

Case study 1: ‘A multi-scale approach to support integrated landscape management in rural mountainside areas (RMAs) of Alps’ 3

 Relevance for TULIP project: 3

 Overview: 3

 Challenges: 3

 ILM approaches and results: 3

 Source:..... 4

Case study 2: ‘Integrated landscape management of the Ipel river Basin – Slovakia’ 5

 Relevance for TULIP project: 5

 Overview: 5

 Challenges: 5

 ILM approaches and results: 5

 Step of methodological procedure-Description..... 5

Case study 3: ‘Hydric potential of landscape and integrated river basin management in mountain and submontane regions – Slovakia’..... 6

 Relevance for TULIP project: 6

 Overview: 6

 Challenges: 6

 ILM approaches and results: 7

 Source..... 8

Case study 4: ‘Integrated Landscape management – Dartmoor National Park, United Kingdom’..... 8

 Relevance for TULIP project: 8

 Overview: 8

 Challenges: 8

 ILM approaches and results: 8

 Source:..... 9

Case study 5: ‘Evaluating Integrated Watershed Management using multiple criteria analysis – a case study at Chittagong Hill tracts in Bangladesh’ 10

 Relevance for TULIP project: 10

 Overview: 10

¹ Prepared by: Amin Emadi, Watershed management specialist
Land and Water division FAO, July 2021

Challenges:	10
ILM approaches and results:	10
Source:.....	11
Case study 6: ‘Participatory integrated watershed management for sustainable food security in Burundi – Kagera river basin’	12
Relevance for TULIP project:	12
Overview:	12
Challenges:	12
ILM approaches and results:	12
Source:.....	13
Case study 7: ‘Enhancing water availability through an integrated watershed management approach in selected sites in Tanzania – Kagera river basin’	14
Relevance for TULIP project:	14
Overview:	14
Challenges:	14
ILM approaches and results:	15
Source:.....	15

Case study 1: 'A multi-scale approach to support integrated landscape management in rural mountainside areas (RMAs) of Alps'

Relevance for TULIP project:

This case study demonstrates methodologies, implementation and results of ILMP's in rural mountainside areas, which can be considered as a model for rural mountainsides of Turkey.

Overview:

This study presents a multi-scale approach to support integrated landscape management in Rural Mountainside Areas (RMAs) of Alps. The approach was developed within a research project funded by the Autonomous Province of Trento (Italy). Principles and aims of both the European Landscape Convention (ELC) and the Alpine Convention (AC) were the main conceptual basis of this project and the ALPTER EU-Interreg project has helped in developing the methodological approach.

- The ELC introduces a Europe-based definition of landscape; *'area whose character is the result of the action and interaction of natural and/or human factors'*.
- The ELC convention calls for the contracting Parties to integrate landscape into its regional and town planning policies, as well as in any other policies with possible direct or indirect impact on landscape

Challenges:

- Abandonment of agro-pastoral practices in the rural area due to physical constraints and economic factors
- Change in landscape characters and loss of cultural traditions and agricultural heritage of Alpine regions
- Providing definition of rural mountainside areas (RMAs) since general definitions were lacking in literature

ILM approaches and results:

The methodology integrated quantitative (maps and data) and qualitative (field works, expert opinions, etc.) analyses. To support integrated management in rural mountainside areas a multi-scale approach was developed, including the following steps:

1. **Definition and localisation of RMAs;** *'Rural landscapes located on hill or mountain slopes (generally terraced) shaped by hydraulic interventions and extensive agricultural practices conferring a high socio-cultural value.'*
2. **Selection of priority contexts;** based on the assessment of values and risks at two scales:
 - Large scale values: Ecological, landscape and economic
 - Regional scale risks: Hydro-geological, environmental, and anthropic risks.
3. **Definition of integrated measures;** A matrix-based approach to support the formulation of these measures, by crossing 3 main strategies (Protection and conservation, Tourism and development, and Environmental sustainability) with 3

identified targets for implementation of the strategies (Rural buildings and assets, Production systems, and Accessibility)

Moreover, some policy and regulatory instruments for landscape management were implemented at a regional scale to preserve rural landscapes, including Regional Spatial Planning, The rural development programme of the province of Trento, and The landscape fund: A financial resource for managing rural landscape at regional scale.

