and intensity of flash floods) are the main causes of land degradation.

**Q: In order to promote sustainable land management, what are the most important aspects that one must consider?**
**A:** The most important aspect to promote sustainable land management is to focus on the establishment and the strengthening of community based organizations as management structure and the elaboration of rules for managing the areas. When the management structure is established, enabled and their roles and responsibilities are defined, the community based organizations will be able to apply other measures such as grazing management, cutting of bushes and trees in a sustainable manner, re vegetation of the area with fruit, non fruit trees and locally available shrubs and the application of different techniques of soil and water conservation.

There should also be enabling policies and institutions for supporting community based projects.

**Q: How useful do you believe is WOCAT as a tool to document, share and evaluate SLM experiences?**

**A:** I think WOCAT has good tools for documentation and evaluation of SLM experiences. The tools can be used all around the world by practitioners for documentation and evaluation of not only their own projects, but also for sharing their knowledge with other practitioners all over the world by using the WOCAT website. I think that this is necessary to know the lessons learnt which were made by other practitioners in the field by applying soil and water conservation techniques and approaches.

**Q: Is your organization using WOCAT in documenting and sharing SLM knowledge? How?**

**A:** Yes, we are using few WOCAT tools for identification and documentation of three watershed projects which are under implementation in Kahmard district of Bamyan province. Some of the techniques are in the process of documentation and will be shared through the WOCAT website.

The other initiative which Helvetas Afghanistan has been working with other stakeholders is to establish Sustainable Land Management Institute (SLMI), which will operate in Bamyan province of Afghanistan. One of the key components is to develop AfCAT (Afghanistan conservation approaches and technologies). WOCAT tools will be used for developing AfCAT and lesson learnt will be documented and shared with field practitioners in Afghanistan, regional countries and all over the world.

**Q: Do you find the HIMCAT network beneficial for promoting sustainable land management? Any suggestions how it can be further strengthened?**

**A:** Yes, HIMCAT is a virtual platform that allows the HIMCAT members and other SWC specialist from the region and Asia to share their lessons learnt on soil and water management. But still there is shortage in documentation of lessons learnt which have already been applied in the regional countries.

Also there is local knowledge about soil and water conservation techniques which has been applied few decades ago but is still not evaluated and documented. It will be good to start the documentation of local techniques and work for improvement of techniques through involvement of local people. HIMCAT will be strengthened through the introduction of HIMCAT to the regional practitioners and using of the website for sharing of lessons learnt by them. It will be good to conduct some events in the regional countries for introducing and using of HIMCAT and WOCAT.

**Q: Anything more you want to say?**

**A:** I appreciate the initiative which is made by HIMCAT and WOCAT for sharing of lessons learnt through providing knowledge sharing platforms for practitioners.

## Profile HIMCAT member: Mr. Mohammad Khalid "Azami"

**Present designation / organisation**
Deputy Program Director and Disaster Risk Mitigation Project Manager,
Helvetas-Afghanistan

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**A short summary of professional experience**

I got B.Sc degree in Civil Engineering from engineering faculty of Kabul University in 2003. I started to work in the field with UN Habitat for implementation of National Solidarity Program (NSP) in 2004. I worked in different positions like site engineer, district engineer, district senior engineer, district manager and micro hydro power plants focal point at province level. I joined Helvetas Afghanistan in June 2007. I also worked as a technical adviser for Infrastructure projects and I have been working as a Disaster Risk Mitigation Project Manager since 2008. Sustainable Land Management is one of the key components of disaster risk mitigation project. We are implementing three watershed management projects in Kahmard district of Bamyan province. The key objectives of the project are as follow:

a) Reduce the threat of devastating flash floods and production potential of degraded watersheds regained.
b) Re-establishment of vegetative soil cover supported by soil and water conservation measures.
c) Capacity development (organization, cooperation, institution and skills) to support and anchor the proposed strategies and approaches in the local communities.

