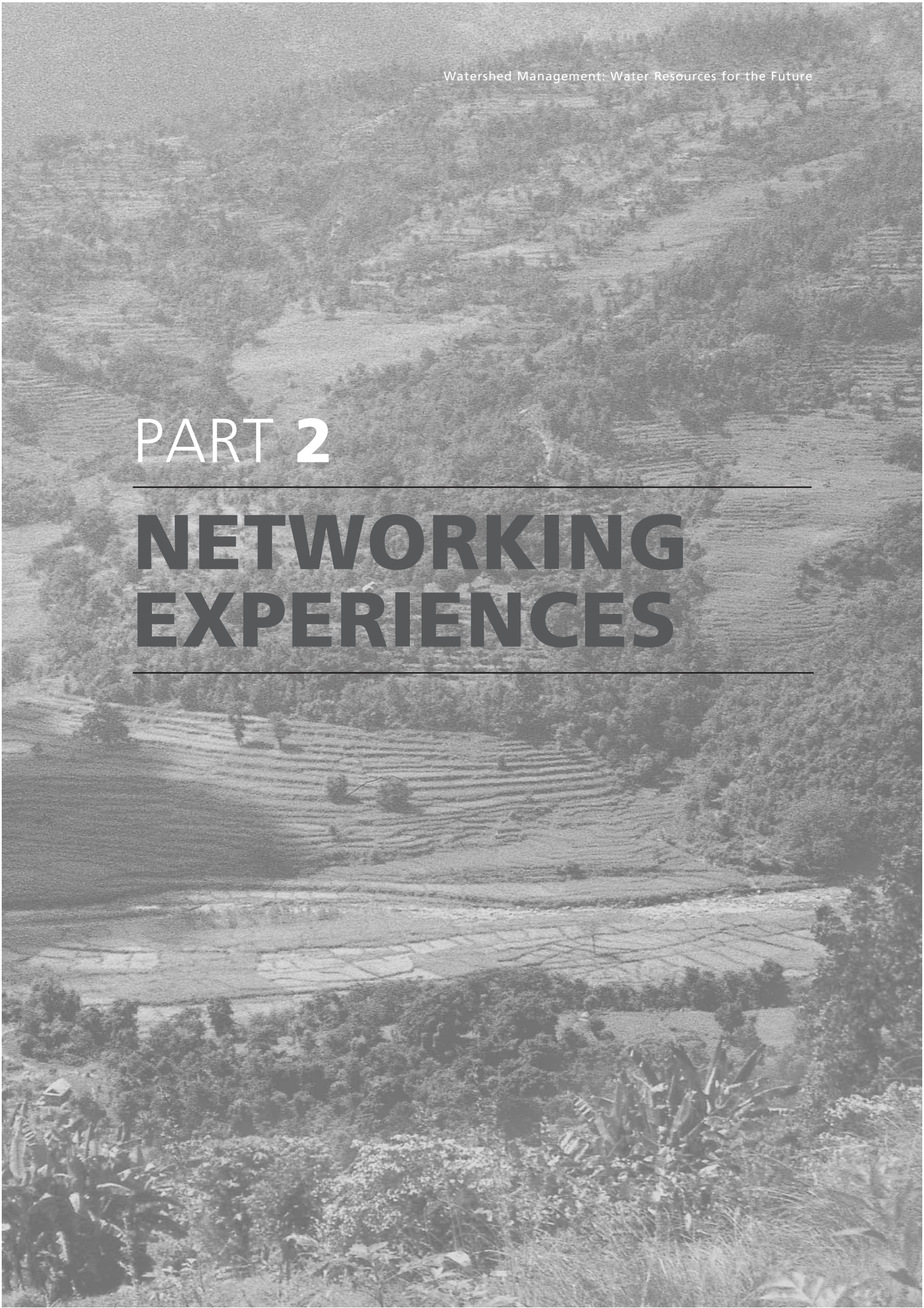


PART 2

NETWORKING EXPERIENCES

CHAPTER 7
INTEGRATED WATER RESOURCE MANAGEMENT OVER THE WORLD

Gilles Neveu
Office International de l'Eau

INTERNATIONAL NETWORK OF BASIN ORGANIZATIONS

The International Network of Basin Organizations (INBO) was established during the constitutive assembly in 1994 at Aix-les-Bains, France by organizations whose common goal was to implement integrated basin water resource management. The organizations made a voluntary act of joining the charter, which was adopted in 1996 at Morelia, Mexico and then confirmed at the following general assembly meetings in Valencia, Spain (1997) and in Salvador, Brazil (1998).

INBO's members established an association governed by the French Law of 1 July 1901 and the Decree of 16 August 1901 in accordance with the following statutes. Its headquarters is located at the Permanent Technical Secretariat in Paris.

INBO's objective is to promote integrated water resources management at the level of river basins as an essential tool for sustainable development. According to this objective, INBO endeavours to:

- develop lasting relations among the organizations interested in such comprehensive management, and favour exchanges of experiences and expertise among them;
- facilitate the implementation of tools suitable for institutional and financial management, for knowledge and follow-up of water resources, for the organization of databanks, and for the concerted preparation of master plans and action programmes in the medium and long terms;
- develop information and training programmes for local elected officials, users' representatives and the different stakeholders involved in water management, as well as for the executives and staff of the organizations in charge of water management at the river basin level;
- encourage education of the population regarding these issues;
- promote these principles in international cooperation programmes;
- evaluate ongoing actions initiated by the member organizations and disseminate their results.

The term "important river basins" means the catchment areas of rivers and lakes, including their aquifers and the catchment areas of their various small tributaries.

