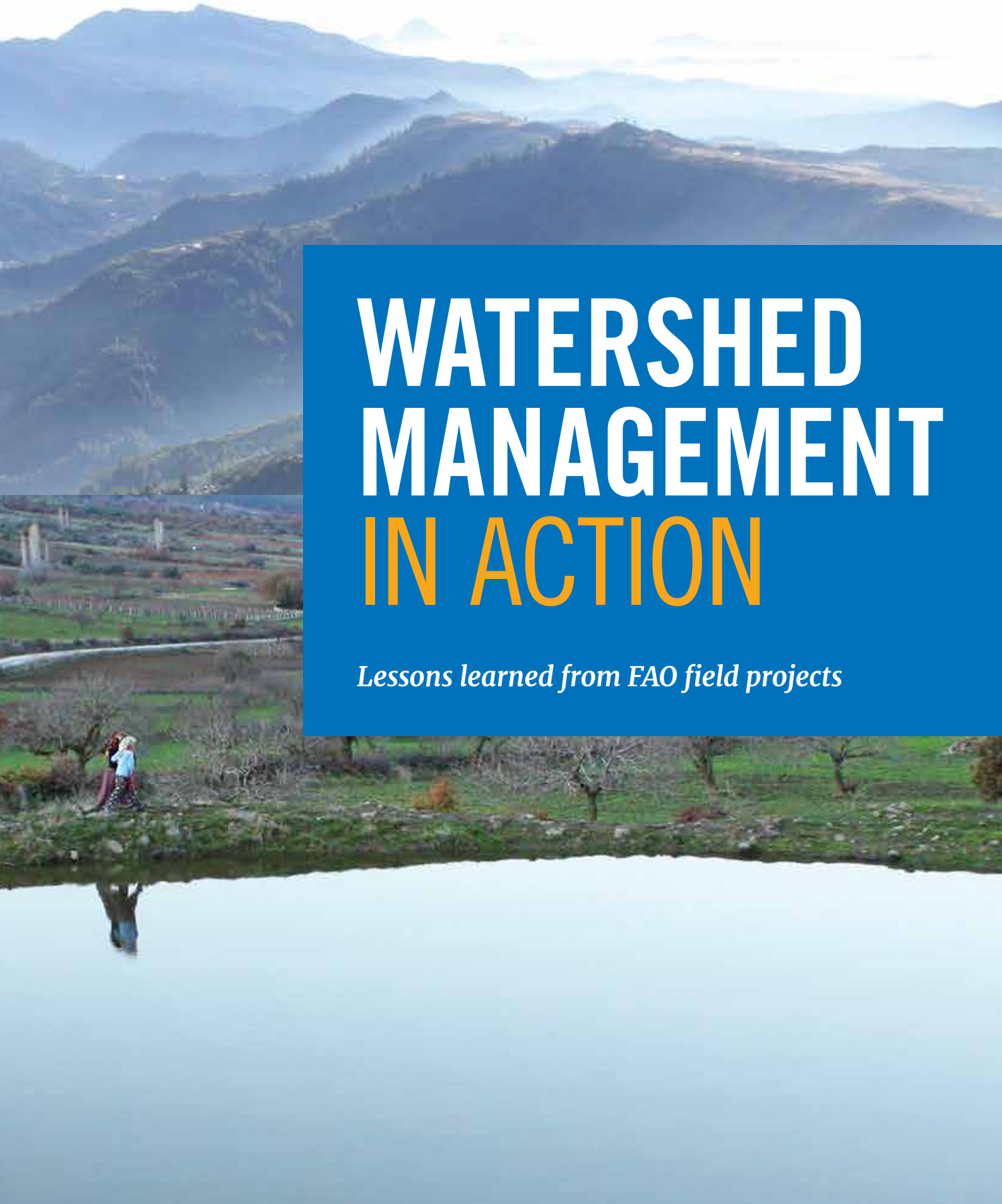
Food and Agriculture Organization of the United Nations



WATERSHED MANAGEMENT IN ACTION

Lessons learned from FAO field projects

WATERSHED MANAGEMENT IN ACTION

Lessons learned from FAO field projects

Food and Agriculture Organization of the United Nations
Rome, 2017

Recommended citation: FAO. 2017. *Watershed management in action – lessons learned from FAO field projects.* Rome.

ISBN 978-92-5-130014-5

CONTENTS

BOXES

FIGURES

TABLES

FOREWORD

A decade ago, FAO presented the results of a global review of watershed management projects carried out between 1990 and 2000. *The new generation of watershed management programmes and projects*, published in 2006, reflected the increasingly wide acceptance of watershed management as an integrated approach to environmental protection and development, addressing conservation of water, land and biodiversity resources and improvement of local livelihoods through enhanced and diversified production. The publication identified new perspectives and ideas for future interventions.

In the intervening years, FAO has formulated and implemented many new projects in which the new approaches to watershed management have been tested and demonstrated. This study is a comparative review of 12 such projects, carried out in as many countries in Africa, Asia and Latin America. It represents an attempt to bring together and disseminate the lessons that can be learned from these projects, their achievements and their difficulties.

Based on the experiences of these projects, the publication provides detailed recommendations for use by practitioners working on watershed-related programmes, projects and initiatives at the national, subnational and local levels. We hope that the publication will also be of value to managers and planners involved in other integrated landscape management and natural resource planning and restoration initiatives.

To meet the Sustainable Development Goals (SDGs), strategies are needed to tackle persistent inequalities in the poorest economies, where development needs and dependency on natural resources are greatest. The need to address the SDGs simultaneously calls for integrated approaches aimed to achieve coherence in policies and actions across scales, from local to global, and across multiple sectors. Watershed management is one such integrated approach, supporting collaboration across sectors, scales and actors to balance competing needs and generate simultaneous benefits for people and the environment.

The watershed management approach advocated in this publication is in line with FAO's holistic approach for addressing complex and interconnected challenges and for achieving coherence between the Organization's strategic documents and the 2030 Agenda, to which food and agriculture are central. FAO's work on watershed management is directly aligned with the five principles for sustainable food and agriculture, which balance the social, economic and environmental dimensions of sustainability: improving efficiency in the use of resources; managing natural resources and ecosystems sustainably; protecting and improving rural livelihoods and social well-being; enhancing the resilience of people, communities and ecosystems; and promoting innovative, effective and responsible governance mechanisms of both natural and human systems.

By adhering to these principles, watershed management promotes the transition to more sustainable production systems and practices in the crop, livestock, forestry and fisheries sectors, while preventing environmental degradation and biodiversity loss. It reflects FAO's vision for sustainable food and agriculture – a vision of a world in which nutritious food is accessible for all and natural resources are managed in a way that maintains ecosystem services, functions and biodiversity to support current and future human needs.

Hiroto Mitsugi
Assistant Director-General
FAO Forestry Department

ACKNOWLEDGEMENTS

This publication was prepared by Petra Wolter under the overall guidance and technical supervision of Thomas Hofer, Team Leader, Water and Mountains, in the FAO Forestry Department. The report benefited greatly from the technical contributions of Luca Fè d'Ostiani and the supporting work of Tomás Gonzáles Ginestet and Robert Nylander. A number of other FAO experts across technical departments and regions reviewed drafts of the report and provided technical inputs throughout the preparation process: Samantha Abear, Nabil Assaf, Faizul Bari, Paul Boettcher, Turi Fileccia, Johanna Flores, Simon Funge-Smith, Viorel Gutu, Li He, Fawzi Karajeh, Andrey Kushlin, Damiano Luchetti, Jorge Meza, Hivy Ortiz Chour, Catrin Promper, Marlos de Souza, Elaine Springgay and Ekrem Yazici.

The following external experts and watershed practitioners from intergovernmental, governmental and non-governmental agencies and the research community are gratefully acknowledged for their substantial contributions, comments and recommendations on several drafts of the study: Lorenzo Bosi, Louise E. Buck, Volli Carucci, Abdelkrim El Majoudi, Don Gilmour, Charles Kenny Jordan, Benjamin Kiersch, Thomas Kohler, Rajan Kotru, Josef Krecek, Neil Ladell, Rima Mekdaschi Studer, Grant Milne, Frits Ohler, Rikke Olivera, John Parrotta, Isabelle Providoli, Isabella Rae, Sanginov Sanginboy, Keshar Man Sthapit, Andrew Taber, Larry Tennyson and Kumar Upadhyay.

Many thanks also to Andrea Perlis for editing the document, Kate Ferrucci for graphic design and layout, James Varah for proofreading and Antonella Sorrentino for overall administrative support. Special thanks are due to Gorta–Self Help Africa for its financial support.

ACRONYMS AND ABBREVIATIONS

ADWAC	Agency for the Development of Women and Children (the Gambia)
CHPC	Chimborazo Provincial Council (Ecuador)
CIG	common interest group
CODEP	Community Oriented Development Programme (Zambia)
CSO	civil society organization
EU	European Union
GADPCH	Gobierno Autónomo Descentralizado de la Provincia de Chimborazo (Decentralized Autonomous Government of the Province of Chimborazo, Ecuador)
GEF	Global Environment Facility
GIS	Geographic Information System
GIZ	German Agency for International Cooperation
GSHA	Gorta–Self Help Africa
HCEFLCD	High Commission for Water and Forests and the Fight Against Desertification (Morocco)
ICIMOD	International Centre for Integrated Mountain Development
IFAD	International Fund for Agricultural Development
IUCN	International Union for Conservation of Nature
LADA	Land Degradation Assessment in Drylands
LPFN	Landscapes for People, Food and Nature Initiative
M&E	monitoring and evaluation
MAGA	Ministry of Agriculture, Livestock and Food (Guatemala)
MEDD	Ministry of Environment and Sustainable Development (Mauritania)
NGO	non-governmental organization
NWFP	non-wood forest product
OUBAME	project name derived from Oued OUtat in Morocco, Oued BArbara in Mauritania and Río MEmbrillo in Ecuador
PAHO	Pan-American Health Organization
PIDD	Chimborazo Development Investment Project (World Bank)
PRA	participatory rural appraisal
PROMAREN	Proyecto de Manejo de los Recursos Naturales de Chimborazo (Ecuador)
PSC	Project Steering Committee
SDG	Sustainable Development Goal
SENAGUA	Secretaría Nacional del Agua (Ecuador) (now Secretaría del Agua)
SMART	specific, measurable, achievable, relevant and time bound
SWOT	strengths, weaknesses, opportunities and threats
TCP	Technical Cooperation Programme (FAO)
TFCG	Tanzania Forest Conservation Group
TIKA	Turkish International Cooperation and Coordination Agency
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
VDC	village development committee
WMC	watershed management committee
WOCAT	World Overview of Conservation Approaches and Technologies
WRI	World Resources Institute

EXECUTIVE SUMMARY

This study reviewed the achievements, and also the shortcomings, of 12 watershed management projects technically supported by FAO over the past decade, with a view to learning from experience. These projects were implemented in the Democratic People's Republic of Korea, Ecuador, the Gambia, Guatemala, Kyrgyzstan, Mauritania, Morocco, Pakistan, Tajikistan, Turkey, the United Republic of Tanzania and Zambia.

FAO defines a watershed as the geographical area drained by a watercourse, and watershed management as any human action aimed at ensuring the sustainable use of watershed resources. Unlike sectoral development approaches, watershed management involves examining the interactions among various natural processes and land uses and managing land, water and the wider ecosystem of the watershed in an integrated way. It combines measures that improve or conserve the ecosystem services and functions in the watershed (mainly those related to water); increase land productivity and resource efficiency; and improve or diversify people's livelihoods and income. By integrating these measures in a well-defined geographic space and time sequence, the approach is expected to deliver multiple benefits, both on and off site and in the short and longer term.

Watershed management is predominantly relevant for upland areas, where smallholder agriculture, forestry and animal husbandry are the prevailing land-use systems and where human action has an impact, positive or negative, on downstream areas. Mountain watersheds provide a wide range of ecosystem services and goods such as freshwater supply, high biodiversity, timber, food, fibre and medicinal plants; yet the inhabitants of these areas are disproportionately poor and vulnerable to climate change and natural hazards.

Watershed management is best carried out as a stepwise multistakeholder process. The project review identified a sequence of steps that watershed management projects or programmes should ideally follow. The structure of this publication is based on these steps:

- promoting an enabling environment (policy, legal and regulatory frameworks, institutional dialogue and cooperation, capacity building, sharing of results, and finance and investment);
- selecting the area for interventions – the size, number and location of watersheds – based on appropriate criteria;
- identifying target beneficiaries, mobilizing actors and fostering multistakeholder participation;
- assessing the state and trends in the watershed – biophysical, socio-economic and institutional – using a variety of scientific and participatory methods and tools, to establish a baseline for defining interventions and monitoring future results;
- bringing together the stakeholders to analyse the problems in the watershed (using the results from the assessment phase), to identify solutions and to prioritize potential interventions;
- developing a watershed management plan, formulated through a collaborative process and validated by all stakeholders, to ensure holistic planning, resource allocation and implementation;
- implementing activities on the ground, establishing a balance among the competing needs, demands and priorities of different stakeholders within the available resources;
- monitoring to measure the changes in the state or condition of the watershed and to track the performance of the project against its objectives, based on an appropriate set of environmental, social, economic and institutional indicators.

For each of these steps, project results have been reviewed and a set of lessons learned and recommendations developed. They are summarized in the following "Key recommendations".

Overall, the projects covered in the review had the greatest effects on the ground, at the watershed level. They invested strongly in capacity development, in setting up and facilitating participatory

processes and in engaging stakeholders from different sectors and segments of the population, including indigenous people, local communities, youth and women. They demonstrated effective collaboration across sectors (forestry, agriculture, water and others) at the district or municipal level.

The projects were less successful at the national policy level, in fostering inclusion of the watershed management approach in regular policy-making and planning and in ensuring the sustainability of project action beyond the immediate intervention area. Because it is difficult for fragmented, small-scale, short-term projects to influence higher level policy- and decision-making, opportunities must be sought to undertake larger-scale and longer-term transformative programmes that can generate qualitative changes in the well-being of populations and in the conservation or restoration of terrestrial ecosystems. The growing momentum around landscape initiatives and the call for integrated approaches for implementing the Sustainable Development Goals provide opportunities for increasing the visibility of watershed management in the global development arena.

Watershed management is an effective approach for responding to global challenges of water supply, land restoration, climate change adaptation, disaster risk management and fighting hunger. To meet these challenges, the next generation of watershed management projects and programmes must be implemented over longer time frames, and they require sustained and coordinated investment from the public and private sectors. In particular, the review identified the following areas for moving forward:

- **Institutional strengthening for improved watershed governance.** Based on sound analysis of underlying policy and institutional challenges and the causes of resource competition in the watersheds, future projects should support strategic planning and institutional coordination processes and create incentives for multistakeholder dialogue and action platforms.
- **Watershed monitoring.** Priority must be given to systematic and regular collection and analysis of data on conditions in the watershed. Technical guidance and tools are needed to support the selection of appropriate indicators and develop stakeholders' capacity to monitor processes in watersheds. Such efforts may be supported by a framework being developed by FAO and its partners for monitoring forest and water interactions in landscapes and the water-related ecosystem services provided by forests.
- **Capitalizing on increased data availability.** More systematic use of increasingly available geospatial data and tools may complement on-the-ground assessments and contribute to the improved quality of environmental information while reducing time and costs.
- **Knowledge sharing and learning.** A platform for systematic sharing of watershed management experiences, approaches and tools among development partners and research organizations could avoid duplication of effort, help future programmes take advantage of the latest knowledge, and contribute to harmonization of terminology and approaches.
- **Strategic partnerships for joint action on the ground.** Given the comparatively small size of FAO projects, their impact can be enhanced through association with larger investment programmes. The World Bank, the International Fund for Agricultural Development (IFAD) and the regional development banks have programmes in watershed management and can be important partners providing technical support and guidance for responsible investment in watersheds. Such strategic collaboration could be further expanded to include international organizations working on broader landscape management and restoration initiatives.

KEY RECOMMENDATIONS

ENABLING ENVIRONMENT

- ☐ Review policies and laws in relevant sectors such as water, agriculture, forestry, and rural development, during project formulation and/or assessment.
- ☐ Promote safeguarding of legitimate tenure rights.
- ☐ Promote dialogue among and within institutions and sectors to support horizontal and vertical integration.
- ☐ Establish mechanisms for interministerial collaboration and coordination and for systematic upward communication of locally tested integrated solutions.
- ☐ Build capacity of both individuals and organizations, based on assessed needs.
- ☐ Strengthen skills in leadership, strategic and integrated planning and the fostering of a territorial vision among stakeholders.
- ☐ Foster establishment of formal watershed management training programmes, incorporating up-to-date research findings and tools.
- ☐ Support global, regional and national knowledge sharing and exchange.
- ☐ Join forces with development partners engaged in watershed management or other integrated landscape approaches as well as with universities and research centres.
- ☐ Plan and budget for communication and documentation of results, case studies, success stories and lessons learned.
- ☐ Present the experiences and results of watershed management interventions in national and global discussion fora, including technical conferences.
- ☐ Seek finance for integrated activities in watersheds from multiple sources, and develop new financing mechanisms that can overcome the shortfalls of sector-based approaches.
- ☐ Encourage resource partners to support long-term watershed management programmes in preference to short-term projects.

WATERSHED SELECTION

- ☐ Choose the watershed as the basic management unit for the coordinated management of multiple natural resources.
- ☐ Use a nested approach, to analyse spatial relationships over a sufficiently large area while concentrating interventions in a core demonstration area.
- ☐ Take advantage of previous experiences to identify which watershed sizes and scales are best for upscaling and replication.
- ☐ In small projects focused on demonstrating the watershed management approach, concentrate field activities in one watershed.
- ☐ In larger projects, determine the number and size of watersheds based on the available human and financial resources.
- ☐ In selecting watersheds, use criteria such as representativeness, visibility and accessibility; evidence of watershed degradation and physical restoration potential; diversity in land-use pattern, products and problems to be addressed; demonstrated interest of stakeholders; demonstrated commitment and support from government line agencies and local entities; and the need for protection of high-value areas downstream.

ENGAGING WATERSHED STAKEHOLDERS

- ☐ Perform a careful and inclusive stakeholder analysis early in the project.
- ☐ Identify target beneficiaries based on transparent criteria, distinguishing clearly between direct and indirect beneficiaries.
- ☐ Identify specific actions with each group of beneficiaries under each relevant output.
- ☐ Foster inclusion of young people as key project beneficiaries.
- ☐ Engage field facilitators or community mobilizers to ensure continuous engagement of local populations.
- ☐ Involve students from local universities in field activities for mutual benefits and to cultivate future watershed management champions and leaders.
- ☐ Where the socio-political environment is conducive to a formalized governance structure, establish watershed management committees (WMCs) to foster multistakeholder participation. They should be a product of stakeholder negotiation and should build on existing structures, without duplicating their functions.

WATERSHED ASSESSMENT

- ☐ Carry out a multidisciplinary assessment of the watershed situation and trends to understand the main issues at stake, establish a baseline and adapt solutions to the local context.
- ☐ Involve technical staff of decentralized government offices in the assessment exercise to foster their ownership of the collaborative process.
- ☐ Select external technical experts, if needed, based on practical field experience rather than academic qualifications.
- ☐ Keep the time frame for the assessment phase short enough to leave sufficient time for subsequent planning and implementation.
- ☐ To keep the watershed assessment short, consult existing documentation from ongoing or previous programmes and projects in the area.
- ☐ Collect only those data needed for the analysis of main issues and the design of possible solutions.
- ☐ Focus the assessment on water and the key degrading influences in the watershed.
- ☐ Analyse existing land, water and forest tenure systems to identify drivers or obstacles to investment in watersheds.
- ☐ To ensure inclusiveness, use participatory mapping and analysis tools.
- ☐ Incorporate new tools for assessing the value of ecosystem services and the costs of loss and damage, and modern geospatial tools for speed and cost effectiveness.
- ☐ To build the trust and engagement of watershed populations, identify a few “no-regret” actions for early implementation.
- ☐ Have the assessment validated by the watershed stakeholders.

IDENTIFYING OPTIONS AND SETTING PRIORITIES

- ☐ Develop different scenarios of future land-use and land-management options based on the information and data collected during the assessment.
- ☐ Involve watershed stakeholders in problem analysis, identification of options and delineation of potential areas for interventions.
- ☐ Raise stakeholders’ awareness of alternative land-use options that could be more favourable than current practices.
- ☐ Focus on the articulated priorities of local stakeholders and on those problems or land-use conflicts that need an urgent solution.
- ☐ Plan a mix of short-, medium- and long-term interventions and environment- and development-focused interventions.
- ☐ For physical conservation measures, accent bio-engineering soil and water conservation measures whenever viable.

- ☐ Prefer collective benefits over individual benefits.
- ☐ Assess the economic and institutional feasibility and the environmental and social risks of the proposed solutions.
- ☐ Identify local organizations that can ensure continuity after the project ends.

THE WATERSHED MANAGEMENT PLAN

- ☐ Focus the watershed management plan on water to facilitate coherent interventions.
- ☐ Harmonize the watershed management plan with existing municipal or communal development plans.
- ☐ Establish synergies with sectoral programmes and plans of relevant technical line agencies.
- ☐ Only prepare a watershed management plan if human and financial resources are available for its implementation.
- ☐ Where local development plans are in place, consider enriching these plans rather than developing separate watershed management plans.
- ☐ In the plan, rely as much as possible on tables, diagrams and maps, keeping the narrative sections as short as possible.
- ☐ Organize a high-level workshop for formal validation of the plan by all concerned technical agencies and authorities.
- ☐ Distribute the final validated plan to all stakeholders.
- ☐ Adjust the plan periodically; this is necessary for all plans, regardless of their vision, scope and quality.

IMPLEMENTATION

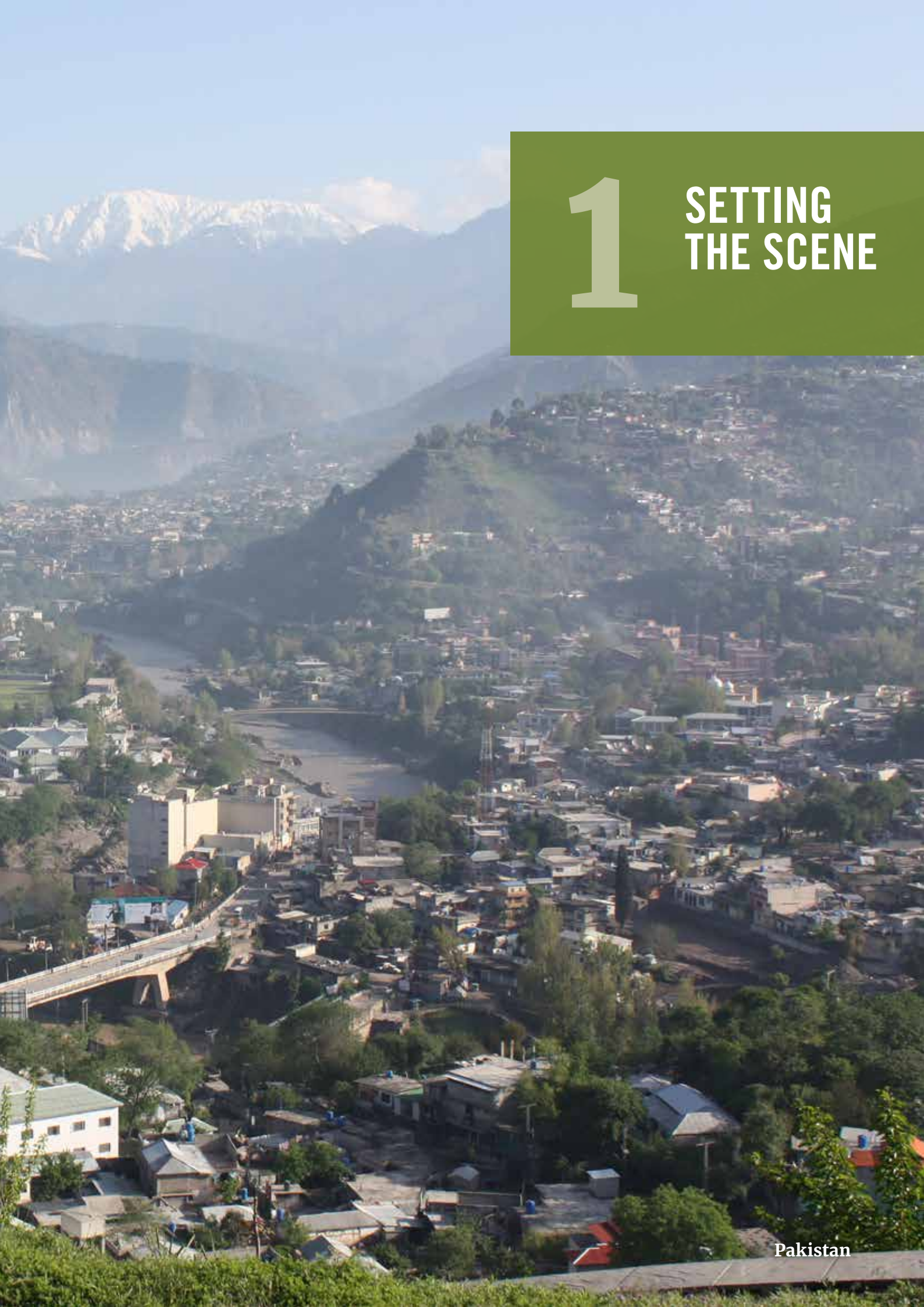
- ☐ Maintain a long-term perspective and engagement for implementation of the watershed management plan.
- ☐ Promote sharing of implementation responsibilities among relevant stakeholders from early in the process.
- ☐ Implement the plan by sector and through annual work plans.
- ☐ Target each intervention to the needs of specific beneficiary group(s).
- ☐ Seek coherence in providing inputs and obtaining contributions from beneficiaries across development interventions.
- ☐ Where possible, develop incentives and mechanisms to compensate for the provision of ecosystem services by upper parts of the watershed.
- ☐ Ensure effective procurement procedures for timely provision of inputs.

MONITORING

- ☐ Prepare a monitoring and evaluation plan to organize regular data collection, processing and analysis.
- ☐ Monitor not only outputs (for evaluation of project performance), but also the multiple processes in the watershed.
- ☐ Combine scientific monitoring of complex interactions with participatory monitoring of some easy-to-measure biophysical parameters by local communities.
- ☐ Strengthen monitoring capacities and skills at all levels.
- ☐ Foster a transition from short-term project-led monitoring to long-term stakeholder-led monitoring.
- ☐ Develop a set of SMART (specific, measurable, achievable, relevant and time bound) indicators that will make it possible to establish the watershed baseline and set project targets.
- ☐ Include indicators of performance changes in organizations involved in watershed management and indicators of changes in the environment resulting from project action.
- ☐ Use monitoring as the basis for knowledge management, learning and communication of project experiences and achievements.

©Thomas Hofer

1 SETTING THE SCENE



Pakistan

1 SETTING THE SCENE

GLOBAL CHALLENGES AND THE NEED FOR INTEGRATED APPROACHES

To address the complex and interrelated problems that the world is facing – including climate change, population growth, urbanization, water scarcity, sustainable food and agricultural production, hunger, poverty, environmental degradation, biodiversity loss, gender equality and peace and human security – in 2015 the international community agreed on the 2030 Sustainable Development Agenda, including the 17 Sustainable Development Goals (SDGs) and 169 associated targets which together represent a global plan of action for people, the planet, and prosperity in the twenty-first century. The SDGs are universal (affecting developed and developing countries alike), are interlinked (no one goal is separate from the others) and integrate the three dimensions of sustainable development: economic, social and environmental. The SDGs are becoming the main reference for national development policies, plans and programmes, and they will shape the future of international development cooperation.

None of these global challenges can be addressed by one organization alone or by a single-sector programme. They require strong collaboration and integrated approaches to ensure coherence in policies and actions across institutions, sectors, disciplines and scales and to bring about coordinated responses.

While the challenges are global, the 2030 Agenda must be implemented primarily at the local level to reduce vulnerabilities and build resilient communities. Multi-pronged strategies are needed, especially to tackle the persistent inequalities within and among the poor local communities and economies where development needs and dependency on natural resources are greatest.

Managing collaborative action and planning at the landscape scale is an increasingly popular approach for balancing local needs and global challenges and addressing both environmental protection and food production goals. Integrated landscape management unites features of broad stakeholder participation, negotiation around objectives and strategies, and adaptive management based on shared learning (Scherr, Shames and Friedman, 2013). The Landscapes for People, Food and Nature Initiative defines a landscape as a socio-ecological system that consists of natural and/or human-modified ecosystems and is influenced by distinct or unique ecological, historical, economic and socio-cultural processes and activities (LPFN, 2015).

Landscape approaches to natural resource management are not new (see Reed *et al.*, 2016). In fact, watershed management has a long history of addressing complex problems and providing solutions that support integration and collaboration across sectors, scales and actors to balance competing needs and generate simultaneous benefits for people and the environment.

WATERSHED MANAGEMENT AS AN INTEGRATED LANDSCAPE MANAGEMENT APPROACH

FAO (2007) defines a watershed as the geographical area drained by a watercourse, and watershed management as any human action aimed at ensuring a sustainable use of watershed resources. These resources are dealt with through an integrated ecosystem approach centred on the understanding of the overall interactions between biotic (including humans) and abiotic factors. Inequalities among communities in terms of their socio-economic status and their access to water and other resources and services as a consequence of their geographical location are best addressed at the watershed level.

Watershed management provides a framework for understanding and reconciling the interconnections among various land-use systems and for collaborative action and decision-making in the face of competing claims on resources, especially water resources. Based on a sound analysis of present conditions and dynamic processes in the watershed, a medium/long-term vision is developed which allows for the design and implementation of a

combination of measures aimed at preserving ecosystems and biodiversity, optimizing resource productivity and improving human livelihoods and well-being. As shown in this review, watershed management is highly context specific but also highly flexible and adaptive to different fields of application and scales of implementation.

Watershed management is predominantly relevant for mountain areas, which represent 22 percent of the Earth's land surface area and are home to 915 million people. Smallholder agriculture, forestry and animal husbandry are the prevailing farming systems in these areas. Mountain ecosystems host 25 percent of terrestrial biodiversity and have global significance for the supply of freshwater. They provide a wide range of other ecosystem services and goods such as timber, food, fibre and medicinal plants. They store water, carbon and minerals, support nutrient cycling and regulate water flows, climate and fresh air. But mountains are fragile ecosystems, highly susceptible to erosion, landslides and other natural hazards, and mountain people are disproportionately affected by climate change and seismic activities, including earthquakes.

The living conditions in mountains are characterized by a harsh climate, rugged and steep terrain, poor soil quality, limited availability of arable land and limited access to markets, services and basic infrastructure. FAO (2015a) has shown that 39 percent of mountain populations in developing countries are vulnerable to food insecurity, against a global average of 12 percent.

Severe land, soil and watershed degradation is widespread in mountain areas, provoked by unsustainable management practices, misuse and overuse of finite natural resources and fuelled by a development paradigm that incentivizes exploitation for short-term economic goals instead of long-term sustainable investment. Global challenges, including climate change, deforestation, overgrazing and natural disasters, are affecting mountain areas in an unprecedented way, exacerbating poverty and triggering social tensions, outmigration and depopulation due to the competition for increasingly scarce resources and the lack of investment. The acknowledgement of the globally important goods and services provided by mountain regions is not matched by the attention they receive in policy-making and investment.

FAO considers watershed management an important means to trigger investment in mountain areas and thereby make a significant contribution to meeting the intertwined global challenges of protecting and restoring terrestrial ecosystems (SDG 15), combating climate change and its impacts (SDG 13), ensuring sustainable water management (SDG 6), ending poverty (SDG 1) and achieving food security, improved nutrition and sustainable agriculture (SDG 2).

At the same time, it must be acknowledged that watershed management, like other approaches to integrated landscape management, has some inherent challenges, including: identifying the appropriate scale for interventions and delineating boundaries; selecting technical and methodological elements to define what constitutes integration; handling uncertainties that iterative negotiation processes among stakeholders may bring about; and measuring multiple benefits and impact.

Watershed management includes actions at the national, subnational and local levels. Sound national policies and efficient institutions are essential to set up a coherent normative framework that guides the preparation of local arrangements and interventions in a consistent way. Development assistance can provide a safe operating space to demonstrate and field-test innovative practices, approaches and forms of cross-sectoral collaboration for the sustainable management of natural resources and to facilitate adoption and uptake by local stakeholders through national programmes. Strong evidence from field experiences and implementation-oriented research (Liniger *et al.*, 2017) is needed to influence policy dialogue, decision-making and investment priorities at the national level. However, incorporation and institutionalization of successfully tested practices, approaches and collaboration models in national policies, strategies and programmes and adoption of a country-wide investment framework for watershed management to achieve transformational change in the long run are largely the responsibility of government authorities.

Watershed management is predominantly relevant for mountain areas, where conditions are harsh and environmental degradation is widespread (Morocco)

©Thomas Hofer

The international community can support such in-country processes through the development of new financing mechanisms that focus on integrated approaches and that encourage coordinated investment in well-designed long-term initiatives in specific landscapes or watersheds. Tapping into climate finance could be a promising pathway for mobilizing additional funds and stimulating investment for integrated watershed management. Together with support for global knowledge sharing and stronger coordination among international agencies, integrated area-based (as opposed to sector-based) development and climate finance could make an important contribution towards achieving multiple SDG targets (LPFN, 2015; Reed *et al.*, 2016).

FAO'S WORK ON WATERSHED MANAGEMENT SINCE 2006

Between 2002 and 2005, FAO and several international partners carried out a global stocktaking exercise to review the knowledge and experiences accumulated in watershed management projects from 1990 to 2000 and to identify new perspectives, ideas and approaches for future interventions. The results were published in *The new generation of watershed management programmes and projects* (FAO, 2006). It reflected the awareness that watershed management had become widely accepted as an integrated approach combining environmental protection and development through conservation of water, land and biodiversity resources and improvement of local livelihoods through enhanced and diversified production.

The English version of the 2006 publication was reprinted twice, translated into Spanish in 2007 and French in 2008 and made available online in the three languages. More than 6 000 hard copies have been distributed, and since 2012 over 8 000 online views have been registered. A readership survey in 2011 found that the large majority of readers appreciated the product, learned from it and were using it in the design, adjustment or implementation of watershed management projects and programmes. However, the survey also revealed that the publication may not have reached its main intended target audience – field-level watershed management practitioners and local decision-makers at the district or municipality level – suggesting a potential gap between the applicability of the book and its actual application in the field.

Moreover, watershed practitioners have expressed some difficulty with the conceptual subtleties indicated by the variety of adjectives preceding the term "watershed management". While the shift from "participatory" to "collaborative" watershed management is generally appreciated (the latter including all stakeholders, not just rural communities, thus focusing on negotiation of trade-offs between conflicting interests), the shift from "integrated" to "embedded" watershed management (which addresses only those socio-economic aspects that are directly linked to natural resource management and environmental issues, while overall sustainable livelihoods and poverty alleviation goals are addressed in collaboration with broader sustainable development processes) has proved difficult to explain and has so far not been taken up by the community of watershed management practitioners. Over the past few years, therefore, FAO has reverted to using the simple term "watershed management" without a modifier.

The findings and recommendations of the 2006 publication were translated into 12 key guiding principles that are being promoted and increasingly applied in FAO's own watershed management field projects (Box 1). Apart from these principles, FAO has not developed any methodological framework to guide the conceptualization of watershed management and its operationalization in field projects in a standard way.

In the intervening decade FAO has formulated and implemented several new projects. These projects represent an important testing ground for new approaches to watershed management. However, the experiences, lessons learned and difficulties encountered in one project have not been easily available for personnel associated with

BOX 1

Twelve principles of watershed management

1. Treat underlying causes (not just symptoms)
2. Generate scientific evidence (don't rely on common myths)
3. Adopt an integrated approach (multisector, multistakeholder and multiscale)
4. Ensure holistic planning and implementation (watershed management plan)
5. Seek innovative low-cost solutions and co-financing
6. Ensure that institutional arrangements are in place
7. Combine bottom-up and top-down processes
8. Combine traditional knowledge and technical advice through action research
9. Reflect upstream–downstream linkages and compensate off-site effects
10. Strive for gender balance in decision-making
11. Include capacity development at all levels
12. Instil a flexible, adaptive long-term approach to planning and financing

Source: T. Hofer, unpublished

other projects. Each project has responded to the specific needs and motivations of the individual countries that requested FAO technical assistance and the requirements of specific resource partners that provided the funding. This study is an attempt to bring together the knowledge from these recently implemented watershed management projects through a comparative review.

ABOUT THE STUDY

PURPOSE

This study collects and analyses lessons learned from recent watershed management projects implemented under the technical supervision of FAO and gives recommendations on the way forward in watershed management. By reviewing the design and the implementation modalities of these projects, the study examines the experiences and captures the lessons that can be learned, identifies good practices and provides guidance and recommendations for other watershed management practitioners and for the development of future watershed management projects.

The use of lessons learned is a key element of effective project management, continuous learning and adaptive management. The systematic collection, sharing and dissemination of lessons learned and knowledge derived from past experience helps to avoid repeating the same mistakes and contributes to improved project design and performance through adoption of proven good practice.

TARGET AUDIENCE

The publication is designed for practitioners working on watershed-related programmes, projects and initiatives at the national, subnational and local levels, including staff working in technical departments (i.e. agriculture, forestry, water, rural development and planning) of governmental organizations, non-governmental organizations (NGOs) and international development cooperation agencies. It will also be useful for managers and planners involved in other integrated landscape management and natural resource planning and restoration initiatives, and for technical experts including natural and social scientists from the private sector, academia and research. The document will be of interest to institutions that work at the intersection of conservation and development in a multidisciplinary way, that promote cross-sectoral collaboration and that facilitate multistakeholder planning and monitoring processes.

STRUCTURE

These chapters of the publication reflect the ideal sequence of steps in a watershed management project or programme, and correspond broadly to the main phases in the standard project cycle, from assessment to planning to implementation and monitoring:

- the enabling environment for watershed management, i.e. the policy, legal and institutional framework required for the smooth implementation of watershed management projects and to ensure their sustainability;
- the area of local watershed interventions: the size, scale and number of watersheds selected and the criteria used for their selection;
- the forms of social organization and how to engage the stakeholders in the watershed;
- multidisciplinary assessment of the state and trends in the watershed, covering the biophysical, socio-economic and institutional dimensions;
- envisioning the future by building scenarios and designing potential solutions;
- narrowing down these options and translating them into a set of feasible priority actions selected for implementation;
- the formulation of the watershed management plan, which is the result of the analytical, planning and negotiation process;
- formal validation of the watershed management plan by all stakeholders before it can be implemented;
- implementation of the watershed management plan – how and by whom;
- watershed monitoring, i.e. the monitoring of the activities set out in the watershed management plan for implementation.

For each step, the text presents the results from the review of individual projects, the lessons learned from these projects and a set of recommendations for future action by watershed management practitioners and project developers.

These steps do not necessarily occur in the chronological order given. Watershed management is an iterative process which allows continuous learning from experience and adaptation to changing circumstances. It is not a rigid step-by-step procedure, and some steps or elements of the planning process are often carried out simultaneously. Preferred options for implementation can be narrowed down at the same time that problems and potential solutions are discussed, for example. Not all projects analysed for this review followed all the steps. In particular, some have not embarked on the preparation of a watershed management plan.

METHODOLOGY

The study is based on a systematic desk review of available project documents, including project progress reports, consultants' reports, reports from contracted partners, back-to-office reports, project terminal reports, project evaluation reports, special thematic studies prepared by the projects, assessment reports and watershed management plans.

The retrieval of documents produced by the projects was particularly difficult for those projects that ended several years ago. While FAO's Field Project Monitoring and

Information System (FPMIS) is a good repository of formal project agreements and mandatory project progress, terminal and evaluation reports, it rarely provides access to internal project documents and outputs produced during implementation.

Information from the available project documents was reviewed, extracted and synthesized. Important experiences were identified and analysed in such a way as to allow comparison of approaches, achievements and challenges across projects. The study is supported by the findings of two *ex post* field visits that were undertaken by external consultants to Pakistan and Tajikistan a few years after project termination. The study is further enriched by discussions with key technical staff involved in project implementation.

The review of internal project documents was complemented by an extensive review of literature related to watershed management and other integrated landscape approaches, as well as of FAO publications that are relevant for watershed management from a thematic or operational point of view.

The draft study has been peer-reviewed internally in FAO and externally by approximately 30 technical experts dealing with watershed management and other integrated approaches. Facts were cross-checked by selected key informants who were directly involved in one or more of the projects.

PROJECTS INCLUDED IN THE STUDY

The study covers 12 projects, which differ in scope, size, duration and budget envelope (Table 1). While nine of the projects were implemented by FAO, three were implemented by NGOs:

- the Tanzania Forest Conservation Group (TFCG) initiatives to improve rural livelihoods in the West Usambara Mountains, **United Republic of Tanzania**;
- a programme of the Agency for the Development of Women and Children (ADWAC) to address low agricultural productivity, soil erosion and overall environmental degradation in the Northern Bank of **the Gambia**;
- the efforts of the Community Oriented Development Programme (CODEP) to improve community livelihoods in the Chiparamba area in **Zambia** through comprehensive and integrated natural resource management.

These NGOs are all collaborators of Gorta (the Freedom from Hunger Council of Ireland, which merged with Self Help Africa in 2014 to create Gorta–Self Help Africa [GSHA]), which has been engaged in partnership with FAO since 2012. This partnership facilitates regular exchange of experiences and best practices among field-level practitioners – for example, through a joint regional workshop in Zambia in 2013.

The FAO projects were designed in response to specific requests from FAO's member countries and implemented under the lead technical responsibility of the FAO Forestry Department, in line with the guidance provided by *The new generation of watershed management programmes and projects* (FAO, 2006). Funding was provided either by voluntary contributions from FAO's resource partners or from the Organization's regular budget through the Technical Cooperation Programme (TCP), which provides technical assistance through targeted, short-term and catalytic projects.

While each project had a different entry point and a different origin, taken together the projects demonstrate the wide range of watershed management activities, applied with the main focus of:

- rehabilitating degraded upland areas;
- stabilizing landslides;
- protecting and conserving natural resources and biodiversity;
- reducing rural vulnerabilities and improving the livelihoods of mountain peoples;
- improving and rationalizing current land use;
- creating environmental awareness and promoting a territorial vision that recognizes spatial relationships of people and flows of resources and ecosystem services;
- negotiating and balancing trade-offs in the case of conflicts over the access to and use of these resources.

All the projects combine policy work at the central and subnational levels with fieldwork at the local level. New approaches, techniques and ways of collaboration are tested and demonstrated in a local context. The results from small-scale field application are expected to make a case for stronger cross-sectoral collaboration and improved governance of natural resources and ultimately to influence higher-level policy- and decision-making

The Government of the **Democratic People's Republic of Korea** requested FAO technical assistance to reverse the serious degradation of upland resources, especially in forested areas that have been depleted over the years to ensure the supply of fuelwood and other forest products or converted to agricultural lands for food production. The TCP project Participatory Integrated Watershed Management in Upland Areas was primarily a reforestation project designed to re-establish forest protective and productive functions and to conserve soil and water resources.

A TCP project with the same title was implemented in **Tajikistan**, where the government has recognized that the degradation of upland resources is a serious threat to agricultural production and development downstream. An integrated approach was needed to ensure the sustainable management of upland land, water, soil and forest resources; to halt watershed degradation; and to

TABLE 1. OVERVIEW OF THE PROJECTS INCLUDED IN THE STUDY

Country(ies)	Project	Duration	Budget *(USD)*	Funding source	Implementing agency
Central Asia: Azerbaijan, Kyrgyzstan, Tajikistan, Turkey, Uzbekistan	Capacity Building for Sustainable Management of Mountain Watersheds in Central Asia and the Caucasus	2012–2015	300 000	Turkey	FAO
Democratic People's Republic of Korea	Participatory Integrated Watershed Management in Upland Areas	2002–2004	342 000	FAO	FAO
Ecuador	Management of Chimborazo's Natural Resources (Proyecto de Manejo de los Recursos Naturales de Chimborazo, PROMAREN)	2011–2017	3.87 million	GEF	FAO
Gambia	Agricultural Production and Productivity Project	2003–2015	About 1 million	GSHA	ADWAC
Guatemala	Reduce Vulnerabilities and Contribute to Rural Development in the Municipalities of the Upper Suchiate and Coatán Basins in the Department of San Marcos	2010–2015	7.4 million, of which 2.33 million for FAO	Sweden	FAO, UNDP and PAHO
OUBAME: Ecuador, Mauritania, Morocco	Interregional Project for Poverty Alleviation and Combating Desertification through Collaborative Watershed Management (OUBAME)	2010–2015	3 million	Spain/FAO	FAO
Pakistan	Assist the Earthquake Reconstruction and Rehabilitation Authority and its Partners in Restoring Livelihoods in the Earthquake-Affected Areas of Pakistan	2007–2011	6.6 million, of which 0.85 million for watershed management	Sweden	FAO
Tajikistan I	Participatory Integrated Watershed Management in Upland Areas	2003–2005	353 000	FAO	FAO
Tajikistan II	Community Agriculture and Watershed Management Project	2006–2010	500 000	World Bank	FAO
Turkey	Development of Public Participation and Improvement of Socio-Economic Prosperity in Mountain Communities: Yuntdagi Model	2008–2010	355 000	FAO	FAO
United Republic of Tanzania	Support to the Implementation of the New Generation of Watershed Management in Africa	2013–2015	130 000	GSHA	TFCG
Zambia	Integrated Watershed Management	2012–2015	538 000	GSHA	CODEP

establish an improved agriculture-based economy for the rural upland communities. The project was to address in particular issues related to the involvement of all relevant stakeholders, coordination among institutions and overlap of mandates related to the conservation of upland resources. This project is labelled "**Tajikistan I**" throughout this study.

In follow-up to Tajikistan I, the World Bank contracted FAO to support the implementation of the Community Agriculture and Watershed Management Project in one of its four geographical areas. The United Nations Development Programme (UNDP), Deutsche Welthungerhilfe (German Agro Action) and the Aga Khan Development Network were responsible for three other geographical areas. Although the project had watershed management in its title, it did not apply an integrated territorial approach but stipulated instead community-based development, creating common interest groups in villages to channel investments for improved agricultural production, natural resource management and infrastructure in rural areas. Project design and operational modalities were defined by the World Bank, with little leeway for FAO to propose technical adjustments. This project is labelled "**Tajikistan II**" throughout the study.

In **Turkey**, most mountain areas are marginalized in terms of infrastructure and service provision, and employment opportunities are rare since mountain agriculture cannot compete with the intensive production in the lowlands. Efficient measures were needed to improve the management of the natural resources and the livelihoods of the mountain people, especially to find alternatives to agriculture for young people migrating out of the areas. A TCP project was implemented to

support the mainstreaming of concepts and integrated approaches of sustainable mountain development in national institutions, strategies, policies and legislation, and to develop a management model at the field level for replication and upscaling.

Following the short-term relief operations after the October 2005 earthquake in northern **Pakistan**, a longer-term project supported by Sweden was conceived to emphasize rehabilitation of the livelihoods of earthquake-affected populations in the provinces of Pakistan-administered Kashmir and Khyber Pakhtunkhwa (referred to as North-West Frontier Province until 2010). The project assisted the Earthquake Reconstruction and Rehabilitation Authority and its partners in formulating and implementing Community Livelihoods Rehabilitation Plans. A specific project component was added to introduce holistic watershed management planning, essentially to stabilize landslides and landslips that were brought about not only by the earthquake, but also by decades of deforestation, overgrazing and soil erosion in steep mountain areas.

In **Guatemala**, FAO joined forces with UNDP and the Pan-American Health Organization (PAHO) to develop and implement a United Nations (UN) Joint Programme to reduce vulnerabilities and support rural development in five municipalities in two headwater basins in the San Marcos Department. The three UN agencies, collaborating with sectoral counterparts (the Ministry of Agriculture, Livestock and Food (MAGA); the Ministry of Public Health and Social Assistance; and the General Planning Secretariat) and local governments, contributed to implementation of the National Policy of Integrated Rural Development. Within this framework, FAO, together with MAGA, was responsible for the agricultural component to improve food security, to create economic opportunities and to ensure the sustainable use of natural resources by applying a watershed management approach.

An interregional project, funded by Spain, was formulated to fight desertification and rural poverty in arid and semi-arid areas (and implicitly also to address environmental migration) through FAO's collaborative and integrated approach to watershed management. The project was called **OUBAME**, derived from the names of the three watersheds where it was implemented: Oued OUtat, **Morocco**; Oued BArbara, **Mauritania**; and Rio MEmbrillo, **Ecuador**. A fourth country, **Peru**, was involved during the project's extension phase.

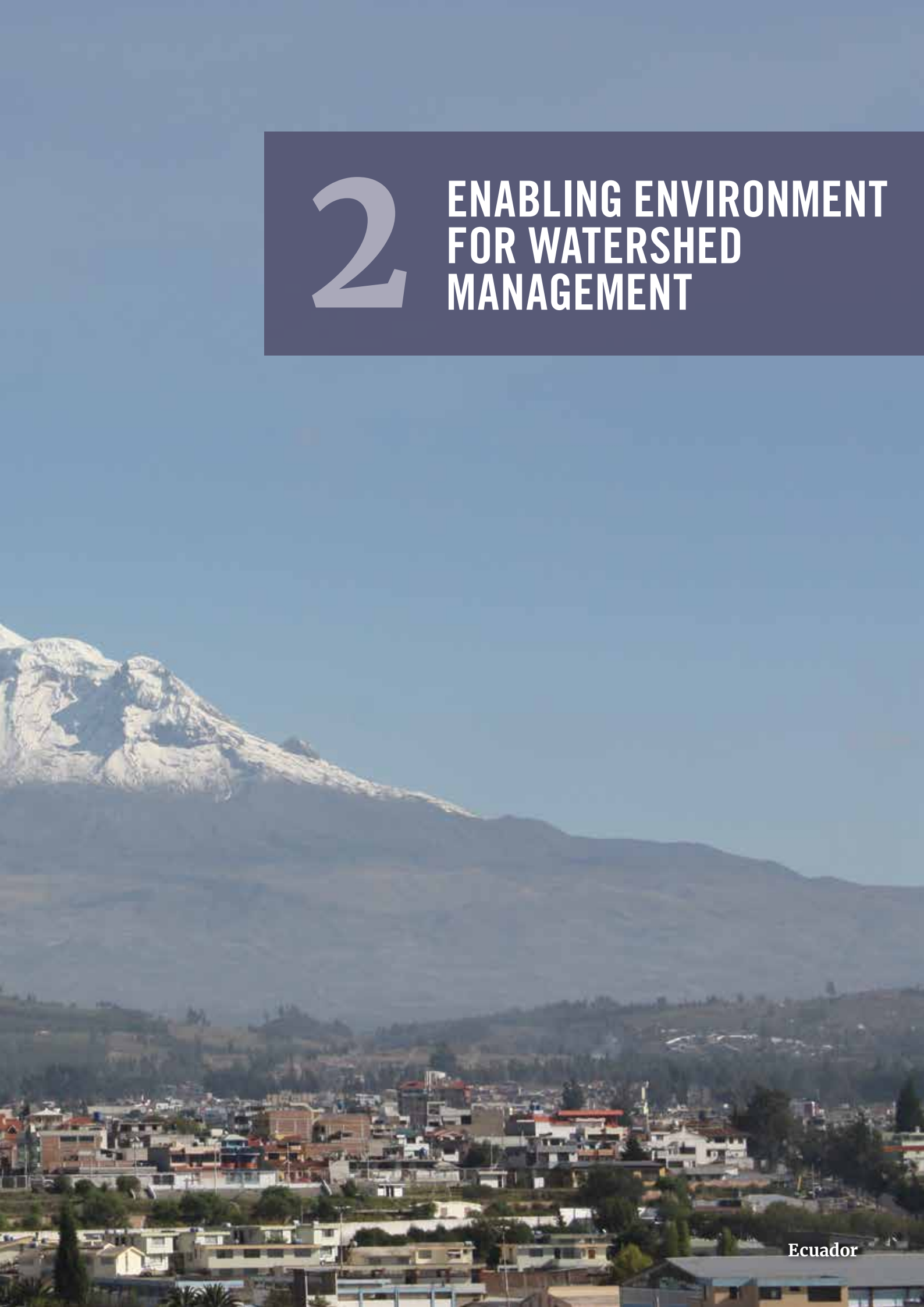
A second project in **Ecuador**, Proyecto de Manejo de los Recursos Naturales de Chimborazo (PROMAREN), funded by the Global Environment Facility (GEF), is aimed at managing Chimborazo's natural resources in a more sustainable way. Because of the small size of landholdings and increasing population pressure in the province over recent decades, crop and pasture areas have expanded into higher altitudes at the expense of the high-mountain páramo ecosystem, resulting in reduced habitats, biodiversity and water flows. Working in five watersheds, the project supports the Chimborazo Provincial Council in protecting the biodiversity and water resources and in improving the livelihoods and food sovereignty of the local population. Major activities include strengthening policy, legal and institutional frameworks, creating local awareness and capacities and establishing a compensation mechanism for environmental services provided by upland dwellers. This is FAO's first project executed directly by a national (in this case provincial) institution. It is also the only project selected for the review that is still ongoing, so the results assembled from this project are not yet final.

A small subregional project funded and technically supported by the Turkish Government was aimed at strengthening capacities for the sustainable management of mountain watersheds in **Central Asia and the Caucasus**. The project trained representatives from institutions in Azerbaijan, Kyrgyzstan, Tajikistan, Turkey and Uzbekistan in a demonstration watershed in **Kyrgyzstan** to improve the management of natural resources and to contribute to livelihood development in an integrated and participatory way.

Fact sheets providing more detailed information on each project are presented in Annex 4.

©Thomas Hofer

2 ENABLING ENVIRONMENT FOR WATERSHED MANAGEMENT



Ecuador

2 ENABLING ENVIRONMENT FOR WATERSHED MANAGEMENT

Effective watershed management primarily depends on sustained political commitment and investment by national governments (Box 2). FAO helps governments to develop or advance an enabling environment for the collaborative management of watershed resources to reduce environmental degradation and make agriculture more sustainable. This support varies depending on national needs and capacities.

The enabling environment, as defined by FAO, includes the institutional set-up of a country, its implicit and explicit rules, its power structures and the policy and legal environment in which individuals and organizations function. Changes to the enabling environment may involve policy reform, changes to legislation, strategic exercises in country planning and prioritization, and changes to incentive systems (FAO, 2010).

