



**Water catchments – issues and options
for research**

**Main research questions for socio-economic
work**

FRP consultancy ZF0146

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1. Background

1.1 DFID and FRP research priorities

DFID has recognised the need for reliable mechanisms to capture and distribute the costs of improved forest management activities to deliver better water. It knows that better hydrological data is needed to support such mechanisms. It would like to see the development of decision support systems to enable land-use managers to value catchment water values holistically. This includes:

- Taking in different stakeholder views.
- Working out how to downstream users can compensate upstream land-managers for changed activities.
- Recognising that the process of developing systems, mechanisms and values is at least as important as the end value itself.

FRP is willing to support relatively long-term study into the effects on water flows and quality of land-use change in water catchments with significant cloud forest cover. It wishes to see hydrological research backed up by work that will help land use decision makers to come to sensible decisions about different management and policy options and their effects on up- and down-stream stakeholders.

FRP is looking for original thinking and experimental research in this area. Observational case studies are not adequate. It wants to see work that turns theoretical research into understanding of practical impacts on livelihoods.

1.2 Terms of reference

The consultant was to make use of available documents and human resources (email and telephone) and extract the most significant questions for research that FRP should support. Research should contribute to improve the sustainable livelihoods of forest-dependent poor communities living in or near upper water catchments. The focus is on catchments:

- containing tropical montane cloud forest (TMCF);
- in DFID forestry partner countries or regions in which those countries are found;
- where hydrological work within the same research cluster is being carried out.

Whilst there is no limit to the number of sites, it is anticipated that 1-3 will be finally selected.

The review of literature should ensure proposed research does not overlap with or duplicate work already done, ongoing or in the pipeline. The output will be rationalised sets of socio-economic problems, to be addressed in linked projects, which complement work done or ongoing. Experimental approaches are to be favoured over observational case-studies.

One or more of the socio-economic studies should include:

- Valuation methods appropriate for the different kinds of stakeholders. This study should rationalise the choice of valuation method appropriate to each class of

stakeholder, bearing in mind the need to arrive at consensus among categories of catchment stakeholders about the values of land use changes and land management methods.

- A comparative demonstration of the effect of using different valuation techniques for valuing the whole or parts of the water catchments under study.
- The derivation of a decision support system which takes account of the conclusions from the valuation studies and which enables the variety of stakeholder categories to come to a consensus on land and forest management methods and changes in land and forest uses.
- Also, following from the valuation studies, a rationalisation of the revenues which local and central government may reasonably take from the production of goods and services from upper water catchments, and a rationalisation of the mechanisms by which revenue levels may be set and adjusted. The study should also include mechanisms for capturing the revenue streams.
- A study of mechanisms by which downstream beneficiaries may support or influence the land and forest management methods employed by upstream managers in water catchments. Although these are commonly termed 'compensation mechanisms', the study will take account of the need to avoid paying the potential polluter.

2. Lessons from and gaps in work to date

2.1 Lessons

Importance of equity amongst stakeholders

Neglect of socio-economic issues has caused downfall of many watershed development projects.

Watershed development must recognise the needs of marginalised groups (the poorest, landless, women) if it is to make a contribution to sustainable, improved livelihoods.

Sustainable, long-term improvements require equitable distribution of investment and benefits amongst all stakeholders.

Stakeholder diagnosis is important to assess the differences amongst stakeholders in how they approach and value the issues, and to identify the key questions, conflicts and information needs to achieve sustainable improvements.

Importance of local institutions

Local institutions are usually necessary to facilitate and negotiate sensible cooperation to:

- avoid overuse of the common resource (water) at the local level, and
- achieve equitable understanding and arrangements between up and downstream populations (groups of stakeholders).

Good local institutions require social unity, cooperation and leadership at the local level.

Development and support of local institutions can be crucial - watershed associations have been seen to be effective negotiating platforms in many places.

Importance of government/regulatory institutions

Local learning and debate must link to national decision making for optimal impact.

Effective, decentralised (local) regulation and enforcement, and decision making helps to achieve this.

