Integrated Watershed Management as a Tool for Ecologically Sound Water Resources Management and Sustainable Economic and Social Development

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Abstract

Water drives ecological processes and supports economic activities in agriculture and industry. It is the most precious natural resource, and its sustainable use is crucial not only for maintaining ecological processes but also for sustainable social and economic development.

The natural spatial unit within which water resources can best be managed is the watershed, and it is against this background that the concept of watershed management has emerged. Watershed management acknowledges that water resources are inseparably linked with other natural resources such as land and the atmosphere. Consequently, the overall objective of watershed management is to maintain the ecological health of natural resources as precondition for both social and economic development. Its key challenge is the equitable distribution of water resources between upstream and downstream stakeholders. Global climate change and the continuously changing environmental conditions it causes may add to existing challenges.

To achieve its objective and address its key challenge, watershed management uses an integrated management approach which guides the overall planning at the watershed and basin level. It is a continuous negotiation process between civil society, private sector and government to optimise the provision of the water resources within the watershed and to maintain ecological integrity. The actual understanding of watershed management recognises the key importance of multi-stakeholder negotiation as a means of combining top-down policy implementation and bottom-up participatory processes. It promotes inter-sectoral institutional strengthening. Furthermore, it perceives differences of interest as an opportunity to negotiate for the better management of resources, and recognises that most disputes over access to natural resources are rooted in social and institutional structures rather than being the result of technical causes.

This understanding of watershed management is being put into practice all over the world, and also in the Lower Mekong Basin, where the Mekong River Commission provides a framework for improved cooperation in the field of sustainable development of water and related resources.

Basic understanding of Watershed Management and main challenges

Water drives ecological processes and supports economic activities such as agriculture and industry. It is the most precious natural resource, and its management and sustainable use is crucial not only for maintaining ecological processes but also for sustainable social and economic development.
Watersheds are the most appropriate spatial units on the terrestrial landscape for managing natural resources. They contain and define the geophysical and ecological processes related to surface water and its movement to a common point. Human modification of these units, their soils and vegetation has a direct impact upon the delivery of water, sediments, and nutrients into these river drainage systems. Watersheds therefore integrate the interrelations between key natural resources and human activity within a natural geographical and biophysical unit. It is because of these attributes that water resources can best be managed on the watershed scale and that the concept of watershed management has emerged (FAO, 2006).

The core focus of watershed management is to maintain the ecological health within a watershed by controlling the quantity and quality of water. It is a participatory and multidisciplinary subject requiring the collaboration of all stakeholders and which is based on geology, ecology, environmental economics and social sciences. It is the process of guiding and organizing the use of a watershed's forests, land and other resources to sustainably provide people with desired goods and services and without adversely affecting ecology. This recognizes the interrelationships among land use, soil and water, the linkages between upland and downstream areas, and the numerous types of stakeholders. Thus, stakeholder participation and collaboration is crucial for successful and sustainable watershed management.

Experiences over the last years showed that recent approaches to manage water and other natural resources should focus less on the technical foundations of resource management. Increasingly, the governance of resource use has come to the fore as overexploitation of natural resources is often – explicitly or implicitly – due to governance problems. Within the context introduced in this paper, the term governance includes all the informal and formal rules and mechanisms of their enforcement that guide and coordinate people's behaviour with regard to a concerted outcome. Many problems of unsustainable resource use result from a limited number of basic governance shortcomings, such as a lack of clearly defined property rights, and open access or insufficient enforcement of existing rules. The underlying problems are often quite similar, regardless of whether water, forests, land, the atmosphere, or biodiversity are at stake.

Against this background the Mekong River Commission (MRC) / German Technical Cooperation (GTZ) - Cooperation Project on Watershed Management (WSMP) focuses on the negotiation process of stakeholders responsible for the regulatory framework in a country, and stakeholders with responsibilities and requirements on the management of the resources and user side. It recognises the key importance of multi-stakeholder negotiation as a means of combining requirements for policy development and implementation. The project focuses on governance, on the strengthening of institutions in the riparian countries to increase co-operation, information exchange and sharing of improved approaches for sustainable natural resources management. As

all this leads to the maintenance of ecological functions of watersheds, economical and social functions as basis for livelihood of the population can also be covered.