This chapter looks at the national, subnational and local policies and legislation in place which may support (or hamper) the adoption of watershed management strategies, processes and practices as a means to halt

BOX 2

Underlying commitment needed for effective watershed management

Watershed management has the best chance to prosper when leaders have the political will to:

- care for people and nature;
- shift from a "degrade–abandon–migrate" to a "restore–sustain–protect" paradigm in natural resource management (GM, 2016);
- ensure and increase effective stakeholder participation and empowerment, inclusive of gender, youth and indigenous people;
- decentralize responsibilities and devolve power and authority from central to subnational entities, fostering more inclusive policy- and decision-making processes and stimulating the direct contact of administration, service delivery and policy-making with the concerned actors in the field;
- adopt local-level decision-making for adaptive resource governance that is better able to deal with rapidly changing environmental, social and economic circumstances as well as with multiple interests and increasing conflicts over scarce resources;
- grant a certain level of budget authority and greater autonomy in the management of financial resources to subnational governments for sustainable local development, in line with the principle of subsidiarity;
- harmonize and align sectoral policy and planning processes, work collaboratively across sectors and actively overcome institutional barriers to pursue environmental and development goals simultaneously;
- translate international agreements and national policies, strategies and plans into concrete actions at the local level;
- internalize, upscale and replicate development actions, processes and mechanisms that have been tested and validated at the local level;
- appreciate existing traditional practices and knowledge, and recognize and secure local and indigenous rights and management rules in defining and revising legislation;
- shift programme or project modalities from a focus on delivery of inputs and outputs to a process approach that stimulates participation, long-term learning, communication, transparent procedures and inclusive decision-making.

resource degradation and reverse unsustainable forms of land use in upland areas. Efficient, equitable and sustainable watershed management requires both top-down and bottom-up processes to ensure the participation of stakeholders, from the national level down to the watershed level. The institutional architecture governing watershed management is complex, involving a range of sectoral policies and institutions with often incompatible goals and priorities and differing legal and institutional processes. Institutions are therefore often ill-suited for managing watershed resources in an integrated way and for enabling dialogue and coordination among diverse stakeholders.

To prepare for institutional reforms and to ensure the sustainability of development interventions, it is frequently necessary to strengthen stakeholders' capacities (Box 3). FAO increasingly plays a facilitating role in capacity development processes led by national actors and agencies. Capacity development actions address both technical and functional aspects of watershed management.

The review addresses the following important elements of an enabling environment for watershed management:

- existing policy, legal and regulatory frameworks, especially for the governance of natural resources, and their compatibility (or the need for adjustments) with the proposed watershed management approach;
- preparation of strategic documents to conceptualize national watershed management programmes in a specific country context;
- the creation of interministerial task forces, working groups or steering committees to foster cross-sectoral dialogue and collaboration at the policy level, and the integration of watershed management approaches within local planning exercises;
- institutional mechanisms for upscaling and replicating field experiences;
- learning from project experiences, and related communication;
- formulation of investment or follow-up project proposals to attract domestic and/or external resources towards watershed management.

POLICY, LEGAL AND REGULATORY FRAMEWORK

RESULTS OF THE REVIEW

The projects have operated within the existing policy, legal and regulatory framework, but overall they have made few attempts to influence or shape ongoing policy processes or to deliver outputs that could directly influence, orient or change the existing policy setting or legislation. No project has supported concrete action towards harmonization of policies, plans, strategies and legal instruments that have a bearing on the use of natural resources in a country and thus on efforts to promote watershed management approaches. Most countries have multiple policy and planning processes under way, including those related to agriculture, forests, water, economics and trade as well as more cross-cutting ones for rural development, land and water tenure, food security and climate change. All have implications for the way natural resources are managed.

In **Morocco**, for example, marginal attention was paid to the impact of traditional grazing systems, especially nomadic and transhumant ones, on the degradation of the upper watersheds. A deeper analysis would have required a thorough examination of the underlying complex legal and tenure framework. The project in **Turkey** invested in the development of a model for sustainable mountain development and the preparation of a land-use plan, but

BOX 3

Capacity development: definitions

Capacity development, as defined by FAO (2010), is "the process whereby individuals, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time". It involves social and political aspects and not only technical ones. Capacities must be developed at the individual level, at the level of organizations and in the enabling environment.

Functional capacities refer to the capacities needed to take up and sustain changes. They are relevant for all technical sectors and include soft skills (i.e. communication, negotiation and advocacy) and managerial skills such as policy formulation, project management, leadership, strategic planning, knowledge exchange and partnership building.

Technical capacities are those needed for an adequate response to the technical challenges faced in a specific project situation. In a watershed context, for example, technical capacities may relate to sustainable natural resource management practices, ecosystem valuation, watershed zoning and planning, participatory approaches, Geographic Information Systems, value chain development or market analysis.

no legal regulation was in place to support the approval and implementation of such a plan or the adoption of the model and its gradual inclusion in national institutions, policies and legislation.

On the other hand, some projects had to adapt to changing legal frameworks. A new Water Act in **Ecuador**, for instance, triggered some adjustments in the possible roles and responsibilities of the watershed management committees (WMCs) established in the **Chimborazo** project. The project also reviewed and helped update the regulation on the conservation and management of vicuña in Ecuador following the agreement by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to transfer the country's vicuña population from Appendix I (most endangered species, whose trade is prohibited) to Appendix II (species whose trade must be controlled) in 2013 (see Box 9 in Chapter 8). New operational guidelines for vicuña shearing were drafted which include arrangements for benefit sharing and marketing. The revised regulation is currently under review by the Ministry of Environment.

Preparation of strategy documents. The project in **Turkey** invested considerably in actions intended to anchor sustainable mountain development issues in national policy and institutional frameworks and mobilized international and national expertise to support institutional processes. Proposed outputs in the project document included a framework for the description and definition of mountain areas in Turkey, a draft sectoral expertise report on sustainable mountain development for inclusion in the National Development Plan, and a draft strategic document for inclusion in the preparation process for European Union (EU) accession. Following modifications to these intentions during implementation, a single mountain strategy document was prepared, with one part included related to EU accession. To insert the strategic document into the national planning process, an outline was drafted for a specific mountain chapter to be included in the country's National Rural Development Plan. However, the documents prepared with project support were neither taken up by decision-makers nor incorporated in national policy-making and planning; a review of Turkey's major planning documents, including the National Development Plans for 2007–2013 and 2014–2018, revealed no specific reference to mountain areas.

Another intended project output, a project document for the replication of project experiences in other mountain areas in Turkey, was not pursued, as it was assumed that national resources would be allocated to sustainable mountain development once the strategy document was inserted in the national planning process – which did not come to pass.

The project also aimed to set up a permanent institutional mechanism for implementing sustainable mountain development in Turkey. A two-day workshop was held at mid-term, and a half day of working group discussions in the final seminar addressed the harmonization of mountain management approaches and more appropriate legislative and institutional mechanisms for internalizing sustainable mountain development. These activities do not seem sufficient to bring about the expected transformational changes. The idea of setting up a permanent institutional mechanism for sustainable mountain development was clearly overambitious for a low-budget project of only two years' duration.

In **Tajikistan I**, the project team prepared a draft national watershed management strategy and five project profiles aimed at creating a long-term vision and launching a comprehensive watershed management investment programme in the country. The strategy and the profiles were endorsed by the government and presented in a meeting with resource partners. The presence of several external resource partners already working in watershed management and FAO's active involvement in the execution of the subsequent Tajikistan II project were expected to provide fertile ground. Still, in **Tajikistan II**, the executing agencies in the four provinces (the Aga Khan Development Network, Deutsche Welthungerhilfe, FAO and UNDP) had limited communication and exchange, and no efforts were undertaken to harmonize their different approaches. While institutional strengthening and contribution to policy and strategy issues at the national level were foreseen in the project document, these apparently have not taken place. Neither the World Bank (the funder of this multi-agency project) nor the State administration fully carried out their expected roles in project coordination and harmonization of approaches and concepts. Furthermore, the parallel structure set up by the World Bank to implement the project and to disburse the loan created further problems. This project management unit became a "ministry within the ministry" which fell apart soon after project closure.

LESSONS LEARNED

Existing policy and legal frameworks in the countries covered by this review diverge widely. Some countries actively pursue decentralization and have local and provincial development plans and related regulations and ordinances, which overall are more conducive to participatory processes and watershed management approaches. In other countries, the legal frameworks for land and natural resource management are under the control of central government institutions. In some countries relevant legal frameworks are simply absent.

Tasking external consultants with the formulation of strategy documents, even if fed by consultative processes, did not yield the expected results. It may have been more appropriate to mandate the Project Steering Committee (PSC) (see below) with this task or to set up a specific strategy formulation committee in the country to agree

on the overall structure of the document and assign chapters to individual committee members. An external facilitator could support the coordination of such a process and moderate meetings for discussion, consultation and writing. Such a collaborative formulation effort may take longer but would broaden national ownership of the process and of the final product. If it is supported by several entities, the strategy may have a better chance of being formally adopted and implemented.

A careful analysis of a country's enabling environment for watershed management helps to frame realistic project objectives. A number of projects have largely ignored the existing national policy, legal and regulatory frameworks, sometimes regarding them as an insuperable bottleneck and using this view as a justification for a certain lack of initiative. A more detailed examination of the underlying policy and legal framework and a more thorough analysis of those governance mechanisms that could seriously impede the uptake of the watershed management approach might have been beneficial in these cases. On the other hand, it has proved difficult to achieve the (sometimes over-) ambitious policy results within the limited time frame of most projects. The two-year maximum duration of TCP projects is clearly not sufficient for the creation of government ownership to consolidate and expand initial watershed management experiences and ensure engagement in longer-term processes.

RECOMMENDATIONS

Watershed management projects must engage in systematic assessment of relevant policies and laws – mainly related to water, agriculture, forestry and rural development – during the project formulation and/or assessment phase. Such a review is indispensable for full understanding of the existing legal framework and tenure systems and for identifying potential conflicts, overlapping or contradictory mandates and any other issue that may inhibit cross-sectoral collaboration among government agencies to address the drivers of watershed degradation in an integrated way.

Watershed management projects should play a more active role in promoting and applying the *Voluntary guidelines on the responsible governance of tenure of land, fisheries and forests in the context of national food security* (FAO, 2012a). These guidelines address the recognition, respect and safeguarding of legitimate tenure rights. When land rights are fuzzy, when there is a mismatch between formal and customary tenure systems or when inadequate and insecure tenure rights drive conflict and environmental degradation in watersheds, watershed management must take on a more proactive role. In the design of new watershed management projects, specific actions could be incorporated that aim at improving land and tenure governance and clarifying the rights of different, often competing, watershed users to have access to, use, manage and control the watershed's natural resources.

INSTITUTIONAL DIALOGUE AND COLLABORATION

RESULTS OF THE REVIEW

Interministerial collaboration (horizontal). Project implementation arrangements and the adequate assignment of roles and functions for the coordination of activities and actors are key to promote a closer collaboration among government agencies (and other service providers) at the central, provincial, district and local levels.

The main institutional counterpart holds the primary responsibility for coordination and for actively involving other institutions whose contributions will be crucial to the project's results. The decision about which entity will be the official project counterpart is obviously of high importance for any project. Usually, the ministry or authority that officially requests FAO assistance is later designated as the official counterpart; having taken part in the project formulation, it can be expected to be motivated to play a key role also in project implementation. The final responsibility lies with the national government.

The only project that had a modification in the competent body was the **OUBAME** project in **Ecuador**. While the Forest and Environment Development Corporation of the Provincial Development Council of Manabí was involved in project formulation, the national government decided at project start-up to assign the responsibility to the national water authority (Secretaría Nacional del Agua, SENAGUA).

Establishment of a national Project Steering Committee (PSC) is a key element in all FAO projects. The PSC is expected to provide oversight and guidance on strategic issues for project coordination and to steer the overall direction and policy setting of the project. However, the documentation from the projects in this review provides little information for analysis of the composition, meetings or recommendations of these committees. In the project in **Turkey**, it was foreseen that the PSC would evolve into a long-term multistakeholder national commission on sustainable mountain development, but such a commission has not been established and the envisaged coordination mechanism among relevant public entities at the central level does not exist.

TCP projects – i.e. those in the **Democratic People's Republic of Korea**, **Tajikistan I** and **Turkey** – do not provide for the recruitment of staff or long-term consultants for coordination purposes. In view of the short duration and limited budget of such projects, the

national counterpart institution is expected to fulfil the coordination role by assigning a full-time national project director or coordinator (and additional national staff as required) to the project.

Projects funded from extrabudgetary resources have greater flexibility to set up entire national project management teams or units (such as the five-person teams in **Guatemala** and in the **Chimborazo** project in **Ecuador**) or to recruit a consultant as assistant national coordinator to provide day-to-day support to the national project director (as in the OUBAME project). Larger project management units risk becoming too independent and too detached from the national administration, as occurred in **Tajikistan II**, where the management unit created for the project fell apart after the project's end.

The arrangements of the **OUBAME** project offer more promise for institutional sustainability. The formal responsibility for project coordination remained with the main counterpart ministry and in the hands of the government official nominated as national director of the project. However, since this role entails additional duties that can overload the nominated official, the project recruited a consultant as assistant national coordinator to help with overall project management. In all three OUBAME countries, the assistant national coordinator has been the real resident counterpart both to FAO and to the national implementing agency. They shaped the overall project development, served as field team leaders and built relationships with other line agencies at regional/provincial and field levels. Their technical and managerial skills in involving other team members and engaging partners in cross-sectoral dialogue and planning was essential to the results achieved. However, the impermanence of their recruitment may be disadvantageous for institutional sustainability and the uptake of the approach.

The OUBAME project experience further showed that where the decentralization process is more advanced (**Ecuador**), dynamic local authorities have an important role in mobilizing local and regional resources to complement limited project resources. Where local municipalities lack a significant budget or are trapped in a traditional top-down decision-making system (**Morocco** and **Mauritania**), their contribution to the intersectoral dialogue has been less relevant.

In **Mauritania**, regional authorities invited project staff to be regular observers in the meetings of the regional development committee. Their presence helped to draw resources and technical expertise towards the remote project area and, more importantly, to make the project's experience known and increasingly supported at the central level.

In the OUBAME project, the inclusion of a specific step for formal validation of the watershed management plans formulated (see Chapter 7) proved an effective mechanism for obtaining the official endorsement of all key actors, e.g. line agencies, partner organizations and the concerned municipalities/communities, at the highest possible political level.

In **Pakistan**, the counterparts for the overall project were the earthquake rehabilitation agencies at the national and provincial levels. However, the formal counterparts for the project's watershed management component were the Forestry Department and its subordinate Divisional Forest Offices. Formal agreements between FAO and the Forestry Department were signed to ensure the implementation of the watershed management plans adopted together with local communities. Despite the broad spectrum of activities, including those on agricultural and pasture lands (e.g. crop diversification, kitchen gardens, water harvesting, repair of irrigation channels) and those related to income generation, the agreements had no clause for involving other line departments. This was clearly a missed opportunity, not only for ensuring adequate technical supervision of all activities, but especially for formal collaboration with line agencies dealing with agriculture, rangelands, water and local development issues vital to local communities.

Institutional arrangements for the upscaling, replication and internalization of the watershed management approach (vertical). The project in **Turkey** established regular, two-way dialogue among the national project coordinators in Ankara, the field project coordinators at the provincial level (Manisa Province) and the mayor in Turkmen village. The local project coordinator – a forest engineer from the Provincial Directorate of the then Ministry of Environment and Forestry, acting as the secretary of the project's Provincial Implementation Committee – had a key role in maintaining the flow of communication.

In the **OUBAME** project in **Ecuador**, the geographical overlap between the watershed management plan prepared by the project and the existing local development plan facilitated linkages to higher administrative levels and the subsequent flow and cross-fertilization of financial and technical resources. Government authorities at all administrative levels in the country recognized this as a concrete and institutionally acceptable model for future replication.

LESSONS LEARNED

Effective mechanisms for coordination of activities and stakeholder collaboration are crucial to ensure institutional sustainability and continuity of results after project closure. The nomination of an appropriate main counterpart institution and the formal involvement of other important stakeholders in the national PSC are key requisites in this regard. The tasks and duties of the PSC should be clearly defined, and it is important to keep proper records of PSC meetings, recommendations and decisions.

Creating space for dialogue is an important first step in fostering interministerial and cross-sectoral collaboration. However, more formal mechanisms of vertical and horizontal collaboration and coordination should follow. A possible mechanism worth closer examination is the idea of transforming a well-functioning national PSC into a permanent interministerial coordination body for the collective management of natural resources at larger watershed levels.

Incorporating projects in existing institutional structures is crucial at both the local and national levels. Linking preparation of the watershed management plan to the local administration and creating synergies with existing local development plans is as important as active collaboration with relevant national entities to influence government-led policy and decision-making processes. Parallel project implementation units are at odds with the Paris Declaration on Aid Effectiveness and should disappear.

The limited geographical coverage, small financial envelope and short time frame of the projects limited prospects for creating and sustaining government ownership. In countries with limited previous experience in watershed management, there is no evidence of a real appropriation of the watershed management approach at the national government level or of sustained interest in including watershed management among national policy priorities (as might be manifested, for example, by the regular allocation of domestic public resources to set up a nationally owned watershed management programme and to gain gradual independence from external funding). In countries with long-term experience in watershed management, e.g. Turkey and Morocco, the short-term and small-scale FAO projects had limited possibilities for political influence, especially when compared with large World Bank–supported watershed investment projects or important policy processes such as the preparation of a National Basin Management Strategy in Turkey in 2010–2011.

RECOMMENDATIONS

All possible opportunities for creating space for dialogue on key watershed management issues among and within relevant institutions and sectors should be explored and pursued. Implementation arrangements should be designed in such a way as to facilitate the progressive integration of diverse partners throughout the assessment and planning process, to produce a shared and common plan of action for the entire watershed in which human, physical and financial investments can be mobilized by various government agencies and partners in an agreed manner. It is essential that institutional arrangements be inclusive and provide for an open exchange of experience and expertise among technical services and with external partners such as universities, research centres, NGOs, civil society and resource partners.

Such dialogue should be supported and guided to lead gradually to more effective learning and reflexive decision-making by stakeholders with diverse institutional backgrounds, interests, norms and values. Projects have an important role in providing sound data and expert judgement to inform decision-making.

It is important to pursue more formal and permanent mechanisms for interministerial collaboration and coordination at the national level. Such mechanisms may evolve from temporary arrangements set up during project implementation (e.g. the PSC) or may build on learning from successful examples in other countries. Systematic research for collection of good examples and case studies is recommended. Assigning an interministerial committee or coordination body concrete tasks, such as the joint formulation of a strategy or policy document on an issue of common interest, can strengthen the bond among committee members and the collective ownership of both the consultative process and the product – in turn increasing the prospects that the strategy or policy will ultimately be approved and applied.

Projects should engage in developing and setting up effective mechanisms for systematic communication and upward transmission of locally tested integrated solutions. It is important for high-level officials, for example officially nominated PSC members, to participate in project implementation so that their policy- and decision-making is based on sound experience from the reality in the field. Inviting policy-makers, parliamentarians and media representatives on exposure visits to watersheds that demonstrate a combination of watershed management measures is a means of stimulating reflection and influencing national decision-making. Such measures can lead towards the gradual internalization of an integrated approach and the evolution of appropriate policies and legal frameworks.

CAPACITY DEVELOPMENT

RESULTS OF THE REVIEW

All the projects invested strongly in capacity development actions at various levels, at various steps in the process and for the benefit of a variety of stakeholders. Some examples are given here.

Training activities in the early projects (**Democratic People's Republic of Korea** and **Tajikistan I**) had a strong focus on technical aspects such as soil erosion processes, technology transfer and introduction of watershed management as an approach for corrective

action. To build up significant national capacities, staff from different administrative levels and with different technical backgrounds were targeted.

Several projects combined technical training with exposure visits abroad for a limited number of higher-level government officers (usually three to four), to countries where watershed management is more advanced – for example, Nepal (for staff from **Pakistan** and **Tajikistan**) and China (for staff from the **Democratic People's Republic of Korea**). However, there is no documentation about what the study tour participants took home or whether the exposure to a different reality led to transformational change in their country or had any lasting impact.

Within-country visits to observe field activities of other projects were also organized. For example, in **Morocco** five visits were organized to different geographical areas for lower-level staff and selected local beneficiaries, with on average ten participants per visit.

In regional and interregional projects, multicountry workshops were widely used to foster knowledge exchange and learning among countries. The **Central Asia** project organized three regional workshops on the sustainable management of mountain watersheds for decision-makers and technical specialists from Azerbaijan, Kyrgyzstan, Tajikistan, Turkey and Uzbekistan – countries whose ecological contiguity and common problems presented opportunities for learning from one another's experience and pursuing joint actions. Technical presentations were combined with practical and interactive training sessions on watershed management and extended field visits within Turkey.

Practitioners from Ecuador, Mauritania and Morocco plant trees in a demonstration for knowledge exchange organized by the OUBAME project in Morocco

©Petra Wolter

In **Zambia**, GSHA, in collaboration with FAO, organized a regional seminar on the role of watershed management in protecting the village environment, where partners from the Gambia, the United Republic of Tanzania and Zambia exchanged experiences, methods, techniques and tools.

The interregional **OUBAME** project held an interregional workshop in **Morocco** which brought together watershed management practitioners from the Maghreb region and from Latin America. The sharing of experiences between continents, increasingly promoted as South–South cooperation, goes well beyond technical aspects. It provides exposure to diverse realities including socio-cultural differences and helps to create a culture of broad-mindedness.

Five government officials from **Pakistan**, most from District Forest Offices and the Sarhad Forest School, were given the opportunity to participate in a three-week training of trainers course on watershed management at the International Centre for Integrated Mountain Development (ICIMOD) in Nepal. After returning to Pakistan, these officers set up two training sessions for an additional 41 officers. However, no information is available on institutional uptake, for example on whether low-cost soil conservation techniques have been included in the Forestry Department's regular work programme and/or the Forest School's curriculum and whether these practices have been disseminated and replicated in the field.

The **Ecuador** component of the **OUBAME** project stands out for the high number of capacity development events organized or attended by the local project team: 110, including workshops, seminars, training courses, study tours, national dialogues and fora. These events targeted a varying number of participants (from 1 to 300) and covered a myriad of topics, addressing not only technical but also functional and managerial skills (e.g. project management, strategic planning, organizational strengthening and gender mainstreaming). The strong presence of the project in national events created visibility and opportunities to foster synergies and collaboration.

In other projects, however, efforts to develop functional capacities have been limited. In a rare example, three managerial staff from **Pakistan** participated in a three-day course organized by ICIMOD on documentation of case studies and lessons learned. One of the participants was later recruited for the write-up of four success stories.

Several projects invested in the preparation of training materials. The **Chimborazo** project team, in collaboration with Riobamba University, has prepared a voluminous

set of modules on watershed management (currently under review). The **Central Asia** project prepared technical guidelines for natural resource rehabilitation in mountain watersheds, with a focus on technical specifications for (bio-)physical structures for slope stabilization, based on Turkey's experience. The project in **Guatemala** produced a technical manual on trout farming.

LESSONS LEARNED

The demand for strengthening of individual technical skills remains high. Many technicians and field staff of technical line agencies, extension services and other service providers still lack essential technical skills related to the linkages among natural resources and human influences in watersheds. A combination of practical on-the-job training and formal classroom training on the theoretical background has proved the most effective preparation for individuals involved in planning and implementing watershed management projects.

Along with technical capacities, the functional capacities of national and local governments also require strengthening. Functional skills that are generally missing from the training opportunities offered by project teams include negotiation, conflict resolution, systems thinking to build a territorial vision and facilitation of multistakeholder meetings and processes.

Exposure visits and study tours must be well crafted and supported by complementary measures for sustained uptake and change at the organization level. Exposure visits and study tours abroad are popular with higher-level policy- and decision-makers, but their benefits remain vague. Their potential to translate into concrete action in the home country remains largely untapped, especially in the absence of complementary measures to strengthen the functional capacities of the participants. As a minimum requisite, participants should be required to prepare a report describing the results of the visit and the take-home messages, which would make it possible to track any follow-up action. In-country visits to expose high-level officials to the realities on the ground appear to be more important, especially when project activities are implemented far from the capital.

Regional and interregional workshops foster collective learning as well as information and knowledge sharing. While exposure visits share knowledge predominantly in one direction, regional or interregional knowledge-exchange meetings, in which each participant shares his or her knowledge with others, foster mutual learning and effectively provide access to new knowledge, experiences and tools.

The projects did not undertake capacity development to strengthen the internal functioning of institutions and to improve their way of working (e.g. communication flow between administrative levels). The focus of the capacity development activities has been almost exclusively at the individual level, which limits the prospects for triggering institutional uptake and transformative change.

None of the projects assessed existing capacity gaps in a systematic way (at either the individual or organizational level) so as to formulate a coherent capacity development strategy. Such an analysis should be the first action before any concrete training programme is designed.

RECOMMENDATIONS

The existing capacities of actors and institutions involved in watershed management should be assessed systematically, and a coherent plan developed to fill the identified capacity gaps and needs at all levels. Gaps in performance and mandates should be assessed against a set of determined performance criteria. A mix of actions for strengthening both technical and functional skills and for targeting both individuals and organizations should be preferred.

To advance watershed management concepts and approaches in policy and practice, it is necessary to design specific activities for strengthening leadership skills, strategic and integrated planning and the creation of a territorial vision. It may be useful to identify watershed management champions that have developed such a vision and/or to invest strategically in capacity development for actors with high potential to become such champions. Development of leadership and vision is crucial not only for State actors, but also for the empowerment of non-State actors, including civil society.

It is indispensable to strengthen not only the capacity of individuals involved in watershed management, but also the organizational capacity of key institutions. For the internalization of watershed management field experience, institutions involved in watershed management may need to become more receptive to participatory governance models, which may require adjustment of skills, systems, structures, functions and strategies. New job categories may be required to integrate temporary project staff (e.g. field facilitators, community mobilizers) among the core staff in government structures. It may also be necessary to review and revise existing methods for policy analysis, planning, coordination, budgeting and monitoring as well as lines of command and the communication flows between national and subnational administrative levels.

Capacity building requires continuity and follow-up. One-time workshops and training events may have limited practical relevance, and close follow-up and on-the-job support may be required so that trainees will be able to apply their new skills.

Well-crafted training of trainers courses are effective for creating a critical mass of trainers in a country. Such a pool of trainers could be instrumental in accelerating dissemination and upscaling of successful watershed management practices and approaches. More systematic and targeted design of training programmes for watershed management would provide the required knowledge, skills and experience at different administrative levels and create institutional capacities more rapidly. Targeted training materials may have to be prepared.

Projects and institutions should continue to participate in and organize watershed management training workshops that support global and regional knowledge sharing and exchange, ideally joining forces with development partners engaged in watershed management or other integrated landscape approaches. Exchange visits and study tours should be broadened to include not only senior officials but also field staff that are in daily contact with communities and farmers and who would particularly benefit from exchange of experience among peers. Selection of participants is always a challenge; nominations should not be at the discretion of government institutions only. Participants should always prepare a study tour report to identify new practices and lessons learned, and they should explore how best to integrate these in their daily routine. Participants could also share their new knowledge in seminars within their institutions.

Establishment of formal watershed management training programmes should be explored, and existing curricula reformed. For example, FAO could work with interested governments to establish a certified watershed management programme at a university or technical institute where students and field officers can receive credits for participation in formal training courses. Existing courses could be revised to ensure that integrated approaches and watershed management principles are taught more systematically and as early as possible, from the elementary to the secondary and university levels, to facilitate a generational shift towards the study of systems and sustainability sciences.

Capacity development in watershed management should incorporate new tools and research findings. Watershed management projects must keep abreast of new developments and tools such as scenario building, modelling and multicriteria analysis. The application of these tools at a strategic level can help policy-makers reduce uncertainties and prepare for what might happen in the future, for example in dealing with an increasing scarcity of water resources and the resulting economic impact for various sectors.

CAPITALIZING ON EXPERIENCE AND HIGHLIGHTING RESULTS

RESULTS OF THE REVIEW

In the **OUBAME** project in **Ecuador**, the formal involvement of a nation-wide institution (SENAGUA) enabled the local project team to participate in several national discussion fora (e.g. the national agricultural forum and a national conference on watershed management organized by SENAGUA), providing opportunities to reflect on project experiences, to draw lessons and to suggest possible policy adjustments in the context of a wide audience. The project organized a large fair and debate on integrated collaborative watershed management in Membrillo, where technical and administrative entities were largely represented at all levels.

In **Turkey**, the personal involvement of the Governor of Manisa Province in the project was instrumental in obtaining media coverage about the project, including regular communication in newspapers, at least at the subnational level. In addition, the project published two issues of a newsletter and established a website. Unfortunately, the suggestion to transform the project's website into a permanent national mountain portal was not taken up by counterparts when the project came to an end.

The **Chimborazo** project also has a website, under the provincial government in **Ecuador**. In addition, the FAO Country Office in Ecuador posts regular news pieces on its website. Overall, the corporate development of FAO country web sites and the regular preparation of bulletins and newsletters in a number of countries over the past few years has greatly improved the visibility of the Organization's activities and results.

The project in **Guatemala** documented the personal experiences and impressions shared by six project beneficiaries throughout the project's life span. The project in **Pakistan** prepared success stories from four watersheds, describing cases in which individuals benefited from project support to develop their businesses (for example in cut-flower and vegetable production). The **Pakistan** project also featured prominently in illustrations of FAO's work on disaster risk management. Case studies from several projects were included in FAO publications or joint publications with partner organizations.

The **OUBAME** project produced videos on the country activities in **Morocco** and **Ecuador** and a Spanish-language video on the interregional activities.

LESSONS LEARNED

Over the past few years more attention has been paid to documentation of projects' experiences and dissemination of results through various communication channels. This tendency is clearly visible in the more recent projects in this review, which have devoted time and resources to

the preparation of success stories, case studies, videos, newsletters and other communication materials.

However, previous experiences and lessons learned are not generally examined seriously before formulation of new national programmes and projects. This observation holds for most international development projects, well beyond the watershed management projects covered in this study. Largely because of time and financial constraints, recipient governments and resource partners fail to give priority to both *ex post* evaluation of past programmes and projects and *ex ante* assessment of critical factors likely to have impact on new programmes and projects. Newly recruited technicians and newly elected politicians are unaware of past and even recent successes and failures, including some of most well-documented long-term programmes implemented in recent decades (for example in Peru). Recent policy and strategy changes, sometimes more apparent than real, suffice to justify the formulation and initiation of new field activities with no attention paid to past results in the same geographic and thematic areas. Repetition of the same errors is a common feature of many international and national programmes and leads to significant waste of financial and human resources.

The beneficiaries' views on changes (positive or negative) resulting from project action have rarely been collected and analysed during or after project termination. In a few exceptional cases *ex post* evaluation has been carried out several years after project closure. By that time, institutional and external actors have usually changed; local people have a deeper understanding of what the project has left behind and are willing to express their views more freely; and evaluators are ready to listen to interpretations that are not conditioned by employers and decision-makers. Unfortunately, *ex post* evaluation does not usually fall within the immediate interest of resource partners and national entities. Few resources are allocated for this type of exercise, although it could provide deep insights into the effects of long years of technical and financial assistance to rural communities in the developing world and economies in transition. This rather discouraging scenario applies fully to watershed management. Traditionally, only marginal financial resources have been invested in upstream areas and little political attention has been paid to their dispersed and unorganized communities. In this context, the positive or negative feedback from past experiences could have significant consequences for national policy priorities and investments in new initiatives.

RECOMMENDATIONS

Involving universities and research centres in assessment of lessons learned from previous experiences can contribute effectively to the development of new watershed management programmes and projects. Involvement of graduating students contributes to the sensitization of future leaders. In addition, academic curricula and research programmes can be adjusted and oriented towards a territorial approach and more implementation-oriented, applied research.

New watershed management projects should systematically include in their results framework an output, activities and a budget provision for documenting case studies, success stories and lessons learned, communicating results and capitalizing on experience. During implementation, each project team should regularly make efforts to reflect on and document the lessons learned as a joint learning exercise, putting emphasis on bottlenecks and (perceived) failures in order to identify areas for improvement and to take timely corrective action. Such reflection should take place within the general work planning and monitoring cycle (see Chapter 9). The write-up of project experiences, case studies, best practices and lessons learned requires regular technical support from a journalist or communications expert capable of designing specific products tailored to different target audiences and communication channels. Aggressive marketing and strong dissemination of results is key to improving both the visibility of work on watershed management within and beyond the countries and its influence on national policy and legislation.

The experiences and results of watershed management projects should be presented in national and global discussion fora and technical conferences. Such exposure could help to advance watershed management on the policy agenda and encourage collaboration with other development partners that support watershed management or other integrated landscape approaches.

Project results and outputs should systematically be included in project databases such as FAO's Field Project Monitoring and Information System (FPMIS). Project archives should include not only technical studies, assessment reports, strategy papers and draft policies, but also communication products such as videos, flyers and newsletters.

FINANCE AND INVESTMENT FOR WATERSHED MANAGEMENT

RESULTS OF THE REVIEW

The project in the **Democratic People's Republic of Korea** prepared a comprehensive long-term investment programme for watershed management, including eight distinct project profiles (e.g. on capacity strengthening, the management of critical watersheds and the establishment of a survey and information management

system). This programme was formally presented in a three-day national workshop, which, according to the authorities, was the first event in the country ever to bring together government professionals, scientists, field staff and representatives from international organizations to discuss a topic of common interest. However, the limited number of resource partners present in the country and the political context, in which the development partners could provide only humanitarian assistance, were not conducive enough to secure external follow-up funding for the expansion of the watershed management approach.

The project in **Tajikistan** also prepared an investment strategy, as well as five project profiles to advance the concept of watershed management in policy, research and management practice. Resource mobilization efforts, however, were not successful.

In view of the positive results achieved at the end of the first phase of the project in **Guatemala**, the Swedish Development Agency agreed to finance a second phase, which is now ongoing. The new phase, in six watersheds that were not previously covered by international development assistance, builds on previous experience and includes innovative elements such as the promotion of high-value and high-quality products for local and national markets.

After providing three years of funding, the Spanish Development Agency pulled out of the **OUBAME** project before the second phase. To sustain the promising results at both the field and policy levels and the institutional mechanisms created, FAO agreed to fund a small project from its own resources until fresh resources could be mobilized. This bridging project has played a catalytic role, securing resources from Switzerland for a new project which is now continuing and replicating the activities in **Morocco**. It also developed, together with counterparts from **Mauritania**, a concept note, which has been approved by GEF, for a project to further develop the project's approach for increasing climate resilience and to expand the approach in three neighbouring regions in Mauritania. Resources from the Least Developed Countries Fund are awaited for the formulation of the full project proposal. In line with GEF standard policy, a high share of co-financing must come from the national budget and from other partners.

Morocco provides an excellent example of the joint provisioning of government resources to ensure the implementation of the watershed management plan formulated by the project (see Chapter 7). Important investments were made by several ministries and local authorities, including the High Commission for Water and Forests and the Fight Against Desertification (HCEFLCD), the Ministry of Agriculture and the Ministry of Equipment and Transport, among others. However, despite the model developed in the OUBAME project, HCEFLCD continues to implement its own National Watershed Management Plan, approved in 1996, which aims to combat erosion in a rather traditional way. Accordingly, the national budget is allocated to HCEFLCD to achieve the plan's long-term target (treatment of 1.5 million hectares of land, 75 000 ha per year) through its core mandate (the reforestation and mechanical treatment of upland areas in 22 priority watersheds to reduce siltation of lower-lying dams that have a critical role for the provision of water for irrigation and other purposes). No shift is observed towards the use of core budget to support innovative collaborative watershed management processes and actions that build on the OUBAME experiences.

The **Chimborazo** project in **Ecuador** is the only project with a clear mandate to foster investment in upper watershed areas, with an objective to analyse and test options for the progressive establishment of schemes to compensate upstream inhabitants for sustaining ecosystem services. Based on a well-focused study analysing the economics of present and potential environmental services generated in upper and intermediate areas of the Río Blanco watershed, several innovative pilot compensation schemes were designed addressing the main categories of users, including the private sector (e.g. the hydroelectric company and flower nurseries) and irrigation user groups. An innovative water tax system focusing on beneficiaries of new peri-urban irrigation schemes and the drinking water supply system in Riobamba is also being explored. Since the project is still ongoing, it is too early to report on the results of the implementation of these schemes.

LESSONS LEARNED

Efforts to mobilize additional resources were largely concentrated on how to secure external financing to continue project action. The focus should rather be on how to involve existing local and national financial streams for continuous investment in solutions that reduce watershed degradation and improve livelihoods, getting gradually away from a project-by-project approach.

FAO technical assistance has not resulted in any evidence of increased public investment in watershed management. Recipient governments did not take up or further develop the ideas, strategies or profiles formulated by the projects for future investments in watershed management, even with the support of external resource partners. Reasons for this rather disappointing conclusion may include the short duration of most projects, the mixed quality of the strategy documents produced, the lack of concrete follow-up action in the countries and the attention diverted to new priorities once the projects came to an end.

The private sector has had little role in the mobilization of resources. The projects could have made a greater effort to develop business models for watershed management that are economically attractive to private companies

and that could foster entrepreneurial thinking among watershed users, gradually reducing the dependency on external development assistance.

The examples have shown that external assistance is not always reliable and predictable. Resource partners may change priorities at short notice. In addition, they generally prefer to support short-term projects that show quick results (in two to three years), whereas changing the way rural watersheds are managed requires more time to institutionalize dialogue and joint action among multiple stakeholders across sectors.

Efforts to collaborate or partner with other externally funded programmes or projects have been limited. While the project formulation process usually includes identification and mapping of other programmes or projects that intervene in the same geographic area, more efforts could have been made to develop joint activities and to pool resources from different sources for joint implementation. The promotion of cross-sectoral collaboration in the national institutional setting should have included the community of external resource partners, as a direct contribution to the harmonization and alignment of the development agencies' practices for effective aid delivery.

RECOMMENDATIONS

Watershed management projects must systematically explore ways and strategies for accessing finance from multiple sources. To develop appropriate financing mechanisms that overcome the shortfalls of sector-based approaches, they should assess the full spectrum of public and private financial institutions in a country, including government, non-State actors and international development assistance. They should assess existing finance streams for land-based sectors (e.g. agriculture, forestry, climate, environment and biodiversity) as well as for infrastructure, education and health, and seek ways to coordinate these investments at the watershed level.

Strategic collaboration should be pursued, both at the policy and field levels, with partner organizations that provide financial support to developing countries. Suitable partners are those that have an important portfolio of relatively large watershed management investment projects, such as the World Bank, the International Fund for Agricultural Development (IFAD) and other international financial institutions.

The ministries of finance and planning should be included among the key State actors to be involved in watershed management projects (e.g. as members of PSCs). These ministries ultimately influence the preparation of national, provincial and municipal budgets and plans.

The private sector should be engaged more systematically, for example in stakeholder analysis or defining of field activities. An increasing number of private companies and finance institutions are willing to develop business models that compensate for sustainable investment in upland areas (e.g. payment or compensation for ecosystem services and microcredit schemes for small enterprises, which often lack access to adequate financial products). These actors represent an untapped potential for the mobilization of resources.

Focus on action for which time and funding are adequate. The complete watershed management process cannot be set up in the framework of project that is funded for only two to three years. If a country has no prior watershed management experience to build on, it may be justified to reject such a request or to downsize the project to focus on realistically achievable action (e.g. a watershed assessment or capacity development programme). If more time is available and the formulation of a watershed management plan is foreseen, proper implementation arrangements must be negotiated and stated in the project agreement to ensure that public resources from national and local budgets (and not only from external partners) will be made available to implement the plan.

Dialogue and advocacy with resource partners should aim to instil a gradual shift from short-term sectoral projects towards long-term financing of integrated programmatic approaches and development processes that work at the landscape level and are needed to achieve the SDG targets. Watershed management is such an approach. The need to set up long-term, in principle open-ended watershed management processes and iterative multistakeholder watershed management planning cycles should be promoted at every opportunity.

©Thomas Hofer

3 SELECTION OF THE AREA FOR LOCAL INTERVENTIONS

Zambia

3 SELECTION OF THE AREA FOR LOCAL INTERVENTIONS

This chapter reviews project design elements related to the selection of the geographical area for interventions at the local level. The management unit in rural development and natural resource management interventions is ideally a watershed (delineated by hydrological boundaries) but often a village or rural community (reflecting an administrative unit). Since water is the key resource and water does not follow administrative boundaries, effective planning and management of water resources needs to be based on hydrological units. The watershed is also the appropriate management unit for addressing spatial linkages and for promoting collective action among communities in regard to shared natural resources. However, working at the watershed level is considered more challenging because social groupings do not necessarily correspond to the biophysical features in the watershed. Statistical data are usually assembled according to administrative units and need to be "translated" into a watershed context since village boundaries and watershed boundaries do not usually match.

Watershed issues can be addressed through management actions at different scales. According to Davenport (2003), no formula exists for determining the appropriate geographical scale for any watershed intervention. Nevertheless, experience shows that the adequate scale of intervention is determined in line with the objectives that a project wants to achieve, taking into account the specific country context. Selecting a watershed at the appropriate scale and applying specific criteria to guide this selection is crucial.

Watershed management usually integrates a variety of management actions to improve both the natural resource base and the livelihoods of the population. The watershed serves as a learning site to raise awareness and conduct practical stakeholder training for the creation and enhancement of capacities and the dissemination of experiences and knowledge. Ideally, it also provides evidence for policy-makers and resource partners on the need to shift attention and investment towards integrated and cross-sectoral approaches. High visibility, accessibility and conditions that are representative of a larger geographic area are characteristics that can support uptake and replication beyond the initial area of intervention.

As stated in Chapter 1, FAO (2007) defines a watershed as the geographical area drained by a watercourse. The World Bank defines a watershed as "an area that supplies water by surface or subsurface flow to a given drainage system or body of water, be it a stream, river, wetland, lake or ocean" (Darghouth *et al.*, 2008). A watershed is a spatially defined unit which includes diverse, unevenly distributed natural resources and which connects communities that use these resources differently depending on their position within the watershed. Both the watershed resources and the user communities are interdependent (Shiferaw, Kebede and Reddy, 2012). A watershed is thus not only a hydrological unit but also a socio-ecological entity which plays a crucial role in determining food, social and economic security and provides life support services to rural people (Wani *et al.*, 2008).

Connecting communities that use its diverse resources, a watershed is a socio-ecological as well as hydrological unit (Pakistan)

©Thomas Hofer

Since size is not a factor in the definition of a watershed, there is no universally agreed system to classify watersheds by size. However, the World Bank (Darghouth *et al.*, 2008) has suggested a classification of watersheds at different levels (Table 2). As can be seen in the table, watersheds vary from a few to hundreds of thousands of hectares. Watersheds are nested systems, with smaller watersheds nesting in larger ones. In line with the classification in Table 2, a microwatershed is nested in a subwatershed which is nested in a watershed and so on. According to the World Bank (Darghouth *et al.*, 2008), the term "watershed management" typically refers to management at the level of a micro- or subwatershed (whereas action at the level of the entire watershed system, sometimes across country boundaries and with a focus on institutional and policy issues, is usually called basin management).

In recent years, several Latin American countries (including Ecuador, Guatemala and Peru) have reclassified their watershed systems using a system for delineating and codifying the Earth's river basins first described by O. Pfafstetter (Verdin and Verdin, 1999). Basins are classified according to the hierarchy of their tributaries, with Level 1 watersheds at continental scales, subdivided into smaller Level 2 watersheds, which are divided into Level 3 watersheds, and so on. In this multi-level classification system (which in the case of Guatemala goes down to Level 8) each watershed is assigned a unique hydrological code. In this classification the terms subwatershed and microwatershed are no longer used. Regardless of which classification is applied, a watershed approach uses hydrologically defined areas to examine the relationships between the natural environment and human activities and to coordinate the management of natural resources in that area.

As watersheds increase in size, it becomes more difficult to measure impacts and to attribute them to project action in terms of erosion control and reduction of downstream sediment flows. The effective size of a watershed is influenced by its drainage patterns and stream order, as well as by its geological, geomorphic and soil characteristics. As watersheds increase in size, they become more complex in terms of topography, slope, and vegetation cover as well as institutional patterns.

In relation to the regular annual planning of interventions in national watershed programmes, Maxted, Diebel and Vander Zanden (2009) present an interesting framework for exploring how trade-offs among individual watershed size, the total number of watersheds and the amount of investment within the watersheds can affect the overall utility of watershed management. The model shows that the optimal combination of number of watersheds, watershed size and implementation effort varies strongly as a function of total programme budget. As programme budgets increase, the number of watersheds should increase most quickly, followed by watershed size and then by management effort. This framework, developed for interventions to reduce agricultural non-point source pollution to improve water quality in the United States, may be of limited suitability in many developing countries, especially where there is no national watershed management programme in place. However, it suggests useful elements for consideration in the project review: the number and the size of the watersheds selected for intervention and the type of management unit chosen.

FAO does not have a consistent terminology for watershed sizes and scales. Projects frequently use the terms "watershed" and "microwatershed" without any clear definition that would make it possible to distinguish a watershed from a microwatershed by its size. In this study, the term "watershed" is used throughout when referring to project action at the local level, although the watershed area in the reviewed projects varied between 80 and 50 000 ha and would fall in four different categories according to the World Bank classification in Table 2. A portion of a watershed is referred to as a "subwatershed".

TABLE 2. WATERSHED MANAGEMENT UNITS AND MAIN CHARACTERISTICS

Watershed management unit	Typical area *(ha)*	Influence of impervious cover	Primary planning authority	Management focus
Microwatershed	<100	Very strong	Property owner (local)	Best management practice and site design
Subwatershed	100–1 000	Strong	Local government	Stream classification and management
Watershed	1 000–10 000	Moderate	Local or multiple local government	Watershed-based zoning
Sub-basin	10 000–100 000	Weak	Local, regional or State	Basin planning
Basin	>100 000	Very weak	State, multistate or federal	Basin planning

Source: Adapted from Darghouth *et al.*, 2008

TYPE OF MANAGEMENT UNIT

RESULTS OF THE REVIEW

Most projects selected a watershed as their basic management unit at the local level, although there were a few exceptions that worked at the village or community level. The latter was the case in **Turkey**, where assistance was related more to sustainable mountain development and less to the application of a watershed management approach, and where activities were implemented in one small village. The World Bank–funded **Tajikistan II** project, although labelled "Community Agriculture and Watershed Management Project", selected the village level to trigger investment in rural production, natural resource management and infrastructure improvements. The projects supported by GSHA in the **United Republic of Tanzania** and **Zambia** also selected the village as their basic management unit, since their focus was on promoting community development, food security and livelihood improvement, to which a watershed management component was added later.

All the other projects selected a watershed as their basic planning and management unit to promote an integrated approach addressing land and water management across all categories of land use in the area and involving participatory processes with local stakeholders to overcome problems of overuse and degradation. Especially in Latin America, territorial approaches are widespread and project sites are usually defined by watersheds since the economic activities of the indigenous communities evolve from the productive resources available in their territory.

Under the subregional project for **Central Asia**, the State Agency for Environmental Protection and Forestry of **Kyrgyzstan** selected a watershed for training and demonstration purposes. While the watershed had a total area of nearly 10 000 ha and a population distributed over three villages, only one village was involved in the project. The area-based interventions were planned for a small spot just above that village (see Chapter 8). This focus left out the upper part of the watershed and did not integrate the neighbouring villages with which the selected village is jointly administered. Singling out one village in this way was not in line with the key principles of FAO's watershed management approach, because the resource flows and interconnections among actions in various parts of the watershed can only be addressed by involving all those who have a stake in the watershed.

LESSONS LEARNED

The watershed unit is more suitable than administrative planning units for the efficient and collective management of the vital resources on which local communities depend. A planning unit is required that allows for balancing competing interests, resolving conflicts among users and negotiating agreements on access, use and control of common resources.

RECOMMENDATIONS

Choosing a watershed as the basic management unit is imperative for the coordinated management of multiple natural resources and for dealing with the hydrological linkages among them. Rural areas in developing countries are often characterized by complex land and water management problems, and the watershed scale makes it possible to address them simultaneously and in an integrated way.

SIZE AND NUMBER OF SELECTED WATERSHEDS

RESULTS OF THE REVIEW

The projects range from a mini-catchment of 80 ha in **Tajikistan I** to a larger watershed of 50 000 ha in **Ecuador**, with most projects working in an area of 5 000 to 10 000 ha (Table 3).

The project area was larger than 20 000 ha in **Mauritania**, because of the flat morphology and the dispersion of human settlements in the eastern part of the country, and in **the Gambia**, which also has extremely flat topography. Since the spatial and temporal linkages between the land-use systems in the Gambia were not easily discernible in the landscape, ADWAC with the support of GSHA developed the concept of "eco-zones", defined as "the total landmass within a watershed or environmental unit, within which many villages or communities share the same or similar interrelated socio-economic, political, physical and environmental problems". Nine eco-zones were identified in the North Bank Division (now the Kerewan Local Government Area), and the one selected by the project comprises 27 villages spread over an area of 50 000 ha.

Cases where the project area was smaller than 1 000 ha include **the Democratic People's Republic of Korea**, where the project document specified a preferred size between 500 and 1 000 ha.

Several projects applied a nested approach, which means that the overall planning was done at a larger watershed level, and within this watershed a smaller area was selected for demonstrating improved practices and their interlinkages.

In **Tajikistan I**, a succinct distinction was made between the larger watershed, which served as a regional hub for testing and demonstrating watershed management principles and practices for the medium term (beyond the project duration), and one of its tributaries, in which 80 ha were delineated as a core demonstration area where a few confidence-building measures were implemented within

TABLE 3. OVERVIEW OF PROJECT LOCATIONS, WATERSHED AREAS AND POPULATIONS

Country	Province	Watershed	Subwatershed	Area *(ha)*	Population	Communities	Households
Democratic People's Republic of Korea	North Hwanghe		Rakhyon Reservoir	530	n.k	n.k	n.k
	South Pyongan		Sangwon	600	n.k	n.k	n.k
Ecuador	Manabí	Río Grande	Membrillo	15 490	5 000	14	1 200
	Chimborazo	Chambo	Río Chimborazo	12 162	5 425	24	n.k.
		Chambo	Río Cebadas	50 359	7 968	31	1 992
		Chambo	Río Blanco	14 504	2 236	17	459
		Chanchán	Atapo-Pomachaca	10 925	7 515	21	1 503
		Chanchán	Zula-Guasuntos	23 647	9 452	19	2 363
Gambia	North Bank Division	Njaba Kunda Eco-Zone		50 000	12 602	27	n.k.
Guatemala	San Marcos	Coatán	Coatancito	1 548	6 570	10	n.k.
		Coatán	Esquichá	3 775	11 946	14	n.k.
		Alto Suchiate	Las Barrancas	2 070	3 660	9	n.k.
		Alto Suchiate	Cutzulchimá	9 549	4 998	16	n.k.
		Alto Suchiate	Sibinal	2 455	2 106	7	n.k.
		Alto Suchiate	Malacate	2 342	546	2	n.k.
Kyrgyzstan	Chuy		Cholok Kaindy	9 235	1 597	1	283
Mauritania	Hodh El Gharbi	Barbara	Barbara	26 900	4 500	4	600+700 nomadic
Morocco	Midelt	Oued Moulouya	Oued Outat	18 010	5 100	9	818
Pakistan	Pakistan-administered Kashmir		Lamnian	354	2 676	2	503
			Chinari	515	2 580	2	451
			Chattar Klass	524	5 064	2	623
			Balgran	830	6 062	10	866
			Danagali	455	2 540	5	n.k.
			Langla	n.k	n.k	n.k	n.k
			Kurshidabad	n.k	n.k	n.k	n.k
			Tarar Chata	n.k	n.k	n.k	n.k
	Khyber Pakhtunkhwa		Batora-Gulmera	160	2 262	9	377
			Shoal Mazullah	500	5 033	9	1 160
			Chinarkot	n.k	n.k	n.k	n.k
			Kamari Shergar	n.k	n.k	n.k	n.k
Pakistan	Khyber Pakhtunkhwa		Biari Darra	n.k	n.k	n.k	n.k
			Mera	n.k	n.k	6	n.k.
			Batera	194	n.k	8	51
			Boi	n.k	n.k	n.k	n.k
			Sora Berangali	n.k	n.k	n.k	n.k
Tajikistan	Districts of Republican Subordination	Obi Sangbur	Bodomo	80	5 155	7	658
	Khatlon	Toirsu		90 000	59 405	62	9 000
United Republic of Tanzania	Tanga, West Usambara Mountains	Pangani Basin	Upper Mokolo and Kwebulu Rivers	n.k.	30 000	21	n.k.
Turkey	Manisa		Turkmen	1 158	193	1	39
Zambia	Eastern Province		Chitilira and Mtaya	5 689	25 000	n.k.	n.k.

n.k. = not known

the short-term project framework (usually not exceeding two years in FAO TCP projects).

The number of watersheds addressed in a country varied from one (in six countries) to 17 (in **Pakistan**). One project had two watersheds, and two projects had five watersheds each. Most projects worked in only one watershed, which clearly highlights the intention to use it mainly for demonstration purposes. For small projects, working in only one watershed is almost a natural consequence of the limited budget envelope. The only exception was the TCP project in the **Democratic People's Republic of Korea**, which despite its small budget and limited duration, planned from the outset to test and implement participatory integrated watershed management in two watersheds in two different provinces. The **OUBAME** project, although larger, also concentrated its efforts in one watershed per country.

Over time, several projects reduced the number and/or the size of the watersheds addressed (Box 4) or switched to the nested approach during project implementation. While such adjustment demonstrates flexibility and adaptation during the course of the project, it also shows that simultaneous work at several sites requires adequate planning of human capacity from the onset and sufficient available staff with the required technical and social competencies.

In the **OUBAME** project, where the intervention area ranged from 15 000 to 38 000 ha depending on the country, it became evident over time that a smaller area of approximately 2 000 to 3 000 ha is a more feasible scale for jointly identifying, selecting and implementing a complementary set of activities for water and soil management and livelihood improvement in a replicable way. National counterparts and international resource partners, however, have high expectations for rapid and substantive extension and replication of the project experiences in other watersheds. For these the most appropriate scale of intervention is yet to be decided.