Market arrangements are useful – but typically only where supported by appropriate institutional arrangements.

Capacity development is usually required to implement mechanisms, both at local and national level.

Importance of market and economic instruments

Regulation is expensive, and if applied alone can cause resentment, but can be important in ensuring equity.

To make land-use that supplies good water competitive with other (i.e. less water-friendly) land-uses the externalities must be financed. Users of land/water must be prepared to pay for the benefit of improved water provision.

Any intervention/mechanism needs to fit into a wider framework of instruments and policies – for example: taxing poor practice, securing tenure, provision of information – and be coordinated with the efforts of other institutions, government departments, and donors.

2.2 Approaches tried

Economic and market mechanisms proposed and tested include:

trust funds, cheap credit for good practice, user-pays (compensation for improved practice), polluter pays (e.g. differential charges for land-use based on ‘damage’ it will do downstream, or taxes on poor practice), tradeable water rights.

Experience with these show that they need to be supported with *policies* that promote: tenure security, development of alternative income opportunities (e.g. ecotourism, NTFP marketing), capacity building (government and local institutions), participation and empowerment of marginalised groups.

‘*Decision support systems*’ (DSS) have been developed for improved land- and forest-use, mainly in European contexts. They provide balanced guidance to decision-makers dealing with the conflicts of the costs and benefits of different land-uses. These could also be used in water (use and supply) decision making.

2.3 Needs

Communication and participation

Increased collaboration between hydrologists and other disciplines (i.e. socio-economists etc) is required.

There is a need for better communication and participation amongst stakeholder populations, in order to:

- break down myths and share truths and realities
- take information from theory to practice and implementation.

Decision-Support Systems (see below) could be a useful tool to promote integration of information from different disciplines.

Valuation methods [and payment mechanisms]

More reliable ways are needed of valuing land-use and water (including social and cultural values as well as economic) to allow *pricing* which best manages demand and increases appreciation of (production of) the resource. Pricing must not exclude the poorest, and should not be subject to inequitable or untransparent ‘lobbying’ from powerful interests.

Need to further develop methods to compare:

- the relative impacts (costs and benefits) of *different/alternative land uses* on the value of the water resource – from both a hydrological and a socio-economic perspective. Methods should account for ‘secondary’ uses/benefits such as conservation, environment, amenity, as well as non-monetary cultural and social values.
- the relative impacts (costs and benefits) to *different stakeholders* – what’s good for one is bad for another – how to negotiate, balance, prioritise? Both willingness and ability to pay should be compared.

Methods such as ‘willingness to pay’ need to be more robust and easy to apply. – need further development.

Better valuation would allow prioritisation of uses of water. This is especially needed where water demand is increasing to match or outstrip supply of water. To promote sustainable livelihoods, basic human consumption and sanitation and environmental needs should be higher priority than major industry, power and intensive agriculture.

Decision-support systems

Needed to:

- link hydrology and economic models into reality for land-users and decision makers etc, and
- help provide a framework for better definition and consideration of stakeholder issues, relations, values (including non-monetary) and priorities.

Need to develop approaches for developing countries/regions. They need to be flexible to tailor to national/local needs using locally available information. They are especially important in developing countries where land-use change is happening rapidly.

Approaches used to date need to be further tested. A DSS needs to be developed for the conditions under which economic and market mechanisms are appropriate and workable. A DSS needs to provide a *process approach* to developing and agreeing valuations in order to reach agreement on optimum benefit of current and future land-uses.

Institutional change

Economic and market arrangements need to be supported by appropriate institutional arrangements and supportive policy development.

New roles need to be clarified for local and government institutions.

2.4 Examples of recent work, current proposals

CREED – Arenal, Costa Rica. Results suggested that clearance to pasture is not necessarily bad, depending on the extent. Optimal socio-economic and hydrological benefit comes from patchwork clearance of cloud forest for livestock production. Mechanisms for downstream water users and upstream land-users to negotiate and support each other are being developed.

CGIAR – SWIM. Aligning water and agriculture strategies. Improving equity of water use beyond the major users.

