

# CPWF TOPIC 3 synthesis

## Water Benefits Sharing for Poverty Alleviation and Conflict Management

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## **Water Benefits Sharing for Poverty Alleviation and Conflict Management: Topic 3 Synthesis Paper**

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## **CPWF Topic Synthesis Papers**

In the second phase of the CGIAR Challenge Program on Water and Food, activities will be organized around Basin Development Challenges and Topics. Basin Development Challenges are water and food problem areas of recognized importance in a river basin area. Topics are subject matter areas selected to support research on basin challenges. Topics play two roles: to ensure the quality of science in research on basin development challenges, and to facilitate the development of international public goods.

The process of jointly defining basin challenges and topics began with stakeholder surveys, and consultations with Basin Coordinators, Basin Focal Project teams, Phase 1 Theme Leaders, and external experts. This process culminated in a series of one-on-one interviews with key basin stakeholders from research, development and policy arenas.

In their present form, the priority Topics are as follows:

- Improving Rainwater Productivity
- Multi-purpose Water Systems
- Water Benefits Sharing for Poverty Alleviation and Conflict Resolution
- Global Drivers and Processes of Change

The four synthesis papers describe these priority Topics: their present status, how they evolved, what was learned about them in Phase 1, and the kinds of research likely to be needed on each topic in Phase 2.

These papers are not the final word, however. Basin challenges and topics will continue to be re-defined. Topics are intended to support and serve the basins: as research on basin challenges unfold, the content of individual topics may be modified. Whole new topics may emerge and other topics dropped.

I wish to thank Theme Leaders who have put tremendous effort into these papers, as well as others in the CPWF community, who together have made this document possible.

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**Science Leader**  
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# Introduction

As demand for water intensifies, so does its value. Nevertheless, a large proportion of water is being used as if its value were low. Waste is common when water is undervalued. This situation needs to change in order for water to achieve its potential contribution to society. Changing the value of water, however, is not sufficient.

Many people appreciate and highly value water but their voices are not always heard. Sufficient water for domestic and productive needs can remain a luxury and dream.

For society to increase and share benefits from water resources, a process is needed. Existing rules and customs (institutions) on water ownership and use are not only the pathway for change but are also a target for change. By ensuring that voices are heard, change is more likely. With adequate representation, the voices of women and other citizens affected by poverty can better communicate their needs. Identifying effective ways to communicate and share perspectives is essential.

Generating more value from water implies greater productivity with new opportunities for equitable economic growth. For example, when women increase their access to water, their productivity improves family welfare. Their extra money or energies are delivered back into improving family, nutrition, and education. Moreover, by attending to critical water needs and improving fairness, social tensions that lead to conflict can be reduced.

Typical water sharing mechanisms focus on distributing quantities of water (e.g. m<sup>3</sup>). Nevertheless, allocating specific amounts of water may not be optimal. Since potential benefits from different water uses are often unknown or not considered, conventional water uses may be inefficient. In contrast, *Water Benefits Sharing* focuses on optimizing the values (economic, social, cultural, political and environmental) generated from water in its different uses and equitably distributing the benefits amongst water users and suppliers.

How can benefits be shared? Benefit sharing mechanisms can be monetary or non-monetary and can be classified as ways to: (a) compensate for lost assets or loss of access, (b) restore and enhance livelihoods, (c) develop communities, (d) develop basins, and (e) share benefits. To achieve water benefits sharing, a series of overlapping processes regarding water management and

policy need to occur: diagnosis, knowledge generation, consultation and negotiation, agreement and enforcement. Research has a key role throughout.

The premise of the CPWF is that participatory diagnosis, design and implementation of water benefits sharing schemes can sustainably increase the total benefits derived from water and help to reduce conflict and poverty. Local and external insights are required to achieve better understandings of current and potential situations. Since advances in benefits sharing require consideration of distinct social contexts, CPWF research will address site-specific issues while generating insights into where and how best to foster water benefits sharing agreements elsewhere.

*Research is needed to develop and test:*

- guidelines on how to identify opportunities for water benefits sharing,
- benefit valuation and cost quantification methods, procedures on how to design and implement an equitable sharing of benefits with respect to gender and economic/social status.
- Training key water stakeholders in the effective use of these guidelines, methods, procedures and principles will occur via CPWF research activities, workshops and publications.