LESSONS LEARNED

The actual size of a watershed selected for a project intervention is highly context specific, and it is not easy to determine what the ideal "manageable" size of a watershed should be. The size of the watershed needs to take project objectives into account and is determined based on, *inter alia*, the soil composition, vegetation cover and existing land uses. Where there is one predominant land use, e.g. forestry, a larger area can be managed in a single project. If there is a mix of different land uses on a small scale and several challenges to overcome, the size must be smaller.

If the selected watershed is too small, interventions are site specific, and upscaling to other areas is likely to be difficult and costly. In addition, a small intervention area may only allow for characterization of a fraction of the watershed, which may not be representative of the whole area or give the full picture of the relationships between its upper and lower parts.

Budget implications and implementation requirements in pure demonstration sites with varied activities on small demonstration plots are different from those of larger areas in need of and planned for actual restoration. In some cases there is a risk that interventions will be scattered and disconnected. Choosing the right area and the

BOX 4

Adjustments during project implementation: the case of Pakistan

In Pakistan, field activities were implemented in 17 watersheds spread over two provinces (Table 3), reflecting the desire of the national counterparts to cover all earthquake-affected districts. The same amount (USD 50 000) was allocated for each watershed, regardless of its size (which was not documented) and the conditions and the range of problems to be dealt with. Arguably, it would have been more realistic to focus on fewer watersheds, considering the available human resources, the project's time frame, the size of each watershed and the level of investment required.

In the wake of delays experienced during implementation and in line with mid-term review recommendations, in the third year the project delineated a focus area of 300 to 500 ha in each watershed in which to concentrate the project activities and focus human and financial resources. Proximity to the main road and the potential for development were the main criteria applied to identify these focus areas, the rationale being that where achievements were visible the areas could best serve as demonstration and learning sites. In addition, the project introduced a concept of differentiated treatment: Watershed management plans were formulated and implemented in ten of the more advanced watersheds (five in each province), while in the remaining seven sites, where interventions started later, the project activities were limited to single landslide stabilization measures.

right size makes it easier to identify spatial relationships in the issues to be addressed and to understand the interdependencies among different interventions.

The larger the watershed, the more information required. Similarly, the larger the watershed, the more time and resources needed for the collection and analysis of data to establish the watershed baseline (see Chapter 5). A realistic estimate of the time and resources needed must be made at an early stage in project development.

The projects paid little attention to documenting the size of the watersheds and the number of inhabitants. What would seem to be part of the basic information about each project was not in all cases easy to retrieve from the available documentation.

RECOMMENDATIONS

The nested approach applied in some projects seems to be an effective and practical solution to address an area sufficiently large to analyse the spatial relationships while at the same time concentrating interventions in a core demonstration area. Based on the projects' experiences, a watershed of 5 000 to 10 000 ha seems to be a good scale for defining the intervention goals and assessing and analysing existing interdependencies, e.g. upstream–downstream linkages. A subwatershed of approximately 500 to 2 000 ha could be an appropriate level for planning, implementing and monitoring a set of interconnected activities. The actual size will have to be determined based on the local context, including previous experiences and existing capacities. Reconciling the watershed size with the size and boundaries of existing administrative units, to the extent possible, will help to reduce coordination efforts.

In small projects, where the main emphasis is on demonstrating the watershed management approach in practice, it is recommended that field activities be concentrated in one watershed. A second watershed offers little additional value unless it represents a completely different situation or is included for comparison of different measures in a research context. While implementing the same activities in two locations may undoubtedly be beneficial for local populations and may increase the project's visibility, it also bears the risk of dispersing resources too thinly to have a lasting impact.

In larger projects, a balance should be sought in the number of watersheds and the size of each, keeping in mind the human and financial resources required to work simultaneously in more than one location. In a project context, funding is obviously a decisive factor determining the extent to which field activities can be included in the project design. Leverage of additional resources and buy-in from potential partners to start work on upscaling up front can increase the project's sustainability.

Further sharing of knowledge and experience is needed to address questions relating to optimal watershed size and scale for effectiveness and upscaling. Since the budget is a limiting factor even for larger projects, the question remains whether it is better to invest in small but contiguous subwatersheds with the intent to expand gradually to an entire watershed, or to spread the budget among disconnected watersheds to cover a larger geographic area. Only the former can generate measurable hydrological improvements, but the latter can demonstrate concepts across a larger geographic area.

SELECTION OF WATERSHEDS: PROCESS AND CRITERIA

RESULTS OF THE REVIEW

The watersheds were usually selected during project formulation by country representatives from the main counterpart institutions at the national, subnational and local levels together with FAO technical staff and other key stakeholders, e.g. previous projects. In some cases, the set of selection criteria had already been developed at the time of project formulation, especially if a formulation mission had taken place. Some projects formulated and refined their list of criteria only during implementation.

The project in **Turkey** followed a rigorous, stepwise and well-documented process to select first the main mountain range (opting for western Turkey because of the prevailing mixed land-use system and the lack of investments in mountains relative to Eastern Anatolia), then a specific mountain range (the Yuntdagi Mountains, which have fewer resources and a higher population density than other comparable mountains in western Turkey), and finally a village within the Yuntdagi mountains for field implementation (ranked first among ten potential villages).

In **Guatemala**, the criteria for the selection of watersheds and within them the communities and target beneficiary families were established jointly by technical staff from the three implementing agencies (FAO, PAHO and UNDP), the Ministry of Agriculture, Livestock and Food and the Municipal Departments of Planning in each of the five municipalities involved, in consultation with other actors in the area such as the Tacaná Project led by the International Union for Conservation of Nature (IUCN). The municipal authorities oversaw the selection of the 58 communities based on criteria that were also agreed with the Community Development Councils. Because three UN agencies were involved, the project worked in a balanced way at the watershed and village

levels, using the watershed as a unifying element for assessing the problems and proposing actions in the intervention area.

The criteria for the final selection of the **Chimborazo** project sites were discussed and established during a participatory planning workshop with the Chimborazo Provincial Council and key stakeholders, as part of the provincial development plan formulated before the project was approved. Nine potential watersheds were identified, evaluated, ranked and finally narrowed down to four (in addition to the Chimborazo Fauna Reserve) based on specific indicators that were developed in line with the initial set of criteria.

Unlike the size of the intervention area, the criteria applied for the selection of the watershed(s) were well documented in almost all cases (Table 4). Several criteria are reflected across many or all projects, such as the extent of natural resource degradation, the commitment of local communities and institutions to engage in the process, potential for natural resource regeneration and broader economic development, and accessibility and visibility. A number of the criteria would have been relevant in additional projects but were not considered by them at the time. For example, only the **Tajikistan** project mentioned the protection of downstream values as a selection criterion, but this aspect was actually very relevant for a number of projects, such as those in **Morocco** and **Mauritania**, where past floods had destroyed important infrastructure and urban settlements downstream from the project area.

Highlighting that the projects approved over the past decade were conceived more to restore and rehabilitate degraded land than to maintain and protect intact ecosystems, the preservation of existing mountain ecosystem functions and services was a selection criterion for only two projects. The **Chimborazo** project, for example, in line with GEF's focus on biodiversity conservation, gave priority to those watersheds that had at least 50 percent of their territory still covered with páramos of high ecological value and that provide important environmental services, e.g. water for irrigation. It also gave priority to sites where agriculture was the main driver of the local economy; the population had some experience with improved agricultural and/or natural resource management practices; and people were aware of the value of conserving the páramos and had the capacity to establish alliances with other stakeholders.

Only the projects located in high mountain areas in Latin America considered the presence of an altitudinal profile among their selection criteria and provided information on the altitudinal range of the project area. For example, the **Chimborazo** project operates between 3 800 and 6 310 m above sea level.

In **Mauritania**, the criterion related to accessibility and visibility was purposely sacrificed when the government decided to locate the project in the very poor eastern part of the country rather than in the coastal western regions where most international cooperation projects have been carried out.

LESSONS LEARNED

Most watersheds were selected from areas in need of restoration and rehabilitation, while only a few targeted areas meriting conservation and protection. This imbalance illustrates the reactive nature of many development interventions and the lack of environmental awareness that still prevails in many countries (not only developing countries). While restoration of degraded lands is high on the current political agenda and may contribute to conservation of less degraded areas, strong efforts will also be needed to drive behaviour change towards conservation of existing resources, preventive action and implementation of the precautionary principle. The fact that prevention costs less than rehabilitation may play a part in the long run.

Nearly all projects based the selection of watersheds on sound criteria and documented the selection process accordingly. Several of these sound criteria were common to many projects – see the following recommendations.

RECOMMENDATIONS

The watershed should be visible, accessible and representative of the project area. This criterion is in line with the use of the watershed to raise awareness about environmental problems, to demonstrate innovative practices and to train stakeholders in their practical application. A highly visible location that lies in sight of other villages or close to a main road offers good potential for spillover effects, expansion and replication within neighbouring villages that have similar conditions. An easily accessible location allows for farmers to visit and learn on the spot from resident farmers already trained and proud to share their newly acquired skills. It facilitates guided visits from policy-makers and resource partners to attract interest and funding. If convincing impact can be achieved with the available resources during the project term, a well-located watershed may well serve as a model site and develop into a permanent learning, testing and demonstration station that remains when the project ends.

Interventions should be targeted to watersheds with human-induced degradation of natural resources and potential for physical restoration. Watershed degradation can be caused by natural factors, human interference or a combination of both. For watershed management projects, it is more relevant to focus on the human responsibility to protect the resource base and the solutions to human-induced problems. A marginally degraded watershed would not need urgent management interventions, while a badly degraded watershed with insufficient potential

TABLE 4. OVERVIEW OF CRITERIA APPLIED BY PROJECTS FOR THE WATERSHED SELECTION

Criterion	Chimborazo	Democratic People's Republic of Korea	Ecuador	Gambia	Guatemala	Kyrgyzstan	Mauritania	Morocco	Pakistan	Tajikistan	Turkey	United Republic of Tanzania	Zambia
Extent (advanced stage) of natural resource degradation, e.g. soil erosion, landslides, destabilized slopes		●	●	●	●	●	●	●	●	●	●	●	●
Dynamic and motivated local institutions, community organizations and user groups	●	●	●	●	●		●	●	●		●	●	
Interest and commitment of local population to participate		●	●		●	●	●	●			●		●
Accessibility		●	●	●	●	●	●			●	●		
Development potential and scope for non-farm economic activities		●	●		●		●	●	●	●			
Occurrence of natural disasters				●	●	●			●				●
Reversibility of degradation and potential for rehabilitation			●			●	●	●					●
Visibility and demonstration potential			●			●	●		●	●			
Altitudinal profile and mix of different land-use categories					●				●	●	●		
High poverty indices	●					●						●	●
High population density and number of potential beneficiaries	●			●		●							
Lack of basic services, e.g. water infrastructure					●							●	●
Support from technical line agencies and decision-makers						●				●	●		
Representativeness and potential for replication elsewhere					●	●				●			
Food insecurity risks				●	●								
Presence of several villages and/or indigenous communities	●								●				
Expected benefits and success		●				●							
Agriculture as main driver of the local economy	●												●
Potential to use synergies with other projects and initiatives	●								●				
Experience from previous projects	●				●								
Presence of well-preserved high-value ecosystems under pressure	●											●	
Importance of the watershed in terms of quantity and quality of water supplied	●												
Municipal resource allocation for natural resource management	●												
Potential to improve social equity	●												
Awareness/concern for ecosystem conservation	●												
Lack of service providers					●								
Remote villages in severely earthquake-affected areas									●				
Achievable results with the available resources									●				
Downstream values to be protected										●			
Experience with management of communal resources, e.g. water sharing, rotational grazing										●			
Availability of maps and data for planning										●			

for rehabilitation may not show positive results within the lifetime of a project. Local populations and technical services should both recognize the potential for tangible benefits from managing the watershed resources in a sustainable way.

The watershed should be diverse in land-use pattern, products and problems to be addressed. A mosaic of diversified land-use categories and production systems (including forestry, crop and livestock production) with an associated diversity of problems – often along an altitudinal gradient – is important to show spatial and temporal linkages and to demonstrate a set of interconnected practices for rehabilitation, conservation and sustainable management. An area dominated by a single land use or problem may be less suitable for demonstrating the watershed management approach. In line with the mix of different land uses, the population should be engaged with a wide range of activities and products. Ideally, other sectors besides agriculture have development potential – for example, tourism or the local products value chain.

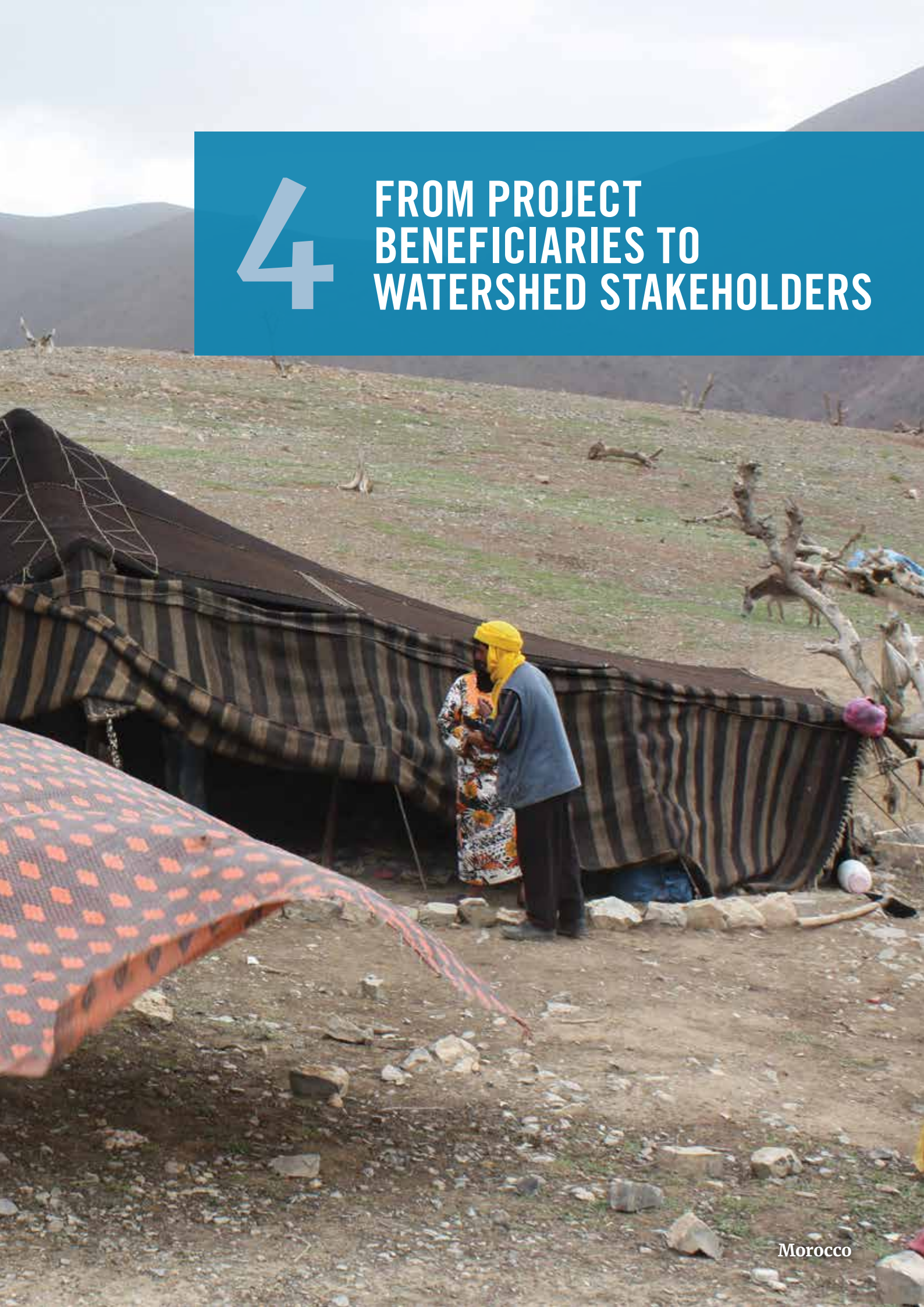
Appropriate watersheds are those where local communities show openness to change and a clear interest in participating in the planning and implementation of project activities. The presence of educated and enterprising young people will be an asset, especially in mountain areas where outmigration is widespread. The presence of active user groups and associations and a spirit for community activities will facilitate the formation of groups or committees to deal with resource management. Ideally, the watershed will comprise several villages or hamlets that interact with each other and have a common interest (or an existing conflict) in more sustainable management of their private, communal and public lands in upstream and downstream areas.

Government line agencies and local entities should demonstrate commitment and support. Watershed management requires strong, capable and committed local entities in the public, private and civil sectors that are interested in engaging with the local population and open to working in an integrated and cross-sectoral way. Any project should build on and strengthen existing institutions and initiatives instead of creating parallel implementing structures. Authorities should be noticeably willing to progressively integrate and internalize the watershed management approach into existing governance mechanisms.

The watershed should include high-value areas downstream that need protection. Watershed management is especially pertinent where mismanagement in the upper watershed has direct consequences for urban settlements, economic infrastructures, irrigated agricultural lands and high-value wetlands or coastal zones downstream. Such a situation may attract attention at the policy and decision-making levels and may provide opportunities for effective compensation and incentive mechanisms. Compelling evidence for investment in watershed management can be obtained by weighing the upstream and downstream costs and benefits: the costs of upstream watershed protection versus the costs of rehabilitating damaged goods and infrastructure downstream, and the upstream benefits of soil and water conservation combined with those of downstream protection against flooding and sedimentation.

©Thomas Hofer

4 FROM PROJECT BENEFICIARIES TO WATERSHED STAKEHOLDERS



Morocco

4 FROM PROJECT BENEFICIARIES TO WATERSHED STAKEHOLDERS

This chapter considers project design elements related to the selection of beneficiaries and target groups for specific project activities and the processes facilitated by project teams to ensure community participation and organization within the watershed.

In EU, IFAD and UNDP classifications, target groups are the main stakeholder groups expected to gain from the results and changes brought about by a development intervention in the long term. Specific target groups for rural development or natural resource management interventions are usually farmers, nomadic herders, women or female-headed households and, more recently, rural youth. Beneficiaries are the individuals, groups or organizations that will benefit directly or indirectly from the activities carried out during the intervention. Direct actions in a watershed can target individual households or families, a set of households that collaborate for a specific purpose or the entire population.

While the terms "beneficiaries" and "target groups" are used in any project context to describe the recipients of development assistance in general terms, in the context of watershed management reference is increasingly made to stakeholders and to a stakeholder approach to community participation. Watershed management is a people-centred approach; it emphasizes the importance of people's involvement in decision-making on the use of watershed resources, including negotiation processes that may be needed to balance competing needs and demands to resolve potential conflicts over scarce resources. FAO and UNEP (1999) define stakeholders as "anyone or any institution who has interests in, or is affected by, an issue or activity or transaction and, therefore, has a natural right to participate in decisions relating to it". A stakeholder analysis is usually carried out at early project stages to identify the individuals or groups that have a stake in the watershed, that are affected by the existing problems and whose interests must be considered when potential solutions are designed. Multistakeholder initiatives are increasingly established to promote collective forms of governance and to create discussion platforms where diverse stakeholders from the public, private and civil sectors can collaborate to improve the management of natural resources and, more broadly, to address complex development challenges that cannot be solved by one party alone.

Working with individual households requires more attention, resources and effort than working with households organized in a group. Promoting collective action has considerable advantages and makes the planning, implementation and supervision of activities easier, more concentrated, faster and more cost efficient. Careful consideration must be given to designing mechanisms that ensure social inclusiveness and equitable representation of all watershed stakeholders, including socially and economically disadvantaged or marginalized groups, in planning and decision-making processes.

Targeting women: in Pakistan, training provided for women involved in small home-based handicraft activities helped them to develop business skills and increase their social mobility

BOX 5

Types of community-based organizations

Village development committees (VDCs) are organizations for collective governance of a village with responsibility for development. Collective governance of a community implies a set of accepted endogenous rules, i.e. the institutions of the community, and an organization responsible for the application of the rules and for organizing collective action of interest to all the members of the community.

Common interest groups (CIGs) are organizations of some members of the community that come together to achieve a common purpose.

Users' associations are CIGs established to operate and maintain a facility constructed with public and/or private funds, with resources mobilized from the members of the association.

Microfinance institutions are community-level CIGs specialized in savings and lending.

Networks of community-based organizations may join together VDCs or CIGs, more commonly the latter. Federations of CIGs of various types are often classified as "professional associations".

Source: FAO, 2005a

A critical question in any watershed management project is which type of community organization(s) to promote (Box 5). While it should be a priority to work with existing groups identified and mapped during the stakeholder analysis, during project implementation it may be considered necessary to create new groups for specific purposes, for example thematic interest groups to address economic opportunities or maintenance groups to take care of investments provided by external resource partners. Water user groups centred around new or rehabilitated water points are a common feature of many watershed initiatives.

Recent watershed management programmes and projects have promoted the establishment of watershed management committees (WMCs) to foster multistakeholder participation. WMCs are meant to provide a forum for discussion, negotiation and implementation for all actors involved in the management of the watershed resources. Participants in the WMC include different resource user groups living in the watershed as well as other stakeholders from within and outside the watershed, including representatives of local authorities and government institutions. The WMC also provides a space for presenting and sharing assessment results (see Chapter 5), prioritizing and planning subsequent activities to improve the state of the watershed, and allocating relevant management functions, entitlements and responsibilities. Its geographic reach goes well beyond that of the village development committees (VDCs) organized in many countries.

IDENTIFYING BENEFICIARIES AND TARGET GROUPS

RESULTS OF THE REVIEW

Some projects supported individual producers (**Turkey**) or existing user groups and associations (**OUBAME**, **Zambia**), while others created new common interest groups (CIGs) (**Tajikistan**, **United Republic of Tanzania**) or WMCs (**the Gambia**, **Pakistan**). Some projects did both, i.e. working with existing groups while also creating higher-tier intervillage committees or watershed councils (**Guatemala**, **Ecuador**). This variety of approaches reflects to some extent the different degrees of social organization in the countries, but also the practical working modalities chosen by the projects to adapt to the local context.

The description of beneficiaries and target groups in the initial project documents was often long and all embracing, as if to make sure that no potential beneficiary was left out.

The **Pakistan** project operated in 17 watersheds, involving approximately 7 500 households (farmers, vulnerable groups and female-headed households) from earthquake-affected villages that were making a living mostly from forestry-related activities. To avoid conflicts and to ensure the best possible impact in restoring food security and sustainable livelihoods, the project intended to tailor its assistance to a range of earthquake victims, from the most affected (i.e. those with total loss of family and production assets or suffering injury or disability) to the less affected (i.e. those with loss of crops, livestock

and/or forest resources, but with moderate damage to their production assets that could be restored within the time frame of the project).

The **OUBAME** project targeted at the local level rural and farm households, women's groups, farmers' organizations and community associations in the selected watershed areas, with individual households more precisely described as "mainly poor, small and sometimes landless agricultural producers, livestock breeders and small entrepreneurs, men and women". The project set a target that "at least 30 percent of local households take part in the design and implementation of the watershed management plans and actions".

In **Guatemala**, the municipal authorities, in close collaboration with FAO, MAGA and UNDP, were responsible for the selection of the direct primary beneficiaries, guided by two transversal principles: inclusion and empowerment of women and indigenous people. The beneficiary selection was based on a set of predefined criteria including living conditions (poor housing, lack of basic services) and the presence of malnourished children and/or disabled household members. Preference was given households headed by widows and single women. Selected beneficiaries agreed to apply sustainable management practices on their land and to pay back a part of the incentives received from the project into a community capitalization fund.

Tailoring activities to the beneficiaries. The project documents provided less detail regarding the selection of activities that would have to be specifically targeted and adapted to the particular needs of given groups of beneficiaries (see Chapter 6) or the monitoring and reporting of the type and number of beneficiaries actually reached (see Chapter 9). In **Mauritania**, the geographical isolation, the lack of job diversification opportunities and the existing social caste system impelled the project to focus its action on organized beneficiaries, including women's and young people's associations. This selection was also justified by the strong migratory flux of adults and young men leaving their settlements to look for jobs in urban areas. However, the project neglected to focus action in favour of the nomadic and semi-nomadic households that made up the majority of the population; its focus on area-based productive and socio-economic activities (e.g. agriculture, horticulture, small-scale livestock rearing) had the effect of targeting the settled minority of the local population. A similar tendency to work with settled households and communities rather than to adapt project activities to the nomadic and semi-nomadic lifestyle was also found in **Morocco**. This lack of attention and ultimately political will to address issues related to nomadic and semi-nomadic groups is reflected in a failure or delay in adjusting and updating legal and procedural instruments, especially those related to land tenure and land and water use rights.

In **Morocco**, occasional conflicts between settled and nomadic or semi-nomadic communities, each having different customs and land-use systems and generally using different parts of the watershed territory, were evident from the initial assessment stage. Conflicts were mainly related to their different ways of exploiting forests, pastures and transhumance corridors. While the project's target groups were women and young people, it worked predominantly with these groups in settled rather than nomadic households.

The **Guatemala** project was the only one that clearly tailored its activities according to three distinct categories of beneficiaries:

- More than 2 600 vulnerable families living at or below the subsistence level benefited directly from the distribution of inputs to improve their food security and livelihoods.
- More than 500 better-off families producing agricultural surpluses benefited from the strengthening of producers' organizations to improve their production and marketing strategies.
- Members of public institutions and civil society organizations (CSOs) at the municipal, departmental and national levels were trained to improve their support services for primary beneficiaries using a watershed management approach.

The OUBAME project aimed to involve at least one-third of local households in watershed management planning (Morocco)

©Thomas Hofer

LESSONS LEARNED

The projects did not systematically engage in stakeholder analysis to identify the key groups that could benefit

from project action and should be involved in the project. While most projects established a broad list of potential beneficiaries and target groups at the project formulation stage, rarely was this exercise translated later into a clear strategy for targeting and adapting watershed management activities to the particular needs of specific target groups (see Chapter 6).

RECOMMENDATIONS

A careful and inclusive stakeholder analysis is required at an early stage in the process. Some sort of stakeholder analysis is needed during project formulation for preliminary identification of the project's expected beneficiaries and the key actors to be involved. However, considering the usual time and budget constraints during the formulation process, it may be more realistic to carry out a more detailed and refined stakeholder analysis as one of the primary actions at project start-up.

The targeting of beneficiaries needs to be based on transparent criteria, and direct and indirect project beneficiaries should be clearly distinguished. The selection of potential project beneficiaries needs to be based on an accurate and comprehensive consideration of the local context in social, economic, environmental and institutional terms, avoiding generic descriptions and unrealistic expectations to reach all and sundry.

A clear targeting strategy should be developed to identify specific actions for each group of beneficiaries under each relevant output. The selection of a small, manageable set of indicators will be essential to define the situation at project start-up and to compare this baseline with the situation at the termination of the project. These indicators will be used to monitor changes for selected beneficiaries or beneficiary groups. The indicators should, to the extent possible, be identified in cooperation with the project's beneficiaries (see Chapter 9).

Fostering the inclusion of young people as key project beneficiaries requires concrete and well-targeted actions. It is necessary to reflect on how to adapt traditional project activities, mainly linked to the primary sector, to the vision and social and cultural preferences of the young people still living in a rural context; and how to create job opportunities and decent employment conditions before young people leave for urban centres.

MOBILIZING STAKEHOLDERS

RESULTS OF THE REVIEW

In **Morocco**, at the project's start, two cooperatives (for women's handicrafts and beekeeping) and eight associations were active in the areas of water management, ecotourism, agriculture and livestock. However, the national project team favoured the establishment of new and somewhat parallel structures (village associations) which were expected to represent the whole community and to supervise and coordinate all activities promoted in the village. The lack of a technical focus or economic returns for these village associations caused tensions and conflicts over time, which progressively led to the disaggregation of most of them.

The **Tajikistan I** project facilitated the creation of new CIGs, supported by Deutsche Welthungerhilfe's work to organize local communities and to ensure people's participation in planning and implementing project interventions. CIGs were created on the following topics: water management, agroforestry and horticulture, pasture and livestock management, and income generation. The income generation groups were exclusively for women; seven women's groups were established with 10 to 15 members each. Their activities were linked to a grant distribution scheme for setting up small individual businesses. Since women had different business ideas, the groups served more as village savings groups than CIGs. Although these groups were not formalized, they were still functioning when the project area was visited during an *ex post* impact assessment eight years after the project ended (Jin, 2013).

In **Tajikistan II**, CIG creation was mandatory, as a formal requirement for development assistance. Here the *ex post* impact assessment indicated that collaboration was weaker, and these imposed groups appeared to be falling apart after project termination.

In the **United Republic of Tanzania**, where domestic water supply is a key bottleneck, TFCG, with the support of GSHA, helped establish 21 water user groups, one per village, and subsequently two water user associations regrouping the user groups at the watershed level. Water user group members were trained in the maintenance of the improved water points and in methods of water purification for human consumption. Both the user groups and the associations have been officially recognized at the district level. In addition, this project stands out for its well-documented stakeholder analysis, which was carried out by an external consultant. The analysis provides detailed information on the many resource user groups within the communities, which include savings and loan associations, forest conservation committees, village natural resources committees (since 1997), beekeeping cooperatives (officially recognized by the district), fish farming groups and farmer field school groups. All the committees and groups have a structured organization with elected officers and systematic record-keeping. The stakeholder analysis also lists the external actors whose decisions affect the use of natural resources in the project area.

In **Pakistan**, WMCs were created at an early stage in project implementation. In each watershed, 9 to 25 members were elected during a general meeting,

In Zambia, about two-thirds of the area's population participated in project activities such as construction of check dams

©Thomas Hofer

with an effort made to represent all the villages in the watershed and to include women, if socio-culturally accepted, and the landless, where present. However, the WMCs were not truly multistakeholder entities; they comprised only community members and the local forest ranger representing the counterpart institution, the Forestry Department. Other government departments (such as those responsible for agriculture, water and infrastructure affairs) or CSOs or NGOs working in the area were not represented. A stakeholder analysis does not appear to have been carried out, which might have helped to identify a broader range of stakeholders.

The WMCs had a formal structure (including a president, a secretary, a project committee and an audit committee) and played a key role in the implementation of project activities. The Forestry Department, which was under agreement to provide technical and financial support to the activities in each watershed, formally delegated the responsibility for the fieldwork to the WMCs, which thus essentially served as arms of the Forestry Department. The Forestry Department considered the WMCs a good forum for reaching out to the communities and for setting up a practical cash-for-work scheme. The project team does not appear to have reflected critically on possible shortcomings in the technical quality of the work (lacking skilled labour), the multiple and potentially conflicting roles of the forest ranger or the possible overburdening of the WMCs.

The community members appreciated the WMCs for bringing together parts of the local society that had traditionally been divided, recognizing social cohesion and cooperation as a positive outcome from the devastating earthquake. Some WMCs were unofficially registered with the district forest offices, but they were not officially registered and did not become legal entities under provincial forestry legislation as they had all desired.

In **Zambia**, five village-level watershed committees were responsible for the implementation, monitoring and evaluation of the programme, i.e. coordinating the daily work of hundreds of farmers and documenting the progress made. CODEP, with the support of GSHA, documented that of a total population of 7 350 people, 3 210 men and 1 637 women participated during the initial stages of implementation, carrying stones, digging trenches and constructing check dams and terraces.

In the Njaba Kunda eco-zone in **the Gambia**, ADWAC, with the support of GSHA, introduced the concept of "eco-zone committees". For each of the 27 villages involved in the project, the VDC selected one man and one woman to represent the village in the eco-zone committee. While the VDCs were responsible for overseeing activities affecting a community, the eco-zone committee planned, coordinated and oversaw the whole programme at the larger eco-zone level. In meetings also attended by ADWAC field staff, the eco-zone committee selected beneficiaries, decided on the location of activities and allocated resources. The eco-zone committee is acknowledged by the government agricultural officers and the Governor of Kerewan, but, unlike the VDCs, it is not officially registered and is thus not a legally recognized entity of the local government system.

The **Chimborazo** project in **Ecuador** documented a large number of diverse stakeholders including national,

In Pakistan, watershed management committees were set up in each watershed, comprising both men and women

©Thomas Hofer

provincial and municipal governments, parish committees in 45 rural jurisdictions, civic committees in six urban centres, religious groups, indigenous communities, farmer organizations, 200 water user associations, water user federations, universities, research institutions, 200 NGOs and private-sector entities. To coordinate these many players, the project supported the creation of WMCs, accredited by the provincial authorities and the national water authority (SENAGUA), for each of the five watersheds. Created during the initial assessment phase, the multistakeholder WMCs were foreseen in the project document as the driving institutional mechanism for watershed management planning and oversight of its implementation. Involving local leaders, decentralized governments and association representatives, they facilitate communication and coordination among different levels of government and the beneficiary communities. They are expected to become the operational and technical arm of the local and provincial governments and thus to continue to function even without external technical and financial support. Their role is explicitly mentioned in the watershed management plans.

Furthermore, in the context of the changing national institutional setting in Ecuador, the New Water Act promulgated in 2014 requires SENAGUA to establish a National Water Council integrating representatives of 29 national watersheds. The members of the WMCs created by the Chimborazo project at the subwatershed level could in principle be called upon to represent their higher-level watersheds in the national council. Such an official function would be an important step towards formal recognition and a permanent role for the WMCs after project termination. This example also serves as a reminder of the need to keep pace with ongoing policy changes and the development of new legal and institutional frameworks at the national level, especially if the project is embedded in the organizational structure of a provincial government.

The Guatemala project involved many external partners as intermediaries in implementing, complementing and expanding specific project activities, including CSOs, producer associations, cooperatives, foundations and NGOs. The departmental, municipal and community development councils were useful fora for promoting the inclusion of the watershed plans in the existing municipal development plans. The project also established strong collaboration with local universities. Several students were involved in the field activities, benefiting from a practical context for their studies and contributing new and innovative ideas. Another unique feature of this project was the prominent role of so-called field promoters, innovative and dynamic farmers selected to demonstrate on their land the practices promoted by the project. Each field promoter worked regularly with approximately 30 other families, engaging them to apply the innovations on their farms.

LESSONS LEARNED

The progressive establishment of some form of multi-stakeholder association or committee is essential for the promotion of a territorial vision of the watershed. Such a committee must involve, as much as possible, a broad spectrum of users of watershed resources, representing diverse and sometimes diverging interests, views and stakes, in the watershed's upper, middle and downstream parts.

There is no single approach to stakeholder engagement. Research on the social and institutional context and mapping of key stakeholders in the early stages of the project are crucial to understand the functioning of existing local institutions and to appreciate local dynamics. Collective action is needed to mobilize communities to work jointly towards common goals, but more importantly also to ensure that the views and needs of all watershed residents are collected in planning and decision-making and that potential benefits from project interventions are distributed as equally as possible and negotiated up front.

Projects have adopted different strategies and approaches for the establishment of WMCs. In some cases, a watershed committee has been created at the beginning of the intervention to support the introduction of a more participatory process and to improve the relationship between forest authorities and local communities. In other cases, the project has built on existing associations and organizations capable of supporting the expected participatory planning process. The establishment of a watershed committee was seen as desirable only for local processes of medium-term duration (two to three years), adequate for the communities living in the watershed territory and local authorities to develop a common understanding of the problems and possible solutions for the upper, middle and lower parts of the watershed.

It may be possible for local associations and groups to survive after project termination if members share a clear, common and concrete interest to remain in the group. If all members share a mutual concern about the need for stable access to a given resource or service for which an organized system is indispensable, they will collaborate to ensure its permanence. A typical example is a water user group constituted around an irrigation scheme or drinking-water facility. Such groups can promote both individual and group interests and benefits, depending on the circumstances.

RECOMMENDATIONS

When setting up WMCs, it is desirable to build on existing structures. Before creating new WMCs, it is necessary to assess the available time frame and to verify that the social and policy environment is conducive to the

formalization of structures created during the project. Ideally, the potential to establish WMCs is institutionalized and their responsibilities are defined at the national level, e.g. in a water law.

If established, WMCs need to be the result of discussion and negotiation among the parties involved. If a WMC is established at the request of a temporary actor, such as a project, it can help assess the present situation and identify priority sectors and possibly priority actions for implementation, but it is unlikely to evolve into a decision-making entity capable of representing all local stakeholders and taking decisions on their behalf.

The specific mandate and functions of WMCs need to be clearly identified and respected. The main functions of WMCs, in strict coordination with municipal planning entities, should be to promote a territorial vision and understanding of local problems and possible solutions, and to strengthen intercommunity actions to manage and protect shared resources. In addition, they should be the main contact for the establishment and maintenance of public services and infrastructures such as tracks, local water supply systems and public centres in the watershed territory. Professional and resource management associations, cooperatives and interest groups should continue to perform their more specific duties. WMCs should not overrule or duplicate the work of any other local representative groups or authority.

Field facilitators or community mobilizers are indispensable to engage local populations. Their continuous involvement is crucial to establish mutual trust and confidence between the project team and the communities and to keep local people motivated to participate in the interventions.

5 ASSESSMENT OF THE STATE AND TRENDS IN THE WATERSHED

Democratic People's Republic of Korea

5 ASSESSMENT OF THE STATE AND TRENDS IN THE WATERSHED

This chapter considers the methodological concepts and tools applied to assess the state of the watershed. It examines which actors were involved; what type of information was collected, at what level of detail and for what purpose; and how the results were presented for use during the subsequent steps of the project. Whether the objective of an intervention is to protect an undisturbed watershed from degradation or to restore an already degraded one, it is important to start by assessing and describing the current state and trends in the watershed. This baseline survey should include the biophysical features and resources in the watershed, the socio-economic conditions that determine the livelihoods of the watershed population and the institutions that operate in the watershed.

The assessment of the biophysical features usually comprises an analysis of the climate (including climate scenarios and projected climate change related impacts), geology, topography, watershed resources (land, water, soils, plants and animals), biodiversity and ecosystem services and functions. It has a special focus on hydrological aspects, i.e. water quality and quantity, including infiltration rates and runoff, land cover and land suitability or potential for different purposes.

The assessment of the socio-economic conditions and livelihoods analysis looks at demographics (including different social and/or ethnic groups and population dynamics), existing land-use categories and production systems (and associated problems), major resource user groups, gender relations, livelihood strategies, major economic activities and sources of income, access to land, credit and markets, social infrastructure, knowledge and other assets. It further includes a review of underlying policies, laws and regulations and an analysis of existing tenure regimes on land, water and other natural resources (see Chapter 2).

The assessment of the institutional set-up involves mapping the capacity, interest, influence and level of organization of local stakeholders – formal institutions and service providers as well as informal groups – so that the key players for watershed management can be identified and engaged. It is also important to identify the custodians of traditional knowledge and to establish links to existing municipal or sectoral plans. The national and subnational institutional framework that influences watershed management must also be reviewed (see Chapter 2).

Looking at the watershed in a holistic way and understanding it as a dynamic system allows for a better understanding of the spatial and temporal relationships of people and resource flows within it. The analysis of the current situation should also look at recent changes, which are crucial to understand trends and to determine future action.

Biophysical data can be collected by using remote-sensing methods, for example satellite imagery interpretation, and by conducting on-site observation, field measurements and surveys. The availability of and access to global geospatial datasets has greatly improved over the past decade, facilitating the generation of digital maps. Maps are powerful tools for the spatial representation of biophysical and social processes. Data collection is complemented by data compilation from secondary sources, including literature review and statistical data.

A broad array of participatory rural appraisal (PRA) tools and techniques which are largely visual can be used in the assessment phase, not only to collect information and data but more importantly to engage stakeholders in assessing and mapping their own living conditions, challenges and potential so they can actively seek to change their situation. Tools are available, for example, to visualize stakeholders' perceptions on: the localization of resources and land uses (resource mapping, transect walks); the importance of existing institutions, organizations, and groups (Venn diagrams); and seasonal changes in workload, availability of food and water, income or diseases (seasonal calendars). PRA tools can also be used later to identify and prioritize problems and strategies for solving them (see Chapter 6), to involve communities in planning and decision-making related to their watershed (see Chapter 7) and to educate and empower stakeholders.

The World Overview of Conservation Approaches and Technologies (WOCAT) network has developed a modular questionnaire system for documenting and evaluating

sustainable land management. It includes a specific and comprehensive questionnaire for documenting and evaluating watershed management approaches (WOCAT, 2017), which could be a useful tool in assessing the current state of a watershed. FAO (2013a) has developed the Land Degradation Assessment in Drylands (LADA), which comprises a set of tools and methods for use at the global, national and local levels.

In a degraded watershed, the assessment is oriented towards the identification of key drivers, pressures and degrading influences resulting from human activities that have altered the environmental state of the watershed and that need to be addressed to reverse the situation. During the assessment phase it is necessary to try to establish, quantify and localize the pressures and impacts of human activities.

Barriers that may prevent the implementation of watershed management principles and practices must also be identified. Response measures to counter or cope with the problems will be identified and prioritized at a later stage (see Chapter 6).

The results of the assessment should ideally be presented in a set of maps and tables, keeping the narrative sections as short as possible. Watershed mapping or zoning is particularly useful to visualize the current land uses and the degree of degradation and to develop scenarios for the future.

The results of the assessment phase will build the knowledge base for defining future protection, adaptation or restoration strategies. The baseline survey is also a starting point for monitoring and evaluation (M&E), since it defines the pre-project baseline against which the status in future years can be compared. The assessment results need to be translated into a set of indicators in the M&E system, against which the impact of future interventions will be measured (see Chapter 9).

Apart from collecting the facts and figures, the assessment phase is also the starting point for a longer-term collaboration and project presence in the watershed. A cautious and well-considered approach is thus necessary to establish confidence and trust between local stakeholders and the project team.

ACTORS INVOLVED

RESULTS OF THE REVIEW

In some projects, external expertise was called upon to undertake the assessments (national or international consultants or NGOs). International NGOs were involved in two cases. In **Pakistan**, technical backstopping and capacity development for the assessment, planning and designing of rehabilitation activities was outsourced to ICIMOD, which also provided technical guidance for the preparation of inventories and the analysis in the watersheds. In **Tajikistan I**, Deutsche Welthungerhilfe conducted the socio-economic household survey, while for the biophysical assessment, a team of three national consultants with different sectoral backgrounds (a soil and water conservation expert, a forest management expert and a range management expert) worked under the guidance of an international watershed management expert.

Several projects used the services of field facilitators or community mobilizers who were recruited to ensure continuous interaction with local populations in the watershed and who assisted with the collection of data during the assessment phase. Their role for the establishment of mutual trust and confidence between the project team and the communities cannot be overestimated. In the **OUBAME** project, for example, a team of national consultants and field facilitators conducted the assessment of biophysical, socio-economic and institutional features. A soil and water or watershed management specialist initially assessed the physical and natural resource management aspects, and a sociologist or socio-economic consultant covered the socio-economic and institutional aspects. In each country, the consultants were assisted in the fieldwork by two young field facilitators in charge of day-to-day exchange with local communities, mobilizing local expertise and collecting required field data and information.

In **Ecuador**, the national watershed management expert carried out the analysis of the physical, socio-economic and institutional features of the project area, with the direct involvement of local associations and decentralized authorities at the municipal and, to a lesser extent, district and provincial levels. Graduating students from the local agrarian university were included in specialized field studies and surveys and brought a lot of energy, enthusiasm and new ideas to the project team. This collaboration not only enriched the assessment process at the territorial level, but also subsequently translated into innovative activities, for example the processing of bamboo for handicraft, furniture and outdoor buildings.

In **Mauritania**, a local environmental association linking the four villages of the area, previously established with support from the German Agency for International Cooperation (GIZ), facilitated the survey team's access to local households. The assessment was undertaken by the national watershed management specialist, accompanied by two male facilitators who ensured continuous interaction with both men and women (because contact between women facilitators and local men would not have been socially accepted) and a short-term socio-economist/group organizer. While the prevailing customs and traditions were initially a barrier for the participation of women, through their personal qualities and skills the facilitators secured the progressive acceptance of the project team and the gradually increased participation of all segments of the local society. However, the focus of the assessment (and subsequent action) was largely

In Morocco, including nomadic herders in the assessment was a challenge because of their unstable presence in the watershed area

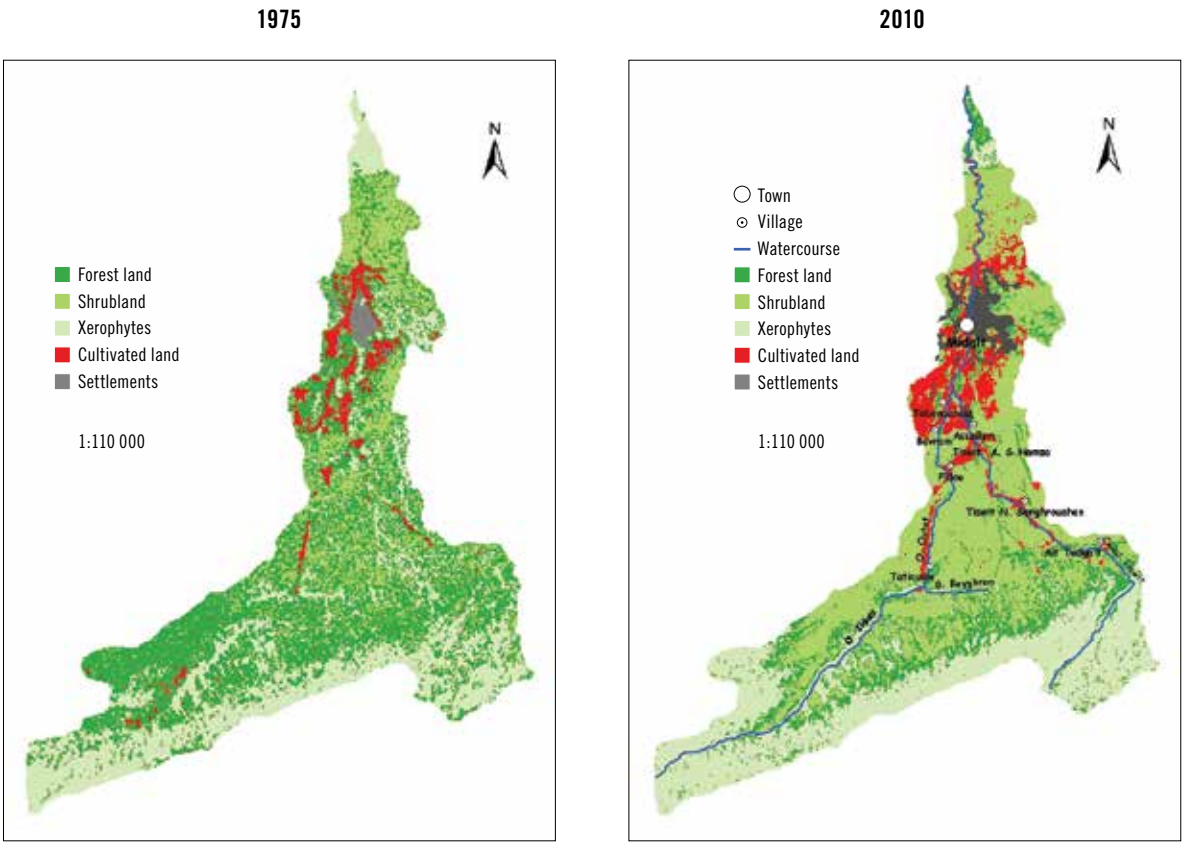
©Thomas Hofer

oriented towards settled people (and/or the settled part of local households), largely neglecting the nomadic and semi-nomadic habits of the local population.

In **Morocco**, the assessment was carried out by the national watershed management consultant, assisted by two young facilitators, a man and a woman. The facilitators progressively established an open and constructive relationship with local communities, especially those settled in the valleys. As in the case of Mauritania, nomadic and semi-nomadic herders temporarily living in and using upstream areas were only sporadically included, not only because of their unstable seasonal presence in the watershed territory, but also because of their different customs and culture and their sometimes conflictive relationships with public administration services operating in the upper forest and grazing-land areas. Thus, despite a clear trend of decreasing forest

FIGURE 1

Land cover in 1975 and 2010, Morocco



vegetation (Figure 1), the assessment and planning of the upper watershed parts remained rather superficial, and few field activities were identified, agreed upon and subsequently put into practice by nomadic people.

In **Guatemala**, there was no need to rely on short-term consultants during the assessment phase since the national project team comprised six long-term technical experts representing different disciplines: a project manager and five specialists in M&E, agriculture, natural resources, social organization and food security, and trade.

In the subregional project in **Central Asia**, a team of six consultants and technical experts from the Turkish General Directorate of Combating Desertification and Erosion in the Ministry of Forestry and Water Affairs travelled to **Kyrgyzstan** twice to conduct the assessment and to prepare the watershed management plan together with national colleagues. However, the assessment was carried out rather superficially, with sketchy and incomplete results.

LESSONS LEARNED

Field facilitators or community mobilizers had a vital role in ensuring a permanent project presence in the watershed and continuous interaction with local populations. While the explicit role of field facilitators in the assessment phase was to assist with the collection of socio-economic data, their fundamental value was in the establishment of mutual trust and confidence between the project team and the communities. Their availability and engagement was crucial to keep the local people interested and motivated to remain involved in the interventions.

Capacity gaps identified in the watershed assessments were mainly in the socio-economic disciplines and linked to inadequate analytical skills. While decentralized government agencies generally had technical capacity for biophysical assessments, expertise was more frequently lacking in the socio-economic disciplines. However, both biophysical and socio-economic experts lacked analytical skills. Many consultants' reports reviewed for this study were descriptive rather than analytical, showing a lack of skills to interpret facts and translate them into concrete and practical suggestions and recommendations for future action.

In some cases, closer involvement of technical staff from government agencies in the assessment would have reinforced government ownership in the participatory and collaborative process. While government staff were sometimes involved in the preparation of terms of reference and the screening and selection of consultants, involving local technicians in the assessment on the ground would have helped to secure government buy-in and adoption of the innovative approach. However, before proposing their participation it would have been necessary to consider the available human, technical and financial resources as well as the time required to conduct the assessment. Strong arguments and incentives may be needed to convince local technicians to engage fully in the watershed management process.

Welcoming students from local universities to conduct their graduate research studies within field projects can contribute to cross-fertilization between science and practice. Projects benefited not only from the data collected by students and the results of their research, but also from the fresh ideas, energy and enthusiasm that students brought to the project teams. Students benefited from the exposure to the field and from the opportunity to make concrete contributions to solving real problems. Such field exposure may influence students' planning of their professional careers, helping to close the development gap in their countries.

RECOMMENDATIONS

A multidisciplinary assessment of the biophysical, socio-economic and institutional dimensions in the watershed requires a team of professionals from diverse technical disciplines and with varied but complementary experience, qualifications and skills. A multidisciplinary assessment is essential to improve the understanding of the main issues that must be addressed jointly and to identify and adapt the available solutions to the local context. While each professional brings a particular area of expertise, it is important to ensure that these experts work as a team to analyse the issues at stake and to design potential solutions. The assessment must also explicitly include the non-scientific expertise of local inhabitants, administrators and other key stakeholders whose extended local knowledge is indispensable to an understanding of the history and trends in the watershed.

Capacity development actions need to be designed to instil skills in promoting a territorial vision at the watershed level. It has proven difficult to identify experts with this capacity. The territorial vision should link the biophysical, socio-economic and institutional dimensions to identify shared perceptions and common goals, ultimately reinforcing collaboration across sectors.

External technical experts should be selected based on their practical field experience rather than their academic career. Reliance on external consultants or research institutions makes sense to cover those technical areas for which expertise is not available in the national project team. The major criterion for the selection of external expertise should be a proven record of concrete implementation experience at the field level, including demonstrated analytical and report-writing skills. Potential candidates should be interviewed to verify their practical experience. Before initiating any recruitment, existing capacities in the project should

be assessed, including those of technical line agencies directly contributing to project action.

It is recommended that technical staff of decentralized government offices be directly involved in the assessment exercise to foster their ownership of the collaborative process and to build capacity. Where external experts are called upon to fill technical capacity gaps, they should work in tandem with a government staff to pass on their expertise to build government capacity for future assessments. Capacity development for local counterpart agencies may be needed particularly in the socio-economic and institutional disciplines.

ASSESSMENT STRATEGIES, PROCESSES AND TOOLS

RESULTS OF THE REVIEW

In **Pakistan**, ICIMOD trained the national project team to apply selected tools from the PRA basket such as social mapping, resource mapping, transect walks, daily activity charts, seasonal calendars, pairwise ranking, wealth ranking, pie diagrams and linkages diagrams. These tools were used primarily to collect socio-economic and physical information, but also to improve the communities' understanding of the upstream–downstream linkages and the relationships between watershed resources and the communities. Resource maps were prepared at the village level through participatory mapping. In addition, experts from the provincial forest and land-use planning departments were tasked with preparing maps of land use/land cover as well as maps indicating damage and hazards, i.e. landslides and unstable slopes (Figure 2).

Resource map of Khorian watershed, Pakistan, prepared through participatory mapping

©Paolo Ceci

In **Tajikistan I**, Deutsche Welthungerhilfe carried out socio-economic household surveys in the seven villages of the watershed and four gender-sensitive PRA training sessions of three to four days each. A combination of PRA tools was used, including brainstorming; creation of interest groups and focus group discussions; ranking of problems and solutions; drama and role playing; strengths, weaknesses, opportunities and threats (SWOT) analysis; seasonal calendars; transect walks; cause–effect diagrams; institutional diagrams; problem trees; and a visioning exercise.

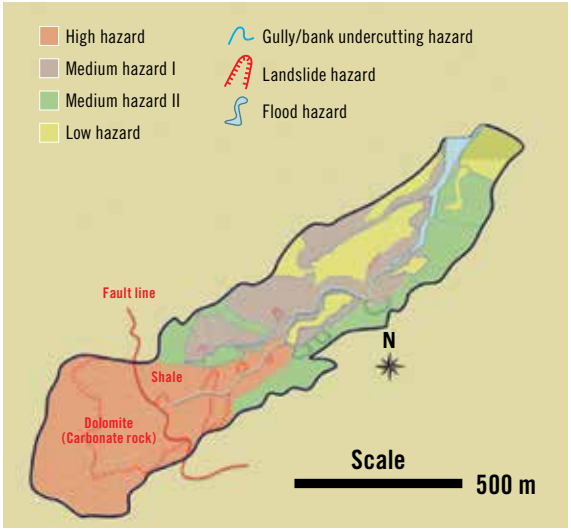
The project in the **United Republic of Tanzania**, implemented by TFCG with the support of GSHA, conducted a baseline household survey in 2011 and an endline household survey in 2013 to compare the situation before and after the project.