I attended several trainings and workshops like, 24$^{th}$ and 25$^{th}$ Aguasan workshops which was conducted in Switzerland, Low Cost Soil and Water Conservation Techniques and Watershed Management activities which was conducted by ICIMOD in Nepal. I also participated in the WOCAT symposium in Bern, Switzerland in 2008 and participated in surveying and designing of Micro Hydro Power and National Solidarity Program related trainings in Kabul.
I have long-term experience in decentralize community based IS projects.

## Contributions from members

### 1. Riser stabilization by vegetative conservation measures (Kanla Samrakjan) in Nepal.

**Ms. Sabita Aryal Khanna** (sabita@ku.edu.np)

**Left and Right: Hilly terrain of Sarada Batase VDC, Kavre District (Isabelle Providoli)**

The technology of maintaining permanent plants in the terrace riser to give protection against wind and water erosion is a common practice in Nepal. This technology is a widely used farmer friendly sustainable technology which is spread in the mid hills of Nepal mainly through the farmers to farmer diffusion approach.

The plants established in the riser mainly hold the soil by anchoring with roots and intercepting with vegetative cover. Thus this practice enhances the biodiversity and provides agro-ecosystem sustainability. The technology also adds economic productivity to the overall farm land. The natural cover of wild grass such as *siru* is most often substituted purposely with improved variety of fodder and forage species such as napier, alfa-alfa for better productivity.

**Left and Right: Napier Plantation in risers. (Gyanbandu Sharma)**

The technology is found in both bari land (irrigated or rainfed- high land) as well as khet land (partially or fully irrigated-low land) and is also applicable even in the terraces with acute riser slope. However, the farmer seems to be more interested in planting improved varieties in the bari land than in the khet land. The reason for that is that the bari land is more vulnerable from a soil and water conservation point of view than the khet, as the establishment of the plant in bari land is difficult and needs extra inputs. Khet land and irrigated land are naturally supported by wild species such as *siru* for the coverage and the improved forage variety, if substituted, may give shade effect to the crops in the terraces. To plant improved varieties in bari land is

also very convenient to get the fodder from nearby bari land as the residences are most often in the hill tops far away from the khet land. Thus the technology not only stabilizes the riser but also provides fodder and forage thus providing the opportunity of additional income merely from the crops. In addition to that it also improves the health of crops by restoring the nutrient and water within the terraces.

The technology can be maintained by the farmer as a low cost technology with no additional inputs. Regular trimming of the plant in the riser are very useful not only to feed the cattle but also to control the habitation of rats and snakes. Slicing the riser from time to time and replacing old plants with young seedlings may add organic material on the terraces as well as eradicate the habitat of unwanted pest.

Due to its benefits the cultivation of fodder species on the riser is getting more and more popular mainly due to its lucrative value of availing food for cattle thus getting additional income. In addition to that the technology restores nutrient and water from the farm, reduces the risk of riser failure during monsoon, provides ecological diversity to the farm ecosystem by conserving flora and fauna, and restores the beauty of the farm even in the dry period.

## 2. Integrated (modified) Hedgerow: A Viable Technology for Sloping Land Management

***Gyanbandhu Sharma*** (gsharma@libird.org) ***and Bir Bahadur Tamang*** (btamang@libird.org)***, LI-BIRD, Pokhara, Nepal***

### Introduction

**Left and Right: Demonstration site and close view of integrated hedgerow technology (Gyanbandu Sharma)**

Integrated (modified) hedgerow technology is a preferred cultivation practice by farmers for sloping land areas which stabilizes soil and enhances food production and on-farm cash income. This technology is one of the viable technological options for sustainable management of sloping agriculture land. It is tested and modified in farmer's field using Participatory Technology Development (PTD) approach. In this approach, the gap between farmers' knowledge and scientific knowledge is analyzed and incorporated for the designing of technology. This technology is a modified form of sloping agriculture land technology (SALT) integrating different components like fodder/forage, horticulture crops, other cash crops and livestock. In this technology,