*Water Benefits Sharing* schemes are typically advanced within an international transboundary context (e.g. Milewski, et al., 1999; Sadoff and Grey, 2002). Nevertheless, intranational settings such as upstream-downstream “transboundaries” within basin and community contexts can also be candidates for benefits sharing. Therefore, the CPWF will also examine the role of geographic scale and associated political sovereignties in water benefits sharing.

In sum, the CPWF *Water Benefits Sharing* highlights research on water values, benefits distribution, institutional structures and implementation mechanisms.

# Rationale

The diversity of needs for water are rarely understood or acknowledged. As populations and economies grow, water-related conflicts, inequities, and poverty may not only persist but are likely to increase. In order to make better decisions regarding the use and management of water, the importance of water to human society must be recognized.

A central finding of the *Comprehensive Assessment of Water Management in Agriculture* is that for many of the world's river basins, the core issue is how best to share water supplies between competing users (Molle, et al., 2007). The sharing of benefits from water enables a separation between physical allocations of water from a distribution of benefits from water use. This different focus on sharing the benefits of water provides greater scope for identifying mutually beneficial cooperative actions (Sadoff and Grey, 2005). Examples of which include: (a) win-win situations where the overall benefits increase (Fisher and Huber-Lee, 2005), and (b) the value of water derived from a new use more than compensate the losses of those who forego their use of water (Fisher and Huber-Lee, 2005, 2006).

Benefits sharing of water can also be a way to develop a viable alternative to the challenging issue of property rights (Qaddumi, 2008). With attention diverted away from volumes of water toward the values derived from water use, actors can view different levels of water

as achieving positive-sum outcomes. The prospect of greater overall benefits enables the approach to down-play or even sidestep typical arguments against sharing, which tend to be raised by those with existing access and ownership rights to water. Moreover, there is need to ensure that the water use rights of women are not overlooked or minimized.

## The many values of water

Water affects and shapes society. The importance or *value* of water is viewed and communicated differently as a result of cultural conceptions, philosophical views, disciplines and schools of thought. *Value* is the contribution of an action or object to user-specified goals, objectives, or conditions (Millennium Ecosystem Assessment, 2003). Numerous benefits and associated values can be derived from water. Table 1 summarizes potential water benefits drawn from analytical frameworks of international river cooperation and ecosystem services (Sadoff and Grey, 2002; Millennium Ecosystem Assessment, 2003).

The ecosystem concept provides a useful framework for analyzing and acting on the linkages between people and the environment. Benefits range from the more tangible and direct (benefits to and from water) to the intangible and indirect (reducing problems/costs because of water and increasing benefits beyond water). Similarly, the tangible and direct benefits come from supporting and provisioning services; whereas the cultural services

Types of benefit	Water benefits / services	Environmental service / Constituent of well-being
<b>Increasing benefits to water</b>	Water quantity, quality, regulation, soil conservation, ecology/ biodiversity	Supporting/Regulating
<b>Increasing benefits from water</b>	Hydropower, agriculture, fishing, flood-drought management, navigation, freshwater for domestic use	Provisioning
	Spiritual and religious, recreation and ecotourism, aesthetic, inspirational, educational, sense of place, heritage	Cultural
<b>Reducing costs because of water</b>	Cooperation instead of conflict, economic development, food security, political stability	Social relations and security
<b>Increasing benefits beyond water</b>	Integration of regional infrastructure, markets and trade, regional stability	

Table 1. Water benefits and services

Adapted from Sadoff and Grey, 2002; Millennium Ecosystem Assessment, 2003. use (with possible adequate compensation for loss)

along with social relations and security are less tangible and direct. Considering such a range of benefits helps to develop a better understanding of the diverse benefits generated from water, to thereby present compelling, equitable and efficient water benefits sharing schemes.

Research on *Water Benefits Sharing* examines water uses and the values associated with those uses, both past and present, in order to understand future consequences and potentials. A key challenge is to achieve an optimal value of water use. The concept of optimal value depends on the interests and preferences of many users, who appreciate water for economic, social, cultural, environmental and political purposes. Valuation is a process of communicating the worth or importance for a particular good or service, in terms of something that can be counted, often money, but also via other methods and measures. Many benefits and costs are not easily monetized but are equally important to humans. Examples range from religious and spiritual values of water (Pradhan and Meinzen-Dick, 2003) to increasing the resilience of the poor and ecosystems. Research will explore the potential for market-oriented approaches to encourage water benefits sharing, including water pricing and virtual water trade. In addition, non-market approaches will be examined. These alternatives, such as regulation and negotiation, may be feasible and preferable approaches.

