Pay

Establishing payments for watershed services

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The World Conservation Union

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Key messages

1. Incentives for Water Security

Watersheds are the appropriate units for water management
A watershed is the area of land that feeds water into a river, through the process of precipitation draining through the landscape, into tributaries and into the main river channel. Watersheds are also called 'catchments', 'drainage basins' or 'river basins'.

Watershed services benefit people and nature
The various components that make up the landscape within a watershed – for example forests, grasslands, cultivated areas, riparian areas and wetlands – form groups of ecosystems. These ecosystems provide 'watershed services'. These are defined as the benefits obtained from the ecosystems within a watershed that support downstream water users, including ecosystems.

Payment for watershed services is an important innovation in water management
Watershed services are key in creating water security for downstream water users. Providing incentives by paying land and water managers to maintain watershed services is an innovative way of strengthening water security. A wide variety of cases now exist around the world from which one can draw lessons of the do's and don'ts relating to payment schemes for watershed services.

2. Valuing and Managing Watershed Services

Linking upstream land and water use and downstream benefits
For a payment scheme to succeed and endure, the actions and change brought about by upstream land and water managers should result in identifiable benefits for downstream water users. Therefore, clear cause-and-effect relationships between upstream land and water use practices and the provision of watershed services for downstream users needs to be identified. The degree to which this is possible varies considerably from case to case.

Using indicators and targets to define service baselines and track progress
Watershed services are controlled by an 'optimal mix and intensity' of land and water use in watersheds. It is important to define and quantify indicators to track the delivery of watershed services to benefit specific users. These indicators and targets need to relate directly to measurable land and water use variables and should be agreed upon by the stakeholders involved. Planning for new or improved data collection on a limited set of key indicators and targets may be needed as part of the scheme.

Focus investments on agreed actions and locations
It is important to define clearly the goals of the payment scheme based on the causal links established between upstream actions and downstream benefits. Clear goals help to define which

locations will be targeted for specified interventions. It also helps to narrow down the group of stakeholders to be involved in the scheme and the mechanisms to be used. It further creates transparency and trust amongst stakeholders in the scheme.

Build a case for investment through valuation of watershed services
The economic valuation of watershed services can be used to raise awareness of the importance of these services and create support for a payment scheme. However, the final prices agreed within a payment scheme will be determined by the costs and benefits to stakeholders.

Information provision and negotiation among stakeholders are essential
Stakeholders need to be well informed to be able to decide where investments should be made and what changes and impacts are sought. One needs to establish clearly which stakeholders can impact watershed services ('sellers') and which stakeholders can benefit from watershed services ('buyers'). Evidence that relates changes in land and water to levels of watershed services forms an important basis for bringing potential buyers and sellers together.

3. Designing a Payment Scheme

Making watershed services in everyone's interest
With the right ingredients, good design and effective agreements, a payment scheme makes restoration or maintenance of watershed services beneficial to all parties. Looking after watershed services then becomes in everyone's interest, instead of only those threatened by or suffering from the impacts of degradation. The fundamental basis for this shift is the introduction of values for watershed services and linking those values to markets where these services are exchanged.

Creating markets helps to internalise costs perceived as externalities
Payment schemes internalise externalities by creating market mechanisms for exchanging watershed services delivered by upstream sellers for payment by downstream beneficiaries. If well-designed, payment schemes can be a cost-effective and efficient way of influencing choice and behaviour in land and water management throughout a watershed. They can help to increases the awareness among stakeholders of the value of watershed services, encouraging them to make better use of the resources available in order to increase water security.

Understanding the marketplace for watershed services
To establish a market for watershed services, there must be recognition of the goods and services provided by the mix of ecosystems in the watershed as assets. There must be recognition that these assets can be traded and that a price for them can be agreed. Buyers and sellers of watershed services who are willing to consider entering a potential scheme should be identified. Property, access and use rights relating to land tenure and water resources should be clearly established.

There are a range of options for payment schemes
Different types of payments schemes are possible. A *private scheme* involves direct payment to service providers, the purchase of land or the sharing of costs among involved private parties. A *cap-and-trade* scheme establishes a cap for water abstraction or pollution and enables trading

of permits among water users. With a *certification or eco-labelling scheme*, costs of services are included in the price paid for a traded product. Finally, *public payment schemes*, the most common schemes, involve public agencies and include user fees, land purchase and granting of rights to use land resources, as well as fiscal mechanisms based on taxes and subsidies.

Carefully evaluate the options to find the best fit
For any payment scheme for watershed services, the objectives should be clearly stated and the potential economic, social, health and environmental impacts should be assessed. The advantages and disadvantages of various options for schemes need to be compared. Also their suitability should be defined given the social, economic and political context of the scheme. Stakeholders should be informed about and involved in the evaluation of the various options.

Identify financing needs and options for mobilizing funds
Establishing a payment scheme involves not only a financial transfer between service buyers and sellers. Additional costs and transfers need to be included, such as for research and development, training and awareness activities, coordination and administration, monitoring and impact studies, legal fees, inflation and contingencies. Mechanisms for long-term financing of a scheme to cover these costs needs to be identified.

4. Roadmap Towards Agreement

Establishing a payment scheme requires buyers and sellers to negotiate
Negotiations among buyers and sellers of watershed services can take many years. To complete these negotiations successfully, facilitators and stakeholders have to develop a shared understanding of the diverse interests, assets, capacities and power of the players. The aim should be the formation of an agreement that specifies the design and rules for operating a payment scheme that is effective, efficient, enforceable, transparent, equitable and sustainable.

Getting the right parties involved early on
Identify who needs to be involved in negotiation of the payment scheme and gauge their interest through effective communications at an early stage. Aim to have an intermediary act as an honest broker, for example from local NGOs, community groups or government agencies. Involve potential service buyers who use watershed services either directly or indirectly, not forgetting provision for the environment itself. Invite those potential service sellers able to provide the most impact given the amount of financing likely to be available. Identify the specialist support needed at various stages of the negotiations process including hydrologists, ecologists, land user planners, bankers or lawyers.

Carry out targeted analysis to support negotiations
Use stakeholder analysis to guide negotiations towards agreements that will be institutionally feasible and socially and politically acceptable. Use institutional analysis to help negotiators decide which institutions need to be involved in a payment scheme, what roles are appropriate and where new institutions are needed to fill gaps. Assess the relative influence and control over watershed management of different stakeholder groups using power analysis. Ensure that the interests of key stakeholders with little power are protected during negotiations.

Use a range of opportunities to start or advance deal making
Numerous opportunities will arise that can help progress towards an agreement. Opportunities can arise from changes in policies, allowing stakeholders to discuss their implications. Also new information might become available related to watershed services of direct relevance to some or all parties. Tensions, conflict or a crisis might occur that bring parties together and enable them to find new ways to further their discussions. Also a new (local) political leader or champion can appear or be found who can catalyse the parties to sit together and work towards agreement.

5. Rules at Work

Clear and enforceable rules and transaction mechanisms are essential
Payment schemes for watershed services need clear and enforceable rules and transaction mechanisms to operate successfully. All parties understand and agree to these rules and mechanisms. A failure to establish appropriate rules and transaction mechanisms is likely to erode trust and confidence among stakeholders.

Design an institutional framework for the chosen scheme
The key ingredients are effective institutions, reliable contract law, enabled by good governance, capacity for transaction governance and credible enforcement. Hence, setting the rules for payment schemes demands design of an institutional framework for the scheme. This includes the clarification of rights, agreement of obligations among parties, establishment of contractual arrangements and mechanisms for ensuring compliance and enforcement.

Well-defined land and resource tenure are at the foundation of payment schemes
Tenure issues need to be taken into account for property rights to effectively support a payment scheme for watershed services. Hence, property rights must provide for more than the regulation of land ownership and include the natural resources that the land provides. Ensuring that property rights are clearly designated, whether through formal or customary law, is essential if payment schemes are to result in the anticipated incentives for watershed management. Effective registration and administration of tenure rights is an instrument for clarifying rights among stakeholders.

Define and establish mechanisms for assessing compliance
Clear specification of a payment scheme indirectly describes what constitutes compliance. Nevertheless, how compliance will be determined and monitored needs to be stipulated. Compliance can be assessed through field inspections, in which case the methods and procedures used, the institutions involved and other important details must be defined. Compliance can also be assessed through desk reviews, by screening reports prepared on the basis of self-monitoring and record-keeping by service sellers and buyers using agreed procedures. There should be clear designation of responsibilities for proving compliance, and agreed sanctions in cases of non-compliance.

Sound project management is vital

When developing and running a payment scheme, there must be effective coordination among components. Expertise from a range of disciplines needs to be brought together and integrated. This requires team-work and good communications among project staff, experts and stakeholders. This task should not be overlooked or down-played, as it can make or break a payment scheme. A solid project manager with excellent communications skills is therefore required to run the scheme.

Establish an effective and transparent social learning process

A social learning process must enable meaningful and well-informed participation by stakeholders in setting-up and running the payment scheme. Scoping, situation analysis, scenario analysis and feasibility studies are early opportunities to engage stakeholders in social learning. Monitoring and evaluating the results and impacts of a scheme enable use of hard data to inform participants about whether the scheme is achieving what it set out to do. This enables stakeholders to truly reflect on the scheme's achievements and effectiveness. However, seeing evidence at the impact level may take many years.

Carefully assess the effectiveness and acceptance of a scheme

Payment schemes for watershed services demand careful assessment of how useful and acceptable they are to stakeholders. Payments for watershed services are an innovative way of providing incentives for watershed management, but they are rapidly developing into a mainstream tool. More people need to become aware of how to develop and run these schemes. Social learning will remain a critical aspect of developing successful payments schemes in the future.

Preface

Water as a good, a service or a right, is more and more frequently put forward as a major challenge in our globalised world. We are putting our water resources under increasing pressure and we need to address how we deal with this extra stress on our environment. When we add our desire for social equity, economic yield and environmental accountability – the problem becomes extremely complex.

To pay or to compensate for environmental services – how to do this and who has to do it – is not yet fully incorporated into the present models of water management. Today we urgently need new and innovative ideas, tools and ways of working to finance the protection of our water resources. We need to obtain positive, sustainable results which guarantee effective, environmental management of water supplies.

This guide attempts to define a roadmap for the creation of economic mechanisms and tools that relate development to conservation, agricultural and industrial production, and the increasing urbanization of our landscapes.

The search for integrated water resources management is dependant upon the integration of all water users and their needs. This requires their active participation in decision-making based on the co-responsibility and shared aims for the use of resources. Involvement of stakeholders is a fundamental prerequisite and crucial for successfully implementing a payment scheme which finances responsible water management. We hope that this publication is a useful guide for those considering payment schemes. We all need to become involved in such an Endeavour, not only in defining the problems but also in implementing the solutions.

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Chapter 1

Incentives for Water Security

People use the services provided by businesses and government, family, friends and communities in their daily lives. They also use services provided by the ecosystems around them. Often the latter are not recognised until the moment they cease to exist. For example, once barren and eroded hill slopes rapidly discharge sediment loaded water downstream and then it is usually too late to reverse the damage. Silted up reservoirs and irrigation channels then become a major constraint on securing water supplies. Often it will be very costly to reverse and restore watershed services that used to buffer water flows. Watersheds and the services they provide are essential concepts underpinning the creation of incentives for people to invest in watershed services and to better contribute to water security downstream.

1.1 Understanding watershed services

A watershed is the area of land that feeds water to a river, through the process of precipitation draining through the landscape, into tributaries and into the main river channel. Watersheds are also called 'catchments', 'drainage basins' or 'river basins'. All of these terms are essentially interchangeable though they are sometimes applied to different scales. Thus 'river basin' is usually used to describe a watershed covering a large area of land that drains into a major river, while 'sub-catchments' or 'micro-catchments' are much smaller parts of a basin that drain into a tributary stream.

Within a watershed, the quality, quantity and timing of water draining into and flowing along rivers is modified by topography, geology, soil type, vegetation cover, land use and other human activities. Along the way, water is lost – primarily via evaporation from lakes, wetlands, the soil surface and wet vegetation, and through transpiration by plants and trees. Water moving down slopes and stream channels, as well as underground, may carry sediment, nutrients and other chemicals or contaminants. The quality and quantity of water available to downstream users in a watershed thus depends on the particular types and distribution of vegetation, the underlying geology, the soil types present and the way that land is used and managed.

As a watershed determines waterflows, it is an appropriate area for organising the planning and management of water resources. The condition of a watershed, and the management of the vegetation cover, the soils and land resources together with the waterways within it, are therefore integral to planning water allocation and use. Watershed management needs to be at the heart of strategies for securing water supplies and ensuring adequate flow regimes in the river for downstream water users. Those downstream water users, such as irrigators, hydropower operators, municipalities, industries and nature conservationist need to work out together how water can best be allocated.[1]

"WATERSHED SERVICES: THE BENEFITS PEOPLE OBTAIN FROM ECOSYSTEMS IN A WATERSHED."

The various components making up the landscape within a watershed form groups of eco–systems. They include, for example, forests, grasslands, cultivated areas, riparian areas and wetlands. These ecosystems support plant and animal biodiversity, but also provide goods and services that support human welfare (see Figure 1.1). Examples of water-related goods and services provided by ecosystems in a watershed are shown in Table 1.1. These are *watershed services*: the benefits people obtain from ecosystems within a watershed.[2] Changing the mix of ecosystems and their coverage will change the watershed services provided. The waterflows in a watershed, and hence the timing and availability of water downstream, depends on the vegetation cover in the catchment upstream. As ecosystems within a watershed are changed, lost or degraded, their capacity to deliver watershed services to satisfy human needs is changed.

Table 1.1: The main water-related services provided by ecosystems in a typical watershed

Provisioning services **Services focused on directly supplying food and non-food products from water flows** • Freshwater supply • Crop and fruit production • Livestock production • Fish production • Timber and building materials supply • Medicines • Hydro-electric power	*Regulating services* **Services related to regulating flows or reducing hazards related to water flows** • Regulation of hydrological flows (buffer runoff, soil water infiltration, groundwater recharge, maintenance of base flows) • Natural hazard mitigation (e.g. flood prevention, peak flow reduction, landslide reduction) • Soil protection and control of erosion and sedimentation • Control of surface and groundwater quality
Supporting services **Services provided to support habitats and ecosystem functioning** • Wildlife habitat • Flow regime required to maintain downstream habitat and uses	*Cultural and Amenity services* **Services related to recreation and human inspiration** • Aquatic recreation • Landscape aesthetics • Cultural heritage and identity • Artistic and spiritual inspiration

Figure 1.1: The main functions and services of a typical watershed.

1. Forest, sedimentation control
2. Recreation; swimming, fishing, camping and water storage
3. Hydro-electric station
4. Municipal water supply
5. City and industrial waste treatment plant
6. Pump to equalizing reservoir for irrigation.
7. Diversion dam and lake
8. High-level irrigation canal
9. Levees for flood control
10. Erosion control: stream dams, contour terracing and wetland restoration
11. Regulating basin for irrigation
12. Wildlife refuge
13. Low-level irrigation canal
14. Gravity irrigation
15. Contour ploughing
16. Sprinkler irrigation
17. Community water treatment plant
18. Navigation: barge trains, locks, ect.
19. Re-regulating reservoir with locks
20. Farm pond with pisciculture

1.2 Why are watershed services important?

The ecosystems that provide watershed services form part of the infrastructure needed for water security. In practical terms, water security implies several important considerations. Water supplies need to be secured for specific uses such as drinking water, agriculture, industry, transport or downstream ecosystems. On the other hand, it implies reducing water based hazards and risks related to floods, droughts or pollution. Groups of ecosystems in a watershed, such as forests or wetlands, are increasingly recognised for the role they can play in contributing to water security.

With increasing recognition of the contribution of watershed services to water security, more and more emphasis has been placed on determining the value of these services.[3] Also people have started to realise that they need to invest in the maintenance of watershed services, just as they invest in the maintenance of other types of infrastructure. Without such investments, specific watershed services that are beneficial to downstream users are likely to be degraded.

"PEOPLE NEED TO INVEST IN WATERSHED SERVICES."

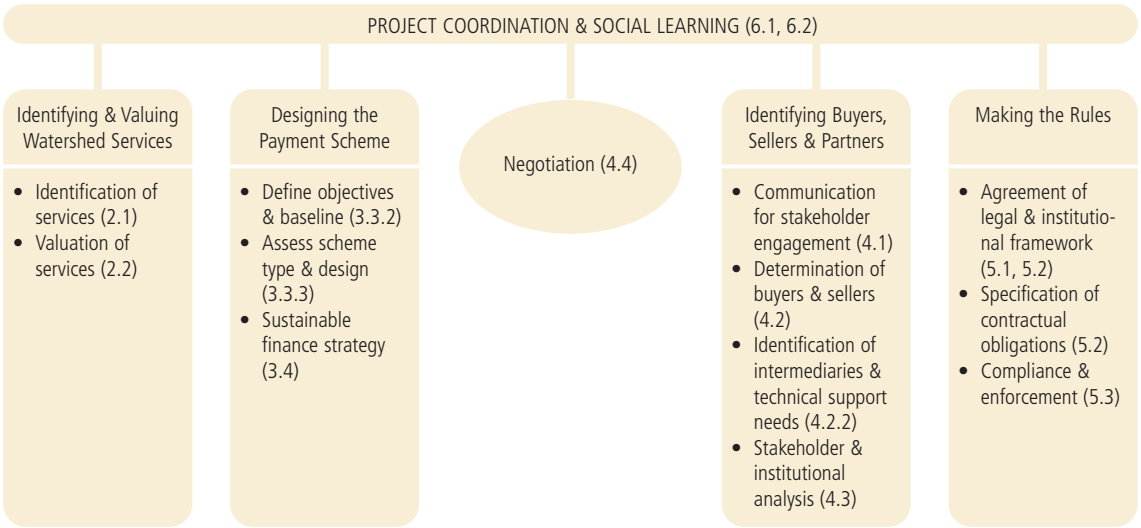
Though people increasingly realise that their water security can be influenced by the management regime in their watershed, they are often ill-equipped to translate this into actions on the ground. Payment for watershed services is an important innovation in water management to address this problem. It uses an incentives-based approach for maintaining watershed services

Photo 1.1 Clean water in rivers downstream depends on the delivery of upstream watershed services (Quito, Ecuador).

that are critical for water security. Over the last decades, a range of pilot schemes have been developed. Often these have used different 'banners' such as Payment for Ecosystem Services (PES), water banks, water trading schemes or water subsidies. Increasingly, information is now available about the do's and don'ts of setting-up and managing these schemes.

PAY responds to the demand for more synthesised, practical information on establishing and running payment schemes for watershed services. This demand is expressed by potential buyers and sellers of watershed services, as well intermediaries who often facilitate the setting-up and running of payment schemes. The aim of PAY is to assist these parties in designing schemes that are effective, efficient, sustainable and equitable. PAY provides an overview of the various components that must be brought together to establish a payment scheme for watershed services. A number of critical issues are addressed in the various chapters, as summarised in Figure 1.2.

Figure 1.2: Components that must be brought together during development of a payment scheme for watershed services. Numbering refers to Sections in Chapters 2-6 discussing each component.



First of all, PAY clarifies what watershed services are, how to measure them and how to put a value on them. It also explains why it is vital to establish a clear causal link between improving or avoiding degradation of a watershed service and direct outcomes related to water security. Without this link, a payment scheme is unlikely to galvanise wide support from potential buyers.

Secondly, PAY distinguishes a range of payment schemes for watershed services. Understanding the various mechanisms, their pros and cons as well as their 'basic mechanics', is important for selecting a specific approach for a particular situation. It further explains the viewpoints of both buyers and sellers of watershed services. Finding a bridge between these two perspectives is crucial for establishing a payment scheme.

Following this, PAY defines how to bring buyers and sellers together. Understanding the policy, institutional and legal context is critical in this regard. PAY explains how, based on sound stakeholder analysis, the right selection of stakeholders can be made from the start of developing a scheme.

"PAYMENT FOR WATERSHED SERVICES IS AN IMPORTANT INNOVATION IN WATER MANAGEMENT."

PAY then defines the range of policy and legal issues involved in establishing and running a payment scheme for watershed services. Key ingredients of payment schemes are effective institutions and a reliable contract law or clear customary law. These should be enabled by good governance, effective capacities for governance of transactions and credible enforcement. PAY shows how the clarification of rights, agreement of obligations among parties, establishment of contractual arrangements and mechanisms for ensuring compliance and enforcement all form part of a successful scheme.

Finally, PAY explains what is needed to keep a payment scheme together over longer periods of time. Monitoring, evaluating, learning and updating the scheme are all critical parts of the sustainability of a successful scheme.

Chapter 2

Valuing and Managing Watershed Services

Understanding connections is critical to developing payment schemes for watershed services. Payment schemes have to link watershed management to downstream impacts, and therefore the interests and motivations of upstream and downstream stakeholders. Values for watershed services have to be linked to decision making in watersheds. There are key issues that must be understood before these connections can be used to construct a payment scheme. How does watershed management relate to sustainable use of watershed services, and how can the condition of watershed services be monitored? These are critical questions because identifying the cause-and-effect links between watershed management and changes in the delivery of watershed services is a fundamental building block of payment schemes. Who are the beneficiaries of watershed services, and who are the suppliers or providers of services? Creating economic incentives for watershed management demands that the influence of values for watershed services on the choices and behaviour of these stakeholders is understood. Connecting watershed management to valuations for watershed services and to decision making helps to build a case for payment schemes. Raising interest, awareness and understanding of these connections is vital to ensuring that paying for watershed services can be justified to stakeholders.

2.1 Linking land and water use to downstream benefits

The relationship between the condition of ecosystems in a watershed and its capacity to provide watershed services is fundamental to the concept of payments for watershed services. It is the basis for linking the needs and welfare of downstream users of water or aquatic resources to the actions of managers responsible for upstream waterways, vegetation cover, soil use and land management. It is what links the economic interests of downstream fishers, irrigators, dam operators and water supply companies to decision making by distant upstream farmers, foresters and land-use planners. Recognition of the downstream benefits of watershed services is the motivation for trying to influence decision making and management upstream. Schemes supporting payment for watershed services are designed as one means of using economic incentives to influence how watersheds are managed.

"CONNECTING WATERSHED MANAGEMENT TO VALUATIONS HELPS TO BUILD A CASE FOR PAYMENT SCHEMES."

2.1.1 Watershed management

Indicators for watershed services

In identifying approaches for managing watershed services, a useful question to ask is how much of the services needed downstream can be supplied by the watershed? What is the capacity

of the watershed to meet the demand for services? Capacity for service provision depends on biotic and abiotic characteristics of the mix of ecosystems in the watershed. Different ecosystems in the watershed (e.g. forests, grasslands, rivers) provide different combinations of services, in different amounts and at different times of the year.

"DIFFERENT ECOSYSTEMS PROVIDE DIFFERENT COMBINATIONS OF SERVICES."

The challenge for managers who have to decide on the optimal mix and intensity of land use in watersheds is to define and quantify indicators to track the delivery of watershed services (see Table 2.1). For example, the capacity of the watershed to provide fish can be measured by maximum sustainable harvest levels, the capacity to deliver water throughout the dry season can be tracked by hydrological parameters and the attractiveness for recreational use can be monitored by the willingness to pay of visitors or potential visitors. It is important to remember, though, that most functions and processes in ecosystems are inter-linked. Thus, to be meaningful, indicators of sustainable use of watershed services need to provide information on both the status and the dynamic interaction between ecosystem components (e.g. land cover) and processes (e.g. water flow).