The following legal entities may be members of INBO:

- basin organizations – i.e. organizations that have been entrusted by relevant public administrations with integrated water resources management at the level of important river basins, either national, federal or transboundary, as well as the cooperation structures they have developed among them. These organizations must be entrusted with a mission of

public interest, have legal existence and their own budget, in accordance with national or federal legislation or international agreements in force;
- the governmental administrations in charge of water management in the countries that apply or are interested in applying integrated and sustainable water resources management: organized at the level of river basins; associating administrations and local authorities, as well as users from the various sectors; having specific budgetary resources at their disposal, obtained by applying the "user/polluter-pays" principle;
- bi- and multilateral cooperation agencies supporting activities related to integrated and sustainable water resources management at the level of river basins.

The Permanent Technical Secretariat of the Network is operated by the Office International de l'Eau.

For developing and strengthening river basin organizations, INBO and the Global Water Partnership develop an associated programme, the goal of which is to support all initiatives for the organization of integrated water resource management at the river basin, lake and aquifer levels, whether national or shared. It also aims to develop many experiments to reconcile economic growth, social equity, environmental conservation, water protection and the participation of civil society.

Output 1: Twinning of existing, future or pilot basin organizations

Purpose: To allow direct cooperation for stimulating and supporting water management at the river basin level.

Proposed services:

- direct exchanges of experiences among twin basin organizations;
- regional and international promotion;
- exchange of decision-makers and technicians.

Output 2: Mobilization of professional support capacities in existing basin organizations

Purpose: To promote the setting-up and development of new basin organizations and assist with their management options. To help, on request, progress in this long process of discussion, reflection, dialogue and decision-making undertaken at the level of river basins, or at the national or regional level. These teams may be broadened to include experts from international organizations.

Proposed services:

- assistance with the implementation of institutional reforms;
- initiation of pilot projects;
- support to several countries sharing a transboundary river basin;
- design of monitoring networks and databases;
- training of personnel from basin organizations;

- assisting new basin organizations with the setting-up of technical teams;
- formation of partnerships and establishment of institutional mechanisms allowing equitable citizens' participation in the decision-making and activities of basin organizations.

Output 3: Synthesis of available knowledge and expertise

Purpose: To collect and analyse actual practices in order to generate ideas and recommendations, and to promote practical guidelines for putting integrated river basin management into practice. To promote the initiation of pilot projects and implementation of institutional reforms in interested countries.

Proposed services:

- assessing the performances of the different systems;
- contributing to the improvement of knowledge and expertise in the area of basin organizations and integrated water resources management;
- making available a set of common, easily accessible and measurable performance indicators, in a typological form;
- training in good practices.

Output 4: Networking of water documentation systems

Purpose: To exchange knowledge about water resource management at the river basin level. To allow all INBO members and possible partners to share and exchange institutional documentation.

AQUADOC-INTER aims to:

- manage water-related information in a comprehensive and coordinated manner;
- make an inventory of all information networks, and develop lasting links;
- develop common meta-crawlers to address queries to all existing networks;
- build multilingual tools, dictionaries and glossaries, norms and consistent grids for classifying the information;
- organize specialized workshops.

AQUADOC-INTER is already being implemented in Latin America and Europe. In the Mediterranean, EMWIS involves the 27 country signatories of the Barcelona Convention.

Proposed services:

- exchange of information and documentation;
- assistance with the structuring of national relay documentation centres, responsible for validating, collecting, storing and accessing knowledge useful for water management in each country concerned;
- services to professionals and decision-makers to provide them the most appropriate information and documentation.

PROJECTS SUPPORTED BY INBO

TWINBASIN^{XN}: Promoting Twinning of River Basins for Developing Integrated Water Resources Management Practices

A basin organization (BO) is generally regarded as one of the best solutions to adopt for developing integrated water resources management (IWRM) at the catchment level.

There have then been many types of BO, some of them existing for several decades, and many in the process of development. They present a great diversity of legal statutes and economic schemes. None of these examples can be regarded as a model, but by facilitating direct exchanges on best practices, as well as on failed experiments, twinning can help BOs to improve their effectiveness: BOs can profit from peers regarding administrative, technical and institutional matters, or a quicker diffusion of the research outputs in real life.

The main goal of TWINBASIN^{XN} is to support effective use of research and development in the field of IWRM by promoting the twinning of BOs. This will be achieved by creating a worldwide forum dedicated to identifying and sharing knowledge and best practices.

A Memorandum of Understanding (MoU) takes the form of a cooperation framework signed by a wide range of organizations, both public and private, which have an interest in the deployment of IWRM practices. It is a voluntary agreement, entered into by organizations that are prepared to be active participants in developing consensus on issues of common interest, and that are willing to commit both human and financial resources for this purpose. This MoU implies public commitments from signatories to cooperate in the production of recommendations and guidelines for developing twinning and related services by cooperating in the specification of twinning activities – exchange of information, exchange of personnel – and of common knowledge representation systems and dissemination practices. The project will support staff mobility between twinned BOs.

The initial partnership gathers 18 participants, but is forecast to expand to up to 150 MoU signatories involved in the exchanges after 48 months.

The project is financially supported by the European Commission within the Sixth Research Framework Programme.

IWRM.Net: Towards a European-wide Exchange Network for Improving Dissemination of Integrated Water Resources Management Research Outcomes

The objective of this project is to check the feasibility and prepare a proposal of an ERA-Net project (coordination activities to prepare the European Research Area[ERA]) on IWRM at a European scale (including candidate countries), from the point of view of the implementation of the Water Framework Directive (WFD). The potential of including other countries (in particular Newly Independent States [NIS] and Africa) within the framework of the European Water Initiative (EUWI) will also be examined.