TMCF Initiative – Formed in 1999 to build and strengthen networks of TMCF conservation and research organisations, to improve information about TMCF conservation, and to produce strategies for TMCF conservation. Lack of funding has limited progress.

WRI – ‘Critical Flows’. Case studies of developing watershed (and other environmental services) markets in; South Africa, Guatemala, Panama.

Forest Trends - Supporting workshops on markets for environmental services issues. Focuses on information sharing to stimulate market development. Mainly attended by developed country participants.

PROFOR – looking at financing of sustainable forestry, little progress so far.

IIED - Proposal to learn from existing experience and establish new markets through action learning in 5 countries.

PRISMA - developing and establishing markets in El Salvador

HELP - linking hydrology and livelihoods

GWP - Global Water Programme

IUCN - Water and Environment Initiative

FAO/CLUWRR - Panama study

IFAD – Upland environmental services (water, biodiversity, carbon) - incentives for the poor in Asia.

Aims – creation of an international effort to establish an ‘Asian Environmental Services Facility’ as a funding base for support.

Includes – Developing and testing payment mechanisms in upto 10 sites, including Trust Funds. Also looking at ‘Negotiation support systems’ (like DSS?)

Key questions:

- Contractual arrangements – how to agree, enforce and monitor?
- How to make payments equitable, and have effect on many households, inc poorest.
- How to create and implement enabling policy framework?

EC Framework 5 proposals

DFID - Udzungwa Mountains, Civil Society Unit project.

Decision Support Systems – UK and European university efforts (Jamieson 1996 and O’Callaghan 1996, in Calder 1999) show/suggest that DSS’s could be designed to meet regional needs. As yet there are none for developing countries or for TMCF. Good information (hydrology, land use, valuations) required to base them on.

3. Research locations

Some of the locations of socio-economic research will be determined by where hydrological work is to be carried out (and where funding is available).

Some of the criteria used for selecting locations of hydrological research and some of the considerations of who that research should target include socio-economic considerations, as follows.

Enabling environment: *Is there supportive and capable government for interventions?*

Why? For integrated planning and/or application of mechanisms to link upstream activities and downstream impacts, there needs to be appropriate institutional and legal framework, capacity and/or political will to provide it.

3.1 Considerations – research target populations

In identifying who the demands for information are from and on whom the focus of research should be, FRP's focus is on improving equity and livelihoods through efficient research. Considerations include:

- Up *and* downstream issues: Focus on local groups only ignores wider concerns for down/upstream populations (e.g. flood-control). Research cannot simply focus on benefits to upstream land-users. (The challenges of linking hydrological research at the local level to water impact at the wider level is recognised).
- Stakeholder characteristics: Populations in different levels/areas of the catchment have different problems, characteristics, strengths and weaknesses, which must be considered, analysed and compared.
- Livelihood dependency: What impacts will changes in land use or water quality/quantity have on people's livelihoods? Do they have alternative options?
- Land tenure: Land-users may have little incentive to change management practices at their own cost if they do not have secure tenure. Changes will only be made if immediate benefits can be made, otherwise investments cannot be justified, especially for the poor.
- Marginalised people: Are the needs of marginalised groups (such as women, landless poor) taken into account? The poorest and most marginalised must be considered, as are most likely to be disadvantaged further by land-use changes.

Research should also consider the likelihood of success. Are the 'pre-conditions of success' in place? These might include:

- Enabling environment - supportive and capable government policy.

'*Policy ripeness*' is a key factor in selecting where research will be most likely be successful. Where work *should* be done is not always where work *could* be done - the political feasibility of being able to accept and implement research outcomes can make a big difference to the long-term success. Along with stakeholder analysis, the state of institutions and policy need to be considered. The *willingness and capability* of land/water users to accept and implement changes can significantly influence success of efforts.

- Few, organised groups of stakeholders.

The existence of organised groups of stakeholders makes *information sharing, communication and negotiation* over costs and benefits more feasible in limited time periods. They are also more likely to raise awareness of issues between up and downstream populations. The poorest and most marginalised must be represented, as are most likely to be disadvantaged further by land-use changes.