In preparing the development of a payment scheme for watershed services, sources of appropriate indicators and data need to be identified. The data needs to be acquired and organised into formats useful for the planning, negotiation and monitoring of payment schemes. The type of data required is determined by the criteria chosen for allocating payments and monitoring impacts. Where the availability or quality of data is inadequate, design of the payment scheme will have to include plans for new or improved data collection on a limited set of key indicators and targets.

Relating land use and management to watershed services

Having measures of sustainable-use levels for watershed services does not, however, provide enough information to create a payment scheme. Clear targets need to be set for maintaining or improving critical indicators. Once defined, these targets provide a simplified description of the desired state of the watershed. The payment scheme can then be designed to either maintain or restore the target level for a particular indicator.

"TARGETS ARE A SIMPLIFIED DESCRIPTION OF THE DESIRED STATE OF THE WATERSHED."

To create a payment scheme, there are four key questions:

- What should be invested in?
- Where should investments be made?
- How much should be invested?
- Who should be investing?

Answers to the last two questions are discussed in Chapters 3 and 4, respectively. To decide what to invest in and where, knowledge is needed about how the quantity, quality, timing and duration of watershed services responds to changes in the type of land cover, land use and management regimes.

Table 2.1: Watershed services and examples of indicators of the state of services and sustainable use levels

Watershed services	Service attributes	State indicator	Sustainable use indicator
Provisioning services			
Water supply	• Precipitation, infiltration, soil water retention, percolation, streamflow, groundwater flow • Biotic and abiotic effects on water quality	• Water storage capacity (m^3/m^2) • Pollutant concentrations	• Discharge (m^3/year)
Food provision	• Crop, fruit and livestock production • Edible plants and animals (e.g. fish, algae, invertebrates)	• Agricultural water use (m^3/ha) • Fish stock (kg/m^3)	• Maximum sustainable water use for irrigation (m^3/year) • Net Productivity (kg/ha/year)
Non–Food goods	• Production of raw materials (e.g. timber, reeds) • Production of medicines	• Amounts available (kg/ha/year)	• Maximum sustainable harvest (kg/ha/year)
Hydro-electric power	• Flow for energy generation	• Storage capacity of riverbeds and lakes (m^3/km^2) • Slope (deg), elevation (m)	• Maximum sustainable energy production (kWh/year)
Regulating services			
Regulation of water flows	• Retention of rainfall and release (especially by forests and wet-lands) • Water storage by rivers, lakes and wetlands • Groundwater recharge and discharge	• Infiltration capacity (mm/h) • Water storage capacity of soils (m^3/m^3)	• Baseflow volume (m^3/year);
Hazard mitigation	• Reduced flood peaks and storm damage • Coastal protection • Slope stability	• Maximum natural water storage capacity (m^3/m^2)	• Size (km^2) and economic value (US$/$km^2$/year) are protected from flooding
Control of soil erosion and sedimentation	• Protection of soil by vegetation and soil biota	• Infiltration capacity (mm/h) • Slope length (m) • Barren land (%)	• Soil loss (kg/ha/year) • Sediment storage (kg/ha/year)
Water purification	• Reduced siltation of streams and lakes • Nutrient uptake and release by ecosystems • Removal or breakdown of organic matter, salts and pollutants.	• Nitrogen amount (kg/ha) • Total dissolved solids (kg/m^3) • Electric conductivity (µS/cm)	• Denitrification (kg/ha/year)
Supporting services			
Wildlife habitat	• Wildlife and nursery habitats	• Resident and endemic species (number) • Surface area per ecosystem type (ha)	• Increase or decline in species population size (number)
Environmental Flows	• Maintenance of river flow regime	• Area of critical habitats (ha) • Discharge for each season (m^3/day)	• Fish species and population • Total fish catch (t/year)
Cultural & amenity services			
Aesthetic and recreational services	• Landscape quality and features	• Stated appreciation • Recreational value (e.g. entrance fees (US$/visit)	• Houses on lakeshore (number/km) • Visitors (number/year)
Heritage and identity	• Landscape features or species	• Cultural significance and sense of belonging	• Visitors (number/year)
Spiritual and artistic inspiration	• Inspirational value of landscape features and species	• Books and paintings using water-shed as inspiration	• Pilgrims (number/year)

Photo 2.1 Village led, research discussions on water flows (Thai Baan, Thailand).

Table 2.2 helps to identify what land-use and land-cover types are most favourable to given watershed services. Comparing columns in the table indicates how the mix of services available shifts as a result of changes in land cover or use. For example, clearing forests to expand the area of cultivated land in a watershed will increase the provision of food and some other products but will change and often reduce the availability of many other services, such as hazard mitigation, control of sediment runoff and wildlife habitat. Payment schemes aiming to maintain a particular watershed service or set of services need to create incentives that prevent changes in land cover that will degrade service provision. Where schemes aim to restore specific watershed services, they need to create incentives that promote change to land uses and management practices that improve provision of these services.

"PAYMENT SCHEMES CREATE INCENTIVES TO IMPROVE PROVISION OF SERVICES."

In the Murray-Darling Basin in Australia, a payment scheme is used to finance restoration of natural vegetation as a strategy for controlling dryland salinisation (Case 1).

Case 1: Salinity credits used to finance upstream reforestation in the Murray-Darling Basin, Australia [4]

Widespread land clearing for agricultural development in the Murray-Darling Basin has caused salinisation of soils and irrigation water in many areas, resulting in severe loss of agricultural productivity. Clearing natural vegetation means that less water is transferred to the atmosphere, causing the water table to rise and deposit mineral salts in the soil and surface waters. Dryland salinity severely affects 40% of private land managers in New South Wales, and saline water is estimated to affect 15% of irrigated land, with a further 70 to 80% of irrigated land threatened.

In 1999, State Forest of New South Wales (a government agency), entered into a 'Pilot Salinity Control Agreement' with Macquarie River Food and Fibre (MRFF), an association of 600 farmers in the Macquarie River watershed. The agreement provides financing for tree planting as a cost-effective strategy for reducing salinity in river systems. The MRFF purchases salinity credits from State Forests based on water use by restored forests in the upper watershed. Farmers pay US$ 45/ha/year. The funds generated are used for restoring natural vegetation on public and private land. The aim is to restore 40% of the cleared forest, which is necessary to reverse the salinisation process.

In reality, it is not possible to simply replace undesirable characteristics of land cover or management with desirable ones. Trade-offs are inevitable. These may be between watershed services, types of benefits and different beneficiaries. For example, planting of fast-growing trees in a degraded area will increase erosion control and reduce downstream sedimentation, but may also reduce water yields. Incomes of land users or employment opportunities may also change.

Table 2.2: Simplified relationship between land-cover type and the watershed services they provide [5]

Watershed services	Land cover type					
	Grasslands	Forest	Cultivated land	Rivers and streams	Lakes	Marshes, swamps, floodplains
Provisioning						
Water supply	medium +	medium +	negative	high +	high +	low +
Food	high +	low +	high +	low +	high +	high +
Non-food goods	low +	high +	low +	low +	low +	medium +
Hydropower	medium +	low +	negative	high +	high +	low +
Regulating						
Regulation of flow	medium +	low +	medium +	high +	high +	high +
Hazard mitigation	medium +	low +	medium +	low +	high +	high +
Control of soil erosion and sedimentation	medium + / -	high +	negative	medium +	medium +	medium +
Water purification	medium +	low +	negative	low +	low +	high +
Supporting						
Wildlife habitat	medium +	low +	medium +	high +	high +	high +
Environmental flows	medium +	high +	negative	high +	high +	high +
Cultural and amenity						
Aesthetic and recreational services	medium +	low +	medium +	high +	high +	low +
Heritage and identity	medium +	low +	low +	high +	high +	low +
Spiritual and artistic Inspiration	medium +	high +	medium +	high +	high +	low +

It is vital that watershed services included in a payment scheme are selected in close consultation with the main stakeholders, and are based on the best available analysis of the potential impacts of proposed changes in land-cover type or management. A useful step to support identification of trade-offs is to describe the various services available from each of the main land-use types or ecosystems in the watershed (e.g. grassland, forest, river, wetland, or lake) in detail, and to then map the spatial distribution of the ecosystems and the main groups of stakeholders involved. Results from the stakeholder analysis (Chapter 4) can then be used to understand how the interests of different groups may be impacted by proposed changes in land cover and management.

Information provision and negotiation among stakeholders are essential to deciding *where* investments financed by payment schemes should be made. The information used by stakeholders in this process has to enable them to agree on what changes in land use or management need to be promoted or avoided by financial incentives. Evidence that relates change to levels of watershed services forms an important basis for creating transparency and trust in the effectiveness of a payment scheme.

"EVIDENCE OF WATERSHED SERVICES IS IMPORTANT FOR TRANSPARENCY AND TRUST."

For certain land use and land cover types the relationships with downstream water flow regimes is well established. For example, soil loss and river sedimentation is reduced in cultivated areas by farming systems using zero-tillage or agroforestry compared to cropping systems that leave the soil bare for parts of the year. Also it is well established that intact old growth forest provides higher water quality.

Thus, there is a well established knowledge base around the link between land use or management practices and water quality and sedimentation.

A more varied picture has emerged around the relationship between forest cover and water quantity. Traditionally many have assumed a universal hydrological 'benefit' from forests for downstream water users. Increasingly, it has been demonstrated that this is not always the case. For example, forest cover in arid and semi-arid areas has negative impacts on the dry season flow available downstream, as water is 'lost' through evapotranspiration. In many cases it is important to establish the relationship between forest cover and water yield before starting with the development of a payment scheme. Where knowledge is inadequate, payment schemes can be undermined by generalised assumptions that can be misleading and result in unintended impacts and unexpected outcomes from changes in land use or management (Box 2.1).

To make payment schemes for watershed services successful, misunderstandings over relationships between land-use management and watershed services need to be avoided. Careful and location-specific analysis of information on watershed services, land use and management practices forms a critical step in developing payment schemes. The best available data and up-to-date knowledge of how land cover characteristics change watershed function should be brought together. Expert analysis can then provide the evidence base for decisions on actions to be supported by the payment scheme and their likely impacts on watershed services. Where there is not sufficient data, expert panels can be used to analyse and provide a 'best estimates' of likely responses to interventions in land use and management aimed at improving watershed services.

"LOCATION-SPECIFIC ANALYSIS IS CRITICAL FOR SETTING-UP PAYMENT SCHEMES."

Box 2.1: The impacts of forests on watershed services

There is a widely-held and persistent idea that retaining forest cover is always a good thing and deforestation always a curse for watershed management. This assumption leads, however, to management decisions that do not always work out as expected. In some situations, the real impacts of afforestation or forest removal can be rather different. For example:

- It came as a great surprise to foresters in Fiji when it was discovered that planting fast-growing exotic pine trees to boost timber and paper pulp production from otherwise marginally productive, fire-climax grasslands more than halved dry season streamflows. Water security for numerous villages situated downstream from the forest estate was unintentionally jeopardised as a result.
- Planting exotic trees in sub-humid parts of South Africa is no longer considered a merely positive act because of their detrimental effects on water availability. A 'water tax' is now being charged if such income-generating activities are likely to reduce streamflows.
- Montane cloud forests are known for their very high water production capacity, which has been traditionally ascribed to stripping of water by the forest canopy from frequent fog. It was feared therefore that clearing of cloud forest would cause streamflows to diminish. Recent evidence from Costa Rica has shown, however, that the overall hydrological impact of cloud forest conversion was close to neutral, because reduced cloud stripping was more or less balanced by the lower water use of grassland.

Overcoming assumptions about forest hydrology should not, however, dictate decisions about how forests are used in watershed management. Evidence of the relationship between montane cloud forest and streamflow, for example, should not be taken to mean that cutting cloud forests has no adverse impacts. Erosion and landslide incidence can be expected to increase after conversion, and numerous rare and endemic species would be lost. It is critically importance, therefore to include all relevant watershed services when assessing the impacts of change in land cover, not just the effects of forests on streamflows.

2.1.2 Who are the service providers and who are the beneficiaries?

Watershed services are provided by land and water managers upstream whose decisions, either individually or collectively, impact on flow regimes and the quality and quantity of water available downstream. The beneficiaries of watershed services are those downstream whose interests and livelihoods depend directly or indirectly on the amount of water available and on the level of sediments, nutrients or other chemicals in the water. Direct benefits of watershed services include, for example, timely availability of high quality water for irrigation or drinking water supply. Indirect benefits include the appropriate flow regime to maintain a downstream wetland that supports a subsistence, commercial or recreational fishery. Thus, beneficiaries of watershed services include downstream ecosystems, and those who use and value those ecosystems.

"BENEFICIARIES OF WATERSHED SERVICES INCLUDE DOWNSTREAM ECOSYSTEMS."

When designing a payment scheme for ecosystem services, however, such a general definition of service providers and beneficiaries is not adequate. To discover who the relevant upstream and downstream stakeholders are, the water-related problem or security issue must be clearly defined. Downstream stakeholders must then be identified through analysis of who will have sufficient financial interest in particular watershed services to be motivated to pay for their upkeep. Upstream stakeholders should be equally carefully identified, to be sure that those who take part in the scheme and are eventually paid for managing watershed services are actually able to administer the desired controls on the use or management of land and waterways. Upstream service providers must be situated in the targeted areas in the watershed and able to implement decisions that will make a difference to downstream water quality, quantity and flow regime.

Scale is a critical issue in linking watershed services and stakeholders, and thus in designing payment schemes. Downstream beneficiaries may be interested in watershed services that are relevant to large areas – for example provision of sufficient water for hydropower generation. Upstream managers may, however, operate only on very small areas of land and thus individually have almost no influence on the service in question. Design of a payment scheme for watershed services then has to include assessment of the costs and benefits and trade-offs relevant to managers working at such a scale and to mechanisms for ensuring that sufficient impact is possible through collective action to justify payment. For example, using a payment scheme to support maintenance of ecosystem services provided by the upper watershed will put restrictions on use of this area by local stakeholders. The impacts of these restrictions on local livelihoods have to be assessed when planning potential payment schemes.

"PAYMENT SCHEMES HAVE TO REFLECT A COLLECTIVE INTEREST AND CAPACITY TO PAY."

Very different scenarios for payment schemes are possible where there are shifts in the scales relevant to services providers and beneficiaries. For example, large-scale establishment of fast-growing tree plantations for timber and pulp production in areas that do not have sufficient rainfall to support evergreen forest has often led to major reductions in annual and seasonal streamflow available to downstream users.[6] If downstream water users are small-scale irrigators or fishers, any payment scheme would have to reflect their collective interest and their capacity to pay, and perhaps therefore involve public institutions. Thus, in addition to knowing who the upstream and downstream stakeholders are, it is critical to understand how their interests and capacity for action relate to the scale of the desired impacts and action needed in the watershed.

2.2 Valuation of watershed services

2.2.1 Justifying investment in watershed services

Investments in watershed services must be supported by sound economic and financial analysis. Without this analysis, investments are difficult to justify and potential investors are unlikely to be motivated to invest sufficiently. Understanding the economic value of watershed services enables more informed decision making on investment and development in watersheds. It helps to ensure that decisions are justified in the context of a more complete picture of the

values and benefits at stake when water services are impacted by change in a watershed. To better understand the economic value of watershed services, a range of methods can be used.[7] The information derived from such valuation of watershed services helps to determine the true costs and benefits of various land-uses and trade-offs involved in deciding between them. Making values for watershed services explicit also helps to motivate people to consider these services in decision making in the first place. Failure to recognise these values often leads to under-investment in watershed services at the cost of degradation of the entire ecosystem.[8]

"INVESTMENTS MUST BE SUPPORTED BY SOUND ECONOMIC AND FINANCIAL ANALYSIS."

Valuation of ecosystem services is based on the concept of *Total Economic Value* (TEV), which has become a widely used framework for looking at the value of ecosystems. Total Economic Value is typically disaggregated into two categories *use values* and *non-use values* (Figure 2.1). Use value is composed of three elements:

- *Direct-use value*, which is also known as the extractive, consumptive or structural use value, is mainly derived from goods that can be extracted, consumed or enjoyed directly. Examples of these goods include drinking water, fish and hydropower, as well as recreation activities.
- *Indirect-use value*, which mainly derives from the services that the environment provides, including regulation of river flows, flood control and water purification.

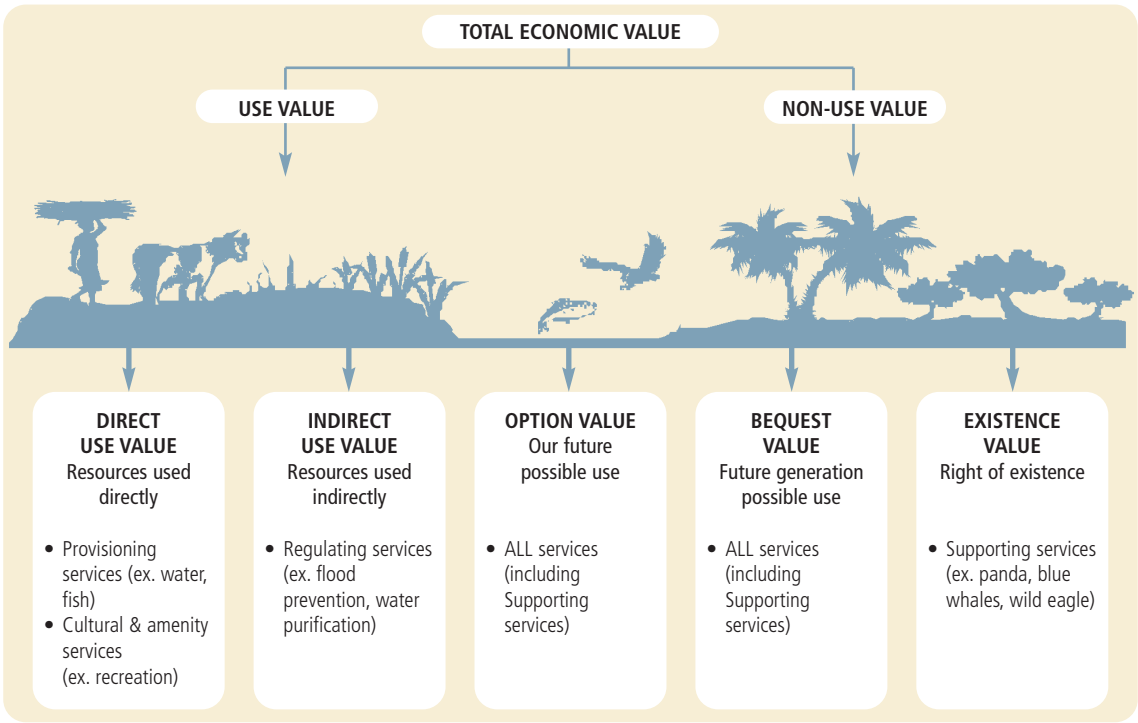
Photo 2.2 Downstream fisheries are dependent on quality water derived from upstream watershed services (Barra de Santiago, El Salvador).

- *Option value*, which is the value attached to maintaining the possibility of obtaining benefits from ecosystem goods and services at a later date, including from ecosystem services that appear to have a low value now, but could have a much higher value in future because of new information or knowledge.

Non-use values, on the other hand, derive from the benefits the environment may provide that do not involve using it in any way, whether directly or indirectly, and comprise:

- *Existence value*, which is the value people derive from the knowledge that something exists, even if they never plan to use it. Thus people place value on the existence of blue whales or pandas, even if they have never seen one and probably never will, as demonstrated by the sense of loss people would feel if they ever became extinct.
- *Bequest value*, which is the value derived from the desire to pass on ecosystems to future generations.

Figure 2.1: The Total Economic Value of ecosystems[9]



Investment decisions for development projects in intact watersheds have conventionally focused only on direct-use values and ignored the other components of TEV. As a result, there are many instances where development has ultimately led to the need for restoration of watersheds and watershed services at high cost. In the Netherlands for example, where there is a long tradition of draining wetlands, dikes have been the preferred choice for managing water and preventing flooding. With the protection offered by these dikes, infrastructure, agriculture, housing and industry are now concentrated in former wetlands, and the cost of flooding in these areas is therefore very high. However, as the cost of restoring lost wetlands is much less

than the cost of the infrastructure needed to avoid floods, a programme of river restoration has commenced and includes broadening floodplains, (re)creating water retention areas in natural depressions and (re)opening secondary channels of rivers.[10]

"PAYMENT SCHEMES NEED TO RELATE TO THE CHANGES IN THE BENEFITS FROM SERVICES."

Another example of using valuation of watershed services in planning investment decisions comes from New York City (Case 2). New options for investment in infrastructure for water filtration resulted from better understanding of indirect use values of the watersheds supplying water to the city.

Case 2: Sustainable water management in the Catskill and Delaware watersheds, USA[11]

The Catskills and Delaware watersheds provide New York City's 9 million residents with 90% of their drinking water supply. The watersheds have a population of 77,000 and cover an area of 4,000 km^2. Historically, these watersheds have supplied high quality water, but in the 1980s concerns about pollution increased. In 1989, the United States Environmental Protection Agency initiated a requirement that all surface drinking water supplies had to be filtered. This could be waived if there were existing treatment processes or natural watershed services that provided safe water. In 1992, the City of New York decided to invest in protecting watersheds rather than new water filtration facilities, which would have cost US$ 6 to 8 billion to build and US$ 300 million annually to operate.

The costs of investing in watersheds to maintain and restore natural filtration are much lower. Diverse mechanisms for investment in the watersheds are used. Investment of US$1 to 1.5 billion over 10 years was financed by a 9% tax increase on New York City water bills. In comparison, a new filtration plant would have required a two-fold increase in water bills.

Funds have been used to finance a US$ 60 million trust fund for environmentally sustainable projects in the Catskill watershed. The City has provided US$ 40 million in compensation to cover the additional costs of dairy farmers and foresters who adopted best management practices. Foresters who adopted improved forest management, such as low impact logging, received additional logging permits for new areas. Forest landowners with 20 ha of land or more that agree to commit to a 10-year forest management plan are entitled to an 80% reduction in local property tax. The City is also purchasing development rights for sensitive land near reservoirs, wetlands and rivers at market price. Farmers and forest landowners are able to enter into 10 to 15 year contracts with US Department of Agriculture to remove environmentally sensitive land from production.

Incorporating ecosystem services into decisions on watershed management thus changes the range of options available, and may also change the choices made. Increasingly, it is being shown that options which accommodate sustainable use of multiple ecosystem services are not only more ecologically sound but can also be economically more beneficial.[12] Investments in watershed development and management therefore need to be scaled on the basis of returns measured in terms of TEV. Similarly, payment schemes for watershed services need to be related to the changes in the value of benefits from the watershed services they are designed to maintain

or restore. If these values are low, payment may not be justified and a payment scheme may not be an appropriate incentive for sustainable management of watershed services. Awareness of the value of watershed services (Table 2.3) – and the justification for creating incentives – is needed to build understanding and support for payment schemes.