### Institutions and scales

The success of benefit sharing depends, amongst others factors, on the capacity to effectively redistribute the costs and benefits. Experience shows that strong and transparent institutions are needed to implement re-distributing policies between different water users and suppliers. An institutional capacity to redistribute is a prerequisite for benefit sharing, not a result thereof. Achieving such institutions does not come about easily (Van der Zaag, 2007).

Water benefits sharing requires investments and changes in practice. Traditions of ownership rights and use, however, can be difficult to change. Longstanding uses of water often prevent the possibility of attaining higher values, whether defined in economic, social, environmental or political terms. Despite the possibility of other water uses generating greater benefits, existing social institutions (laws, customs) often preserve historical water use patterns. Obstacles to change can arise from a range of actors including governments, communities and resource owners. To overcome such impediments, CPWF research will develop principles on how to design and implement benefits sharing mechanisms according to site-specific organizational and institutional contexts.

Before opportunities can be realized, incentives to coop-

erate must overcome fear of change such as potential risks resulting from modification of water rights, access or use. Therefore, benefits sharing may require careful diagnosis and negotiation in some river basins. For example, the sharing of transboundary water is challenging for many countries and sub-regions around the world. Some countries, particularly those upstream, perceive cooperation as being too risky; and therefore do not want to negotiate away future water uses (Phillips, et al., 2006) To reduce perceived risks, CPWF research will develop guidelines on (1) how to recognize benefits sharing opportunities through comprehensive diagnosis procedures, and (2) how to reduce impact of perceived future risks on willingness to take advantage of current opportunities.

Benefits sharing is an institutional arrangement for managing water. The effectiveness of institutional arrangements depends on a number of factors, including scale of the water system. Organized user management institutions have a comparative advantage at smaller spatial scales such as an irrigation system. Collective action and local knowledge of the water system can improve performance. In contrast, state institutions tend to perform well at higher scales. Substantial financial resources and authority are typically required to coordinate across larger areas (Meinzen-Dick, 2007). With varying degrees of success, research and policy on water management have promoted other institutional approaches (Svendsen and Meinzen-Dick, 1997). Benefits sharing can be implemented in place of, or in conjunction with, state control, management by water user organizations and market-based approaches (Milewski, et al., 1999; Sadoff and Grey, 2002; Phillips, et al., 2006).

Existing water benefits sharing schemes are often linked with hydroelectric projects in an international transboundary context (e.g. Milewski, et al., 1999; Sadoff and Grey, 2002; Mokorosi an van der Zaag, 2007). Nevertheless, transboundary conditions also exist within national contexts, such as distinct upstream-downstream contexts. Water users at the community level can perceive their water rights and responsibilities much like national authorities. These within-basin “transboundaries” can also be candidates for benefits sharing, especially via compensation for environmental services (Appleton, 2002; FAO, 2004). The principles of benefit sharing remain the same but mechanisms vary by scale due to differences in trust, degree of information asymmetry between parties, and ease of monitoring as well as the form that the benefits will take (e.g. monetary versus non-monetary). Therefore, the CPWF will also examine the roles of geographic scale and associated institutions in advancing water benefits sharing.

## The dangers of inequity and inefficiency

Accurate multi-benefit and multi-perspective valuation of water is one of many challenges facing water benefits sharing schemes. Other challenges include: (1) equitable sharing of value, especially with women and the less-wealthy, (2) potentially high costs of development and implementation, (3) changing historical water institutions/traditions, and (4) overcoming perceptions of increased economic or security risk.

Although efforts to change existing water use patterns can produce greater benefits, simple mechanisms for compensation to actors who lose rights are hardly used in practice (Molle, et al., 2007). Often power relations amongst water users greatly affect the outcome of international transboundary water interactions (SIWI, 2006). Given that many water users have little power or influence, a high probability exists for unfair distribution of benefits.

Benefits sharing experiences with other natural resources have been controversial. With plant genetic resources, sometimes legal, technological, and market conditions enable private firms not only to profit from collective resources and knowledge, but also to privatize them and even to prevent the original stewards and creators from accessing them (Ribeiro, 2005). Researchers and policy makers, including international agencies, have used the definition of benefits sharing from the Convention on Biological Diversity to advance industrial interests and, in the process, overlook the rights of the native communities who preserved the knowledge associated with the resources (Sharma, 2005). In order to avoid these potential equity pitfalls, CPWF research will foster procedures on how to enhance enabling conditions and organizational negotiation capacities for pro-poor and pro-environment benefits sharing schemes.