farmers categorize and select the species on the basis of plant characters such as germination capacity, growth habit, coppicing power, branching habit, biomass production, cash income etc. Farmers preferably integrate grass species - mulberry (*Morus alba*), napier (*Pennisetum purpureum*), broom grass (*Thysanolaena maxima*), leguminous crop species - cowpea (*Vigna radiata* ), black gram (*Vigna mungo*), beans *(Vicia faba)*, soyabean *(Gycine max)* and cash crop species - ginger (*Zingiber officinale*), banana (*Musa paradisiaca*) and *colocasia species*. Similarly, other components like bee keeping, mushroom production, vegetable production and goat rearing can also be integrated for income diversification. Now, this hedgerow technology is widely adapted by farmers practicing agriculture in marginal sloping land areas of Nepal.

**Approach used**

Participatory Technology Development (PTD) approach is used in planning, designing and implementing this technology with strong integration of farmers' knowledge and experience. Farmers' local knowledge about management practices of sloping land is documented and used in combination with scientists' research findings to design integrated hedgerow technology. This approach looks very promising and significant to address the adoption and adaptation challenges of this technology.

**Implementation process**

1. Participatory planning and designing of technology - Selection of species, selection of site etc. with the help of farmers and scientists;
2. Field implementation of technology - Preparation of materials such as A-frame, seed/seedlings etc. and establishment of hedgerows;
3. Management of technology - Periodic management operations of hedgerows from seed/seedlings sowing to harvesting of products;
4. Participatory monitoring and evaluation of technology - Periodic monitoring of technology, documentation of good practices and providing feedback for further improvement with the help of farmers, scientists and stakeholders;
5. Scaling up of technology - Dissemination of learning through farmers to farmers extension and knowledge sharing at wider level.

**Problem addressed**

The technology addresses-

- the livelihood issues of marginal farmers,
- the adversity of climate change (soil erosion, decreasing biodiversity etc.)
- the issues of ecosystem health and services,
- the knowledge gap between farmers and scientist,
- the desirable changes within short duration of time in terms of social, economic and environmental aspects.
-

**Cost of implementation**

This technology demands comparatively high cost during the initial stage of establishment, but the average cost of implementation is very low in the long term. Local resources like seeds, seedlings of plants can be used for the implementation of this technology.

**Adaptation of technology**

This technology shows higher chances of adaptation in particular in regard of the social settings and geophysical conditions and addresses the social, economic and ecological problems. Most of the marginal communities such as Chepang, Gurung, Magar etc. are gradually adopting and expanding the area of integrated hedgerows in shifting cultivation and sloping land areas of western and central regions of Nepal. More than 450 farmers' households from Gorkha, Dhading, Tanhun, Chitwan, Makwanpur and Nawalparasi districts are widely adopting this technology. Moreover, this technology is also adapted in 10 districts of mid and far western development regions of Nepal. Some of the factors that encourage farmers to adapt this technology are - intervention strategy, use of local resources, direct impact, demand driven and integrated approach.

**Advantages and disadvantages of technology**

The integrated hedgerow technology has many advantages rather than disadvantages. The application of this technology is more effective and advantageous in sloping and shifting cultivation land areas. Following are some of the advantages of technology-

Ecological advantages

- Soil erosion control and formation of natural terrace,
- Soil fertility improvement,
- Soil moisture and organic matter increase,
- Biodiversity increase,

Socio-economic advantages

- Time saving for collecting fodder/forage/fire wood
- Intervention of farmers' preferred plant species
- Biomass production for livestock
- Diversify options and opportunities
- Livelihood enhancement of farmers
- Community empowerment
- Simple and easily adoptable technology
- Cost effective technology

Some of the disadvantages of this technology are as follows:

- Slow emergence of hedge in steep and degraded land
- Lack of farmers preferred hedge species (local species)
- Takes longer time to establish hedgerows
- Initial cost little high
- Need skillful manpower
- Difficult to establish natural terraces in steep land
- High influence by free grazing system