The core components of the project are therefore governance, the strengthening of institutions as well as information and knowledge management. WSMP supports the analysis and development of watershed management related policies and guidelines as well as the development of the capacity of human resources necessary for sustainable watershed management. Activities are carried out on national and provincial levels, and implementation approaches increasingly on district and local levels. In parallel to institutional and capacity development, the establishment and improvement of a natural resources management information systems (NRMIS) is supported. The NRMIS is designed to support the decision makers and planners on different governmental levels with relevant data for their daily management work, and it should have a special emphasis on the delivery mechanisms to the regional government levels.

The MRC-GTZ Watershed Management Project Core Components

a) Governance and institutional development in natural resources management - an analytical framework

As already mentioned before recent approaches of natural resources management and in this field also watershed management, increasingly focus on governance to guide and coordinate any kind of activities with regard to sustainability. The introduced analytical framework was developed by a group of resource economists and natural resource managers within GTZ and is firmly rooted in the modern theory of environmental and institutional economics (Fischer et al., 2004). It is applicable to any kind of natural resource-use questions, provides a common terminology suitable for analysing governance problems, and reduces complexity without losing its depth.

The framework consists of eight interconnected analytical and planning steps, an overview of which is given in the figure below. The first part (steps 1 to 4) guides the analysis of the initial situation (the *status quo*), whereas the second part (see steps 5 to 8) supports the design of interventions and activities that aim to change the incentives conditioning resource-use patterns.

The framework can help to:

- Better understand governance problems in resource management;
- Improve the capacity for analysis;
- Link regional work more closely to international discussion;
- Establish a basis for an *ex ante* as well as *ex post* analysis of development assistance projects;
- Create a framework for the planning and design of future projects;
- Suggest a reference point for comparing projects and underlying governance problems in order to benefit from these experiences in future work.

The framework features practical applicability and has been used in several case studies world wide (Fischer et al, 2007). WSMP has conducted pilot tests in the Mekong region. Initial scepticism about the applicability of the framework in practical work in the Mekong region was high, particularly for two reasons. First, the framework was considered 'too academic' for use by practitioners outside the scientific world; Second, there were concerns about the readiness to address the potentially highly controversial issue of adverse incentive structures (vested interests, rent seeking behaviour, etc.), which thorough application of the analytical framework almost inevitably brings to the fore.