The proposed project will consist of:

- identifying and describing all the national programmes that are related to IWRM in the concerned countries;
- locating sources of information of recent and current projects;
- identifying and contacting the people in charge of these programmes;
- organizing a workshop for these programme managers to prepare the basis of long-term collaboration, as a basis for the ERA-Net proposal;
- proposing new ways of reinforcing dialogue with stakeholders, in order to develop more demand-driven research and better dissemination of outputs;
- preparing the ERA-Net proposal.

In each selected country (between ten and 15), a monograph will be prepared according to a common framework, defined by a Steering Committee made up of eight INBO member representatives, progressively opening up to national or local people in charge of the identified research programmes.

A workshop will join together about 50 invited research programme managers (one to three per country), to improve and validate proposals for action prepared by the Steering Committee from an holistic analysis of the country reports. This creativity workshop will define the working rules of a future exchange network ready to support synergies among programmes and the better valorization of their outcomes at the practitioner level.

This nine-month project is financially supported by the European Commission within the Sixth Research Framework Programme.

WFD-Community: Virtual Learning Community for Water Professionals

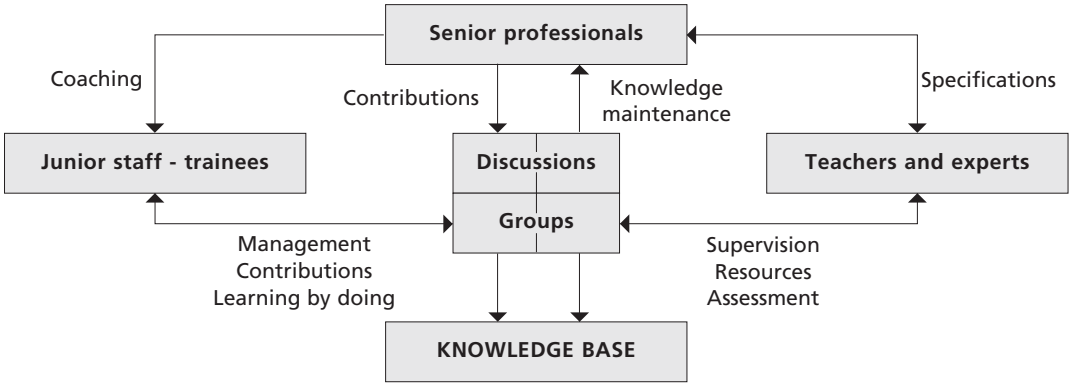
The project consists of creating a continuous education and training scheme for water professionals, based on collaboration among peers, working together on the implementation of the Water Framework Directive (WFD), through a virtual learning community (VLC).

The target public gathers junior and senior executives from basin organizations – members of INBO at the European level who are responsible for the implementation of the WFD to help them to “learn by doing”.

The VLC will help to train the junior managers in charge of integrated water management, by backing them with the experiences of senior staff, either as tutors or as contributors to exchanges, who will thus bring to the young people their knowledge and expertise (both formally and informally), while updating their own knowledge.

A group of 20 trainees (junior staff) will be divided into working groups, each with the responsibility for covering one aspect of the WFD. Group leaders will distribute tasks among the individuals, organize exchanges, moderate fora, synthesize the various contributions, bring complementary elements to the exchanges (documents, testimonies, case studies, etc.) and organize virtual conferences via Internet with ad hoc experts – all actions that make it possible to improve the quality of work.

FIGURE 1
Functioning of the VLC



Each individual trainee will contribute to all groups, prepare inputs on sub-topics and prepare monographs on the implementation of WFD in various contexts. Group discussions will be widely open to senior professionals, so that theories can be compared with hands-on practice.

The role of the teachers will be to define the course path and milestones, supervise the exchanges, guide the students and help them to analyse the external inputs, provide additional resources if needed, and assess the results to validate acquired knowledge. Each group will profit from the coaching of a senior member; it will basically be a matter of guiding the group in reflective analysis of its own work, and helping it to mobilize complementary resources.

The various contributions will be capitalized to feed a base of knowledge for future users. The technological system will be multilingual and include a translation program. The partnership includes basin organizations, universities and water training centres.

This 36-month project is supported by the European Commission within the Leonardo da Vinci programme.

CHAPTER 8
INTEGRATED WATERSHED MANAGEMENT AND FORESTS

Pier Carlo Zingari
European Observatory of Mountain Forests (EOMF)

WHY INTEGRATED WATERSHED MANAGEMENT AND FORESTS?

Since Rio's United Nations Conference on Environment and Development (UNCED) in 1992 a close link has been established at the international level between watershed management, forest and forestry. Indeed, processes such as the United Nations Forum on Forests (UNFF) or, at the European level, the Ministerial Conference on the Protection of Forests in Europe (MCPFE) have been contributing to draw attention to cross-sectoral and integrated approaches to forests, including – among other issues – water resources.

There is no objection to the fact that although forest cover may have different interactions with water regimes, efforts in forest conservation and sustainable management lead to overall positive effects on the watershed, both on the environmental components, such as soil, biodiversity or water quality conservation, and on the socio-economic aspects, such as the diversification of revenues, employment, food alternatives and livelihood opportunities.

Therefore, whenever we think watershed and water we are not wrong in thinking forests and forestry. This is one of the reasons why countries from all over the world recently requested FAO to establish a permanent entity devoted to water and forests in order to meet technical needs on this key issue.

The European Observatory of Mountain Forest (EOMF) has been operating since 1996 on the exchange and feedback between local forest actors and national and international bodies over a wide range of issues: watershed management is one of the priorities. Although definitions may vary, watershed management affects and benefits a number of local actors and relies on the shared responsibility of a number of non-local actors: the European Union uses the term "subsidiarity" to express the sharing of responsibilities among various levels, and we may want to use the term "solidarity" because work on watershed management is a common issue, with common responsibilities and common benefits. By "common" we refer to the upstream–downstream relationships, and also to the relationships among different sectors of society. Much can be learned by making available experiences in Europe and ensuring that exchanges of experiences can be done effectively, both in time, with a retrospective look to the past, and in space, by communicating national and sub-national initiatives. At the same time, the experience of other regions of the world can help to reorient the approaches in Europe.