The project in **Guatemala** was able to build and capitalize on the experience of previous development interventions in the area, including the existing watershed management plans and methodology developed by IUCN for their preparation. At project inception, a rapid analysis of the situation in the watersheds and in the most vulnerable communities was conducted, including identification and quantification of high-risk areas that are prone to natural hazards and extreme events. The work plan foresaw the preparation of hazard maps to sensitize the communities about risk management and threat analysis; however, this activity was not carried out. To establish the project baseline, the project made use of existing methodologies (from the National Forestry Institute and the Ministry of Agriculture) and Geographic Information System (GIS) technology to compile information on the extent of areas with forest cover, degraded areas and areas with a reforestation potential. To address institutional barriers, a diagnostic of the existing public agricultural institutions and a proposal for their strengthening was elaborated for each of the five municipalities involved.

The **Chimborazo** project in **Ecuador** had an almost four-year-long preparation phase (including a change in the implementing agency from the World Bank to FAO), during which several studies and assessments were conducted before the project was approved. These studies were attached to the main project document and provide detailed information, for example on the status of and threats to biodiversity and protected areas. A social assessment was carried out to gather and validate demographic, social and cultural information; to map main actors and potential beneficiaries; to identify current agricultural production systems and land uses; to assess local capacity for natural resource management; and to assess the local willingness to develop new sustainable

FIGURE 2

Hazard map of Batora watershed, Pakistan



natural resource management practices. A special study of the animal population and degree of human interference in the Chimborazo Fauna Reserve and its buffer zone was also conducted to lay the basis for future project interventions. It found, for example, that some of the 38 communities in the reserve enjoy traditional land-use rights, and that 80 percent of the reserve is exploited to some extent by farmer organizations, cooperatives, associations and a few private property owners.

The pre-approval studies provided important background information, but since they were carried out at the provincial level (to link the foreseen project actions to broader threats and barriers), they were not specific enough for formulating the watershed management plans. Thus smaller-scale assessments were carried out in each of the project's five watersheds during project implementation. These baseline assessments were extremely rich in terms of the biophysical, socio-economic and institutional information and data collected and analysed. All available secondary sources of information were used, and additional information was collected in meetings with local communities, provincial technicians and local and provincial authorities. While the biophysical, socio-economic and institutional conditions differ considerably from one watershed to the next, an integrated landscape approach was the common basis for the assessments. They were carried out across different altitudinal belts located higher than 3 200 m above sea level, demonstrating the diversity but also the linkages among these altitudinal belts and highlighting the relation between the high-altitude land-use systems, conservation of the páramos and the economic situation of the local communities.

LESSONS LEARNED

Baseline studies must be carefully planned and designed so that appropriate measures to address the pressures, drivers and challenges can be easily identified. Sophisticated assessments can consume significant time and resources, and collecting large amounts of information can be counterproductive if it is not the right information for subsequent priority setting and implementation. Incomplete findings in the baseline assessment may need to be supplemented by specialized studies in the project implementation phase.

Participatory assessment and mapping tools are fundamental for engaging watershed stakeholders, depicting local knowledge and creating ownership. Most projects used at least some tools from the PRA basket to gather information on traditional knowledge and practices and to gain better understanding of how watershed populations perceive their local environment. Participatory mapping was used to visualize local resource use patterns, natural hazards and other elements that communities consider important.

FAO's watershed management projects have not used a standardized format for data and information collection. While all projects applied specific tools during the assessment phase, mainly PRA tools and to a lesser extent geospatial tools including GIS, a more standardized approach would have been useful. Standardized tools facilitate comprehensive baseline data collection and comparability, which are necessary for regular collection of the same type of data, especially for monitoring purposes (see Chapter 9).

RECOMMENDATIONS

A reasonable time frame should be set for the assessment phase within the overall project duration, leaving sufficient time for subsequent planning and implementation. Ideally, to minimize the burden for local people, technical services and the project team, the assessment should not exceed three months. It should also be carried out at an appropriate time of year, embracing seasonal variations for a balanced impression of the watershed. A short assessment phase also helps to make the planning process replicable.

To save time, it is recommended to start with a stocktaking of existing documents, reports and plans from ongoing and previous government programmes and development cooperation projects in the same area. Very few geographical areas around the globe have not experienced any previous interventions. The systematic review and analysis of existing documentation and data will help to avoid duplication of effort and repetition of errors, as well as to gain insight into previous approaches and changes and trends over time.

A more systematic use of new geospatial tools and high-resolution satellite images could contribute to fast and cost-effective watershed assessments. FAO and partners recently developed Open Foris, a set of free and open-source software tools that facilitates flexible and efficient data collection and analysis (Open Foris, 2017). One such tool, Collect Earth, could be tested to complement fieldwork in watershed assessments. Developed in collaboration with Google and employing Google Earth, Collect Earth enables visual interpretation of high- and very-high-resolution satellite imagery and can be used to assess land use and land-use change and to conduct forest inventories.

Participatory mapping and analysis tools ensure that the assessment is participatory and inclusive. Maps produced through participatory mapping often portray a socially or culturally distinct understanding of the watershed and include important information on the local environment that is not available from official maps. Local traditional knowledge must be combined with scientific knowledge to address local natural resource management issues in multidisciplinary assessments; thus watershed management needs both maps created by local populations and digital maps prepared by technical experts.

It is important to present the assessment results to the watershed stakeholders for their validation. Care must be taken to reach all stakeholders. Special fora or translation of results in local languages may be required to ensure that the information is understandable to everyone. Visualizing the results through maps, tables, graphs and photographs can be useful. The results of participatory exercises, including maps drawn by the stakeholders themselves, must be included in the presentation to foster stakeholder ownership of and identification with the process and the results. The discussion should aim for a shared view of the present situation in the watershed and an agreement to continue discussions on options for future land uses.

COLLECTING THE RIGHT INFORMATION FOR USE IN WATERSHED MANAGEMENT PLANNING

RESULTS OF THE REVIEW

In all three **OUBAME** countries, the assessment process lasted three to six months and was accompanied by the parallel identification and implementation of a limited number of demonstrative field actions. These actions were intended to keep up the momentum with the local population without interfering with the progressive design of the watershed management plan, whose rationale and scope were only defined at the end of the assessment stage. Additional specialized studies (e.g. on range management, reforestation and forest conservation techniques, GIS techniques and value-chain development) were commissioned subsequently, in parallel with the continuously evolving formulation of the watershed management plan, to deepen understanding and aid identification of possible measures on specific subjects. All together, these studies made it possible to identify the recent changes and trends in the watershed territory and to project further changes likely to occur in the near future – especially deforestation and erosion processes that could have serious consequences downstream, where most of the population and infrastructure (e.g. dams, roads and energy networks) are located.

For example, an interesting study in **Morocco** compared the cost of flood damage with the cost of reconstruction and rehabilitation, providing useful insights to inform recommendations for upstream actions. It found, for example, that between 1995 and 2011 more than 60 percent of all public investment in hydraulic infrastructure was for the repair and reconstruction of infrastructure damaged by flood events that occurred in 2001, 2005 and 2008 in and around Midelt. Unfortunately, the results of this and other studies were not systematically used to refine information compiled in the project document; nor were they used to develop a set of indicators for the M&E system (see Chapter 9), which would have made it possible to measure progress regularly during implementation and to compare results obtained at the end of the project against the initial baseline.

Because of the shallowness of the assessment in **Kyrgyzstan**, the management plan includes only generic background information, including one page on location, topography, geology, soil conditions, climate and hydrology; a second page on current land use (including map) and ownership structures; and a third page on the demographic and socio-economic conditions. Clearly, this information is not sufficient to understand the situation in the watershed; the problems are not clearly depicted and or localized. An example of the incompleteness of the information is the statement that livestock is "the top income resource of the community". Without any indication on the existing breeds and the number of cows, sheep and goats, neither their economic importance nor their environmental footprint can be assessed.

LESSONS LEARNED

Tenure systems and local governance arrangements were not systematically assessed in the projects. Existing rules and regulations that have a bearing on who has access and user rights to land, water and forest resources were not always carefully reviewed and analysed. On the contrary, in some cases they were taken as an insuperable bottleneck which was in turn used as a justification for

a certain lack of initiative. Where tenure arrangements are contested or outdated or where legal and customary systems are mismatched, particularly on common lands and in open-access areas, tenure reforms may be needed to realize the full potential of watershed management.

Linking the biophysical, socio-economic and institutional dimensions in the analysis of the watershed is challenging but indispensable to develop a territorial vision. Natural resource management experts are usually good at describing and (to a lesser extent) analysing the biophysical features to understand problems related to soils and water availability and management. Socio-economists provide a view of the problems from the perspective of different user groups. However, it has proven difficult to bring the different experts' ideas together. Their assessments have usually been carried out separately, with little attention to the value of joint field visits and discussions. Joint analysis of the problems at stake and joint design of potential solutions acceptable for all are essential for a more solid territorial vision that fully embraces the spatial relationships in a watershed.

RECOMMENDATIONS

Assessment exercises should refrain from collecting an excessive amount of data without clear prospects for its further processing, analysis and use in designing solutions. It is beneficial to define from the outset, in line with the project objectives, what type of information and data is needed, at which level of detail and for which purpose. For future projects, the development of a standardized approach that could be used in any watershed management project would be useful, including a basic set of data to be collected and assessed, with additional information to be added depending on the local context.

Instead of seeking an all-embracing assessment, it is recommended to sharpen the focus on water and the key degrading influences in the watershed. Watershed management is first of all about water resources, and a solid understanding of the hydrological processes in the watershed is needed. Although the relevant data are not always available, all enquiries and surveys – even those related to socio-economic and institutional conditions – should address issues related to water supply, conservation, use and reuse as well as water-related ecosystem services. Common issues will include the protection of water sources, the need for more efficient water resource management in times of climate change and the lack of safe drinking-water supply.

The assessment should also be oriented towards recognizing broader environmental changes taking place in the watershed and their impact on human lives and ecosystems. These changes can be human-induced on-site or linked to global climate change processes. A better understanding of these changes and expected trends is essential.

An in-depth analysis of land, water and forest tenure issues must be a key element of the overall watershed assessment. Tenure determines who has access and rights to use land, water and forest resources, and consequently has a strong influence on watershed management. It is important to investigate local tenure arrangements and their impacts (positive or negative, potential or actual) on stakeholders, especially the poor. This is particularly true for common lands and lands where customary systems prevail.

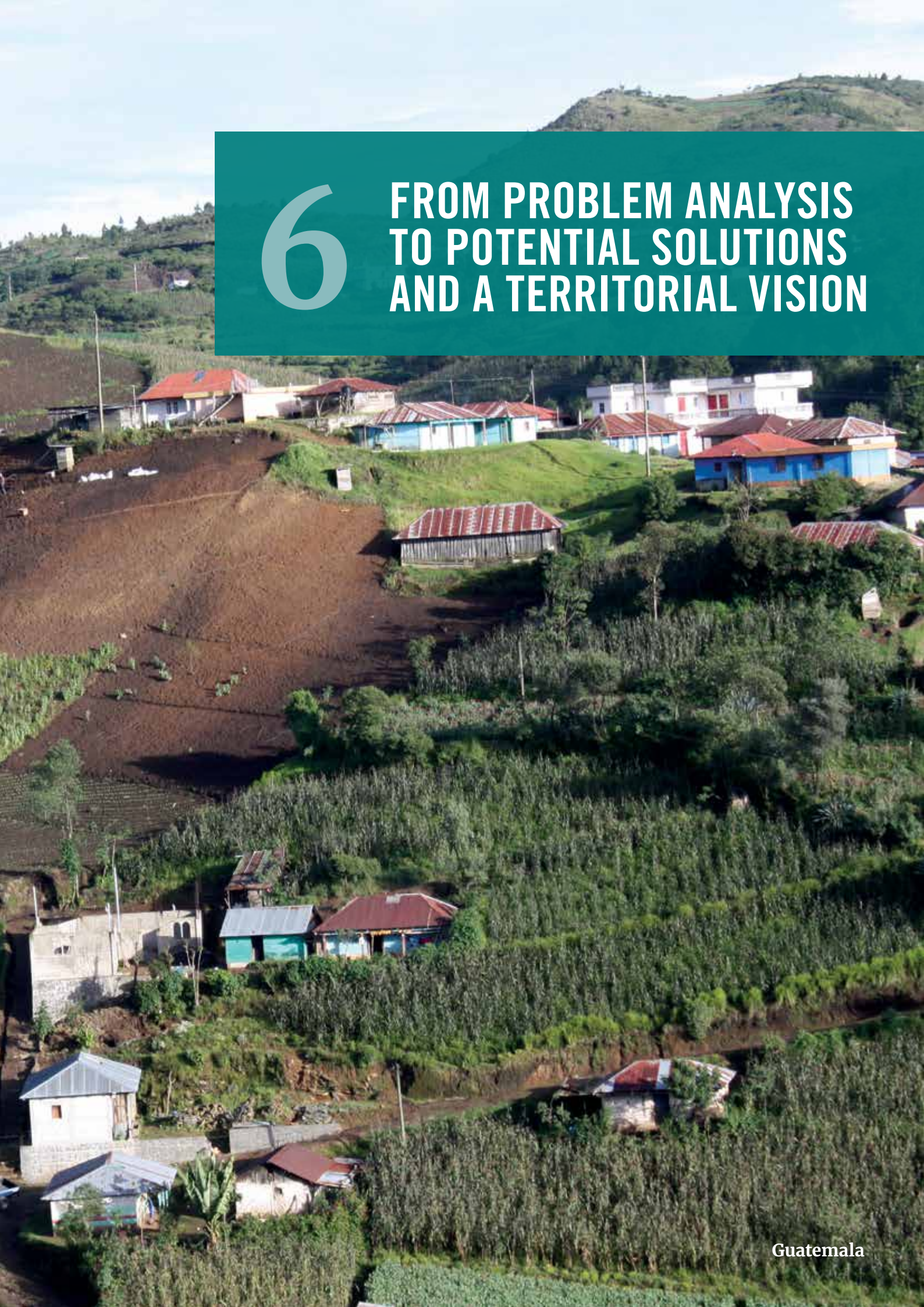
Watershed assessments should incorporate new knowledge and tools linked to assessing the value of ecosystem services as well as the cost of loss and damage. Knowing the value of ecosystem services provided by upper watershed areas – particularly those services that regulate and support natural processes, such as water flow regulation, water purification, nutrient cycling and habitat provision – is a prerequisite for understanding their contribution to economic development and for promoting investment for their management, including through innovative mechanisms for the compensation of ecosystem services. Since unsustainable natural resource management practices in upland areas can result in serious damage downstream, economic quantification of damage can also make a case for investment upstream. Quantification of loss and damage is also gaining momentum in the context of adverse effects of climate change and should therefore be referenced in adaptive watershed planning and management.

Identification of priority "no-regret" actions for immediate implementation during the assessment phase can help build trust and confidence between the project team and the watershed population. To respond to urgent needs expressed by watershed inhabitants during the assessment, primarily related to gaps in infrastructure, action research can help to identify and implement low-cost and simple investments that can have collective benefits and an immediate positive impact on people's livelihoods (see Chapter 6). In addition, such actions are considered a good way to engage the local population in the longer-term planning process and in the implementation of future activities.

The key results of the assessment must be systematically captured to establish and refine the baseline and to finalize the arrangements for future data collection and monitoring. The baseline is needed to compare changes over time. To measure the progress and impact of project activities in the biophysical, socio-economic and institutional dimensions, it is necessary to select a set of indicators that will become the building blocks of the M&E system (see Chapter 9).

©Thomas Hofer

6 FROM PROBLEM ANALYSIS TO POTENTIAL SOLUTIONS AND A TERRITORIAL VISION



Guatemala

6 FROM PROBLEM ANALYSIS TO POTENTIAL SOLUTIONS AND A TERRITORIAL VISION

This chapter looks at how the results of the assessments were used to analyse the current situation, discuss desirable future land use and management options in the watershed, and prioritize activities for eventual implementation. The results need to be presented to and discussed with all stakeholders to reach an agreement on the findings and to develop a road map for future action. A stakeholder workshop involving representatives from the local communities, technical line agencies, civil society and the local administration is usually a good venue for presentation and discussion of the assessment findings.

With dwindling natural resources and continuing population growth, there is a need to accelerate the shift from extractive land-use forms (for short-term profits but also as a survival strategy of the rural poor) to more sustainable land-use systems. Landscape approaches are gaining momentum as processes for identifying the best future land-use options and optimizing resource efficiency and agricultural productivity. Strategies for deriving the best options include, among others, water resource efficiency analysis and land suitability assessments, which evaluate the land's capacity to sustain specific land uses and its productive potential.

According to GIZ (2012), land-use zoning, i.e. the delimitation of homogeneous zones that have either the same biophysical characteristics or the same functions, should be part of any land-use analysis. The categories for zoning should be derived from the key problems, major challenges and/or main potentials of the intervention area (in this case the watershed). A matrix is generally produced indicating the principal characteristics of each zone.

The set of maps generated in the assessment phase help to visualize the results in a way that can be easily understood by all stakeholders. Maps are powerful tools for contrasting current and future uses of land and land resources. They are also used to identify and localize hot spots, i.e. areas that have a special need for treatment or protection or an unusual development potential. Both the maps generated by technical experts with GIS tools and the participatory maps drawn by the communities are useful in this regard.

The identification and mapping of areas for protection and production interventions across all land-use categories is a key step in watershed management planning. Box 6 gives some examples of key areas that could be identified, mapped and demarcated for future action in the watershed:

The mapping of potential intervention areas needs to be combined with an identification of the livelihood needs of different stakeholder groups and an analysis of the tenure systems governing the rights of these groups to access and use the watershed resources. Competing needs and conflicts between different groups may have to be analysed and understood as well.

Several tools are available for analysing problems, identifying objectives and solutions and developing scenarios for the future. A problem tree or a problem analysis chart can be a useful visual tool for clarifying the causes and effects of a problem and highlighting the links among them. It can be applied within PRA exercises and in smaller focus group meetings (e.g. divided by sex and/or age) to capture the views of different actors. Discussion of the main problems in the watershed and their underlying causes can then be used to identify potential solutions and development opportunities. A problem tree can be reformulated into a solution tree, and the problem analysis chart can easily be expanded to include not only the causes of each problem but also existing coping strategies and possible future opportunities.

Participatory scenario development (Reed *et al.*, 2013) can be useful to identify and develop the available options for improving the state of the watershed. Further analysis of the options involves assessing their technical, operational and economic feasibility and cost effectiveness (see Chapter 6). Ranking and scoring of different options against a set of predefined environmental, economic and social evaluation criteria will support negotiation and decision-making to settle on the most appropriate solutions.

Various conceptual frameworks have been developed over the years for analysing complex environmental problems and the interaction between social and ecological systems, such as the driver, pressure, state, impact, response (DPSIR) framework and the sustainable livelihood approach (SLA) (see Binder *et al.*, 2013 for a thorough comparison

BOX 6

Potential intervention areas in the watershed

- Areas that are ecologically sensitive or particularly valuable and that need to be protected from destruction and conversion to other uses, e.g. forested headwater areas, riverbanks or freshwater reservoirs; areas with a high natural or agricultural biodiversity value or concentration; areas with high carbon stock; or areas where a change in land use would have negative impact on critical environmental services or local peoples' livelihoods
- Areas that are protected by national legislation (nature reserves, national parks and other categories of protected area as classified by IUCN) or by international conventions such as the Ramsar Convention on Wetlands or the United Nations Educational, Scientific and Cultural Organization (UNESCO) system of World Heritage Sites
- Areas that are degraded or threatened by misuse, overuse or contamination and that need restoration, regeneration or rehabilitation, e.g. agricultural areas where soil fertility needs to be restored to increase or restore productivity; areas of deforestation and forest degradation where afforestation or reforestation activities could enhance carbon sequestration and wood supply; or overgrazed pasture areas that need to be temporarily fenced off to allow for regeneration
- Areas of input-intensive (often monocultural) crop production that could be converted gradually into less intensive, more sustainable and more diversified systems, e.g. agroforestry systems, thus also improving ecosystem services, flows and functions in the watershed
- Areas demonstrating comparative advantages for the sustainable intensification of agricultural production, e.g. potential irrigation areas, areas with relatively high soil fertility or areas with better access to infrastructures and services, where a shift from large-scale, extensive, low-input and low-return subsistence agriculture to more intensive, higher-input and higher-return farming of smaller areas could help to reduce the agricultural footprint and land consumption rates
- Areas that are prone to erosion or at risk of landslides, flooding and other natural disasters
- Areas where current crops or livestock breeds may need to be replaced by different varieties or subjected to different management practices in order to adapt to projected climate change and to cope with increased frequency and/or severity of extreme events such as drought, heat, storms, hail or rain
- Areas where crop production is no longer feasible or profitable and where a switch to livestock grazing or other extensive use could be beneficial
- Areas that need to be maintained for local food security, e.g. home gardens, community forestry woodlots or fish ponds, to ensure healthy, nutritious and diverse food for current and future generations
- Areas that are the object of conflict between different land users, for which agreements need to be negotiated
- Areas that could be set aside for responsible larger-scale agricultural investment

of ten such frameworks). However, none of the projects seem to have systematically applied these conceptual frameworks, and only a few used some of the available analytical tools. Indeed, documentation on this step of the process is rather thin in the project documents reviewed.

After producing a table of potential solutions and options for future action, the next step is to assess the feasibility – technical, environmental, social, institutional and, most importantly, economic – of these options. At the same time, it is necessary to define the concrete objectives of what can realistically be achieved by a watershed management plan. Having defined the objectives and narrowed the list of options to those that are feasible, projects can set priorities and select the most appropriate solutions for implementation.

It is not likely that all possible and desirable measures can be implemented, since the type and number of selected activities is usually a function of the available budget. If the benefits and associated costs of proposed measures can be expressed in monetary units, the cost-benefit ratio can help to prioritize among actions.

It is important to define clear and transparent criteria for determining priorities and selecting specific activities for implementation. The choice is highly context specific, and it is generally challenging to find the right mix of measures and to balance different needs and expectations. Apart from the cost-benefit ratio, other criteria could include:

- the need for urgent action on a pressing or recurring problem;

- a measure's proven effectiveness and good potential for adoption and uptake;
- a preference for collective action to deal with common-pool resources and public goods (as opposed to individual benefits on private lands);
- the need for short-term economic returns;
- an intervention's suitability as a simple and early no-regret measure that can help build confidence and trust.

Activities may also be selected to be staggered over time, with immediate priority given to addressing the most urgent problems, and activities that are less important or more elaborate postponed to a later stage in the process.

IDENTIFYING AREAS FOR INTERVENTION

RESULTS OF THE REVIEW

The projects in **Tajikistan I** and **Turkey**, which operated over a small territory and were oriented mainly towards demonstration, seem to have skipped this step and moved immediately towards the selection of a set of interventions.

In **Morocco**, GIS maps were prepared during the assessment phase for the detailed analysis of biophysical aspects and to identify and map homogeneous land-use units within the watershed. However, hardly any use was made of this concrete georeferenced information in the selection and prioritization of field interventions.

In the **OUBAME** countries, changes and trends identified during a thorough and participatory assessment phase made it possible to outline the actions required to reduce environmental pressures and improve local livelihoods. Involving local households, women, farmers and nomadic herders right from the start, together with line agencies, local technicians and local authorities, led to a rich diagnosis of strengths, weaknesses, risks and opportunities. However, the project did not fully address the linkages among conditions and actions at different locations within the watershed territory. Thus opportunities related to improved use and conservation of rangelands in the upper part of the watershed (in **Ecuador** and **Morocco**) or in extended neighbouring areas (in **Mauritania**) were partly overlooked, even where problems and risks stemming from traditional management practices were evident. The omission was probably due to the complexity of the existing socio-cultural and tenure issues; neither project management nor national authorities were willing at that time to confront the changes in natural resource governance or national legal instruments that would have been required to address the problems.

In **Pakistan**, the watershed management component was added to a large livelihood rehabilitation project to address jointly the impacts of a sudden shock (the earthquake) and long-term unsustainable management practices. In this context, it was necessary to distinguish deep-seated landslides provoked by an earthquake or other tectonic process from shallow landslips that occur because of erosion on slopes due to human-induced overgrazing or deforestation. Only the latter can be addressed by watershed management actions. The distinction of these two features helped to raise awareness of one of the key principles of watershed management: the need to address the underlying causes, not just treat the symptoms of a problem. A resulting shift in the perceptions of national authorities allowed the project to move beyond purely technical issues of landslide stabilization to embrace broader local development issues.

In the **Chimborazo** project in **Ecuador**, the altitude, water, soil conditions and vegetative cover were identified as the main criteria for further subdivision of the watersheds, with a view to identifying appropriate actions in their higher, middle and lower parts. When the watershed management plans were developed, each watershed territory was subdivided into three major categories:

- Areas for environmental conservation
  - Nature reserves and protected areas
  - Environmental restoration areas
- Areas for socio-economic development
  - Crop production areas
  - Livestock production areas
  - Forest production areas
  - Mining areas
- Special areas
  - Water bodies
  - Urban zones

LESSONS LEARNED

Project experiences related to watershed zoning showed mixed results. Some projects (generally those aiming to demonstrate individual interventions rather than seeking area-wide coverage) did not divide their intervention areas into zones that had the same characteristics or that were suitable for the same types of intervention. Other projects embarked on GIS-based watershed zoning and mapping but did not consider the results of this exercise when defining specific activities in the subsequent planning phase. Only a few projects used the zoning exercise as the basis for identifying suitable locations for proposed field interventions. As will be seen in Chapter 7, the variety of approaches to spatial planning, zoning and mapping largely coincided with the specific objective and scope associated with each watershed management plan.

All the projects were oriented towards seeking solutions for specific problem areas (as identified by local stakeholders), while only a few sought to identify geographical areas that had a particular development potential. In such areas, conversion to other more

productive uses could make a substantial contribution to livelihood improvement and economic development (within the limits of the existing natural resource base).

RECOMMENDATIONS

Instead of thoroughly analysing the whole watershed territory and evaluating all potential land uses and development options, it may be more appropriate and less time consuming to focus on the articulated priorities of the local stakeholders and on selected problems or existing land-use conflicts that need an urgent solution. While complete spatial watershed zoning is desirable for larger-scale area-based planning, it may not always be necessary. The identification of key areas in the watershed that have a particular problem or a particular potential may be sufficient and may help to narrow the focus from a broad assessment of the situation to what the project can and will do. In watersheds that span a large altitudinal gradient, mapping areas retained for special purposes together with the distinct biophysical and socio-economic characteristics of each altitudinal zone can be useful for localizing potential intervention areas.

ANALYSING PROBLEMS AND IDENTIFYING SOLUTIONS

RESULTS OF THE REVIEW

In **Pakistan**, major problems were listed by sector, and for each problem the main underlying causes were identified as well as a few prioritized activities to tackle each problem (Table 5). What was missing was the spatial dimension, e.g. the localization of areas experiencing the problems and where the activities would be implemented. Since the project did not define or map geographical areas for specific interventions or undertake a complete watershed zoning, it is difficult to perceive the reasoning that guided the selection of areas for the implementation of project activities.

In the watershed in **Kyrgyzstan** that served as a training site for the subregional project in **Central Asia**, problems and solutions were identified in two parallel processes: a one-day PRA exercise in the village in which 23 men and 15 women participated (of a total population of 1 597 people); and a separate meeting for other stakeholders, including the Deputy Governor of the District and technical experts from district and central units of forestry, agriculture, water and pasture agencies, as well as schoolteachers, village committee members and the Turkish planning team. Following the two gatherings, a joint visit of the problem sites was organized for the experts and the villagers.

The two processes differed largely in both the problems identified and prioritized and the solutions proposed (Tables 6 and 7). Problems identified by the villagers revolved around the village's immediate infrastructure needs (repair of drinking and irrigation water systems, repair of bridges, school heating) and lack of physical assets (agricultural machinery, milk processing, sawmill) (Table 6). Their awareness of the state of the natural resources surrounding the village seemed to be limited. Insufficient grass and fodder resources were mentioned as a low-priority problem, and tree planting was desired only for ornamental purposes to green the village. On the other hand, the two high-priority problems identified in the technical meeting (Table 7) were the inadequate use, degradation and low productivity of some pasture areas and the inadequate forest and tree cover in the microcatchment. This process also mentioned the local beekeeping potential, which the villagers did not bring up at all. Ultimately the experts included activities of both types, natural resource rehabilitation work and infrastructure development, in the watershed management plan (see Chapter 7).

The **Kyrgyzstan** example shows a rather narrow interpretation and application of the PRA tool, which could have been used more inclusively to bring together all the stakeholders in the watershed, not just some villagers. Creating more space for discussion among local people, local authorities and technical experts, beyond the one-time joint field visit, could have led to consensus on interventions for inclusion in the watershed management plan. Such an approach can build confidence, foster an agreed territorial vision and strengthen local resource governance and uptake of natural resource management measures. A more inclusive process is also conducive to local empowerment and reduces dependency on external assistance in the long run, making the project more sustainable.

Priority setting in Guatemala involved analysis of options for restoring the forest landscape and the development of a spatial model to identify priority sites

©Thomas Hofer

TABLE 5. ANALYSIS OF PRIORITY PROBLEMS, THEIR CAUSES AND PROPOSED ACTIVITIES IN THE PAKISTAN PROJECT (FROM THE GULMERA WATERSHED MANAGEMENT PLAN)

Problem area	Causes	Prioritized activities
Crops		
Uncultivated land	Soil erosion Unlevelled land Non-availability of seed Lack of financial resources Lack of irrigation	Field terracing/levelling Retaining walls Introduction of new crops and provision of seed Intercropping Diversion channel
Lack of small-scale vegetable and orchard production	Small landholdings Lack of skills in orchard management Lack of awareness of new cash crops (fruits and vegetables)	Introduction of new cash crops (orchard and vegetables) Skill enhancement training in orchard management and vegetable production Development of market linkages
Low income from crop husbandry	Lack of improved seed Lack of skills in cultural practices Undulated land for cropping	Provision of good quality seed (rainfed) Intercropping Training for skill enhancement Land levelling
Livestock		
Low milk production	Lack of improved breeds Disease attack Non-availability of immediate services Insufficient feed supply Lack of improved skills in animal rearing Lack of financial resources	Regular vaccination and deworming campaign at village level Provision of doorstep veterinary services Introduction of new fodder species Hedge plantation of fodder trees Training of local extension workers
Population decrease	Mortality during earthquake Lack of financial support Local breeds	Provision of good-quality breeds for breeding purposes
Forest		
Deforestation	Increase in population pressure No alternative for heating and cooking energy sources Landslides and erosion	More plantations Hedge plantation on agricultural land Landslip stabilization through (bio)engineering techniques Introduction of biogas plant
Microenterprise development		
Lack of income resources	Economic life cycle disturbed by earthquake Savings utilized in illness and recovery after earthquake Lack of financial support Lack of skills in rural entrepreneurship	Poultry farming (female activity) Tube nursery establishment Medicinal crop production Garden of ornamental flowers Kitchen gardening
Productive infrastructure		
Limited availability of productive physical infrastructure	Increased requirement of funds because of earthquake Construction on small scale because of limited resources	Rehabilitation of bridle path Rehabilitation of irrigation channel Construction of diversion channel Construction of animal pond Construction of shelter for poultry farming

TABLE 6. PROBLEMS AND DEVELOPMENT NEEDS IDENTIFIED AND SOLUTIONS SUGGESTED BY VILLAGERS IN TELMAN, KYRGYZSTAN: RESULTS OF PARTICIPATORY RURAL APPRAISAL

Problem or development need identified	Priority	Solutions suggested
Inadequate drinking-water system (water transmission pipes broken at some locations; water intake and chlorination units in need of repair)	1	Replacement of broken drinking-water transmission pipes Replacement of broken chlorination devices (2) Repair of metal screen at the water intake point from stream
Irrigation water system in need of repair (serious water losses [30–40%] due to broken channel sides and bottoms at different locations; lack of water reservoir)	2	Repair of destroyed parts along 3 km of irrigation channel (procurement and placement of 100 concrete blocks) Concrete lining of the upper part (3 km) of the main channel Establishment of a water pond
Few trees in the village and the need for village greening plantations	3	Planting ornamental trees and plants (e.g. spruce, pine, oak, blackwood) along village roadsides, on the village administration premises, in the school garden, around the football field and in the village cemetery
Poor road conditions for access to highlands and summer pastures	4	Repair of the road to the highlands and summer pastures
Low milk sale prices and the need for processing and better marketing of milk	5	Establishment of a milk collection centre and/or a dairy plant to serve for Telman as well as neighbouring villages
High cost of getting trees sawn/processed in Karabalta town	6	Establishment of a small sawmill in Telman village, which would also serve for neighbouring villages
Few and old fruit orchards, inadequate practices and productivity	7	Provision of saplings of high-quality fruit-trees Technical assistance for establishment of sample fruit-tree orchards with interested villagers, including drip irrigation demonstrations
Lack of agricultural machinery	8	Assistance for procurement of tractors for Telman village administration
Two bridges in the village in need of repair	9	Repair of the culvert under the bridge connecting to the village cemetery
Inadequate heating of the village school in winter	10	Support for improving insulation of the school building
Inadequate football field	11	Levelling of village football field
Other problems: ▶ Ticks/mites ▶ Insufficient grass and fodder ▶ Poor electric line ▶ Lack of agricultural terraces	12	Assistance for addressing these problems

In the **Guatemala** project, where people's livelihoods were highly dependent on forest ecosystem goods and services (especially water), priority setting was focused on activities to restore the forest landscape in the watersheds. Various restoration options were analysed and a spatial model was developed to identify priority sites where restoration benefits would be higher than elsewhere. Biophysical features, including existing high-value areas such as water sources or community forests, were mapped through a participatory process in a series of field visits to communities and meetings with community leaders. Social criteria were included to assess the socio-economic viability of the proposed actions, for example by mapping areas where inhabitants showed a high degree of interest and acceptance and a high level of community organization.

LESSONS LEARNED

The projects tended to devote more attention to analysing the current situation than to planning for the future. This phase revealed that in addition to the risk of the assessment phase absorbing excessive time, resources and stakeholder energy, too much attention to problem analysis may divert the focus away from the planning of concrete actions. The work plan should reflect a balance in the time, resources and attention paid to activity planning *vis-à-vis* the situation assessment and data analysis.

Project staff increasingly took on the role of external facilitator. To help actors analyse their own problems and to mediate diverging views, the role of an external facilitator cannot be underestimated. Project staff increasingly took on this role, facilitating dialogue, consultation and negotiation processes, thereby building consensus and trust among stakeholders.

Tools for vision mapping and scenario development were not used. Vision mapping and scenario development tools are considered useful to discern ideas and priorities for future development, but the projects did not systematically use them either in the framework of PRA exercises or in modelling alternative land-use options.

TABLE 7. PROBLEMS AND DEVELOPMENT NEEDS IDENTIFIED AND SOLUTIONS SUGGESTED BY TECHNICAL EXPERTS AND LOCAL GOVERNMENT REPRESENTATIVES IN KYRGYZSTAN

Problem or development need identified	Priority	Solutions suggested
Inadequate use, degradation and low productivity of some pasture areas	High	Rehabilitation of pasture lands
Inadequate forest and tree cover in the microcatchment	High	Afforestation Rehabilitation of degraded forest lands
Increasing erosion risk on steep lands of the microcatchment	Middle	Planning and conducting erosion control measures and interventions
Inadequate use of beekeeping potential	Middle	Beekeeping development demonstrations with selected households
Need to grow poplar and other fast-growing trees on more areas	Middle	Provision of high-quality saplings of selected poplar clones/varieties
Lack of fodder cultivation on rainfed lands	Middle	Establishment of demonstration sites with sainfoin (*Onobrychis* spp.) and other suitable fodder crops on suitable rainfed lands, including on and between terraces
Awareness-raising and capacity development needs in relation to: ▶ natural resource conservation and sustainable management ▶ development of innovative and adaptable opportunities for improving livelihoods and socio-economic circumstances of the people whose daily activities strongly affect the sustainability of natural resources around the village	High	Practical training (in Kyrgyzstan and Turkey) Technical study tours for local villagers and decision-makers Technical assistance

RECOMMENDATIONS

It is useful to develop different scenarios of future land-use and land-management options based on the information and data collected during the assessment. Scenario development requires good-quality data and appropriate tools to support the analysis. The scenarios should include at least a business-as-usual scenario highlighting the negative consequences and trends if no remedial action is taken; a minimum scenario in which the most pressing drivers of degradation are addressed; and an ideal scenario describing the desired state of the watershed in the future. Scenario development must take place in a multistakeholder setting where the anticipated changes and their implications for different groups can be identified, and where consensus can be built among stakeholders about what a desirable future could look like (WRI, 2008). By talking and listening to each other, stakeholders may develop a better understanding of the impact of their actions and practices on others. Such a process must be facilitated and guided by an experienced moderator and backed up by evidence from research.

Science can help with scenario development and modelling. A closer collaboration with local research institutions, universities and academia should be systematically foreseen when new watershed management projects are designed. Bringing together the newest research-based scientific knowledge, local traditional knowledge and the practical experience in the watersheds will support cross-fertilization between science and practice, which is particularly necessary where there is no standardized analytical framework for modelling the complex interactions and processes in the watershed. Such collaboration may also inspire local universities to set up research programmes for more applied and implementation-oriented research.

Stakeholders need to be made aware of opportunities and alternative land-use options that could be more favourable than their current practices. It can be useful to organize in-country study tours in which representatives of local communities can view interventions in other areas that could potentially be transferable and applicable in their own context. Such visits can help them to open up to new ideas and to visualize potential impacts in their own communities, thus contributing to an enhanced basket of options and the creation of a local watershed management vision.

A range of watershed stakeholders must be involved in problem analysis, identification of alternative options and delineation of potential areas for interventions. Linking local stakeholders with scientific experts is key to fostering mutual learning and understanding about the watershed. Local communities may not be aware of innovative potential solutions tested elsewhere, while technical experts are not necessarily familiar with the specifics of the area. Involving local actors in the identification of options and scenario-based planning also enhances ownership of the solutions proposed, helps

to build a territorial vision and can contribute to the resolution of existing conflicts among stakeholder groups. To this end, transparent and inclusive consultation, negotiation and decision-making processes are required (not merely an occasional stakeholder meeting). Project teams are increasingly facilitating such processes and mediating diverging stakeholder views.

PRIORITY SETTING

RESULTS OF THE REVIEW

In **Turkey**, the project team selected nine activities for implementation out of 25 intervention proposals made. Criteria applied during the selection process include a contribution to improved local livelihoods, a positive impact on the protection and sustainable use of the natural resources and a visible result at the project's end.

In the **Chimborazo** project in **Ecuador**, priorities were defined in the project document, which stipulated a transition from traditional village development planning based on administrative boundaries to landscape planning based on hydrological watershed boundaries. This watershed management planning approach was fully in line with the provincial government's development plan "Minga por la vida" (Participatory work for life); the micro projects to be implemented by the project (see Chapter 7) had already been prepared and designated as high priorities during the provincial participatory planning process associated with "Minga por la vida", but had not yet been implemented because of a lack of resources and technical capacities. The provincial government was under pressure to focus on immediate poverty reduction goals and had often had to compromise long-term environmental sustainability for short-term income generation objectives. Accordingly, the project prioritized not only environmental and livelihood improvement activities, but also institutional and legal assistance for mainstreaming biodiversity considerations in the provincial development programme and in key sectoral strategies in a way that would be economically feasible, environmentally beneficial and politically palatable in the short and long run.

In **Kyrgyzstan**, in the subregional project in **Central Asia**, activities selected in line with the priorities identified by the experts and villagers were clustered in two thematic blocks:

- Conservation, rehabilitation and sustainable use of natural resources: physical interventions for soil conservation through terracing, planting of seedlings and gully plugging through check dams and wattles; pasture improvement through stone collection and construction of stone cordons along contour lines; and agroforestry and fast-growing tree plantations;
- Income generation and livelihood improvement activities: repair of irrigation channels; repair of drinking-water facilities; village greening and beautification; fruit orchards; beekeeping; and maize production for animal feed, including installation of a fodder mill.

The activities also included awareness raising and capacity development in technical aspects of natural resource management. In addition, feasibility studies were carried out for the construction of a sawmill and a milk collection and marketing centre (with negative results).

In the **OUBAME** countries, several field demonstration actions were carried out during the initial assessment phase to keep up the project's momentum with the local population. Selection criteria for those activities were derived from preferences expressed by local associations and household groups, mainly women. The actions included, for example, distribution of fruit-tree seedlings to compensate for terrace maintenance or support to handicraft production as an additional source of income. Project staff also proposed a certain number of localized demonstration activities for the recovery of vegetative cover and forest protection.

Similar criteria were adopted to select activities at a later stage in the watershed management planning, i.e. a mix of natural resource management activities together with income generation and diversification as well as capacity building at different levels. At this stage, more effort was made to integrate the proposed field activities in the annual regular programme of the technical agencies. In this way the project enabled them to comply with their mandates while at the same time promoting an adjustment in their approach and modalities of implementation, in line with the participatory and integrated nature of the project's approach.

A collaborative institutional process involving regional and local development councils and the political authorities made it possible to mobilize education and health services as well as other development projects and NGOs working in the same areas. The result was a mix of hard measures (physical or structural measures such as infrastructure, buildings and other constructions) and soft measures (non-structural measures such as changes in management practices, planning and individual behaviour) intended to provide concrete contributions to local agricultural production and livelihood conditions. Some of the hard measures were for the benefit the whole territory (e.g. improvement and rehabilitation of roads), others were for the benefit of specific user groups (irrigation check dams and water diversion channels), while some, such as medium-size retention dams planned in the upper part of the watersheds in **Morocco** and **Mauritania**, were also intended to benefit the downstream population by decreasing the recurrent risks of river floods. Most of the actions aimed at income generation and diversification were by nature targeted to individual groups of persons or households.

LESSONS LEARNED

The projects made little effort to document the feasibility assessment, the selection process and the criteria applied when selecting priority interventions for implementation. From the documents reviewed, it is not possible to understand how projects decided which interventions to pursue and which to discount. The screening of options against a set of feasibility criteria covering all dimensions of feasibility (technical, operational, environmental, institutional, social and economic) was also not documented and may not have been conducted in a systematic way. It is largely unclear which criteria were used for the final selection of activities.

Whenever activities are selected, it is important to involve from the beginning the technical agencies that will assist with their implementation and take over after the project's end. Incorporating the selected activities into local government planning and establishing linkages with regular interventions planned by line ministries is crucial. A district forestry officer given a target to reforest a certain number of hectares, for example, would do well to consult the eventual watershed management plan to see whether any critical areas have been identified and designated for reforestation. Since the plan will have been negotiated with the local population, it is likely that reforestation activities can be implemented without major opposition and with the direct financial, technical and personnel support of government authorities.

Projects did not sufficiently engage downstream water users or operationalize the concept of upstream–downstream linkages. Since conservation interventions are not likely to yield economic returns at the household or community level, incentives and compensation schemes may be necessary to support their adoption, acceptance and further replication and uptake after the end of the project. Conservation and proper management of upland watershed resources can create significant off-site benefits such as flood prevention or controlled water discharge. Involving downstream resource users (for example, private companies, industrial plants or municipalities that source their water from upland areas) in the project is a means of planting the seed so that these users will ultimately agree to compensate upstream stewards of the resources for managing them in a sustainable way. While the need to reflect upstream–downstream linkages is a key principle of watershed management (see Box 1 in Chapter 1), this principle was hardly ever translated into concrete and convincing action.

RECOMMENDATIONS

Field activities in a watershed ideally include short-, medium- and long-term interventions as well as a mix of environment- and development-focused interventions. Investments in natural resource management, which often show delayed or indirect returns, must be balanced with short-term economic gains and benefits.

Early "no-regret" measures or "credibility investments" can be valuable to engage the watershed residents in the management of the watershed, to build their confidence and trust and to get their support for longer-term planning processes. Low-cost infrastructure investments that benefit the whole watershed population or a large section of it, such as repair of a drinking-water supply system or maintenance of a rural road, are particularly useful activities to improve people's livelihoods and the environment. In addition, they create local employment opportunities.

Collective benefits should be preferred over individual benefits. If activities are selected that benefit individual households, the community (in the form of a WMC or interest group) should be involved in the selection of the beneficiaries, and the criteria to be applied should be carefully documented. The selection of these individual beneficiaries requires careful consideration and depends greatly on the activity. Individual beneficiaries, for instance, could be chosen from a specific vulnerable or poor segment of the population, especially in those cases where activities aim to reduce poverty and income disparities; or they could come from a specifically motivated or skilled segment of the targeted communities, e.g. youth, if for instance the project wishes to support business or small enterprise development. When activities are intended to bring about an immediate economic return, an appropriate contribution from beneficiaries should always be foreseen. A WMC that fully represents the diverse social groups can play a crucial role in the selection of beneficiary households for specific interventions.

Each selected intervention needs to be targeted to the needs of specific beneficiary group(s) and should be an integral part of the watershed management plan. In line with an earlier recommendation that specific and targeted actions need to be identified for each group of beneficiaries under each relevant output, likewise each activity selected for implementation and inclusion in the watershed management plan must be clearly described, including a clear indication of which group(s) of beneficiaries will be involved in each activity and how they will benefit from it. To the extent possible, activities should address existing gender inequalities.

A feasibility check to assess the practicality of the prioritized solutions is highly recommended before formulation of the plan and implementation of activities. This need not be a detailed study, but it should document the results of a quick appraisal of the technical, institutional, environmental, economic and social feasibility of the solutions.

Particular attention should be paid to analysis of the economic feasibility and cost-benefit ratio of proposed interventions. Assessment of the economic feasibility is particularly important for business development activities that are designed for individual or group beneficiaries and that involve an important start-up investment from project resources. Activities that have some potential economic return should be preferred to those that cannot easily produce revenue without external support. Important questions to ask in this regard include the following: What are the costs of implementing the activity? How will the costs be shared? Are the costs acceptable in comparison with the expected benefits? How long will it take to achieve a return on the investment made? The responses to these questions will not only provide valuable information for project managers to orient the selection of activities, but will also help to strengthen the capacity of rural households and associations in the planning, implementation and monitoring of their own investments. A similar process could also take place with local authorities at the communal level to promote a territorial mix of actions in which line agencies and other stakeholders can act within a common framework and vision and ideally pool their resources for joint local investments.

Each selected activity should be scrutinized for its institutional feasibility to identify the right form of local organization not only for its smooth implementation, but more importantly, for its continuity after the project ends. In this respect, the assistance of an expert in institutional development and grassroots organizations is highly recommended. The choice among informal user groups, associations or cooperatives cannot be left in the hands of the project team if it has insufficient technical expertise in these issues. An enormous number of global, regional and national studies is available on the diverse forms of local organization promoted by technical and resource partners over the years.

The potential environmental and social impact (positive or negative) and risks of each selected intervention must be assessed to prevent and mitigate undue harm to people and the environment at all scales, even in small-scale investment activities. Interventions that may have negative environmental effects (e.g. water or air pollution, habitat disturbance) and/or social effects (disadvantaging or unfairly preferring particular groups of people) should ideally not be pursued or must be closely monitored. The capacity of stakeholders to identify, understand, monitor and mitigate any emerging environmental degradation or social disruption must be strengthened.

©Sid'Ahmed Lehbib, Cheikh ElHousseine

7 THE WATERSHED MANAGEMENT PLAN

Mauritania

7 THE WATERSHED MANAGEMENT PLAN

This chapter deals with the formulation and validation of the watershed management plan. Since not all of the projects produced a plan, this chapter refers to some of the projects only.

Plan formulation is often not a separate distinct step in the project, but rather a gradual process after the results of data collection and analysis have become available and consultative stakeholder processes to compare the actual and desired future state of the watershed have been completed and documented. The plan summarizes the most salient points resulting from the assessment and provides links to the detailed studies produced in the project. It is not necessary to present all the details in the plan. However, it should include the maps prepared in previous phases, both those based on GIS and those drawn by stakeholders, either integrated in the text or attached as an annex.

A watershed management plan should contain the following elements (adapted from GIZ, 2012):

- a brief description and analysis of the initial situation, highlighting existing problems, challenges and potential, as well as trends and drivers;
- a brief description of the consultative process among technicians, authorities and local populations;
- clearly defined objectives of the plan, including the vision developed;
- a clear intervention logic, explaining the spatial interlinkages among the measures selected for implementation and their impact on each other;
- expected monetary and non-monetary benefits of the interventions, including synergies and consensus on necessary trade-offs;
- initial and running costs of the interventions as well as a financial plan, including budgets and the contributions of different funding sources, including the beneficiaries;
- the division of tasks and responsibilities among institutions and individuals;
- the timetable for implementation;
- the overall responsibility for plan implementation;
- the clearly defined geographical area for which the plan is valid, including clear identification of areas where specific interventions will take place;
- agreements negotiated between or among different resource users, including compensation for restrictions on land use and sanctions if any agreements are not respected;
- reference to existing village or municipal development plans and/or sector plans that must be respected;
- the M&E plan and indicators for monitoring the effectiveness of the implementation of the watershed management plan.

The watershed management plan is a unique document, adapted in form, content and language to a specific local context, reflecting its origin from a negotiation process among diverse stakeholders. It is important to ensure that all stakeholders adhere to the plan and identify with its contents.

To ensure firm stakeholder buy-in and commitment, it is important to present the plan in a formal meeting or workshop where it can be approved by all parties involved, including technical line agencies, municipalities and the local population. This step will not only secure the concrete involvement of relevant technical services and local authorities in the short and medium term, but will also foster internalization of the project experience in national policies, programmes and budgets.

FORMULATION

RESULTS OF THE REVIEW

Short- to medium-term plans. The simplest plan, from Turkey, is the ten-page draft "Land-use plan for Turkmen Village", which sketches current land use, lists problems related to current land management and presents ideas for improved land-use and management practices. The national natural resource management consultant prepared the document following the collection of existing data and maps and considering the baseline survey reports elaborated by the project. However, the lists of problems and solutions both lack analysis and are not prioritized. Two maps comparing the present and potential land use were apparently prepared but were not attached to

the plan, and these maps could not be retrieved. The document states explicitly that it is not legally binding for the village or local authorities, "since there is no legal regulation for the land-use plans to be compulsory in Turkey and there is no authority to approve the plan to put [it] in action". The document is considered a simple future road map for the villagers, local officers and project staff, not necessarily bound to the project's lifetime. While the approach was pragmatic, some deeper and more innovative thinking would have been needed to meet the project's objective of developing a new model for sustainable mountain development that would make its way into national institutions, policies and legislation, ultimately influencing decision-making and creating transformational change.

In **Pakistan** and **Kyrgyzstan**, the watershed management plans were a project output with a one-year time frame and a fixed budget, but no longer-term vision and perspective. These plans were formulated to summarize the set of interventions negotiated with local populations to be carried out during the projects' lifetime.

In **Pakistan**, watershed management plans were formulated for each of the 17 watersheds covered in the project. ICIMOD prepared the first plan, and gradually handed over the lead in formulating the other plans to the Forestry Department and its divisional offices. Each plan was prepared with inputs from the local project team and reviewed by ICIMOD, and each was based on participatory assessments and identification of the key needs and priorities of stakeholders in the watershed. The plans were designed to allocate and distribute the project funds earmarked for field interventions, USD 50 000 for each site. No co-financing from other line agencies or development partners was envisaged.

The first plans included predominantly landslip stabilization interventions, combining structural (engineering) and vegetative (bio-engineering) measures. Later plans increasingly added small-scale demonstration activities to support crop and livestock production (e.g. field terracing, provision of improved seeds and fertilizers, establishment of kitchen gardens and fruit orchards, planting of fodder crops, setting up of poultry farms, vaccination and deworming campaigns) but also forest nurseries, microenterprise development and infrastructure development (rehabilitation of roads and irrigation channels, water harvesting ponds and tanks). The plans allocated approximately two-thirds of the budget for landslip stabilization and one-third for livelihood support activities. However, the spatial dimension was missing; the plans did not indicate where the activities would be implemented, nor who would benefit. The participatory mapping exercise (see Chapter 5) produced only maps on current land use, hazards and resources. In keeping with the short-term nature of the plans, they included no maps sketching the desired future land use and management.

The whole planning exercise in **Kyrgyzstan** was conducted for training and demonstration purposes, under the technical leadership of Turkish counterparts. It presents the project activities in three components (rehabilitation of natural resources; increasing income and improving livelihoods; and awareness raising and capacity building) and lists funding sources (mainly the Turkish International Cooperation and Coordination Agency [TIKA], with a contribution from the Turkish Ministry of Forest and Water Affairs for the training component and a small co-financing contribution expected from the local communities). Surprisingly, the plan does not include the Kyrgyz Government authorities among the sources of funding; this omission would make uptake, internalization and replication through any national programme rather unlikely. While the plan includes a map localizing the planned activities (Figure 3), they are heavily concentrated in a small area just above the village, leaving aside the upper part of the watershed and ignoring the upstream–downstream linkages.

The watershed management plan for **Tajikistan I** could not be retrieved from the accessible documentation and is therefore not an element of this analysis, but it is illustrated in an impressive roadside sign in the project area (see photo).

Signboard illustrating the watershed management plan near the project area in Tajikistan

©Thomas Hofer

In **Guatemala**, the project was able to build on existing watershed management plans previously formulated by IUCN with support from local universities (but not available for this review). These plans were formulated for the medium term (five years) and designed in a way that allowed for revision and updating during their translation into annual operational plans. The project updated the plan for the middle part of one of the watersheds in 2012, providing additional maps on forest cover, current land use, slopes, effective soil depth, physiographic units, landscape elements, soil series, elevation, stream order and geology.