Table 2.3: Estimates of economic values of watershed services[13]

Service Type	Service provided	Developed economies (US$/ha/year)	Developing economies (US$/ha/year)
Provisioning services	Water for people	45 - 7500	50 - 400
	Fish/shrimp/crabs	200	6 - 750
	Agriculture and grazing	40 - 520	3 - 370
	Wildlife (for food)	40 - 520	0.02 - 320
	Vegetables and fruits	40 - 470	1 - 200
	Fibre/organic raw material	45	1 - 40
	Medicinal plants		6
	Inorganic raw material	15 - 160	0.1
Regulating services	Water quality control	60 - 6700	20 - 1400
	Flood mitigation	15 - 5500	2 - 1700
	Groundwater replenishment		10 - 90
	Erosion control		20 - 120
	Carbon sequestration	130 - 270	2 - 2000
	Microclimate stabilisation		10
Supporting Services	Biodiversity conservation		0.6 - 3600
Cultural and Amenity services	Recreation and tourism	230 - 3000	20 - 260
	Cultural/religious activities	30 - 1800	80

2.2.2 Methods to determine monetary values

There are a variety of approaches used for assessing and quantifying the economic value of watershed services. There is no best method. The choice depends on the context, types of ecosystem services taken into account and funding available for the assessment. However, selecting the approach most suited to a particular assessment should be based on knowledge of the characteristics, strengths and limitations of each method. Detailed explanations of the methods and practical case studies are provided in the WANI toolkit VALUE.[14]

Where constraints on the availability of human or financial resources mean that new valuation studies are not done, values are sometimes taken from previous studies that focused on a different region or time period. However, each decision-making situation is unique, and therefore data obtained from one location may not always be applicable in another place. Thus, caution should be used when applying results from elsewhere to approximate the value of a watershed service in a specific area.

"VALUATION OF ECOSYSTEM SERVICES IS AN IMPORTANT TOOL IN THE PROCESS OF DEVELOPING PAYMENT SCHEMES."

It is also important to consider the scale at which studies are done. Valuation studies undertaken at a small scale (e.g. a small sub-catchment) may underestimate watershed values on a larger scale (e.g. the entire basin), as not all of the downstream effects are considered. However, the larger the scale, the more difficult is the task of assessing the value of watershed services.[15]

The Total Economic Value of ecosystems is a very useful instrument for raising awareness of the importance of ecosystems to human society and for increasing the acceptability of payment schemes. However, to design payment schemes, it is knowledge of the change in benefits to stakeholder groups resulting from changes in watershed services that must guide establishment of appropriate levels of compensation.

2.3 Moving from valuation to setting-up a payment scheme

2.3.1 Distinguishing valuations from prices

Valuation of ecosystem services is an important tool in the process of developing payment schemes. Valuations are used to demonstrate the contribution of watershed services to the local and national economy and how payment schemes can be economically beneficial to stakeholders. They help to increase awareness of the existing benefits that water-related ecosystems provide to people, and thus build support among local stakeholders and politicians for the establishment of payment schemes. They also enable a comparison of the economics of payment schemes with other alternatives.

However, valuations do not determine the prices paid by beneficiaries of watershed services to service providers. As in any transaction between contracting parties, prices paid for watershed services under payment schemes are the subject of negotiations guided by the interests and preferences of the beneficiaries and service providers.

"PRICES PAID FOR WATERSHED SERVICES ARE THE SUBJECT OF NEGOTIATIONS."

For downstream beneficiaries, the price they are willing to pay will be measured against the added cost that would result from a detrimental change in the watershed services supplied from upstream. This is the marginal cost downstream of watershed degradation – resulting from loss of benefits or the cost of replacing benefits – and it will not be worthwhile for beneficiaries to pay a price for watershed services that is any higher. For example, dam operators would not pay more to maintain flows in a river than the income they would lose if flows were reduced. Similarly, water utilities would not in principle have an incentive to protect a wetland from destruction if it was cheaper to obtain the same water purification benefits by building a filtration plant.

The price upstream service providers are willing to accept is determined by either the added costs they must bear to increase service provision, or the income they must forego – the opportunity cost – if they elect to give up management practices or changes in land use that degrade watershed services. For example, re-vegetating and excluding cattle from streambanks can help to reduce erosion and downstream sedimentation of waterways, but will increase costs for ranchers upstream, because of re-vegetation works and the need for fencing. A payment scheme

offering a price that is lower than these costs will not be attractive to ranchers. Similarly, a payment scheme aiming to provide an incentive for landowners to retain forest on sloping land will have to offer a price that replaces income that would otherwise have been obtained from converting forest to pasture or cropping.

2.3.2 The ingredients of payment schemes

The basic elements of a payment scheme for watershed services are summarised schematically in Figure 2.2. Here, upstream land-use and management practices are related – through a series of steps and using an array of information and data – to payments from downstream service buyers to upstream service providers.

These steps begin with activities (or potential activities) by upstream land users that modify hydrological processes controlling water quality, water quantity and the timing of flows. In turn, these impact the watershed services available downstream, which affect the welfare of individuals and communities and the profitability of industries and business. Where impacts on watershed services are negative (e.g. increased pollution) and where regulations do not impose controls on upstream activities, downstream stakeholders then need to think of options for reducing or counteracting the loss of services they face. They can use valuation studies to compare the costs and benefits of alternate means of restoring or maintaining watershed services. They can then identify which potential solutions are most cost effective. If paying upstream stakeholders to either apply desired management practices or prevent detrimental change in land use proves to be a cost-effective option, then the potential service providers upstream need to evaluate the financial profitability of complying. This can be done by comparing the net profits generated by alternative land uses or management practices, taking into account potential payment schemes.

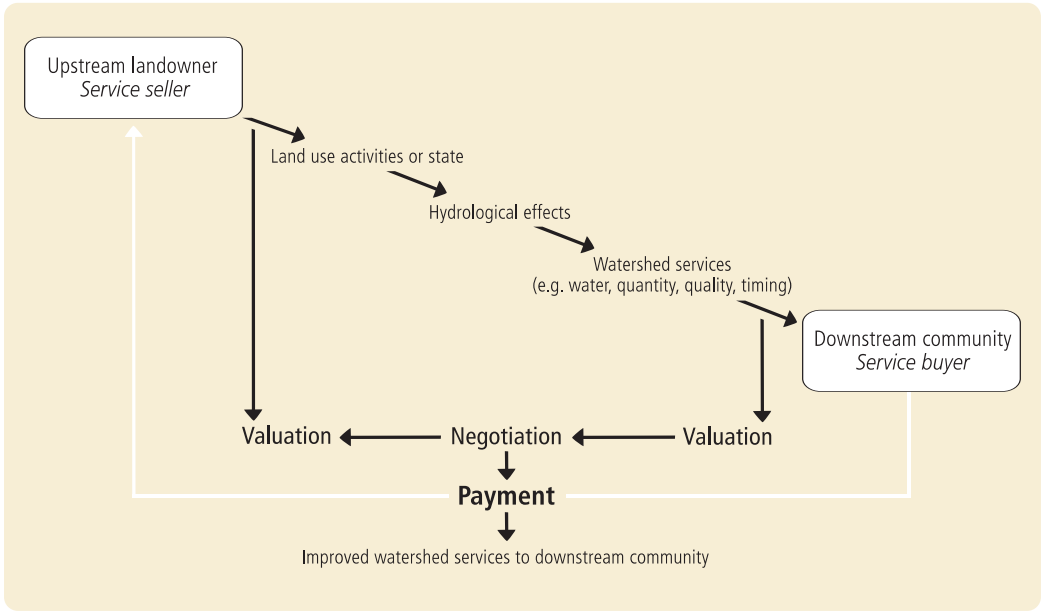
The economic and financial studies undertaken by downstream service buyers and upstream service providers are used to inform and support the design and negotiations of a payment scheme. These studies help to relate the interests and obligations of stakeholders in a payment scheme to real costs and profitability. Negotiation between the contracting parties then determines the price paid by service buyers to compensate service providers. Economic valuation can thus provide justification for investment in watershed services and enable identification of the most profitable options for delivering needed services. However, social perceptions, political views and bargaining power play a crucial role in complex negotiations among stakeholders over the final prices paid for services. Therefore it is critical to disseminate, as widely as possible, available information relating to existing linkages between land use and water-based ecosystem services, valuation studies and the economic efficiency of undertaking a payment scheme. The aim should be to raise awareness and the interest of different stakeholder groups in participating, and to facilitate the decision-making process.

"SOCIAL PERCEPTIONS, POLITICAL VIEWS AND BARGAINING POWER DETERMINE FINAL PRICES FOR SERVICES."

During negotiations, agreement is also needed on how to cover the costs of the entire scheme, not only the payments between buyers and service providers. Besides the actual payments, there are many other costs involved in setting up a payment scheme. The costs for designing and operating payment schemes (see Chapter 3) should not be underestimated.

Preliminary costs include studies to identify watershed services and links with land use, stakeholder consultations, economic valuation studies, etc. Transaction costs include attracting buyers and sellers, negotiations, and monitoring of compliance. Transaction costs are often significant, especially when high numbers of stakeholders are involved.

Figure 2.2: Payments link upstream and downstream stakeholders in watershed services.



2.4 Checklist: building a case for payment schemes

Link upstream land and water use and downstream benefits

- Identify the ecosystem services most relevant to watershed management.
- Establish clear cause-and-effect relationships between land use and the provision of watershed services. Use up-to-date scientific knowledge and, where needed, expert analysis and new data collection.
- Assess trade-offs expected in the watershed because of changes in land-use or management.
- Utilise these relationships and data to select and prioritise locations for intervention.

Use indicators to define baselines and track progress

- Identify indicators for measuring and monitoring watershed services.
- Acquire and organise the data needed to support planning, negotiation and management of a payment scheme.

Understand the needs and capacities of stakeholders

- Identify the major stakeholders in the watershed, including potential buyers and sellers.
- Compare the scale at which watershed services are supplied and the scale of action possible by landholders.

- Undertake analysis of the socio-economic characteristics and interests of stakeholders, to help ensure that payment schemes are appropriate to their needs.

Build a case for investment in watershed management

- Assess the value of watershed services.
- Use information on the values identified to raise awareness of the importance of watershed services and create support for the concept of a payment scheme.

Plan what needs to be done to develop a payment scheme

- Include: a design phase; planning of sustainable financing; negotiation of a fair price between buyers and sellers; establishment of an enabling legal and institutional framework; and processes for building public awareness and leading change.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Chapter 3

Designing a Payment Scheme

Payment for watershed services is about creating incentives that influence choices and behaviours of upstream land and water managers and downstream water users. With the right ingredients, good design and effective agreements, a payment scheme makes restoration or maintenance of watershed services beneficial to all parties. Looking after watershed services then becomes in everyone's interest, instead of only those threatened by or suffering the impacts of degradation. The fundamental basis for this shift is the linking of values for watershed services to markets where these services are traded. Benefits for watershed services that were formerly seen as 'free' – and therefore usually overlooked in economic decision making – can then be subjected to the rigours of negotiation and contractual agreement.

"PAYMENT SCHEMES ARE AN INNOVATIVE WAY OF USING MARKETS TO PROVIDE INCENTIVES FOR BETTER WATER MANAGEMENT"

A payment scheme for watershed services is an innovative way of using markets to provide incentives for better environmental management.[16] Alternatives to market-based approaches include, legal, regulatory or social mechanisms that mandate, compel or ban specific practices in uses of natural resources. The mechanisms of the market are used to shape decision making over changes in land use and management that are critical to the sustainable use of watersheds. However, the market is no more than a tool; it is a means to an end, not the end in itself. The goal is to change behaviours that damage watersheds, or ensure preferred choices are maintained. Therefore payment schemes must be carefully designed to make sure that the incentives they create result in the desired impacts on land cover and land and water use. Those leading the development of payment schemes need a clear understanding of how markets for watershed services operate, and which options for the design of payment schemes are most likely to lead to success.

3.1 Market-based incentives for watershed management

3.1.1 Using monetary values to change management choices

Take an example where forest management activities carried out by upstream landholders provide benefits to a community downstream in the form of clean water. This can be the case, for example, where reduced-impact logging or excluding grazing animals from a forest result in downstream benefits. Without a market to facilitate trading of this benefit for a reward, the stakeholders upstream receive no compensation for the services they deliver. The benefits of

land-use activities that flow downstream are then just side effects that are not reflected in prices paid or income generated. In the forest management case, the clean water service is in effect, therefore, offered freely. Many such watershed services are, as a result, regarded as public goods that are available (to various degrees) to all. Services that remain outside markets in this way are said to be externalities.

The failure of the market to accommodate externalities means that land users lack monetary incentives to look after or restore watershed services. In the case of payment schemes, internalising externalities means creating market mechanisms for upstream sellers to exchange services for payment. Payments are made by the downstream beneficiaries of services. When faced with choices between management actions that conserve or degrade watershed services, landholders may then have an added interest in pursuing sustainable management because of the income they can generate. Moreover, the need for beneficiaries to pay for watershed services increases their awareness of the value of these services, encouraging them to make better use of the resources available.

Downstream users can use alternative remedial measures such as investing in filtration plants or finding other sources of clean water, if they are cheaper than paying for watershed services. If well-designed, payment schemes can be a cost-effective and efficient way of influencing choice and behaviour in watershed management.

"PAYMENT SCHEMES CAN BE A COST-EFFECTIVE AND EFFICIENT WAY OF INFLUENCING CHOICE AND BEHAVIOUR"

3.1.2 Understanding the marketplace for watershed services

To develop a market for watershed services, three elements are needed as a starting point:

- First, there must be recognition of the goods and services provided by the mix of ecosystems in the watershed as assets that can be traded and for which a price can be agreed.
- Second, there must be buyers and sellers of these goods and services. Possible buyers for watershed services include stakeholders from both the public and private sectors such as water utilities, hydropower operators, municipalities, government agencies, industries or farmer associations. Possible service providers or sellers include individual landowners, farmers holding tenure or property rights and local communities holding communal or common property rights. Third parties in the development of markets for watershed services are often intermediaries who facilitate the formation of links between buyers and sellers. Intermediaries are usually a government agency, an NGO or a commercial broker.
- Third, it is important to ensure that property, access and use rights are well established. This relates to land tenure as well as rights for water abstraction and use.

Before watershed services can be exchanged through markets, there must be clear understanding of who manages and delivers watershed services. Although ownership of land can be relatively easy to identify, the ownership of the services delivered as a consequence of land use or management choices can be difficult to establish. For example, it may be possible to argue that clean water is a right belonging to communities downstream. In such a case, those downstream may feel entitled to compensation for damage caused to water quality by changes in land use higher in the watershed. They are unlikely to agree to pay for watershed services and

will instead have to rely on regulation of land use and management, backed by the imposition by government of penalties on upstream landholders. Payment schemes are sometimes considered a constructive alternative where government regulation fails or is unworkable. Changes in behaviour and management choices are facilitated through a series of positive incentives instead of threats of penalties that cause resentment between stakeholders

"CHANGES IN MANAGEMENT ARE FACILITATED THROUGH POSITIVE INCENTIVES"

To operate a marketplace for watershed services, and ensure that it is transparent and stable, there are additional critical elements:

- Motivations of buyers and sellers and their perceptions of risk need to be understood to facilitate dialogue and negotiation.
- Agreements must be negotiated between buyers and sellers.
- Standards, legal rights and capacity and norms for governance of transactions must be in place, to ensure that contracts for watershed services are enforceable and that there is confidence in the market on all sides.
- There must be financial mechanisms in place that enable completion of transactions between buyers and sellers.

Photo 3.1 A mosaic of productive units in the Mekong basin. Local fisheries and agricultural production depends on and determines watershed services (Cambodia).

3.1.3 The logic behind payments

In principle, markets help to ensure that choices are economically efficient. Payment schemes for watershed services are considered efficient when buyers pay less than the costs of alternatives, and sellers receive at least as much income as foregone because of compliance with the scheme. This is shown schematically in Figure 3.1. Here the payment made under Scenario C is less than the expected costs downstream caused by loss of services, but ensures that upstream landholders do not lose income. This is the minimum acceptable payment to sellers. In principle, actual payments might include a bigger surplus for sellers, depending on the outcome of negotiations with buyers.

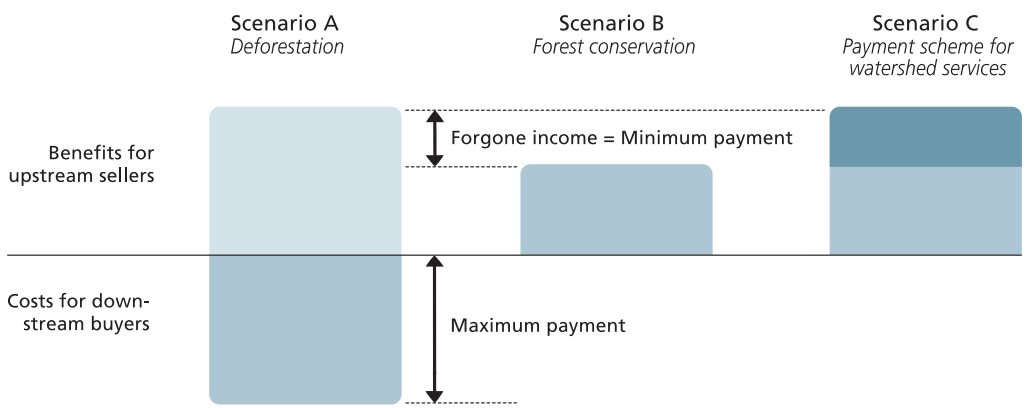
The viewpoint of service buyers: willingness to pay

Figure 3.1 shows that service buyers in a payment scheme must carefully evaluate how much it is worth paying for watershed services. They should not pay more than the cost of losing services or of alternatives. Most valuation studies applied to payment schemes therefore estimate the willingness to pay of service buyers, using survey methods. The maximum willingness to pay is an estimate of the value of the service and can be considered the upper limit for payment under any potential payment scheme. Service buyers must also take into account, however, alternative solutions to loss of services, such as using a filtration plant to increase water quality or building a dike to reduce the risk of flooding. A payment scheme will, in principle, only be attractive to a buyer if the costs of the scheme are lower than the costs of alternative solutions. In the case of poor communities, though, it is important to recognise that willingness to pay may actually be lower than this threshold, because of lack of capacity to pay.

The viewpoint of service sellers: no loss of profits

Service sellers must evaluate the minimum payment needed to make participation in a payment scheme worth their while. They should not accept less than the opportunity cost of the scheme. This is the profit they would lose as a consequence of the changes in land use and management or restrictions on land use needed to comply with the scheme.[18] It is assessed by comparing the economic returns from land-use activities before and after implementation of the payment scheme. For example, landholders need to compare the change in profitability caused

Figure 3.1: Payments for watershed services are based on assessments of the costs and benefits of land and water management for upstream and downstream stakeholder.[17]



by reforestation of farmland if that is a condition of payment. Care must be taken to also consider profits foregone from potential land uses, as there will be opportunity costs if the payment scheme restricts options for land use. Thus, for example, to be attractive to service sellers, payments must make up for profits foregone because forests can no longer be converted to farmland, or farmland can no longer be developed for housing. The general rule is that payment must be at least equal to the foregone net profit of upstream service sellers.

"PAYMENT MUST BE AT LEAST EQUAL TO THE FOREGONE NET PROFIT OF UPSTREAM SERVICE SELLERS."

Room for a deal: acceptance by buyers and sellers

In principle, a payment scheme deal is only possible, where the willingness to pay of downstream buyers is higher than the minimum payment needed by upstream sellers. If this overlap does not exist, then buyers and sellers of services will not be able to agree a price that is acceptable to both parties. In general, with high opportunity costs upstream and a low value for downstream benefits, it will be difficult to establish a payment scheme. However, if the reverse is true and there are low opportunity costs upstream and downstream stakeholders have high willingness to pay, then negotiation of a price that is acceptable to both parties may be possible. Examples of prices paid in payment schemes for watershed services are shown in Table 3.1.

"A DEAL IS POSSIBLE, WHERE THE WILLINGNESS TO PAY OF BUYERS IS HIGHER THAN THE MINIMUM PAYMENT ACCEPTED BY SELLERS."

In practice, when developing payment schemes for watershed services, it is important to bear in mind that choices and behaviour made by people have many motives. Decisions are not solely determined by financial incentives. There are consequently many non-monetary rewards and motivations that can contribute to the acceptance of payment schemes, such as prestige, public recognition, group belonging, avoidance of group sanction and environmental awareness.[20] Such motives can mean that payment schemes are adopted even if they are not the most profitable or least cost choice for a landowner or downstream service user.

When using valuation data in developing a payment scheme, users also need to be watchful for potential biases in estimated values. For example, in a study of three payments schemes used for protection of water quality protection in Honduras (Jesus de Hotoro), Nicaragua (San Pedro del Norte) and Costa Rica (Heredia), there was evidence that estimates of income foregone by upstream landholders were too high. Possible reasons for these discrepancies were that:

- Landowners may not report all of their transactions. They may therefore overstate their profits, the willingness to rent their land and the fair price for engaging in the payment scheme, with the aim of obtaining a higher level of compensation.
- Farm profits may be overstated in those areas that are not very suitable for agriculture because of, for example, poor soil quality or steep slopes.
- Non-economic benefits may be included when estimating the value of land. Landowners may give a value to their land that includes not only the income they derive or would derive from their land, but also other socio-cultural values such as aesthetic values that are not otherwise accounted for.

Table 3.1: Examples of payments made for watershed services[19]

Price paid	Activities compensated	Watershed services provided	Service buyer	Service seller	Location
US$ 45/ha/year	Reforestation	• Salinity control • Freshwater supply	Downstream farmers association	Government and upstream landowners	Murray Darling Basin, Australia
US$ 230/ha/year	Reduced-input farm management	• Water quality control • Freshwater supply	Perrier Vittel (Private bottler of mineral water)	Upstream farmers	Rhine-Meuse Basin, France
US$ 45 - 116/ha/year	Protecting, sustainably managing and replanting forests.	• Freshwater supply • Wildlife habitat • Cultural heritage and identity	National Forest Office and National Fund for Forest Financing – FONAFIFO	Private upstream landowners	Costa Rica
US$ 48/ha/year	Protecting, sustainably managing and replanting forests.	• Hydropower • Regulation of flows • Sedimentation control	Energia Global (hydropower company) and FONAFIFO	Private upstream land owners	Sarapiqui watershed, Costa Rica
US$125/ha/year	Soil conservation	• Soil protection • Sedimentation control • Water quality control • Regulation of flow	US Department of Agriculture (Government)	Farmers	United States
US$ 170/ha/year	Watershed restoration	• Freshwater supply • Wildlife habitat	State of Parana (government)	Municipalities and private landowners	State of Parana, Brazil

"DECISIONS ARE NOT SOLELY DETERMINED BY FINANCIAL INCENTIVES."

3.2 Types of payment schemes for watershed services

There are several types of market-based instruments for creating incentives for better environmental management. Four can be distinguished as mechanisms for payment for watershed services. These mechanisms are differentiated by the degree of government intervention in administration of the schemes and the characteristics of the buyers and sellers. The four types of schemes are:

1. private payment schemes
2. cap-and-trade schemes, under a regulatory cap or floor
3. certification schemes for environmental goods
4. public payment schemes, including fiscal mechanisms

In practice, many initiatives are a mix of these approaches, adapted to local needs and context. The outlines of each type of scheme that follow are therefore not prescriptions, but are basic frameworks that can be used as starting points for the process of designing payment schemes.