INTEGRATED WATERSHED MANAGEMENT AND FORESTS INITIATIVES

Given the issue raised by this conference, it is our aim to bring here a few forest-related examples of the work going on with reference to integrated watershed management and water resources:

- ***FAO/European Forestry Commission Working Group on the Management of Mountain Watershed – WG-MMW.*** This is a 52-year-old group dealing with exchange among countries of their experiences and progress in watershed management. It has become evident during recent decades that technical aspects, be they engineering, hydrological or ecological, require sound communication, open debates and involvement of local stakeholders. WG-MMW is currently investigating some 40 governments in Europe regarding different aspects of watershed management: the first outcomes show a growing interest in the issue beyond sectoral and geographical borders. To give just one example, the Netherlands is turning its interest to mountainous countries in order to know more about policies and practices in watershed management that may affect water and risks downstream.

- ***IUFRO Task Force on Forests in Sustainable Mountain Development.*** The International Union of Forest Research Organizations (IUFRO) has been developing a cross-sectoral Task Force on Forests in Sustainable Mountain Development. After a first phase, concluded in 2000, the current work is concentrating on water-, watershed- and risk-related management in both research and practice.

- ***International Consultation on Mountain Forests 2002, Navarra, Spain and Iraty, France.*** This consultation took place on mountain forests at the global level. There was a strong consensus on considering forests not as isolated ecosystems, but as part of a larger land-use system. Forests appear as necessary but not sufficient in watershed management. Forests require rehabilitation with special attention to lands with low cover, high erosion levels, low revenues and employment or strong poverty patterns. The highest rates of deforestation and forest degradation are found in mountain areas in developing countries. Effective tools have been identified by participants in multistakeholder alliances, coalitions, partnerships, agreements and contracts.

- ***Shiga Expert Meeting Declaration, Japan, 20 to 22 November 2002.*** Among the important issues identified, this expert-level meeting raised the issues of: holistic approaches to forest and water management; improved understanding of the biophysical interactions between forest and water; improved understanding of the cultural and socio-economic impacts of policies and practices; development of mechanisms for managing upstream and downstream interactions; and better dissemination of scientific knowledge.

- ***Chambéry Workshop on Forests and Water, France, 5 to 6 June 2003***. A major recognition reached at this meeting is that continuous and determined efforts are needed to integrate the management of forests and water. These efforts are better supported by: a watershed perspective; participation and cross-sectoral mechanisms; full valuation of water-related services; national and sub-national policies; solidarity among countries; and improved datasets for use in monitoring progress.

CONCLUDING REMARKS

Watershed management is one of the oldest socially organized, economically based and culturally driven human activities. Indeed, where I was born, in Rome, Italy, I could benefit from the work done by my Etruscan and Roman ancestors on soil conservation, drinking- and sanitation water availability by means of the well-known aqueducts, and on land-use harmonization through the system of "centuriae", i.e. pieces of land structured according to their value, use and administration patterns.

Integration and participation in watershed management require dynamic and process-like tools, such as communication skills, capacity building and training programmes, contract-based and multisectoral management of resources versus planned and sectoral approaches, governance as an operational and not a conceptual instrument, and dataset development and availability.

Forests are a key component in watershed, water and risk management. Forests are preventive tools in watershed management. Even when low forest or no forest cover occurs, rehabilitation of a minimum level of forest should be considered as a watershed management tool. On the other hand, when there is forest cover, it should be considered as a necessary but not sufficient element of a complex patch-dynamic system, i.e. one element of a mosaic-like system.

CHAPTER 9
THE CANADIAN MODEL FOREST CONCEPT

Peter Besseau
Executive Director, International Model Forest Network Secretariat

Superficially, the relationship between model forests and integrated watershed management is not immediately apparent. Admittedly, the words "model" and "forest" would not naturally lead to such a connection. To clarify, model forests are not exclusively about modelling or forests, *per se,* although they can include the former and always include an important component of the latter. Rather, model forests are chiefly about people, and their current and future relationship with the landscapes that support them in many different ways. Most model forests have major elements of, or even complete, watersheds within their boundaries while several – in China, Chile, Costa Rica, the Philippines and the Dominican Republic – are deliberately watershed-based and contain significant water management values in their action plans.

What model forests are, essentially, is a process to translate policies of sustainable forest management into practice, on a large scale and for the benefit of all stakeholders, from communities to national policy-making bodies. They do this at an operational level on a specific land base (often a watershed or sub-watershed) through voluntary, locally based partnerships of stakeholders who jointly agree on a process to:

- develop a shared, locally relevant vision of sustainability;
- define goals, objectives and strategies for working towards it;
- agree on specific actions and activities in support of it;
- work together to achieve it.

The idea of model forests can be traced to the early 1990s and a point of intersection of multiple unanswered questions that served as a barrier between policy and practice in the field of sustainable forest management (SFM): If no single actor or agency is capable of achieving sustainability, how do we organize ourselves to create an effective consortium of interests, and pool resources to make lasting progress? If we are obligated by necessity to integrate disciplines and sectoral plans and strategies, how can we go about this at the operational level? If those who challenge traditional planning and management processes are to be included, how can they be brought in constructively and what – if any – concessions are needed from those who have traditionally wielded power over such issues?