Nevertheless, the project suggested that integrating landscape issues and analyses into policies, plans and projects is not enough, since to be effective it seems more important that these measures and tools be undertaken with active cooperation among authorities and related offices, academics, technical and local experts and public. To facilitate this cooperation a political willingness is imperative since landscape policies cannot be separated from rural development or other sectoral policies as the ELC stresses.

Source:

Bragagnolo, Chiara, Rizzi, Chiara, & Staniscia, Stefania. (2014). A Multi-scale Approach to Support Integrated Landscape Management in Rural Mountainside Areas (RMAs) of Alps. In Landscape Planning and Rural Development (SpringerBriefs in Geography, pp. 61-88). Cham: Springer International Publishing.

Case study 2: 'Integrated landscape management of the Ipel river Basin – Slovakia'

Relevance for TULIP project:

This case study devised a methodology for integrated landscape management as a basic tool for the implementation of its sustainable development in actual practice.

Overview:

This paper presents an evaluation of the Ipel river basin, examining its sustainable development. The main objective of this case study is to define the socio-economic and environmental problems, to design measures to eliminate these problems and/or to prevent new problems arising. The ultimate goal is to achieve management practices which are in harmony with this area's potential, to the greatest possible extent. Thus, basic principles are applied to landscape-ecological optimization of landscape organisation, including nature protection, biodiversity, landscape stability and the protection of its natural resources. These involve its water and soil and the air/atmosphere in its forests. The protection of its cultural-historical resources is extremely important, including, inter alia, the protection of cultural monuments, protection of historical landscape structures and protection of the entire environment.

Challenges:

The natural resources and potential of this territory have not been used effectively. Such inappropriate use of natural resources led to a series of environmental problems, and the following types have been selected in this study area:

- A. Problems of endangered spatial stability
- B. Problems of endangering natural resources
- C. Problems of endangering individuals and their environment

ILM approaches and results:

According to Izakovičov et al. (1997), the basic principles of integrated landscape management are as follows:

- a) Preservation of the overall ecological stability of the landscape
- b) Protection and rational utilization of natural resource components
- c) Protection of the immediate human environment
- d) Ensuring appropriate standards in the population's quality of life
- e) Ensuring social and cultural diversity

This methodological procedure is based on geo-system comprehension of the landscape. It consists of the following basic steps:

Step of methodological procedure-Description

- I. Analyses Evaluation of the resources (natural, socio-economic and cultural-historical) and potentials of the territory and evaluation of the present state of their utilization
- II. Evaluation Evaluation of the problems appearing from the unsuitable use of resources and potentials of the area

III. Proposal Proposal to eliminate the identified current problems and prevent new ones in the given area

Accordingly, a set of solutions for sustainable utilization of the territory were proposed for improvement of a) socio-economic conditions and the overall quality of life and, b) environmental conditions.

In conclusion, Integrated landscape management is a new-age but very much actual problem setting out from the needs of landscape research as integration of natural, cultural-historical and socio-economical resources in the given area. It follows from the necessity to solve not only the environmental problems but existing ones of mankind arising due to the prevailing habits in land use and protection. Its application in practice contributes not only to elimination of environmental problems, but also to the intensification of socio-economical development of the given areas in harmony with capacity abilities of natural resources of the area. The successful application of integrated landscape management requires many social measures on the level of legislation, economical means as well as education and teaching.

Case study 3: 'Hydric potential of landscape and integrated river basin management in mountain and submontane regions – Slovakia

Relevance for TULIP project:

This study takes into account river basin specifics to implement landscape ecology methods into river basin management and natural resources management in the context of sustainable development.