- Limited conflict.

Conflicts between groups make it more difficult to clearly see the costs and benefits of land-use and water resource impacts. To enable understanding and compromise about land-use, the stakeholders must be able to ‘talk’.

- Good negotiating platforms and communication routes.
- Adequate public awareness of the concerns/issues.

3.2 Populations – types of water-users

Stakeholder groups of water interests are very varied. They include:

- Farmers - subsistence and large-scale (irrigation)
- Fisheries - local and industrial
- Foresters - plantations, woodlots, agroforestry and reserves
- Public - domestic consumption, sanitation, recreation
- Tourists - domestic consumption, sanitation, recreation
- Industry - small and large
- Municipalities - water suppliers, bridge and road maintenance
- Hydroelectric power providers - dams and reservoirs
- Mining, oil and gas production companies
- Flood plain populations
- Transport - rivers and boats

4. Main socio–economic research questions

FRP seeks to promote and support an experimental approach to research. Observational case study work is not desirable. Learning approaches should seek to resolve research questions, rather than simply share experiences.

4.1 Valuation

There is already a wide range of existing resource valuation methods available. These should not be reworked and improved, but existing methods should be compared for use in different situations. A 'toolkit', with simple indicator-based guidelines for when to use which tools, should be developed which could then be used without extended donor support.

It will be critical to draw out some of the non-monetary (qualitative) benefits from the body of cash-based (quantitative) work done to date. Emphasis should be less on the valuation itself and more on *how* stakeholders define their commodities and values - the criteria each stakeholder uses, and the processes of dialogue and negotiation. Just as payment schemes may be flawed if based on false *information* (hydrological data), they will also be flawed if based on false stakeholder *values* (socio-economic realities).

Comparing methods and options

Research should assess which valuation methods work under which conditions and for whom. Conditions may vary according to: policies, economy, types of predominant water or land use. Stakeholders may be up or downstream, using land and water for subsistence or enterprise.

This will involve investigating what processes and criteria are important in stakeholders' definition of commodities and negotiation of their values? How do different stakeholders decide what resources are valuable to them and how do they establish those values? Products might be:

- Sets of criteria used by different stakeholders for defining commodities.
- Identification of types of process used for valuing those commodities.

This should allow more realistic evaluation of:

1. Different land-uses, and the water-services provided by them, in terms of livelihoods to all (upstream and downstream) stakeholders.

This work should consider:

- implications for and interests of the poorest and most marginalised.
- 'knock-on' effects on health, employment, wealth, education, etc..
- whether it is more efficient/cheaper to change upstream catchment management or to implement downstream water protection measures.

2. Different uses of water, in order to establish prioritisation and pricing.

This must consider:

- the need to prioritise high value water uses (e.g. domestic consumption) over low value water uses (e.g. irrigation)
- competition between uses?
- how best to price water resources for different uses.
- the ability to pay of the user.

3. What land-use and water supply change will mean for different stakeholders?

This should consider:

- that what is an improvement for one group may be worse for another – who is more sensitive to change?
- the trade-offs required to reach equitable consensus between different stakeholders on current and future water and land use options.

Research should *test and compare different valuation methods* to find the most appropriate and workable in any given situation. In all instances, work must:

- ensure account is taken of social, cultural and environmental values (externalities) and of abilities to pay.
- consider that different valuation methods may bring different results – which methods are suitable for which stakeholders?

4.2 Linking upstream and downstream costs and benefits

There is a need to turn current anecdotal experience lessons to share, particularly about what works where. Key elements are the brokering process that leads to price and payment mechanism agreements and the mechanisms themselves. A well negotiated market process should involve all stakeholders being able to express and defend their own needs and values adequately, so that all values are treated fairly. Work should include looking at what triggers co-operative behaviour and acceptance of compromises, and what ensures equity.

What are the best approaches for facilitating communication, awareness and influence?

Research should test and develop approaches to brokering the trade-offs. Establishing what information changes behaviour is key.