Not only had this latter situation of "we and they" been a source of conflict over resource planning and management, but the continued failure to address it also meant that often very valuable options, ideas and views were neglected or, worse, misunderstood, misrepresented or unknown. There were other reasons as well: the need to devise a functional feedback loop between the field and the policy level; a need to scale-up local advances and extend and adapt innovations elsewhere; a need to see sustainability as an approach or process, rather than a

project; and a need to devise instruments to share and network field-level and policy advances with those who were ready and willing to use them.

But, if we were to pare down the question of what explains the emergence of model forests to its most elemental it might simply be that model forests were needed to answer the very important question that arose from many years of talk, workshops, seminars, debate, experimentation, research and proceedings: now that we have agreed on the fundamental policy lines for framing SFM what – operationally – are we supposed to do? That is, what – as woodlot owners, regional administrators, educators, communities, industry and other players who influence and are influenced by resource planning and management – are our roles, what are our options, what are our opportunities and obligations? How do we get from here to there?

In much of the above – the people issues, the need for integration and so forth – the difference between model forests and integrated watershed management is one of weight and emphasis. While in the former we will expect forest resource values to be dominant, in the latter the chief management value and objective will be water. In between these we find an extremely high complementarity of issues at play, and a need for a similar, people-centred process to guide and improve decision-making to safeguard both the resources in question and the communities that depend on them.

BACKGROUND AND DEFINITIONS

Since emerging in Canada in the early 1990s, where a national network was established, the International Model Forest Network (IMFN), which is a separate entity from Canada's own network, has grown from three sites to 20, and from two countries, as well as Canada, to nearly 15. The core following defining attributes that make up a model forest have not changed measurably since the concept was first introduced:

- based on an inclusive, locally based partnership;
- stakeholder commitment to SFM;
- large enough in scale to capture all of the values and uses represented in a landscape;
- a programme of action representative of stakeholder values;
- a governance structure that is transparent, representative and accountable;
- a commitment to networking at all levels – from the local to the international.

These minimum defining attributes allow considerable flexibility for each site to develop a locally relevant programme of SFM while maintaining sufficient commonality to support networking opportunities from local to global levels, regardless of ecosystem type, history of resource use, administrative system or stakeholder dynamics. In practice, it has been discovered that while no two model forests – even within one country – are alike, there is significant overlap in both the types of problems being addressed and the tools used to address them. Out of this, multiple opportunities have emerged to share and accelerate the introduction of specific advances, views, methodologies and approaches.

Two further observations are helpful in describing what a model forest is. First, model forest partnerships do not remove any authority over land-use planning or management from tenure holders. While this might appear at first to relegate a model forest partnership to the status of

a debating club, with resources to support action and broad common goals, it has instead proven to be its strength. Model forest partnerships have developed largely as constructive, neutral fora where non-traditional players can work together, horizontal linkages can be established and specific action can be agreed. Second, in the absence of technical and scientific rigour and a context of SFM, model forests could easily become convenient packaging for unrelated projects, however, the actions and activities decided on by the partnership must be technically and scientifically sound and based on a strategy of achieving SFM.

As noted above, model forests originated in Canada at a time of high-level conflict in the Canadian forest sector. Following a promising start, Canada announced the IMFN at the Rio Conference in 1992. Subsequently, the IMFN Secretariat, was "incubated" at the Canadian Forest Service until 1994, and has been located at the International Development Research Centre (IDRC) since 1995. IMFN's first regional centre was launched in October 2002, hosted by the United Nations Development Programme (UNDP), Santiago de Chile, and work is now under way to develop options for a similar centre for Asia, with inroads also being made in Central Africa.

Today, including Canada's 11 sites, the network consists of some 30 sites established or under development in 14 countries, across five continents. Their aggregate land-base is approximately 28 million ha, and there are currently several additional countries actively exploring model forest development within IMFN. What this adds up to is a unique and potentially very powerful global community of large-scale platforms, well supported by policy, research and science, and implementing virtually all aspects of SFM through a common partnership-based approach.

While the Secretariat is supported by a consortium of Canadian Federal agencies and departments, a large array of institutional donors and collaborators have supported model forest development through parallel support from numerous bilateral and multilateral collaborators at the regional and site levels. These have included FAO (Asia, Africa and Latin America), UNDP (host institution for the Regional Model Forest Centre for Latin America and the Caribbean, in Santiago, Chile), UNDP-GEF (through a global partnership agreement on co-location and joint networking), CUSO (in Latin America) and site-level support provided to individual model forests by the International Tropical Timber Organization (ITTO), the United States Department of Agriculture (USDA) Forest Service, the Japanese International Cooperation Agency (JICA), the Japan Forest Agency and many others. In addition, the model forest partnerships themselves are engaged in regional- and global-level networking. The Canadian network alone represents within its 11 sites more than 400 partner organizations. Fundamentally, however, model forests must be country/demand-driven, with country- and site-level partners fully invested in the risks and dividends of the effort. This investment shows itself in the form of political will, direct and in-kind resources, and participation.

WHAT DO MODEL FORESTS DO?

Model forests typically operate as registered not-for-profit organizations. Their activities can be broadly set in two areas: support to the partnership, and delivery of the programme identified by the partners. On the operational side of things this typically means that a small staff and supporters will work to develop and maintain the partnership, facilitate strategic and

operational planning (defining SFM in locally relevant terms and describing goals, objectives and activities from it), mobilize resources and manage information and data, as well as documentation, analysis and reporting.

At the level of programme and project delivery, the model forest organization is responsible for elaboration of a balanced programme that reflects the priorities identified by the partners, and feeds into a broader strategy for SFM. The priorities vary in ranking from one model forest to the next, but the core group of themes is highly consistent among all model forests. Generally, many of the following issues will be found among a given model forest's programme objectives:

- best forest management practices (a broad group of initiatives);
- criteria and local-level indicators of SFM;
- economic development/poverty alleviation;
- issues of partnership, governance and conflict mitigation;
- integrated planning and management;
- GIS applications;
- demonstration, training and capacity building;
- link and feedback between the policy and the operational levels;
- leveraging of resources.