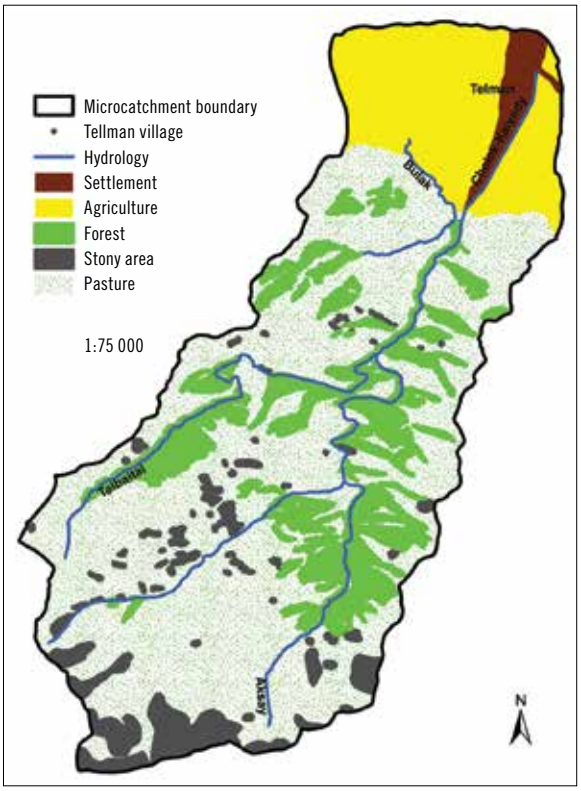
Long-term plans. Two projects (OUBAME and Chimborazo) invested in the formulation of genuine long-term watershed management plans that include a clear vision for the future, cover the entire watershed and all categories of land use, and mobilize diverse sources of funding to secure the implementation of the plan.

The **OUBAME** project foresaw from the beginning the formulation of a medium- to long-term management plan for the selected watersheds in Ecuador, Morocco and Mauritania, including actions across all land-use categories, considering also livelihood improvement actions and mobilizing different funding sources. This focus facilitated the progressive inclusion of all possible partners in the plan formulation process: local people and associations, technical line agencies, local authorities, NGOs, universities and international partners. Because of this inclusive approach, most technical agencies operating in the project areas recognized the project as a trustworthy partner, and the project was able to obtain observer status in relevant regional and provincial committees. The close collaboration with several partner institutions fostered the integrated dimension of the watershed management plan, triggering a set of specialized studies (e.g. on forest regeneration, transhumance and rangeland management, value chain development) (see Chapter 5) which supported its formulation. In part because of these studies, the plan formulation phase was excessively prolonged. Still, the plan is the result of discussions and negotiations among stakeholders in a process that was both bottom up (using participatory methods and tools) and top down (employing specialized technical expertise and sectoral studies). The project teams played a fundamental role in

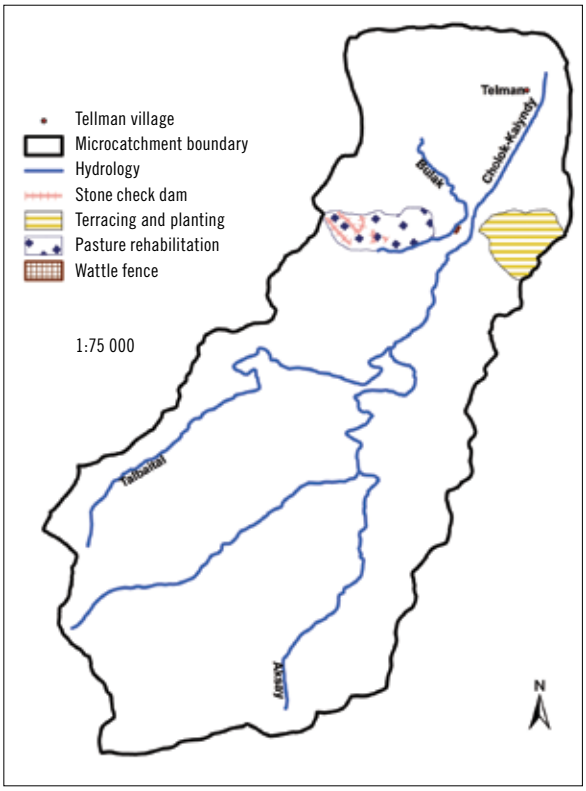
FIGURE 3

Present land use and localization of project activities, Kyrgyzstan

Present land-use map of the catchment



Map of the activities to be implemented



BOX 7

Format of the watershed management plans in the OUBAME project

The three watershed management plans of the OUBAME project have almost the same format. Each plan provides for three levels of action:

- actions carried out with direct project support if they fall within its mandate;
- actions performed by other partners in collaboration with the project, if they fall completely or partially within the project's mandate;
- actions carried out by other partners that are outside the mandate of the project but consistent and complementary with those supported by the project and its partners, and that can be facilitated by the project.

The plans are structured with the following chapters:

1 General context and legislative-institutional framework
2 Physical and environmental framework
3 Socio-economic framework
4 Local institutional framework and characterization of key actors
5 Watershed zoning and identification of territorial units
6 Strategic vision and scenarios for the watershed plan
7 Objectives of the plan and methodology
8 Components of the plan
9 Organization and implementation arrangements
10 Monitoring and evaluation
11 Risk analysis
12 Sustainability

Interventions are outlined in the eighth chapter, on components of the plan. They include the following activities:

- Soil and water conservation and protection
- Improved forest and pasture management
- Improved water management including irrigation
- Building/improving service infrastructure
- Building/improving production infrastructure
- Improvement/diversification of productive and income-generating activities
- Studies and mapping
- Capacity development actions
- Exchange of experience and dissemination of lessons learned
- Interinstitutional coordination, meetings, working groups and committees

facilitating and steering this collaborative process towards joint decision-making.

The OUBAME project produced three watershed management plans (FAO, 2017a) which follow a common structure (Box 7). Each presents four distinct scenarios describing the strategic vision:

- a scenario zero, referring to the *ex ante* situation, before the project and plan;
- a scenario 1, referring to the situation at the end of the first phase of the project, when the first draft of the plan had been prepared and several demonstration activities had produced the first results;
- a scenario 2, referring to the situation after two to three years of implementation, after implementation of a significant part of the activities in the plan;
- an ideal scenario, corresponding to the almost complete and satisfactory management of the whole watershed territory by different user groups (after five to ten years of implementation).

In **Ecuador**, the formulation of the plan started almost at project inception, thanks to a constructive relationship with parish and canton leaders and the full-time assignment of two technicians from the Ministry of Agriculture to reinforce the project field team. With the involvement of local communities, several demonstration activities were rapidly identified and implemented, each addressing a concrete priority (i.e. crop rotation schemes, a drip irrigation system and new pasture species). As a result, local households and local and regional authorities became more confident in the project, and plan formulation advanced rapidly. GIS maps were used as descriptive support more than as a planning tool. Direct and continuous support from municipal and higher-level authorities was provided during the plan formulation; as a result the watershed management plan almost completely corresponds to the municipal development plan.

In **Mauritania**, the draft watershed management plan is made up of an almost complete assessment of the project area and related SWOT analysis, accompanied by a series of conclusions and initial recommendations for action in different sectors. The plan refers to a five-year period after project termination and includes a cost estimate for each activity proposed. The plan does not include specific indications on intervention locations, number of households involved or modalities of implementation. However, it is very clear that the plan belongs to local

actors and that its implementation requires important financial and technical means. Local authorities are aware that they must take a leading role in assigning responsibilities for each activity to appropriate bodies of the public administration and in ensuring the necessary resource provision.

In **Morocco**, the watershed management plan is the result of a complex and time-consuming iterative process involving baseline studies, demonstration actions, specialized studies and significant interventions by line agencies under their regular programme of action. Extensive use was made of GIS maps and detailed analysis of biophysical aspects. The plan includes a detailed table of planned activities listed by funding source (summarized in Table 8), which illustrates clearly that the project's budget is just a minor source of funding among several other sources, mainly provincial government institutions. The plan also makes specific reference to different scenarios and includes annual programmes of action for technical services, with the programme for the first year fully developed.

Like the OUBAME project, the **Chimborazo** project in **Ecuador** needed more time than anticipated to formulate its five watershed plans – almost three years to approval by the provincial authorities (FAO, 2017b). Only two plans were drafted in the first year of implementation (2012), outsourced to a national consultancy firm. For the formulation of the remaining three plans, a team of four national specialized consultants was put together. In each case, the strong reliance on external expertise is a bit surprising, given that a core technical team (a project coordinator, an administrative assistant and three technical experts) is under contract to ensure project implementation.

The plans are of high quality, and each includes a set of maps. The format of these watershed management plans is similar to that used in the OUBAME project (Box 7, above). The more recent plans include a few indications on the justification and technical content as well as some organizational aspects of the proposed actions, related indicators and cost estimates. The time horizon for the full implementation of the plans is ambitious; they refer to a ten-year period up to 2024. Several major activities are proposed for implementation in so-called "micro projects" (Box 8), monitoring and subsequent capitalizing on experience and dissemination. It remains to be seen

TABLE 8. SUMMARY OF THE WATERSHED MANAGEMENT PLAN FOR THE OUED OUTAT WATERSHED, MOROCCO, AS AGREED BY ALL PARTNERS

Funding source	Type of action	Total cost *(dirham)*	Total cost *(USD[a])*
Moulouya Water Basin Agency	Dam construction and flood control measures	39 300 000	3 996 120
Rural Municipality of Ait Izdeg	Social infrastructure improvements in eight villages (electricity access, new classrooms, repair of wells and irrigation channels, bridge construction)	472 860	48 081
Provincial Directorate of Agriculture	Expansion of irrigated areas and provision of materials for fruit-tree production	2 124 000	215 973
Provincial Directorate of Equipment	Rehabilitation of rural road between Midelt and Midkane (24 km)	9 000 000	915 142
Provincial Delegation of National Education	Construction of new classroom and sanitary facilities	140 000	14 235
Provincial Health Delegation	Awareness campaign on sanitary education and mobile medical services for the eight villages and the nomadic populations	215 000	21 862
Urban Agency	Feasibility study for an urban land-use plan for the city of Midelt	500 000	50 841
National Association of Sheep and Goat Keepers	Training on animal health and feeds for livestock keepers	5 000	508
High Commission for Water and Forests and the Fight Against Desertification (HCEFLCD)	Reforestation and afforestation, gully control, rehabilitation of forest roads, nursery rehabilitation and tree production, compensation for livestock keepers that respect fenced-off reforested areas	29 005 000	2 949 300
OUBAME project	Micro projects (e.g. market gardening, beekeeping, small ruminant and chicken rearing, farmer-to-farmer exchange visits and training	768 600	78 153
Total		**81 530 460**	**8 290 220**

[a] Based on currency exchange rate on 21 May 2017

BOX 8

Planning of micro projects in the Chimborazo project

In the Chimborazo project, interventions are broken down into micro projects, feasible packages for implementation. The project document states that the WMC will propose the packages to the Project Management Team for approval based on the following criteria:

- the diversity of the proposed activities;
- the logic and linkages among the activities in the landscape and in an upstream–downstream context;
- the relevance of the activities for biodiversity conservation, natural resource management and increasing local benefits.

To compensate farmers for adoption of land-use practices that are environmentally and socially desirable, the project staff, local associations and technicians have jointly elaborated proposals for combining environmental conservation with improvements in production and income. Examples include promotion of improved fodder species, recuperation of traditional cereal varieties, diversification of vegetable production and improvements in milk production. Some micro projects concern the development of value chains, for example in tourism infrastructure in the Chimborazo Fauna Reserve and in milk collection and marketing.

A well-conceived and well-presented economic and financial analysis of the relevant costs was presented at project level for all micro projects proposed for implementation, in line with the expectations of the provincial government, which must justify the use of its own and national public resources. However, this analysis to establish the internal rate of return did not consider the economic costs and returns of such activities and investments at the farmer, household and community or association levels, which would have contributed to the important step in the project document calling for "assess[ment of] the economic feasibility of improved natural resource management practices within the communities".

A question that still needs to be resolved is how to connect the micro projects (and the larger watershed management plan) with the ongoing institutional programmes and plans, both in terms of time horizon and the approach. The micro projects must comply with national and provincial strategies, programmes and plans and must complement actions already planned by other institutional actors. But while the integrated territorial vision of the project favours a multiplicity of actors, the institutional view is more sectoral and requires short-term results satisfying local demand for livelihood improvement.

how a cross-sectoral validation process could be organized before implementation of the micro projects, either within the project duration or during the remaining time of the ten-year watershed management plan.

In the Chimborazo project the WMCs are indicated as the key players all along the planning sequence from the formulation of the plan, to its communication to all stakeholders, to resource mobilization, implementation and supervision. It is obvious that there is a long way to go for these local multi-actor entities (called in the first plan "Comité de Actores Locales") to evolve into self-propelled bodies that can ensure conflict management and consensus building at the territorial level and obtain continuous institutional and financial support from decentralized and central authorities and partners. The project team is actively promoting a multi-actor interinstitutional network. The team is strongly engaged in capacity development at various levels and in the formulation of policy decrees that have been approved and adopted by provincial and local governments.

LESSONS LEARNED

The conception of the features, objectives and scope of a watershed management plan differed greatly from one project to another. Major discrepancies concerned the plan's time frame (restricted to the project's lifetime or incorporating a longer-term vision and perspective) and the financing of its implementation (from the project's budget only or including other funding sources). In terms of scope, some projects limited their sphere of action to the demonstration of a set of interventions, while others engaged in a participatory planning exercise for the development of a spatial plan foreseeing action across all types of land use within the entire watershed for an ultimate change in its state.

The preparation of a watershed management plan should be a bidirectional process, both bottom up (using participatory methods and tools) and top down (employing sectoral studies and specialized technical expertise). The participatory approach alone cannot ensure

tangible and sustainable results, especially in the case of scarce resources or collective or undivided ownership or tenure. External, up-to-date technical, economic and institutional expertise makes an essential contribution to the overall process. In this regard, the project team has a fundamental role in steering the collaborative process towards joint decision-making.

The more comprehensive area-wide long-term watershed management plans tend to be long documents but emphasize the assessment of the current situation more than planning for the future. The Chimborazo and OUBAME plans include a good mix of text, tables and maps, but they tend to be more exhaustive than necessary. Several exceeded 130 pages, often reproducing the results of the assessment reports in full. Summarizing these results in a few pages could help to shift the focus to the forward-looking parts of the plan and make it more reader friendly.

RECOMMENDATIONS

It is important to keep in mind that the watershed management plan, whatever its vision, scope and quality, is not an end in itself. The watershed management plan should be considered a highly flexible tool which reveals a territorial vision and promotes a unified reading of the watershed interactions among key stakeholders. Formulation of the plan is not necessarily a distinct step in the project; it can be developed gradually as the results of data collection, analysis and consultative stakeholder processes become available. Still, the concrete output of plan formulation is often used to monitor results in watershed management projects. In all cases, the plan should clearly define its objective and scope.

Building the plan around water as the key resource helps to focus the interventions. The aim of the planning process should be to identify, plan, implement and monitor a set of coherent and complementary actions for the sustainable use and conservation of water and other precious resources in the watershed.

It is important to understand the financial implications before embarking on the formulation of a watershed management plan. The preparation of a genuine watershed management for the medium to long term requires sufficient technical, human and financial resources for both its formulation and its subsequent implementation. Plans that envisage implementation solely with external project resources (without co-financing from domestic resources) are not recommended, as these resources are bound to the duration of the project. If clear funding prospects have been identified and partners have pledged resources for joint formulation and implementation of a watershed management plan, all efforts should be made to produce a genuine plan that includes a clear cross-sectoral development vision for the future; covers the entire watershed and all categories of land use; and includes various scenarios for the future.

If it is unclear whether the required human and financial resources are available for plan implementation, no watershed management plan should be prepared. Engaging stakeholders in consultative planning processes and in the joint preparation of a watershed management plan creates expectations that will not be met if the plan is not implemented. Where resources are short, planning is a waste of resources and time. Priority could instead be given to undertaking a capacity needs assessment and strengthening selected technical and/or functional capacities of stakeholders, depending on the local context. The project focus could also be limited to the preparation of a watershed assessment study to provide evidence for broader ongoing policy processes and dialogue – linked, for example, to cross-sectoral and multistakeholder collaboration for SDG implementation, or to identifying areas and approaches to help countries fulfil their pledges to restore degraded and deforested lands.

It is recommended to keep the narrative sections in the plan short and to rely as much as possible on tables, diagrams and maps. As each plan is specific to the local context, the format proposed above should be taken as a reference only, while keeping the three main axes of analysis: biophysical, socio-economic and institutional. Presenting the action plan in tabular form helps to aggregate, structure and display the information clearly, for example by type of activity, year or type of funding source. Displaying activities by funding source is particularly useful to show the engagement and financial envelope of various partners involved in the process.

The plan should define, as much as possible, a precise and realistic distribution of tasks and responsibilities for the funding, execution, supervision, monitoring and evaluation of the planned activities. These should be fully consistent with national policies and programmes. A tentative budget should be included for each planned activity; however, detailed costing of activities will be done later, in the preparation of more detailed annual plans of implementation.

It is important to ensure that the watershed management plan is harmonized with any existing municipal or communal development plan and linked to relevant sectoral programmes and plans. These plans may cover the same territory, involve the same authorities or expect funding from the same institutional sources. They should mutually reinforce each other, leading to an integrated landscape or territorial approach and vision. It is important to build the capacity of local government authorities and administrators to understand watershed management, what it is and what it does, and to get officials involved in

watershed management planning. In addition, the planning exercise should take into full consideration the existing, mostly sectoral, programmes and plans of technical line agencies and other partners, to position the project as much as possible within the ongoing work of other entities.

In some countries, it may be more effective to enrich existing local development plans rather than to develop new watershed management plans. In countries where the central government provides an annual development budget to local communities and/or municipalities to finance part of their local development plans, it may be more effective to enrich these existing plans with principles, elements and practices of watershed management. Such an approach requires careful consideration of factors such as the overlapping of administrative and geographic boundaries (ideally as complete as possible), the quality and focus of the existing plans and the inclusiveness of the processes that led to their preparation. Often, these local development plans have no spatial dimension and do not localize the planned interventions in the communal or municipal territory.

VALIDATION

RESULTS OF THE REVIEW

To ensure national policy support as well as subnational and local technical support for the implementation of planned activities, the **OUBAME** project introduced a specific step in the planning process for official validation and endorsement of the watershed management plan, marking the transition between planning and implementation. This step appears fully coherent with the bidirectional nature of the plan formulation step, which combined and mediated between bottom-up and top-down planning. The official validation workshop was also instrumental in getting official agreement and endorsement from higher-level officials in countries where local decision-makers often refrain from taking any official position in informal meetings, sometimes even on technical matters, unless they have received specific approval from their superiors.

Before validation, the preliminary plan was revised based on a systematic review of the priorities for action of the local people and their associations, jointly carried out with field technicians. The collective validation exercise involved provincial and national decision-makers of the concerned technical line agencies. The workshop was also an occasion for informing other potential partners about the participatory and interinstitutional process taking place at watershed level, offering them opportunities to join the common effort.

The validation workshop provided an occasion to formalize collaboration between several line agencies and to obtain official engagement for concrete coordination among services; they agreed to integrate relevant priority actions in their annual work plans and postponed or rejected those actions that were not. As a secondary output, the workshop provided an opportunity for these line agencies to observe potential operational synergies, not only within the project watershed, but also in the whole territory under their jurisdiction.

In **Ecuador**, where the watershed management plan was developed the most quickly, the plan was officially presented and validated through joint sessions with national, provincial and local authorities and line agencies to ensure the required policy and financial support. The whole planning process continuously involved local and provincial counterparts through a sequence of informal and official meetings which enabled a satisfying level of consensus on the plan among concerned stakeholders. As a result, the final validation event was more an official ceremony to present the plan to a diverse public than an open debate among concerned line agencies and peoples' associations. The event was nonetheless beneficial in catching the attention of provincial and national media, promoting the project's image and attracting subsequent policy support.

In **Mauritania**, the plan was submitted to the regional development committee for consideration, review and clearance. The project's approach was to initiate an official dialogue with local administrative units at the communal and regional levels for the validation of the watershed management plan and to facilitate its integration into the Communal Development Plan. Such integration would include the modalities of functioning and funding, the interinstitutional coordination mechanisms required to rationalize public investments in the territory and the identification of possible synergies with national and international partners. However, as the watershed management plan was finalized at a late stage in the project, it was not possible to solicit concrete collaboration from other technical line agencies for the implementation of the activities in the plan, despite the constant support of the Governor and the regional development committee. The main counterpart ministry could not commit to the provision of a significant part of its modest financial, technical and human resources. The validation event was therefore an open forum where each party declared its position and demonstrated its level of engagement. In any case, the excellent work and engagement created at field level is likely to pave the way for future continuation and consolidation of the initial results obtained, including repetition of the validation exercise at a later, more advanced stage of commitment.

In **Morocco**, a step-by-step validation was carried out with local associations, authorities and technical services. The high-level representation of the counterpart agency, the governorate and numerous line agencies made the event extremely fruitful, with direct policy and operational

implications. Most of the field actions were confirmed and approved, which required the concrete engagement of several technical agencies and the short- and medium-term integration of the project in their regular budget and programme of action.

LESSONS LEARNED

A workshop for formal validation of the watershed management plan by all stakeholders has multiple benefits for cross-sectoral coordination and joint implementation of mutually selected activities. The most important result was the official agreement of the technical agencies, in front of provincial and municipal authorities and national-level representatives of the main project counterpart agency, about each of the actions proposed in the plan. Several of these actions require significant investment in infrastructure, physical inputs and skilled staff. The validation step also provided a favourable and timely opportunity for official discussion and approval of innovative methods and techniques that would subsequently be implemented, with a view to strengthening national and local skills and knowledge.

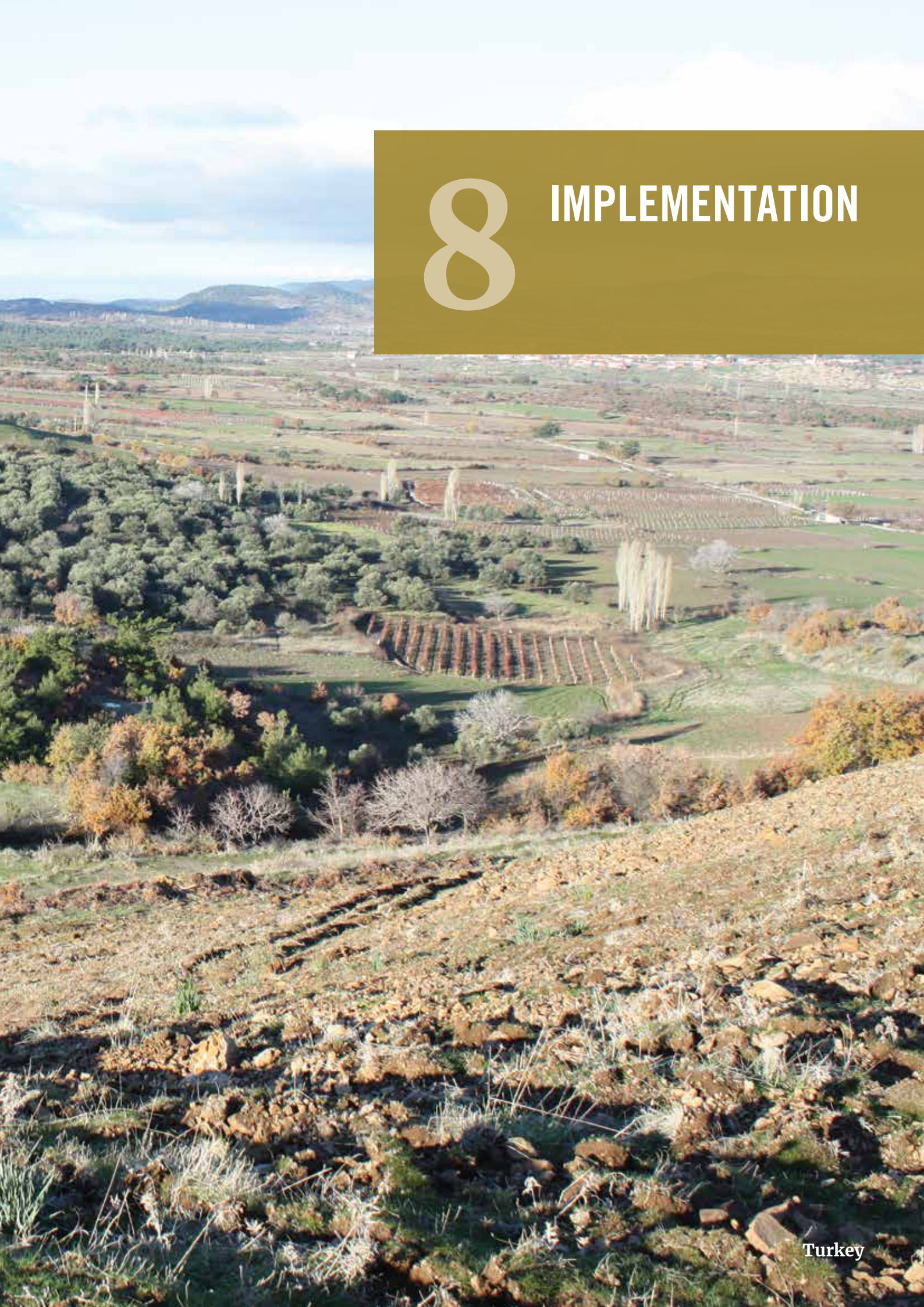
The workshop provided an opportunity to review the initial results of some early activities implemented during the assessment and planning stage. Initial field actions facilitated the whole planning and implementation process and proved that careful planning does not have to delay rapid implementation of well-designed field interventions. In order to stimulate the adoption, internalization and replication of jointly selected activities beyond the project area, it is important to ensure that they are in line with national policy orientations, are based on adequate technical, economic, environmental and social assessment and fall within the mandate of at least one partner institution.

RECOMMENDATIONS

It is highly recommended that future watershed management projects include a formal watershed management plan validation step. In future projects, the plan validation step should ideally include regular informal and (as much as possible) formal checks with concerned stakeholders throughout the planning and formulation stage as well as a final workshop. For the final workshop, higher-level representatives of main government authorities and partner organizations should be invited to endorse the plan officially and to confirm their role and function as agreed in previous meetings. Once validated, a hard copy of the finalized watershed management plan should be distributed to all stakeholders involved in the process. A press release on the occasion of the workshop with an electronic link to the plan could help to ensure its broader dissemination. If an interministerial committee for watershed management has been created at the national level, the review and validation of the watershed management plan(s) should be among its key tasks, to ensure support, engagement and commitment at the highest political level.


©Thomas Hofer

8 IMPLEMENTATION



Turkey

8 IMPLEMENTATION

This chapter looks at the implementation aspects of the watershed management plans, in those projects that prepared them, as well as the area-based watershed management activities carried out in parallel with or in the absence of a watershed management planning process.

Watershed management usually combines measures that improve or conserve the ecosystem services and functions in the watershed (mainly those related to water); increase land productivity and resource efficiency; and improve or diversify people's livelihoods and income. By integrating these measures in a well-defined geographic space and time sequence, the approach is expected to deliver multiple benefits, both on and off site and in the short and longer term.

Given the competing needs, demands and priorities of different stakeholders in a watershed, trade-offs are unavoidable and a balance may have to be negotiated, for example:

- among different resource users, such as crop farmers and livestock keepers competing for scarce land resources in highly populated or marginal areas;
- among sectors competing for water resources for different purposes such as human consumption, agricultural production and energy generation, requiring fair allocation of water, including for environmental water needs, i.e. water needed to ensure the ecosystem functions of the watershed;
- between the desires of local populations (often requesting improved access to infrastructure, goods and services) and the priorities of technical agencies (often focusing on hard [physical or structural] measures to achieve national policy and programme targets, e.g. reforestation);
- between activities that benefit the whole watershed community and activities tailored for individual beneficiaries (being careful to keep an acceptable ratio of number of beneficiaries to total population, since resources are usually insufficient to reach all watershed residents).

Given the relatively long time frame usually needed to implement the actions required to improve the state of a watershed, implementation of a watershed management plan usually exceeds the project duration and requires additional financial resources beyond those available in the project's budget. Experiences with plan implementation are still limited.

IMPLEMENTATION OF THE WATERSHED MANAGEMENT PLAN

RESULTS OF THE REVIEW

As discussed in Chapter 7, two projects, one in **Pakistan** and one in **Central Asia**, formulated watershed management plans with a one-year time frame for immediate implementation. The review found that these two projects differed greatly in the progress of their implementation.

Unfortunately, the activities selected for implementation in **Kyrgyzstan** were not realized at all. The following reason is given in the project's terminal report: "Because of the high number of different types of activities, that necessitated many small-scale tenders to be handled individually, and the high staff turnover in its Bishkek office, TIKA faced serious constraints in identifying qualified subcontractors and allocating the agreed upon resources". In the end, the portion of the project budget earmarked for implementation was shifted to the printing and dissemination of capacity-building materials developed by the project. The project closed with expenditures of USD 260 000 against an available budget of USD 300 000.

The **Pakistan** project, in contrast, delivered on its promises. Activities in the 17 sites were implemented, seemingly in line with the formulated plans. The available project documentation, which comprises the watershed management plans from four sites and the report of a consultant tasked with compiling some lessons learned (Marjan, 2010), does not provide sufficient information for systematic comparison of planned and implemented activities in each watershed. Information is particularly scarce for those activities that supported agricultural production and that were implemented on the private lands

In Pakistan, field measures included construction of retaining walls to stabilize soil

©Thomas Hofer

of individual beneficiaries. However, some aggregated figures are available summarizing the implementation of forestry and soil conservation measures (see Annex 4). The Forestry Department retained 10 percent of service charges, and the project paid for the labour provided by the beneficiary population. However, beneficiaries had to deposit a certain share of the payments received in a watershed management fund: 10 percent for activities on communal lands and 25 percent for interventions that benefited an individual household.

Field interventions initially focused largely on rehabilitation of watersheds badly affected by landslides and slips provoked by the earthquake. Interventions included soil stabilization through a mix of physical and bio-engineering measures such as check dams and retaining walls; natural regeneration of pastures; and tree planting. It must be noted that the earthquake worsened the state of the environment in an area where natural resource degradation was already prominent. During the course of implementation, partly as a result of efforts to persuade the counterparts from the Forestry Department, the focus shifted towards a more integrated approach. Activities that were then introduced included support to agricultural production through terracing, field levelling, establishment of kitchen gardens and fruit orchards for improved food diversity and nutrition, and water tank installation for irrigation and roofwater harvesting. From the documentation it is not clear, however, how the (largely individual) beneficiaries of these production-oriented activities were identified and selected.

Two other projects, OUBAME and Chimborazo, formulated watershed management plans with a multiyear time frame.

As described in the previous chapter, in the **Chimborazo** project the watershed management plan is implemented through micro projects, which are outlined in the plan and subsequently prepared in more detail by project staff in collaboration with local associations and technicians. To date, 20 micro projects have been formulated and are at different stages of implementation. Ten micro projects have been executed, five to protect water sources and support water collection and storage and five to promote sustainable and diversified agricultural production through an agro-ecological approach. Six micro projects are currently being implemented, four for livestock development and two on environment. Four new micro projects to support ecotourism and agriculture development are under review. The budgets of these micro projects usually come from a mix of provincial resources, project resources and in-kind (labour) and/or cash (5 percent of the budget) contributions from beneficiaries.

Other project interventions include support to vicuña management (fibre shearing) as an economic alternative for communities in the reserve and buffer zone (see Box 9).

The validated watershed management plans in the **OUBAME** project carry proposals for a set of activities to be implemented, as much as possible, in adherence with the ongoing regular programmes of concerned line agencies, balancing their technical mandates with local needs and expectations. They were to be reviewed and updated on a yearly basis, considering the new annual programmes and budgets of the concerned technical services and the results already obtained in the field. A number of organizational and institutional mechanisms were established to sustain the implementation and monitoring of the plans. These include:

- an interinstitutional steering committee, comprising high-level officials of concerned authorities and technical services, with the responsibility for supervision, guidance and approval of the annual operational plans;
- an interinstitutional working group, comprising sectoral technicians, which assessed the technical feasibility and organizational mechanism of planned actions;
- community and/or activity-specific associations comprising local households as counterparts to local institutions, which could eventually evolve into a watershed committee.

The project staff did not push for the creation of watershed committees, recognizing that they should evolve from concrete field experience; otherwise they would be artificial and unlikely to be directly interested in managing the watershed territory.

Because the watershed management plans in the OUBAME project were finalized and validated only after

a long process (two to three years), the project experience was primarily a set of demonstration activities, capacity development actions and civil works carried out by local households, technical services and other partners in parallel with, and influencing, the planning process. The project followed a different approach in each country, as follows.

In **Ecuador**, the watershed management plan shares the same territory as the local municipal development plan, and thus covers a few communities that are geographically outside the watershed territory. A clear benefit of the spatial superposition of the two plans and the support of the municipal authorities was a common interest in the same infrastructure, civil works, social services and allocation of financial resources. The slight enlargement of the area of action of the watershed plan was more than compensated by the stronger prospects for internalizing the approach at the municipal and higher levels. Activities in the communities outside the watershed were mainly transversal, such as capacity building. As family habitations and farms are predominantly dispersed, the grouping of similar resource users was promoted, whenever feasible, for capacity building and demonstration activities. Dissemination and replication of innovative measures and techniques was in the hands of local authorities, facilitated by their good relationships with the technicians working in the various line agencies. They worked together so effectively that the Ministry of Agriculture assigned two full-time agents to support the national project team led by SENAGUA, a voluntary contribution beyond what was foreseen in the project document.

In **Mauritania**, local leaders initially saw the watershed management plan as a rival to the municipal development plan. For some time, the mayor maintained a negative and non-collaborative attitude towards the project team and the local associations supported by the project. The cooperation improved only once the local authorities recognized how much the lower strata of the local society appreciated the project. As the watershed territory is geographically isolated and marginalized, it remains to be seen whether the technical services that took part in the regional development committee will continue to provide their support to the actions in the validated plan, or whether they will move to other areas of the region.

BOX 9

Support to vicuña management as an economic alternative to cattle grazing

Assessments in the Chimborazo project in Ecuador indicated that to conserve and manage the páramo and other highland-related ecosystems in a sustainable way, cattle grazing in the project area should be discontinued and replaced by camelids (alpacas, llamas and vicuñas) whose environmental impact is less detrimental. The project is therefore supporting vicuña management for fibre production as an economic alternative for indigenous communities in the Chimborazo Reserve and buffer zone. The vicuña is a wild species that was reintroduced in the reserve. It is adapted to high altitudes and has good wool production rates. Its products are attractive to the high-quality woven goods market, fetching extremely high prices on the international market.

Before the commercialization of vicuña products it was necessary to change the species' legal status in Ecuador from protected to controlled (see Chapter 2). The project helped update the regulation on the conservation and management of vicuña and helped draft new operational guidelines for vicuña shearing which include arrangements for benefit sharing and marketing. Subject to the approval of the revised regulation (currently under revision by the Ministry of Environment), the first shearing is expected in 2017.

Vicuña, Ecuador
©Thomas Hofer

On-the ground activities in Mauritania were focused in a few geographical places, because of the low population density and the physical concentration of agricultural activities along the seasonal river beds where water is acceptably deep. Activities were also differentiated by gender. While men were involved in the protection and management of limited agricultural areas under seasonal flooding (including date palm plantations), women's groups were mobilized around horticultural crops and non-farm activities such as handicraft production, food processing and marketing.

In **Morocco**, several line agencies were mobilized throughout the watershed management plan formulation process, so many diverse demonstration actions were implemented, including among others construction and maintenance of rural roads and irrigation dams, reforestation schemes, distribution of small ruminants and fruit-tree seedlings and capacity-building courses. These agencies made significant investments in both physical and financial terms. The project established community associations that were made responsible for the design, support and monitoring of the whole set of project activities taking place in their territory. In Morocco, each activity was implemented and managed by a specific group of beneficiaries. These included women's groups that received chicken or goats; men supported in re-establishing and planting their terraces with apple trees; and groups of nomadic herders assisted in achieving access to government incentives for protecting or not exploiting areas fenced off for forest regeneration.

The project in **Guatemala** was expected to support the incorporation of the watershed management approach and watershed management criteria as well as the concept of risk management in municipal planning processes. This result was not fully achieved, partially because of an earthquake in 2012 that provoked a shift in the priorities of the municipal governments. While the criteria for allocating municipal resources should encompass the social, institutional, technical, environmental, economic and financial dimensions of watershed management, little is documented about the practical results and the actual content of the investment plans prepared by the Municipal Departments of Planning.

LESSONS LEARNED

The watershed management plan should effectively combine measures for the short, medium and long range in space and time. The multiyear watershed management plans were usually designed to be broken down into annual implementation plans or packages of interventions that must be implemented together to be effective. It is important to refrain from concentrating only on short-term measures with the most attractive and early economic yields.

Efficient and timely procurement of goods and services is a major factor for timely and cost-efficient implementation of the plan. Efficient procurement systems and procedures must be in place, and people trained in their application. It may be necessary to strengthen the government's existing procurement system or to introduce a new system.

Interventions must be combined with capacity development actions adapted to the specific target groups. The capacity of direct beneficiaries was strengthened through specific hands-on training and classroom sessions on topics of interest, through the use of farmer field schools for wider dissemination and outreach, and through farmer-to-farmer exchange visits for sharing of knowledge and experience among peers. Producer associations and local institutions were strengthened to carry out and maintain project interventions, to facilitate group meetings and to foster group dynamics, as well as to carry out advocacy campaigns and lobbying for their cause (see Chapter 2).

RECOMMENDATIONS

Watershed management and the preparation of a watershed management plan require a medium- or long-term perspective and engagement. If the project duration is less than four to five years, project staff should examine new watershed management processes and field initiatives carefully before accepting the technical and operational responsibility for their implementation. If the project's objective is to support ongoing national watershed management programmes, a shorter time frame may be acceptable. Concerted efforts are required to move away from short-term project cycles to longer-term programmatic approaches (see also Chapter 2).

The watershed management plan should be flexible and adaptive. It should be reviewed, updated and adjusted on a regular basis, ideally once a year, reflecting the results achieved in the previous year and the planning of activities for the year to come. Continuous monitoring of results and impact should contribute to improving the plan. Regular planning and validation workshops may be beneficial in this context. On the other hand, the plan's flexibility may have to be limited in certain situations, as a plan that is not considered final may sometimes be challenged by local politicians or elites.

The strengthening of local capacity should lead to a progressive transfer of responsibilities and functions to local entities. These may include WMCs and municipal development committees.

The watershed management plan should be implemented through annual sectoral work plans. Annual work plans are based on the budget made available by the concerned technical agencies and should include detailed costing for each activity. The annual work plan should

include procurement planning to ensure the timely acquisition of required goods, services and work in an efficient, competitive and transparent manner. The timely scheduling of procurement actions is particularly important in regions where field activities cannot be implemented year round because of climatic conditions.

To ensure the integrated management of the watershed in its entirety, an adequate balance must be sought between the few initial actions implemented during the diagnostic and planning stage and the larger set of activities included in the watershed management plan. Ultimately, as a planning orientation tool, the watershed management plan is expected to confirm and assist in realizing the vision formulated in the ideal scenario, with adjustments and improvements made along the way by key stakeholders – on the one hand local households and associations gradually assuming responsibility for the sustainable management of their watershed, and on the other hand technical services and authorities with evolving yearly programmes and budgets.

IMPLEMENTATION OF AREA-BASED ACTIVITIES

RESULTS OF THE REVIEW

In the **Democratic People's Republic of Korea**, the interventions focused entirely on measures to reverse the degradation of upland natural resources in general, and more specifically the decline of tree cover. Consequently, the activities included afforestation, nursery rehabilitation and demonstration of agroforestry practices. Small monitoring plots were set up to measure soil erosion, vegetation growth and river sediment loads. However, livelihood improvement and agricultural production were not part of the mandate of the national counterparts from the Forestry Department.

In **Turkey**, the area-based interventions were primarily implemented by individual farmers on private lands and were directed towards increased grape and pistachio production, improved fodder production and grazing practices, and some afforestation. By law, all forest areas surrounding the village are State owned, independent of their state of productivity or degradation; therefore rehabilitation of degraded forest areas did not rank high among the villagers' priorities and was not included in the project interventions. Collective benefits were obtained by establishing a sheep washing and disinfection pool, which is open to shepherds from neighbouring villages, and by renovating an old building which served as the project office and was subsequently developed into the Yuntdagi Rural Initiative Centre. Costs of the activities were generally shared among the project, the villagers and the national and provincial forest authorities, with some generous subsidies, e.g. for solar energy devices established in ten randomly selected households (of a total of 39), for which the beneficiary contribution was only 15 percent of the cost.

In **Tajikistan I**, where the watershed site was only 80 ha, interventions were primarily intended for demonstration and were implemented on a very small scale. The selected area-based interventions were related to pasture management, water management, erosion control and gully rehabilitation, horticulture, installation of a greenhouse for the tree nursery and a demonstration plot for zero tillage, including provision of no-till machinery. Agricultural inputs (seeds of fodder plants, pulses and fruit-trees as well as urea) were provided to 39 beneficiary households along with tree seedlings. The project also set up a revolving fund (with a limited initial investment of USD 12 000 from project resources) to provide small grants to the members of seven newly created women's income generation groups, one per village, and each initially having 10 to 15 members. The individual grants varied from USD 75 to USD 300, with repayment terms of six or eight months. Grants were mainly invested in livestock breeding, trade of agricultural products, petty trade and establishment of sewing businesses.

In the Toirsu watershed in **Tajikistan II**, the project provided support to the creation of so-called "credibility investments" and "subprojects" for 62 of the 74 villages in the district. These investments and subprojects were to be handled by CIGs and together formed the "community action plan". To foster sustainable growth of farm productivity, investments were made in agricultural production (123 subprojects), natural resource management (242 subprojects) and rural infrastructure (54 subprojects). However, the budget as allocated by the World Bank was unevenly distributed among the three categories, with the rural infrastructure budget less than half the natural resource management budget. This allocation contrasted sharply with the priority needs expressed by most villages in the watershed, which were related to road improvement, bridge construction or repair and safe drinking-water systems – costly interventions that could not be implemented with the limited resources available. Indeed, the number of subprojects in the natural resource management category appears inflated, as 159 (i.e. all but 83) of them were related to orchard development activities, which have much greater value for agricultural production than for resource protection (as newly planted fruit-trees have limited potential to stabilize soil). Only six forestry subprojects were approved, demonstrating that interest in reforestation is limited when local populations do not have control over the use of forest resources.

Budgets were allocated at the village level based on the number of households and were generally small; the initial credibility investments had a maximum budget of USD 1 000 per village, whatever its size. The credibility

investment budgets could not be lumped together across several villages or merged with subproject budgets.

The subprojects were implemented essentially in isolation; for example, a subproject to introduce high-productivity goats was not accompanied by another to produce the necessary fodder, as might have been expected. Overall, the project reports aggregate the information on the subprojects in such a way that it is not possible to assess the impact, relevance or efficiency of individual subprojects, nor even to calculate the number of subprojects per village.

In the Gambia and Zambia, the projects supported by GSHA and implemented by local partners were composed of three components: food security, livelihoods and soil and water conservation. The third component was included at a later stage in both projects (in 2008 in the Gambia, and in 2010 in Zambia). In the Gambia, there was a strong focus on reducing labour burden and enhancing micro-enterprise development ventures for women through the provision of rice milling machines, ploughing services and microcredit schemes, and through the purchase of maize and rice seeds, fertilizer and more recently also inputs for poultry production and ram fattening schemes. The soil and water conservation activities mainly comprised the design and construction of anti-salt dikes and spillways, gabion check dams, half-moons and contour bounds, as well as the rehabilitation of woodlots and the reclamation of water ponds. The activities were spread over approximately 50 000 ha, and 27 villages benefited from project interventions. Training was also included in the project activities but was limited; between 2010 and 2012 only 30 farmers received training in soil and water conservation. In contrast, 1 194 women benefited from microcredit and 321 from ploughing services.

The project in Zambia established tree and vetiver grass nurseries and trained 463 farmers in nursery management; constructed terraces, check dams for gully rehabilitation, stone pitches, contour ridges and weirs; distributed 550 beehives, along with related training, to 85 beneficiaries (20 men and 65 women); supported a goat rearing "pass-on" programme (in which beneficiaries of initial inputs pass along their returns to others) which benefited 173 farmers (62 men and 111 women); constructed fish ponds, pit latrines, water boreholes, a market and a community training centre; and rehabilitated roads.

The project in the United Republic of Tanzania, supported by GSHA since 2008, initially focused on trees and forests and the establishment of woodlots, agroforestry plots and household tree planting to reduce pressure on natural forests and improve domestic wood supply. It then gradually expanded its scope of activities towards an integrated watershed management approach. To improve domestic water supply, it opened 21 water points (one per village) and established and trained 21 water user groups. The introduction of sustainable agricultural practices was included only towards the end of the project. This aspect needs more emphasis in the future, for a more coherent approach to improve local food security and reduce food shortages while reversing degradation trends and improving soil fertility on sloping lands in upstream areas.

Activities in Guatemala were divided between direct interventions to benefit poor, vulnerable and food-insecure households, and indirect interventions to facilitate strengthening of the institutional capacity of local authorities and producer organizations. Food insecurity and unbalanced nutrition were addressed by improving food availability and access to food; measures included diversified production in kitchen gardens, improved

The project in Zambia distributed beehives and supported a goat rearing programme that continues after the projects' end

©Thomas Hofer

The project in Guatemala supported small enterprise development in flower production and trout farming

©Thomas Hofer

livestock rearing to produce eggs as a source of animal protein and promotion of their consumption in the family diet. Income generation from surplus production (beyond subsistence needs) was promoted to provide access to foods less commonly produced on the farms. The project also supported small enterprise development in flower production and trout farming. The provision of agricultural inputs at the farm level and the creation or rehabilitation of forest nurseries supported soil conservation and forest restoration work in watershed areas, thereby increasing the connectivity of existing forest remnants. Access to national forestry incentive programmes was facilitated to expand the scale of forest management interventions.

LESSONS LEARNED

While exposure to innovation is certainly not a bad thing, caution is advised before introducing economic activities that are completely new to local populations. It is not documented whether feasibility studies were made before beekeeping and fish farming were brought to communities that had never engaged in them before, nor whether the results, e.g. in terms of honey yields, were compared with those that were predicted. It may make more sense to build on existing traditional skills, e.g. to help traditional beekeepers move towards more advanced production or marketing technologies, than to start new businesses from scratch.

Potential environmental risks must not be overlooked when selecting activities. Some activities, such as the goat-rearing scheme in Zambia, were so successful that they now self-propagate without further project support. While this type of dissemination is usually the best way of scaling up good practices, a practice that may have detrimental effects on the environment is not a good practice. In this example, the environmental consequences of an increased goat population (e.g. in terms of additional fodder needs, depletion of pasture resources due to overgrazing, and trampling around water holes) were not considered from the beginning as a potential risk.

Cost-effectiveness and appropriate design were not always considered in the selection of structural soil and water conservation measures. In several cases the physical structures built to prevent erosion were overdesigned and costly, consuming a large share of the budget. Emphasis should be given to simple and cost-effective bio-engineering measures that combine trees, grasses, earth and loose stone bunds. High-cost interventions should be limited to strategic locations that are at high risk or of fundamental importance (e.g. to avoid blockage of rural roads). Structural measures should always be combined with agronomic, vegetative and management measures to reduce soil degradation and enhance productivity at the same time. Proper training on how to maintain and expand these structures is also important.

Water has proved to be a good catalyst for mobilizing communities and building their confidence and trust. Addressing concrete water needs early in the project, for example by providing access to or repairing drinking-water facilities, creates noticeable improvement in rural peoples' livelihoods and helps make them receptive to a stronger focus on water-related activities.

The projects did not have a unified approach for providing inputs or for compensating beneficiaries for their contributions. Some projects expected beneficiaries to provide time and labour free of charge as an in-kind

Action addressing water needs – for example, rehabilitation of water infrastructure – is a good catalyst for mobilizing communities

©Thomas Hofer

contribution to project activities. Others chose to remunerate farmers for their manual labour through cash for work (which is usually a social protection intervention for poor rural households in post-disaster emergency contexts). Some provided compensation for natural resource management work on communal land (such as terracing, field levelling and tree planting) but not for investments on private land. Similarly, some projects distributed material inputs (such as seeds, seedlings and fertilizers) freely, while others requested a (sometimes symbolic) financial contribution. Not all projects documented their approach. This is an issue common to all development projects. Guidance for a more coherent approach could be helpful, for example to address what type of inputs can be distributed freely to which kind of beneficiary at what stage in the development process; in what situations and to what extent a contribution (in kind or cash) from beneficiaries can be expected; and how contributions should be differentiated among beneficiary groups (e.g. by household size, size of landholding, land tenure category) and types of activities (conservation, development, investment).

Selected interventions were not always clearly mapped and appropriately targeted to the needs of specific, previously identified beneficiary groups. While careful consideration was often given to identifying different beneficiary groups in the watershed (see Chapter 4), specific activities were rarely targeted to the specific needs of each of the identified beneficiary groups, or at least such targeting was not documented. Selection of field activities needs to be accompanied by an appropriate selection of organizations to take responsibility for them, with a proper distribution of internal responsibilities among group members. Projects may need to support the development of capacity and skills for the organizations and their group members and should see such activity as support to the sustainability of the project.

Projects could have paid more attention to documenting the selected interventions, including the anticipated benefits of each measure. Especially in view of the projects' testing and demonstration character, they must provide the evidence of concrete, ideally quantifiable results. Measures that did not deliver the expected benefits or perhaps even had negative impacts must also be documented. Anticipating, planning and monitoring the flow of environmental, economic and social benefits to the diverse constituencies in the watershed is vital for the uptake, replication and wider dissemination of (only) those measures that have shown positive results.

RECOMMENDATIONS

Some type of simple economic analysis at the household and association level is recommended to envisage the cost, timing and return of proposed income-generating activities at the producer level. Such an analysis would provide the elements for monitoring the results and impact of the activities in terms of investments and income. In the long run, creating the capacity to undertake simple cost-benefit analysis can make an important contribution to households' and associations' self-management of assets and initiatives.

A more systematic application of the RuralInvest toolbox is recommended in this regard. FAO developed RuralInvest (FAO, 2017c) to assist in the preparation of small-scale rural investment projects and business plans. It is applicable for the development of income-generating activities across all sectors, and also for non-income-generating projects aiming to improve living standards and social infrastructure.

To understand what drives or impedes investment in watersheds, it is necessary to analyse the existing land tenure systems and their influence on potential watershed management interventions. Existing tenure governance arrangements influence not only investments in watersheds but also the acceptance of regulations on certain land uses, especially if those have a cost to the landowners. People's willingness to invest time and resources is obviously greater on private lands than on communal lands, and incentives may be necessary to promote investment in natural resource management on communal lands. If the local people are highly dependent on natural resources for their livelihoods and if they have few economic opportunities outside agriculture, the sustainable, rational and more efficient use of natural resources must be promoted in all possible ways.

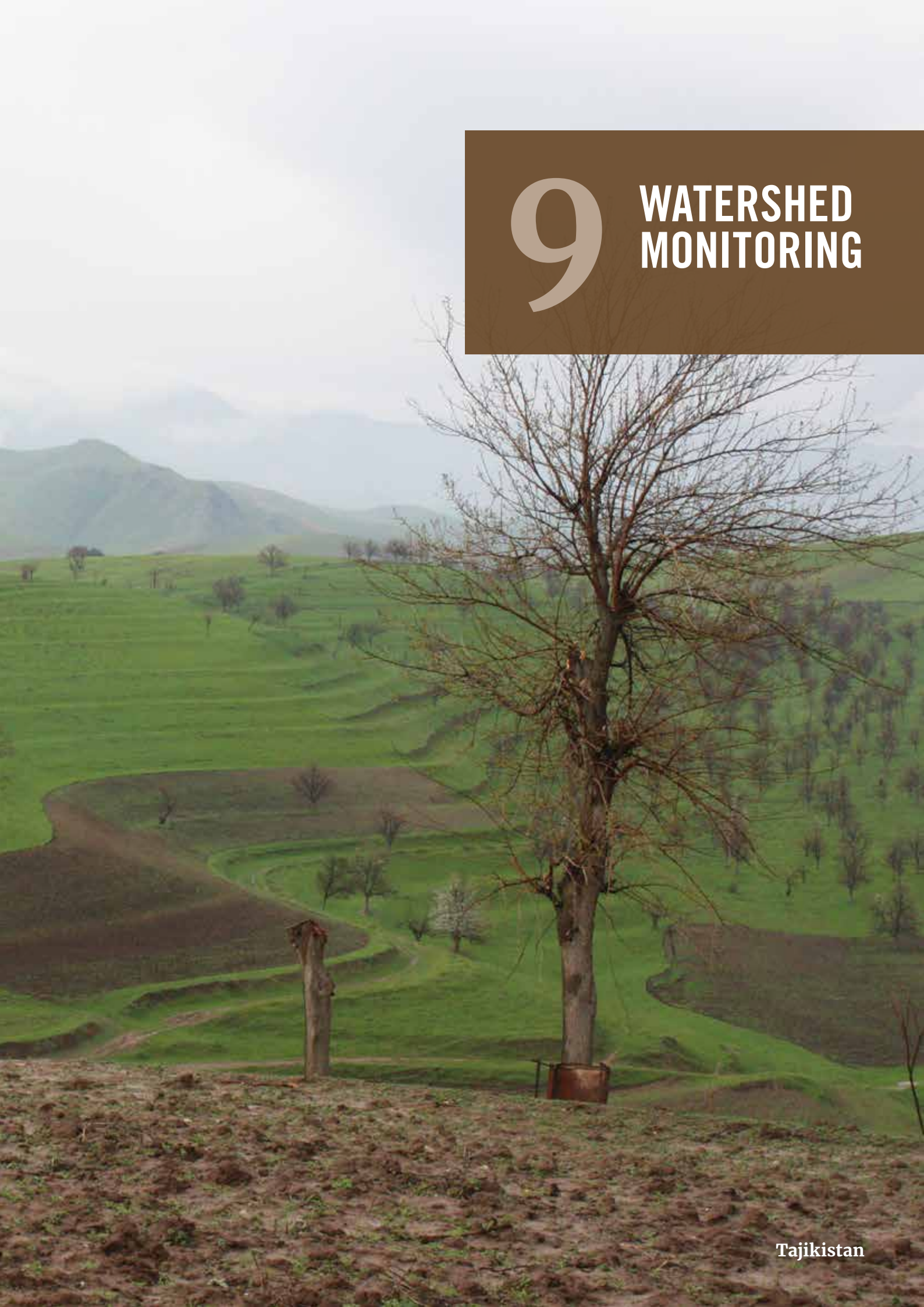
For physical conservation measures, emphasis should be given, whenever feasible, to bio-engineering soil and water conservation measures. Bio-engineering soil and water conservation measures employ trees, grasses, earth and loose stone bunds and are generally more cost-effective than structural interventions. High-cost interventions should be limited to strategic locations that are at high risk or fundamentally important (e.g. to avoid blockage of rural roads).

