
MANAGEMENT OF
MOUNTAIN WATERSHEDS
EDITED BY
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Springer

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Preface

Mountain catchments are some of the most challenging issues for watershed management. They include areas that are commonly remote, steeply sloping and marginal in many respects: geographical, economic and often socio-political. They are also, often, places that are the targets for the exploitation of natural resources. These resources begin with their scenic and tourist possibilities and continue to include geological resources, water resources and the forests that are their dominant vegetation. Mountain forests, frequently, lie on the front-lines of human development. They compete for space in those sites that are most targeted for human development and share the land with the most exploited and exploitable water resources, mountain rivers and lakes.

Today, mountain watersheds are also giving concern because of the effects of climate change. In strict scientific terms, the effects of these changes are, to date, more anticipated than actually proven. However, climate change contains the potential to be a serious problem because of the relatively extreme vulnerability of these mountain landscapes to catastrophic environmental change.

Formerly, mountain watersheds and their resources were managed often by Government agencies or commercial companies that were mainly oriented to resource development and extraction. The success of watershed management has been that today these lands are more commonly treated as integrated systems for management purposes. Simultaneously, this trend has given an increased voice to the inhabitants of these areas and with that increased voice has come increased responsibilities for environmental management. Increased responsibilities demand better informed communities who are able to understand the process and decisions that have to be taken to conserve and sustain their habitat. This realisation has given new emphasis and importance especially to environmental education in these mountain areas and to education that is constructed to give these communities sufficient understanding to manage their own resource and land use decisions (e.g. Watershed councils in USA).

This volume contains selected papers from the most recent meeting of the European Forestry Commission Working Party on the Management of Mountain Watersheds, which is co-sponsored by the FAO (Food and Agriculture Organisation of the United Nations). The Working Party has a

long and distinguished history (described here in the paper by Hofer and Ceci), particularly concentrated now on forest-water relationships in high altitude and latitude regions, and climate change impacts.

This volume is also co-sponsored by the International Association for Headwater Control (NGO founded in 1989), which has sought to bring together the diverse voices of the applied science practitioners, researchers, policy makers and community groups and forge a collective vision of the best management strategies for mountain watersheds around the world.

Josef Krecek
Martin J. Haigh
Thomas Hofer
Eero Kubin

About the Editors

Josef Krecek is the founder and managing Co-Director of the International Association on Headwater Control (IAHC), and former President of the EFC/FAO Working Party on the Management of MountainWatersheds. He teaches courses on Applied Hydrology at the Czech Technical Univesity in Prague, and conducts forest hydrological research on Mountain Waters of the Earthwatch Institute. He is experienced with several international projects in Europe and Asia, and coordinated a number of publications on watershed management and headwater restoration.

Martin J. Haigh is a Co-Director of the International Association on Headwater Control, Senior Fellow of the Higher Education Academy (U.K.), former Vice-president of the World Association of Soil and Water Conservation, and Co-Editor of the *Journal of Geography in Higher Education*. He is also on the Editorial Board of *Asian Journal of Water, Environment and Pollution*, since 2004. He is currently Professor of Geography and University Teaching Fellow at Oxford Brookes University in England. He conducts research into Education for Sustainable Development and Community based Environmental Reconstruction. In 2010, he won the Royal Geographical Society's international 'Taylor & Francis Award' for his contributions to teaching and learning in Higher Education.

Thomas Hofer is Forestry Officer and leader of the Watershed Management and Mountains Team at the Food and Agriculture Organization of the United Nations (FAO). Since 2006, he serves as the secretary of the EFC/FAO Working Party on the Management of Mountain Watersheds. He has vast field project experience in Asia and Central Asia, Eastern Europe, Africa and Latin America. He has coordinated the development of a number of flagship publications on watershed management, sustainable mountain development and forest hydrology.

Eero Kubin is former president of the EFC/FAO Working Party on the Management of Mountain Watersheds, and Management Committee Member

of EU COST Action 725. Over 15 years, he served as Director of the Muhos Research Unit of the Finnish Forest Research Institute, and he is leader of long-term research projects on phenology, and environmental aspects of forestry practices. As docent of the Oulu University and Helsinki University he is lecturer on forest ecology and supervisor of several doctoral thesis.

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Part I

Institutional Aspects in Control of Mountain Regions

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Mission and History of the European Forestry Commission Working Party on the Management of Mountain Watersheds

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The European Forestry Commission Working Party on the Management of Mountain Watersheds, formerly called the Working Party on Torrent Control, Protection from Avalanches and Watershed Management, was established by the European Forestry Commission (EFC) of the Food and Agriculture Organization of the United Nations (FAO) on the occasion of its Third Session on 1 September 1950.

In the course of that session, the Commission considered that soil conservation, restoration and improvement in the plains and in hilly districts constituted an extremely wide problem which required the collaboration of all the actors involved in the rational utilization of soil and water resources. On the other hand, the Commission observed that torrent control and soil restoration in mountainous regions, the importance of which is undeniable, were generally entrusted to the forestry services in European countries. Based on these considerations, the Commission recommended the establishment of a Working Party with the objective to study the technical aspects of torrent control and soil restoration in mountainous regions.