3.2.1 Private payment schemes

Private payment schemes have the lowest level of government intervention. The term 'private' refers to ownership characteristics and includes two heterogeneous groups. These are first, privately-owned, profit-seeking companies, such as farms and hydropower companies, and secondly, private individuals or groups of individuals, for whom profit seeking is not the primary objective (e.g. consumers). In these schemes, private entities agree amongst themselves to provide payments or rewards in return for maintenance or restoration of a watershed service. The actual transaction mechanisms in such schemes can take many forms, of which the most popular include:

- *Transfer payments.* These are direct payment schemes. A service seller receives a payment from a service buyer in return for the protection or restoration of a watershed service. For example, a hydroelectric power company experiencing increasingly irregular water flows may decide to pay landowners upstream to change management practices. Here the company assumes that a different management practice will improve water supply. Another example of a transfer payment initiative is provided in Case 3. The water utility *Empresa Servicios Publicos de Heredia* (ESPH) raises money from their consumers and clients to support watershed management, combining a fiscal mechanism with a transfer payment.
- *Land purchases.* A private party may decide to purchase land from another private party with the aim of safeguarding the watershed services originating from the land in question. Strictly speaking, this is a mechanism for payment for watershed services only if the land is purchased and then leased back to the former owner under a contract stipulating how the land can be used or managed. Case 4 gives an example of such an arrangement developed by Nestlé Waters to safeguard sources of bottled mineral water.
- *Cost-sharing.* Beneficiaries of watershed services can agree among themselves to share the costs that must be met by service sellers upstream to maintain or restore watershed services. For example, if conversion of natural vegetation upstream is causing deterioration of water quality, downstream landowners can agree to share the costs of compensating or rewarding upstream landowners for maintaining or establishing preferred land-uses in certain areas.
- *Purchase of development rights to land.* In this type of mechanism, property rights are separated from development rights. A forest owner, for example, may retain the property rights for his or her land (i.e. he remains the owner), but he can sell the development rights. The buyer and seller then agree in the purchase contract on restrictions on land use and management practices that protect watershed services.

Case 3: Enhancing surface water quality – a user fee and private payment scheme in Heredia, Costa Rica

Empresa Servicios Publicos de Heredia (ESPH) is a water utility company in the Heredia region of Costa Rica. ESPH is a pubic company in which the citizens of the area are also shareholders. ESPH recognised the urgent need to protect the water supply and catchment area from risks posed by land use in the upper watershed, and determined that paying landowners to manage the watershed sustainably would be more cost effective than building a filtration plant. All parties therefore agreed that management costs for conservation of five micro-watersheds should be levied as payment for the water quality benefits received.
Ecosystem services provided: Forest cover maintained in strategic areas of the watershed to help ensure water quality downstream, reducing public health risks and costs of chlorination.

Stakeholders involved:

- *Buyers:* Household users and the private sector. Water users in the city of Heredia pay a *Tarifa Hidrica* to ESPH in their monthly water bills. In addition, Florida Ice & Farm, a large soft drink, bottled water and brewing company, finances 55% of each contract in the Río Segundo watershed, for conservation of the upper watershed areas that supply water to their production facilities.
- *Sellers:* Public (the Braulio Carillo National Park) and private landholders. Participating landowners receive a payment close to US$ 110/hectare/year for protecting forests around ESPH's water sources. This amount represents the opportunity cost of land use in the upper watershed. In the case of the national park, the Ministry of Environment (MINAE) is paid for conservation and reforestation activities at the rate of US$ 30 ha/year.
- *Intermediaries:* ESPH and FONAFIFO (The National Forestry Financing Fund) act as intermediaries in this scheme.

Payment scheme type: Private transfer payments and user fees. ESPH collects fees from consumers in their monthly utility bills. The money collected is equivalent to US$ 0.1/m^3, half of which is invested in forest conservation and reforestation in three watersheds in the Central Valley of Costa Rica (Rio Segundo, Rio Tibas and Rio Ciruelas); the other half of the funds raised are invested in water infrastructure and research. The major private sector buyer, Florida Ice & Farm, pays its share of contracts directly.

Case 4: Securing aquifers – a private sector payment scheme by Nestlé Waters in France[21]

Vittel (a subsidiary of Nestlé Waters) is the world's largest bottler of natural mineral water. Its most important water sources in France are in heavily-farmed watersheds. Runoff of nutrients and pesticides risked contaminating the aquifers on which the company's business depends. The company determined that purchasing farmland, reforesting sensitive infiltration zones, and financing farmers to build modern facilities and switch to organic farming was in fact more cost effective than building filtration plants. The cost advantages were so significant that participating farmers could be offered extremely profitable terms.

Ecosystem services provided: Reduced chemical usage and sustainable land-use management to sustain extremely high spring water quality standards.

Stakeholders involved:

- *Buyers:* Vittel, a bottler of natural mineral water. For the first seven years the company spent an average of US$ 24.5 million annually.
- *Sellers:* Farmers and landowners. In compensation for reduced use of fertilizer – and hence reduced profitability and higher perceived risk – farmers were given contracts by Vittel for up to 30 years.
- *Intermediaries:* The *government* facilitated the deal by providing a small amount of financial aid and a strong legal framework to ensure the enforceability of contracts.

Payment scheme type: Private sector payment scheme. Vittel purchased 1500 ha of farmland for US$ 9 million, paying more than the market price. Usufruct rights were then granted back to the farmers, giving them the legal right to use and derive profit from land owned by Vittel. Farmers receive US$ 230 per hectare annually to manage the land using sustainable practices that ensure high water quality standards.

3.2.2 Cap-and-trade schemes

Under a cap-and-trade scheme a cap is established for, say, the release of pollutants or abstraction of groundwater. In the case of pollution, the cap is the aggregate maximum amount of pollution that can be released by participating entities. Tradeable pollution permits or credits are then allocated by dividing up the allowable overall total among polluters. Industries or companies can sell permits that they do not need to other participants who need more than their allocation. This rewards companies able to cut their pollutant discharge and penalises those who pollute more heavily, creating an incentive for them to invest in pollution control. Trading increases the economic efficiency of water and environmental management, by enabling companies or landholders to buy permits from those able to comply in a cheaper way.

"TRADING INCREASES THE ECONOMIC EFFICIENCY OF WATER AND ENVIRONMENTAL MANAGEMENT."

Three main steps are needed to set up a cap-and-trade scheme. First, the level of the cap must be determined. The cap is set either by a government agency or voluntarily, as in cases where large companies have established internal trading systems. Second, permits or credits must be allocated among resource users or polluters. Third, a market is developed for the exchange of permits and credits between buyers and sellers. These types of schemes are applied increasingly to the management of groundwater, surface water, wetlands and water quality.[22] Case 5 provides an example of a cap-and-trade scheme used in the USA to control nutrient pollution of waterways.

Case 5: Controlling nitrogen discharges – a cap-and-trade scheme in the USA[23]

The Clean Water Act in the USA limits the level of nutrients allowable in waterways. To comply with the Clean Water Act, states have developed strategies to keep nutrient discharges below the total maximum daily load allowed under the Act. The Connecticut Nitrogen Exchange Programme is a 'cap-and-trade' scheme for nitrogen discharges through which entities that discharge less than the nitrogen loads allowable (or 'capped') under the Act, can sell (or 'trade') their nitrogen discharge rights to those who exceed their allowances. This creates a financial incentive to diminish nitrogen discharges below allowable limits in order to profit from the sale of those discharge rights – while at the same time the scheme ensures an acceptable cap on total discharges.

Ecosystem services provided: Limit and/or reduce nutrient discharge to waterways in order to maintain or improve water quality.

Stakeholders involved:

- *Buyers:* Polluters and the Exchange Programme. Those who discharge more than their permitted nitrogen load are required to purchase 'nitrogen credits.' In the absence of other buyers, the Exchange Programme will purchase credits from any permit-holder that discharges less than its allowable load of nitrogen.
- *Sellers:* Polluters who discharge less than their allowable discharge load.
- *Intermediaries:* The Connecticut Department of Environmental Protection through its Nitrogen Exchange Programme, established in cooperation with the state of New York and the federal Environmental Protection Agency.

Payment scheme utilised: Cap-and-trade scheme. The federal government set nutrient standards under the Clean Water Act which limit total discharges from point sources. A trading system was then implemented at the state level to create incentives to diminish nitrogen discharges, and to capture the relative efficiency and flexibility of trading schemes over standardised individual compliance requirements.

3.2.3 Certification schemes of environmental goods

Certification or eco-labelling schemes are another payment mechanism for watershed goods and services. Transactions occur between private parties, but payment is embedded in the price paid for a traded product, such as certified timber, fish or organic produce. The buyers in these schemes are consumers who prefer products from suppliers who comply with verifiable environmental standards. Intermediaries play a key role in this type of mechanism, either as the certification agency or as traders in certified products. Examples of eco-labelling schemes include:

- Wood certified by the Forest Stewardship Council (FSC) to originate from sustainably-managed forests.
- 'Salmon-safe' products from farmers in the northwest of the US who undertake protection of waterways that are important for salmon habitat.

"BUYERS ARE CONSUMERS WHO PREFER CERTIFIED PRODUCTS THAT COMPLY WITH ENVIRONMENTAL AND QUALITY STANDARDS."

Sellers of environmental services under these schemes – the suppliers of certified or eco-labelled goods – are compensated through a premium on prices paid by consumers. Payments can be made to suppliers as, for example, a fixed sum, a fixed sum per hectare or directly by a price premium on products sold. A good example of a certification scheme applied to watershed services is the 'salmon-safe' labelling of farm products in the Pacific Northwest of the United States (Case 6).

Case 6: Saving native salmon – a certification scheme in the Pacific Northwest of the USA

A successful certification scheme was set up a decade ago to protect the habitat of the Pacific salmon, which is native to the Northwest of the United States. The scheme was established by 'Salmon-Safe', a non-profit organisation. Erosion and runoff from hillside vineyards and farms brought silt into streams, which had reduced the ability of native salmon to spawn and thrive. Salmon-Safe certifies farms and urban land in watersheds in the states of California, Oregon, Idaho and Washington that practice 'fish-friendly' management. Salmon-Safe has now certified management of 20,000 hectares of land.

Ecosystem services provided: Conservation of habitats used by populations of Pacific salmon, to sustain healthy aquatic ecosystems and wild salmon fisheries.

Stakeholders involved:

- *Buyers:* Consumers in the Pacific Northwest who choose "Salmon-Safe" products and pay a premium on top of the normal retail price to support land management that keeps rivers clean and safe for wild salmon.
- *Sellers:* Farmers and winegrowers.
- *Intermediaries:* Salmon-Safe, who oversees the certification scheme and supports the price premium through education and marketing campaigns.

Payment scheme type: Certification scheme. Participating farmers apply ecologically-sustainable agricultural practices that protect water quality in rivers and salmon habitats. These practices include tree planting on streambanks, growing cover crops to reduce runoff, and application of biological control methods for weeds and pests. The extra costs are paid out of the premium that participating growers receive for their products. Marketing of these products, including wine and foods, is assisted by public education and awareness campaigns by the Salmon-Safe organisation.

3.2.4 Public payment schemes

Public payment schemes have the highest level of involvement by public agencies and, to date, are the most common form of payment scheme for environmental services. Service buyers in public schemes are public authorities such as municipalities or national governments who are typically motivated by the need to provide safe drinking water or regulation of river flows. Mechanisms for payment in these schemes include user fees, land purchase and land easement, which are rights to specific use of land owned by others. Case 7 is an example of a public payment scheme designed to reduce nitrate leaching to drinking water sources.

"PUBLIC PAYMENT SCHEMES ARE THE MOST COMMON FORM OF PAYMENT SCHEME."

Case 7: Lowering nitrate levels in water supplies – a public payments scheme in the UK

The Nitrate Sensitive Areas (NSA) Scheme aimed to reduce or stabilise nitrate levels in key sources of public water supply in the UK. The voluntary compensated scheme provided 5-year direct payments from government to farmers who adopted management practices that reduced leaching of nitrates from agricultural land into vulnerable groundwater. The scheme was applied to about 25,000 hectares using three categories of action: 1. the *Premium Arable Scheme*, which supported conversion of arable land to pasture; 2. *Premium Grass*, supporting lowering of inputs to intensively-managed grassland; and 3. the *Basic Scheme* for continued arable cropping with low nitrogen input.

Ecosystem services provided: Reduced nitrate leaching into public drinking water supplies, significantly contributing to meeting lower nitrate concentrations targets in sources of public drinking water in the UK.

Stakeholders involved:

- *Buyers:* Government. The Ministry of Agriculture, Fisheries and Food directly compensated farmers for adhering to the programme's land-use practices.

- *Sellers:* Farmers. Individual farmers applied to participate in the programme.
- *Intermediaries:* None. This was a direct public payment scheme.

Payment scheme type: Public payment scheme. The government provided financial aid directly to farmers. Payment rates were based on the farmer's loss of income and costs resulting from changes in agricultural practices. As an added incentive, payments were higher than income foregone and costs incurred by an estimated 31%. The majority of participants stated that without financial aid they would not continue to farm using the management practices supported by the scheme because of the increased costs and reduced profitability.

Public payment schemes can also use subsidies and taxes to encourage good environmental management. Subsidies are *positive* fiscal instruments used by governments to reward people for carrying out specified activities. Within the Common Agriculture Policy, for example, the EU uses subsidies to support agro-environmental measures. Thus, more water efficient irrigation infrastructure, such as drip irrigation, is subsidised with the aim of reducing groundwater abstraction and protecting aquifers.

Environmental taxes can be used to ensure that some or all of the externality costs of land use are internalised (or priced into) the decision making process. They create direct price signals for producers and/or consumers. They can be both be used as *positive* or *negative* incentives. Taxes can be *positively* used when people are exempted from paying taxes. In the United States, farmers may deduct the costs of soil and water conservation from taxable income, limited annually to 25 percent of gross income from farming. Environmental taxes can be used *negatively* to discourage consumption or activities that are detrimental to the environment. In most cases, however, the benefits of environmental taxes for the environment are small relative to the size of the problem being addressed. Case 8 is an example of the impacts of applying tax to groundwater abstraction.

Case 8: Managing groundwater extraction – an environmental tax scheme in the Netherlands

In 1995 an environmental tax on groundwater was introduced in the Netherlands. The primary aim of the tax was to increase tax revenue. The secondary aim was to alleviate the environmental impacts of groundwater abstraction and to encourage lower water consumption. Over-abstraction of groundwater was damaging terrestrial ecosystems, but it was cheaper to use groundwater than surface water. The tax on groundwater was intended to discourage use of groundwater by making up this difference in cost. Actual environmental benefits of the tax were low because the tax was not high enough to make groundwater less profitable to use than surface water, and exemptions reduced its effectiveness. Two years after introduction of the tax, water consumption was estimated to have declined by between 2 and 12%.

Ecosystem services provided: Sustainable groundwater usage and terrestrial ecosystem conservation. In this case, the groundwater users provided this environmental service in response to a negative incentive (a tax).

Stakeholders involved:

- *Buyers:* The Ministry of Housing, Spatial Planning and the Environment. The government 'buys' these services by imposing a tax on those who do not supply the service.

- *Sellers:* Groundwater users. Farmers using groundwater for irrigation, industries and consumers utilizing groundwater 'supply' these services by decreasing groundwater use/abstractions.
- *Intermediaries:* The tax was paid through municipal water bills, but was essentially a direct payment from groundwater users to government.

Payment scheme type: Public payment scheme using a fiscal mechanism. A groundwater tax was levied on groundwater users, collected through utilities bills.

3.3 Identifying options for payment scheme design

Examples exist from around the world of how market-based mechanisms result in changes in choices and behaviour that benefit the environment. The essential point is to enable and motivate those who benefit from watershed services and to reward those who supply them. Maintaining and restoring these services becomes an internal part of planning and decision making around land and water resources. If well designed and integrated into land-use plans, payment schemes can serve the interests of both those who benefit from ecosystem services and those who manage and supply them. Payment schemes for watershed services are thus an important tool for water resources and river basin management. To be effective, however, they must be designed appropriately and be suited to the goals and specific social, political and economic context in which they will operate. Effective design is critical. What practical steps are needed to identify suitable options for the design of payment schemes for watershed services? Three steps can easily be identified:

- Check that the general pre-conditions for payment schemes are met.
- Clearly define the goals of the scheme.
- Determine which type of payment scheme is most suited to the goals of the scheme and stakeholders involved.

"ENABLE AND MOTIVATE THOSE WHO BENEFIT FROM WATERSHED SERVICES AND REWARD THOSE WHO SUPPLY THEM"

3.3.1 Pre-conditions for payment schemes

There are a number of pre-conditions that are applicable to all payment schemes. These must be in place before developing a payment scheme. If they are not, then either payment schemes are not a suitable option, or time and resource must first be invested in meeting these benchmarks. Pre-conditions for payment schemes for watershed services include:

- *Need and urgency:* Watershed services are in decline, or there is a threat to future provision of these services. This condition establishes the need and urgency for action. Then, for any payment scheme to be effective and credible there must be a direct, scientifically justified relation between watershed services and changes in land cover, use and management.
- *Support and governance:* Strong institutional and political support exists for using a

payment scheme instead of direct statutory or regulatory mechanisms for solving the problem. Relations between local communities and government should be constructive and there must be effective law enforcement. Strong and capable administrative structures should be available to administer the scheme.

- *Suppliers:* Stakeholders are present in the critical positions in the landscape supplying the watershed services that will be targeted by the scheme. They must hold property and/or legal rights to this land. They must be able to exert the controls on land use and management necessary to modify watershed services. Those supplying watershed services must be willing to participate in a payment scheme.
- *Beneficiaries:* Public or private stakeholders who benefit from watershed services are present in the watershed. These stakeholders must recognise the benefits of watershed services and have expressed a demand for them. They must be able to justify participation in a payment scheme based on the value of the economic benefits they receive from watershed services.

3.3.2 Defining goals for the scheme

The goal of a payment scheme for watershed services is to maintain or restore watershed services. Which watershed services and how they will be measured and monitored must be clearly defined (see Section 2.1 and Table 2.1), according to the issue at hand and the needs of stakeholders. To succeed, the scheme must make a difference to these watershed services. This implies that the scheme must provide *additionality*. This is the action and effects that would not have occurred without the scheme. Therefore goals for payments schemes need to be specified relative to a *baseline*. This baseline must be chosen carefully and should account for changes over time that are expected without the payment scheme in place. For example, payment schemes for reforestation in upper watersheds of Costa Rica build on static baselines for forested areas. If in reality forest cover would increase without the payment scheme, then the scheme ends up paying for action that would have happened anyhow, which may lead to a loss of credibility.[24]

"TO SUCCEED, A SCHEME MUST MAKE A DIFFERENCE TO WATERSHED SERVICES."

Goals for payment schemes should clearly specify the geographical scale of the actions they are designed facilitate. Schemes intended to promote very specific action in a small sub-catchment will need to be designed very differently to nationwide schemes that aim to support broad-scale provision of watershed services for the public good. Nationwide schemes thus tend to have a public character while more site-specific schemes can more readily combine public and private participation or be designed as private payment schemes.

To be effective, payment schemes also need to be consistent with social goals in the communities where they are to be implemented. Poor, rural people are often most dependent on watershed services and therefore *social equity* is a vital component of the goals for payment schemes. If payment schemes increase inequity, they are unlikely to survive or to succeed. Experience from Costa Rica has shown that unless explicit steps are taken to address poverty issues, payment schemes can increase the disadvantages faced by the rural poor. Large farmers and forest owners can be disproportionately represented among participants because those with large landholdings are more likely to have the flexibility needed to engage in innovative new programmes.[25] There is then a danger that, as a result of the extra income generated through participation in a payment

scheme, larger-scale landholders can out-compete smaller farmers, causing deeper poverty. In Costa Rica, exclusion of the poor from payment schemes has led to the emergence of unofficial, parallel schemes and growing pressure for official schemes to become more inclusive and to incorporate social equity in their goals. When developing a payment scheme for watershed services, there should be explicit goals relating to social equity that lead to assessment of the social impacts of the scheme and its implications for poverty reduction.

"PAYMENT SCHEMES NEED TO BE CONSISTENT WITH SOCIAL GOALS IN THE COMMUNITIES WHERE THEY ARE TO BE IMPLEMENTED."

To further increase their effectiveness, payment schemes should aim to prevent 'leakage'. This results when action in one location simply causes degradation to shift to another area. For example, attention is needed to ensure that payments made to reduce forest clearing in one area of a watershed do not inadvertently cause clearing to increase in another area.

Finally, payment schemes should aim to establish permanence. This is an issue when contracts for watershed services end and incentives for upstream landholders to undertake watershed management cease. This implies that payment schemes should aim for long-term contracts. They should also be adaptively managed to ensure that funding mechanisms are responsive to the changing needs and circumstances of stakeholders.

Photo 3.2 City water supplies delivered by truck depend on watershed services (Amman, Jordan).

"SCHEMES SHOULD AIM TO ESTABLISH PERMANENCE."

3.3.3. Identifying suitable models for payment schemes

Payment schemes are most likely to succeed if the type of scheme chosen is suited to the stakeholders involved, their motivations and capacities. It is important to verify that the following specific conditions can be met when selecting which type of scheme to use:

- *Private payment schemes:* Beneficiaries must have a private motivation to pay for watershed services. Government agencies need to be willing and able to accept a minor role in the scheme, through development of regulations or changes in contract law needed to facilitate and enforce agreements.
- *Cap-and-trade schemes:* Governments must be willing to set the cap for the service in question. This is to stimulate demand and reward the most efficient service sellers. Regulations must permit parties to either comply directly with the actions or control measures required or to pay service sellers to do so instead.
- *Certification schemes:* Consumers need to express a demand for products that meet higher environmental standards, and be willing to pay a premium price for them. There must be intermediaries able to operate a credible certification service. Governments need to facilitate operation of certification schemes through appropriate laws and regulations.
- *Public payment schemes:* Public motivation to pay for watershed services exists and a public body must determine which services have the highest priority for protection. There must be sufficient financial resources available to support the payment scheme.

3.4 Mobilising financial resources

In designing a payment scheme for watershed services, there is an obvious emphasis on determining what services are bought, who is buying, who is selling and how transactions are conducted. How buyers pay and what sources of funding are available for developing and maintaining the scheme also need to be determined.

In cases where buyers are business entities with revenues directly linked to benefits from watershed services – a hydroelectric company for example – then private financing of the scheme might be justified on commercial grounds. For publicly-funded schemes and for schemes where the beneficiaries simply do not have the financial resources needed, finance will have to be raised. Financial resources are also needed to pay the many other costs of a scheme, besides actual payments between buyers and sellers. These added costs need to be explicitly factored into the financing of schemes and include:

- Research and development costs (e.g. to quantify the links between land use, management actions and water quantity available downstream).
- Capacity building, community education and public awareness (e.g. for public-awareness campaigns to explain to consumers where their tap water comes from to promote their willingness to pay).
- Operational costs for coordination and administration (e.g. for consultants or NGOs that assist with the design or administration of a scheme).
- Monitoring and evaluation (e.g. for assessment of impacts and additionality of a scheme).

- Transaction costs, to meet social, legal and regulatory obligations (e.g. for legal counsel and for lawyers to draft contracts).
- Contingencies for inflation and unforeseen events.

"ADDED COSTS NEED TO BE EXPLICITLY FACTORED INTO THE FINANCING OF SCHEMES."

Mechanisms for long-term financing of the scheme also need to be identified. Such sustainable financing is essential to creating a stable payment scheme under which both buyers and sellers have the confidence needed to commit to long-term contracts.