**Potentiality for scaling up**

There is high potentiality for scaling up this technology in various parts of Nepal and other parts of the HKH region where most of the geographical areas are hill slopes. Farmers are practicing agriculture in hill slope every year and the top soil with soil

humus flows away with the first rain which increases soil erosion and decreases productivity of land. The integrated hedgerow technology can be the best option to prevent soil degradation and to improve the livelihood standard of rural communities. This technology is more appropriate to implement in degraded forest land, community managed forest, degraded slope land, land slide areas etc. In Nepal, this technology is also scaling up in different regions by government and non-governmental organizations/institutions working in land management sectors.

**Conclusion**

Integrated hedgerow technology is simple, cost effective, environment friendly and sustainable and it is well accepted in different socio-cultural settings and diverse geographical areas. Participatory approach is used for planning, designing and implementing this technology. It has high chances of success because of participatory intervention strategy, use of local resources, direct impact, demand driven and integrated approach. This technology is widely adapted mainly in the western and central mid hills of Nepal. It is necessary to extend all over the degraded hilly region. The main feature of this technology is the integration of diverse components which helps to enhance the livelihoods of marginal communities. It helps to increase soil fertility in term of soil organic matter, soil moisture, and soil deposition with formation of bio-terracing.

## 3. Erosion control activities in Tibet Autonomous Region, P.R. China

Jagannath Joshi, Juerg Merz*, Yang Bin Sino-German Programme on Renewable Energy, Rural Development and Qualification in Autonomous Region of Tibet (TAR)

*Contact: Dr. Juerg Merz, INTEGRATION environment & energy, jmerz@integration.org

**Background**

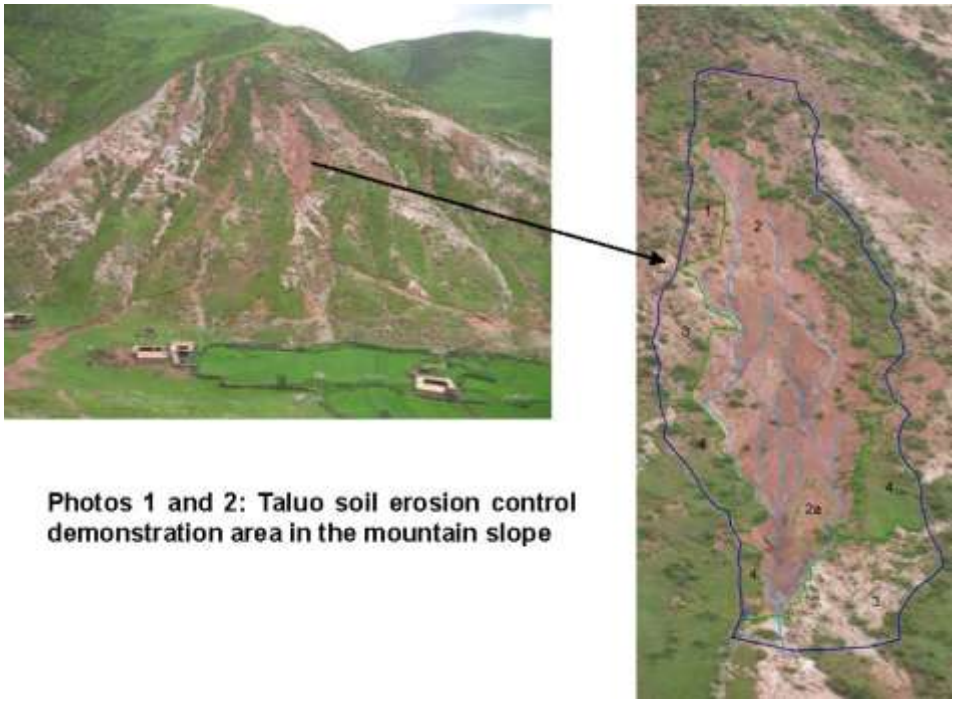
The Sino-German programme on 'Renewable Energy, Rural Development and Qualification Tibet Autonomous Region' (LIBII) - financed by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by the Gesellschaft fuer Technische Zusammenarbeit (GTZ) GmbH - is implementing erosion control activities in two catchments of Eastern Tibet in collaboration with the Water Conservancy Bureau of Tibet Autonomous Region. It is recognized by the programme that soil erosion and the consequent land degradation problem is not only associated with bio-physical problems, but also directly linked to people's aspirations and requirements for sustainable livelihoods. In order to address the problem comprehensively, several root causes need to be addressed simultaneously and the proposed actions need to be planned as part of a comprehensive development strategy at the catchment level. The approach of the programme was described in the HIMCAT Newsletter No. 2 (2008).