In 1951, at the 4th EFC Session, the Director General of FAO was requested to contact European governments in order to organize in 1952 the first meeting of a Working Party dealing with issues related to torrent control and protection from avalanches. The 1st Session of the "EFC Working Party on Torrent Control, Protection from Avalanches and Watershed Management" was held

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in Nancy, France, in June 1952. The group considered that the mission entrusted to it by the EFC was primarily to study the problems related to the protection from torrents and avalanches of villages, croplands, lines of communication and hydroelectric structures in the densely populated mountain areas of Europe.

In 1970, a seminar on the future orientation of the EFC Working Party was held back-to-back with its 9th Session. At the seminar, it was concluded that the terms of reference of the Working Party had to be enlarged to cover five major points in the following order of priority: torrent control, protection from avalanches, soil and water conservation in mountain regions, mountain land use with a special focus on forest land, and the evaluation of the direct and indirect benefits of mountain watershed management. In view of the broadened mandate, it was decided to call the group "EFC Working Party on the Management of Mountain Watersheds".

The core mission of the Working Party is to bring together member countries of the EFC in order to exchange information on forest and water policies, watershed and risk management practices, to fill knowledge gaps and to follow up on progress made. Its main objectives are to collect information, document technologies, monitor evolution, exchange experiences and discuss progress within mountain ecosystems in view of their sustainable management and conservation. Important areas of consideration are improved mountain livelihood systems and the security of mountain ecosystems, sustainable management with special attention to torrent control, avalanches, risk zoning and mapping, and early warning systems.

The Working Party has played an important role in the follow-up to Agenda 21, supported FAO's role as task manager for Chapter 13 on mountain ecosystems, contributed to the implementation of the recommendations from the International Year of Mountains (2002) and International Year of Freshwater (2003) as well as of the commitments from Warsaw Resolution 2 "Forests and Water" (2007) of the Ministerial Conference on the Protection of Forests in Europe (forest Europe).

The Working Party meets every two years in a host country. Each member country is represented by a focal point who is directly nominated by the relevant ministry. National focal points can be based in academic institutions, research institutes or state technical departments. The dialogue among scientists and government technicians is one of the unique and particular features of the group. The Steering Committee of the Working Party is chaired on a rotational biennial basis by a member country, while the Secretariat is provided by the Forestry Department of FAO. Through the reports and presentations submitted for each session of the Working Party, the member countries and the external observers from different regions and organizations contribute to a flow of information on watershed-related issues. A number of inter-sessional activities ensure that communication and exchange of information between countries continue on a regular basis.

Besides working together with the member countries of the EFC, the Working Party collaborates with many organizations and processes, such as

Forest Europe, UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes, EU Water Framework Directive (WFD), International Union of Forest Research Organizations (IUFRO), UNESCO-IHP-HELP, Mountain Partnership, European Forest Institute (EFI) and its regional offices, UN Water, UN Forum on Forests (UNFF), UN Framework Convention on Climate Change (UNFCCC), UN Convention on Biological Diversity (UNCBD), etc.

In order to continue disseminating up-to-date technical and policy information to different groups of stakeholders, the Working Party must constantly cope with emerging issues of global importance. This is the case of climate change and increased hazards in mountain watersheds. Global warming is affecting vital mountain resources and in turn will negatively impact on the socioeconomic situation of mountain people. The Working Party is engaged in raising awareness on these issues, by assessing and disseminating state-of-the-art knowledge and strategies of adaptation to climate change. Acquainted with the most recent national and international institutional developments and the achievements at the level of field projects as well as with the global development priorities in an exchange with countries beyond Europe, the Working Party always keeps an active reflection alive on the impact of its activities and their relevance to respond to emerging country needs.

The Working Party recently initiated a major review of its mandate and modus operandi, in order to address strategic issues such as the positioning of the group within the evolving institutional landscape in Europe and the appropriateness of the current vision, mission and topics dealt with. The exercise is conducted through a desk review and direct consultations with the focal points of member countries and key partner organizations. The findings of the review show a strong interest from some member countries to expand the mandate of the Working Party to cover forests and water issues and to enhance the focus on disaster risk management in mountains, particularly in the context of climate change. The EFC will consider the outcomes of the review, provide guidance and make recommendations for the future direction of the Working Party. The work of the group will feed into the Strategic Plan of the Integrated Programme of Work on Timber and Forestry of the UNECE Timber Committee (TC) and FAO EFC for the period 2014-2019.

The Working Party, its biennial sessions, the inter-sessional activities, the continuous exchange between professionals from Europe and other regions of the world confronted with similar issues, the passion and dedication of its members to disseminate the findings of their work, all these ingredients are at the base of the present publication. The Working Party provided the opportunity to the numerous authors who contributed to this publication, i.e. experts belonging to different and complementing sectors, to know each other and exchange on a regular basis up-to-date information and case studies. Products like this publication, for which the Working Party provides an institutional framework, represent the added value of a technical, long-standing network such as the EFC Working Party on the Management of Mountain Watersheds.