3.4.1 Sources of funding

A variety of financing mechanism can be used to fund payment schemes for watershed services. Most schemes to date have relied on traditional sources of funding. These include taxpayer funding from government. For example, public funds in Mexico were reallocated from the irrigation to the forest sector to support watershed management. New public funds can be raised through taxes, as in Colombia where hydroelectric companies with capacity greater than 10 MW pay 6% of gross sales for watershed management. Many schemes, especially in developing countries, are initiated with seed money from bilateral or multilateral donor agencies, such as the Global Environment Facility (GEF). Such grants are often augmented by loans from multilateral or regional banks, including the World Bank. These grants are used to overcome inertia and resistance as they lower the costs of to scheme participants. Grants also enable establishment of adequate monitoring and evaluation, to support learning and adaptive management.

"MOST SCHEMES TO DATE HAVE RELIED ON PUBLIC OR DONOR FUNDS."

In addition, there are a variety of new mechanisms for financing that can be applied to payment schemes for watershed services. These are summarised in Table 3.2. Trust funds for water are especially attractive, as they can be structured to provide stable funding over periods of decades. The Quito Water Fund in Ecuador is an example that has been financed by water users and is intended to operate for 80 years. Investment returns in the fund are used entirely for watershed protection, including payments to landholders for protection of ecosystem services in the upper watershed (Case 9).

Case 9: Protecting watersheds – a water protection fund in Quito, Ecuador

The Water Protection Fund (FONAG) was created in 2000 in response to the pressing need for better management in the watershed that provides Quito's water supply. The fund was created by a local NGO, Fundacion Antisana, and The Nature Conservancy (TNC), after the Ministry of Environment commissioned the development of a management plan for two reserves in the upper watershed. It was designed to run

for 80 years, to ensure long-term institutional and political legitimacy. In 2006, the fund's endowment was US$ 3.5 million, but was expected to grow to US$ 7.4 million by 2010. Essential to its success was the fact that the fund had strong support from the Mayor of Quito and other influential parties who championed the plan, and from the two major water users in the watershed, the water and electrical utilities.

Ecosystem services provided: Watershed conservation to enhance drinking water quality in the city of Quito.

Stakeholders Involved:

- *Buyers:* FONAG and its contributors. EMAAP-Q, the water utility in Quito which contributed over US$ 3 million, with smaller contributions by TNC, an electrical utility, a brewery and the Swiss development agency.
- *Sellers:* Watershed managers and advocates. Those who undertake reforestation, surveillance of protected areas, sustainable management in agriculture, and development of ecotourism, training, communication and environmental education.
- *Intermediaries:* FONAG, Fundacion Antisana, and TNC. Several intermediaries worked to establish FONAG which now acts as intermediary and buyer.

The fund is run as a non-declining endowment – only investment returns are distributed for watershed management. In the future, there is need to attract more investors, to expand the fund and broaden the decision-making base and ensure that the interests of stakeholders, such as poor people, are not overlooked.

3.4.2 Elements of sustainable financing

A sustainable financing strategy should be developed to strengthen the stability of payment schemes for watershed services and therefore the confidence of stakeholders in them. A range of issues should be considered. First of all, a diverse, stable and secure funding portfolio should be built to minimise risk. Second, budgeting should cover the full range of costs, not just payments. These additional costs can be considerable, especially for new schemes in an area. Third, funding of capacity building for participants in the financial management and operation of the scheme. This is critical for the long-term sustainability of the mechanism. Finally, ensuring that a stable and enabling legal and institutional framework is developed to support the scheme. This may require making changes to law to ensure that participating institutions are entitled to raise funds and disburse them.

"LONGER TERM SUSTAINABLE FINANCING SHOULD BE INCORPORATED INTO THE BUSINESS PLAN FOR A PAYMENT SCHEME."

Sustainable financing should be incorporated into development of a business plan for the payment scheme. A business plan differs from simple budgeting for the scheme. It specifies how much money is needed to implement a set of planned activities and the sources of income to meet short, mid and long-term funding needs. Business planning can thus form the basis for setting priorities, both for collecting revenues and for spending.

Table 3.2: Innovative financing mechanisms for payment schemes for watershed services that could be used to replace or augment traditional sources of public or international donor funding.

Mechanism	Description	Examples
User fees	Fees for watershed management charged to consumers.	Municipal water rates increased for example in New York (USA); Bern (Switzerland); Heredia (Costa Rica); and Pimampiro (Ecuador) to finance payments for watershed services.
Private sector payments	Payments by business for watershed services needed to sustain their income, or as grants to build reputation.	Payments for watershed services by hydropower companies in Costa Rica and by Nestlé Waters in France.
Government bonds	Public borrowing to finance payment schemes, by institutions with the legal right to do so and which believes it can raise the funds to repay the money.	Bonds issued by New York City to finance watershed management programme developed as a cheaper alternative to construction of a filtration plant.
Water bank	Bank set up cooperatively by water boards to finance investments in water infrastructure.	Dutch Water Bank (Nederlandse Waterschapsbank NV).
Debt for nature swaps	Public debt is purchased at a discount by an outside agency – such as an NGO – in exchange for commitments to fund conservation activities.	Potential future applications in financing payment schemes for watershed services.
Trust funds	Endowment funds held to finance investment in water infrastructure and watershed management.	The Water Protection Fund, Quito, Ecuador, which uses investment returns to fund management of watersheds supplying city water.

3.5 Checklist: designing payment schemes

Creating markets to help internalise costs perceived as externalities

- Determine if the elements of a marketplace for watershed services are in place or need to be created. Is there recognition of the goods and services provided by watersheds, and are there potential buyers and sellers? Are intermediaries needed and are they available? Are there mechanisms in place for the negotiation and execution of transactions? Is there an enabling legal and institutional framework, including clearly defined property rights for watershed services?

Understand willingness to pay and opportunity costs

- Use valuation data and economic analysis to compare the willingness to pay of service buyers and the opportunity costs of sellers.
- Take into account the costs of alternatives to payments schemes, such as investment in infrastructure.
- Verify that there is an overlap between the requirements of upstream and downstream stakeholders that provides room for negotiation.

Clearly define the goals for the scheme

- Specify how the scheme will provide additionality relative to a baseline, and consider the geographical scale of actions needed.
- Ensure that the scheme will address social equity and not increase the disadvantages faced by poor people.
- Be aware of the danger of leakage, where the scheme simply shifts the location of resource degradation. Aim to establish permanence.

Carefully evaluate which type of payment scheme is the best fit

- Check that the pre-conditions for any payment scheme, relating to the need for action, governance, supply and demand for services, can be met.
- Assess whether private payment schemes, cap-and-trade, certification or public schemes are suitable approaches given the social, economic and political context of the issue in question. Compare their advantages and disadvantages.
- Determine whether the specific conditions needed for each type of scheme can be met.

Identify financing needs and options for mobilising funds

- Undertake business planning and include a strategy for sustainable financing of the scheme.
- Include the full range of costs, including design, administration, legal advice, and monitoring and evaluation costs.

Chapter 4

Roadmap Towards Agreement

Changing choices and behaviour using payments for watershed services is based on designing new incentives that are shaped by the logic of costs and benefits and by the psychology of the market. To move from design of payment schemes to implementation and impacts demands that people and institutions become engaged. To get engagement, a path must be navigated through a complex landscape of multiple stakeholders and institutions. Along this path people and institutions need to become informed about the values of watershed services and understand how incentives schemes can be used to maintain or restore these services. Engagement should lead to interest in exploring options for the design and implementation of a payment scheme. Development of a scheme often requires a negotiation amongst stakeholders that can take many years. To complete these negotiations successfully, facilitators and stakeholders need to have a shared understanding of the diverse interests, assets, capacities and power of the players. The aim should be the formation of an agreement on the design and implementation of a payment scheme that is effective, efficient, enforceable, transparent, equitable and sustainable.

"A PATH MUST BE NAVIGATED THROUGH A COMPLEX LANDSCAPE OF MULTIPLE STAKEHOLDERS AND INSTITUTIONS."

4.1 Initiating engagement and dialogue

The path towards agreement of a payment scheme begins with communication. All stakeholders need to learn and understand what a watershed is, the benefits it creates through watershed services and the value of these to the economy and households. Initiating discussions on watershed services and payment for their upkeep often requires people to change the way they think. To assist stakeholders in this process, reliable information and know-how needs to be made available. Therefore, it is critical that the results of, for example, assessments of watershed services and their values are communicated in formats that stakeholders can comprehend. Communications need to cater for the differing information needs and technical capacities of the array of stakeholders involved. This implies that a range of communications products need to be developed to reach villagers, politicians, economic planners, industries, utilities, agribusinesses and international donors alike.

"MOVING TOWARDS AGREEMENT BEGINS WITH COMMUNICATION."

As awareness of watershed services and their values builds, proponents of payment schemes need to share their vision for a new type of incentive that can support livelihoods, economic development and sustainable use of resources. They need to make clear how such incentives can

change choices about how watersheds are used and managed. They also have to explain how the values of watershed services justify financial transactions between beneficiaries and providers of services. Not least, they need to explain how these payments are in the interests of all parties. As engagement and interest grows, people need to come to the negotiation table to work out deals that transform the vision for a payment scheme into practice.

Multiple triggers for starting or accelerating dialogue about watershed services and payment schemes are possible, including:

- *Changing Policies:* Government or private sector policies may change, perhaps as the limited impacts of statutory, command-and-control approaches to reducing land degradation become more apparent. New policies may encourage alternatives that devolve decision making away from the centre towards farmers and other land-owners. Bringing stakeholders together is then an opportunity to discuss how benefits can be generated and how these and their costs can be shared among stakeholders in a watershed.
- *New Information:* New information and broader understanding of the linkages between economic activities in watersheds may result in individuals or groups recognising their shared interests. For example, downstream irrigators facing sedimentation of canals might open discussions with upstream farmers about reducing soil erosion and sediment delivery to streams. Likewise, upstream farmers who wish to improve land management, but lack the necessary finance, could start a dialogue with downstream users over benefit sharing.
- *Tension or Conflict:* Rising tension or conflict among stakeholders can be a powerful motivation for starting dialogue or coming to the negotiation table. For example, tension can easily arise in a watershed if downstream water users are impacted by a decline in water quantity or quality caused by abstraction or pollution of water upstream. Mechanisms for dialogue and dispute resolution then create opportunities to identify shared interests and enable stakeholders to find innovative solutions. Where development pressures are high, forward thinking stakeholders may recognise that dialogue is needed. Participatory planning may then offer a forum for agreeing incentives for watershed management.
- *Crisis:* Crisis can provide an opportunity for change. The welfare impacts and economic losses caused by floods, drought or catastrophic hurricanes or cyclones can be both devastating and a powerful stimulus for action. At such times, stakeholders may have higher motivation for working together to reduce vulnerability. Windows of opportunity may be brief, but solidarity after a catastrophe can be used to bring people together to discuss new incentives for using watershed management to protect their shared interests.
- *Political Support:* Experience from on-going payment schemes has shown that political support is vital if payment schemes are to move successfully from concept to negotiation. For example, at the Sama Biological Reserve in Tarija in Bolivia, the local NGO Prometa has conducted several studies showing willingness to pay for environmental services by local users. However, the scheme has not taken off because in the prevailing political environment, it is seen as "a new water tax".[26]
- *Champion:* Another turning point on the pathway to agreement can be the emergence of a champion for a payment scheme. This might be an influential individual, group or coalition who is committed to the concept and its aims. Such a champion is likely to be outwardly free of vested interests in the way a watershed is managed and is therefore able to play the role of facilitator and catalyst for change. Champions for payment schemes have been institutions, NGOs or individuals able to articulate the potential effectiveness of a payment scheme. They are often connected to networks able to facilitate access to information sharing, technical assistance and funding.

unilateral decisions are often quicker to implement, they rarely prove to be sustainable. It may be expedient, however, to keep the initial number of parties relatively limited while exploring and testing a payment scheme initiative, to allow some agreement to be reached with a smaller number of parties.

4.2.1 Identifying buyers and sellers

Service beneficiaries

The key question in identifying potential buyers for watershed services is: who has economic interests in the watershed services at stake? Answers should begin to emerge from the identification of benefits from watershed services in valuation studies (Section 2.2). Knowing who to approach to participate in negotiation of a payment scheme then depends on whether demand for watershed services is from direct or indirect users of services. There are two broad categories of users, with different types of stakeholders associated with each.

"IDENTIFYING BUYERS REQUIRES KNOWLEDGE OF WHO HAS INTERESTS IN THE SERVICES AT STAKE."

Direct users of watershed services are individuals or organised groups who are directly affected by land management upstream. This group could include hydropower generators or final consumers of domestic water supply (with demand channelled through waters utilities). It could also include water-related industries, such as beverage manufacturers, irrigators or pulp and paper companies. Direct users of services are more likely to include private buyers with interests in private payment schemes (Section 3.2.1)

There are a variety of possible indirect users of watershed services. These include national and local government, as well as international agencies with interests in financing of development or nature conservation. Pooling of buyers creates an indirect user of watershed services. In this case, services are bought by a single fund for users with a variety of interests, as in the example of FONAG, the Water Protection Fund in Quito, Ecuador (Case 9, Chapter 3). Pooling of service buyers is also an attractive option for governments where watershed services cannot be realistically financed directly by downstream users. Public payment schemes (Section 3.2.4) funded in whole or in part by national governments can improve provision of public goods. Examples of this practice include the Costa Rican programme of payments for ecosystems services', the South-African programme 'Working for Water' and the 'Sloping Land Conversion' programme in China.

The involvement of indirect users of watershed services increases when:

- The ability-to-pay of downstream stakeholders is low, but welfare is threatened by degradation of watershed services.
- Downstream demand is low, but upstream areas are of particular national interest or importance.
- The link between supply and demand is not location-specific or cannot be quantified sufficiently, as might be the case for groundwater recharge.
- Downstream users are already heavily taxed and the government may agree to re-allocate some of these funds to watershed service payments.
- Watershed services are regarded as public goods, falling under governmental responsibility.

4.2 Who should take part?

Clearly, for an agreement on a payment scheme to be reached, the right parties need to be involved in navigating the path towards agreement. Identifying these individuals and institutions is therefore a critical step in developing an agreement. Basically, there are four main categories of stakeholders that need to be represented during negotiations:

- *Beneficiaries:* those who have a demand for the maintenance or restoration of watershed services and who are potential buyers.
- *Providers:* those providing watershed services or could improve watershed services and who may act as sellers.
- *Intermediaries:* those who can broker links between buyers and sellers.
- *Specialists:* those who are able to provide information and assessments.

"ACTIVE PARTICIPATION OF ALL THE STAKEHOLDERS IS VITAL."

Clear channels of communications, consultation among parties and active participation of all the stakeholders are vital. These take time to establish. The time and resources used should be seen as investments, as they can reduce opposition and help to save time in the future. Though

Photo 4.1 Protest by activists and affected communities on World Water Day to demand clean drinking water (New Delhi, India).

Downstream ecosystems are water users and are therefore an important source of demand for watershed services. Developing mechanisms to enable water to be allocated to maintain downstream ecosystems can be critical for economies and societies. Mechanisms are needed for incorporating demand for water by downstream ecosystems in payment schemes. Some experience of this exists. For example, some revenues that are effectively derived from the environment, for example through tourism, can be earmarked to pay for watershed services (Box 4.1). In such cases, downstream demand for water by ecosystems needs to be represented in negotiations.

"DOWNSTREAM ECOSYSTEMS ARE WATER USERS AND ARE THEREFORE AN IMPORTANT SOURCE OF DEMAND FOR WATERSHED SERVICES."

Box 4.1: Can downstream ecosystems pay?

Downstream ecosystems are an important stakeholder in negotiating the allocation of watershed services. Around the world, legal and water policy instruments are being revised to recognise and protect environmental flows in river basins, as explained in the IUCN-WANI toolkit FLOW.[27] However, especially in developing countries, implementing environmental flows can be constrained by lack of data, funds and technical capacity.

Payments offer one approach for bridging the gap between concept and effective local practice – if local demand for ecosystem services that require allocation of water can be established. For example, it is estimated that the Kruger National Park in South Africa would lose 30% of its tourism business if rivers flowing into the park dried up.[28] Revenues from tourism can thus be applied to ensuring that this does not happen. The IUCN-WANI toolkit VALUE[29] provides further examples suggesting that the benefits from downstream ecosystems can form a basis for payments to maintain environmental flows.

Most existing examples of payment schemes have brought together both direct and indirect beneficiaries in negotiations. In many cases, governmental or international agencies have made critical contributions early in the development of payment schemes. Their involvement is used to mobilise funds for pilot schemes and to promote trust among stakeholders. It is also used to encourage downstream users to pay and to set-up mechanisms for monitoring compliance by upstream landholders. Such external support often carries the expectation that negotiations will result in commitments by direct stakeholders in services.

Service providers

The objectives of any payment scheme have to clearly define what is being paid for. This needs to take into account the additionality criterion for payments as described in Section 3.3.2. Improvements in or maintenance of provision or management of a watershed service are specified relative to a baseline. Payment is then made if agreed actions have been carried out or if target values for indicators of watershed services have been met. Stakeholders invited to take part as service providers in negotiation of a payment scheme must be able to implement the needed

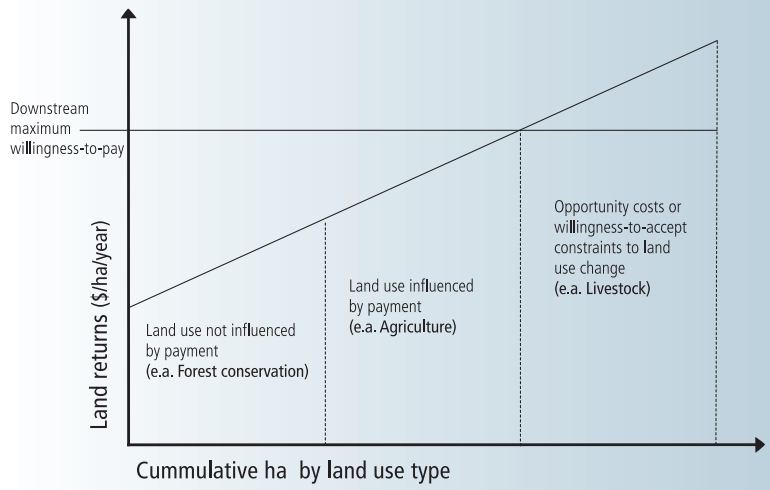
controls on land use and management. They must be situated in the necessary positions in the landscape (see Section 2.1) and there should be a clear understanding of who holds property rights for both land and services (see Section 5.2.1).

"OBJECTIVES OF ANY PAYMENT SCHEME HAVE TO CLEARLY DEFINE WHAT IS BEING PAID FOR."

In reality, it may be necessary to make some service providers a higher priority than others. Blanket approaches that aim for broad-based participation can be suitable at national scale and are a way of cutting transaction costs. However, they also have inefficiencies because payments are then made outside of priority areas such as water recharge zones, biodiversity hot-spots or communities where vulnerable social groups are located. A critical question to consider, therefore, is which groups of service providers will have the biggest desired impact within the resources available. In the example in Box 4.2, priority groups were identified by determining which groups were most likely to be influenced by payments.

Box 4.2: Determining priority groups of service providers

Opportunity costs for alternative land uses can help to determine which groups should be given priority as potential service sellers in negotiation of payment schemes for watershed services. The graph shown here was adapted from observations made in Brazil and Costa Rica[30] to illustrate how the influence of incentives on decision making varies among land uses. Here, conservation forestry is considered the desired land management regime in order to maximise downstream environmental services. Land use returns from conservation forestry are low, in general, compared to land uses such as agriculture or livestock raising. Existing conservation forestry is not under threat of clearing because of enforced legal sanctions or because stakeholders do not have access to needed labour, credit or technology. In this context, paying for services from existing conservation areas makes no economic sense unless there are other reasons for targeting them, such as meeting social equity objectives or because of the influence of groups with vested interests.[31]



Returns from livestock raising are significantly higher than the maximum willingness-to-pay of downstream service buyers. There is little economic justification for paying livestock farmers to change land use without a large subsidy that is likely to bear little relation to the value of or demand for the services provided. This leaves the agricultural sector as the group most likely to participate effectively in a payment scheme. The opportunity costs they face are comparable with the level of payments likely to be on offer. In this example, therefore, priority is given to the agricultural sector, because negotiation of a fair price that will influence choice and behaviour is feasible (see also Section 3.1.3). In reality, diversity within groups is likely to be high and explicit strategies are needed to ensure that the interests of the most vulnerable or disadvantaged are identified and protected during negotiations.

Smallholders can be at a disadvantage in negotiating deals for payment schemes, because transaction and monitoring costs are lower for larger properties. This problem can be reduced by grouping landholders together as associations or cooperatives. A representative may negotiate on behalf of the group, and in turn arrange individual contracts with group members. For example, in Mexico, the authority representing the *ejidos* (communal lands) applies for payments from the government based on existing forest cover. These payments are subsequently redistributed within the *ejido* by the authority based on internal agreements relating to the distribution of land. However, experience has shown that special care is needed when sub-contracting within groups in this way, because it is difficult to guarantee compliance from everyone. There can thus be a danger that an agreement may be void if only one provider breaks the commitment.

4.2.2 Identifying brokers and supporting negotiations

Intermediaries

Direct upstream-downstream negotiations are the simplest way to reach deals on payments for ecosystem services. For example, in Costa Rica the hydroelectric company La Esperanza has made direct payments for water regulation to a private cloud forest reserve located in their recharge area since 1998. This is a relatively straightforward arrangement, with a one-to-one deal between powerful and knowledgeable players. Existing land use is agreed and not in danger of changing in the future. In addition, the scheme provided a mechanism for settling disputes over land tenure and securing access to the stream by the hydroelectric company.

Such clear-cut examples of direct negotiation between service buyers and sellers are rare. In most cases there are many upstream land users and many downstream interest groups. In these cases brokering is necessary and intermediaries emerge.

"DIRECT UPSTREAM-DOWNSTREAM NEGOTIATIONS ARE THE SIMPLEST WAY TO REACH DEALS."

Intermediaries are often essential catalysts in setting up and running payment schemes. They act as an honest broker between service buyers and sellers to improve the process of negotiation. They help to define contractual terms, fill institutional gaps and facilitate financial transactions. These roles can be vital and result in lower transaction costs and increased trust and transparency. Intermediaries are commonly local NGOs, community groups or government agencies who are funded or subsidised by donor organisations. Intermediaries often act in effect as administrators for a scheme.

Photo 4.2 Identifying water abstraction points helps to determine stakeholder groups and potential buyers and sellers of watershed services (Pangani Basin, Tanzania).

An effective intermediary seeks to maximise downstream service buyers' demand by identifying sellers who will deliver the greatest improvement in services at the lowest cost. This is not straightforward and is almost certain to vary by location. The principle should hold unless other political, social or environmental criteria are imposed or included in the goals of the scheme.

In their role as honest broker, intermediaries must also weigh-up possible perverse incentives for changes in currently benign land uses created by payments. For example, a payment scheme supporting silvopastoral land management in Central America had the perverse incentive of encouraging some landholders to cut trees. Payments were only offered for increasing tree cover up to a threshold level. Farmers with land where existing tree cover was higher than the threshold, were then only eligible for payments if they first cleared some of the trees. This forced the programme to also pay for pre-existing environmental services, as this was cheaper than scrutinising pre-existing land cover.[32]

"INTERMEDIARIES MUST ALSO WEIGH-UP POSSIBLE PERVERSE INCENTIVES FOR CHANGES."