SOME LESSONS LEARNED

Model forests have been operational for more than 12 years in Canada. Internationally, some have been active for nearly a decade, but most for no more than five years. As such, this latter group is only now maturing in terms of cohesiveness within its members' partnership groups and impacts. Perhaps the most important conclusion that has been reached is also the most fundamental – the concept works. The concept/approach is valid across ecosystems, forest types and administrative circumstances. To the extent that a successful integrated watershed initiative must create effective partnerships with local stakeholders, integrate planning and management, and maintain a high technical and scientific quality, the following lessons learned from model forests may be of value. Most of the lessons learned will seem familiar. But what the model forest network possesses, and what I believe is unique, is an operational mechanism – a highly varied "how to" of experiences around the world in the areas of SFM at an operational level – which are available to be shared with those who can benefit from them:

- Local communities, including traditionally marginalized groups such as indigenous peoples, can and should be made full and active contributors to SFM.
- Partnerships take time to demonstrate their net worth – often about three years.
- SFM must demonstrate benefits that are tangible, relevant and timely, particularly to local stakeholders and particularly in the area of sustainable economic opportunity.
- Networking works, but only with resources, a deliberate strategy and clear self-interest from the beneficiary groups.
- The overall effort needs to fit with national objectives and must be country-driven, particularly as policy impacts are an objective.

- SFM is a process, not a project: this poses challenges for funding agencies whose typical time horizons are too short and whose evaluation standards are not equipped to deal with the so-called "soft" (people) issues of sustainability.
- In all cases a "champion" or "champions" have been required in order to help chart the course and attract resources and political support.
- National and lower levels of government must see themselves as primary enablers, investors, participants and beneficiaries in the process.
- Partnership without resources is a debating society – these efforts need money.
- Governments tend to be among the first beneficiaries of the work of model forests, as it allows different government departments an open door to collaborate and share with one another.

Much of what we have learned in the IMFN has application to watershed management issues.

ROLE OF THE SECRETARIAT

The IMFN Secretariat plays a critical role in facilitating the work of model forests around the globe. It provides the central day-to-day coordination of support and development services to the network, works to strengthen and expand the network and, at the site level, supports new and existing model forests in the following areas:

- networking among sites and regions (transfer of technology and expertise);
- assistance in resource expansion;
- technical and logistical issues in establishing and operating model forests;
- communications, advocacy and outreach;
- targeted programme support (as available);
- documentation;
- monitoring and evaluation (with partners).

While each model forest differs from the others in its history of land use and the management concerns it faces, there are a range of common issues of special significance to the Secretariat, including:

- partnership development and capacity-building;
- poverty alleviation and economic diversification;
- measuring and assessing progress towards SFM;
- development and demonstration of best forest management practices;
- monitoring and evaluation;
- good governance and support for civil society;
- conflict management;
- integrated resource planning and management.

Support to model forests comes through regional and global meetings, training and extension work, specialized workshops and the dissemination of information. While the Secretariat is not a grant-making institution, it does manage a small programme fund earmarked for issues and areas of high priority.

CHAPTER 10
IUFRO AND WATERSHED MANAGEMENT: THE CHALLENGES BETWEEN RESEARCH AND APPLICATION

Gernot Fiebeger
EFC/WP

Human society and its research have always been in close relation to forest and watershed management. Forests and water have always been reflections of society. Multifunctional forest and watershed management should be practised and considered on an international scale. As a result of historical development small-scale ownership structures prevail in the European Union (EU), family forest farms and family water plants play a decisive role in this respect.

For centuries, forestry and watershed management have been a crucial element in the development of rural and mountain regions.

The global discussion on sustainable development of mountainous regions focuses in particular on forests and water resources. This is the challenge between research and application, where sustainability originates. Not to take more from the earth than it offers from natural regrowth and renewal, to extend planning periods over several generations and to show a sense of responsibility when optimizing the effects on the area are important guidelines that must also be considered in other fields of economy and policy.

By means of appropriate services and improved public relations, the challenges between research and society in forests and water can make important contributions to sustainable mountain development. Cooperation between society administration research and education assists in making knowledge available beyond the circle of forest and water, forestry and watershed management.

The high water retention capacity of forests is of vital importance for a well-balanced water cycle, and therefore for watershed management. The high bonding capacity with respect to dew, hoarfrost and fog drops, and the slowing down of snowmelt in spring are to the benefit of protection against natural hazards and of water utilization. However, forests and water are also in a close ecosystemic relation.

Humans' freshwater supply has always been a great challenge, particularly in urban centres. Lack of watershed management, e.g. polluted water from wells, has been responsible for the course and spread of a number of epidemics.

Water pipes running over great distances from forests to people's homes have been known since Roman times, including in the Alps. Even then, bridges made of stone – so-called aqueducts – overarched whole valleys as part of water piping systems. Until the beginning of

modern times, simpler and shorter water supply systems were often made of joined wooden pipes. In this way, the water reached the settlements, and wells, most of which were situated in central places, became the heart of social life. However, wooden constructions were also indispensable for scooping water from groundwater wells.

At the moment, only 3 percent of the available water resources are exploited in the central Alps. There is hardly any other region on earth where the positive interaction between watershed management and forests and water is so clearly visible, as can be proved by the excellent quality of drinking-water of Alpine regions.

As early as 1864, large cities such as Vienna purchased large forests in the mountains, and managed them with special consideration of the water supply and yield and of spring protection. The identification of water protection areas and water sanctuaries according to applicable modern water legislation is frequently based on the positive effects of forests. This has to be mentioned during the Year of Freshwater, 2003.