Overview:

The Váh River (Slovakia) is a left-hand side tributary of the Danube River with the total length of 403 km, a river basin with the area of more than 10 000 km² and a long-term stream flow of 196 m³. Significant seasonal variations in stream flow and a number of floods have led to the building of 22 water dams, 16 of them used also as hydropower stations. The upper Váh river basin consists of 38 sub-basins that present significant spring areas of the Váh River providing water for ecosystems, 2.2 million of inhabitants, dams and industry. The case river basin is situated at an altitude of 430 – 2494 m above sea level with the average annual air temperature of +6 °C and the average annual precipitation level of 700 mm in lower parts and with the average annual precipitation level of 2130 mm and annual air temperature of 0 °C and less in the mountain areas. The average annual potential evapotranspiration level ranges from 550–600 mm in lower parts to less than 300 mm in alpine areas. The present day land use consists of forests (cca 60%), agricultural landscape (30%), and urban landscape with industrial areas (4%). Agricultural landscape, urban and industrial areas have elevations ranging from 430 to 800 m above sea level.

Challenges:

As water becomes increasingly scarce, water managers are seeking new and sustainable solutions to water supply problems. Any inappropriate human activity in a river basin can bring about a series of irreversible changes that may completely influence the character of water

resources and the way their downstream usage. The objective of the paper is to identify basic functions of landscape (ecosystem) properties in the upper Vah river basin and to specify areas with a different potential to retain water. On this basis, there can be suggested suitable basin management which follows interactions between water, landscape, and biota as well as securing a sufficiency of quality water resources for ecosystems and the socioeconomic sphere.

ILM approaches and results:

Integrated river basin management (IRBM) in line with the Water Framework Directive – WFD (Directive 2000) and represents an approach to managing water resources of a river basin by integrating environmental, economic and social issues. IRBM plans should provide complex solutions to address inter-disciplinary challenges regarding water resources, their accessibility and sufficient supply of good quality water for eco-systems and human activities.

The methodology for IRBM was partially derived from the methodology of landscape ecology planning. The intention of the modified methodology was to accept and consider river basin specifics, and to implement landscape ecology methods into river basin management and natural resources management in the context of sustainable development. The goal of the methodology is to divide river basins into the categories of significance (in relation to the hydric potential of landscape) where the most suitable management of human activities can be chosen.

The hydric potential of landscape depends on **1.hydrogeological conditions** (bedrock transmissivity), **2.meteorological conditions** (average annual precipitation level, average annual potential evapotranspiration level), **3.geomorphological attributes** (slope inclination), **4.soil conditions** (soil textures and types), **5.forest landscape characteristics** (forest ecological stability) and **6.non-forest landscape characteristics** (types and structure). These landscape features were assessed based on their quality, and the more important the feature (1-6), the more considerable and higher significance the number. After adding up all landscape attributes marks, river basins have been divided into categories of hydric potential.

Based on the significance of **landscape hydric functions**, we can delimitate areas with a greater/lower potential of landscape to infiltrate and to detain precipitation. Identified areas can show managers (landscape planners, forest managers, farmers, water managers etc.) where a need to limit conventional land use is and, on the other hand, where areas with a possibility to manage landscape or resources are as usual. Also, there is a possibility to change land use in accordance with the hydric functions of the landscape. Concrete actions should respect local environmental conditions.

On the basis of the **environment's hydric significance**, we can acquire suitable records of achieving the integrated river basin management objectives and of optimal strategies in the field of anti-flood protection. Following the submitted methodology, the evaluation of the landscape's hydric attributes (as well as integrated river basin management plans and flood management strategies) can be carried out at the regional and wider level. For preparing documents and plans at the local level, the methodology could be used, but local landscape characteristics (e.g. socioeconomic characteristics, the present local load, more detailed analysis of the non-forest landscape status, structure and hydric characteristics) have to be considered in great detail. Optimum socioeconomic activities distribution and accepting hydric

functions of landscape can ensure a sufficient amount of quality water resources for ecosystems and stakeholders in river basins.

Source:

Lepeska, Tomas. (2010). Hydric potential of landscape and integrated river basin management in mountain and submontane regions. *Ecohydrology & Hydrobiology*, 10(1), 13-24.