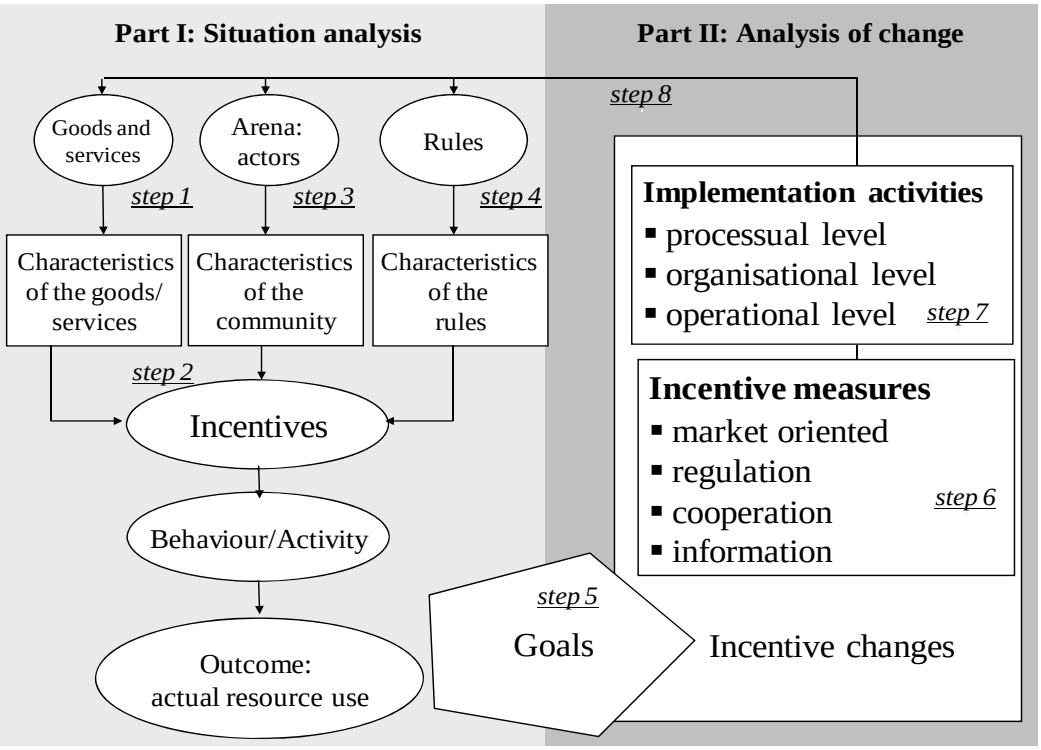

Fig. 1: Eight steps of the analytical framework on natural resources governance [Fischer et al., 2007].

The pilot testing, which took place through three workshops, involved participants from all four lower Mekong Basin countries. The objective of these workshops was to a) apply the framework to case studies; and b) thereby evaluate its relevance to participants' work and its usefulness in analysing natural resource management problems in watersheds and in proposing options for their solution; and finally c) conclude whether the framework is suitable for subsequent practical application. The national workshops were held in the respective riparian languages, with all course materials being made available in those languages.

Workshop participants evaluated the relevance and potential applicability of the analytical framework very positively. They pointed out that it is highly practical for application in project analysis and planning, and for supporting policy development, and they recommended some next steps.

Among the remaining challenges is the process design for integrating the analysis results and suggested interventions into actual policy making. WSMP is planning to address this challenge within its current phase (2005 to 2008), and to support broader application of the analytical framework for natural resources governance, through, for example, cooperation with multipliers such as universities and other national research institutions.

b) Development of human resources of the institutions directly involved in watershed management - capacity building

To implement programmes that effectively and efficiently address natural resources management and other development issues, individuals and organizations increasingly need to develop new capacities, harness new technologies and adopt innovative approaches (OECD, 2006). Building and developing capacities in the watershed management context can help ensure that implementation will respect needs and requirements of all stakeholders as people get the capacities to play a part in the preceding negotiation, planning and implementation processes. Natural resources management can only be sustainable if relevant actors have enough capacities to support the process, collaborate and govern (FAO, 2006; Igbokwe et al. 2003). Capacity development alone is not sufficient, but without proper capacity development, financial, organizational and institutional cooperation will neither be successful nor sustainable.

Assistance in developing and strengthening capacities on different levels of governmental and non-governmental organizations and institutions is provided by organizing training workshops on relevant topics, promoting networking, improving access to scientific and nonscientific information necessary for sustainable watershed management, and fostering partnership. WSMP's capacity development can be understood as an integral part of the activities on policy, institutional and decision-making development.

Goals and objectives of capacity development within our project include:

1) Building a knowledge base and awareness which facilitate better negotiation and decision-making;
2) Improving several skills required to adapt to differing and changing circumstances;
3) Improving management practices and techniques;
4) Fostering institutions that promote and support cooperation.

The goals which should drive these activities are to upgrade the knowledge, communication and managerial skills necessary to address more effectively the emerging issues in sustainable water resources management, and to promote information dissemination among local communities, policy makers, academics and other institutions.

Besides involving different levels of governmental and non-governmental organizations watershed management integrates many different sectors as forestry, agriculture, fisheries and industry. Therefore, the knowledge needs to broaden the basic skills of all stakeholders as policy makers, extensionists and people living in the watershed, giving them the tools to face or adapt to any new situation of their rapidly changing social and ecological environment.