Water Benefits Sharing comes with a cost. Benefits sharing can be defined as any action designed to change the allocation of costs and benefits associated with cooperation (Sadoff and Grey, 2005). Many proponents of collaboration have argued that broad inclusion of stakeholders can lead to better environmental solutions while also establishing legitimacy, building social capital, and overcoming conflicts. Nevertheless, such broad inclusion may be inefficient in terms of time, energy, and resources, and may not yield the desired results (Koontz and Johnson, 2004). In some cases, the scale of benefits may not justify the costs of cooperative actions (Sadoff and Grey, 2002). To address this challenge, CPWF research will develop guidelines to examine *ex-ante* the feasibility of benefits sharing opportunities.

## Contributions from Phase 1

Research of CPWF Phase 1 examined numerous aspects of *Water Benefits Sharing* on water values, benefits distribution, institutional structures and implementation mechanisms. Research was conducted in Africa, Asia and Latin America. Although advances were made on understanding different values of water and methods to improve the distribution of benefits by including the poor in policy processes, previous CPWF research revealed that few attempts to reform water policies and institutions have been successful (e.g. PN47 *African Models of Transboundary Governance*: Merrey et al, 2007).

Research on the quantification and valuation of economic, social and environmental impacts of diverse land uses within watersheds was a key element of the CPWF in the Andes. Impacts of current and potential land uses were assessed by the project *Payment for Environmental Services (PES) as a mechanism for promoting rural development in the upper watersheds of the tropics* (PN22). The project refined a multicriteria model (ECOSAUT) in which net income is maximized while considering farming system and environmental constraints and effects.

New land use opportunities (i.e., conservation agriculture) affecting water availability and sediment retention were identified, tested and promoted in selected watersheds. In Fuquene Colombia, the PES project helped stakeholders determine costs and benefits of modifying environmental externalities. The *ex-ante* analysis showed that conservation agriculture will increase net income, potato production, social benefits, sediment retention, increase employment and reduce production costs. Nevertheless, the analysis revealed that the initial investment cannot be covered by the small farmers' current cash flows. Therefore, innovative financing mechanisms were explored. In the Altomayo basin (Peru), the PES project simulated current land uses and compared them with change scenarios of deforestation, reforestation, implementation of live barriers, and agroforestry systems. The ECOSAUT model predicted livelihood outcomes for different land-use interventions. Results indicate the feasibility of a PES scheme to promote agroforestry systems or to introduce sedimentation reduction measures into traditional farming practices. At present the municipal water-supply company is concerned about high sediment loads and is preparing a payment for environmental services scheme.

CPWF Phase 1 included research on collective action

and institutional innovations that created links between stakeholders in water management. The project *Sustaining Inclusive Collective Action that Links across Economic and Ecological Scales in Upper Watersheds* (SCALES – PN20) worked to strengthen the ability of the poor to participate in collective processes at multiple scales in watersheds. The project’s conceptual framework proposed a new way of looking at social and ecological interactions within watersheds. Watersheds are inherently multi-scale, therefore collective action can occur simultaneously within and across scales. Resource flows in watersheds are not limited to lateral flows of soil and water but also include “reverse flows” of economic, social and political resources that can go from downstream to upstream in response to actual or potential hydrological externalities. In such a context, decisions with important implications for resource management can be made in multiple fora or “action arenas.” Projects that seek to strengthen the role of the poor in watershed management need to work in and/or create spaces in which the action resources of the poor have value.

The project also examined incentives for cooperation in a watershed context and the impacts of potential policy interventions. Economic experiments (based on economic game theory) were conducted under field conditions with over 600 residents in four watersheds. The results revealed that communication rather than regulation is the most effective way for people to improve levels of cooperation, though there may be exceptions to this in cases where there are deep social divisions within communities. Upstream communities have an important role to play in initiating watershed dialogue. Downstream people, both in the games and in reality, appear to have a deep distrust of upstream residents. Their willingness to initiate cooperation is limited, but they are willing to reciprocate - if upstream people make the first move. There is also need for further research to analyze the gender differences, if any, with respect to incentives for cooperation.