Case study 4: 'Integrated Landscape management – Dartmoor National Park, United Kingdom'

Relevance for TULIP project:

Overview:

The Dartmoor Farming Futures Initiative in Dartmoor National Park, South West Devon, illustrates how land-use conflicts between agricultural production and nature conservation can be eased with the help of an integrated landscape management plan. The analysis is based on semi-structured interviews conducted at land managers' residences in the area.

Challenges:

The main challenge for conflict resolution is to align the landscape management priorities of Natural England and the Department of Environment, Food and Rural Affairs, DEFRA (the public bodies responsible for England's natural environment), and those of the commons owners and hill farmers.

One of the key characteristics of Dartmoor is the high diversity of multiple stakeholders who collaborate on the development and funding of land management plans. Thus, often there are conflicting views on land management between these groups; for example, regarding the optimum livestock stocking rates on moorlands. As a result of lowering stocking rates on Dartmoor, hill farmers have had to increase the area of land they lease or manage (to maintain the same head of stock). This demands the purchase of more leases, which adds to debt in an industry that traditionally does not have a high profit margin. Many hill farmers, therefore, rely on higher levels of agri-environment subsidies for survival. Adding value to livestock produce (e.g., encouraging organic cooperatives) may be one way of countering such trends, and increasing demand for land. Also, trees had colonised the open moor landscape and gorse had begun to obscure substantial above-ground archaeological remains, thus endangering heritage values. Therefore, there is a call for a Land Management Plan that will conform to all appropriate regulations, including those arising from cross-compliance, the National Park and the Dartmoor Commoners'.

ILM approaches and results:

To address these challenges, integrated landscape management initiatives including land management plans were developed. As part of a specific plan for the commons, farmers can identify a range of outcomes that could be delivered from the land these cover the full

spectrum of ecosystem services from food production to water management where applicable. The farmers then use their expertise and experience to identify the management required to deliver these outcomes, which after much negotiation, are included in an integrated management plan signed by both Commons Association and various State agencies. The activities included in the farm-scale plan may be very different to the generic, top-down activities imposed by Natural England and DEFRA through more traditional agri-environmental schemes, as they are tailored to the needs of the individual farmer, the specific assets present on his/her hill farm and the collective interests of the Commons Association in which that farm is located.

Currently, around 15–20% of Common Agricultural Policy (CAP) payments to farmers are for agri-environment schemes. It is this component of the CAP which has been renegotiated through the Dartmoor Future Farming Initiative; not affecting the Basic Payment Scheme which is paid in accordance with the area in which land managers farm.

Source:

Mann, Carsten, Garcia-Martin, Maria, Raymond, Christopher M, Shaw, Brian J, & Plieninger, Tobias. (2018). The potential for integrated landscape management to fulfil Europe's commitments to the Sustainable Development Goals. *Landscape and Urban Planning*, 177, 75-82.

Case study 5: 'Evaluating Integrated Watershed Management using multiple criteria analysis – a case study at Chittagong Hill tracts in Bangladesh'

Relevance for TULIP project:

This case study contributes to establishment of a framework for the evaluation and implementation of alternative integrated watershed management (IWM) practices in the focused area.

Overview:

Criteria and indicators assessment is one of the ways to evaluate management strategies for mountain watersheds. One framework for this, Integrated Watershed Management (IWM), was employed at Chittagong Hill Tracts region of Bangladesh using a multi-criteria analysis approach. The IWM framework, consisting of the design and application of principles, criteria, indicators, and verifiers (PCIV), facilitates active participation by diverse professionals, experts, and interest groups in watershed management, to explicitly address the demands and problems to measure the complexity of problems in a transparent and understandable way. Management alternatives are developed to fulfil every key component of IWM considering the developed PCIV set and current situation of the study area. Different management strategies, each focusing on a different approach (biodiversity conservation, flood control, soil and water quality conservation, indigenous knowledge conservation, income generation, watershed conservation, and landscape conservation) were assessed qualitatively on their potential to improve the current situation according to each verifier of the criteria and indicator set. Analytic Hierarchy Process (AHP), including sensitivity analysis, was employed to identify an appropriate management strategy according to overall priorities (i.e., different weights of each principle) of key informants. The AHP process indicated that a strategy focused on conservation of biodiversity provided the best option to address watershed-related challenges in the Chittagong Hill Tracts, Bangladesh.