MRC-GTZ WSMP carried out a capacity needs assessment which led to the development of the following training packages:

1) Executive package for decision makers and senior managers
2) Package for regional managers responsible for watershed management related sectors in a transboundary context
3) Package for local managers as heads of departments and organizations directly involved in watershed management, commune and village leaders
4) Policy and planning analysis package for planners and technical staff at national level
5) In depth training package for field personnel directly working in the watershed

The packages are delivered in separate tailored modules to government officials, extension staff and locals to directly and effectively address their needs. For example, package one for decision makers and senior managers was carefully designed to provide sophisticated information within a short period of time. It is crucial to increase the understanding for watershed management of high level policy makers as their support is essential to the progress of sustainable watershed management. The package will be delivered within one day in the form of a consultative meeting providing information on the concept of watershed management with emphasis on the linkage of natural resources management from local to national and to international level, comparative policy and legislation and institutions and organizations relevant to watershed management.

Another example is the training package for field personnel, which directly addresses those working in the area related to watershed management at the field level. This will take more time and for some sectors, backstopping will be required. A lot of practices and field work will be needed additionally to preparatory theoretical courses and awareness raising.

c) Information and knowledge management within WSMP – the Natural Resources Management Information System (NRMIS)

To manage natural resources in a sound manner, information and knowledge resources have to be managed effectively. Managing information is concerned with establishing processes and systems to gather, organize, summarise and package information. Furthermore, its timely delivery to the right decision-making person for the specific situation is essential. In contrast, knowledge management focuses on the process and the people involved in creating, sharing and leveraging knowledge among science, communities, resource managers and policy makers. This means, however, that information and knowledge management focus on different parts of the same value chain (Allen, 2001, Fig. 2).

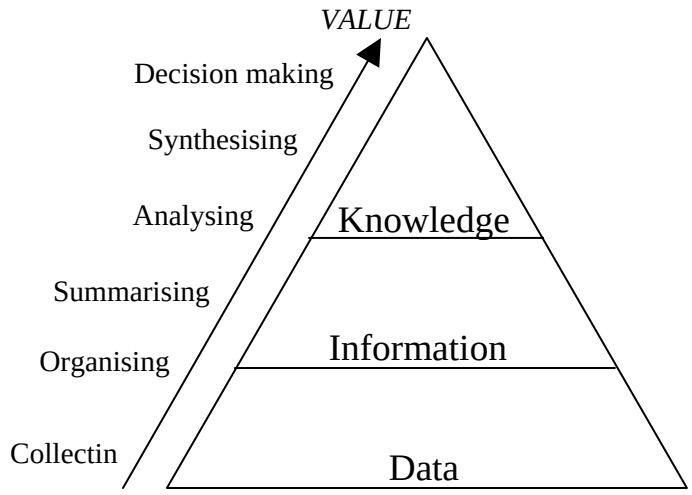

Fig. 2: The processes from data collection to information and knowledge development [Allen, 2001].

Therefore, in integrated watershed management, the issue is to design appropriate information and knowledge flows and to develop standards and procedures that enhance the availability of information and knowledge, respectively. In other words: information and knowledge need to be appropriately managed in order to achieve the intended impact on sustainable natural resources management and development.

The objective of the information and knowledge management component within MRC-GTZ WSMP is to outline and give orientation for the management of information and knowledge on sustainable watershed management. It also intends to contribute ideas and suggestions to the overall information and knowledge management strategy of the MRC Secretariat, in the expectation that information and knowledge management approaches initiated by the WSMP will contribute to shaping and will ultimately become fully integrated into the information and knowledge management strategy of the MRC Secretariat. Therefore, a comprehensive, flexible and adjustable Natural Resources Management Information System (NMRIS) shall be established.

The overall goal is that relevant policy makers and leading institutional developers in the Lower Mekong Basin countries are aware of, have access to, and, most of all, make use of relevant information and knowledge available on management of water related natural resources in a watershed context.

To achieve the overall goal of providing a sound NRMIS for policy formulation on management of water-related natural resources in a watershed context, the information and knowledge has to be inventoried and collected. Particular emphasis is laid on its trans-boundary nature and on the inclusion of institutional and economic framework conditions. Furthermore, those parts of the information and knowledge pool which are considered most relevant are summarized and valuated to compress the vast amount of material collected.