Perverse incentives are associated with the concept of 'crowding out'. This occurs when people who are currently good environmental stewards stop providing voluntary and free services. By introducing payments, a scheme may unintentionally undermine positive, voluntary and unpaid

behaviour – in effect, crowd it out. In the case of the silvopastoral programme, there were sufficient funds to buy the scheme out of unexpected behavioural responses to payments. The ability of smaller schemes to overcome the problem of perverse incentives and crowding-out may be much less. There are risks and costs associated with 'learning by doing'. Intermediaries can therefore help to strengthen payment schemes by leading exploratory scenario analysis and feasibility studies (see Chapter 6).

Specialist support

An effective intermediary should try to concentrate on facilitating negotiations and administration of the scheme, delegating technical functions to specialists. Assistance can be provided with feasibility studies, communication and exchange of information, forest management plans, and monitoring, including collection and management of hydrological data. Specialist support is also often used to support participation by landholders. For example, FONAFIFO in Costa Rica administers the national PES ('Payment for Environmental Services') programme, but delegates monitor and liaise at the local level with local groups such as FUNDECOR. These local groups are the direct contact with local farmers, helping to prepare applications for payments. They are also a vital conduit for feedback to intermediaries, supporting learning and adaptation of the scheme (see Chapter 6).

"SPECIALIST SUPPORT IS OFTEN USED TO SUPPORT PARTICIPATION BY LANDHOLDERS."

Specialist support usually includes financial institutions that manage transactions and make payments. Banks help to ensure transparency and are better suited to managing trust funds or to collecting and making payments than an intermediary handing out cash in the back of an office. Specialist legal and institutional support is also often needed.

While some intermediaries might be able to provide some of these services, delegation to competent parties is a means of cutting transaction costs. For example, FONAFIFO has kept transactions costs in Costa Rica's national payment scheme for ecosystems services to the low level of 7%. Partnerships with local support groups have been instrumental, providing on-site technical control and speeding up processing by pre-screening applications. While FONAFINO keeps accounts for the scheme, a designated bank carries out actual financial transactions.

4.3 Navigating institutions and power

Having identified who should be engaged in negotiation of agreements on payments for watershed services, it is then necessary to understand the motivations and capacities of the different parties, and how they interact through current institutions. The key point is that, in addition to being environmentally defensible (Chapter 2), payment schemes must be socially and politically acceptable and institutionally feasible. Facilitators thus need to guide negotiations effectively, with the aim of successfully establishing governance for payment schemes that will work as intended. Stakeholder and institutional analysis provide the information needed to help facilitators navigate the complex interests and relationships that shape the context in which the payment scheme will have to operate.

"UNDERSTAND THE MOTIVATIONS AND CAPACITIES OF THE DIFFERENT PARTIES."

4.3.1 Institutional analysis

It is important to gain an in-depth understanding of the way people are organised in the watershed. This is the institutional context and it frames the way people and communities interact and is the organisational setting in which a payment scheme will have to operate. The purpose of institutional analysis is to identify how institutions link to and influence buyers and sellers of watershed services and what changes are needed for a payment scheme to succeed. Both local and external institutions need to be considered. At the local level, the assessment needs to ask:

- What are the rules that currently govern watershed management, whether formal or informal, and whether enforced or not?
- What institutions are important in the operation of these rules?
- What other institutions shape the choices and behaviour of people in the watershed?
- Who controls these institutions and what incentives (or disincentives) do they create for watershed management?
- What institutions if any currently link potential buyers and sellers of watershed services?
- What support can local institutions provide for negotiation?

"PAYMENT SCHEMES MUST BE SOCIALLY AND POLITICALLY ACCEPTABLE AND INSTITUTIONALLY FEASIBLE."

External actors that need to be considered are outside institutions trying to promote (or reduce) change. This includes intermediaries and champions in payment schemes, but also other outside influences, such as other development or conservation projects in a watershed. The assessment needs to identify the goals of these groups and the resources and incentives they bring to the watershed. Their influence on local institutions needs to be characterised.

Guidance for negotiations should emerge from the institutional analysis. This should be used to shape the architecture of the payment scheme – that is how it should be constructed to function effectively within the local reality. For example, the assessment should help negotiators decide what institutions should be involved, what roles are appropriate and where gaps mean that new institutions need to be created.

In Costa Rica, participation of a private hydropower company in a national payment scheme for watershed services is facilitated by a set of institutions that link landowners and consumers. Each institution has a specific role in the architecture of the payment scheme (Case 10).

Case 10: Institutional roles in a scheme for financing of upstream reforestation in Costa Rica[33]

The Government of Costa Rica originally established the National Forest Office and National Fund for Forest Financing (FONAFIFO) to provide incentives for reforestation. FONAFIFO compensates private landowners who agree to protect, sustainably manage or reforest their land. The Fund is financed by a 5% national sales tax on fossil fuels. FONAFIFO also serves as an intermediary between hydropower companies and upstream forest owners.

Energía Global (now Enel Latin America), a private hydropower company located in the Sarapiqui watershed, provides electricity for about 400,000 consumers. The company wanted to protect the watershed to increase the reliability of streamflow throughout the year and to reduce sedimentation. Through FONAFIFO, Energía Global pay owners of upstream private land to reforest their land, engage in sustainable forestry or conserve forest cover. Landowners who have recently cleared their land or landowners planning to replace natural forest with plantations are not eligible for compensation. Energía Global pays US$ 18 per hectare to FONAFIFO, which then adds an additional US$ 30 per hectare. FONAFIFO makes cash payments to landowners who have signed contracts with Energía Global. Total payments of US$ 48/hectare/year are related to the opportunity costs reforestation or forest conservation, such as potential revenues from cattle ranching. A local NGO, FUNDECOR (Fundación para el Desarrollo de la Cordillera Volcánica Central), oversees the implementation of the conservation activities, carries out technical studies and administers the scheme.

Downstream communities in Colombia found that existing institutions were not able to address their interests in protection of watershed services. To fill this gap they created water user associations to facilitate investment in watershed management (Case 11).

Case 11: Formation of water user groups to organise investment in watershed protection in the Cauca River Basin, Colombia[34]

The fertile Cauca river basin in Colombia has abundant water resources that supply 5 million people in the region. However, rapid urban, industrial, and agricultural development in the late 1980s resulted in increasing water scarcity in summer and flooding during the rainy season. Impacts on farmers were severe because Colombian water laws require that water is allocated first to domestic users. The Cauca Valley Corporation (CVC), the regional environmental authority responsible for water allocation and environmental protection, did not have the financial resources needed to deal with the water shortages faced by farmers.

Faced with growing water scarcity and inadequate public finances, farmers in the Cauca river basin formed 12 water user associations to invest in protecting upstream watershed areas. The water user associations are funded by voluntary user fees paid by members based on water consumption. Proceeds are put into a fund that is used by CVC to finance watershed restoration activities intended to improve streamflow. Land management contracts are agreed with upstream forest landowners and funds are also used to purchase land in critical locations in the watershed.

4.3.2 Power analysis

Stakeholder analysis is used to discover which individuals, groups and institutions have an interest in a payment scheme. A fundamental step is to examine what differences there are among stakeholder groups in their interests, capacities and influence. This can uncover answers to critical issues that negotiators of a payment scheme will have to deal with, such as: who might be the winners and losers, who are the barriers to change and who has interests that need to be protected? Facilitators need answers to these questions to steer negotiations towards agreement.

Power analysis[35] is a useful tool in stakeholder analysis. It is based on:

- Identification of the key stakeholders.
- Assessment of their interests, characteristics and circumstances.
- Identification of interactions between stakeholders and their context.

- Assessment of the power over decision making held by stakeholders.
- Analysis of the control stakeholders have over the actions needed to operate a payment scheme.

As shown in Table 4.1, the results from power analysis are used to relate the power of different stakeholders to their potential to control implementation or be affected by a payment scheme. Thus, it may be most beneficial to invite powerful stakeholders with a high-level of control to be partners in development of the payment scheme. An example of such a stakeholder might be a water or hydroelectric utility, or beverage manufacturer. Smallholder farmers in upper watersheds likely hold little power, but have high levels of control, making their involvement vital. Similarly, smallholder farmers on a downstream floodplain have little power, but watershed management can have a large impact on their interests. Care is therefore needed to ensure that there is support for the participation in negotiations of groups that lack power and that their interests are protected. Powerful stakeholders with little control may be in a position to block or scupper agreements that are perceived to threaten their interests. Agreements need mechanisms to overcome or avoid any barriers to change they may create. Finally, stakeholders without power who are not involved in or affected by watershed management should not influence negotiations.

Table 4.1: Stakeholder power and their potential to either control implementation or to be impacted by a payment scheme, with the implications for negotiations of engagement of each category of stakeholder[36]

Stakeholder power	Stakeholder potential	
	High	**Low**
High	Partnership in the payment scheme	Ensure barriers they may create are avoided
Low	Representation, supported by capacity building and active steps to secure their interests	Minimise influence, but monitor impacts

4.4 Paving the way for successful negotiations

4.4.1 Setting up the process

Successfully negotiating a payment scheme for watershed services should end in a sustainable agreement that incorporates the needs of both buyers and sellers of services. This cannot mean that all parties come away with all of their wishes met. Compromise is an essential ingredient of reaching agreement. This demands an approach to negotiation that is integrative rather than distributive. In a distributive negotiation process, parties simply haggle over how to divide up the cake differently. For one party to gain, another party must lose. This style of negotiation will never provide the outcome desired from a payment scheme for watershed services, which is to create incentives for better choices.

"COMPROMISE IS AN ESSENTIAL INGREDIENT OF REACHING AGREEMENT."

The alternative is to use an integrative approach, which builds on collective learning and incorporates the wider interests of stakeholders that stretch beyond the immediate issues of watershed services. Instead of having to adamantly defend their positions – or their slice of the cake – parties can use the negotiation as a forum to educate other participants about the concerns and constraints they face. As mutual understanding grows, stakeholders can then develop solutions to problems that accommodate shared interests and acceptable compromises.

For example, using integrative negotiation processes might mean that solving secondary issues can be a catalyst for wider agreement. In Costa Rica, upstream land managers were not in favour of participating in a payment scheme if benefits were simply dollars paid per hectare. If road improvements and access to land titles were included, then agreement was possible. In Sukhomajri, India compensation was negotiated for restrictions on grazing in upland areas. The agreement included construction of new irrigation infrastructure and mechanisms for benefit sharing, as the community had an interest in diversifying their livelihoods (see Case 15, Chapter 6).

Negotiation will not always be successful. There may just be too much divergence in the interests of the various stakeholders. In such cases, any agreement might inevitably leave some people worse off, making it impossible for them to participate. Cooperation might be difficult because information is hidden from some stakeholders. There may just not be enough evidence to convince all parties that it is worth taking part, leaving too much uncertainty about, for example, links between the actions of service providers and the value of benefits.

"INFORMATION IS A CRUCIAL INPUT INTO THE NEGOTIATION PROCESS."

Information is thus a crucial input to the negotiation process. The essential components of the evidence base that need to be brought to the negotiation are the assessment of watershed services (Section 2.1); the valuation of watershed services (Section 2.2); the design framework for the scheme (Section 3.3); and the stakeholder and institutional analysis (Sections 4.2 and 4.3).

4.4.2 Elements of an agreement

Agreements on payment schemes for watershed services involve a formal contract between buyers and sellers of services. The form of this contract, and the parties included, varies with the type of scheme (Section 3.2). However, all agreements have some fundamental elements:

- *Services provided:* The agreement should specify the services provided. These must be carefully defined, to ensure that all parties have the same understanding of what is being paid for. Contracted services can be specified in terms of management actions implemented – such as hectares of forest planted – or in terms of quantitative service indicators. Caution is needed, however, when using service indicators such as, nutrient loads in rivers or minimum flows. Besides requiring sophisticated systems for measurement, natural variability of indicator values may be high and there is a danger that sellers may not meet contractual obligations through no fault of their own.
- *Compensation:* The amount and form of compensation for services provided must be agreed and clearly specified. Buyers and sellers need to reach agreement on the price for contracted services (Section 3.1.3) and whether payment will be cash, in-kind or a combination of both. Cash is the most flexible incentive, but other, in-kind benefits, such as road improvements or beehives, can also motivate participation.

- *Monitoring and compliance:* Parties need to specify how monitoring of implementation of the agreement will be done. They need to clearly define what will be measured and what sanctions will be put in place if parties fail to comply with their commitments (see Chapters 5 and 6).
- *Governance and management:* Parties must agree on who will administer the scheme and how roles and responsibilities are allocated among institutions and other stakeholders (Box 4.3).

"AGREEMENTS ON PAYMENT SCHEMES INVOLVE A FORMAL CONTRACT."

Box 4.3: Allocating roles and responsibilities in the governance and management of payment schemes

The allocation of roles and responsibilities may vary enormously according to the stakeholders and institutions involved, their capacities and the goals, scale and type of scheme. However, here are some guidelines:

- Operation of payment schemes can be supported by a management board, which meets regularly to make the most important decisions for the scheme. The board should include representation of stakeholders, such as water-user groups, farmers or other service suppliers, government, the academic sector, and conservation or development NGOs in the area.
- Administration of the scheme may be done by an intermediary group, working directly with the general board to execute the decisions taken, but delegating specialist tasks to third parties. The intermediary is responsible for drawing up and managing contracts, and ensuring that compliance is monitored.
- Baseline studies are usually contracted out to private consultants, technical NGOs or universities. These studies cover hydrological assessments, water demand, land use mapping, cadastral mapping, stakeholder analysis, historical narratives and policy reviews.
- Technical support for landholders, to help them to implement changes in management practices or restore vegetation cover for example, is usually contracted out to specialists by larger schemes. Smaller schemes sometimes have an extension agent on staff.
- Management of funds is best delegated to banks. This also minimises the transaction costs for payments.

In some circumstances, a 'do-it-yourself' approach is used. For example, in Heredia, Costa Rica the water utility ESPH deals directly with private landholders upstream (see Case 3, Chapter 3). However, utilities usually prefer to delegate to intermediaries with the knowledge and skills needed for working with farmers.

4.5 Checklist: reaching agreement

Engage stakeholders through effective communication

- Communicate the results from assessments of watershed services and valuation studies.
- Develop a common vision for how new types of incentives can change choices in watershed management. Explain how values for watershed services justify financial transactions.

Get the right parties involved

- Identify who needs to be involved in negotiation of the payment scheme.
- Involve potential service buyers who directly or indirectly use watershed services, not forgetting provision for the environment itself.
- Invite those potential service sellers able to provide the most impact given the amount of financing likely to be available.
- Aim to have intermediaries act as honest brokers, for example from local NGOs, community groups or government agencies.
- Identify specialist support needed to assist planning and decision making in the negotiation process.

Carry out targeted analysis to support negotiations

- Assess the relative influence and control over watershed management of different stakeholder groups using power analysis.
- Use institutional analysis to help decide what institutions need to be involved in a payment scheme, what roles are appropriate and where new institutions are needed to fill gaps.
- Use stakeholder and institutional analysis to guide negotiations towards agreements that will be institutionally feasible and socially and politically acceptable. Ensure that the interests of key stakeholders with little power are protected during negotiations.

Develop a negotiation process between buyers and sellers

- Use negotiation based on collective learning and mutual understanding of the wider interests of parties. Aim to develop agreements that accommodate shared interests and incorporate acceptable compromises among buyers and sellers.
- Ensure that negotiated agreements clearly specify: the services to be provided under the payment scheme; the amount and form of compensation; how implementation will be monitored; sanctions for non-compliance; and how the scheme will be administered.

Chapter 5

Rules At Work

Payment schemes for watershed services need clear and enforceable rules and transaction mechanisms. Without an understanding of these and agreement by all parties, a payment scheme will not operate successfully. Failure to establish appropriate rules and transaction mechanisms is likely to erode trust and confidence among stakeholders. The new choices and behaviours in watershed management promoted by the scheme will then not be implemented. The key ingredients are effective institutions and reliable contract law, supported by good governance, effective transaction capacities and credible enforcement. Hence, designing the rules for a payment scheme calls for development of an institutional framework for the scheme. This includes the clarification of rights, agreement of obligations among parties, establishment of contractual arrangements and mechanisms for ensuring compliance and enforcement.

"PAYMENT SCHEMES FOR WATERSHED SERVICES NEED CLEAR AND ENFORCEABLE RULES AND TRANSACTION MECHANISMS."

5.1 Enabling institutions

5.1.1 Institutional framework

Any rules for payments schemes must operate within a wider framework of institutions that is shaped by both formal laws and policies and customary arrangements.[37] The institutional framework for a payment scheme is the combination of organisations, social structures and mechanisms that support order and cooperation in relationships between parties. Institutions make and enforce the rules, which are the legislative, customary and/or contractual norms used in implementing a payment scheme. Rules specify the rights and obligations of parties and the responsibilities and powers of institutions.

"ANY RULES FOR PAYMENTS SCHEMES MUST OPERATE WITHIN A WIDER FRAMEWORK OF INSTITUTIONS."

Formal institutions provide 'the rules of the game' and include for example, water law and water policy as well as formal administrative mechanisms in the water, land and wider natural resources sectors. Customary institutional arrangements are 'the rules in use', or how people actually deal with each other according to customary law and traditions. Payment schemes interact with both types of institutions and their associated rules and transaction mechanisms. The relative strength of one over the other, however, strongly influences which options are available in practice for developing and implementing a payment scheme for watershed services.

Formalisation of the water sector depends heavily on the level and pace of economic development in a country (Table 5.1). For example, in the developing countries of sub-Saharan Africa, the water sector is much less formalised than in the highly industrialised countries of Western Europe. As a result, the water sector in sub-Saharan Africa is principally organised on the basis of customary arrangements applied at community level. In a highly-industrialised economy, in contrast, large water industries are organised on a commercial basis. A different institutional framework is needed for a payment scheme in each of these settings.

"LOCAL PAYMENT SCHEMES MAY BE OPERATED USING INFORMAL INSTITUTIONAL ARRANGEMENTS."

Where the formal institutional environment is ineffective – because laws are weak or not enforced – local payment schemes may be operated using informal institutional arrangements that are based on customary law.[38] Key legal issues in making rules for a payment scheme in this context are clarification of rights and tenure and establishing effective compliance and enforcement mechanisms (Table 5.1). Where the reach of formal laws is wide and effective, a payment scheme can make use of existing law – relating for example to enforcement of contracts – and therefore new rules are likely to focus most heavily on how to monitor compliance (Table 5.1).

Table 5.1: Influence of level of formality on the development of the institutional and legal framework for a payment scheme for watershed service.

Stages of institutional development	Examples	Formal / customary institutions	Institutional arrangements in water sector	Priority legal issues for payment schemes
Completely informal	Sub-Saharan Africa	Weak / Strong	Self-supply and community management	Land and water rights, compliance an enforcement
Largely informal	Bolivia, India, Nicaragua	Weak / Strong	Growing public provision but self-supply dominates	Land and water rights, compliance an enforcement
Formalising	Chile, Costa Rica, Mexico, Tanzania, eastern China, eastern Europe, Mekong region	Emerging / Falling	Private-public provision to improve service and manage resources	Land and water rights, compliance an enforcement
Highly formalised	North America, Western Europe, Australia	Strong / Weak	Modern water industry. Self-supply disappears	Compliance

The rules needed to run a payment scheme for watershed services effectively also vary with scale and the public or private nature of the scheme. At local scales where deals are made between buyers and sellers of specific services, for example relating to sustainable use of a specific forest area, schemes may be based on private agreements (Section 3.2.1). Reliable contract law, or clear customary norms, and enforcement capacity are then key. As scale increases, it is harder to directly link buyers and sellers of services and the need grows for appropriate public institutions to facilitate transactions (see Section 3.2.4).[39]

"RELIABLE CONTRACT LAW, OR CLEAR CUSTOMARY NORMS, AND ENFORCEMENT CAPACITY ARE KEY."

"GOOD GOVERNANCE IS NEEDED TO BRIDGE THE GAP BETWEEN FORMAL AGREEMENTS AND HOW RULES ARE PLAYED OUT."

5.1.2 Good governance

Development of an institutional framework is not in itself sufficient to ensure that rules for a payment scheme can be implemented. Good governance is needed to bridge the gap that frequently exists between formal agreements on management of water resources and how rules are played out, and contracts established and enforced, at local level. The role of good governance is to promote compliance with the scheme by fostering cooperation and coordination among sectors, levels of government and public stakeholders. It is critical to bear in mind, however, that translating the rhetoric of good governance into meaningful action is as much a challenge for payment schemes as for the wider water sector:

"Although Water Governance and holistic and integrated approaches to water resources management feature strongly in the international water agenda, in many countries water governance is in a state of confusion. The specific water governance issues vary. In some countries, there is a total lack of water institutions, and others display fragmented institutional structures (sector-by-sector approach) and overlapping and/or conflicting upstream and downstream interests regarding riparian rights and access to water resources are pressing issues that need immediate attention; in many other cases there are strong tendencies to divert public resources for personal gain, or unpredictability in the use of laws and regulations and licensing practices, which impede markets and licensing practices and encourage corruption and other forms of rent-seeking behaviour".[40]

"SAFEGUARDING THE CREDIBILITY OF THE INSTITUTIONAL SET-UP IS VITAL."

Thus, in many settings, the reality is that achieving the level of good governance required for a payment scheme will depend on wider reforms of governance and democratization in water and land resources management. Provision for citizen participation is important, including the right of citizens and non-governmental organizations to bring lawsuits for the purpose of enforcing the rules and contracts associated with payment schemes. Safeguarding the credibility of the institutional set-up is vital. Efforts must be made to prevent bribery or falsification of data, for example through criminal liability. Application of the law has to be fair and consistent, for example based on written guidance and policies for interpreting and implementing the rules and requirements of a payment scheme. The overall aim of governance structures should be to create order and to mitigate conflict for the benefit of all parties.

5.2 Legal and contractual framework

5.2.1 Clarifying rights

Successfully establishing and operating a payment scheme for watershed services demands clear understanding of property rights and tenure rights. Property rights are crucial for two reasons. First of all, the distribution of payments among land users will be a source of conflict if

property rights are not clear to everyone. These rights relate to both tenure and the ownership of watershed services. With clearly defined rights to sell services, disputes over who is entitled to be paid will be prevented. Second, insecure tenure is often directly related to overexploitation of natural resources and thus degradation of environmental services. If tenure is unclear, payments for services may end up providing further impetus for overuse of resources. For example, without clearly assigned tenure rights, the prospect of payment for land and water management may attract increased numbers of resource users to an area.

"CLEAR UNDERSTANDING OF PROPERTY RIGHTS AND TENURE RIGHTS IS CRUCIAL FOR OPERATING A PAYMENT SCHEME."

Property rights vary significantly from country to country. In general, a clear scheme of property rights needs to address the following questions:[41]

- Who may enter a property and enjoy non-extractive benefits?
- Who has the right to use the resource (the 'usufruct' right) or control how it will be used?
- Who can exclude others from unauthorised use?
- Who may derive income from the resource?
- Who has the right to sell all or some of these rights to others, either permanently, or for a limited time (such as through a lease)?
- Who has the right to pass these rights down to one's successors (the right of descendants to inherit land or resource rights)?
- How are land and resources protected from illegal expropriation?

Photo 5.1 Warning signs indicate that the polluted Zarqa river (Amman, Jordan) no longer provides services to support drinking water supply or recreation.

All of these tenure issues need to be taken into account for property rights to effectively support a payment scheme for watershed services. Hence, property rights must provide for more than the regulation of land ownership and include the natural resources that land provides. Ensuring that property rights are clearly designated – whether though formal law or customary arrangements – is an essential step in ensuring that payment schemes result in the intended incentives for better choices and behaviours in watershed management.