Challenges:

In the Chittagong Hill Tracts (CHT), watersheds are increasingly limited in their capacity for sustainable provision of resources for the local economy. Only 5% of the land area in the CHT can be used for crop production, 20% for horticulture (tree fruit production) and the balance is comprised of hill slopes vulnerable to erosion from various land uses. The major land uses are shifting cultivation, horticulture, and production of tea, rubber, yam, or ginger. Soil loss is often not considered in land management, with shifting cultivation frequently leading to enhanced rates of erosion and sediment transport. As a result, disturbances in upland watersheds have seriously affected the lowland environment, especially via water quality degradation and flooding impacts.

ILM approaches and results:

A set of criteria and indicators (C&I) was used in conjunction with the AHP to identify an appropriate watershed management strategy addressing the land management preferences of farmers, the experience of resource professionals, and interest groups in watershed management. The detailed methodology used is as it follows:

- **Selection of small watershed for IWM;** a study area for this research was selected near the Soil Conservation and Watershed Management Centre, Bandarban, Southeastern Bangladesh, following discussions with local watershed specialists.
- **Selection of key informants and groups;** experienced stakeholders living in or familiar with the CHT, including local farmers, resource managers, watershed specialists, civil engineers, and university scientists (representing forestry and environmental sciences), were selected as key informants and assigned to specific stakeholder categories.
- **Application of multi-criteria analysis for IWM at Chittagong Hill tracts;** a set of PCIV was developed via a two-stage process, with the first stage consisting of a search for relevant literature and discussions with forest managers and other key informants in the planning area, and the second stage consisted of consultation with local experts to refine the final PCIV set.
- **Management alternatives for IWM;** were developed to fulfill the key components of IWM, taking into consideration the developed PCIV set and the current situation of the study area. Forty-six activities were developed as possible activities to reduce environmental risk factors and improve standard policy, local economy, ecosystem protection, local livelihood standard, and management planning.
- **Qualitative assessment of effect of management systems on verifiers;** following development of the PCIV set the stakeholder group participated in a qualitative assessment of the potential impact of each management alternative on the verifier set. Information from the peer-reviewed literature on watershed management was used to further refine this information.
- **Preference elicitation;** during stakeholder meetings, a PowerPoint presentation on the process of preference elicitation (ranking and rating method) helped key informants to understand PCIV concepts as well as the systematic steps of filling out a “Evaluation Preference Form”.
- **Application of the Analytic Hierarchy Process;** the PCIV set was used to decompose integrated watershed management into a hierarchy for structuring the complex problems into smaller parts with a relational structure between them. Six principles and 22 criteria were used to develop the AHP model.

This research is an example of using a preference-based framework with a stakeholder group to clarify complex decision-making processes. Assessment of C&I for IWM can reduce informational complexity and align the managerial vision of participants, develop a multivariate model for decisionmaking, iteratively formulate potential indicators and verifiers for future monitoring, and (most importantly) establish communication between stakeholders. Both C&I assessment and MCA facilitate the identification of centrally important goals in the implementation of a compromise IWM strategy, or any other multiple-value land management system, in the Chittagong Hill Tracts.

Source:

Biswas, Shampa, Vacik, Harald, Swanson, Mark E, & Haque, S M. Sirajul. (2012). Evaluating Integrated Watershed Management using multiple criteria analysis—a case study at Chittagong Hill Tracts in Bangladesh. *Environmental Monitoring and Assessment*, 184(5), 2741-2761.

Case study 6: ‘Participatory integrated watershed management for sustainable food security in Burundi – Kagera river basin’

Relevance for TULIP project:

This study by FAO provides integrated watershed management approaches, especially participatory approaches, for sustaining food security in transboundary agro-ecosystems.