Opportunities to develop incentives and mechanisms to compensate for the provision of ecosystem services in the upper parts of watershed should be identified. Compensation mechanisms represent one of the few ways to encourage the lowland population to invest adequately in upstream areas in the medium to long term, to ensure the continuous provision of essential goods and services such as clean water. Several positive examples have been documented in Latin America, but it has proved challenging to transfer the concept to countries that have a high concentration of family farmers with small landholdings, where transaction costs are very high.

Opportunities should be explored to link natural resource management activities with existing social protection schemes. Upper watershed areas are often intrinsically poor, lack infrastructure and economic potential and receive little attention from political powers. In some countries, their residents include specific disadvantaged groups that receive direct income support through national social protection programmes and schemes. While social protection schemes are usually designed to reduce poverty and food insecurity in rural areas, they could be further developed and refined to become not only pro-poor but also pro-environment. In such a scenario, socio-environmental safety nets could not only stimulate people's productive investments in agriculture but also support investments in the protection and sustainable management of natural resources that underpin sustainable food and agriculture. Examples include public work programmes in large watershed management initiatives in Ethiopia and conditional cash transfer for labour-intensive rural road construction in the Sahel (Jooseten and Grey, 2017; FAO, 2013d).


©Thomas Hofer

9 WATERSHED MONITORING



Tajikistan

9 WATERSHED MONITORING

This chapter looks at how watersheds and watershed management plans and activities implemented in watersheds are monitored. It reviews the strategies and systems devised by projects to support the watershed stakeholders in observing and documenting their local environment and any changes therein.

In a project context, monitoring can be defined as the regular systematic collection and analysis of information to track the progress and performance of project execution against preset objectives and targets, and ultimately to measure the change in the state or condition of the watershed. Monitoring is usually named in the same breath as evaluation (becoming M&E), which is the periodic external assessment of the higher-level outcomes, impact and sustainability of a development intervention. Evaluation is not covered in this chapter.

To monitor changes in the watershed, the key data and findings from the baseline assessment reports (Chapter 5) need to be translated into indicators for the monitoring system so that conditions can be compared with the before-project situation. An indicator is a key statistical parameter that can be used to describe (indicate) the condition of something, track progress and performance and guide decision-making. An indicator allows comparisons over time, comparisons by different groups to assess variations in performance and comparisons against a preset target or standard.

Apart from measuring and reporting progress and performance of project execution, monitoring has other important functions in a project context. By developing a monitoring system, stakeholders build consensus on what they want to achieve. During monitoring, comparison of the data with baseline information and defined goals fosters understanding of where the project stands and what management decisions need to be taken. Monitoring makes it possible to detect not only successes but also failures in project execution, and consequently aids learning from previous experiences and adaptation to changing circumstances. Monitoring is key for demonstrating the multiple benefits and impacts of watershed management projects, which is critical for the institutionalization and upscaling of solutions and models that have proved successful. Monitoring is also crucial for securing additional financial resources. It contributes to accountability and provides a basis for external project evaluation.

As the watershed is a complex socio-ecological system in which ecological, social and economic processes are closely linked, different types of indicators must be identified, combined and monitored at regular intervals. The set of indicators ideally comprises environmental, social, economic and institutional indicators:

- Environmental indicators are mainly biophysical measurements, for example of water quality, soil erosion and forest cover, which can provide information about the state and trends of watershed resources or the extent of resource productivity and natural resource management intensity.
- Social indicators refer to social well-being and livelihoods and document changes in people's attitudes, behaviour and progress towards social equity.
- Economic indicators refer to economic well-being in terms of employment and income.
- Institutional indicators measure the performance of service providers, the influence and dynamics of existing local institutions or the functioning of WMCs put in place.

Social and economic indicators should be disaggregated for different groups (e.g. by gender, age, wealth and ethnicity) to make it possible to monitor, for example, participation in watershed management planning and implementation or perceptions of tenure security in access to resources for different population groups.

In order to track progress and measure both environmental benefits and socio-economic benefits for local communities, it is important to define performance, impact and process indicators that can capture the changes resulting from project interventions.

- Performance indicators are directly linked to project activities and are often expressed as a rate or a count, for example the number of hectares reforested or the number of people trained. They are useful to report on measures implemented on site, such as the number of check dams built to reduce soil erosion, but they do not provide information about off-site effects, such

as whether the amount of sediment downstream has decreased as a consequence of the check dams.
- Impact indicators are used to measure changes in the medium to long term as a result of action taken by the project and are linked to higher-level project objectives and outcomes. They are needed, for example, to measure upstream–downstream linkages.
- Process indicators are used to document progress towards adoption of improved practices, participation in planning processes, better local resource governance and empowerment of watershed residents.

The challenge lies in selecting and assembling a reasonable set of indicators that is neither overambitious nor lax, focused on the information that is truly needed and sparing on information that would be nice to have. Given the resource constraints in many developing countries, it is important to consider issues of practicability, cost effectiveness, accessibility and compatibility with existing data sets and statistics.

Indicators should, wherever possible, be SMART, meaning that they should be:
- specific (clear, robust and precisely formulated, responding to the who, what, when, where and why questions);
- measurable (quantifiable and objectively verifiable, easy to collect or measure);
- achievable (realistic and attainable);
- relevant (reflecting issues of importance to policy-makers);
- time bound.

When developing an indicator, it is important to set a target quantity and quality for the parameter to be measured and the time by which the change is expected. It is equally important to identify the data source(s) for each indicator.

In line with the increasing attention on participatory, gender-sensitive planning approaches in the broader development context, more participatory forms of M&E are attracting growing interest in the natural resource sector. However, as noted by Guijt (1999), "participatory M&E is not just a matter of using participatory techniques within a conventional M&E setting. It is about radically rethinking who undertakes and carries out the process, and who learns or benefits from the findings." The reluctance of project staff to work towards this change of mindset and to delegate responsibilities may be the main reason why "participatory impact monitoring" (GATE, 1996) and other concepts allowing stakeholders to document the socio-cultural impact of actions and changes at the community level have not been systematically incorporated in project design and implementation.

The new generation of watershed management programmes and projects (FAO, 2006) concluded that globally, most watershed management projects implemented between 1990 and 2000 tended to focus on input–output monitoring and lacked performance and sustainability indicators. The publication recommended that future projects avoid overly complex project design, define comprehensive and clear performance indicators and establish M&E procedures that link project performance and sustainability indicators to project objectives.

ESTABLISHING A MONITORING SYSTEM

RESULTS OF THE REVIEW

Over the past decade, FAO and other development organizations have moved to more systematic results-based planning and monitoring, including the use of standardized formats for project formulation and reporting. However, most of the projects covered in this review did not follow this approach. When the earlier projects were initiated they were required to prepare an indicative work plan and timetable, but not a logical framework; thus, no indicators were identified to measure project performance (let alone impact). More recent projects developed logical frameworks of varying quality which included specific indicators along the results chain (impact, outcome and output indicators). The establishment of a baseline and the setting of target results were added even more recently.

In terms of the monitoring of biophysical aspects in the watershed, it was the earlier approved projects that included field-level monitoring among their activities. The project in the **Democratic People's Republic of Korea** purchased and installed equipment to measure soil erosion on sloping fields and hydrological stations to monitor the suspended sediment load of rivers. The **Tajikistan I** project installed two rain gauges at different altitudes and an evaporation pan to support monitoring of meteorological parameters. The documentation does not report on the use of the equipment (how often, by whom or the results).

The development of an M&E system to monitor the state of biodiversity and the management of natural resources is one of the key planned outputs of the **Chimborazo** project in **Ecuador**, to which a substantial amount of budget has been allocated. However, the project has experienced delays in the actual establishment of the monitoring system. The project team has prepared a baseline, a draft list of indicators to measure change and a draft concept for operationalizing the system (who will collect what data, where, how and with what frequency), together with a list of equipment needed. Initially, five locations in each watershed are to be monitored. The draft indicators are being refined to measure the impact of project activities in quantitative terms, e.g. land under sustainable management practices; land under natural regeneration or reforestation with native species; and number of springs protected. A mobile application is being developed to facilitate data collection and analysis.

The **Guatemala** project developed a well-crafted output monitoring system which made it possible to report on project performance in terms of numbers of people reached and trained as well as the number of hectares treated. The project had a well-elaborated and detailed logical framework and a national expert working full time on M&E issues. An international consultant contributed to the initial design of the M&E system. Several indicators were defined for each output, as well as a baseline value and a preset target for each indicator. The achievements against the targets were reported in the terminal report.

Although the **OUBAME** project was relatively recent, its efforts to establish a baseline and to set up an M&E system were late and insufficient. An international M&E consultant visited **Morocco** and **Mauritania**, but the project did not have enough time to incorporate his recommendations in the project operations of each country. Retroactively, the project estimated the situation at start-up in 2010 for comparison with the situation in 2014 (see the section on indicators, below).

Although the project in the **United Republic of Tanzania** carried out both baseline and endline surveys (see Chapter 5), the project impact was measured entirely by the responses (and to some extent guestimates) of the villagers. The project lacked a viable field-level monitoring system to measure the results of land-based activities, such as the extent of restored forests, the household income generated from production-oriented interventions and the impact of new technologies (e.g. the effect of improved stoves on consumption of fuelwood).

In **Pakistan**, the project team did not systematically collect and assemble information for reporting and accountability purposes from the WMCs that were responsible for the implementation of activities in each watershed. The achievements in each watershed (e.g. area covered, beneficiaries reached, benefits generated) were not reported. Some figures were presented in the lessons learned report (Marjan, 2010), but they were aggregated for all 17 watersheds.

LESSONS LEARNED

The monitoring systems only measured outputs, with little attention to monitoring of outcomes or impact. Although an understanding of underlying processes is critical for watershed management projects, these processes are more difficult to measure and are hence often neglected when M&E systems are set up. It is still important to understand if and why individual behavioural changes or institutional changes occur, and whether or not they can be attributed to project action.

Monitoring can be hampered by shortcomings in the formulation of project documents. In some cases, indicators that were clearly not SMART (e.g. not precise, not relevant, not measurable) were formulated when the logical framework was initially crafted. Strikingly, project documents with flawed logic were approved without request for adjustment, which points to a lack of critical review and analysis in the project approval process. Moreover, the project teams did not further elaborate, adjust or refine weak logical frameworks during implementation. Ideally, the logical framework should guide regular monitoring of project performance, but some project teams did not follow this principle.

Attention to on-site environmental monitoring has decreased over time in watershed management projects. While two small, relatively early projects included field monitoring of some biophysical parameters, projects with a longer duration and a larger budget did not systematically include hydrometeorological and other field-based measurements.

The projects did not attempt to include participatory watershed monitoring or to create capacity related to monitoring. Quantitative and qualitative monitoring of activities may have been among the tasks of some WMCs, but if so it was not documented. On the contrary, monitoring was too often left to the project team, with insufficient participation from stakeholders – as evidenced by the fact that no specific capacity-building interventions were devised around M&E themes for any group of stakeholders.

Project goals and results from detailed watershed assessments were not sufficiently operationalized in the monitoring systems. The assessment phase did not systematically result in a proper baseline. While project documents and assessment reports were generally rich and detailed, for example in terms of identifying target beneficiary groups, this precision was not often maintained during implementation or for monitoring purposes. Activity selection was not usually mapped to specific target groups, and the terminal reports usually favoured aggregated information. As a result, the actual results could not be compared to the expected results for each target group as formulated in the project document.

RECOMMENDATIONS

The preparation of an M&E plan is recommended to organize the collection of data during project implementation. In developing indicators and defining related data collection processes, it is important to have a clear conception about what the data will be used for, who will be responsible for their collection and what methods or tools will be used. The M&E plan will ensure that relevant information on project progress and performance is collected, processed and analysed on a regular basis.

A share of the project budget should be reserved for personnel services to support M&E. This support is necessary to set up the system on time, establish the

baseline, collect and analyse data and produce regular progress reports. The projects that were able to monitor and report on their performance invested in human resources.

Strengthening monitoring capacity and skills at all levels must be a key component of future watershed management projects. The capacity to develop consistent logical frameworks, including results chains that are logical and indicators that are SMART, must be strengthened, first and foremost for watershed management project designers and implementers. Project managers, local institutions and government technical agencies require strengthened capacity in collection and analysis of data, including statistical data, and in dissemination of results from data analysis. To advance participatory M&E for the (self-)monitoring of multistakeholder processes in watershed management, stakeholders require support in the joint design and testing of monitoring methods and tools adapted to their specific needs and the local context. Capacity is also needed for the development of appropriate procedures and systems to foster exchange of information and data among institutional actors involved in watershed management.

While output monitoring must be maintained to report on project performance, more effort is needed to monitor the multiple processes taking place in the watershed. Given the understanding of a watershed as a socio-ecological system and the definition of watershed management as an iterative collaborative process, a system is needed that monitors the environmental and institutional processes taking place in the watershed – including the watershed management planning process itself – and that involves the watershed stakeholders. Watershed management planning can be improved and made more efficient over time by regular monitoring and feedback loops, in which concerned stakeholders must be closely associated.

Possible watershed management benefits must be systematically compared with the actual benefits achieved through watershed management interventions. A compendium of expected on-site benefits, incorporating the environmental, economic and socio-cultural dimensions of watershed management, could be helpful for developing a standard set of impact indicators that any watershed management project should include in its M&E system. It is relatively difficult to monitor off-site benefits, i.e. to link perceived downstream changes to concrete interventions that have taken place in upper areas, especially in short-term projects where the area treated is usually small. Long-term measurements will be required to substantiate the often claimed upstream–downstream linkages with evidence from monitoring stations at different altitudes in the watershed. Such monitoring can be costly and requires technical competencies that are not always available locally. Quick and easy-to-measure indicators could include the perceived changes in the flow from water sources throughout the year; the observation of dried-up sources that start giving water again; or changes in the time that women and children spend collecting water or watering livestock.

Countries need to overcome the short-term project cycle and to engage in long-term monitoring and reporting on the state and processes in their watersheds, at both the national and local levels. Regular monitoring of local watershed experiences, including data collection, analysis and documentation, must be included in the day-to-day work of national authorities and technical counterparts, with project teams gradually stepping back and handing over this task. Future watershed management projects must therefore provide training in the design and implementation of M&E systems for staff in government institutions and agencies responsible for data provision and statistics. A transition to more advanced information technology and the use of mobile phones may also be needed, in combination with, for example, automated meteorological and water flow measurements.

Combining scientific monitoring of complex interactions with participatory monitoring of some easy-to-measure biophysical parameters in watersheds by local communities may be a promising approach. Joint monitoring might help to illustrate the mutual benefits of merging traditional and scientific knowledge, to increase awareness of changes in the environment and to prevent damage to scientific installations. WMCs with responsibility for implementing activities (as in Pakistan) or local water user groups could be trained to take on part of the on-site monitoring, for parameters such as water flows and quality at various points across the watershed. This would be a clear step towards increasingly shared responsibilities and local empowerment, helping communities become real partners and co-managers of natural resources.

The data and information in the M&E system must be properly managed, documented and communicated to make the project's experiences, impacts and benefits readily available and accessible for diverse audiences. Information products communicating key messages, lessons learned (both successes and failures), success stories, case studies and good practices foster learning and exchange of experience. Web platforms and knowledge networks facilitate documentation of project results and experiences, information flow among actors and dissemination and sharing of data and knowledge. Knowledge sharing supports uptake and replication of good practices and helps to avoid mistakes that may have been experienced in the past.

SELECTING APPROPRIATE INDICATORS

RESULTS OF THE REVIEW

The indicators selected for the watershed management component of the **Pakistan** project were either quantitative, i.e. number of watershed management plans prepared and number of committees established, or general and imprecise descriptions of planned activities, which did not fulfil the SMART criteria. The phrasing of the indicators exemplified some weaknesses in the logical framework: Terminology was not used consistently, with key terms such as "output", "component", "result" and "indicator" not clearly defined and used almost interchangeably; and activities were not spelled out at all. For example, one planned result was "The productivity of degraded community and privately owned forest lands is restored through reforestation and afforestation of productive tree species under an integrated watershed

TABLE 9. CHANGES THAT CAN BE ATTRIBUTED TO PROJECT ACTION IN THE OUED OUTAT WATERSHED, MOROCCO, 2010–2014

Indicator	Situation 2010	Situation 2014	Change (%)[a]
Biophysical indicators			
Soil conservation and land management			
Area of forest vegetation *(ha)*	5 370	6 370	+18.8
Area of pastures *(ha)*	7 272	8 272	+13.6
Area of fruit-growing trees *(ha)*	480	525	+9.4
Gabions *(No.)* Sediments retained *(tonnes)*	124 27 000	256 56 000	+107 +107
Rural road construction and maintenance *(km)*	20	54	+170
Water resources management			
Sources/wells rehabilitated *(No.)* Beneficiaries *(No. of nomadic households)*	1 130	4 266	+400 +100
River bank protection *(ml)*	0	1 000	+
Water diversion dams *(No.)* Irrigated area *(ha)* Sediments retained *(tonnes)* Benefiting farmers *(No.)*	2 1 300 40 000 250	8 2 300b 41 400 350	+400 +77 +4 +40
Socio-economic indicators			
People involved in goat rearing *(No.)* Milk-producing goats, Alpine race *(No.)* Milk produced/self-consumed *(litres)* Protein consumption *(g/person)*	0 0 0 0	3 000 266 120 1.3	+
Improved stoves *(No.)* Beneficiaries *(No.)* Wood consumption *(tonnes/household/year)*	0 0 2	20 120 1.5	+
Households connected to electricity *(No.)*	796	812	+2
Fruit-trees (apples) *(No.)* Apple production *(tonnes)*	300 000 12 000	330 000 13 000	10 8
Beehives *(No.)* Beekeepers *(No.)* Honey production *(litres)* Seasonal income *(dirhams)*	0 0 0 0	78 41 125 25 000	+
Agritourism sites *(No.)*	0	3	+
People trained in agricultural practices *(No.)*	0	114	-
Women participating in income-generating activities *(No.)*	0	48	+
Institutional indicators			
Associations *(No.)*	0	8	+
Cooperatives *(No.)*	2	4	100
Technical staff trained *(No.)*	2	8	300
Interinstitutional steering committee *(No.)*	0	1	+
Interinstitutional technical working group *(No.)*	0	1	+

[a] + refers to a strong but unquantified increase.
[b] In addition to 480 ha within Oued Outat watershed, the six new dams were servicing 1 820 ha downstream, with an increase of about 1 000 ha after 2010.

management approach". Three indicators were given for this result:

- private nurseries established and sustained;
- community and private land planted with multipurpose trees and fruit-trees;
- community and private land protected from grazing animals, fire, etc.

No target was set for these indicators, for example in terms of hectares to be reforested or numbers of nurseries to be established. No explanation was provided for the distinction between community and private land, and importantly, this aspect was not addressed during implementation, with no systematic monitoring and comparison of actions implemented on community and private land. Achievements were not systematically reported against the predefined indicators.

In the **OUBAME** project in **Morocco** and **Mauritania**, biophysical, socio-economic and institutional indicators were chosen retroactively to compare the situation in 2014 against the (estimated) situation in 2010 (Tables 9 and 10).

TABLE 10. CHANGES THAT CAN BE ATTRIBUTED TO PROJECT ACTION IN THE OUED BARBARA WATERSHED, MAURITANIA, 2010–2014

Indicator	Situation 2010	Situation 2014	Change *(%)*[a]
Biophysical indicators			
Natural resource management and infrastructure development			
Construction of earth dams for water retention *(No.)*	0	4	+
River bank protection *(ml)*	300	700	233
Securing the oasis of Radhi *(ha)*	0	2.5	+
Improved and fenced-off pasture area *(ha)*	0	3	+
Protection of crops in flood recession areas *(ha)*	115	160	39
Rural road construction and maintenance *(km)*	0	100	+
Protection of vegetable production areas *(ha)*	1	4	300
Drinking-water supply system *(No.)*	1	3	200
Drip irrigation unit *(No.)*	0	1	+
Solar irrigation unit *(No.)*	0	1	+
Socio-economic indicators			
Strengthening/diversifying productive activities			
Introduction of fruit-trees *(No.)*	0	150	+
Groups created for village butcher shops *(No.)*	3	11	266
Groups created for petty trade *(No.)*	5	13	160
Groups created for textile dyeing *(No.)*	0	4	+
Livelihoods improvements			
Households with solar energy devices *(No.)*	10	70	600
Households with water filters *(No.)*	0	100	+
Youth groups with sports equipment *(No.)*	0	4	+
Capacity development			
Farmer field schools on agricultural practices *(No.)*	0	22	+
Training on agricultural practices for technical staff *(No.)*	0	3	+
Study tours and farmer-to-farmer exchange visits *(No.)*	0	19	+
People trained in water pump maintenance *(No.)*	0	4	+
People trained in the management of associations and groups *(No.)*	15	188	+
Institutional indicators			
Associations *(No.)*	1	2	100
Cooperatives (of which female) *(No.)*	9 (8)	13 (10)	44
Farmer organizations with female members *(No.)*	5/12	10/15	66
Interinstitutional steering committee *(No.)*	0	1	

[a] + refers to a strong but unquantified increase.

Indicators such as number of trees planted or nurseries established help to mark progress against afforestation or reforestation targets, but do not demonstrate changes in environmental processes affecting water quality or flows (tree nursery, Turkey)

©Thomas Hofer

The selected indicators were all quantitative, and thus do not provide any indication of the beneficiaries' perceptions or behaviour changes or whether they continue to apply what they learned through the project. Nonetheless, this exercise provided important support to the negotiations for follow-up funding in both countries.

LESSONS LEARNED

In general, the projects neglected to select useful indicators. Despite the clear recommendations in the earlier evaluation of watershed management projects (FAO, 2006), overall the projects included in this review were not more attentive or proactive than previous projects in selecting meaningful indicators for the regular measuring of project performance and impact.

RECOMMENDATIONS

Projects must devote more attention to developing a set of SMART indicators, which makes it possible to establish the watershed baseline and to set targets against which monitoring will be carried out. It is admittedly difficult to phrase indicators during the design and formulation phase. The preliminary list of indicators should be updated, refined and made SMART during the assessment phase at the latest (Chapter 5), when the baseline and targets are set. Indicators should ideally be developed through a participatory process. They should be aligned to the extent possible with the indicators identified for the SDGs at the global level so that local project action can be attributed to SDG implementation and contribute to periodic reporting on progress.

To monitor institutional processes, indicators are needed that measure performance changes in institutions and organizations involved in watershed management. These bodies include government institutions, community-based organizations and structures created by the project such as WMCs. Indicators for the performance of WMCs, for example, could measure regular meetings, geographical and social representation, segregation of tasks and rotation of leadership. More qualitative elements could be the number of resource use agreements in place or the rules established for the maintenance of work undertaken. Financial contributions, the use of revolving funds and changes in income levels could be useful indicators for savings groups. For already existing community-based organizations, possible indicators could be the capacity to establish linkages with higher-level institutions such as financial institutions, the capacity to mobilize additional resources and the quality of interaction with and feedback provided to their members. In terms of capacity development, the number of people participating in training workshops during project implementation does not indicate anything about the effectiveness of the training or the application and uptake of training content by the trainees thereafter. Training of individuals should be linked to clearly defined outputs and expectations of performance and behaviour change within their respective institutions. Training for the staff of institutions or service providers should be measured in terms of improved quality of services delivered to their clients.

To monitor environmental processes in the watershed, indicators are needed that measure environmental conditions, pressures on the environment and changes as a result of project action. Measuring the state of the environment, e.g. the quality and quantity of natural resource stocks is difficult, time-consuming and costly. Preference should therefore be given to measurement of the changes in the pressures that human activities exert on the environment and on natural resources. Indicators of environmental pressures often measure the intensity of water and forest resource use or change in land use.

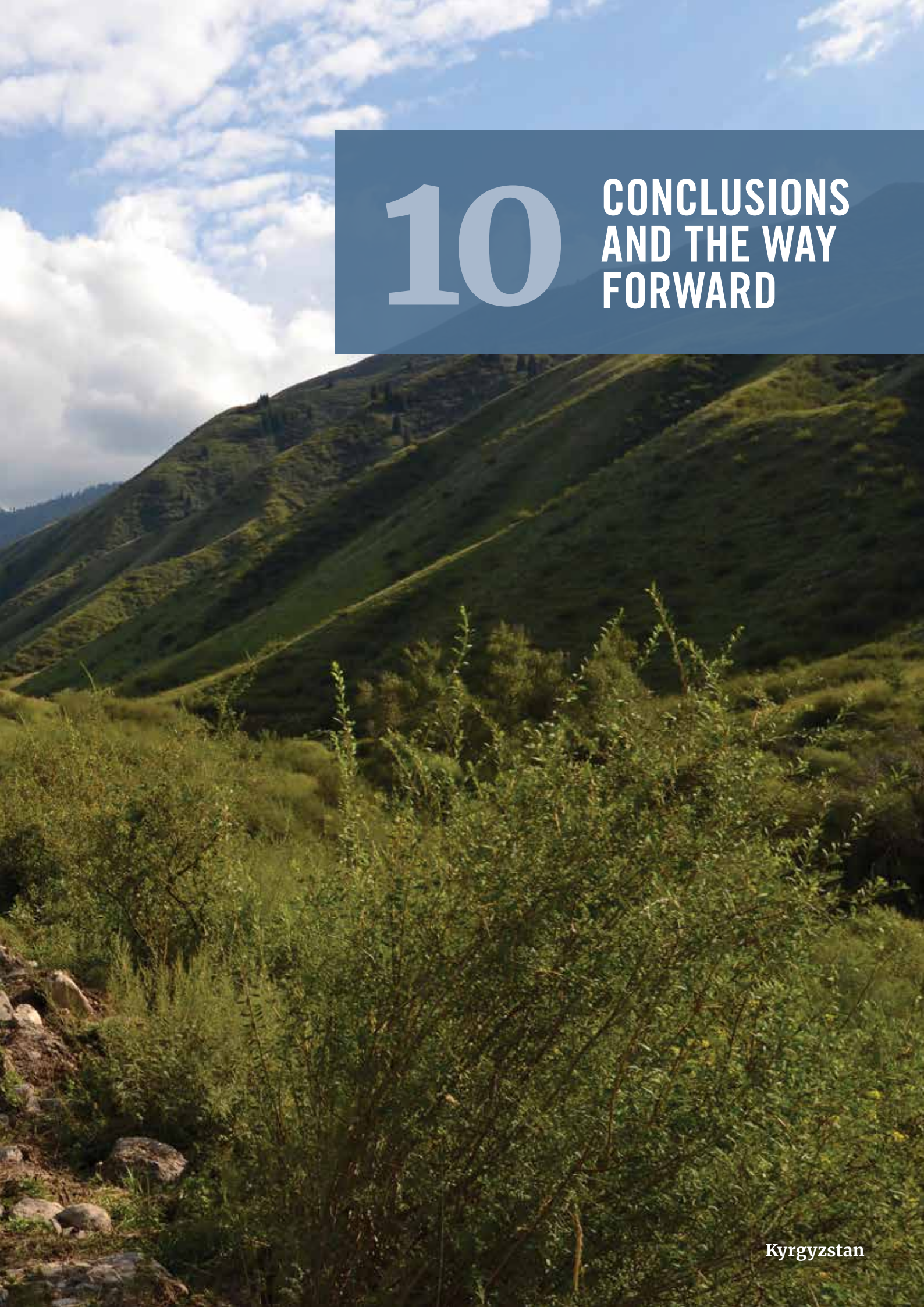
Examples include freshwater extraction from the available water resources or the actual harvest compared to the productive capacity of forests. While counting the number of trees planted or measuring their survival rates by direct observation helps to identify progress against a predefined afforestation or reforestation target, it does not provide information on changes in environmental processes that would contribute to improved water quality or flows in the longer term.

Preference should be given to indicators for which data can be collected and analysed with the available human and financial resources. When data collection for a specific indicator proves to be too difficult or too costly, the monitoring system, including the indicators, can be refined over the course of implementation. Any refinements should be documented.

A long-term goal could be to develop an indicator framework for watershed management to improve the understanding of interactions, synergies and trade-offs within watersheds. To address and measure the complex relationships between forests and water, the FAO Forest and Water Programme is currently developing a standardized monitoring framework. FAO and its partners have prepared a preliminary list of indicators, variables and methods to measure the impact of changes in forests on water flow, water quality and socio-economic factors; these were recently tested in a field project in India and are being refined. The framework could perhaps be further developed to incorporate other important parameters that influence environmental processes in watersheds.

©Paul Jeannin/flic.kr/p/KdfwPz

10 CONCLUSIONS AND THE WAY FORWARD



Kyrgyzstan

10 CONCLUSIONS AND THE WAY FORWARD

This study reviewed 12 watershed management projects technically supported by FAO over the past decade. The intention was not only to highlight their positive achievements, but also to identify areas for improvement, based on a strong belief that there is more to learn from analysing shortcomings than from glorifying successes.

Overall, the projects covered in this review were more effective at the watershed level than at the national policy level, as project managers gave most of their attention to action on the ground. In the field, the projects tested and implemented a variety of measures and practices to demonstrate their multiple benefits for people and the environment and to support their wider adoption by local communities. The projects invested strongly in capacity development for multiple stakeholders (not only at the local level) on a variety of technical issues (albeit less on functional capacities to strengthen communication, negotiation and planning). The projects also invested in setting up and facilitating participatory processes and in engaging stakeholders from different sectors and segments of the population, including indigenous people, local communities, youth and women. They established space for dialogue and collaboration across sectors, including forestry, agriculture, water and others, at the district or municipal level. They supported multidisciplinary situation assessment in the watersheds and joint planning and implementation of priority measures to solve the identified problems. The projects have thus shown at a small scale how cross-sectoral collaboration works and what types of action and investment are needed to safeguard natural resources while also enhancing rural livelihoods.

The projects were less successful in achieving impact at the governance level and in ensuring the sustainability of project action beyond the immediate intervention area, for example through inclusion of the watershed management approach and principles in regular policy-making and planning. Policy-related activities foreseen in project documents were in some cases overambitious, given the short time frame, or policy issues were not properly addressed in project design and not taken up during implementation. It is admittedly difficult for small-scale short-term projects to influence higher level policy- and decision-making, and this is one reason why partnerships with other organizations dealing with watershed management are necessary. Countries are increasingly moving away from pilot interventions for demonstration purposes and giving preference to larger-scale restoration or management programmes. Opportunities must therefore be sought to join forces to scale-up good practices and to move from small-scale, sometimes dispersed and fragmented watershed management projects to larger-scale and longer-term transformative programmes that can generate qualitative changes in the well-being of populations and in the conservation or restoration of terrestrial ecosystems. The growing momentum around landscape initiatives and the call for integrated approaches for implementing the SDGs provide opportunities for increasing the visibility of watershed management in the global development arena.

BUILDING ON GLOBAL MOMENTUM: RELEVANCE OF WATERSHED MANAGEMENT IN ADDRESSING MAJOR GLOBAL CHALLENGES

Watershed management is not a new concept, and its importance for achieving sound natural resource management together with livelihood improvement has been recognized over the past two decades. Still, it has not been extensively applied globally despite considerable efforts by several international organizations, including FAO. The call for integrated approaches in the 2030 Agenda for Sustainable Development and FAO's revised Strategic Framework for achieving the SDGs offer opportunities to promote watershed management and its comparative advantages in strategies for meeting persistent global challenges. Watersheds are an appropriate geographical unit for downscaling global-level targets and goals and for devising local solutions to global challenges. Based

Dense forest cover helps to prevent floods and landslides from steep slopes, Guatemala
©Thomas Hofer

on long-standing experience, watershed management can make important contributions in integrating environmental, economic and social issues and processes; reconciling divergent interests over the use of natural resources; and strengthening coordination, cooperation and coherence in policy and practice, not only horizontally across goals, targets, sectors and disciplines, but also vertically over different levels and scales.

THE WATER CHALLENGE: REFOCUSING WATERSHED MANAGEMENT ON WATER

Overconsumption of freshwater resources and water scarcity are on the rise in many countries, not only as a result of population growth and competing demands from agriculture, industry and urban areas, but also as a result of climate change. Water scarcity has negative impacts on biodiversity, people's livelihoods and food security. It is estimated that 4 billion people face severe water scarcity during at least part of the year, and half a billion people all year round (Mekonnen and Hoekstra, 2016). Watershed management has a key role in the protection of headwater areas, watercourses and springs, and in reducing water consumption, increasing water use efficiency across all sectors and ensuring the equitable sharing of limited freshwater resources. To balance water supply and demand, a careful analysis of the role of water in agricultural productivity, rural livelihoods and environmental processes is required, and it is widely acknowledged that this is best done at the watershed level. FAO promotes water accounting and water auditing as important tools that could be applied more systematically in watershed management projects. A stronger focus on water and water-related issues, challenges and risks will strengthen the position of watershed management in the development arena and also highlight its relevance to climate change adaptation and disaster risk management.

THE CLIMATE CHALLENGE: WATERSHED MANAGEMENT FOR CLIMATE CHANGE ADAPTATION

While the projects included in the review had no particular focus on climate change, it is evident that adaptation (and to the extent possible also mitigation) elements must be mainstreamed in future watershed management projects. Future projects will have to strengthen adaptive capacity and build the resilience of ecosystems and people to prepare for and cope with the potential impacts and risks of climate change. Future water stress will be driven predominantly by variation in the availability of water resources, resulting from changes in precipitation patterns and variations in temperature. Potential climate change impacts and risks must be reflected in watershed management project design and during all phases of the project cycle (climate proofing). Watershed situation analysis must incorporate assessment of key climate trends, vulnerabilities and risks as well as the existing adaptive capacity of people and ecosystems. Future watershed planning must be adaptive in nature, including screening of adaptation options and advocacy of actions to protect people from the adverse effects of extreme weather events; to create or enhance natural buffers to climate impacts (such as forests and trees); and to improve socio-economic resilience by diversifying livelihood options and income sources. Adaptive watershed management allows people to deal with uncertainty and unpredictability. To increase climate resilience, adaptation measures and capacity development are needed in areas as broad as planning, budgeting, governance and individual behaviour. Ultimately, climate action must be seen as an investment (and not as a cost) which should drive economic growth and support the transition towards a low-carbon green economy for a sustainable future. Opportunities should be explored to support the implementation of national policies and measures for reducing emissions from deforestation and forest degradation, including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+).

THE DISASTER CHALLENGE: WATERSHED MANAGEMENT FOR DISASTER RISK MANAGEMENT

Natural hazards and related disasters (such as landslides, floods, droughts and storms) have been increasing in intensity and frequency. Bold action is needed to prevent or mitigate the immediate impacts and far-reaching economic and social repercussions of natural disasters,

and to build the resilience of farmers and rural households, particularly in countries that face recurrent disasters and depend greatly on agriculture for livelihoods, food security and nutrition and economic growth. Decreasing vulnerability and increasing resilience are key to risk reduction and are usually faster, more effective and less expensive than reconstruction and rehabilitation after a disaster. However, global spending on emergency response, reconstruction and rehabilitation outpaces spending on disaster risk reduction and prevention measures. Watershed management will have greater influence if it incorporates disaster risk management actions such as hazard assessment, mapping and zoning, early warning systems, disaster risk reduction interventions and increased investment in disaster prevention.

The Sendai Framework for Disaster Risk Reduction 2015–2030 (UNISDR, 2015) recognizes disaster risk reduction as an important component of sustainable development. It emphasizes multisectoral engagement in the planning and delivery of disaster risk reduction actions. Its goal is to "prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience". Achieving this goal requires integrated approaches that bring multiple sectors and stakeholders together; it should be seen as a call for watershed management to play its part and take on a stronger role in risk management and resilience building. Institutional strengthening and capacity development for risk management, coordination and contingency planning will be crucial in this regard.

THE HUNGER CHALLENGE: WATERSHED MANAGEMENT FOR FOOD SECURITY AND NUTRITION

Watershed management is an important framework for improving livelihoods, for achieving food security through crop diversification and for enhancing agricultural productivity through the efficient and sustainable use of natural resources. By systematically enhancing sectoral linkages for improved soil, water, forest, crop and livestock management at the watershed level, watershed management contributes to improved food security and nutrition. Soil and water conservation measures, efficient water management, water harvesting and improved groundwater recharge have enormous potential for improving water availability and increasing crop productivity, especially in rainfed agricultural landscapes. Increased food production and diversification of food crops not only contribute to improved food security and nutrition, but can also enhance livelihood resilience and foster economic development when combined with actions that support access to markets, services and infrastructures. Through promotion of home gardens and tree orchards, watershed management contributes directly to diversified, healthy and sustainable diets.

ISSUES FOR THE FUTURE

For an effective response to the major challenges described above, the following issues must be addressed in further developing the watershed management concept and approach and in designing the next generation of watershed management projects and programmes.

WATERSHED GOVERNANCE AND INSTITUTIONAL STRENGTHENING

For greater impact and effectiveness at the country level, FAO's revised Strategic Framework includes a focus on addressing governance issues that may obstruct technical solutions. To achieve tangible and lasting results, watershed management projects must develop more focused and more strategic watershed governance interventions. Such interventions should be based on sound analysis of the underlying policy and institutional challenges and the underlying causes of resource competition in the watersheds. This analysis makes it possible to determine the changes that are needed in institutions, structures and processes to create a conducive environment for managing watershed resources in a responsible way and for scaling up locally tested good practices.

Support should be given to strategic planning and institutional coordination processes and to the creation of incentives for multistakeholder dialogue and action platforms. These areas are often underfunded because resource partners continue to prefer demonstrable outcomes on the ground (e.g. in terms of hectares reforested or smallholder incomes raised). Catalytic support to enhance governance and coordination mechanisms should complement technical assistance projects.

WATERSHED MONITORING

The general need to improve monitoring in watershed interventions is widely acknowledged and often repeated. Priority must be given to systematic and regular collection and analysis of data to detect whether conditions in the watershed have changed over time. Methodological tools and technical guidance are needed to support the selection of appropriate indicators. Priority must also be given to developing stakeholders' capacity to monitor environmental, institutional and socio-economic processes in watersheds so that the perceived changes and the full range of benefits and costs of development interventions can be documented. Evidence from monitoring data and statistics is crucial for informed decision-making and increased investment in watersheds.

Within the strategy of its Forest and Water Programme, FAO has embarked on developing a framework to monitor forest and water interactions in landscapes and the water-related ecosystem services provided by forests, such as flood and soil erosion control, cloud cover and precipitation, and aquatic biodiversity. The proposed set of indicators will address the status of water supply (quantity and timing), the status of water quality and the effectiveness of integrated forest and water policies, approaches, and practices. The monitoring framework links SDG 6 (clean water and sanitation) with parts of SDG 15 (life on land). In the longer term, the framework could be expanded by including indicators for other land uses, thus moving towards a true watershed management monitoring framework.

INCREASED DATA AVAILABILITY

Access to open-source geospatial data has greatly improved over the past decade, not least because of Google Earth and related tools such as Collect Earth, which allows for visual interpretation of very high-resolution satellite images made available by the Google Earth Engine. The high frequency of image production has reduced costs, and the availability of easy-to-navigate geospatial tools has greatly increased capacity and reduced the time required to access and analyse large remote-sensing databases of images with very high spatial resolution. A more systematic use of these tools in watershed management may complement on-the-ground assessments and contribute to the improved quality of environmental information while reducing time and costs.

The availability of mobile phones in developing countries is radically changing the approach to data collection and information delivery. In Kenya, for example, text messages are used for rapid data collection. This approach has proved to be much cheaper than in-person household surveys and also makes it possible to collect data in near real time and on repeated occasions, making answers more accurate and reliable. However, it is important to ensure that the voices of those unable to participate in mobile surveys, such as illiterate and/or elderly people or those who may not have access to a telephone, will be heard.

KNOWLEDGE SHARING AND LEARNING

Unfortunately, no institutional mechanism is in place for systematic exchange of experience, data and tools or to foster joint learning and cross-fertilization among development partners and research organizations that deal regularly with watershed management, such as FAO, GIZ, ICIMOD, IFAD, UNDP, WOCAT and the World Bank. It has not been uncommon to find two international organizations working in the same country, on similar themes, with the same government officials, but using different definitions and approaches. A mapping exercise or survey to take stock of important players currently active in watershed management and of tools developed by partners may help all involved to keep abreast of recent developments, to incorporate findings from development-oriented research and ideally to take steps towards harmonization of terminology and approaches.

New mechanisms put in place within FAO to capture and disseminate lessons learned from the Organization's interventions – such as platforms for sharing best practices (e.g. on resilience); internal technical networks on issues such as land, water, forestry and decent rural employment; and knowledge sharing events (e.g. Land and Water Days) – give an idea of the type of knowledge sharing support that would be useful to help watershed management partners learn from one another. It would be similarly helpful (albeit challenging) to develop a platform for sharing watershed management experiences, approaches and tools with those of other integrated landscape approaches.

STRATEGIC PARTNERSHIPS FOR JOINT ACTION ON THE GROUND

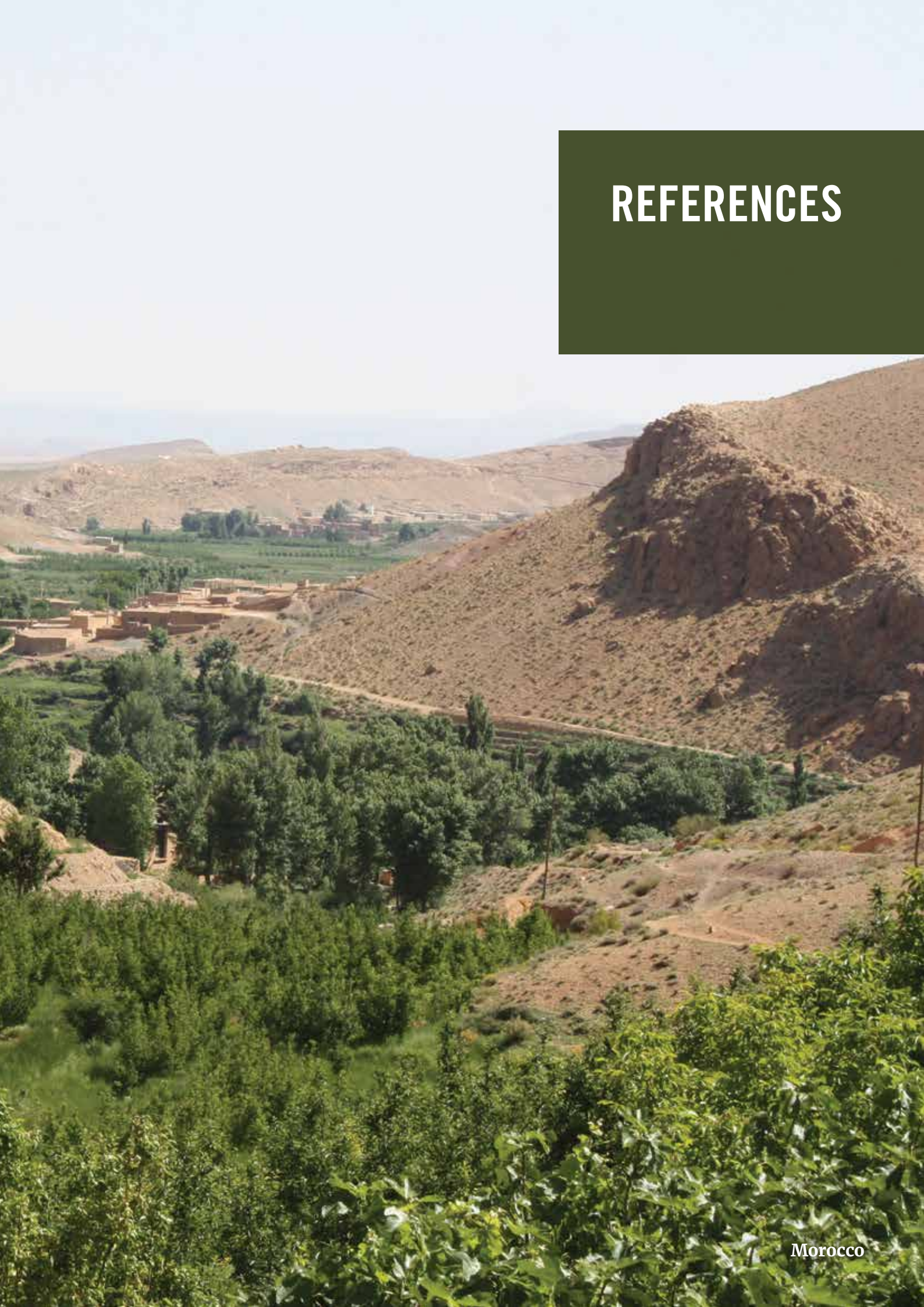
Closer collaboration among partner organizations is not only crucial to foster knowledge exchange and joint learning on watershed management issues, but could also lead to more synergies in actions on the ground. Given the comparatively small size of FAO projects, they have the most impact when the technical support that they provide to countries is closely associated with larger investment programmes. High-quality investment programmes associated with technical expertise on watershed management could be formulated, designed and implemented on behalf of international financing institutions. Action areas could be capacity development, impact assessment or the testing of innovative watershed management practices in the framework of national investment programmes so that promising results could be disseminated and scaled up more rapidly and more efficiently. The World Bank, IFAD and the regional development banks have programmes in watershed management and can be important partners providing technical support and guidance for responsible investment in watersheds.

Such strategic collaboration could be further expanded to include international organizations working on broader landscape management and restoration initiatives, such as the Global Landscapes Forum, IUCN, the Landscapes for People, Food and Nature Initiative (LPFN), the World Resources Institute (WRI) and the research centres of the Consultative Group on International Agricultural Research (CGIAR). Watershed management can make specific and targeted contributions to various restoration pledges including the African Forest Landscape Restoration Initiative (AFR 100), the Bonn Challenge, the Forest Landscape Restoration Mechanism, the Land Degradation Neutrality target-setting process initiated by the United Nations Convention to Combat Desertification (UNCCD) in more than 100 countries, and the United Nations

Climate Resilience Initiative: Anticipate, Absorb, Reshape (A2R). With broad and increasing support for the general principles of the landscape approach, including adaptive management, stakeholder involvement and multiple objectives, it is time to join hands and to move from verbal consensus to joint implementation and financing on the ground. In the words of Scherr (2017): "The international development, agriculture, finance and conservation communities need to join together to develop the financial infrastructure required for long-term investment in sustainable landscapes, whether the initial 'entry point' is watershed protection, biodiversity conversation, land restoration, climate-smart agriculture, or deforestation-free supply chains."

©Thomas Hofer

REFERENCES



Morocco

REFERENCES

Binder, C.R., Hinkel, J., Bots, P.W.G & Pahl-Wostl, C. 2013. Comparison of frameworks for analysing social-ecological systems. *Ecology and Society*, 18(4): 26.

Darghouth, S., Ward, C., Gambarelli, G., Styger, E. & Roux, J. 2008. *Watershed management approaches, policies, and operations: lessons for scaling up*. Water Sector Board Discussion Paper Series No. 11. Washington, DC, World Bank.

Davenport, T.E. 2003. *The watershed project management guide*. Boca Raton, Florida, USA, CRC Press.

FAO. 2005a. *Rapid guide for missions. Analysing local institutions and livelihoods.* Rome.

FAO. 2005b. *An approach to rural development: participatory and negotiated territorial development (PNTD).* Rome.

FAO. 2006. *The new generation of watershed management programmes and projects.* FAO Forestry Paper No. 150. Rome.

FAO. 2007. *Why invest in watershed management?* Rome.

FAO. 2010. *Enhancing FAO's practices for supporting capacity development of member countries.* Learning Module 1. Rome.

FAO. 2011. *The state of the world's land and water resources for food and agriculture – managing systems at risk.* Rome & London, FAO & Earthscan.

FAO. 2012a. *Voluntary guidelines on the responsible governance of tenure of land, fisheries and forests in the context of national food security.* Rome.

FAO. 2012b. *Improving gender equality in territorial issues (IGETI).* Land and Water Division Working Paper No. 3. Rome.

FAO. 2012c. *Coping with water scarcity – an action framework for agriculture and food security.* Rome.

FAO. 2013a. *Land Degradation Assessment in Drylands – methodology and results.* Rome.

FAO. 2013b. *Improving governance of forest tenure – a practical guide.* Governance of Tenure Technical Guide No. 2. Rome.

FAO. 2013c. *Climate-smart agriculture sourcebook.* Rome.

FAO. 2013d. *Guidelines for public works programmes: cash-, voucher- and food-for-work.* Rome.

FAO. 2015a. *Mapping the vulnerability of mountain peoples to food insecurity*, by R. Romeo, A. Vita, R. Testolin & T. Hofer. Rome.

FAO. 2015b. *FRA 2015 terms and definitions.* FRA Working Paper No. 180. Rome.

FAO. 2016a. *Land Cover Classification System: classification concepts – software Version 3.* Rome.

FAO. 2016b. *Water accounting and auditing: a sourcebook.* FAO Water Reports No. 43. Rome.

FAO. 2017a. Mountain and watershed management: OUBAME (online, available at www.fao.org/forestry/watershedmanagementandmountains/74913).

FAO. 2017b. Mountain and watershed management: Management of Chimborazo's Natural Resources Project (online, available at www.fao.org/forestry/watershedmanagementandmountains/74919).

FAO. 2017c. RuralInvest (online, available at www.fao.org/support-to-investment/knowledge-resources/learning-tools/ruralinvest).

FAO. 2017d. FAO TERM portal (online, available at www.fao.org/faoterm).

FAO & UNCCD. 2015. *Sustainable financing for forest and landscape restoration: opportunities, challenges and the way forward.* Rome.

FAO & UNEP. 1999. *The future of our land: facing the challenge.* Rome.

Forward Thinking Platform. 2014. *A glossary of terms commonly used in futures studies.* Rome.

GATE (German Appropriate Technology Exchange). 1996. *Participatory impact monitoring.* Booklets 1–4. Bonn, Germany, German Agency for Technical Cooperation (GTZ). (Available at www.fakt-consult.de/news/publications-on-participatory-impact-monitoring-pim).

GIZ. 2012. *Land use planning – concepts, tools and applications.* Eschborn, Germany.

GM (Global Mechanism of UNCCD). 2016. *Land Degradation Neutrality: the target setting programme.* Bonn, Germany.

Guijt, I. 1999. *Socio-economic methodologies for natural resources research: participatory monitoring and evaluation for natural resource management and research.* Chatham, UK, Natural Resources Institute.

IPCC (Intergovernmental Panel on Climate Change). 2014. *Climate change 2014: impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects.* Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, ed. C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea & L.L. White. Cambridge, UK & New York, USA, Cambridge University Press.

Jin, S.L. 2013. The beneficiary impact assessments of completed watershed management projects in Tajikistan (unpublished). Rome.

Joosten, K. & Grey, S. 2017. *Integrating climate change adaptation and mitigation into the watershed management approach in Eastern Africa – discussion paper and good practices.* Addis Ababa, FAO.

Knowledge Sharing Toolkit. 2017. Participatory rural appraisal (PRA) (online, available at www.kstoolkit.org/Participatory+Rural+Appraisal+%28PRA%29).

Liniger, H.P., Mekdaschi Studer, R., Moll, P. & Zander, U. 2017. *Making sense of research for sustainable land management.* Bern, Switzerland & Leipzig, Germany, Centre for Development and Environment, University of Bern & Helmholtz-Centre for Environmental Research (UFZ).

LPFN. 2015. *Landscape partnerships for sustainable development: achieving the SDGs through integrated landscape management.* Washington, DC.

Marjan, G. 2010. Analysis of processes, interventions and lessons learnt in the watershed management component of OSRO/PAK/701/SWE. Unpublished FAO project document. Rome.

Maxted, J.T., Diebel, M.W. & Vander Zanden, M.J. 2009. Landscape planning for agricultural non-point source pollution reduction. II. Balancing watershed size, number of watersheds, and implementation effort. *Environmental Management*, 43:60–68.

Mekonnen, M.M. & Hoekstra, A.Y. 2016. Four billion people facing severe water scarcity. *Science Advances*, 2(2), doi: 10.1126/sciadv.1500323.

NOAA (National Oceanic and Atmospheric Administration, United States Department of Commerce). 2017. What is remote sensing? (online, available at http://oceanservice.noaa.gov/facts/remotesensing.html). Silver Spring, Maryland, USA, National Ocean Service.

OECD (Organisation for Economic Co-operation and Development). 2004. *Glossary of key terms in evaluation and results based management.* Paris.

Open Foris. 2017. Free open-source solutions for environmental monitoring (online, available at www.openforis.org).

Reed, M.S., Kenter, J., Bonn, A., Broad, K., Burt, T.P., Fazey, I.R., Fraser, E.D.G., Hubacek, K., Nainggolan, D., Quinn, C.H., Stringer, L.C. & Ravera, F. 2013. Participatory scenario development for environmental management: a methodological framework illustrated with experience from the UK uplands. *Journal of Environmental Management*, 128: 345–362.

Reed, J., van Vianen, J., Deakin, E.L., Barlow, J. & Sunderland, T. 2016. Integrated landscape approaches to managing social and environmental issues in the tropics: learning from the past to guide the future. *Global Change Biology*, 22: 2540–2554.

Scherr, S. 2017. Rethinking landscape finance (online, available at http://ecoagriculture.org/blog/rethinking-landscape-finance). Washington, DC, EcoAgriculture Partners.

Scherr, S.J., Shames, S. & Friedman, R. 2013. Defining integrated landscape management for policy makers. Ecoagriculture Policy Focus No. 10. Washington, DC, EcoAgriculture Partners.

Shames, S., Clarvis, M.H. & Kissinger, G. 2014. *Financing strategies for integrated landscape investment – synthesis report.* Washington, DC, EcoAgriculture Partners on behalf of LPFN.

Shiferaw, B., Kebede, T.A. & Reddy, V.R. 2012. Community watershed management in semiarid India: the state of collective action and its effect on natural resources and rural livelihoods. In E. Mwangi, H. Markelova & R. Meinzen-Dick, eds. *Collective action and property rights for poverty reduction: insights from Africa and Asia*, pp. 153–188. Washington, DC, International Food Policy Research Institute.

Surve, R.B. & Kathane, B.Y. 2014. Disparity of spatial and non spatial data. *International Journal of Advance Foundation and Research in Computer*, 1(8): 50–55.