Following this approach, the programme has also initiated the establishment of two soil erosion control demonstration areas in Taluo and Rongme villages in Tsogong and Mangkhang counties, respectively. The article presents first activities implemented in the Taluo demonstration area.

**Taluo Soil Erosion Control Demonstration Area**

***General description and existing conditions***

The site selected to develop "Taluo soil erosion control demonstration area" is located on Taluo stream's left side in Taluo village of Zuo Gong county (Photo 1 and 2).



Photos 1 and 2: Taluo soil erosion control demonstration area in the mountain slope

The area is part of Yardong catchment and has been demarcated by gabion wire fencing in the middle part of the south-west facing slope. It covers about 6200 $m^2$ sloping surface area. Average slope of the area is 30 degree (the lower third of the slope is 25 degree and the rest of the slope is 33 degree). Average sloping length and width of the slope is 220 m and 28 m, respectively. Average width of the area at the top, the middle and the bottom parts of the slope is 20 m, 40 m, and 24 m, respectively. There is a network of run-off water courses (rills) starting from the top of the slope above the fenced area and forming a gully in the lower part of the slope. The central largest part of the area is almost naked red surface indicating degradation. There are signs of various types of soil erosion- surface wash, sheet, rill, gully and shallow slope failure. The area comprises of following sub-areas with varying surface characteristics and erosion features (Figure 1 and Table 1).