In the Mekong, the *Companion Modeling and Water Dynamics* project (PN25) used multi-agent systems (MAS) and the companion modeling method to facilitate water management negotiations, demonstrating that this methodology helped resolve a conflict over the sharing of water resources by establishing a concrete agreement and creating an institution for collective watershed management. Research in Thailand, for example, led to real changes in financial decision-making in communities, as well as transforming the ability of relatively poor farmers/groups to communicate effectively with more wealthy farmers at the local scale. Companion modeling is expanding now to look beyond a single community

to groups of communities. Also in the Mekong, PN 50 M-POWER (the Mekong Program on Water, Environment and Resilience) is a network of people committed to improving local, national and regional governance. The objective of M-POWER is to improve basin level water governance in the Mekong Region through action research, practical policy support, and facilitation. Research points to the need to recognize that stakeholders move at different paces during dialogue and consultation processes.

Phase 1 research also identified opportunities for enhancing benefits through increased water productivity with respect to both quantity and quality. The impact of such research can be enhanced through appropriate benefits sharing schemes. For example, water saving technologies such as aerobic rice (developed by PN16) may be appropriate for farmers who are responding to decreased irrigation water availability. The adoption of water-saving technology may benefit downstream water users. Opportunities may exist for farmers who reduce their water use to receive a share of the benefits realized from other water users. Associated research questions arise. Can/should downstream water users, who benefit from additional water, reward those adopting water saving technologies thereby making these more worthwhile for them? Additional environmental benefits may also be generated such as biodiversity and carbon sequestration for which those adopting water saving technologies should be compensated. There is an inadequate understanding of how changes in water allocation and agricultural practices alter the spatial and temporal distribution and extent of these losses and gains. PN40 or other Theme 4 projects?

## Remaining gaps

Research in the *Water Benefits Sharing* topic examines ways to expand and equitably share the benefits derived from water while increasing the resilience of ecosystems and rural livelihoods. Although water benefits sharing holds great promise (Milewski, et al., 1999; Mostert, 2003; Sadoff and Grey, 2005), it is crucial to understand that maximizing the economic returns from water is just one of many water management goals. Other benefits are not easily measured or monetized such as social and environmental concerns, but are recognized by humans as equally important. With a diversity of water uses – crop production, livestock, fisheries, navigation, domestic use and recreation, the protection of sufficient water supplies and the benefits from water for the poorest and most vulnerable populations is a fundamental concern



(Molle, et al., 2007; Castillo, et al., 2007).

Each benefits sharing example is unique. Cultures, ecosystems and institutions vary across sub-basins to basins. Despite a scheme not being a panacea, such efforts comprise a promising approach that needs further specification (Heinke and Wirkus, 2006;). Given the uniqueness of each benefits sharing scheme, the persistence of myths for and against benefits sharing, and the slow change from unilateral to cooperative action, research is needed to:

- clarify under what conditions cooperative actions can increase water benefits sharing in a way that is politically, socially and financially acceptable, gender equitable, and feasible;
- raise awareness of how cooperative action can increase overall benefits which can be used to improve the livelihoods of the poor without further degrading natural resources, thereby enhancing social and ecological resilience; and
- provide guidelines on how to scope, design and implement benefits sharing schemes - including physical, economic and institutional elements - that are equitable and take the resilience of the poor and ecosystems as a high priority.

## Objectives

The objective of the CPWF Topic 3, *Water Benefits Sharing*, is to contribute to productive and sustainable water use through supporting innovative research in basins that shows how the benefits derived from water can be increased and shared more equitably, with a focus on increasing the resilience of women, the poor and ecosystems. This CPWF research supports scientists and stakeholders at the basin, sub-basin and local levels by improving knowledge of benefits and costs of water with respect to different water users across scales.

Experience and knowledge gained will contribute to efforts both within the CPWF and internationally. Research efforts will generate knowledge that is site and context specific. In order to generate global public goods, research will also contrast and synthesize the advances realized within distinct socio-economic and bio-physical contexts, including development of analytical frameworks.

Research in collaboration with basins will investigate

the social mechanisms by which water benefits can be shared more widely to enhance equity (gender and social/economic status) and sustainability. The objective of increasing water productivity is to increase the total net benefit, which can open possibilities of sharing new additional benefits, not just existing benefits. Research will explore the potential for the emergence of market-oriented approaches to water benefits sharing such as water pricing and compensation schemes, as well as non-market approaches such as regulation and negotiation. Research under Topic 3 will improve the understanding of (a) positive and negative externalities generated; (b) how those externalities are modified according to how water benefits are shared; (c) how changes in water allocation affect benefits and costs along the transmission pathway; (d) who and what influences these processes; (e) how the current dynamics will be affected by future natural and human factors; (f) value attached to different benefits by different stakeholders at different times and in different locations; and (g) what are the most effective water benefits sharing schemes for increasing the resilience of the poor and ecosystems.