The process of registering tenure rights can be an instrument for clarifying rights among stakeholders. A right can only be registered once a person is entitled to this right. Registration of rights is thus a test of rights and a mechanism for determining who are the actual service providers under payment schemes for watershed services.

However, registering tenure rights must not ignore customary rights, as this would lead to social exclusion and, in many contexts, unsustainable land use. Tenure systems must accommodate both formal property rights recognised by the legal system, such as land titles, permits and licenses, and customary rights. Customary rights are unwritten or informal rights, based on long-term occupation or tradition, through which rural people have access to natural resources. A payment scheme that excludes land users without registered property titles – very often indigenous communities – will further marginalise already poor communities. This could then well lead these stakeholders to revert to unsustainable or illegal land uses to generate revenues.

"THE DESIGN OF OBLIGATIONS AND REQUIREMENTS IS CRITICAL TO THE SUCCESS OF THE PAYMENT SCHEME."

5.2.2 Setting obligations and requirements

The overall goals of the parties in a payment scheme for watershed services are straightforward. One party, the service buyer, wants to ensure that a particular watershed service or a bundle of services is delivered. The other party, the service provider, wants to be rewarded for the benefits delivered. To be more than a declaration of intent, however, these goals must be backed up by clearly defined obligations and requirements with real legal meaning. Obligations and requirements can be understood as the specific practices and procedures required by the payment scheme. The precise design of these obligations and requirements is critical to the success of the payment scheme. Parties might agree to define obligations under a scheme on the basis of actions, results or outcomes. These can be monitored against specific targets for an agreed set of indicators (see Chapter 2 and 6). If payment schemes are well designed, then compliance will achieve the desired environmental results. If they are poorly designed, then compliance will be hard to achieve or fail to deliver the intended results.

"A GOOD DESIGN WILL REFLECT THE PRACTICAL REALITIES OF COMPLIANCE AND ENFORCEMENT."

A good design for the legal framework of a payment scheme will reflect the practical realities of compliance and enforcement. In general terms, specification of obligations and requirements should include:[42]

- A clear and understandable definition of the watershed services covered by the scheme, the stakeholders involved and activities subject to regulation.

- Clarification of the legal authority underlying the scheme.
- Explicit definition of the timeframe for implementation of the scheme.
- Measurable indicators for the activities to be performed or services supplied in terms of results or outcomes.
- Precise definitions and exceptions, to enable identification of non-compliance.
- Narrow definition of any exceptions, to avoid situations in which exceptions 'swallow' the definitions.
- Consistent use of definitions throughout the text of the scheme.
- Coordination among different schemes and policies, to prevent ambiguity and conflicts between their obligations and requirements.
- Enough flexibility to ensure the scheme can be constructively adapted to changing circumstances.

Participation and negotiation

The process of establishing the legal and contractual framework for a payment scheme needs to build on the development of the institutional framework, definition of the scale of the scheme and designation of property rights. This process has to involve all stakeholders engaged in or affected by the scheme. This might be done by inviting formal written comments after publication of an official draft scheme, or through testing and assessment of the scheme with stakeholders. However, for the key stakeholders, decisions on the legal and contractual framework for a scheme must be the subject of negotiation (Chapter 4). Negotiation is essential to ensure that the rules for a payment scheme incorporate the needs of both buyers and sellers of services, are acceptable to all parties, and are therefore sustainable and enforceable.

"ENSURE THAT THE RULES FOR A PAYMENT SCHEME INCORPORATE THE NEEDS OF BOTH BUYERS AND SELLERS."

Specifying activities and services supplied

Obligations of service sellers can be specified in terms of behaviour or application of defined management practices. These should be based on causal relationships with the service provision or outcomes desired (Section 2.1). Obligations need to be specified relative to a baseline (Section 3.3.2).

"SPECIFY WHAT ACTIVITIES, SERVICE RESULTS OR OUTCOMES ARE CONTRACTED UNDER A PAYMENT SCHEME."

Alternatively, obligations can be made even more specific and be defined as performance requirements. These can be measured against specifically agreed upon targets for service indicators. For example, an obligation could be to reach an agreed water quality standard at a certain point of measurement by a specified date. However there is a danger with such an approach. Service providers might take the required steps to secure service provision, but performance criteria for services may not be met because of circumstances beyond their control. For example, other users not involved in the scheme might increase pollution of the river, preventing the target from being reached despite action by participating upstream stakeholders. In such a case, payment cannot be made, and the burden of proof in litigation that obligations have

been met will rest with the service provider.[43] Thus, great care is needed in specifying what activities, service results or outcomes are contracted under a payment scheme. Performance must be measurable and open to proof that can be used as legal evidence (Case 12).

Case 12: Disputed evidence of plantation forestry on streamflow in South Africa

Streamflow Reduction Activities (SFRA) is a South African water policy instrument that recognises water as a limiting resource for development and the need to regulate land uses that consume water. Plantation forestry with exotic tree species (e.g. pine and eucalypts) has long been recognised as having higher impacts on water resources than native trees. SFRA aims to tax forestry based on quantitative reductions in streamflow. However, the forestry sector disputes the hydrological evidence behind new and increased charges, because of the complexity of interactions between landscape and hydrology in land-use mosaics. As the debate rumbles on, SFRA policy may be simplified to avoid future disputes, basing SFRA payments on land use instead of hydrological criteria. Liability for SFRA payments would then be much more easily assessed, making the policy more acceptable to the forestry sector and the overall scheme more effective.

Timeframes for payment schemes

The legal and contractual framework for payment schemes must define when and for how long it will be in force. Deadlines for compliance with obligations and requirements need to be specified. In addition the scheme should aim to create long-term impacts, and thus agreement is needed on steps for ensuring the sustainability of the provision of watershed services. The timeframe for a scheme can specify that payments will be made for a few years, a few decades, or even forever. Where payments are only foreseen for a limited period, then provisions need to be made to guarantee sustainability once payments stop. One legal option is to prohibit land-use changes after payments have come to an end. Where schemes are established for longer timeframes, financial sustainability has to be secured in the long term (Section 3.4.2) and there must be scope for adapting the scheme to changing circumstances.

Adapting to context

No generic legal and institutional framework can be applied to payment schemes for watershed services. Legal arrangements must be adapted to the specific context of the scheme. This can be done in two phases. First, at the initial stage when the scheme is being set up, the scheme can be tested in the field using pilot schemes to find out more about what works and what does not.

"LEGAL ARRANGEMENTS MUST BE ADAPTED TO THE SPECIFIC CONTEXT OF THE SCHEME."

During the second phase, lessons learned from pilot schemes can be used in refining the final scheme. The legal framework for the final scheme should include provision for ongoing adaptation of the scheme after it has been put in place. Specific circumstances, such as land-use changes, can be identified that will result in changes to the obligations and requirements. Further provisions can, for example, define a regular timetable for review and revision of the

scheme, or specific events that would trigger a review, such as instability in the economy. It should be specified further whether only certain aspects of the scheme will be reviewed at such times, or whether the whole basis for the scheme is subject to review. Even a full re-negotiation of the scheme can be stipulated to ensure that the scheme remains equitable after undergoing change. Including such provisions often increases trust and the motivation of stakeholders to join.

5.3 Ensuring compliance and enforcement

To be credible, rules for payment schemes for watershed services must include measures for assessing compliance and enforcement. Compliance is achieved if parties fully implement their obligations and requirements under the scheme. Enforcement is the set of actions taken by governments or intermediaries in response to non-compliance. Effective enforcement supports compliance by ensuring fairness for those who willingly comply with their obligations and requirements in a scheme.

"RULES FOR PAYMENT SCHEMES MUST INCLUDE MEASURES FOR ASSESSING COMPLIANCE AND ENFORCEMENT."

5.3.1 Compliance

By clearly defining the services covered by a scheme, the obligations of stakeholders, performance indicators and targets, the legal framework for a payment scheme indirectly describes what constitutes compliance. Nevertheless, just how compliance will be determined must be stipulated.[44] Compliance is assessed by monitoring, which can be done through:

- *Field inspections:* Specific, field-level assessments are defined. Exactly what will be inspected and what test methods will be used are defined. Inspection procedures are agreed and include: the legal authority for inspections; the frequency of inspections; the consequences of refusing inspection; rights of entry for inspectors; whether notification is needed and what documents may be examined.
- *Desk reviews:* Reports based on self-monitoring and record-keeping by service sellers and buyers are monitored. Information in these reports is then used either as a direct basis for enforcement actions, or to target inspections. A clearly defined, standard procedure is again required, including the method, schedule and format for reporting. Data requirements and how long records must be kept must be defined, and whether reports will be made public should be agreed.

Aside from these procedural arrangements, there should be clear designation of responsibilities for proving compliance or non-compliance. This might be a government agency or another intermediary in the payment scheme (Chapter 4). What kinds of evidence can be used to prove compliance and what is admissible in a court of law should be determined.

"A CLEAR DESIGNATION OF RESPONSIBILITIES FOR PROVING COMPLIANCE OR NON-COMPLIANCE."

Photo 5.2 Discussions among stakeholders are critical to reach agreements on payment for watershed services (Burkina Faso)

Additional procedures need to be defined for how cases of non-compliance will be handled. Ideally there will be provisions for using both 'carrots' (facilitative measured to enable future compliance) and 'sticks' (punitive measures to enforce future compliance). 'Carrots' are useful for parties who are willing but unable to comply with their obligations. For example, where lack of knowledge or inadequate technologies mean land users have difficulty complying, then schemes can support improved compliance through training, technical assistance or by arranging access to grants or loans.

5.3.2 Enforcement

The underlying cause for non-compliance with a payment scheme in some cases will not result from an inability to comply, but rather a lack of willingness to do so. Thus, provisions are needed for dealing with deliberate violators who will only change their behaviour if they need to avoid the 'stick' behind a payment scheme. Deterrence relies on two factors:

- Credibility, meaning that there is a high chance violations will be detected and that responses to violations will be swift and predictable;
- Disincentives for non-compliance, including appropriate sanctions.

Powers of enforcement need to be clearly assigned in the legal framework for a payment scheme for watershed services. This implies that both formal and informal response mechanisms should be specified. Informal responses normally precede formal enforcement actions. Thus, non-complying parties are usually given notification that a violation of their obligations and

requirements under the scheme was found, through a warning letter, telephone call or during inspections. Corrective action is specified and a deadline set.

"RESPONSE MECHANISMS TO NON-COMPLIANCE CAN RANGE FROM REMEDIAL ACTION TO SANCTIONS."

If the violation is not corrected within the given timeframe, and if the violation is not successfully contested in an appeal or dispute resolution, then formal enforcement action is initiated. One of the first penalties that can be applied to service sellers who do not comply with their obligations is withholding of regular payments. However, schemes may also specify other responses, such as to failure by service buyers to fulfil their obligations. Response mechanisms can range from remedial action to sanctions. The specifics of these needs to be agreed during negotiation of the rules for the payment scheme and embedded in the contractual arrangements. An example of penalties for violation of contracts under a payment scheme is shown in Case 13.

Case 13: Sanctions for non-compliance with the watershed protection scheme in Pimampiro, Ecuador[45]

San Pedro de Pimampiro is a municipality located in Imbabura province in Ecuador's Andean region. The municipality is subject to water shortages. The Ecological Corporation for the Development of Renewable Natural Resources (CEDERENA), a national NGO, is implementing a project to counteract environmental degradation by helping farmers to implement watershed restoration and sustainable forest management.

As part of this project, a pilot payment system for watershed services is being implemented to create incentives for people to conserve forests, and to penalise those who do not. Payments to landowners depend on land-cover type. To receive payments, landowners must sign an agreement with the municipality of Pimampiro. The agreement establishes a land management plan for the property, specifies the area covered and levels of payment according to current land use. Landowners who violate their contracts have their payments suspended for one quarter. Repeated violations lead to further suspensions and then exclusion from the payment scheme. The municipality of Pimampiro and CEDERENA are developing a structured penalty system, but are learning as the pilot project is carried out.

Remedial action can include imposition of injunctions ordering permanent or temporary shut down of specific activities or practices. For example, logging operations in a watershed might be halted. Action might be ordered to correct any immediate hazards caused by non-compliance or to clean up any environmental damage. Provision might be made for seeking compensation for damage suffered because of non-compliance. As the downstream economic damage in a watershed resulting from unfulfilled obligations can be severe, it may be advisable to establish a compensation fund within the watershed service payment scheme. If a liable party is then unable to pay, the fund can then cover the costs of, for example, drinking water pollution or damage to a hydropower plant. Such a fund can also be used to reinforce the viability of the payment scheme in the case of extreme events, by supporting responses to, for example, severe floods or droughts.

"CRIMINAL SANCTIONS CAN BE IMPOSED IN CASES OF SEVERE NEGLIGENCE."

More punitive sanctions, based on law, may also be foreseen in setting rules for a payment scheme. For example, in cases of negligence, penalties such as fines or payment of damages could be sought. Criminal sanctions can be imposed in cases of severe negligence or in cases of falsifying documents or other fraud.

Other specific provisions are needed to support enforcement of the payment obligations of service buyers. Enforcing payments often requires appealing to court and, consequently, service sellers may need funding and legal representation to help them protect their rights. Intermediary institutions can play an important role in this context, by supporting service sellers in bringing legal action against downstream buyers who are unwilling to fulfil their agreement to pay for services delivered.

5.4 Checklist: making the rules

Design an institutional framework for implementation of the scheme

- Identify the institutions needed to support implementation and operation of the payment scheme.
- Utilise formal and informal institutions as appropriate and ensure compatibility with customary law and practices.
- Ensure that the institutional framework is appropriate to the legal and wider institutional context in which the scheme will operate, and to the scale and the extent of public or private involvement in the scheme.
- Establish good governance to build credibility and demonstrate the fairness of the payment scheme.

Clarify land and resource tenure

- Ensure clear tenure and property rights. Make sure there is agreement on who has the right to derive income from watershed services, who can exclude others from unauthorised use of land and resources, who may sell, lease or bequeath these rights, and how customary rights are respected.

Clear and enforceable rules and transaction mechanisms are essential

- Specify obligations and requirements within a legal and contractual framework for the payment scheme. Design obligations in ways that make the activities to be performed, or results or outcomes to be delivered clear, measurable, practicable, adaptable to change and sustainable in the long term.
- Utilise arrangements for good governance to support translation of formal agreements into effective, on-the-ground operation of the payment scheme.

Define and establish compliance and enforcement mechanisms

- Agree mechanisms to promote and enforce compliance with obligations under the payment scheme.
- Create comprehensive procedures to verify compliance through inspection and reporting.
- Incorporate mechanisms to support compliance through training and technical assistance for service providers.
- Establish both informal and formal enforcement mechanisms, including withholding of payment, remedial actions and sanctions that may result from non-compliance.

Chapter 6

Learning from Partners and Experience

The building blocks of a payment scheme for watershed services have been laid out in the preceding chapters. Building and running a successful payment scheme requires putting these pieces together in a coherent set of agreements and actions. This demands leadership and management of change. Most often, it is project managers in intermediary organisations who face the task of coordinating the development of each of these components and of assembling them into a cohesive, workable scheme. In doing so, they need to keep focused on creating incentives for water and land managers to change their behaviours towards more sustainable use of watershed services. In many ways, establishing and managing a payment schemes implies establishing a social learning process. In this, stakeholders engage to jointly learn to redefine priorities and reflect upon principles and outcomes.

"ESTABLISHING AND MANAGING A PAYMENT SCHEMES IMPLIES ESTABLISHING A SOCIAL LEARNING PROCESS."

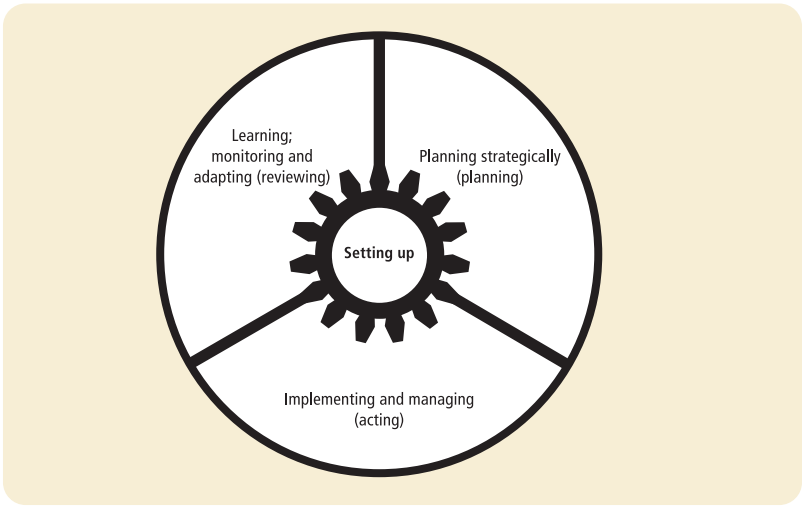
6.1 Payment schemes and social learning

6.1.1 Coordinating implementation and social learning

Chapters 2 to 5 laid out the elements of strategy needed in developing a payment scheme for watershed services (see Figure 1.2). Sound project management is vital, to ensure effective coordination between components. Project managers need to be supported by multi-disciplinary teams combining hydrological, ecological, economic, legal and social expertise and know how. Excellent communication among team members is needed to ensure that analyses under one component are shared with all other components. Moreover, the information and knowledge assembled has to be brought together and used by stakeholders for learning. Project managers need to ensure that this is done in a timely way to ensure that learning and decision making proceeds as the evidence base for the scheme accumulates. Therefore, a critical task in coordinating development of a payment scheme is to establish an effective, transparent social learning process. This must enable meaningful and well-informed participation by stakeholders in setting-up and running the payment scheme.

"SOUND PROJECT MANAGEMENT IS VITAL, TO ENSURE EFFECTIVE COORDINATION BETWEEN COMPONENTS."

Figure 6.1: Setting-up and running a payment scheme requires social learning among stakeholders.



6.1.2 The learning cycle

A strategy for developing and running payment scheme can be broken down into a series of discrete elements that together form a learning cycle (Figure 6.1). This plan-act-review cycle has four key elements:

Step 1. Setting-up

During this phase, an initial situation analysis is carried out. These combine the assessment of watershed services (Section 2.1), stakeholder analysis (Section 4.2), institutional analysis (section 4.3.1) and power analysis (Section 4.3.2). These analyses help to deepen understanding of the situation within the watershed and to establish a baseline against which future progress can be measured. Initial steps are undertaken to build stakeholder support and communicate about watershed services, their values and options for improving their management.

In this early stage, one would establish an interim steering group that can help to galvanise stakeholder support for the process. This group would have the task of outlining the general process, the timeframe, institutional requirements and the resources needed to arrive at an agreement. It can also be responsible for establishing early ideas about the scope, mandate and expectations of a payment scheme for watershed services.

Step 2. Planning strategically

Moving from the initial step, the interim steering group needs to work on building understanding among stakeholders (potential buyers and sellers). Stakeholders should know about each other's values, motivations, reservations, concerns and interests. At this stage, those taking part should be able to establish a common vision for the watershed and its services.

Creating a vision needs to go hand in hand with the identification of issues, challenges and opportunities. As indicated in section 3.3, stakeholders need to examine future scenarios and options. Based on these, the parties need to agree on a common strategy and set objectives for a payment scheme. This needs to be elaborated through the identification of actions, timeframes

and responsibilities. Finally, the various elements of the payment scheme must be laid down in a contractual arrangement (Section 5.2). As in the previous stage, it is important to communicate frequently to ensure transparency and build trust among parties.

Step 3. Implementation and management

During this stage, the parties move to implementation of the agreed scheme. A formalised steering group (or other coordination mechanism) is set-up and embedded in wider existing institutional arrangements. The management structures and procedures required for the running the scheme are also put in place. Resources needed to run the scheme are secured from the buyers, sellers and third parties if required.

Close working relationships among stakeholders continue. These may facilitate developing the capacities of specific stakeholders to implement agreed actions. This implies regular meetings between buyers and sellers to continue to familiarise each with the others' situation. Using these processes to maintain the commitment of stakeholders to the scheme is important, especially as there may be a time lag before results appear.

Step 4. Evaluation and reflection

As payments schemes for watershed services are a significant innovation, it is unlikely that the first design and pilots will all be successful. Therefore, it is important to establish a learning culture and environment. This allows stakeholders to share experiences, questions and information relevant to the development and implementation of the scheme.

In the contract, specific obligations and performance standards should have been defined (Section 5.2.2). These could either relate to actions taken, results produced or outcomes and impacts achieved. What is needed now are practical approaches for monitoring the compliance of the parties and the performance of the scheme in relation to the obligations agreed. This should be based on periodic reviews and discussion of the results with stakeholders. Lessons learned provide feedback into the strategies, implementation procedures and the day-to-day management of the scheme.

6.2 Turning the learning cycle

Two particular sets of activities during development and implementation of a payment scheme are especially relevant to learning. These are the key opportunities for synthesising and reviewing knowledge and information relating to the watershed and payment scheme. First, there are feasibility assessments, when existing knowledge and emerging new information are synthesised for perhaps the first time. Stakeholders can use such early opportunities for review as a platform for better planning and implementation of the scheme. Second, there is the monitoring and evaluation of the implementation of the scheme. Reflection on results from monitoring and evaluation by stakeholders is a vital part of social learning in a payment scheme. These processes sit at the heart of step 4 in the learning cycle.

"REFLECTION ON RESULTS FROM MONITORING AND EVALUATION BY STAKEHOLDERS IS A VITAL PART OF SOCIAL LEARNING IN A PAYMENT SCHEME."

6.2.1 Feasibility studies and learning

One of the first questions that needs to be answered in relation to the feasibility of a payment scheme is: will payments work? Will payment (or in-kind rewards) provide the incentive needed to for upstream landholders to change to preferred choices for land use and management?

Scenario analysis can be used to find answers. It is used to test the adoption of changes in land management by stakeholder groups under alternative types of incentives. Responses to alternative scenarios are surveyed or explored in focus groups. Differences in preferences among stakeholder groups can then highlight what other issues need to be tackled for incentives to take effect. For example, in the Bhoj wetland in India, scenario analysis was used to test the likely effectiveness of making payments to farmers to support conversion to organic farming and reduced wetland pollution. Results showed that payments were only likely to promote the desired outcomes if there was institutional support for training of farmers and for accessing premium markets. Thus, scenario analysis is a valuable tool for understanding, at an early stage, the scope of action needed to make a payment scheme effective.

"SCENARIO ANALYSIS IS A VALUABLE TOOL FOR UNDERSTANDING THE SCOPE OF ACTION NEEDED."

Feasibility studies are done later, as detailed knowledge accumulates. They are used to synthesise and review the diverse data and information gathered on watershed services, their values, finance needs, stakeholders, institutions and legal issues. The purpose is to assess the economic viability of a proposed scheme and therefore support planning of the payment scheme. Feasibility studies should:

- Raise awareness about watershed services, their values and the potential for payment for these services.
- Review alternative approaches to addressing watershed problems, including doing nothing.
- Identify issues that could influence the success or failure of a payment scheme.
- Identify potential buyers, sellers, intermediaries and specialist support.
- Understand the advantages and disadvantages for various scheme options.
- Assess sources of funding for transactions and administration of the scheme.
- Identify options for management of the scheme and institutional and legal issues.
- Weigh up the potential economic, social and environmental impacts of alternative solutions and rank alternatives according to their feasibility and anticipated outcomes.