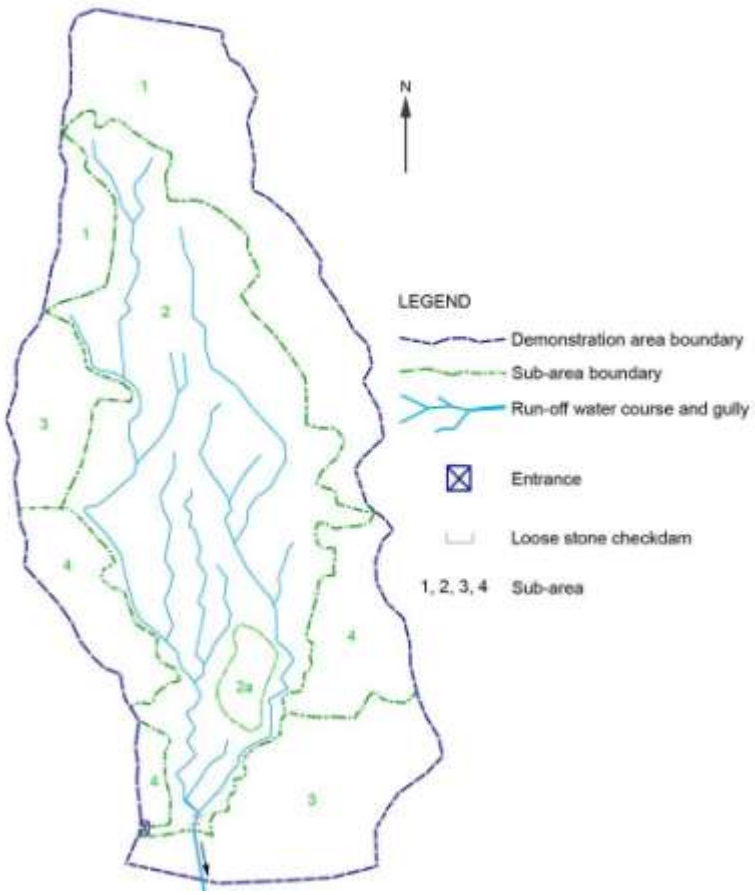



**Figure 1: Sketch map of Taluo erosion control demonstration area (not to scale)**

**Table 1:** Sub-areas with varying surface characteristics and soil erosion features.

| **Sub-area** | | **Description of existing conditions** |
|---|---|---|
| 1 |  | • Thin layer of loose soil<br>• Scattered Juniper and Rhododendron bushes and local grass species growing<br>• Sheet and rill erosion features<br>• Exposed soil surface exists in patches<br>• Located in the upper part of the area |
| 2 |  | • Almost naked area, no or negligible vegetation<br>• Top soil completely eroded<br>• Thin layer of sandy red sub-soil in some parts<br>• Exposed weathered bed rock that is highly fractured and fragmented into small pieces mainly between water courses |
| 2a |  | • About 10 cm thick layer of soil<br>• A few Juniper bushes and local grasses growing<br>• Surrounded by sub-area 2 |

| | | |
|---|---|---|
| 3 |  | • Exposed bed rock (conglomerate and sand stone) with many cracks exists<br>• A few Juniper bushes and local grasses struggling to grow in the cracks |
| 4 |  | • Covered with local grasses and sparse Juniper bushes<br>• Least eroded area<br>• About 50 cm thick layer of soil including top soil |

In addition to the above mentioned characteristics of different sub-areas, signs of soil erosion exist in the upstream as well as downstream area of the selected site, outside the fence. There is a small (5 m wide) shallow landslide scarp just 3 meters above the upper boundary (fence) of the area. Many small rills have developed above the area, which drain run-off water from top of the slope into the demonstration area. All the rills join and form a gully in the downstream area within the demonstration area. This gully has become very big (more than 3 m deep and 5 m wide) about 100 m below the lower fence and just above the base of the slope i.e., stream terrace. The gully transports huge amounts of sediment form upslope including the demonstration area to the Taluo stream. Surrounding area is also in similar condition.

**Recommended Soil Erosion Control Measures**

In order to carry out rehabilitation of degraded slope in Taluo valley following general erosion control measures are recommended:

***Local communities' capacity building***

Soil and water conservation extension education activities such as training, workshop, study tour, conservation education in the local schools etc., need to be implemented involving the local communities. When the local communities become aware of soil erosion and degradation problem and its impacts on their livelihood, they will be motivated to organize themselves and participate in the conservation program voluntarily. They will feel ownership of the activities that they have participated from the very beginning (in planning, implementation and maintenance). Thus, local communities' capacity building will ensure the sustainability of the conservation activities.

***Vegetative measures***

Grass seeding/planting in bare soil, conservation plantation in degraded forest and protection of the existing vegetation are the most appropriate vegetative measures. For this production of planting stocks (seedlings, cuttings etc.,) should be carried out in the vicinity of the area. Species selection for conservation plantation should be made carefully. As far as possible native plant species such as Juniper and Abies species should be planted, which have highest chances of survival in the degraded slopes of Taluo valley. Since there is no production of local grass seed, exotic grass species like Red Fescue (*Festuca rubra L.*) and Green Velvet Kentucky Bluegrass Blends available in Lhasa can be useful in forming quick ground vegetative cover at least in the beginning.

***Structural measures***

Construction of loose stone check dams in a series is appropriate to plug small gullies. Safe drain, toe wall and retaining wall construction is appropriate for shallow landslide treatment and slope stabilization. Stone lined parabolic safe drain need to be constructed above the demonstration area. Structures can be constructed with locally available materials and construction skill should be imparted to the local people.