This work should establish:

- How and why do people make land-use/water-use decisions?
- What types of socio-political issues influence the negotiations and decisions?
- How can local level organisations influence/inform water/land use decisions?
- What kind of ‘negotiation platform’ is most appropriate, and how should it be supported?
- What information do different stakeholders need in order to be able to negotiate equitably and to change their behaviour?
- Can provision of better information about hydrology/land-use links and markets actually change behaviour?

Institutional issues were also recognised as critical constraints, and enabling processes need to be analysed:

- What conditions trigger acceptance of information and behavioural change?
- Can the willingness, ability and capacity to implement and participate in interventions be compared between different stakeholders?
- What are the conditions of successful brokerage? What makes a brokering process work and what makes it equitable?
- How to identify policy ‘ripeness’ for interventions to be successful?
- Can water payment/compensation mechanisms be linked into wider policy and institutional frameworks in the long term?

- What will be the long-term implication of interventions? How to ensure that they will be positive in the long term?

At least basic stakeholder analysis is key to mapping and characterising the stakeholders in terms of their nature, influence and weaknesses. Negotiation models from common property resource management may be useful in developing guidelines for the brokerage process.

Which economic and market mechanisms are appropriate and workable?

This research should use outcomes of valuation method work and brokerage studies to *compare and test mechanisms* that promote equitable participation in watershed management and product/service issues.

Mechanisms could be:

- ‘Compensation’ mechanisms, which downstream water users support upstream land users to carry out management practices which will improve water services. Such methods need to avoid paying the potential polluter (a disincentive to improve watershed services without payment).
- ‘Polluter pays’ mechanisms, where upstream land users are charged for potentially water-degrading activities, when there are better and equally viable (low cost) options....

Options for *learning implementation* should be informed by observations of previous experiences.

Research should note and consider:

- The trade-offs – from a livelihoods point of view, up and downstream, the costs and benefits of different options? Who might be more or less advantaged by interventions? Ensuring water prices are within reach of the poorest, for example, is key.
- What preconditions are needed for such mechanisms to be effective, appropriate and equitable in the long-term? This should include current and future considerations of policy and government institutions, local social and political dynamics, credit availability, ability of the resource to provide a service, etc..
- Whether market-based mechanisms are preferable to alternative government or non-government mechanisms. Both may be needed to ensure equity.

4.3 Decision support systems

This research should use outcomes of valuation methods and study of brokerage approaches in order to develop and test simple, process-approach guidance to:

- develop and agree valuations
- consider the current and future trade-offs required to reach optimal social and economic benefits from land use in terms of water provision/supply.
- enables stakeholder consensus
- guide decisions on management, mechanisms and policies

Research should aim to develop a model DSS for the conditions under which economic and market mechanisms are appropriate and workable. A DSS need not be

complex. It may be most appropriate for the product to be a set of simple checklists for use by different types of stakeholder. Ideally, this work should be available for use in the sites where hydrological work is still ongoing.

Annexes

Information contributing to this report includes formal literature references (below), an FAO email consultation, and responses to the draft report. The latter includes documentation on specific sites and regions.

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Additional information

FAO Electronic Workshop - Land-Water Linkages in Rural Watersheds.

FAO website (Electronic Workshop case studies and background papers):
www.fao.org/ag/agl/watershed/

International Food Policy Research Institute website: www.ifpri.org/themes/mp10.html

International Water Management Institute (SWIM programme) : website
www.cgiar.org/iwmi/swim/SWIM

IUCN website: <http://iucn.org/themes/wetlands/tmcf.html>

Mountain Forum (electronic forum)

Notes from ARCOS - The Albertine Rift Conservation Society.

Notes from IUCN regional offices - Meso America, Africa.

Notes from UNEP-WCMC's TMCF Initiative - Country database (with thanks to P.Bubb)

Notes from WWF Regional Office - Central America.

UNEP-WCMC website: [www.unep-wcmc.org/forest/cloud forest](http://www.unep-wcmc.org/forest/cloud_forest)