Thwinda, J. 2015. Multi stakeholder initiatives: platforms of collective governance for development (online, available at http://blogs.worldbank.org/governance/multi-stakeholder-initiatives-platforms-collective-governance-development).

Wani, S.P., Sreedevi, T.K., Reddy, T.S.V, Venkateswarlu, B. & Prasad, C.S. 2008. Community watersheds for improved livelihoods through consortium approach in drought prone rain-fed areas. *Journal of Hydrological Research and Development*, 23: 55–77.

Verdin, K.L. & Verdin, J.P. 1999. A topological system for delineation and codification of the Earth's river basins. *Journal of Hydrology*, 218(1–2): 1–12.

UNISDR (United Nations Office for Disaster Risk Reduction). 2009. *2009 UNISDR terminology on disaster risk reduction*. Geneva, Switzerland.

UNISDR. 2015. *Sendai Framework for Disaster Risk Reduction 2015–2030.* Geneva, Switzerland.

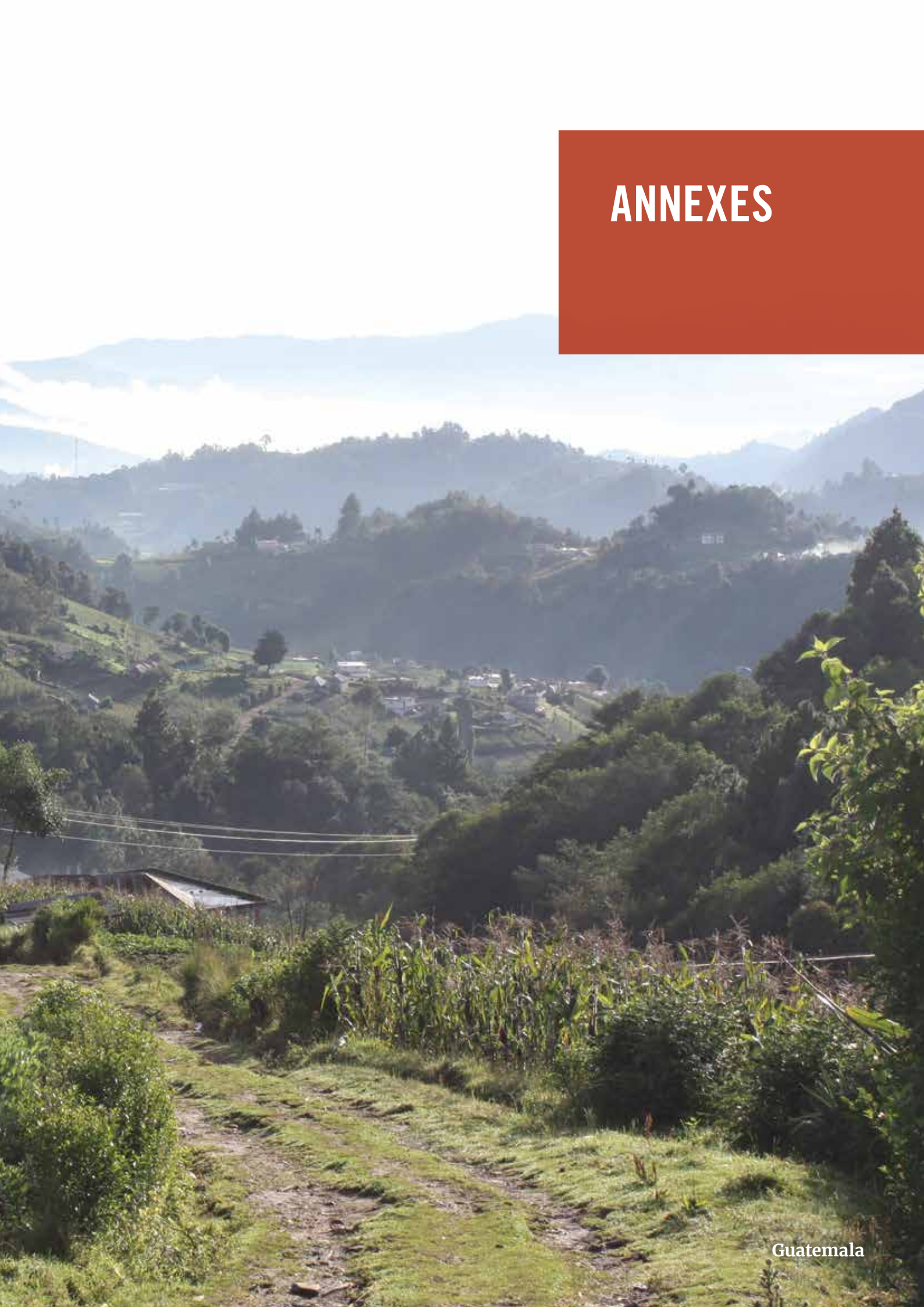
WOCAT (World Overview of Conservation Approaches and Technologies). 2017. Land management mapping tools (online, available at www.wocat.net/global-slm-database/wocat-tools-and-modules/land-management-mapping-tools).

World Bank. 2008. *Sustainable land management sourcebook*. Washington, DC.

WRI (World Resources Institute). 2008. *Ecosystem services: a guide for decision makers*. Washington, DC.

©Thomas Hofer

ANNEXES



Guatemala

ANNEX 1
GLOSSARY

Action research: A process aimed at generating and sharing the knowledge needed to understand development problems and identify socially acceptable solutions (FAO, 2006).

Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2014).

Afforestation: Establishment of forest through planting and/or deliberate seeding on land that, until then, was not classified as forest (FAO, 2015b).

Agroforestry: Land-use systems and practices in which trees are deliberately integrated with crops and/or animals on the same land management unit (FAO, 2011).

Baseline: A set of reference data used as a basis for comparison (Forward Thinking Platform, 2014).

Baseline study: An analysis describing the situation prior to a development intervention, against which progress can be assessed or comparisons made (OECD, 2004).

Beneficiaries: The individuals, groups or organizations, whether targeted or not, that benefit, directly or indirectly, from a development intervention (OECD, 2004).

Biological diversity: The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, among species and of ecosystems (FAO, 2015b).

Deforestation: The conversion of forest to other land use or the permanent reduction of the tree canopy cover below the minimum 10 percent threshold (FAO, 2015b).

Disaster risk management: The systematic process of using administrative directives, organizations and operational skills and capacities to implement strategies, policies and improved coping capacities to lessen the adverse impacts of hazards and the possibility of disaster (UNISDR, 2009).

Disaster risk reduction: The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events (UNISDR, 2009).

Ecosystem: A dynamic complex of plant, animal and microorganism communities, and the non-living physical components of the environment (such as air, soil, water and sunlight), interacting as a functional unit (FAO, 2011).

Ecosystem services: The benefits people obtain from ecosystems. These include provisioning services (such as food and water), regulation services (such as regulation of floods, drought, land degradation and disease), supporting services (such as soil formation and nutrient cycling), and cultural services (such as recreational, spiritual, religious and other non-material benefits) (FAO, 2011).

Efficiency: A measure of how economic resources/inputs (e.g. funds, expertise, time) are converted to results (OECD, 2004).

Forest: Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ* (FAO, 2015b).

Forest degradation: The reduction of the capacity of a forest to provide goods and services (FAO, 2015b).

Forest landscape restoration: An active process that brings people together to identify, negotiate and implement practices that restore an agreed optimal balance of the ecological, social and economic benefits of forests and trees within a broader pattern of land uses (FAO and UNCCD, 2015).

Hazard: The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources (IPCC, 2014).

Impacts: Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended (OECD, 2004).

Indicator: A quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention or to help assess the performance of a development actor (OECD, 2004).

Inputs: The financial, human and material resources used for a development intervention (OECD, 2004).

Integrated landscape management: Long-term collaboration among different groups of land managers and stakeholders to achieve the multiple objectives required from the landscape, including agricultural production, provision of ecosystem services, protection of biodiversity, and local livelihoods, health and well-being. Stakeholders seek to solve shared problems or capitalize on new opportunities through technical, ecological, market, social or policy means that reduce trade-offs and strengthen synergies among different landscape objectives (Shames, Clarvis and Kissinger, 2014).

Land cover: The observed (bio)physical cover of the earth's surface (FAO, 2016a).

Land degradation: The reduction in the capacity of the land to provide ecosystem goods and services over a period of time (FAO, 2011).

Land use: The arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it (FAO, 2016a).

Landscape: A mosaic of natural and/or human-modified ecosystems, with a characteristic configuration of topography, vegetation, land use and settlements that is influenced by the ecological, historical, economic and cultural processes and activities of the area. Both the mix of land cover and use types that make up the larger mosaic, including agricultural lands, native vegetation and urban areas (landscape composition), and the spatial arrangement of different land uses and cover types (landscape structure) contribute to the character of a landscape. Depending on the management objectives of the stakeholders, landscape boundaries may be discrete or fuzzy, and may correspond to watershed boundaries, distinct land features and/or jurisdictional boundaries, or may cross-cut such demarcations. Because of the broad range of factors a landscape may encompass an area of 100 to 10 000 km^2 (Shames, Clarvis and Kissinger, 2014).

Lessons learned: Generalizations based on evaluation experiences with projects, programmes or policies that abstract from the specific circumstances to broader situations. Frequently, lessons highlight strengths or weaknesses in preparation, design and implementation that affect performance, outcome and impact (OECD, 2004).

Logical framework: A management tool used to improve the design of interventions, most often at the project level. It involves identifying strategic elements (inputs, outputs, outcomes, impact) and their causal relationships, indicators and the assumptions or risks that may influence success and failure (OECD, 2004).

Monitoring: A continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds (OECD, 2004).

Multistakeholder initiatives: Initiatives that bring together government, civil society, and the private sector to address complex development challenges that no one party alone has the capacity, resources and know-how to take on alone (Thwinda, 2015).

Nomadism: Non-sedentary pastoral mode of life for which livestock management constitutes the main resource. Nomadic populations are itinerant, following seasonal patterns but not necessarily returning to the original point of departure (FAO, 2017d).

Participatory monitoring and evaluation: A process through which stakeholders at various levels engage in monitoring or evaluating a particular project, programme or policy; share control over the content, the process and the results of monitoring and evaluation activity: and take or identify corrective actions (FAO, 2013b).

Participatory rural appraisal (PRA): A set of participatory and largely visual techniques for assessing group and community resources, identifying and prioritizing problems and appraising strategies for solving them (Knowledge Sharing Tookit, 2017).

Payment for ecosystem services: A voluntary transaction whereby a service provider is paid by (or on behalf of) beneficiaries for land-use practices that are expected to result in continued or improved environmental service provision beyond what would have been provided without the payment (FAO, 2011).

Relevance: The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs, global priorities, and partners' and donors' policies (OECD, 2004).

Reforestation: Re-establishment of forest through planting and/or deliberate seeding on land classified as forest (FAO, 2015b).

Remote sensing: The science of obtaining information about objects or areas from a distance, typically from aircraft or satellites (NOAA, 2017).

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance; responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation (IPCC, 2014).

Results-based management: A management strategy focusing on performance and achievement of outputs, outcomes and impacts (OECD, 2004).

Scenario: A description of how the future may unfold according to an explicit, coherent and internally consistent set of assumptions about key relationships and driving forces (Forward Thinking Platform, 2014).

Social protection: Initiatives that provide income (cash) or consumption (food) transfers to the poor, protect the vulnerable against livelihood risks and enhance the social status and rights of the excluded and marginalized (FAO, 2013c).

Spatial data (geospatial data): Information about a physical object that can be represented by numerical values in a geographic coordinate system (Surve and Kathane, 2014).

Stakeholders: Agencies, organizations, groups or individuals who have a direct or indirect interest in the development intervention (OECD, 2004).

Sustainable land management: A knowledge-based procedure that helps integrate land, water, biodiversity and environmental management (including input and output externalities) to meet rising food and fibre demands while sustaining ecosystem services and livelihoods (World Bank, 2008).

System: A set of interconnected elements that is coherently organized in a pattern or structure (Forward Thinking Platform, 2014).

Target group: The specific individuals or organizations for whose benefit the development intervention is undertaken (OECD, 2004).

Territorial development: In response to growing competition between actors for resources and territory and the role of public administration, the participatory and negotiated territorial development (PNTD) approach seeks to establish and maintain a social dialogue within a territory and to restructure and/or strengthen the territorial institutions. It seeks to reduce asymmetries by supporting negotiation and socially legitimatized agreements that include all development stakeholders. The complexity of the territorial system is thus incorporated, both in its national and supranational context and in its diversity of interests and strategies, with efforts to involve all stakeholders in decision-making (FAO, 2005b).

Territory: A space or arena where individuals/groups/communities live, where they organize themselves in a social way and where different actors claim different types of rights (may be viewed from legal, economic, environmental, social and cultural dimensions/contexts). An arena for dialogue and negotiations which hosts continuous interactions among and between actors and their physical environment, aimed at promoting men's and women's access to land with a gender perspective (FAO, 2012b).

Transhumance: A livestock production system where animals leave their home base for part of the year and migrate in search of grazing (FAO, 2017d).

Vision: A compelling image of a (usually preferred) future (Forward Thinking Platform, 2014).

Visioning: The process of creating a series of images or visions of the future (Forward Thinking Platform, 2014).

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC, 2014).

Water accounting: The systematic study of the current status and future trends in water supply, demand, accessibility and use within specified spatial and temporal domains. The concept of water accounting is based on the argument that knowledge of the current status of water resources and trends in demand and use is a precondition for successful water management (FAO, 2016b).

Water scarcity: An excess of water demand over available supply (FAO, 2012c).

Water use efficiency: The ratio of the amount of water actually used for a specific purpose to the amount of water withdrawn or diverted from its source to serve that use (FAO, 2011).

Watershed: The geographical area drained by a watercourse. The concept applies to units ranging from a farm crossed by a creek to large river or lake basins (FAO, 2006).

Watershed management: Any human action aimed at ensuring a sustainable use of watershed resources (FAO, 2006).

ANNEX 2
PROJECT DOCUMENTS CONSULTED

FAO. 2006. Participatory integrated watershed management project in upland areas. Terminal statement prepared for the Government of the Democratic People's Republic of Korea. TCP/DRK/0169, TCP/DRK/3002.

FAO. 2006. Participatory integrated watershed management project in upland areas. Terminal statement prepared for the Government of the Republic of Tajikistan. TCP/TAJ/2903.

FAO. 2006. Project to assist ERRA and its partners in restoring livelihoods in the earthquake-affected areas of Pakistan. OSRO/PAK/701/SWE.

FAO. 2008. Integrated watershed management of Gulmera (Batora) Union Council Talhata, District Mansehra, North-West Frontier Province, 2008–2009. OSRO/PAK/701/SWE.

FAO. 2008. Integrated watershed management plan of Balgran watershed, Union Council Balgran, District Muzaffarabad, Azad Kashmir [Pakistan-administered Kashmir], 2008–2009. OSRO/PAK/701/SWE.

FAO. 2009. Evaluation of the FAO response to the Pakistan earthquake, May to July 2008. Final report.

FAO. 2010. Interregional program for poverty alleviation and combating desertification through collaborative watershed management. GCP/INT/093/SPA.

FAO. 2010. Programa conjunto "Reducción de vulnerabilidades para contribuir al proceso de desarrollo rural en los municipios de las cuencas del Coatán y Suchiate, del departamento de San Marcos".

FAO. 2011. Capacity building for sustainable management of mountain watersheds in Central Asia and the Caucasus. GCP/SEC/002/TUR.

FAO. 2012. Étude d'impact de l'érosion et de la déforestation en amont du bassin versant d'Oued Outat et sur son aval et estimation des coûts des dégâts provoqués par les inondations et des coûts de reconstruction/réhabilitation des zones urbaines, périurbaines et rurales du bassin versant. GCP/INT/093/SPA.

FAO. 2012. Note méthodologique pour la rédaction du plan d'aménagement des bassins versant de l'Oued Outat au Maroc, Oued Barbara en Mauritanie et Rio Membrillo en Equateur. GCP/INT/093/SPA.

FAO. 2013. Appui à la phase intermédiaire du projet interrégional de lutte contre la pauvreté et la désertification et d'adaptation aux variations climatiques à travers la cogestion des bassins versants. TCP/INT/3405.

FAO. 2014. Projet interrégional de lutte contre la pauvreté et la désertification à travers une cogestion des bassins versants. Conclusions et recommandations du projet GCP/INT/093/SPA.

FAO. 2014. Informe final del proyecto UNJP/GUA/022/UNJ "Coatán-Suchiate" en el marco del programa conjunto "Reducción de las Vulnerabilidades para Contribuir al Proceso de Desarrollo Rural", en los municipios de las Cuencas del Coatán y Alto Suchiate, del departamento de San Marcos, Guatemala.

FAO. 2015. Cholok Kaindy micro-catchment participatory integrated rehabilitation plan. Ankara.

FAO. 2015. Midterm review of GCP/ECU/080/GFF, Natural Resources Management in Chimborazo – PROMAREN.

FAO. 2015. Technical guidelines for natural resources rehabilitation works in mountain watersheds. Ankara.

FAO. 2016. Capacity-building for sustainable management of mountain watersheds in Central Asia and the Caucasus. Terminal report of project GCP/SEC/002/TUR.

FAO. Undated. Community Agriculture and Watershed Management Project. OSRO/TAJ/603/WB. Final report.

FAO & GEF. 2011. Management of Chimborazo's Natural Resources Project. GCP/ECU/080/GFF.

FAO & Ministry of Agriculture, Livestock and Food, Guatemala. 2011. Conservación y manejo suelos en arias degradadas de comunidades seleccionadas en las microcuencas del aria de acción del programa conjunto desarrollo rural Coatan Suchiate.

GADPCH (Gobierno Autónomo Descentralizado de la Provincia de Chimborazo). 2012. Plan de manejo y cogestión para el territorio de la microcuenca del río Chimborazo, Riobamba, Ecuador.

GADPCH. 2013. Plan de manejo y cogestión de la microcuenca del río Atapo-Pomachaca, Guamote-Palmira, Ecuador.

GADPCH. 2013. Plan de manejo y cogestión del territorio hídrico de Cebadas (Yasipán, Tingo, Ichubamba y Guarguallá), Guamote-Cebadas, Ecuador.

GADPCH. 2013. Plan de manejo y cogestión de la microcuenca hidrográfica del Río Blanco, Riobamba, Ecuador.

GADPCH. 2014. Plan de manejo y cogestión de la microcuenca del Río Zula, Alausi-Achupallas, Ecuador.

Gobierno Autónomo Descentralizado de la Parroquia Membrillo, FAO & SENAGUA. 2014. Plan de cogestión de la microcuenca Membrillo, Calceta, Ecuador.

HCEFLCD & FAO. 2015. Plan de co-gestion du sous-bassin versant d'Oued Outat, Province de Midelt, Commune Rurale d'Ait Izdeg, Morocco.

Nambiza, W. & Lyatura, N. 2013. Endline survey for the project "Improving Livelihood Security and Sustainability for Rural Communities in the Eastern Arc Mountains Project" and baseline survey for the "New Generation Watershed Management Project". TFCG Technical Paper 42. Dar es Salaam, United Republic of Tanzania.

Tennyson, L.C. 2013. Evaluation of the Gorta/CLEWM and CODEP watershed management programmes in Zambia.

Tennyson, L.C. 2013. Evaluation of the Gorta/ADWAC Watershed Management Programme in the Gambia.

Tennyson, L.C. 2014. Evaluation of the Gorta/TFCG Watershed Management Programme in Tanzania.

Upadhyay, K.P. 2005. National watershed management strategy for the Republic of Tajikistan. Draft internal document prepared for project TCP/TAJ/2903.

Wagner, S.& Lugazo, S. 2011. An analysis of key stakeholders in the West Usambara Mountains of Korogwe and Lushoto Districts. TFCG Technical Paper 32. Dar es Salaam, United Republic of Tanzania.

Wagner, S. & Lugazo, S. 2011. Baseline survey for the project "Improving livelihood security and sustainability for rural communities in the Eastern Arc Mountains Project". TFCG Technical Paper 33. Dar es Salaam, United Republic of Tanzania.

ANNEX 3
FURTHER READING

Bach, H., Clausen, T.J., Dang, T.T., Emerton, L., Facon, T., Hofer, T., Lazarus, K., Muziol, C., Noble, A., Schill, P., Sisouvanh, A., Wensley, C. & Whiting, L. 2011. *From local watershed management to integrated river basin management at national and transboundary levels.* Phnom Penh, Mekong River Basin Commission.

Bain & Company. 2014. *Growing prosperity: developing repeatable models to scale the adoption of agricultural innovations.*

Boedhihartono, A.K. 2012. *Visualizing sustainable landscapes: understanding and negotiating conservation and development trade-offs using visual techniques.* Gland, Switzerland, IUCN.

Burgeon, D., Hofer, T., van Lierop, P. & Wabbes, S. 2015. Trees and forests – lifelines for resilience. *Unasylva*, 243/244: 86–89.

Caritas. 2010. *Integrated watershed management: a practical implementation guide.* Dushanbe.

Conservation Ontario. 2003. *Watershed management in Ontario: lessons learned and best practices.* Newmarket, Ontario, Canada.

Denier, L., Scherr, S., Shames, S., Chatterton, P., Hovani, L. & Stam, N. 2015. *The little sustainable landscapes book.* Oxford, UK, Global Canopy Programme.

Estrada-Carmona, N., Hart, A.K., DeClerck, F.A.J., Harvey, C.A. & Milder J.C. 2014. Integrated landscape management for agriculture, rural livelihoods, and ecosystem conservation: an assessment of experience from Latin America and the Caribbean. *Landscape and Urban Planning*, 129: 1–11.

FAO. 2010. *FAO handbook on the logical framework approach.* Rome.

FAO. 2011. *Lessons from the field: experiences from FAO climate change projects.* Rome.

FAO. 2014. *Building a common vision for sustainable food and agriculture: principles and approaches.* Rome.

FAO. 2014. *Adapting to climate change through land and water management in Eastern Africa: results of pilot projects in Ethiopia, Kenya and Tanzania.* Rome.

FAO. 2015. *Evaluation of FAO's contribution to knowledge on food and agriculture.* Rome.

FAO. 2015. *Forests and water – a five year action plan.* Rome.

FAO. 2015. *TCP Manual: guide to the project cycle – Appendix 1.* Rome.

FAO. 2016. *State of the World's Forests 2016 – forests and agriculture: land use challenges and opportunities.* Rome.

FAO. 2017. *The future of food and agriculture – trends and challenges.* Rome.

FAO & Global Mechanism of UNCCD. 2015. *Sustainable financing for forest and landscape restoration: opportunities, challenges and the way forward.* Rome.

Filiberto, I., Milne, G., Cestti, R. & Braimoh, A. 2015. *Watershed management portfolio review FY1990–FY2015.* World Bank Group Working Note. Washington, DC, World Bank.

German, L., Mansoor, H., Alemu, G., Mazengia, W., Amede, T. & Stroud, A. 2007. Participatory integrated watershed management: evolution of concepts and methods in an ecoregional program on the eastern African highlands. *Agricultural Systems*, 94: 189–204.

German, L. & Taye, H. 2008. A framework for evaluating effectiveness and inclusiveness of collective action in watershed management. *Journal of International Development*, 20: 99–116.

GEF. 2016. *Time to adapt: insights from the Global Environment Facility's experience in adaptation to climate change.* Washington, DC.

Gorta. 2012. Community oriented watershed management: Gorta's approach. Dublin.

Gray, E., Henninger, N., Reij, C., Winterbottom, R. & Agostini, P. 2016. *Integrated landscape approaches for Africa's drylands.* World Bank Studies, Conference Edition. Washington, DC, World Bank.

IFAD. 2013. *Strengthening institutions and organizations: an analysis of lessons learnt from field application of IFAD's sourcebook on institutional and organizational analysis for pro-poor change.* Rome.

Kerr, J. 2007. Watershed management: lessons from common property theory. *International Journal of the Commons*, 1(1): 89–109.

Kotru, R., Sharma, S., Sharma, E. & Hofer, T. 2017. *Everybody lives upstream: the watershed approach for the changing climate of the Hindu Kush Himalaya.* ICIMOD Working Paper 2017/11. Kathmandu, ICIMOD.

LPFN. 2015. Integrated landscape management: the means of implementation for the sustainable development goals.

Marquis, G. 2015. Reducing disaster risk in Pakistan through watershed management. *Unasylva*, 243/244: 19–24.

Milder, J.C., Hart, A.K., Dobie, P., Minai, J. & Zaleski, C. 2014. Integrated landscape initiatives for African agriculture, development, and conservation: a region-wide assessment. *World Development*, 54: 68–80.

Nyirenda-Jere, T.P.R & Kazembe, J.A. 2014. *Improving policymaking for agricultural and rural development in Africa: the role of ICTs and knowledge management.* IIED Working Paper. London, International Institute for Environment and Development (IIED).

O'Connell, D., Walker, B., Abel, N., Grigg, N., Cowie, A. & Durón, G. 2015. An introduction to the Resilience, Adaptation Pathways and Transformation Assessment (RAPTA) framework.

OECD, FAO & United Nations Capital Development Fund (UNCDF). 2016. *Adopting a territorial approach to food security and nutrition policy.* Paris, OECD Publishing.

Sayer, J.A., Margules, C., Boedhihartono, A.K., Sunderland, T.C.H., Langston, J.D., Reed, J., Riggs, R., Buck, L.E., Campbell, B.M., Kusters, K., Elliott, C., Minang, P.A., Dale, A., Purnomo, H., Stevenson, J.R., Gunarso, P. & Purnomo, A. 2017. Measuring the effectiveness of landscape approaches to conservation and development. *Sustainability Science*, 12(3): 465-476

Sayer, J., Sunderland, T., Ghazoul, J., Pfund, J.-L., Sheil, D., Meijaard, E., Venter, M., Boedhihartono, A.K., Day, M., Garcia, C., van Oosten, C. & Buck, L.E. 2013. Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy of Sciences of the United States*, 110(21): 8349–8356.

Schroth, G. & McNeely, J.A. 2011. Biodiversity conservation, ecosystem services and livelihoods in tropical landscapes: towards a common agenda. *Environmental Management*, 48: 229–236.

Schwilch, G., Hessel, R. & Verzandvoort, S., eds. 2012. *Desire for greener land: options for sustainable land management in drylands.* Bern & Wageningen, the Netherlands, University of Bern Centre for Development and Environment, Wageningen Environmental Research (Alterra), World Soil Information (ISRIC) & Technical Centre for Agricultural and Rural Cooperation.

UNDP. 2012. *What drives institutions to adopt integrated development approaches?* Discussion Paper. New York, USA.

UNDP Africa Adaptation Programme. 2012. *Handbook on capitalization of experiences 2012.* New York, USA.

United States Agency for International Development (USAID). 2015. *High mountains adaptation partnership: lessons learned in Nepal and Peru.* Washington, DC.

Walz, U. 2015. Indicators to monitor the structural diversity of landscapes. *Ecological Modelling*, 295: 88–106.

Willemen, L., Kozar, R., Desalegn, A. & Buck, L.E. 2014. *Spatial planning and monitoring of landscape interventions: maps to link people with their landscapes: a user's guide.* Washington, DC, EcoAgriculture Partners.

ANNEX 4
PROJECT FACT SHEETS

CENTRAL ASIA (AZERBAIJAN, KYRGYZSTAN, TAJIKISTAN, TURKEY AND UZBEKISTAN)

PROJECT TITLE	CAPACITY BUILDING FOR SUSTAINABLE MANAGEMENT OF MOUNTAIN WATERSHEDS IN CENTRAL ASIA AND THE CAUCASUS
Duration	January 2012 – December 2015
Budget	USD 300 000
Resource partner(s)	Turkey
Implementing partner(s)	▸ Azerbaijan: Ministry of Environment and Natural Resources ▸ Kyrgyzstan: State Agency for Environment Protection and Forestry ▸ Tajikistan: State Committee for Environmental Protection ▸ Turkey: Ministry of Forestry and Water Affairs; General Directorate of Combating Desertification and Erosion; General Directorate of State Hydraulic Works; Turkish International Cooperation Agency (TIKA); General Directorate of Afforestation and Erosion Control ▸ Uzbekistan: Main Forestry Department, Ministry of Agriculture and Water Resources
Main objectives	Outcome: ▸ Public awareness and interest of policy- and decision-makers increased ▸ Knowledge and experiences of forestry and other related agencies enhanced about integrated (multidisciplinary) and collaborative approaches to the implementation, rehabilitation and sustainable management of mountain watersheds Short-term project targets: ▸ To increase the awareness, knowledge, experience and capacity of decision-makers and selected specialists on the approaches and methodologies for planning and implementation of integrated (multidisciplinary) sustainable management of mountain watersheds ▸ To prepare an integrated participatory watershed rehabilitation plan ▸ To implement a set of demonstration interventions at a selected site
Location(s)	Kyrgyzstan, Chuy Province, Panfilov District, Telman village, Cholok Kaiyndy microcatchment
Size of location(s)	9 235 ha
Criteria for selection of location(s)	▸ Degree of natural resource degradation ▸ Natural disasters (caused by natural resource degradation) ▸ Reversibility (potential for rehabilitation) ▸ Population density and poverty ▸ Interest of local communities to participate in planning and implementation ▸ Interest and support of the related agencies and decision-makers ▸ Accessibility and demonstration potential ▸ Representativeness (conditions similar to those of other watershed areas)
Population (No.)	1 597 inhabitants in 283 households
Criteria for selection of beneficiaries (communities/households)	
Beneficiaries (No.)	
Biophysical assessment (actors, duration)	▸ Conducted by a team of Turkish consultants during a 3-week mission, combining biophysical and socio-economic factors ▸ Does not allow a full understanding of the situation in the watershed, as the problems are not clearly depicted and especially not localized, and important information is missing (e.g. only one page on location, topography, geology, soil conditions, climate and hydrology)
Socio-economic assessment (actors, duration)	See above; one page in the report on demographics and socio-economic conditions
Institutional assessment + stakeholder analysis	
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	
Current (official) land-use categories	▸ Pasture lands: 5 990 ha (64.86%) ▸ Forest and woodlands: 1 118 ha (12.11%) ▸ Shrub lands: 82 ha (0.89%) ▸ Agricultural lands: 1 350 ha (14.62%), of which 900 ha rainfed and 450 ha irrigated ▸ Rocky, stony lands: 524 ha (5.67%) ▸ Settlement areas: 171 ha (1.85%)

CENTRAL ASIA (AZERBAIJAN, KYRGYZSTAN, TAJIKISTAN, TURKEY AND UZBEKISTAN)

Main crops produced	
Livestock numbers	
Household income sources	Livestock and agricultural produce
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Problems identified by the villagers in local meetings and a PRA exercise: ▸ Immediate infrastructure needs ▸ Lack of productive assets in the village Priorities identified in a meeting of local experts and representatives of public institutions: ▸ Low productivity and degradation of pastures ▸ Inadequate forest and tree cover in the watershed A joint field visit was conducted to observe the problem sites and to identify interventions that could satisfy the needs of both livelihood improvement and rehabilitation of natural resources.
Criteria for selection of interventions	▸ Potential of rehabilitating soil and water resources ▸ Potential of livelihood improvement
Area-based interventions	The following interventions were foreseen in the plan but not realized by TIKA owing to difficulties with procurement and subcontracts. Conservation, rehabilitation and sustainable use of natural resources: ▸ Physical interventions for soil conservation through terracing (70 ha) ▸ Planting of seedlings and gully plugging through check dams (300) and wattles (1.6 km) ▸ Pasture improvement through stone collection and construction of stone cordons along contour lines (100 ha) ▸ Agroforestry and fast-growing tree plantations (3 ha of private lands) Income generation and livelihood improvement activities: ▸ Repair of broken irrigation channels ▸ Repair of drinking-water facilities ▸ Village greening and beautification ▸ Demonstration of fruit orchards (5 ha of private lands) ▸ Beekeeping (7 households, 5 beehives each) ▸ Corn production for animal feed on 4 ha, including installation of a fodder mill
Other project interventions (e.g. capacity development, studies)	▸ Feasibility studies for the establishment of a sawmill and a milk collection and marketing centre ▸ Awareness raising and technical capacity development in natural resource management, including participation of 4 high-level decision-makers from key institutions at a regional workshop in Turkey on participatory integrated watershed rehabilitation and management and the participation of over 100 selected staff and specialists from project countries in practical training courses ▸ Preparation and distribution of technical guidelines for integrated participatory watershed rehabilitation management
Watershed management plan formulation (actors, duration)	Plan prepared through consultation and discussions during a 10-day mission of the team of Turkish consultants
Watershed management plan validation	▸ Presentation and discussion of the plan at a national workshop attended by stakeholders at the local, district and central levels ▸ Finalization of the plan in accordance with the results and recommendations of the workshop
Watershed management plan implementation	Not realized owing to TIKA's difficulties with procurement
Involvement of provincial and/or national stakeholders	
Exit strategy	▸ Increased dialogue and technical cooperation between Turkey and the other countries was expected to support problem solving after the end of the project. ▸ The regional workshops and the pilot demonstrations were expected to secure political commitment and public support for the allocation of an adequate budget, personnel and other resources after the project's closure.
Challenges faced during project implementation	▸ Lack of national data related to watershed management and practices, mainly in Azerbaijan and to some extent in Uzbekistan ▸ The high number of different types of activities, which necessitated many small tenders that needed to be handled individually and involved long procedures ▸ TIKA's inability to fulfil its commitments related to planned field activities because of staff changes in its Bishkek office, unexpected early winter conditions and the unavailability of contractors

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

PROJECT TITLE	PARTICIPATORY INTEGRATED WATERSHED MANAGEMENT IN UPLAND AREAS
Duration	March 2002 – August 2004
Budget	USD 342 000
Resource partner(s)	FAO
Implementing partner(s)	▸ Academy of Forest Sciences under the Ministry of Land and Environment Protection ▸ Phihyon University of Land Management ▸ Ministry of Agriculture ▸ Ministry of Forestry
Main objectives	Long-term objective: ▸ To assist the government in its efforts to reverse the degradation of land resources (soil, water and vegetative cover) Immediate objectives: ▸ Analysis of the existing situation including institutional arrangements and data collection on forest land degradation and required conservation/development measures ▸ Rehabilitation of damaged tree nurseries and establishment of new ones ▸ Small-scale participatory integrated watershed management activities for demonstration and training ▸ Technical capacity building on relevant approaches and methodologies ▸ Preparation of a comprehensive upland watershed management investment programme
Location(s)	▸ Rakhyon Reservoir Watershed in Yonsan County, North Hwanghae Province ▸ Sangwon County Watershed in South Pyongan Province
Size of location(s)	530 ha and 600 ha
Criteria for selection of location(s)	▸ Extent of watershed degradation (with priority to the most severely affected) ▸ Development potential ▸ Availability of capable local institutions for programme planning and implementation ▸ Commitment among stakeholders ▸ Accessibility
Population (No.)	
Criteria for selection of beneficiaries (communities/households)	
Beneficiaries (No.)	
Biophysical assessment (actors, duration)	Collection of relevant information and data from various State departments related to natural resource management, the Central Bureau of Statistics, the State Academy of Sciences, the Academy of Forest Sciences and pilot demonstration counties
Socio-economic assessment (actors, duration)	
Institutional assessment + stakeholder analysis	
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Problems identified: ▸ flood-damaged tree nurseries ▸ continuing soil erosion ▸ water degradation ▸ retreating vegetative cover
Current (official) land-use categories	
Main crops produced	
Livestock numbers	
Household income sources	
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	▸ Soil and water degradation ▸ Vegetative cover loss ▸ Flood-damaged tree nurseries
Criteria for selection of interventions	In response to the needs expressed and the type of assistance requested, the project interventions focused entirely on measures to reverse the degradation of upland natural resources in general and to halt declining tree cover in particular.

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

Area-based interventions	▶ Afforestation (30 ha in each site), using several tree and shrub species on steep, mostly cultivated and eroding land ▶ Rehabilitation of forest tree nurseries ▶ Agroforestry demonstration plots (alley cropping, intercropping and terracing) ▶ Monitoring plots (to measure soil erosion and vegetation growth on sloping lands) ▶ Hydrological stations (to monitor sediment loads in the rivers)
Other project interventions (e.g. capacity development, studies)	▶ Formulation of a draft national watershed management strategy and eight project profiles for possible follow-up assistance ▶ Comprehensive technical training package delivered at different administrative levels for technicians, field staff, government officials and scientists
Watershed management plan formulation (actors, duration)	
Watershed management plan validation	
Watershed management plan implementation	
Involvement of provincial and/or national stakeholders	▶ A national workshop on preparation of a medium- and long-term participatory integrated watershed management investment programme for the Democratic People's Republic of Korea resulted in the government endorsing the programme. ▶ As a result of the project, a section within the Academy of Forest Sciences was renamed "Watershed Management" and is introducing integrated watershed management approaches and methodologies. ▶ Governmental official and technicians took part in various capacity building events.
Exit strategy	▶ To continue the dialogue with resource partners to which the investment programme has already been presented and to broaden contacts ▶ To explore the potential to package certain elements of the investment programme into the emergency project profiles ▶ To explore the possibility of a new technical assistance project
Challenges faced during project implementation	

ECUADOR

PROJECT TITLE	MANAGEMENT OF CHIMBORAZO'S NATURAL RESOURCES PROJECT
Duration	October 2011 – September 2017
Budget	USD 3 870 000
Resource partner(s)	GEF
Implementing partner(s)	▸ Decentralized Autonomous Government of the Province of Chimborazo (GADPCH) ▸ Chimborazo Provincial Council (CHPC) ▸ Ministry of Environment ▸ National water authority (SENAGUA)
Main objectives	Global environment objective: To conserve and manage sustainably Chimborazo's páramos and the biodiversity of the mountain ecosystems, and to improve local livelihoods through strengthening of necessary policy, legal and institutional frameworks and local awareness, capacities and incentives for participation in planning and sustainable natural resource management Development objective: To re-establish and use sustainably the agrobiodiversity and the páramos ecosystems and to improve the food sovereignty of the local indigenous population dependent on Chimborazo's mountain ecosystems by applying modern watershed management approaches
Location(s)	Province of Chimborazo: ▸ Chambo watershed: subwatersheds of Río Cebadas, Río Blanco and Chimborazo (including the Chimborazo Fauna Reserve) ▸ Chanchán watershed: subwatersheds of Atapo-Pomachaca and Zula-Guasuntos
Size of location(s)	126 562 ha in total: Río Cebadas, 16 272 ha; Río Blanco, 14 495 ha; Chimborazo, 12 162 ha; Chimborazo Fauna Reserve, 58 000 ha; Atapo-Pomachaca, 11 713 ha; Zula-Guasuntos, 13 920 ha
Criteria for selection of location(s)	▸ Ecosystem degradation pressure ▸ Proximity to sites of the World Bank's Chimborazo Development Investment Project (PIDD) and to protected areas ▸ Presence of active community organizations and indigenous communities ▸ Beneficiary numbers and potential to improve social equity ▸ Importance of the watershed in terms of water supply for key downstream uses ▸ Status of conservation of the páramos and other natural vegetation ▸ Balance between the remaining páramos and the area dedicated to agriculture ▸ Experience with previous local development projects with natural resource management components ▸ Potential to form alliances with other key actors in and surrounding the watersheds
Population (No.)	33 093 inhabitants: Chimborazo, 5 425; Río Cebadas, 3 954; Río Blanco, 5 000; Atapo-Pomachaca, 6 373; Zula-Guasuntos, 12 341
Criteria for selection of beneficiaries (communities/households)	▸ Communities demonstrating a high level of interest and conservation potential ▸ The same criteria used to select the watersheds
Beneficiaries (No.)	▸ Indigenous and farmers' communities dependent on the páramo ecosystem ▸ CHPC staff involved in the province's natural resource management and environmental policies ▸ Ministry of Environment staff involved in the management of the Chimborazo Fauna Reserve
Biophysical assessment (actors, duration)	▸ Biophysical baseline data collected under the guidance of the project technical team and with the participation of local communities ▸ Land use and vegetation cover in the Chimborazo part of the reserve mapped by CHPC using GIS
Socio-economic assessment (actors, duration)	▸ Demographic, social and cultural assessments based on participatory processes and consultations involving CHPC, municipalities of the selected watersheds, water users' associations and indigenous organizations ▸ Use of a social assessment carried out under PIDD to assess social aspects at the provincial level
Institutional assessment + stakeholder analysis	

ECUADOR

State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Identified problems: ▸ Loss of habitats and biodiversity ▸ Unsustainable water-use practices (mainly irrigation) and reduced water flows ▸ Expansion of agriculture into páramos ecosystems ▸ Soil erosion
Current (official) land-use categories	Agriculture and forestry
Main crops produced	Potatoes, fava beans, wheat, melloco (*Ullucus tuberosus*), oca (*Oxalis tuberosa*)
Livestock numbers	2 331 vicuñas (in 2004), number of cattle and sheep not available
Household income sources	Agricultural produce, livestock husbandry, forestry
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Solutions to the problems identified above, identified through participatory needs assessment, land-use zoning and priority-setting processes: ▸ Substitution of cattle and sheep livestock practices in the páramos with camelid animal husbandry for sustained livelihoods, significantly lower grazing impact and potential income increases (in the case of vicuña husbandry); ▸ Increase of vegetation cover and natural regeneration to increase water infiltration and water storage for irrigation ▸ Transformation of natural resource management from a singular sectoral focus to a wider watershed focus ▸ Capacity building for CHPC on sustainable natural resource management, with a focus on the páramos
Criteria for selection of interventions	▸ Diversity of proposed activities ▸ Linkages between the different activities in a landscape (upstream–downstream) ▸ Relevance of the activities for biodiversity conservation, natural resource management and increasing local benefits
Area-based interventions	▸ Community cattle and sheep grazing replaced by camelids (alpacas, llamas and vicuñas) on 930 ha ▸ Biophysical protection of headwater areas, springs and watercourses through reforestation with native species ▸ Forest restoration (431 ha enrichment, 1 382 ha regeneration) ▸ Soil conservation on steep slopes and water harvesting ▸ Organic and conservation agriculture practices to enhance local agrobiodiversity and increase food sovereignty ▸ Community-based ecotourism (which is likely to be the only viable economic activity in many higher-altitude areas)
Other project interventions (e.g. capacity development, studies)	▸ Establishment of a WMC for each of the 5 watersheds ▸ Various capacity-building activities (biodiversity conservation, livelihood improvements, watershed management and natural resource management) at the watershed and nature reserve level ▸ A comprehensive training programme developed by the University of Chimborazo for the sustainable management of natural resources, with a focus on watersheds ▸ Agreements with the private sector for development of the vicuña value chain, and establishment of a working group on vicuña which set the selection criteria for communities to participate in the vicuña fibre exploitation process ▸ Compensation mechanism for environmental services operationalized in Río Blanco watershed, supporting decision-making of water users (General Board of Water Users in Río Blanco and Quimiag) and the Empresa Electrica Riobamba S.A. ▸ Design of a system for monitoring and surveillance of natural resources, developed at the provincial level, including participatory monitoring of environmental variables at the community level ▸ Support to the preparation of a new regulation clarifying the environmental impact assessment process at provincial level
Watershed management plan formulation (actors, duration)	Plan prepared by the project's technical team in collaboration with local stakeholders using a community-based watershed planning methodology involving a diagnosis, economic analysis of best practice and prioritization of activities to reduce pressure on the páramo ecosystem
Watershed management plan validation	

continues

ECUADOR

Watershed management plan implementation	20 micro projects focused on protective or productive actions are being implemented in 111 communities in the 5 watersheds, and more than 11 000 people have benefited from project action. Examples include: ▶ Water collection and storage in the uplands ▶ Installation of milk collection centres for sustainable livestock production ▶ Diversification and integrated management of potato, lupins, beans, barley and horticultural crops using an agro-ecological approach
Involvement of provincial and/or national stakeholders	GADPCH is responsible for implementation and coordination of project activities, financial management and procurement of goods and services, with FAO's role limited to the provision of technical assistance. The project is embedded in the GADPCH Environmental Management Coordinating Office, which seeks to institutionalize project actions, avoids creating temporary execution units and presents quarterly financial and technical reports to FAO on project progress, annual work plans and budgets.
Exit strategy	Not needed, as the project is embedded in GADPCH
Challenges faced during project implementation	▶ Pressure on CHPC to focus on immediate poverty reduction goals, meaning that long-term environmental sustainability is often compromised for short-term income generation objectives ▶ Changes in institutional and environmental regulations (such as the Water Law), by which new roles were assigned to the local authorities, conditioning the actions related to the páramos and vicuña management ▶ Long planning processes (e.g. prioritization and approval of actions tied to compliance with regulations of national and international execution partners) ▶ A small fieldwork team (8 field promoters) relative to the area covered by the project ▶ Double discourse regarding the ban on the use of the páramo for agriculture, i.e. strict enforcement of regulations in the case of indigenous people and greater permissiveness for large landowners or new ventures ▶ Lack of commitment of some local governments to the project, possibly because of diverging political trends

GAMBIA

PROJECT TITLE	AGRICULTURAL PRODUCTION AND PRODUCTIVITY PROJECT
Duration	2003–2015
Budget	USD 1 million, approximately
Resource partner(s)	Gorta–Self Help Africa
Implementing partner(s)	Agency for the Development of Women and Children (ADWAC)
Main objectives	▸ To improve sustainably the productivity of work against famine and poverty ▸ To help the local people to manage their water resources in an integrated way ▸ To improve the environment of the eco-zone ▸ To reinforce the capacity of the actors to ensure the implementation and replication of the actions
Location(s)	North Bank Region (now Kerewan Local Government Area), Central Baddibu District, Njaba Kunda eco-zone
Size of location(s)	Approximately 50 000 ha
Criteria for selection of location(s)	▸ High food insecurity due to low productivity and scarcity of arable land, soil infertility and high levels of salt intrusion ▸ Serious deforestation – virtually complete loss of the area's forest cover ▸ Major flood hazards
Population (No.)	12 602 people in 27 villages
Criteria for selection of beneficiaries (communities/households)	▸ Extent of the problem ▸ Number of beneficiaries per community ▸ Strategic location of the community (accessible for other villages in the eco-zone) ▸ Village-level institution established
Beneficiaries (No.)	12 602
Biophysical assessment (actors, duration)	▸ Assessment carried out by the Soil and Water Management Unit of the Ministry of Agriculture and Natural Resources ▸ Baseline study (including individual interviews and focus group discussions) by a consultant ▸ Took 2 months to complete (both activities)
Socio-economic assessment (actors, duration)	Part of the baseline survey mentioned above
Institutional assessment + stakeholder analysis	Elements of institutional assessment included in the baseline survey, especially the availability of local institutions and their capacity to participate in and sustain the project interventions
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Problems identified: ▸ Environmental degradation due to recurrent droughts ▸ Deforestation and diminishing vegetation cover ▸ Serious soil erosion (water and wind), soil infertility and salinity ▸ High level of salt intrusion from the river floodplain ▸ Decrease and salinization of the water table, with the wells beneath the lowlands becoming salty during the dry season ▸ Disappearance of fauna including fish and shellfish resources because of habitat destruction and oversalinity ▸ Women's lack of landownership and other agricultural resources ▸ Demographic pressures ▸ Increased frequency of conflicts due to a surge in competition over natural resources ▸ Disappearance of good agricultural practices (e.g. fallowing, rotation, diversification, cultivating perpendicular to the slope, agroforestry, organic fertilizer) ▸ Decrease in pasture areas and watering places for livestock
Current (official) land-use categories	Agriculture, residential and designated forest park (community managed and State owned)
Main crops produced	Rice, millet, maize, groundnuts, vegetables
Livestock numbers	Up-to-date statistics are not available, but approximately 15 000 animals estimated
Household income sources	Agricultural produce, remittances, petty trading

continues

GAMBIA

Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Prioritized actions: ▶ Reinforcement and lengthening of anti-salt dykes ▶ Construction of gates for the spillways so the depths can be emptied to wash out the salts and accelerate desalinization ▶ Reinforcement of trails to rice fields and construction of perimeter dykes around rice fields ▶ Construction of laterite dykes, reinforced concrete spillways, and dykes, gabions and braided-branch filters along the level curves of the uplands ▶ Establishment of wells for pasture lands in the uplands and definition of animal corridors ▶ Technical capacity building for communities ▶ Exchange visits inside and outside the zone ▶ Development of alternative activities to crop production (e.g. small business development, beekeeping, poultry farming, handicrafts) ▶ Fodder cultivation and promotion of destocking
Criteria for selection of interventions	▶ Extent of the problem ▶ Number of beneficiaries ▶ Strategic location of the community (accessibility for other villages in the eco-zone)
Area-based interventions	▶ Livelihood enhancement ▶ Forestry ▶ Soil and water conservation ▶ Livestock management ▶ Conflict management
Other project interventions (e.g. capacity development, studies)	▶ Capacity building for local institutions on livelihood enhancement and agricultural, soil and water management ▶ Capacity building for local institutions, committees, women's groups and extension staff on local health issues, data collection and analysis, advocacy, women's and children's rights, M&E and group dynamics
Watershed management plan formulation (actors, duration)	▶ Community consultations to share the results of the baseline study and key activities identified and to develop plans for the implementation of the identified actions ▶ Creation of a WMC with 1 male and 1 female representative from the VDC in each community ▶ Plans originated by the communities discussed with ADWAC and relevant government line departments (e.g. for agriculture, livestock services, community development and environment) by representatives to the WMC ▶ Review of the plans for technical and financial feasibility before their adoption as the annual plan of action ▶ Review at the end of each quarter, following the same participatory process
Watershed management plan validation	▶ Validation at village level (where the plans originated) ▶ Validation at the watershed level by all members of the WMC ▶ Sharing of the validated plans at various levels to bring any changes, additions and areas of clarification to the attention of the committee
Watershed management plan implementation	▶ Involves all stakeholders ▶ VDCs: Ensuring community participation in village-level activities ▶ WMC: Oversight of overall implementation and monitoring at the watershed level ▶ ADWAC field coordinator: Technical support to VDCs and eco-zone committees ▶ Relevant line department staff and members of the multidisciplinary team (comprising government and NGO extension staff): Monitoring and technical advice related to their specific expertise
Involvement of provincial and/or national stakeholders	Same as above
Exit strategy	▶ Intention to establish viable local institutions to take responsibility for development initiatives in the watershed ▶ Initiation of a 10-year plan for gradual handover of key responsibilities to the WMC, to be determined by an external evaluation at different stages of project implementation ▶ Failure to establish the phase-out plan by the end of the first 5 years, and funding no longer available to design the exit strategy thereafter
Challenges faced during project implementation	▶ Drought, erratic rainfall and lack of adequate meteorological data, affecting the proper planning and maximization of the agricultural interventions ▶ Low level of literacy, hindering the ability of the target group to adopt new and improved agronomic techniques ▶ Limited resources, such that not all identified actions could be implemented ▶ Ability of local institutions to take the lead in their own development hindered by inadequate enforcement of the Local Government Decentralization Act

GUATEMALA

PROJECT TITLE	REDUCE VULNERABILITIES AND CONTRIBUTE TO RURAL DEVELOPMENT IN THE MUNICIPALITIES OF THE UPPER SUCHIATE AND COATÁN BASINS IN THE DEPARTMENT OF SAN MARCOS
Duration	November 2010 – December 2015
Budget	USD 7.4 million (of which USD 2.33 million for FAO)
Resource partner(s)	Sweden
Implementing partner(s)	▶ FAO ▶ UNDP ▶ PAHO ▶ Ministry of Agriculture, Livestock and Food (MAGA) ▶ Ministry of Public Health and Social Assistance ▶ Presidential Secretary of Planning and Programming
Main objectives	Overall project objective: To reduce vulnerabilities of local communities in terms of health and rural habitats and to create economic opportunities for the population, fostering gender rights and cultural heritage Objective of the agricultural component, for which FAO and MAGA were responsible: To improve food security, to create economic opportunities and to ensure the sustainable use of natural resources by applying a watershed management approach
Location(s)	Municipalities of San José Ojetenam, Tacaná, Ixchiguán, Tajumulco, and Sibinal within the Department of San Marcos; watersheds of Coatancito and Esquichá within Coatán watershed; watersheds of Sibinal, Las Barrancas, Malacate and Cutzulchimá within Suchiate watershed
Size of location(s)	21 740 ha total: Coatancito, 1 548 ha; Cutzulchimá top, 3 204 ha; Cutzulchimá medium, 6 345 ha; Esquichá, 3775 ha; Las Barrancas, 2070 ha; Malacate, 2342 ha; Sibinal, 2455 ha
Criteria for selection of location(s)	▶ Geographic characteristics (height, drainage, dissection) ▶ Possibility to build on previous FAO and UNDP work ▶ Soil degradation level ▶ Diversity (soil, water, forest and other productive resources) ▶ Motivated municipal governments and watershed councils ▶ Logistics for providing technical and timely assistance (e.g. market access) ▶ Low State institutional presence
Population (No.)	154 061 inhabitants (total of the 5 municipalities)
Criteria for selection of beneficiaries (communities/households)	▶ Interest in investing some of the benefits back into the community ▶ Geographical location (dispersion degree), aiming at stimulating corridors ▶ Success story replication potential (at regional as well as country level) ▶ Families with both farm and non-farm incomes ▶ Those not already benefiting from another similar development programme (although complementarity was encouraged) ▶ Families of vulnerable groups (suffering from e.g. lack of basic services, high food insecurity risk, child malnourishment) ▶ Priority to widows and/or single women as heads of household
Beneficiaries (No.)	Direct beneficiaries: ▶ 2 611 families in subsistence farming ▶ 528 families producing agricultural surpluses Indirect beneficiaries: ▶ 154 061 people (the inhabitants of the 5 municipalities) ▶ Public and civil society institutions
Biophysical assessment (actors, duration)	▶ Assessment carried out by IUCN ▶ Participation of community stakeholders and leaders through a series of field visits to the communities in a participatory process
Socio-economic assessment (actors, duration)	An earlier study on the profiles of livelihoods in Guatemala conducted by the national government and FAO in 2000, complemented by an assessment of community vulnerability conducted by the project team
Institutional assessment + stakeholder analysis	Institutional analysis conducted by FAO for each of the 5 municipalities involved in the project, focusing on the capacity development needs and potential of local agricultural public institutions to extend their services
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Problems identified: ▶ Loss of forest cover ▶ Overgrazing and soil erosion on steep slopes ▶ Poor socio-economic conditions of watershed residents ▶ Downstream areas exposed to floods, landslides and sedimentation

continues

GUATEMALA

Current (official) land–use categories	▶ Agriculture ▶ Non-agriculture
Main crops produced	Maize, beans, potatoes, rice
Livestock numbers	Not available
Household income sources	Agricultural produce and wage labour (e.g. at local coffee plantations)
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Proposed solutions for the problems identified above: ▶ Restoring forest landscapes ▶ Facilitating product diversification (improving socio-economic conditions and mitigating overgrazing) ▶ Facilitating producers' access to new markets for their products
Criteria for selection of interventions	▶ Families and communities with the least resources ▶ Local capacity to maintain the new practices in the long term; ▶ Affordability ▶ Interventions that improve resource use efficiency and promote connectivity of forest remnants
Area-based interventions	▶ Livelihood enhancement (kitchen gardens, poultry production) ▶ Soil and water conservation (37 ha of infiltration ditches, 5 ha of dead barriers, 32 ha of contour lines); ▶ 379 ha of forest lands restored ▶ 96 water sources protected and 256 infiltration wells built ▶ Land rehabilitation ▶ Establishment of 36 tree nurseries
Other project interventions (e.g. capacity development, studies)	▶ Support to producer organizations to improve their business and marketing capacity in trout fishing, honey and shampoo production; ▶ 134 volunteer agricultural promoters trained under the method "learning by doing – farmer to farmer" and creation of 134 Learning Centres for Rural Development, used as reference farms for family farming ▶ Additional training of 55 community promoters outside the project watersheds ▶ Training of producers with special potential, watershed councils, Ministry of Agriculture representatives and municipal technical teams ▶ Technical assistance to strengthen the rural economy delivered by 5 rural extension agents (from MAGA) to 2 145 subsistence farming families and 630 families with productive potential for the market ▶ Creation of an overarching Coatán-Suchiate watershed committee with local authorities of the 5 municipalities ▶ Creation and management of 2 capitalization funds aimed to support investments in more efficient production
Watershed management plan formulation (actors, duration)	▶ Watershed plans were formulated by IUCN in 2011 with the support of local universities. ▶ FAO was tasked with updating 2 plans, carried out with active participation of the development councils (composed of community associations, committees and cooperatives as well as private-sector representatives).
Watershed management plan validation	
Watershed management plan implementation	Implementation of soil management and conservation practices in degraded areas by the watershed councils, the 5 municipalities and 2 municipal forest offices (San José Ojetenam and Tajumulco)
Involvement of provincial and/or national stakeholders	Alliances with many partners supporting project implementation, including CSOs, NGOs, producer associations, cooperatives, foundations, research institutes and national universities
Exit strategy	Ongoing replication of the model developed by the project in 5 municipalities in the Río Cuilco basin of the Department of San Marcos with additional resources from Sweden
Challenges faced during project implementation	▶ Extreme climate events (high precipitation, drought, extended frost periods) ▶ High levels of insecurity due to poppy production and smuggling ▶ National and local elections leading to changes in financial priorities, preventing an expected increase in the allocation for government agencies operating in the project area ▶ Little interest from municipal authorities to invest in agricultural extension ▶ Lack of legal land tenure documents, hindering the reforestation actions which required significant tracts of land and clear rules for access and use