## Scope

The potential for water benefits sharing requires a shift from decision-making by unilateral authorities to collaborative change processes (Waalewijn, et al., 2005). In order to enhance the capacity of water users to act collectively and negotiate, Topic 3 scientists will work with organizations at different scales. Researchers will coordinate efforts with the Basin Teams and donors, community based organizations, government ministries, utilities (public and private), international water and food research communities, and national and international development NGOs.

Who is likely to gain or lose from changes in water use depends on existing rights and access to water, both legal and actual. Therefore, Topic 3 researchers will identify and facilitate policies and institutions that achieve optimal allocation of water that increases water productivity and equitably generates and shares the benefits. These efforts will be based on research that estimates the costs and benefits of current and alternative water use arrangements.

The research under Topic 3 will also examine water management and use organizations, social institutions (rules and norms), physical infrastructure, and the allocation of public and private investments related to water. Policy analysis will be used to explore private arrangements

that can generate greater overall benefits from water but share these benefits equitably, such as compensation for environmental services. Both public and private institutions will recognize the need to reimburse those negatively affected by (a) changes in rights and access to water, or (b) investments required to comply with new water use standards. Efforts will also be made to analyze the differing water rights and priorities of men and women, where appropriate.

The geographic focus of benefits sharing research is at the river basin and sub-basin scale. Based on the experience of Phase 1, we have only seen success with benefits sharing schemes at the sub-basin scale within a single country (international boundary remain to be achieved). Regardless of scale, the strengthening of institutions is essential for improved communication, understanding and incentives to negotiate. Such upstream-downstream institutional linkages can generate mutually beneficial outcomes. In addition, such institutions may also be a pre-requisite for improving management at higher scales, especially in terms of increasing the profile of basin stakeholder organizations via enhanced water use accountability and citizen participation.

(Table 2). Topic 1 Rainwater Management and Topic 2 Multiple Water Use Systems emphasize technical solutions to water use, thereby identifying opportunities for benefits generation with an emphasis on fostering equity. These Topics tend to focus on plot and community levels of analysis. In contrast, Topic 4 on Drivers and Processes of Change provides important social and political contextual information priorities and opportunity at larger global and national scales.

This topic will work closely with the other CPWF Topics

Topic	1 Rainwater management	3 Water Benefits Sharing			4 Drivers and Process
		Subtopic			
		a	b	c	
Keywords		Diagnosis Participation Water values	Externality identification Valuation methods Institutions Governance Benefits distribution	Design Implementation Consultation Negotiation Monitoring Evaluation Enforcement mechanisms	
Research issue	Technical		Institutional /Political		
Scale of analysis	Plot/Community		Community/National		National/Global
	Watershed		River basin		Transboundary

Table 2. Topic 3 Water Benefit Sharing within the research topics of the CPWF

# Key research areas and guiding questions

The *Water Benefits Sharing Topic Working Group* will develop research based on the CPWF Basin Research Questions so that research efforts achieve broader understanding and impact in the CPWF basins. Research questions in the sub-sections below are considered guides for the topic of *Water Benefits Sharing*.

Because water benefits sharing (biophysical, socio-economic and institutional) schemes can take many forms, an integrated and easily accessible knowledge base on experiences and methods are needed to aid stakeholders<sup>1</sup> to navigate the complex process of diagnosing, designing and implementing effective water benefits sharing schemes. Research will build on the existing (CPWF) knowledge base by focusing on the following sub-topics:

- Diagnosing water benefits sharing opportunities through participatory identification, quantification and valuation of benefits,
- Improving methods for generating credible technical and institutional information and for facilitating its use in consultation and negotiation processes,
- Design and implementation principles of site-specific water benefits sharing mechanisms.

## Diagnosing water benefits sharing opportunities through collaborative identification, quantification and valuation of benefits

At community and watershed levels, agriculture generates both positive and negative externalities<sup>2</sup> that translate into off-site gains and losses. Some externalities are felt far away. Agriculture is a major contributor to: (a) soil erosion and reservoir siltation, and (b) rising nutrient pollution in rivers. Two examples illustrate these problems. In the Yellow River basin, soil erosion threat-

<sup>1</sup> The general public and politicians, policy makers and planners, benefit providers and receivers, negotiators, researchers and other practitioners who directly or indirectly influence the enhancement and sharing of benefits.