To cover the most relevant information and knowledge for watershed management, three main categories of different priority according to its type and content were defined. The categories are comprised of the i) core i.e., essential, indispensable references; ii) important i.e., useful resources and; iii) marginal i.e., add-on material information and knowledge. Since the beginning of the establishment of the information and knowledge management system, the categories were already adapted but will need further adaptation and modification according to the rationalization of what information and knowledge inventory and collection efforts, would be most appropriate. Depending on which category information and knowledge is grouped to, its management would have different levels of intensity.

For the time being, most information and knowledge collection and inventory was carried out by WSMP who used their existing national informal and formal networks of partners and partner institutions. Since watershed management is an emerging process in the Lower Mekong Basin, the region itself only has a limited relevance as a source of information and knowledge. Inputs from other geographic areas were required, which were also actively sourced by WSMP. To extend the participatory and capacity building aspects of information and knowledge inventory and collection, governments of MRC member countries will have to increase active contribution. It is expected that over time the inventory and collection process will gradually pass into full ownership of the governments of MRC member countries. Additionally, working relationships with government institutions usually not belonging to the spectrum of cooperating line agencies, as well as academia and NGOs, will have to be maintained.

Access to NRMIS for main actors who are engaged in designing policies concerning or organising the implementation of watershed management, for example, civil society representatives, institutional developers and capacity builders to the pool of information and knowledge collected will mainly be provided through the internet. Information and knowledge dissemination systems that are not internet-based are simply no longer up to date. Therefore, an internet based regional NRMIS was created which is hosted by the MRC, and can be visited at www.mekonginfo.org. It is an interactive system for sharing information and experiences about natural resources management. Since its creation more than 13,000 users have registered with some 300 new users registering every month. Currently, it holds some 3,000 documents covering natural resources management issues in its online library. All documents can be accessed and downloaded by everyone. Interested persons and institutions may also use the MekongInfo homepage as platform to share experiences and lessons learnt in posting their documents.

One of the core documents to be compiled will be the Watershed Management Resource Kit. It is meant to be a thorough and condensed collection of information and knowledge relevant for watershed management from a broad range of disciplines. The Watershed Management Resource Kit will be a comprehensive document for policy makers, institutional developers and practitioners in the four countries which can also be used in very remote areas as the hardcopy version can be easily transported.

Lastly, for the NRMIS it is most essential that all information and knowledge is packaged and actively communicated and disseminated to relevant policy makers and leading institutional developers through appropriate mechanisms. This requires linkages between WSMP, MRC

Secretariat and the target groups as well as active engagement of the individual members of the target groups. Networks will have to be established and expanded on national and regional level.

Other communication channels which could be useful are all kinds of events such as trainings, workshops, or high-level dialogues, depending on the detailed composition of the audience. Combined with information markets and the follow up of preparation and distribution of proceedings, this essentially contributes to information and knowledge distribution.

Expected results of the project

The project aims to achieve effects at two levels. On the one hand, local effects in the upstream watersheds themselves are expected. On the other hand, considering the regional trans-boundary mandate of the MRC, off-site effects, and especially trans-boundary effects, are at least equally important. Sustainable management of upstream watersheds creates downstream effects with a significant time lag. Sometimes such effects are not directly attributable to, but are a plausible result of watershed management.

- Socio-economic effects at the level of target groups are reached through long result chains. They consist of contributions to sustainable resources management and thus also to the sustainable creation and increase of income and the reduction of potential conflicts over access to and use of water resources.
- Socio-cultural effects are achieved through improved communication at the national level between organisations, and at the regional level through information and knowledge exchange and promotion of conflict-avoiding strategies for resources utilisation.
- Ecological effects of the project include sustainability of management and conservation of natural resources.
- Effects on partner institutions are achieved through extensive capacity building measures, which target on improved service delivery, networking, cooperation, and in particular, participatory development and good governance. This applies to organizations both at the national and regional levels.

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