OUBAME – ECUADOR

PROJECT TITLE	INTERREGIONAL PROJECT FOR POVERTY ALLEVIATION AND COMBATING DESERTIFICATION THROUGH COLLABORATIVE WATERSHED MANAGEMENT (OUBAME)
Duration	June 2010 – May 2015
Budget	USD 3 million (of which approximately USD 850 000 per country)
Resource partner(s)	Spain and FAO TCP funds
Implementing partner(s)	National water authority (SENAGUA) Ministry of Agriculture
Main objectives	To increase the capacity of key stakeholders in the participating countries to design and implement collaborative integrated watershed management programmes in arid and semi-arid lands with a view to fighting poverty, improving food security, combating desertification and promoting environmental good governance
Location(s)	Membrillo Parish, Canton of Bolivar, Province of Manabí
Size of location(s)	15 490 ha
Criteria for selection of location(s)	▸ Advanced stage of natural resource degradation, as perceived by the population ▸ Natural-resource and socio-economic development potential ▸ Dynamism of local society and farmers' organizations ▸ Adequate accessibility and visibility for demonstration purposes
Population (No.)	5 000 inhabitants in 1 000 households in 14 dispersed communities (32 inhabitants per km^2)
Criteria for selection of beneficiaries (communities/households)	▸ Households interested in assessing present problems and needs and prioritizing actions by interest groups, associations and cooperatives ▸ Interest groups ready to establish ad hoc working associations ▸ Openness to contribute to infrastructures of collective interest
Beneficiaries (No.)	Small farmers/herders, female household heads, young people
Biophysical assessment (actors, duration)	▸ Carried out by the local population with assistance from the national coordinator assigned by SENAGUA, the Ministry of Agriculture, the project team, university professors and students and local government representatives ▸ Field assessment of about 3 months, followed by a number of specialized studies during project implementation (e.g. soil, water, forests, GIS cartography)
Socio-economic assessment (actors, duration)	▸ Carried out in parallel with institutional and biophysical assessments ▸ Took about 3 months ▸ No assessment of costs and benefits at the beneficiary level
Institutional assessment + stakeholder analysis	See above
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Advanced degradation of soil, rangeland and forests in the upper areas
Current (official) land-use categories	State land, collective land and private land
Main crops produced	Cassava, citrus, cacao, banana, alfalfa, horticulture
Livestock numbers	82 000 sheep, 40 000 goats, 250 cows, 450 horses
Household income sources	Agriculture and livestock
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Problems identified: ▸ Forest and rangeland degradation ▸ Soil erosion ▸ Low income ▸ Poor public infrastructure Proposed solutions: ▸ Joint protection of forested upper areas ▸ Promotion of integrated land management techniques ▸ Income-generating activities ▸ Joint community building efforts

continues

OUBAME – ECUADOR

Criteria for selection of interventions	▸ Issues of general interest within the watershed territory ▸ Readiness of households to engage in field demonstration activities ▸ Openness to express perceived priorities and solutions and to accept technical and organizational recommendations from technical line agencies and the project team in view of official validation and support by local authorities ▸ Integration of activities covering different watershed sections
Area-based interventions	12 territorial units were identified and mapped, but packages of actions were identified and implemented for only some of these units, partially leaving out the upstream forested areas. Main actions implemented: ▸ Establishment of 7 pasture demonstration plots (with the Socio Bosque programme for compensation of forest protection measures) ▸ Protection of 7 water sources in 5 communities and establishment of 4 drinking-water collection systems ▸ Reforestation of 40 ha with local species ▸ Management of 110 ha of agroforestry plots ▸ Production of biofertilizers in all communities ▸ 200 ha with good practices for soil conservation ▸ 3 livestock watering points protected against water pollution ▸ 7 bus stops built with bamboo ▸ Installation of 10 rain gauges ▸ Establishment of 14 greenhouses for horticulture ▸ 2 simple metallic silos for grain stocking and conservation
Other project interventions (e.g. capacity development, studies)	▸ Thematic studies (NWFPs, value chain development, ecotourism development, water quality, soil capability) ▸ Interinstitutional and cross-sectoral dialogue and fora ▸ Promotion of 6 microenterprises (handicraft, cocoa processing, NWFPs) ▸ Participation in 20 rural trade fairs ▸ Several capacity development activities at various levels
Watershed management plan formulation (actors, duration)	▸ Content derived from local priorities and subsequent technical and organizational feasibility checks by the project team and technical services ▸ Draft 3-year work plan agreed with concerned administrative levels ▸ Longer-term plans to be managed by SENAGUA and local entities through a mechanism for intersectoral collaboration aimed at streamlining public territorial investment and securing co-funding and maintenance by concerned stakeholders ▸ Regular review and updating foreseen to incorporate lessons learned and adjust to new programming and funding of concerned technical and administrative partners ▸ Emphasis on coherence and complementarity with the local development plan
Watershed management plan validation	▸ Validation step seen as essential to ensure ownership of the plan by local people, technical services and authorities, its progressive implementation and subsequent review and updating ▸ Regular official submission and validation of the updated plan by concerned stakeholders, in line with the local development plan, seen as the main way to attract institutions, CSOs and private partners to engage in implementing it
Watershed management plan implementation	A first set of pre-selected activities at field level, particularly focused on income generation, implemented to mobilize the interest and confidence of local people and organizations, together with concerned national and decentralized partners
Involvement of provincial and/or national stakeholders	▸ Administrative, technical and academic entities were involved in the design and implementation of activities foreseen by the plan and in mobilizing funding. ▸ Local authorities, from the parish to the provincial level, were seen as key in maintaining the watershed management efforts long enough to develop a concrete model for national upscaling and replication, and in convincing partners about emerging and expected benefits (including downstream benefits).
Exit strategy	Ongoing efforts by concerned parties to ensure the continuation of field activities after project termination
Challenges faced during project implementation	▸ Unstable interest or support of counterparts and other national line agencies because of changing policy and institutional setting ▸ Limited economic skills of the project team and consultants ▸ Prevalence of scattered interventions, with limited attention to applying a watershed territorial approach in space and time

OUBAME – MAURITANIA

PROJECT TITLE	INTERREGIONAL PROJECT FOR POVERTY ALLEVIATION AND COMBATING DESERTIFICATION THROUGH COLLABORATIVE WATERSHED MANAGEMENT (OUBAME)
Duration	June 2010 – May 2015
Budget	USD 3 million (of which approximately USD 850 000 per country)
Resource partner(s)	Spain and FAO TCP funds
Implementing partner(s)	Ministry of Environment and Sustainable Development (MEDD)
Main objectives	To increase the capacity of key stakeholders in the participating countries to design and implement collaborative integrated watershed management programmes in arid and semi-arid lands with a view to fighting poverty, improving food security, combating desertification and promoting environmental good governance
Location(s)	Oued Barbara watershed, Commune of Radhi, Hodh el Gharbi Region
Size of location(s)	26 900 ha
Criteria for selection of location(s)	▸ Advanced stage of natural resource degradation, as perceived by the population ▸ Natural-resource and socio-economic development potential ▸ Dynamism of the local society and farmers' organizations
Population (No.)	9 000 inhabitants, of which 600 households in 4 *douar* (villages) and 700 nomadic households (17 inhabitants per km^2)
Criteria for selection of beneficiaries (communities/households)	Also based on an intervillage association promoted by a previous GIZ project: ▸ Households interested in assessing present problems and needs and prioritizing actions by interest groups and associations ▸ Interest groups ready to establish ad hoc working associations ▸ Openness to contribute to infrastructures of collective interest
Beneficiaries (No.)	Small farmers/herders, women and female heads of household in particular, young people
Biophysical assessment (actors, duration)	▸ Carried out by local population with assistance from the national coordinator assigned by MEDD and the project team, with 2 field facilitators and occasional participation by local authorities and technical line agencies ▸ Took about 4 months ▸ Accompanied and followed by capacity development field courses (such as farmer field schools) and specialized studies during project implementation (e.g. vegetation cover, NWFPs)
Socio-economic assessment (actors, duration)	▸ Carried out in parallel with institutional and biophysical assessments ▸ Took about 4 months ▸ No assessment of costs and benefits at the beneficiary level
Institutional assessment + stakeholder analysis	See above
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	▸ Advanced soil, rangeland and forest degradation in upper areas ▸ Holistic territorial vision basically lacking, as reflected in the subsequent process of identifying possible solutions to priority problems
Current (official) land-use categories	▸ Collective land and private land
Main crops produced	Dates, millet, maize, beans
Livestock numbers	Sedentary: 4 000 sheep/goats, 7 000 cows, 720 horses, 2 420 donkeys, 270 camels Nomadic: 5 600 sheep/goats, 4 600 cows, 12 horses, 1 830 donkeys, 6 000 camels
Household income sources	▸ Agriculture (mainly date palms and grains) ▸ Livestock (both nomadic and sheltered) ▸ Handicrafts
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Problems identified: ▸ Soil erosion, dune formation, water-table lowering and limited rainfall for water stocking and irrigation facilities ▸ Overgrazing and deforestation ▸ Social subdivision (castes) and poor socio-economic conditions Proposed solutions: ▸ Mobilization of local associations towards good operation and maintenance of infrastructure of joint interest ▸ Promotion of improved integrated land management techniques ▸ New income generation activities and promotion of associations for women and youth

continues

OUBAME – MAURITANIA

Criteria for selection of interventions	▸ Needs and expectations expressed by local population and associations (bottom-up) ▸ Programmes, plans and opportunities for integration and coordination presented by local technical services (top-down)
Area-based interventions	8 territorial units and relevant actions were identified and mapped, but packages of combined actions were not designed for each unit, partly leaving out initiatives in the rangeland areas used by nomadic herders. Main actions implemented: ▸ River-bank protection (houses and 2 300 date palms in the oasis) ▸ 4 earth dams for water retention to irrigate 150 ha of fields and to provide animal drinking-water ▸ Fencing 150 ha of agricultural land against animal divagation ▸ Establishment of 4 ha of improved pasture species ▸ Reforestation of 10 ha for sand-dune stabilization ▸ Drinking-water supply system in 2 villages ▸ 4 women's horticultural groups (140 members) and protection of 3 ha of vegetable production area ▸ 7 women's butcher associations ▸ 1 childhood nutrition centre ▸ 1 multifunctional centre ▸ 60 solar kits distributed for house lighting and cellular charging ▸ 100 water filters distributed at household level
Other project interventions (e.g. capacity development, studies)	▸ Thematic studies (biophysical assessment of downstream areas; geophysical studies for drilling wells; forest and grassland management; NWFP and handicraft production and marketing) ▸ Training materials and courses for group formation, farmer field schools, handicraft production, water-pump maintenance
Watershed management plan formulation (actors, duration)	▸ Content derived from local priorities (bottom-up) and subsequent technical and organizational feasibility checks by project team and technical services (top-down) ▸ A draft one-year work plan prepared for validation by concerned administrations and authorities along with a mechanism for intersectoral collaboration aimed at streamlining the use of public funds, mobilizing the private sector and securing co-funding and maintenance by concerned stakeholders ▸ Regular review and updating foreseen to incorporate lessons learned and adjust to new programming and funding of concerned agencies and partners
Watershed management plan validation	▸ A validation workshop was held but its conclusions were not officially communicated. ▸ The activities foreseen in the plan could be implemented through a new project being formulated for GEF funding.
Watershed management plan implementation	▸ Despite the existing traditional social stratification, the plan was perceived as the property of the local people and technical services, and its progressive implementation will be fully under their responsibility. ▸ Activities already implemented have mobilized all concerned stakeholders.
Involvement of provincial and/or national stakeholders	▸ MEDD, regional government and municipal authorities, Ministries of Agriculture and Energy and NGOs were involved in the design and implementation of the activities foreseen in the plan and in mobilizing funding. ▸ The remaining issue is how to maintain watershed management efforts to develop a model that is solid enough for national upscaling and replication.
Exit strategy	▸ Efforts were made to ensure continuation of field activities after project termination. ▸ With FAO funding, a 1-year TCP project formulated a new GEF project which will extend and replicate the project experiences in 3 eastern regions (*wilayas*).
Challenges faced during project implementation	▸ Conflicts between herders and small farmers, partly because of policy, tenure and legal issues ▸ Unstable interest by line agencies because of the limited size and physical distance of project intervention areas and overwhelming problems linked to a lack of public resources for decentralized technical services ▸ Initial conflictive relationship with communal entities ▸ Limited economic skills of the project team and consultants ▸ Prevalence of scattered interventions, with limited attention to applying a watershed territorial approach in space and time

OUBAME – MOROCCO

PROJECT TITLE	INTERREGIONAL PROJECT FOR POVERTY ALLEVIATION AND COMBATING DESERTIFICATION THROUGH COLLABORATIVE WATERSHED MANAGEMENT (OUBAME)
Duration	June 2010 – May 2015
Budget	USD 3 million (of which approximately USD 850 000 per country)
Resource partner(s)	Spain and FAO TCP funds
Implementing partner(s)	▸ High Commission for Water and Forests and the Fight Against Desertification ▸ Ministry of Agriculture
Main objectives	To increase the capacity of key stakeholders in the participating countries to design and implement collaborative integrated watershed management programmes in arid and semi-arid lands with a view to fighting poverty, improving food security, combating desertification and promoting environmental good governance
Location(s)	Oued Outat watershed, Commune of Ait Izdeg, Province of Midelt
Size of location(s)	18 228 ha
Criteria for selection of location(s)	▸ Advanced stage of natural resource degradation, as perceived by the population ▸ Natural-resource and socio-economic development potential ▸ Dynamism of the local society and farmers' organizations ▸ Adequate accessibility and visibility for demonstration purposes
Population (No.)	5 074 inhabitants, with 820 sedentary households in 8 *douar* (villages) and 800 semi-nomadic families (28 inhabitants per km^2)
Criteria for selection of beneficiaries (communities/households)	▸ Households interested in assessing present problems/needs and prioritizing actions by interest groups/associations/cooperatives; ▸ Interest groups ready to establish ad hoc working associations; ▸ Openness to contribute to infrastructure of collective interest
Beneficiaries (No.)	Small farmers and herders, female household heads, young people
Biophysical assessment (actors, duration)	▸ Carried out by the local population with assistance from the national coordinator assigned by HCEFLCD, Ministry of Agriculture technicians, the project team and local government representatives ▸ Field assessment took about 3 months ▸ Followed by several specialized studies during project implementation (e.g. soil, water, forests, rangeland, GIS cartography)
Socio-economic assessment (actors, duration)	▸ Carried out in parallel with institutional and biophysical assessments ▸ Took about 3 months ▸ No assessment of costs and benefits at the beneficiary level
Institutional assessment + stakeholder analysis	See above
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	▸ Advanced soil, rangeland and forest degradation in upper areas ▸ Holistic territorial vision basically lacking, as reflected in the subsequent process of identifying possible solutions to priority problems
Current (official) land-use categories	State land, collective land and private land
Main crops produced	Apples, alfalfa, horticulture
Livestock numbers	82 580 sheep, 40 560 goats, 1 420 cows, 433 horses, 650 donkeys
Household income sources	▸ Agriculture ▸ Livestock ▸ Handicrafts
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Problems identified: ▸ Overexploitation of vegetation cover leading to soil depletion and water erosion ▸ Lack of maintenance of public and collective infrastructure ▸ Conflicts between settled and semi-nomadic people ▸ Poor socio-economic conditions of local people Proposed solutions: ▸ Enforcement of existing laws and establishment of fenced-off areas, in agreement with nomadic groups ▸ Mobilization of local associations towards good operations and maintenance of infrastructure of joint interest ▸ Enforcement of existing rules and agreements on rangeland management practices ▸ Value chain development and diversification of agricultural and non-agricultural income sources

continues

OUBAME – MOROCCO

Criteria for selection of interventions	▸ Issues of collective interest within the watersheds ▸ Readiness of households to engage in and manage demonstration field activities ▸ Balance between local aspirations and the technical and organizational recommendations of technical line agencies and the project team for obtaining official validation and support from local authorities
Area-based interventions	5 territorial units were identified within the watershed using LADA/WOCAT methodology. The watershed was subdivided into 12 subwatersheds to identify the areas most prone to erosion and to define priority actions for water and soil conservation. However, packages of actions did not address all territorial units, partly leaving out initiatives in the difficult upstream territory used by nomadic herders. Most of the actions in the watershed management plan are linked to the programmes and work plans of partner technical services and local governments, including: ▸ Mini-dams for irrigation water derivation (6); ▸ Reforestation and rangeland improvements; ▸ Rehabilitation of rural roads (34 km); ▸ Gully control with apple- and olive-tree plantation (2) ▸ Establishment of drinking-water supply or reservoir systems (3) ▸ Improved apple plantation management (250 farmers on 25 ha) ▸ Apiculture development near forest or shrub areas (2 women's groups) ▸ Improved poultry farming systems (3 women's groups) ▸ Introduction of improved goat species (3 women's groups)
Other project interventions (e.g. capacity development, studies)	▸ Thematic studies, e.g. evaluation of downstream damage and its costs due to upstream mismanagement; preliminary dam feasibility studies; forest and rangeland management; value chain development for apple orchards, medicinal plants and milk ▸ Interinstitutional and cross-sectoral dialogue and fora ▸ Several capacity development activities at various levels
Watershed management plan formulation (actors, duration)	▸ Content derived from local priorities (bottom-up) and subsequent technical and organizational feasibility checks by project team and technical services (top-down) ▸ A 4-year work plan agreed with concerned administrations and authorities, to be implemented by HCEFLCD and local entities through a mechanism for intersectoral collaboration aimed at streamlining use of public funds, mobilizing the private sector and securing co-funding and maintenance by concerned stakeholders ▸ Regular review and updating foreseen to incorporate lessons learned and adjust to new programming and funding of concerned partners ▸ Emphasis on coherence and complementarity with local development plans, which represent the key reference for concerned authorities and technical services for medium- and long-term planning
Watershed management plan validation	The official submission and validation of the watershed management plan was considered the best way to draw the attention and engagement of higher-level institutional partners in its implementation.
Watershed management plan implementation	Thanks to validation, the plan progressively became the property of local people and technical services, so that local people, their organizations and national partners were very active in implementation of the plan.
Involvement of provincial and/or national stakeholders	▸ Public entities involved in the design and implementation of the activities in the plan include HCEFLCD; the Ministries of Agriculture, Health, Equipment and Water/Mines; Moulouya River Basin Authority; and provincial and local governments. ▸ The remaining issue is how to maintain watershed management efforts to develop a model that is solid enough for national upscaling and replication.
Exit strategy	▸ Efforts were made by all concerned parties to ensure the continuation of field activities after project termination. ▸ With FAO funding, a 1-year TCP project obtained additional funding from the Swiss Agency for Development and Cooperation (SDC) to replicate and consolidate the project experiences in an extended geographical area, to use the model developed for the update of the national watershed management plan and to incorporate the watershed management concept into Moroccan academic curricula.
Challenges faced during project implementation	▸ Difficulties in addressing problems related to nomadic people because of policy, tenure and legal issues (at the national and local levels) ▸ Unstable engagement of line agencies because of the limited size of the project intervention area ▸ Limited economic skills of the project team and consultants ▸ Prevalence of scattered interventions, with limited attention to applying a watershed territorial approach in space and time

PAKISTAN

PROJECT TITLE	ASSIST THE EARTHQUAKE RECONSTRUCTION AND REHABILITATION AUTHORITY AND ITS PARTNERS IN RESTORING LIVELIHOODS IN THE EARTHQUAKE-AFFECTED AREAS OF PAKISTAN
Duration	January 2007 – September 2011
Budget	USD 6.6 million, including USD 850 000 for the Collaborative Watershed Management component
Resource partner(s)	Sweden
Implementing partner(s)	▸ Earthquake Reconstruction and Rehabilitation Authority ▸ Forest Departments and Divisional Forest Offices of Pakistan-administered Kashmir and Khyber Pakhtunkhwa Province (known as North-West Frontier Province until 2010) ▸ International Centre for Integrated Mountain Development (ICIMOD)
Main objectives	Overall project objective: To make a significant contribution to the Government of Pakistan's livelihoods rehabilitation programme in the earthquake-affected areas in Pakistan-administered Kashmir and Khyber Pakhtunkhwa Objectives of Collaborative Watershed Management component, aimed at addressing underlying long-term environmental issues: ▸ Strengthening capacity of local stakeholders to negotiate and jointly implement actions aimed at restoring or enhancing selected natural capital assets (e.g. eroded arable land, diminishing water sources, degraded forests and rangelands) ▸ Identifying and testing effective, affordable and potentially replicable solutions to local watershed management problems, based on both local environmental knowledge and expert knowledge of the natural and socio-economic functioning of watersheds
Location(s)	Initially 17 watersheds were selected, 8 in Pakistan-administered Kashmir and 9 in Khyber Pakhtunkhwa. During implementation, watershed management plans were developed and implemented for 10 watersheds, while only single landslide stabilization measures were realized in the other 7 watersheds
Size of location(s)	Initial size not known; later, focus areas of 300–500 ha in each of the 10 sites for which watershed management plans were developed
Criteria for selection of location(s)	Initial selection of 17 watersheds: ▸ Reasonable size that allows achieving visible impact ▸ Remote villages, most-affected areas and areas that sustained major earthquake damage ▸ Existing settlements ▸ Prevalence of shallow landslides and destabilized slopes ▸ Complete altitudinal profile (e.g. government forests, pastures, agricultural terraces, irrigated fields) ▸ Achievable results with the available financial resources ▸ Scope for interventions and for visible impact ▸ Strong local institutions, motivation for collaboration and existing initiatives ▸ Potential for synergies with other ongoing projects Criteria for focus areas following the mid-term review: ▸ 300–500 ha in size ▸ 3 to 4 villages ▸ Mix of different land uses ▸ Presence of landslides and/or landslips ▸ Scope for other activities ▸ Visibility from the main road and potential for demonstration
Population (No.)	1.5 million inhabitants in 250 000 households
Criteria for selection of beneficiaries (communities/households)	▸ Affected by the 2005 earthquake ▸ Degree of natural resource degradation
Beneficiaries (No.)	
Biophysical assessment (actors, duration)	Delineation of watersheds and damage, hazard and resource mapping carried out by ICIMOD
Socio-economic assessment (actors, duration)	Topical participatory rural appraisal
Institutional assessment + stakeholder analysis	

continues

PAKISTAN

State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Prevalent signs of degradation on hillsides, caused by deforestation, overgrazing, and soil erosion before the earthquake
Current (official) land-use categories	Mix of forest, cropland and grazing land
Main crops produced	Maize, wheat, rice, vegetables, fruits
Livestock numbers	
Household income sources	Agricultural produce, temporary off-farm labour, remittances (national and international)
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Proposed solutions for the problems identified above: ▸ Rehabilitation of watersheds that were badly affected by landslides and slips provoked by the earthquake ▸ Soil stabilization through a mix of physical and bio-engineering measures ▸ Support to agricultural production
Criteria for selection of interventions	A variety of interventions selected to address the needs of all population segments, targeting especially landless people and small- and medium-scale landowners
Area-based interventions	▸ Construction of check dams (24 305 m^3), retaining walls (2 576 m^3) and gabion walls (309 m^3) ▸ Repair and construction of irrigation channels (600 m) and stream embankments (180 m) ▸ Wattling (3 971 m), brush layering (5 364 m) and palisades (235) ▸ Facilitating natural regeneration of pastures (344 ha) and direct seeding of improved fodder crops (16 ha) ▸ Establishment of 10 forest and fruit-tree nurseries and tree planting (462 ha) ▸ Terracing and field levelling on 17 ha ▸ Establishment of kitchen gardens, composting units, home-based poultry farms and fruit orchards ▸ Establishment of water-harvesting ponds and fish ponds ▸ Roofwater harvesting and water-tank installation for irrigation
Other project interventions (e.g. capacity development, studies)	▸ Establishment of a WMC in each watershed ▸ Training on landslide/gully treatment and hazard mapping (27 participants) ▸ Low-cost soil and water conservation techniques (88 participants) ▸ Preparation of integrated watershed management plans and case studies (3 participants) ▸ Exposure visit and training of trainers course at ICIMOD (9 participants) ▸ Technical training at community level (e.g. orchard management; processing, packaging and marketing of medicinal plants, fruits and nuts; livestock management; kitchen gardening; afforestation; and basket making)
Watershed management plan formulation (actors, duration)	▸ Plans initially prepared by ICIMOD ▸ Gradual shift of responsibility to the Forestry Department and its divisional offices, with ICIMOD providing technical backstopping ▸ Full involvement of the communities in the planning, implementation and monitoring of field activities through the WMCs
Watershed management plan validation	
Watershed management plan implementation	▸ Letter of Agreement between FAO and the Forestry Department ▸ Agreement between the Forestry Department and the WMCs for the implementation of activities agreed upon in the plan
Involvement of provincial and/or national stakeholders	District forestry officers had a key role, but other line departments and external partners such as NGOs were not sufficiently involved in the process.
Exit strategy	
Challenges faced during project implementation	▸ Field mobility was reduced because of conflict in adjacent zones. ▸ The Earthquake Reconstruction and Rehabilitation Authority showed some reluctance to take up gender issues, and FAO field staff included few women. A gender analysis would have been beneficial to assess women's workload and improve project design. In some areas, women's groups' activities remained local and disconnected from line departments and relevant institutions. ▸ Government funding priorities were redirected towards flood response after the 2010 flood caused heavy loss of lives, livelihoods, infrastructure, agriculture and livestock in the project areas. ▸ The global economic crisis forced many male migrants to return to their villages, creating additional pressure on the scarce agricultural land and on the economic situation of the targeted families.

TAJIKISTAN I

PROJECT TITLE	PARTICIPATORY INTEGRATED WATERSHED MANAGEMENT IN UPLAND AREAS
Duration	September 2003 – August 2005
Budget	USD 353 000
Resource partner(s)	FAO
Implementing partner(s)	▸ Soil Science Research Institute ▸ Agrarian Academy of Agricultural Sciences ▸ Ministry of Agriculture ▸ Ministry of Environmental Protection and Forestry ▸ State Land Committee ▸ NGO Deutsche Welthungerhilfe (German Agro Action)
Main objectives	▸ Conduct participatory integrated watershed management activities for the rehabilitation of upland natural resources on a small scale for demonstration, on-the-job training and eventual replication ▸ Identify income-generating activities within the framework of integrated watershed management for the improvement of the living conditions of local people and support to the sustainable use of upland resources ▸ Increase technical capacities of selected technicians in fields related to approaches and methodologies in participatory integrated watershed management ▸ Prepare project profiles for the multiplication of integrated watershed management interventions
Location(s)	Faizabad District, Javonon Jamoat, Obi Sangbur watershed, Bodomo subwatershed
Size of location(s)	80 ha
Criteria for selection of location(s)	▸ Visibility and accessibility ▸ Percentage of degraded land ▸ Diversity of land uses, ecosystems (from subalpine to subtemperate) and stages of degradation across the watershed ▸ Visible effects of upstream–downstream linkage ▸ Demonstrated capacity for social mobilization and technical management ▸ Significant downstream values to be protected (e.g. arable land and economic infrastructure) ▸ Availability of planning data (including maps and biophysical and socio-economic data) ▸ Representation of a typical agro-ecological zone
Population (No.)	5 155 inhabitants in 658 households in 7 villages
Criteria for selection of beneficiaries (communities/households)	
Beneficiaries (No.)	
Biophysical assessment (actors, duration)	Biophysical profile prepared mainly by the international watershed management consultant, with inputs from the team of national consultants and the international consultant on forestry management
Socio-economic assessment (actors, duration)	Socio-economic survey conducted by Deutsche Welthungerhilfe, covering 50% of the households in the 7 villages.
Institutional assessment + stakeholder analysis	
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Problems identified: ▸ Mountainous terrain with insufficient arable land ▸ High pressure on the land from overgrazing, deforestation and inappropriate agricultural practices ▸ Lack of agricultural inputs, machinery and knowledge ▸ Lack of trees and forests that could satisfy fuelwood demand ▸ Severe erosion and degradation ▸ No access to clean drinking-water ▸ Legal restrictions on private landownership
Current (official) land-use categories	▸ Crop production (78 ha) ▸ Orchards and kitchen gardens (31 ha) ▸ Pastures (40 ha) ▸ Forests (17 ha) ▸ Non-agricultural land (15 ha)

continues

TAJIKISTAN I

Main crops produced	Wheat, tomatoes, onion, fruits, potatoes
Livestock numbers	In surveyed households (50%): 565 cattle, 585 goats, 316 sheep, 540 poultry, 106 oxen (for ploughing)
Household income sources	▸ Remittances from migrants (75% of households surveyed) ▸ Kitchen gardens (47%) ▸ Pensions (21%)
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Problems identified: ▸ Loss of vegetation cover ▸ Erosion due to cultivation and overgrazing Prioritized solutions: ▸ Introduction of agroforestry practices ▸ Planting of trees (using local tree nurseries) ▸ Awareness raising initiatives
Criteria for selection of interventions	▸ Biophysical situation (climate, soils, topography, erosion) ▸ Individual farmer and community needs ▸ Costs/benefits/risks ▸ Availability of inputs (e.g. time, money, equipment, plants, labour)
Area-based interventions	▸ Demonstration plots for controlled grazing and pasture rotation system ▸ Provision and planting of high-quality fruit-tree seedlings ▸ Demonstration plot for drip irrigation of apple trees with gravity ▸ Gully rehabilitation and erosion control through gabions, fencing and tree planting on degraded slopes and in shelterbelts ▸ Demonstration plot for zero tillage including provision of no-till machinery ▸ Installation of a greenhouse to serve as a tree nursery to provide seedlings for afforestation and gully rehabilitation ▸ Installation of rain and evaporation measuring equipment and water collection ponds
Other project interventions (e.g. capacity development, studies)	▸ Creation of four specific common interest groups in the main village: income generation, water management, agroforestry and horticulture, pasture management and livestock ▸ Establishment of a revolving fund to introduce a grant distribution and repayment scheme for 7 women's groups ▸ Study on the conditions of different types of pastures ▸ Study on water resources management and irrigation scheduling ▸ PRA training for all 7 villages (total 13 days in 4 sessions) conducted by Deutsche Welthungerhilfe and attended by 163 villagers
Watershed management plan formulation (actors, duration)	The outline for an integrated watershed management plan is available, and a road sign illustrating the plan is posted strategically at the entrance to the subwatershed. The plan itself could not be retrieved.
Watershed management plan validation	
Watershed management plan implementation	
Involvement of provincial and/or national stakeholders	The project attracted high-level attention from the authorities in Tajikistan at both the central and the district levels.
Exit strategy	
Challenges faced during project implementation	▸ Lack of full-time English-Russian-Tajik translator as part of the project team; unsatisfactory involvement of translators on a temporary, short-term basis, specifically for workshops, missions or the translation of reports ▸ Insufficient time allocated to the different national experts in the project document

TAJIKISTAN II

PROJECT TITLE	COMMUNITY AGRICULTURE AND WATERSHED MANAGEMENT PROJECT
Duration	August 2006 – March 2010
Budget	USD 500 000
Resource partner(s)	World Bank
Implementing partner(s)	
Main objectives	Long-term objective: To contribute towards an enabling environment for national watershed management in Tajikistan through institutional, organizational and strategic reforms. This included restructuring of the decision-making process from a system of taking collective action through traditional leadership structures to a community-based participatory development approach through empowerment of the weakest beneficiaries. Immediate objective: To institutionalize a watershed approach to community-based development, including: ▶ Development of operational manuals for participatory village planning, selection and design of rural production investments, land and natural resource management and rural infrastructure improvements ▶ Capacity building to use the manuals and oversee the preparation of participatory plans and their implementation ▶ Support to project coordination
Location(s)	The project operated in four geographical areas/watersheds, with different agencies handling the execution of the project in each area. FAO was contracted by the World Bank as facilitating organization to support work in the Toirsu watershed, Dangara District, Khatlon Province.
Size of location(s)	62 villages in 6 *jamoats* (Pushing, Lolazor, Ismat Sharif, Korez, Oqhsu, Lohur)
Criteria for selection of location(s)	▶ Seriously affected by land and soil degradation ▶ Experienced loss of crops, extensive deforestation and pasture degradation
Population (No.)	59 405
Criteria for selection of beneficiaries (communities/households)	▶ Low-income households ▶ Female-headed households ▶ Large families ▶ Households that had lost property and/or harvest or livestock as a result of several years of drought, flooding and other natural disasters ▶ Households willing to organize in common interest groups (CIGs)
Beneficiaries (No.)	Approximately 9 000 beneficiary households
Biophysical assessment (actors, duration)	
Socio-economic assessment (actors, duration)	▶ A 2 to 3 day PRA exercise conducted in each village by FAO community mobilizers and staff from the projeact coordination unit, followed by extensive consultations to identify the local population's priorities and select projects ▶ Creation of CIGs and training of members in project design, planning and proposal writing
Institutional assessment + stakeholder analysis	
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Problems identified: ▶ Land and soil degradation (overgrazing, deforestation, unsustainable agricultural practices) ▶ Decrease in downstream agricultural productivity as a result of floods and landslides
Current (official) land-use categories	
Main crops produced	
Livestock numbers	
Household income sources	
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	
Criteria for selection of interventions	

continues

TAJIKISTAN II

Area-based interventions	▶ Preparation and implementation of up-front credibility investments, with a maximum budget of USD 1 000 per village, not to be merged with the budget of other villages or subprojects ▶ 123 village-level interventions ("subprojects") to support rural agricultural production, benefiting 1 337 households organized in CIGs (up to USD 30 per household), in the areas of beekeeping (19), poultry farming (11), watermelon and vegetables (5), blacksmithing (17), animal husbandry (22), veterinary support (15), greenhouses (13), mill workshops (18) and fishery (3) ▶ 242 subprojects to promote sustainable land and natural resource management, benefiting 3 543 households organized in CIGs (up to USD 74 per household), in the areas of orchard development (158), vineyard (12), crop rotation (18), pasture development (48) and forestry (6), on a total of 1 481 ha ▶ 54 subprojects to improve rural infrastructure, excluding social infrastructure, supporting 5 724 households (up to USD 28 per household) with safe drinking-water for human (29) and animal (1) consumption as well as improved roads (14) and rehabilitated bridges (10)
Other project interventions (e.g. capacity development, studies)	▶ Technical training for 703 beneficiaries (including 78 women) in poultry keeping, beekeeping, horticulture development, compost preparation and the use of mineral and organic fertilizer ▶ Institutional training in organizational management, project design, proposal writing, participatory approaches, finance and accounting for 3 312 beneficiaries (including 972 women)
Watershed management plan formulation (actors, duration)	
Watershed management plan validation	
Watershed management plan implementation	
Involvement of provincial and/or national stakeholders	
Exit strategy	
Challenges faced during project implementation	▶ Little opportunity for FAO to promote an integrated watershed management approach, as the project designed by the World Bank was essentially a rural development project implemented in a watershed ▶ Overall, insufficient attention paid to addressing unsustainable land and natural resource management practices ▶ Lack of coordination between the four facilitating organizations ▶ Little attention to policy and strategy issues, despite the World Bank's stated intention to compare different approaches and to agree on a common watershed management approach for the country ▶ Lack of coordination between villages, local authorities and *jamoat* administration in the absence of effective and functioning VDCs ▶ Discrepancy between the intended beneficiaries (poor and most vulnerable households) and the project proposals designed through CIGs, often composed of influential community leaders

TURKEY

PROJECT TITLE	DEVELOPMENT OF PUBLIC PARTICIPATION AND IMPROVEMENT OF SOCIO-ECONOMIC PROSPERITY IN MOUNTAIN COMMUNITIES: YUNTDAGI MODEL
Duration	January 2008 – December 2010
Budget	USD 355 000
Resource partner(s)	FAO
Implementing partner(s)	▸ Ministry of Environment and Forestry ▸ State Planning Organization
Main objectives	At the national level: Introduce multidisciplinary and participatory approaches for sustainable mountain development and establish a framework for sustainable mountain management planning At the field level: Pilot test modern approaches for the sustainable management of mountain ecosystems and for improvement of income generation
Location(s)	Turkmen village, Yuntdagi Mountains, Western Turkey
Size of location(s)	1 158 ha
Criteria for selection of location(s)	▸ Watershed context ▸ Potential for success ▸ Interest of villagers and other stakeholders ▸ Innovation and initiatives ▸ Diversity of products and activities ▸ Distance from the provincial capital ▸ Availability of user groups (e.g. cooperatives, associations, unions) ▸ Relation with government, public and other institutions ▸ Level of degradation (forest, pasture, agricultural land) ▸ Diversity of land-use pattern ▸ Accessibility
Population (No.)	193 inhabitants in 39 households
Criteria for selection of beneficiaries (communities/households)	
Beneficiaries (No.)	
Biophysical assessment (actors, duration)	Report prepared by the national natural resource management consultant, for both the regional and village levels
Socio-economic assessment (actors, duration)	Survey conducted for the Yuntdagi mountain range by 2 national consultants, 1 expert in agricultural economics and 1 expert in marketing and enterprise development; 160 households in 7 villages surveyed, with specific questionnaires for farmers, women, youth and children
Institutional assessment + stakeholder analysis	Report prepared by the national consultant for institutional development, for both the regional and village levels
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Problems identified: ▸ Outmigration of young people to urban centres ▸ Water shortages limiting expansion of irrigated agricultural lands ▸ Shallow soils not appropriate for afforestation ▸ High degree of forest degradation and soil erosion ▸ Unproductive and degraded forests failing to provide sufficient income-generation opportunities (harvesting, planting, maintenance) ▸ Lack of rangelands and fodder crop production for animal husbandry ▸ Legal restrictions for State-owned lands
Current (official) land-use categories	▸ Forest lands (State-owned): 788 ha ▸ Land suitable for dry cultivation: 363 ha (130 ha actually cultivated) ▸ Irrigated land: 6 ha ▸ Pasture: 1 ha
Main crops produced	Wheat, barley, olives, pistachio, grapes, tobacco, sainfoin (*Onobrychis* spp.)
Livestock numbers	59 cattle, 2 000 sheep, 100 beehives
Household income sources	Agricultural produce
Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	

continues

TURKEY

Criteria for selection of interventions	▸ Contribution to improve the livelihoods of local people ▸ Positive impact on the protection and sustainable use of natural resources ▸ Visible results at the end of the project
Area-based interventions	▸ Establishment of demonstration vineyards in Recepli village on 6 ha of private land benefiting 8 families ▸ Private afforestation and rehabilitation with commercial tree species (*Pinus pinea*) on 2.5 ha of common land ▸ Fodder crop (*Vicia sativa*) production and controlled grazing practices on 20 ha of abandoned and scattered private lands belonging to 33 farmers ▸ Establishment of drip irrigation systems on 7 ha of existing vineyards belonging to 20 households in Turkmen village ▸ Improvement of pistachio growing by grafting of 1 000 wild pistachio trees on the lands of 35 farmers in Turkmen and Recepli villages
Other project interventions (e.g. capacity development, studies)	▸ Promotion of alternative energy sources to reduce fuelwood consumption: establishing solar energy devices on the roofs of 10 houses randomly selected by the villagers ▸ Establishment of a washing and disinfection pool for sheep, and distribution of 30 male sheep from a better-performing variety to village sheep owners ▸ Renovation of an empty village building to serve as the project office, subsequently transformed into the Yuntdagi Rural Initiative Centre ▸ Purchase of processing equipment for women's production of local food products, e.g. a modern and more hygienic system for grape juice extraction, considerably reducing women's workload ▸ Strategy document to include mountain issues in national planning processes ▸ Exchange visits and study tour for high-level ministerial staff ▸ Information products (brochure, newsletter) and media campaign to disseminate project results
Watershed management plan formulation (actors, duration)	▸ Draft land-use plan for Turkmen village prepared by the national natural resource management consultant, sketching present land use and listing some land-use related problems and potential improvements, but without further analysing or prioritizing them ▸ Discussion of issues among project staff and villagers, but without participation of local authorities from agriculture, viticulture and forestry directorates ▸ Two maps, one with present land-use patterns and one with possible future land use, prepared and discussed with villagers (but not available to the author)
Watershed management plan validation	▸ The plan, labelled a road map for villagers, local authorities and project staff, is not legally binding. ▸ In Turkey, there is no legal regulation making land-use plans compulsory, hence there is no authority to approve the plan and to put it into action.
Watershed management plan implementation	
Involvement of provincial and/or national stakeholders	Central and provincial authorities showed strong commitment to the project, but the strategy documents prepared with project support were not taken up by decision-makers or incorporated in national policy-making and planning.
Exit strategy	
Challenges faced during project implementation	

UNITED REPUBLIC OF TANZANIA

PROJECT TITLE	SUPPORT TO THE IMPLEMENTATION OF THE NEW GENERATION OF WATERSHED MANAGEMENT IN AFRICA
Duration	2013–2015
Budget	USD 130 000
Resource partner(s)	Gorta–Self Help Africa
Implementing partner(s)	Tanzania Forest Conservation Group (TFCG)
Main objectives	▶ To ensure the long-term sustainability of ecosystem services ▶ To improve the livelihoods of women, men and children living in rural communities adjacent to high-biodiversity forests in the West Usambara Mountains
Location(s)	West Usambara Mountains, Tanga Region, Korogwe and Lushoto Districts, Pangani Basin, subcatchments of Upper Mkolo and Kwebululu Rivers
Size of location(s)	21 villages
Criteria for selection of location(s)	▶ Absence of integrated water resource management ▶ Presence of threats to water and catchment values ▶ High-biodiversity forests in the water catchment area ▶ High levels of poverty and absence of improved water delivery infrastructure
Population (No.)	Approximately 30 000 people
Criteria for selection of beneficiaries (communities/households)	Residing within the 2 selected subcatchments
Beneficiaries (No.)	▶ 30 000 persons living in 21 communities in the West Usambara Mountains ▶ 100 000 people depending on water supplies from these mountains
Biophysical assessment (actors, duration)	▶ Water-source mapping undertaken in 2011 in collaboration with the district water engineer ▶ Remote sensing to map land cover carried out by TFCG
Socio-economic assessment (actors, duration)	▶ A first baseline survey report produced in 2011 in the framework of an earlier project supported by Gorta ▶ Another baseline survey in 2013 to build both the end line of the earlier project and the baseline of this project
Institutional assessment + stakeholder analysis	Analysis of key stakeholders in the Kwebululu basin in Korogwe district and the Mkolo/Kwemkului basin in Lushoto district, also undertaken in 2011 in the framework of the previous project
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Problems identified: ▶ No access to safe and reliable water supplies for domestic consumption (distant water sources, vulnerable to contamination) ▶ Lack of maintenance and repair of water points ▶ Agricultural practices that were often damaging to the environment and did not generate high incomes ▶ Widespread soil exhaustion and erosion ▶ Shortage of land due to high population density ▶ Limited access to improved crop varieties and technical support ▶ Limited access to information and training for alternative income-generating activities
Current (official) land-use categories	Residential areas, agricultural areas, village forest reserve, roads, markets, schools, religious buildings
Main crops produced	Maize, beans, banana, cassava, tea, coffee, sugar cane, cardamom and vegetables
Livestock numbers	
Household income sources	▶ 99% of households dependent on agricultural produce ▶ A few households also engaging in other small economic activities (e.g. petty trade, food processing, transport)

continues

UNITED REPUBLIC OF TANZANIA

Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Proposed solutions for the problems identified above: ▶ Introduction of water-point payment schemes for access to sustainable capital to contribute to water-point management costs (e.g. repairs and maintenance) ▶ Strengthening conservation agriculture (e.g. agroforestry) using farmer field schools combined with follow-up support to local farmers ▶ Information and training on how to cultivate existing farms more efficiently and on more profitable crops and market alternatives, to decrease farm expansion into woodlands ▶ Restoration of the previous system of irrigation management, in which appointed people in the villages ensured equitable distribution of irrigation water ▶ Community institution building for running the watershed programme ▶ Training and support for adoption of soil conservation techniques ▶ Information and training on agricultural alternatives (e.g. beekeeping) ▶ Development of village land-use plans to strengthen the linkages among water resource management, agricultural land use and forest management
Criteria for selection of interventions	▶ Relevance to the problems identified ▶ Proven effectiveness ▶ Costs and benefits
Area-based interventions	▶ Construction of improved water points ▶ Provision of agricultural inputs and training on conservation agriculture, farmer field school establishment, on-farm terrace preparation and sloping agricultural land technology ▶ Support to farmers on tree planting, silviculture techniques, tree nursery management and agroforestry ▶ Training and equipment for beekeeping groups to increase honey production ▶ Support to farmers in value addition and business skills development ▶ Support to 1 village to develop a village land-use plan (with approval at the district level)
Other project interventions (e.g. capacity development, studies)	▶ Water quality study ▶ Study on the economic viability of fish farming ▶ Technical training for water-point caretakers ▶ Training to water user groups on roles, responsibilities, hygiene and sanitation ▶ Study tour to learn about watershed management ▶ Training on the new generation of watershed management for project staff and local government staff ▶ Awareness raising on watershed management and linkages with agriculture, land-use planning and forest management ▶ Radio programmes on local radio on integrated water resource management ▶ Training on M&E ▶ Field visit for district staff from 2 districts to integrate project strategy with local government and other stakeholders
Watershed management plan formulation (actors, duration)	▶ Establishment of water user groups for each water point, with responsibility to manage the water points ▶ Formation of a water user association (coalition of water user groups) in each subcatchment to coordinate upstream and downstream users ▶ Failure to complete the development of the watershed management plan (the next step) because funding ended abruptly due to a change in priorities of the resource partner
Watershed management plan validation	
Watershed management plan implementation	▶ Management of water points by the water user groups (even in the absence of a completed watershed management plan) ▶ Community management of the village forest reserves within the catchment areas ▶ Intervillage coordination mechanism not functioning
Involvement of provincial and/or national stakeholders	▶ Local government involved at every stage ▶ Involvement of the Pangani Basin Water Office, the body responsible overall for the management of the Pangani River basin, at most stages
Exit strategy	To finalize and implement the watershed management plan
Challenges faced during project implementation	▶ Termination of funding before the process could be finalized ▶ Difficulty of changing people's attitudes and behaviour to introduce payment for water

ZAMBIA

PROJECT TITLE	INTEGRATED WATERSHED MANAGEMENT
Duration	2012–2015
Budget	USD 538 000
Resource partner(s)	Gorta–Self Help Africa
Implementing partner(s)	Community Oriented Development Programme (CODEP)
Main objectives	▶ To improve the livelihoods of communities in the Chiparamba area through comprehensive and integrated natural resource development ▶ To optimize the use of natural resources in the area
Location(s)	Eastern Province, Chipata District, Municipality of Chiparamba, Chitilira and Mtaya villages
Size of location(s)	5 689 ha
Criteria for selection of location(s)	▶ Acute scarcity of drinking-water ▶ Assurance of people's participation through contribution of raw materials and voluntary labour for watershed development as well as for the operation and maintenance of the assets created ▶ High poverty levels ▶ Productive potential of the land ▶ Percentage of land that is degraded ▶ Frequency of drought ▶ Availability of common land
Population (No.)	25 000
Criteria for selection of beneficiaries (communities/households)	▶ Small-scale farmers ▶ People willing to maintain the assets created ▶ Willingness to contribute labour in the development of the watershed
Beneficiaries (No.)	15 500
Biophysical assessment (actors, duration)	▶ Carried out by a consultant with participation of stakeholders and district and local government representatives ▶ Took 12 months to complete
Socio-economic assessment (actors, duration)	Cost and benefit assessment for the project carried out by the consultant together with the biophysical assessment
Institutional assessment + stakeholder analysis	Assessment on structure and functions of stakeholders
State of watershed before project interventions (result of combined assessments – major problems to be addressed)	Problems identified: ▶ Continuing soil erosion ▶ Deep groundwater and lack of irrigation facilities ▶ Low water- and nutrient-holding capacity of the soil ▶ Deforestation ▶ Poor socio-economic conditions of local residents
Current (official) land-use categories	▶ Agricultural ▶ Forest and woodlots ▶ Non-agricultural
Main crops produced	Maize, groundnuts, beans
Livestock numbers	1 878 cattle, 1 639 goats, 2 154 pigs, 421 sheep
Household income sources	Agricultural produce

continues

ZAMBIA

Analysis of assessment results (identified problems, proposed solutions, prioritization of actions)	Proposed solutions for the problems identified above: ▶ Construction of structures for water harvesting and groundwater recharging (e.g. check dams, percolation tanks) ▶ Construction of drainage line treatments (gully plugs, loose boulder structures and gabions) ▶ Use of improved agronomic practices (improved varieties, nutrient management options, improved implements) ▶ Cultivation of high-value crops (horticulture, vegetables) ▶ Afforestation and woodlot establishment ▶ Goat improvement programmes ▶ Income-generating microenterprises for improving women's income ▶ Community institution building for running the watershed programme ▶ Beekeeping ▶ Seed multiplication
Criteria for selection of interventions	▶ Affordability ▶ Ease of adoption ▶ Potential for economic improvement ▶ Potential to bring returns in short term
Area-based interventions	▶ Livelihood enhancement and diversification: beehives, goat rearing scheme, fish ponds ▶ Soil and water conservation: terraces, check dams, stone pitches, contour ridges and weirs, water boreholes ▶ Land and road rehabilitation ▶ Establishment of tree and vetiver grass nurseries
Other project interventions (e.g. capacity development, studies)	Capacity building and skill development in various activities, including income-generating activities for beneficiaries (the emphasis in the last 3 years of the project)
Watershed management plan formulation (actors, duration)	▶ Planning process involving representatives of farmers' associations, cooperatives, traditional rulers and local government and line ministries from the beginning, through meetings and in a participatory manner ▶ Took 12 months
Watershed management plan validation	Validation by stakeholders after completion
Watershed management plan implementation	Local people were involved up front in planning, implementation, follow-up and maintenance of watershed activities. Government extension officers in charge of agriculture camps within the watershed worked in collaboration with the community to implement the watershed plan.
Involvement of provincial and/or national stakeholders	Active involvement of provincial government officials in the ministries of agriculture, livestock, water and energy, forestry and community development and social welfare
Exit strategy	Prepared at the beginning of the project, indicating the project's overall time frame
Challenges faced during project implementation	▶ Overuse of water points, leading to reduced availability of water ▶ Lack of incentives for technicians working in the field ▶ Lack of transport (e.g. motorcycles) for staff (extension officers), hindering their mobility

This study reviews the achievements, and also the shortcomings, of 12 watershed management projects technically supported by FAO over the past decade, with a view to learning from experience. Unlike sectoral development approaches, watershed management involves examining the interactions among various natural processes and land uses and managing land, water and the wider ecosystem of the watershed in an integrated way. Watershed management is best carried out as a stepwise multistakeholder process. The review identifies a sequence of steps that watershed management projects or programmes should ideally follow. The approach has demonstrated its effectiveness for responding to global challenges of water supply, land restoration, climate change adaptation, disaster risk management and fighting hunger. The study results suggest that future watershed management projects and programmes must be implemented over longer time frames, and they require sustained and coordinated investment from the public and private sectors. The review identifies the following areas for moving forward: institutional strengthening for improved watershed governance; watershed monitoring; capitalizing on increased data availability; knowledge sharing and learning; and strategic partnerships for joint action on the ground.

ISBN 978-92-5-130014-5

9 789251 300145

I8087EN/1/11.17

Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00153 Rome, Italy
www.fao.org