Overview:

The natural resources of the Kagera River Basin, shared by four riparian countries (Burundi, Rwanda, Uganda and Tanzania) support the livelihoods of over 16.5 million people, wherein the majority are rural and depend directly on farming, herding and fishing activities. However, the resource base and the ecosystems are facing increasing pressures as a result of rapid population growth, agricultural and livestock intensification characterized by progressive reduction in farm sizes and unsustainable land use and management practices. As a result, the basin’s land and freshwater resource base, associated biodiversity and populations whose livelihoods and food security depend on those resources, are threatened by land degradation, declining productive capacity of croplands and rangelands, deforestation and encroachment of agriculture into wetlands.

The transboundary agro-ecosystem management project (TAMP) provided the project beneficiary communities with a forum for reasoned, collective reflection about their physical environment, in order to investigate alternative solutions to environmental degradation and unsustainable natural resource use and to mitigate climate change. The overall goal of the Kagera TAMP is the adoption of an integrated ecosystem approach for the management of land resources in the Kagera River Basin. This approach aimed to promote the restoration of degraded lands, carbon sequestration, and maintenance of the water regime.

Challenges:

The Burundian agro-ecosystems are under increasing pressure due to rapid population growth and agricultural and livestock intensification. This has led to a progressive reduction in farm sizes, as well as to unsustainable land use and management patterns. Coupled with climate variability, this is most notably through the increasingly destruction of habitats and loss of biodiversity which directly impedes on agro-biodiversity and rural livelihoods.

ILM approaches and results:

In 2011, Kagera TAMP began participatory natural resource management with a pilot micro-catchment as a physical planning unit. Through this approach, joint solutions to issues related to production systems, water and land management were achieved. Service providers in the sector were invited to contribute to the natural resource management joint plan of action.

A critical analysis of the state of the land resources was jointly undertaken with the beneficiary communities in their community territory. This exercise raised their level of awareness and willingness to reverse the current negative impacts on their environment and socio-economic status.

The integrated watershed management process in the Kagera TAMP area was implemented in six phases.

1. **The preparatory phase;** the selection of the micro-catchment was done in collaboration with the provincial agriculture and livestock authorities and ministry of environment.
2. **Information and awareness-raising phase;** a series of meetings were held with the local administrators, elected representatives, decentralized technical services and beneficiary communities in Kagera region.
3. **Collaborative diagnosis phase;** a quick survey using LADA methodologies of the area was organized in collaboration with the local population.
4. **Participatory analysis phase;** the results of the diagnostic survey were presented and discussed at a follow-up meeting with the beneficiary communities.
5. **Participatory planning phase;** a joint plan of action was drawn including, schedule of activities, and allocated roles and responsibilities.
6. **Physical implementation phase;** carried out by appointed service providers, the local administration and the local population.

Between 2011 and 2014, Kagera TAMP managed 14 micro-catchments with a total surface area of 4 154 hectares. The managed micro-catchments are spread across five provinces (Gitega, Mwaro, Muramvya, Karusi and Kirundo) and have a population of 12 322. Within the population, there are 36 farmer field schools (FFSs) with a total of 1 205 members. These members and their households benefited from the project activities through an improvement in food security as a result of enterprise crop diversification (bananas, potatoes, beekeeping, market gardens and fruit trees).

One of the main activities, was to introduce innovative solutions and relevant technologies. The technologies introduced by the Kagera TAMP have had a positive impact on the environment and contributed to improved food security through crop diversification (including bananas, potatoes, beekeeping, garden crops and fruit trees). The incomes of beneficiary populations also improved. Consequently, floods and their impacts have become far less frequent within the managed micro-catchments, while agricultural production and household income have increased by at least 30 percent.

Source:

FAO (2017), Sustainable land management (SLM) in practice in the Kagera Basin: Lessons learned for scaling up at landscape level – Results of the Kagera transboundary Agro-ecosystem Management Projects (Kagera TAMP)

Case study 7: 'Enhancing water availability through an integrated watershed management approach in selected sites in Tanzania – Kagera river basin'

Relevance for TULIP project:

This study by FAO determines the types of land degradation, their cause and impacts and proposes actions to restore the degraded areas, based on an integrated watershed management approach.