***Bio-engineering***

Combination of both vegetative and structural measures (commonly called bioengineering) is the most appropriate and effective measure to control soil erosion (where ever it is possible). Palisade is appropriate to treat small gullies. Wattling is effective to stabilize loose mass in steep slope. Grass seeding or planting should be carried out above the check dams and retaining/toe walls. Grass seeding and mulching is appropriate for dry, bare slopes.

***Management measures***

In order to minimize the pressure on surrounding areas and minimize degradation, grazing management needs to be carried out.

**Erosion Control Measures for Specific Sub-areas**

Based on the existing conditions of the sub-areas, following soil erosion control measures are recommended to develop the demonstration area:

**Table 2**: Recommended soil erosion control measures for each sub-area of Taluo erosion control demonstration area.

| Sub-area | Recommended soil conservation measures |
|---|---|
| 1 | • Protect existing vegetation • Basin pit plantation in appropriate places • Grass seeding in exposed soil patches |
| 2 | • Grass seeding throughout the area • Mulching • Basin pit plantation after at least one year of grass cover formation • Complete protection from biotic interference |
| 2a | • Grass seeding • Mulching • Basin pit plantation in appropriate places |
| 3 | • Complete protection from biotic interference |
| 4 | • Protect existing Juniper bushes • Contour basin pit plantation in staggered pattern • Complete protection from biotic interference |

In addition to above mentioned recommendations for specific areas inside the demonstration area, construction of a retaining wall is appropriate to stabilize the head scarp of a small shallow slope failure just 3 meters above the upper fence. Stone lined parabolic safe drain need to be constructed above the demonstration area, which will drain runoff from west to eastern slope up to the rocky area.

## Initiated Activities

### *Check dam construction*

A series of 3 loose stone check dams were constructed near the lower boundary of the area where gully has made wide and deep cutting. Local people have carried out stone collection, transportation and check dam construction as per instruction but not voluntarily. They agreed to participate in erosion control activities only if they get payment at a rate of 180 RMB per cubic meter of stone collection plus transportation to the site and 40 RMB per day for construction work. Construction work was started after collection of stones (next day).





**Photo (3) Gully before check dam construction, (4) local people involved in check dam construction, (5) and (6) a series of 3 check dams (after completion)**

***Basin- pit plantation***


**Photo (7) and (8) Practical demonstration of basin-pit plantation**

Basin-pit digging in staggered pattern and plantation technique was demonstrated practically. Seedlings of Abies species raised in the green house during nursery training (few months back) were used for plantation. In case the planted seedlings would not survive, the local participants were requested to replace the seedlings and to dig more basin-pits and plant additional seedlings themselves.

***Grass seeding***

Since seeds of native grass species were not available, two exotic grass species, namely Red Fescue (*Festuca rubra L.*) and Green Velvet Kentucky Bluegrass Blends available in Lhasa were selected, that have desirable characteristics such as moisture stress resistance, quick vegetative cover forming and are effective for soil erosion control. Seed sowing in diagonal lines, both sides of the gully in lower part and seed broadcasting in upper part of sub-area 2 was carried out on the last day. Grass seeding was carried out on about 4000 square feet sloping surface at the rate of 3 kg per 1000 sq. ft. Since quick vegetative cover on naked soil surface was essential for erosion control and local grass seeds were not available, these exotic grass species were introduced as a trial.


**Photo (9) and (10) Grass seed sowing in diagonal line**

## Issues to be addressed

The following are main issues that need to be addressed to support the improvement of the local environment, working and living conditions of the rural population

involved in the program:

(i) Resource use practice of the local community-too much use of timber and woody vegetation mainly for house construction, fencing and fuel wood;

(ii) Ownership feeling of local community-Who should take ultimate responsibility of management of the demonstration areas, is yet to be clearly understood by the local communities. Ownership feeling is yet to be developed;

(iii) Sustainability- without addressing the above mentioned issues sustainability is questionable.

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## Next issue, spring 2010

Special topic of the issue will be decided at a later stage. You are invited to send us information about announcements, publications, training courses, and your current WOCAT work on new technologies and approaches etc.

Thank you.