The feasibility assessment is useful for marshalling political and financial support for a proposed payment scheme. The cost of the assessment and time needed vary with scale and data requirements. Six months might be adequate for a smaller scheme where most data already exists, but perhaps three years will be needed for large schemes or if large amounts of new data need to be collected.

"FEASIBILITY ASSESSMENT IS USEFUL FOR MARSHALLING POLITICAL AND FINANCIAL SUPPORT."

After the feasibility assessment, pilot schemes might be set up. They are another opportunity to undertake further cycles of planning, acting and reviewing before moving to full-scale implementation. Pilot schemes can be run for a limited time in a sub-catchment of a larger basin where the full scheme will be implemented. Alternatively, pilots may be run for only a simplified set of objectives relating to a sub-set of the watershed service included in the full scheme. The aim of a pilot phase should be to test both the management of the scheme and its impacts. Testing of impacts is done through monitoring key-indicators and evaluating the results. Reflection on the results and impacts of pilot schemes are thus an opportunity to refine plans for implementation of the full scheme.

6.2.2 Monitoring and evaluation

The learning cycle should not end with the launch of a payment scheme. Monitoring and evaluating the impacts of actions is a critical mechanism for review of projects and hence learning. As implementation of a payment scheme proceeds, tracking key environmental and social indicators is used by managers and stakeholders to determine if a scheme and the participating parties are doing what they set out to do. Where gaps or failings are identified, results from monitoring are used to adapt the scheme through the learning cycle. If serious underperformance is recorded, consideration might be given to altering the design of the scheme and changing the contractual arrangements accordingly.

"MONITORING AND EVALUATING THE IMPACTS OF ACTIONS IS CRITICAL FOR LEARNING."

Evaluation of a payment scheme in Costa Rica assessed environmental and social impacts of the scheme (Case 14). The study concluded that the scheme was creating environmental benefits, but was not benefiting the poor.

Case 14: Impacts of a payment scheme on farmers in Virilla watershed, Costa Rica[46]

The 'Payments for Environmental Services' programme in Costa Rica was set up in 1995 to encourage forest protection and management by paying forest owners for carbon, biodiversity, landscape and watershed services provided by their forests. Impacts of schemes run under this programme in the Virilla watershed were evaluated. The study found that landowners in the watershed were relatively wealthy and well educated, and that most participants were not dependant on the land for their livelihood. Landowners identified a range of benefits from the scheme. These included environmental benefits such as reduced land degradation and improved water quality. For some the economic benefits in the form of the payments were important. Additional benefits were access to training and technical support and opportunities to start eco-tourism ventures.

The study also found that poorer households were often excluded from the scheme. First, households receiving government welfare benefits were not entitled to participate. Second, it was difficult for smaller-scale farmers to set aside forest area on the farm. While the scheme was creating environmental benefits, therefore, under the existing arrangements, the scheme was not supporting poverty alleviation.

Monitoring and evaluating outcomes helps scheme managers to adapt to changes in the watershed and in the wider social and economic environment. Results from monitoring and evaluation studies can be used to learn lessons and build the capacities of buyers and sellers. For example, monitoring and evaluation might identify training and support needs for enhancing the quality of the activities, the results achieved and the outcome or impacts attained.

Learning was the key to adaptation of watershed management in Case 15, from India. Cycles of planning, acting and review have seen the scheme change in response to the needs of stakeholders.

Case 15: Adaptive participatory watershed management in the village of Sukhomajiri, India[47]

In the 1970s, residents living in Chandigarh, downstream of the village of Sukhomajiri, were severely affected by water scarcity caused by siltation of Lake Sukhna. Assessments found that Sukhomajiri was the cause of a large share of the sediment load. In response, a water users association was set up in Chandigarh in 1982 to collect fees from water users and fund infrastructure improvements and investment in watershed management. To secure the support and participation of Sukhomajiri, funds were provided to construct a reservoir for irrigation in Sukhomajiri.

Landowners below the reservoir benefited from increased water for irrigation, but landless individuals depending on common lands above the reservoir found that their access to grazing was restricted. To gain additional support for watershed protection from landless households, the water users association introduced a benefits sharing system. A tradable water rights scheme was introduced, where every household was awarded the same right to water. Those with no use for irrigation water (such as the landless) were then able to sell their rights to others, to provide financial reward for complying with watershed protection.

However, fluctuations in water availability made the system of water rights difficult to maintain. The scheme was therefore adapted again. The water user association returned to collection of fees from water users for watershed protection. However, one of the aims of the scheme became to employ landless people to implement watershed protection, thereby providing another incentive to gain their support.

Planning for monitoring and evaluation should take place during the design and negotiation of a payment scheme. This requires a clear definition of:

- The financial and human resources required.
- The key indicators used.
- A data collection strategy.
- A reporting format and strategy.
- A procedure for using the monitoring results.

The budget required to monitor and evaluate a payment scheme is likely to be proportional to the scale of the scheme and the total funding. For example, evaluation costs for seven World Bank impact evaluations were between US$ 200,000 and US$ 900,000, representing 0.20 - 1.25% of total project costs.48 Such figures are beyond what can be afforded by smaller projects working, for example, in sub-catchments. They may have to spend 5-10% of their funds on monitoring and evaluating their scheme. However, this may be a wise investment. Good monitoring of actions and downstream responses provides a strong evidence base compared to descriptive

anecdotes only. Buyers, sellers and third-party sponsors or donors are much more likely to support schemes if pilot schemes where properly monitored and showed real downstream impacts.

"GOOD MONITORING OF ACTIONS AND DOWNSTREAM RESPONSES PROVIDES A STRONG EVIDENCE BASE."

The timing of evaluations is important. Planning for an evaluation should consider the level of monitoring carried out, the purpose of the evaluation and when the results are needed. With good timing, results can be used for overcoming key obstacles, preparing for new funding cycles or as an input into a policy process.

The amount of time required depends on whether monitoring is done to confirm that actions have been taken, results have been achieved or impacts have materialised. Seeing evidence at the impact level may take many years. This is particularly true for social impacts, for example on health or education. Assessment of impacts on natural resources needs to account for variability, for example between wet and dry years. Hence, evaluations may have to be carried out over more than one year or drought-wet cycle.

"SEEING EVIDENCE AT THE IMPACT LEVEL MAY TAKE MANY YEARS."

Photo 6.1 Assessments of freshwater fauna helps to establish baselines against which to monitor progress (Pangani Basin, Tanzania).

The objectives of monitoring should be clearly defined. Targets for key indicators should guide the evaluation of performance at the action, results and impact level. Deciding which indicators to use in an evaluation is thus a key step. It should be done through a consultative process and be included in negotiating a payment schemes and be formalised in the agreement. Ensuring that all stakeholders understand and agree with how success will be monitored and judged will increase trust and confidence in the scheme.

Data collected for monitoring should include measures of:

- Delivery of *actions* agreed among buyers and sellers.
- Compliance with agreed *results*, such as changes in land use or management (or agreed retention of current land uses), and payments by service buyers.
- *Impacts* on the delivery of watershed services and their distribution.

A challenge for many payment schemes is being able to distinguish the impacts of a payment scheme from other, correlated impacts that are caused by other factors. To overcome this, a control area can, ideally, be used for comparison. The control area should be almost identical to the targeted area. For example, impacts of a payment scheme might be compared between two groups of farmers located in different sub-catchments. Each should have similar economic, agro-climatic and land management characteristics, but one participates in the payment scheme and the other does not. The two groups might be in nearby sub-catchments with the payment scheme operating in one but not the other.

Estimating impacts requires sampling of indicators for the groups and locations considered in the evaluation. Sampling should combine comparison of participating and non-participating groups with 'before-and-after' measures. Thus, establishing baselines for key-indicators prior to implementation of a payment scheme is critical. Methods for data collection combine biophysical measurement with quantitative and qualitative survey methods from social research.[49] Specialist expertise is therefore usually needed to design and analyse an evaluation.

"SOCIAL LEARNING WILL REMAIN A CRITICAL ASPECT OF DEVELOPING SUCCESSFUL PAYMENTS SCHEMES."

Payments for watershed services are an important innovation in water management. Innovations do not come without carefully assessing how useful and acceptable they are to stakeholders. As this innovation is rapidly developing into a mainstream tool for water managers, more people need to become aware of the way to develop and run these schemes. Social learning will remain a critical aspect of developing successful payments schemes in the future, as we are 'learning' by doing how to manage the environment more sustainably.

Cases and boxes

Tables and figures

References

[1] Dyson, M., Bergkamp, G. and Scanlon, J., eds. 2003. FLOW – The Essentials of Environmental Flows, 2nd Edition, IUCN – The World Conservation Union, Gland, Switzerland. 132pp.

[2] Millennium Ecosystem Assessment 2003. Ecosystems and Human Well-Being: A Framework for Assessment. Island Press, Washington, D.C.

[3] Emerton, L. and Bos, E., eds. 2004. VALUE – Counting Ecosystems as Water Infrastructure, IUCN – The World Conservation Union, Gland, Switzerland. 88pp.

[4] Perrot-Maître, D. and Davis, P. 2001. Case Studies of Markets and Innovative Financial Mechanisms for Water Services. Forest Trends and Thea Katoomba Group. (Available at http://www.forest-trends.org/documents/publications/casesWSofF.pdf).

[5] Adapted from adapted from: Millenium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Policy Responses – Volume 3. Island Press, USA. In reality, there will be local and regional differences in relative magnitudes depending on the specific ecosystems and their interactions, and the influence of actual management regime.

[6] Scott, D.F. 2005. On the hydrology of industry timber plantations. Hydrological Processes 19 (20): 4203-4206.

[7] Emerton and Bos. 2004. op cit.

[8] Barbier, E.B., Acreman M.C. and Knowler, D. 1997. Economic Valuation of Wetlands; a Guide for Policy Makers and Planners, Ramsar Convention Bureau, Gland, Switzerland.

[9] Adapted from Millennium Assessment 2003, op cit., based on: Pearce, D.W. & Warford, J.W. 1993. World Without End: Economics, Environment and Sustainable Development. Oxford University Press, Oxford; and Dixon, J. and Pagiola, S. 1998. Economic Analysis and Environmental Assessment. Environmental Assessment Sourcebook Update, April 1998, Number 23. Environment Department, the World Bank, Washington DC.

[10] Stuip, M.A.M, Baker, C.J. & Oosterberg, W. 2002. The Socio-economics of Wetlands. Wetlands International and RIZA, Wageningen, The Netherlands.

[11] Perrot-Maître, D. and Davis, P. 2001. op cit.

[12] Balmford, A., Bruner, A., Cooper, P., Costanza, R., Farber, S., Green, R.E., Jenkins, M., Jefferiss, P., Jessamy, V., Madden, J., Munro, K., Myers, N., Naeem, S., Paavola, J., Rayment, M., Rosendo, S., Roughgarden, J., Trumper, K., and Turner, R.K. 2002. Ecology – Economic reasons for conserving wild nature. Science 297 (5583): 950-953.

[13] Adapted from: Korsgaard, L. 2006. Quantification of Environmental Flows in Integrated Water Management. PhD Thesis. Institute of Environment and Resources, Technical University of Denmark.

[14] Emerton and Bos. 2004. op cit.

[15] UN (United Nations) Economic and Social Council, 2006. Draft code of conduct on payments for ecosystem services in integrated water resources management. Meeting of the parties to the convention on the protection and use of transboundary watercourses and international lakes. ECE/MP.WAT/WG.1/2006/3, 6 June 2006, Geneva.

[16] Alternatives to market-based approaches include, legal, regulatory or social mechanisms that mandate, compel or ban specific practices in uses of natural resources.

[17] Adapted from: Pagiola, S. and Platais, G. 2002. Payments for environmental services. Environment strategy, no.3. The World Bank.

[18] FAO. 2004. Payment schemes for environmental services in watersheds. Land and Water discussion paper No. 3. FAO, Rome.

[19] From: Perrot-Maître and Davis. 2001. op cit.; Kumar, P. 2005. Market for Ecosystem Services. International Institute for Sustainable Development. (Available at www.iisd.org).

[20] Vatn, A., Bromley, D. 1995. Choices without prices without apologies. In: Bromley, D. (Ed.), The Handbook of Environmental Economics. Blackwell Publishers, Cambridge.

[21] Perrot-Maître, D. and Davis, P. 2001. op cit.

[22] Millenium Ecosystem Assessment. 2005. op cit.

[23] Perrot-Maître, D. and Davis, P. 2001. op cit.; Millennium Ecosystem Assessment. 2005. op cit.

[24] Wunder, S. 2005. Payments for environmental services: some nuts and bolts. Occasional Paper n. 42, CIFOR, Indonesia.

[25] Zbinden, S., Lee, D.R. 2004. Paying for environmental services: An analysis of participation in Costa Rica's PSA programme. World Development 33(2): 255 - 272. Other issues that contribute to exclusion of smaller landholders from payment schemes are lack of access to information, high transaction costs, bureaucratic barriers and conditions of tenure. For example, schemes may be open only to private landowners with title and exclude communal landholders or tenants.

[26] Robertson, N. and Wunder, S. 2005. Fresh tracks in the forest: assessing incipient payments for environmental services initiatives in Bolivia. CIFOR, Indonesia.

[27] Dyson et al. 2003. op cit.

[28] Turpie, J, and Joubert, A. 2001. Estimating potential impacts of a change in river quality on tourism value of Kruger National Park: an application of travel cost, contingent, and conjoint valuation methods. Water SA 27: 387-398.

[29] Emerton and Bos. 2004. op cit.

[30] Wunder. 2005. op cit.

[31] Rojas, M. and Aylward, B. 2003. What are we learning from experiences with markets for environmental services in Costa Rica? A review and critique of the literature. Markets for Environmental Services, No. 2. IIED, London.

[32] Pagiola, S., Agostini, P., Gobbi, J., de Haan, C., Ibrahim, M., Murgueitio, E., Ramirez, E., Rosales, M. and Ruiz, J.P. 2004. Paying for Biodiversity Services in Agricultural Landscapes. Environment Department Papers, Paper No. 96, World Bank, Washington, D.C.

[33] Perrot-Maître, D. and Davis, P. 2001. op cit.

[34] Landell-Mills, N. and Porras, I.T. 2002. Silver Bullet or Fool's Gold? A Global Review of Markets for Environmental Services and their Impact on the Poor. IIED, London.

[35] For practical information on how to implement stakeholder power analysis and other useful tools, see www.policy-powertools.org.

[36] Vermeulen, S. 2005. Powertools: Handbook of Tools and Resources for Policy Influence in Natural Resource Management. IIED, London.

[37] North, D.C. 1990. Institutions, Institutional Change and Economic Performance. Cambridge: Cambridge University Press.

[38] Robertson and Wunder. 2005. op cit.

[39] Johnson, N, White, A. and Perrot-Maître. 2000. Developing Markets for Water Services from Forests: Issues and Lessons for Innovators. Forest Trends, Washington DC.

[40] UN. 2003. Water for People, Water for Life. The United Nations World Development Water Report, UNESCO, Paris.

[41] Food and Agriculture Organization of the United Nations (FAO). 2002. Land Tenure and Rural Development. FAO Land Tenure Studies No. 3. FAO, Rome.

[42] Adapted from: US Environmental Protection Agency (EPA). 1992. Principles of Environmental Enforcement. (Available at http://www.inece.org/enforcementprinciples.html.

[43] Johnson et al. 2000. op cit.

[44] EPA. 1992. op cit.

[45] Echavarria, M., Vogel, J., Alban, M., and Meneses, F. 2004. The Impacts of Payments for Watershed Services in Ecuador: Emerging Lessons from Pimampiro and Cueca. IIED, London.

[46] Miranda, M., Porras, I.T., and Moreno, M.L. 2003. The Social Impacts of Payments for Environmental Services in Costa Rica : A Quantitative Field Survey and Analysis of the Virilla Watershed. IIED, London.

[47] Landell-Mills and Porras. 2002. op cit.

[48] Baker, J.L. 2000. Evaluating the Impact of Development Projects on Poverty. A Handbook for Practitioners. World Bank, Washington, D.C.

[49] IUCN has a range of materials in several languages on participatory monitoring and evaluation (Available at: http://www.iucn.org/programme/eval/methods.htm#concepts). Another useful resource is Estrealla, M., Blauert, J., Campilan, D., Gaventa, J., Gonsalves, J., Guijt, I., Johndson, D., and Ricafort, R. 2000. Learning From Change: Issues and Experiences in Participatory Monitoring and Evaluation. IDRC/ITDG Publishing, Ottawa.

Glossary

Additionality
The action of impacts that would not have occurred without an intervention.

Bequest value
A component of Total Economic Value: a non-use value derived from the desire to pass on natural resources and ecosystems to future generations.

Cap / Regulatory cap
A maximum level, for example of pollutant loads, that is mandated by law.

Cap-and-trade schemes
Watershed services payment schemes in which aggregate levels (caps) are determined, for example, for the release of pollutants, and then the right to release pollutants is traded among participating entities.

Certification schemes
Watershed services payment schemes in which payments are embedded in the premium price paid for a certified traded product.

Corrective actions
Actions intended to correct or counteract something that is malfunctioning, undesirable, or injurious. Corrective action is also sometimes used as an encompassing term that includes remedial actions, genuine corrective actions and preventive actions.

Crowding out
When government expenditures or actions result in a decline of similar private sector spending or actions.

Customary law or rights
The written and unwritten rules and rights which have developed from the customs and traditions of communities.

Development rights
Legal rights to use, develop or profit from land or resources owned by another, generally synonymous with usufruct rights.

Direct-use value
A component of Total Economic Value: environmental and natural resources that are used directly as raw materials and physical products for production, consumption and sale.

Ecosystem services
The benefits that people receive from ecosystems.

Existence value
A component of Total Economic Value: the intrinsic value of environmental or natural resources, regardless of their current or future use possibilities.

Externalities / Externality costs
Economic side-effects. Costs or benefits arising from an economic activity that affect somebody other than the people engaged in the activity, and which are generally not taken into account in decision making.

Feasibility studies
A preliminary study undertaken to ascertain the likelihood of a project's success, generally including assessments of technical and financial viability.

Fiscal
Relating to government taxation, spending, or financial matters.

Fiscal mechanisms
Financial tools used by the government to affect economic behaviour, for example taxes, subsidies or direct spending.

Governance
The exercise of political authority and the use of institutional resources to manage society's problems and affairs.

Indirect-use value
A component of Total Economic Value: environmental services which maintain and protect natural and human systems.

Institutional analysis
Identifies how institutions influence buyers and sellers of watershed services, and changes needed for a payment scheme to succeed.

Institutions
Institutions can refer, narrowly, to specific organizations – or, more broadly, to the policies, rules, incentives, customs and practices that govern social relations.

Infrastructure
The basic physical structures and services – both man-made and natural – that are needed for the functioning of a community or society.

Micro-catchments
A watershed area usually used to describe a smaller part of a river basin draining into a tributary stream. Similar to sub-catchments.

Monitoring & Evaluation (M&E): Monitoring focuses on tracking inputs, outputs, outcomes and impacts as interventions are implemented. Evaluation assesses the efficiency and impact of interventions (typically after they have been implemented). Together M&E allows policymakers to track results, suggest corrections or improvements during implementation, and assess success.

Marginal cost
The change in cost associated with producing one additional unit of a good or service.

Nonpoint source pollution
Pollution from many diffuse sources, for example when runoff moves over and through the ground carrying natural and human-made pollutants into lakes, rivers, wetlands and coastal waters.

Non-use values
A component of Total Economic Value: values that derive from the benefits of the environment but do not involve using it in any way, either directly or indirectly.

Opportunity cost
The value to the economy of a good, service or resource in its next best alternative use.

Option value
A component of Total Economic Value: the premium placed on maintaining environmental or natural resources for future possible uses, over and above the direct or indirect value of these uses.

Payment schemes
Arrangements for payments between buyers and sellers of goods or services.

Payment for environmental services (PES)
Market-based approaches using payments or rewards to encourage or discourage specific practices in natural resources management.

Perverse incentives
Incentives that undermine or lead to the opposite of the desired result.

Point source pollution
Pollution released at specific identifiable sites, for example from factories or sewage outlets.

Power analysis
Relates the power of different stakeholders to their potential to control implementation or be affected by a payment scheme.

Private payment schemes
PES schemes in which agreements are made between private entities to provide payments or rewards in return for maintenance or restoration of ecosystem services.

Property rights
Legal ownership rights to land or resources.

Public payment schemes
PES schemes in which government entities compel changes in environmental management through a variety of (fiscal) payment mechanisms including user fees, land purchases, taxes and subsidies.

Remedial action
Actions taken to remedy or correct a situation, to return something to its previous or proper state.

River basin
A watershed area usually used to describe a large land area that drains into a major river.

Scenario analysis
A process of analyzing possible future events by considering alternative possible outcomes or scenarios.

Social learning
A learning process in which stakeholders engage to learn jointly to redefine priorities and reflect upon principles and outcomes.

Sub-catchments
A watershed area usually used to describe a smaller part of a river basin draining into a tributary stream. Similar to micro-catchments.

Subsidies
Monetary grants given by a government to lower the price faced by producers or consumers of a good, generally because it is considered to be in the public interest. A subsidy is essentially the opposite of a tax.

Taxes
Financial charges or other levies imposed on an individual or corporation by a government. Also known as 'duties.'

Tenure rights
The legal regime in which land is owned by an individual, who is said to 'hold' the land.

Total Economic Value
The sum of all marketed and non-marketed benefits associated with an ecosystem or environmental resource, including *direct, indirect, option* and *existence values*.

Transaction costs
The costs that arise in the process of trading with others, on top of the price of the good or service exchanged.

Use values
A component of Total Economic Value: value derived from direct use, indirect use and options values associated with natural resources or ecosystems.

Usufruct rights
The right to use property or generate income from property that is owned by another.

Watershed
An area of land that feeds water to a river, draining through the landscape into tributaries and main river channels. Also called 'catchments', 'drainage basins' or 'river basins.'

Watershed services
The benefits people obtain from ecosystems within a watershed.

Willingness to pay
The amount a consumer will agree to pay for a particular good or service – often used as a proxy for its value.

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Erratum

Page 1: Replace 'Edited by Mark Smith, Dolf de Groot and Ger Bergkamp' by 'Edited by Mark Smith, Dolf de Groot, Danièle Perrot-Maître and Ger Bergkamp'

Page 12: Replace 'Edited by Mark Smith, Dolf de Groot and Ger Bergkamp' by 'Edited by Mark Smith, Dolf de Groot, Danièle Perrot-Maître and Ger Bergkamp'

Page 13: Replace 'Bundesamt für Umwelt, Wald und Landschaft (BUWAL)' (Switzerland)" by 'Swiss Federal Office for the Environment'.

Page 25: Table 2.1, column 4 – Replace 'are protected from flooding' by 'area protected from flooding'

Page 101: Replace reference 15 by 'United Nations Economic Commission for Europe, 2007. Recommendations on payments for ecosystem services in integrated water resources management. Meeting of the Parties to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes. ECE/MP.WAT/22'

Pay – Establishing payments for watershed services
Payments for watershed services is an emerging innovation in water management. This guide offers a hands-on explanation of the issues that need to be addressed when establishing these payment schemes. It explains what watershed services are and what their value is. It then highlights the technical, financial, legal and social aspects of establishing payments schemes for maintaining or restoring watershed services critical for downstream water security.

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