Overview:

The Kyazi microcatchment is located in Kyazi village in the Missenyi district. It is divided into three sub-villages (hamlets), namely Bwatangabo, Rubumba and Rubaya. Kyazi village is found in the eastern part of Missenyi district, in a ridged, undulating landscape, with ridges extending from the south to the north. To the west, the village is bordered by Ngonono river which runs northward and drains its water into the Kagera river. Kyazi is a part of the medium rainfall agro-ecological zone, with a bimodal rainfall pattern with the average annual rainfall ranging from 1000 to 1400 mm and an annual average daytime temperature of 20 degrees of Celsius. It has a population of 1380 people part of 317 households, and the average farm size is 0.6 hectares per household. More than 90 percent of the community members are smallholder farmers with a focus on livestock rearing. The Kyazi microcatchment drains westward into the Ngonono River and is mainly occupied by Rubaya and Rubumba sub-villages. The predominant land use types include: Kibanja (settlements associated with plots of permanent crops, mainly banana and coffee); Kikamba (abandoned Kibanja used for growing annual crops such as cassava, sweet potatoes and ground nuts); Rweya (mainly used for communal grazing and grass cut for mulch, while crop production is mostly limited to Bambara groundnuts) and natural and planted forests.

Challenges:

In the Kagera Basin, rural communities in Kyazi micro-catchment are increasingly faced with water scarcity for domestic, agriculture and livestock use. There were reported decreased flows of water from major Rivers (Mwisa, Ngonono and Kagera). During the dry season, the streams and springs dry-up with siltation of water bodies due to sheet erosion (mainly from croplands and rangelands). Other problems include eutrophication and decreased soil moisture content. These problems are mainly caused by poor farming practices, overgrazing, deforestation, and poor land use planning. These issues are exacerbated by rapid climatic change and increased human and livestock pressure on the natural resource base. As a result of the water scarcity, women and children have to walk 0.5 to 1 km every day to fetch water for domestic use. There are also increased incidences of typhoid and other water borne diseases, especially in Bujuruga. This is linked to the transport by runoff of solid animal/human waste in water sources during the rainy season. In addition, the community members are also forced to share their water sources with cattle herders, also resulting in water conflicts between herders and other water users.

ILM approaches and results:

The main objective of the activity was to improve food production and water availability in Kyazi micro-catchment by improving soil moisture and fertility through controlling erosion and increasing quality, quantity and duration of vegetative ground cover.

The integrated watershed management approach was initiated through site characterization exercise. This involved collection of biophysical and socio-economic data using participatory rural appraisal (PRA) and LADA land degradation assessment tools. The data collected were used in the development of a participatory community action plan with organized group activities including communal actions, farmer field schools (FFSs) and income generating activities. The first ones were managed by the communal grazing area managers (Wakondo) selected by the village chief (Omukama) to rehabilitate tree and grassland areas and water sources. The FFS focused on sustainable crop growth on wider watershed demonstration plots. Finally, income generating activities focused on the least advantaged members of the watershed community.

The following results have been achieved over the project period 2010-2014:

- Regeneration of the vegetation cover around water sources, grazing area and on the buffer zone around the wetlands near Mwiswa and Ngonzo Rivers;
- Increased water levels and water flows observed in almost all conserved sources (e.g. at Kinyamgera water source in Kihanga/Katera micro-catchment, after conservation, the water started to flow again on its natural stream to a distance of 2.5Km;
- Increased availability and application of mulching materials in almost all the catchments as result of reduced incidence of bush fires in the micro-catchments (fire incidence reduced by more than 80 percent);
- Increased SLM adoption rate, for example 16 new farmers have adopted dairy goats keeping in their banana field for manure production and soil amendment and ten newly established banana fields using either two of the following practices: mulching, manure application or construction of water retention ditches;
- Increased food availability in the catchment due to increased crop yields, especially of banana.

Source:

FAO (2017), Sustainable land management (SLM) in practice in the Kagera Basin: Lessons learned for scaling up at landscape level – Results of the Kagera transboundary Agro-ecosystem Management Projects (Kagera TAMP)