Torrents, brooks and rivers have not only been exploited as suppliers of drinking-water, but the power of running water, utilized by means of wooden water wheels, was the strongest and most important driving force for centuries, e.g. for mills, sawmills, hammer mills and many other trades. Later, the turbine for energy generation was developed out of the same technique. This marked the beginning of modern watershed management, which today is of great importance to all countries.

As the famous German poet J.W. Goethe puts it: “Everything originates from water. Everything is maintained by water.”

IUFRO CRITERIA AND INDICATORS FOR PROPER AND SUSTAINABLE WATERSHED MANAGEMENT, FORESTRY AND LAND USE

Sustainability

At the Second Ministerial Conference on the Protection of Forests in Europe, held in Helsinki in 1993, sustainable watershed and forest management was defined as follows:

> The stewardship and use of watersheds and forest land in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality, and their potential to fulfil, now and in the future, relevant ecological, economic, and social functions at local, national and global levels, and that does not cause damage to other ecosystems. This definition, which is generally accepted in Europe, takes into consideration the multifunctionality of the forest and the striving for sustainable development by nature and the economy. In order to reach that goal, the European watershed management and forestry policy must be oriented toward a seminatural watershed and forest management. It has also been given high priority in the Council Resolution on a forestry strategy for the European Union. (*Official Journal C 56* of February 26, 1999, p. 1)

WATERSHED AND FOREST RESOURCES AND PRODUCTIVE FUNCTIONS

Special importance is attached to the economic effect of watershed resources and forestry. Wood constitutes an important raw material for many economic areas, and thus safeguards many jobs in rural communities. Wood helps to reduce the consumption of fossil fuels, and thereby the CO_2 emissions and consequent impacts on the climate related to them. Sustainable watershed management guarantees that this basis of raw materials is not exploited in either quantitative or qualitative terms.

Socio-economic function

A healthy and appropriately tended watershed can bring about multifarious benefits. However, in order to render all the services desired by the public (balancing the climate and the hydrological budget, regenerating air and water, protection from natural hazards, recreation, nature protection) to the necessary extent, measures need to be covered from the profits made from forests. By means of appropriate compensations and directed subsidies, watershed management policy aims at ensuring the necessary management. Additional protective measures are taken by means of erosion control and natural disaster management. With the programme on rural development, which was approved in summer 2000 by the EU, measures to promote watershed management have also been included in the rural development scheme, and are co-financed by the EU. Priority is given to measures that have a favourable effect on the maintenance and enhancement of a healthy environment. The promotion of watershed management is accompanied by continuous information and public relations work. This is a basic requirement to ensure knowledge and understanding of watershed management and forests. Knowledge and understanding, in turn, are the basis for creating awareness of the complex interrelations in watersheds and forests, and the interactions between ecology and economy. Fundamental prerequisites for sustainable watershed management and forestry are high-level research, training, and further training and once again training. The existing institutions in this field are currently subject to considerable restructuring and reorganization processes aimed at increasing efficiency, complying with the standards of state-of-the-art technology, and coping with international competition.

Health and vitality

External influences such as air pollution, excessive game population, tourism and forest pastures result in environmental burdens on the ecosystem at a regional level. However, they do not in general pose an existential treat to the forest. The monitoring of the watershed and forest condition takes place mainly by means of permanent European-wide investigations such as European Forest Inventory and European Watershed Management Monitoring and the European Watershed and Forest Damage Monitoring System.

A large-scale dying of forests as feared in the 1980s should be prevented in Europe by means of measures in the fields of watershed and environmental and forestry policy. However, the European Watershed and Forest Damage Monitoring System could show that there is still a high level of pollution and underlines the need to continue with a consistent watershed management and forestry policy.

Problems are arising first and foremost where several weakening factors coincide. The situation is particularly unfavourable in protective forests and protective watersheds. In these sensitive watersheds and forest regions, efforts towards stable land use and forest stands are often rendered more difficult by ageing, damage caused by game and grazing stock and tourist activities.

Biological diversity

Studies have confirmed that it is possible to preserve a high degree of naturalness of watershed ecosystems by means of a sustainable forestry and land use adapted to the natural site conditions. Natural forest reserves are forested land that is left for free development of the forest ecosystem, where no direct intervention takes place except for game management. The natural forest reserves programme should be developed for Europe as an important contribution to the maintenance and enhancement of forest biodiversity on the basis of research, teaching and education.

Further measures aiming at the maintenance of biodiversity in general, and of genetic diversity in particular, are gene reserve forest, clone archives and seed orchards.

Protective functions

The conservation of the living environment in mountain areas depends considerably on a healthy forest stand, because this is the only way to ensure the necessary protection and the desired recreational opportunities. According to the classification of some Alpine forest inventories only 60 percent of the sampling plots of protective forests (without dwarf pine and green alder areas) are described as stable. In the Alps, large parts of the protective forest areas are identified as overmature and patchy. All in all, forest inspection of the central Alpine part of Austria only has identified about 165 000 ha of protection forests, designed for the protection of special objects, as being in urgent need of sanitation.

These are forests with a direct protective effect on settlement and transport routes, which are located in catchment areas of torrents and avalanches or in hazard zones, and which are in a bad condition with respect to their protective function. As far as these priority areas are concerned, rehabilitation measures are indispensable. Therefore, new strategic concepts should be elaborated on the safeguarding of the protective effect of the high elevated protective forests, in order to increase the efficiency of the implementation of current measures.

Criterion 1: Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycle

- area of forest and other wooded land and changes in area (classified, if appropriate, according to forest and vegetation type, ownership structure, age structure, origin of forest);
- changes in: total volume of growing stock; mean volume of the growing stock on forest land (classified, if appropriate, according to different vegetation zones or sites classes); age structure or appropriate diameter distribution classes.
- total carbon storage and changes in the storage in forest stands.