<sup>2</sup> For example, externalities associated with (a) conversion of forest, grassland and wetlands to cropland and its effect on the quantity and quality of flow in lower reaches of a river or in groundwater and on wildlife habitats; and (b) loss of habitat essential to the life cycle of commercial fish species that can trigger a collapse of the fish stock and associated livelihoods.

ens the future supply of electricity and increases the cost of flushing sediments in reservoirs, irrigation canals and river reaches. In Lake Victoria, pollution has disrupted the delicately balanced aquatic ecosystems and threatens the quality of drinking water.

Women and children (who are usually responsible for collecting water for domestic use), the poor, and the environment are particularly vulnerable to such losses. These are the consequences of the failure of farmers and other land managers to internalize the negative impacts they generate. Nevertheless, cases also exist where upstream communities adopt land and water practices in ways that positively impact downstream communities. The potential for benefits sharing mechanisms to provide incentives for upstream communities to internalize negative impacts has not been adequately assessed.

In most cases, however, the extent to which benefits sharing schemes achieve their objectives is contested by both providers and receivers of benefits. This is partly attributed to a lack of consensus on what benefits to include, how to quantify and value them, and how to assess how well the benefits are shared. To address this problem at basin scale, Sadoff and Grey (2002 and 2005) argued that benefits should be interpreted more broadly to include environmental, aquatic ecosystems, economic, social and political gains and proposed a framework (Table 1) for broadening the range of recognized benefits. It is important to adequately value water for rural and peri-urban uses, to ensure that food security can be achieved, livelihoods enhanced, and health and environmental goals can be met.

The major challenge lies in identifying, quantifying and valuing benefits in a participatory manner, particularly for benefits that are not recognized by some stakeholders. Meeting the vital water needs of all also requires greater attention to the policies and institutions, as well as technology for water management. Research is therefore needed to identify opportunities for combining water productivity-enhancing interventions with appropriate benefits sharing mechanisms that result in positive outcomes. This research builds on CPWF research on water productivity and identifies opportunities for compensation or reward for adopting water saving technologies. More water can be released for other users/uses and the environment, thereby contributing to both ecological and human resilience. This research would focus on developing and promoting effective use of guidelines on how to address questions such as:

- What are the negative and positive externalities generated by different actors, and what are the possibilities for

change? What are the associated benefits and costs?

- What is the most appropriate analytical framework for different scales: community, sub-basin and trans-boundary basin? How are benefits perceived at different scales?
- What benefits and costs are experienced by resource-poor and marginalized groups?

### Improving methods for generating credible information and for facilitating its use in consultation and negotiation processes

Generalisations about upstream-downstream linkages and cause-effect relationships of externalities can result in an erroneous diagnosis and design of land and water management interventions. Proper diagnosis and design of water benefits sharing schemes need to effectively address: (1) the complex interactions involved; (2) a lack of appropriate methods to generate information needed to improve our understanding of these complex interactions<sup>3</sup> and their consequences. Although the quantity and distribution of benefits and costs arising from changes in upstream land and water management in both upstream and downstream areas is inadequately understood, it provides the rationale for upstream - downstream cooperation. In addition, inadequate understandings prevail regarding how basin stakeholders respond to various drivers of change and externalities.

The success of water benefits sharing mechanisms is influenced by the perception that benefits providers and receivers have on: (1) the extent to which individual and collective benefits can be increased equitably and sustainably, (2) the willingness of those receiving additional benefits to reward contributors to their gains and compensate the losers; and (3) the extent to which those receiving reward/compensation will consider it to be fair and provide the services they are paid for. Methods are required to generate and apply credible information that disentangle facts from fiction and facilitate informed consultations, negotiations and decision making.

Because the road to water benefits sharing is strewn with many obstacles, effective participation, consultation and negotiation are needed. They are, however, hard to achieve when the information and/or the methods used are contested. Considering the complexity of water ben-

efits sharing schemes and the controversies that generally arise, robust and acceptable methods are needed to generate and facilitate effective utilization of the required information.

Although a wide range of methods have been developed, they need to be adapted for use in the often contentious consultation and negotiation processes. Equally important is the need to build the capacity of key stakeholder (benefits providers and receivers, negotiators, sector managers and researchers) in applying the methods effectively.

*Research on this key research area will focus on developing, adapting and promoting effective use of methods for:*

- Quantifying externalities and their associated costs and benefits;
- Empowering and enhancing participation of the poor and marginalized groups;
- Evaluating alternative (rewarding and compensation) instruments and facilitating associated negotiations; and
- Facilitating scaling up and scaling out of successful water benefits sharing schemes and learning by doing using adaptive management approaches.