Criterion 2: Maintenance of forest ecosystem health and vitality

- total amount of and changes over the past five years in depositions of air pollutants;
- changes in serious defoliation of forest using the UN/ECE and EKU defoliation classification (Classes 2, 3 and 4), over the past five years;
- serious damage caused by biotic or abiotic agents: severe damage caused by insects and diseases with a measurement of seriousness of the damage as a function of (mortality or) loss of growth; annual area of burnt forest and other wooded land; annual area affected by storm damage and volume harvested from these areas; proportion of regeneration area seriously damaged by game and other animals or by grazing;
- changes in the nutrient balance and acidity over the past ten years (pH and CEC), level of saturation of CEC on the plots of the European network, or of an equivalent national network.

Criterion 3: Maintenance and encouragement of productive function of forest (wood and non-wood)

- balance between growth and removals of wood over the past ten years;
- percentage of forest area managed according to the management guidelines;
- total amount of and changes in the value and/or quantity of non-wood forest products (e.g. hunting and game, cork, berries, mushrooms, etc.).

Criterion 4: Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems

- changes in the area of: natural and ancient semi-natural forest types; strictly protected forest reserves; forests protected by special management regime;
- changes in the number and percentage of threatened species in relation to total number of forest species (using reference list e.g. IUCN, Council of Europe or the EU Habitat Directive);
- changes in the proportions of stand managed for the conservation and utilization of forest genetic resources (gene reserve forests, seed collection stands, etc.); differentiation between indigenous species and introduced species;
- changes in the proportions of mixed stands of two to three tree species;
- in relation to total area regenerated, proportions of annual area of natural regeneration.

Criterion 5: Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)

- proportion of watersheds and forest area managed primarily for soil protection;
- proportion of watersheds and forest area managed primarily for water protection.

Criterion 6: Maintenance of other socio-economic functions and conditions

- share of the forest sector in gross national product;
- provision of recreation: area of forest with access per inhabitant, percentage of total forest area;

- changes in the rate of employment in forestry, notably in rural areas (people employed in forestry, logging, forest industry).

Management of watersheds and forests

Watershed management and forestry sciences have to develop:
- rules for protective forest and sustainable watershed management;
- area utilization politics: it should be understood that policy has the responsibility for public awareness about the habitat, soil and ground protection, protected water quality and support of intact ecosystems as goals;
- basis of support for lawful regulations;
- technical guidelines for protection against natural dangers and hazards.

CONCLUSIONS

Mountainous areas provide the basis of life for millions of people in Europe. For example, in the EU 15 countries, 54 million people live in mountains and mountainous areas, accounting for 38.8 percent of the total EU15 land area. Some 14 million people live in 5 800 municipalities in the Alpine arc, which is 1 200 km long and 200 km wide and stretches from Vienna to Nice. There are also important mountain areas in other parts of Europe.

Mountainous areas and watersheds provide employment, transit zones, water reservoirs, landscape, wilderness, natural parks and reserves, recreational and sport areas, open spaces or simply nature. But mountainous areas and watersheds are also vulnerable to natural catastrophes and hazards, as well as to global change.

Our generation has the responsibility to ensure that our mountain heritage is passed along to future generations in such a way that it will provide the basis for their livelihoods, while maintaining its specific characteristics.

The last session of the FAO/EFC Working Party on the Management of Mountain Watersheds considers that the concept and practice of integrated watershed management are necessary for sustainable development in the mountain areas of Europe. The following measures are important for maintaining intact mountain areas to meet social, ecological and economic needs in the future:

- Watershed management and land use in mountainous areas should be adapted to local natural conditions in order to minimize danger to human life. Areas highly threatened by erosion and natural hazards, such as avalanches, debris flows, rockfalls, landslides and floods, are not appropriate for human settlements and infrastructure.

- To ensure sustainable development in mountainous areas and watersheds it is essential to pay simultaneous consideration to agriculture, forestry, land-use planning, transport, trade, tourism, conservation of nature, landscape and cultural heritage, water management, and protection from and prevention of natural hazards. Cross-sectoral approaches are required, and therefore, land-use planning should be integrated rather than sector-based.

- Mountain ecosystems are fragile and particularly vulnerable. They suffer from the adverse impacts of soil erosion, forest fires, air pollution and other phenomena, as well as the impact of globalization, including climate change. Governments have a responsibility to fulfil their international obligations, in particular in the difficult area of air pollution control and climate change, and to implement the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

- All preventive efforts to ensure protection against natural hazards in watersheds and catchment areas should be coordinated in such a way that the residual risk for human beings, infrastructure and property is minimized for all types of natural hazards.

- Mountain watersheds and forests provide a wide range of goods and services and are necessary for human settlement in many areas. Employment linked to all these activities is important, not only for the regional economy, but also to prevent outmigration from mountain areas. Therefore, sound management and protection of mountain forests are of vital importance to the sustainable development of many mountain areas, and the services that mountain forests provide to the public should be fairly compensated through appropriate financial mechanisms at the regional and international levels.

- A greater effort should be made to extend the knowledge generated in the mountains of Europe to other watersheds in the rest of the world. The need for exchange at the international level of experience and progress in knowledge on mountainous areas is greater than ever.

- Education, capacity building, training and research can make important contributions to sustainable development in mountain areas. Specific issues regarding mountainous areas must be studied critically in greater depth when making plans for the future. Better use of information technology tools should be made, particularly in the area of teaching.

- Continuous, long-term monitoring of ecological and hydrological phenomena is necessary for a basic understanding of watershed processes.

- Close cooperation and shared responsibility in watershed management among local, regional and national authorities, at appropriately decentralized levels, are necessary.