### Design and implementation principles of site-specific water benefits sharing mechanisms

Benefits sharing schemes perform well where a series of necessary conditions are present. These include: (a) cooperative action generating additional recognizable benefits; (b) acceptable methods exist for quantifying, valuing and sharing benefits; (c) the goals of different stakeholders are in favour of cooperative schemes over existing governance ; (d) stakeholders are adequately informed and participate effectively in consultations and negotiations; (e) benefits are allocated fairly and the benefits distribution process is efficient and transparent; (f) mechanisms resolve any disagreement; and (g) mechanisms have sufficient flexibility to adapt to changes in the quantities and values of benefits generated and shared.

Enabling conditions encompass the cumulative effect of good policies, regulations, governance structures and processes, organization and political support, power-sharing arrangements, infrastructure, mutual trust and risk reducing mechanisms. There is a general consen-

<sup>3</sup> *The impacts of upstream water and land use and management on downstream water flows, quality, erosion, sedimentation, water table levels and aquatic productivity depend on a number of site-specific bio-physical features, climate and management regimes.*

sus that the performance of benefits sharing schemes improves as the enabling conditions improve.

The primary goal of water benefits sharing schemes is to enhance the benefits derived from water for all parties and to equitably share those benefits. This is achieved by rewarding those who contribute positive benefits and externalities while compensating those who (a) experience negative externalities, or (b) incur additional costs to reduce negative externalities or to generate positive externalities. Benefits sharing schemes have multiple objectives depending on stakeholders, their needs, aspirations and expectations. Numerous benefits sharing mechanisms have been developed and applied in different contexts with differing performance levels.

Urgently needed are benefits sharing mechanisms to manage water allocation trade-offs associated with environmental flows and water requirements for irrigated agriculture, fisheries and aquaculture. For these mechanisms to be most effective, they should be appropriately targeted.

- Research on this sub-topic would focus on developing and promoting effective use of guidelines on how to address questions such as:
- What policy, legal and organizational changes would be needed to support the adoption of benefits sharing schemes
- How would co-management of water, crops, fisheries, grazing and forest resources support benefits sharing schemes?
- What level of trans-boundary cooperation would be most conducive for different types of benefits sharing mechanisms?
- What would be the most appropriate forum and power sharing schemes for resolving conflicts arising from benefits sharing complaints?  
What benefits sharing options would be required under different bio-physical, socio-economic and institutional contexts?
- What consultation and negotiation processes would be suitable for the design and implementation of benefits sharing mechanisms?  
What monitoring and evaluation program would be required to assess the performance of the mechanisms?
- How are they performing and what adaptive man-

agement responses would be required to improve their performance?

- Are existing mechanisms suitable for catalyzing pro-poor and pro-environment increases in water productivity and, if not, what new mechanisms would be required?  
What is the scale (watershed, sub-basin or basin, or community, regional and national) interaction of benefits sharing mechanisms and how would benefits sharing at one scale affect the performance at another scale?
- How can trade-offs associated with short and long-term benefits and with monetary and non-monetary benefits be addressed?

## CPWF niche and value added

Opposition to water benefits sharing includes doubts regarding viability. Some view benefits sharing as a process with numerous obstacles that result in injustice (Sharma, 2005), while others see it as an opportunity to create a better future for all (Berhan and Egziabher, 2005; Sadoff and Grey, 2005). Mechanisms that increase and share benefits have the potential to reduce poverty, inequity and conflict. Furthermore, benefits sharing can enhance social and ecological resilience<sup>4</sup> at all scales (from household to global). Nevertheless, no general consensus exists as to how great the magnitude and extent of the benefits can be. This is a key objective of CPWF Topic 3.

Little concerted research has been conducted to date on water benefits sharing, a gap the CPWF Topic 3 will fill. The gender equitable, pro-poor and pro-environment impacts of well-designed water benefits sharing schemes in the CPWF basins are potentially very large, especially in the Nile, Mekong and Ganges. The CPWF is well-positioned in these basins to bring together key stakeholders to design and implement water benefits sharing schemes and for unlocking the pro-poor potential of water in the CPWF basins and beyond.

<sup>4</sup> CPWF research (PN46), for example, has shown that small community-based reservoirs enhance resilience by using reservoir water during the dry season to diversify livelihood systems (mainly fish and irrigated horticulture production and associated labor activities and trade).

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