Recognizing and Rewarding the Provision of Watershed Services

Fiona J.C. Chandler and Suyanto

World Agroforestry Centre (ICRAF Southeast Asia)
P.O. Box 161, Bogor 16001, Indonesia

Increasing demands for and widening fluctuation of water quantity and declining water quality are contributing to a serious decline in the available water that many see as an unalienable right. Linked to supply of water is the protection of the watersheds that provide the water and with the scarcity of supply comes conflict and competition to own, use and manage the sources of water. Conventional solutions have been left in the hands of government who have not always been the most efficient or appropriate managers. Conversely being left entirely to market forces has resulted in unfair distribution and often misuse and degradation of environmental attributes associated with water. Both approaches have suffered from market failure - the failure for the full economic value of water - indirect and direct, use and non-use, to be fully accounted for. Using market mechanisms can provide protection of watershed resources (securing supply) as well as meeting demands. It will mean that development of market mechanisms must account for the total economic valuation as well as ensuring that there are fully aware, knowledgeable and capable stakeholders in the process, that property rights are clearly defined and that an enabling and supportive policy and institutional environment is in place.

The trend towards decentralization of natural resource management in Indonesia has opened the door for development of market mechanisms for watershed services. A few cases have already started and there is certainly more ready to explore the challenges. The lessons learned from other places, like Costa Rica, where payments for watershed services have been in place and are now being reviewed will provide valuable insights for Indonesia as it moves forward in providing rewards and recognition for watershed services to those that provide the services.

Ensuring an adequate supply of clean water

2003 marked the UN International Year of Freshwater and highlighted the increasing concern over the supply of water to the world's growing population. More so than oil, water is now thought to be the resource that will be in the scarcest supply for our planet's future.

Contributing to the scarcity of supply are increases in population, agricultural development, industrialization, urban expansion, and demographic changes. The increased demand for and the declining amount of clean, usable water means that there have been increasing pressures on water resources and as such increasing levels of water scarcity. When water becomes scarce, the competition for how it is owned, used and managed becomes greater. This has often led to conflict and growing local, national and international concern. This increasing pressure for water is felt in the watersheds that provide the water and other watershed services.

Confounding the arguments over the supply of water and watershed services have been the debate on whether water is a right - that is, a necessity of life and so to be provided without prejudice or favour or whether water is an economic commodity to be allocated based on market mechanisms.

In response there have tended to be two major approaches or solutions - the first being government intervention whereas the government has the responsibility for the provision of the goods and services associated with water. The second approach has been treating water as an economic commodity and letting the market determine the most efficient use and appropriate price for water and watershed services.

The UN Committee on Economic Social and Cultural Rights affirmed the human right to water in 2002, which puts an obligation on governments to progressively extend access to sufficient, affordable, accessible and safe water supplies and to safe sanitation. Where there is a specific barrier to access to water, such as when people are refused access on the basis that they live in illegal settlements, governments have a responsibility to remove the barrier or ensure access by other means, for all their citizens, without discrimination.

On the other hand, private sector management of water supply systems is not a new phenomenon and there are examples of private water supply companies operating in many cities (e.g. Buenos Aires, London, Paris, Seville) in the 19th century. However in these instances it was typically the wealthy areas that received the benefits. Over the past decade there has been significant growth of private sector involvement in water markets. From 1987 to 2000, 183 water and sewerage projects with private corporate participation were initiated in developing countries with a total investment of over $33 billion USD (Bakkar, 2003).

A major point of debate during the negotiations on the 'right to water' was its relationship with 'water as an economic resource' (outlined in the Dublin Principles). The UN Committee on Economic and Social Rights have emphasized that supporting the right to water does not imply that water should be provided free of charge. There is no such assumption about food, medical care, housing and social services. Consequently, the recognition of water as a right is not in conflict with water being understood as an economic good. The difference now is that states are legally obliged to ensure that water for the purposes of drinking and sanitation are affordable for everyone and that pricing of water does not compromise other basic needs. The right to water suggests that any group or person denied the right to adequate water should have access to legal remedies and compensation (Freshwater Action Network, 2004).

The answer to the most efficient and effective provision and distribution of the benefits of water lies in a mixture of both government control and market mechanisms.

But can markets help?

Some may justify government control of water because it is a "fundamental human right." Yet there is increasing evidence that governments cannot provide clean water to poor people, and have their own failings associated with imperfect knowledge, misaligned incentives, inefficient bureaucracies and rent seeking. Furthermore, as pressure mounts on governments to curtail spending and cut budget deficits, their ability to invest adequately in the provision of public goods and services is called into question. And if governments interfere with pricing and profitability, it can result in a distortion of the market.

Efforts to transfer responsibility for environmental services out of the public sector have relied on a combination of regulation and market-based approaches, though the latter have become more prominent in recent years. Market approaches aim to alter incentives facing forest owners and users so that they act in ways consistent with government policy.

However, markets typically fail to compensate those who produce positive externalities due to the absence of property rights or other legal means to require payment for services rendered. A positive externality is any uncompensated benefit. Positive externalities associated with forest protection include, for example, erosion control, reduced risk of flooding downstream and water quality maintenance. Watershed services can be considered a public good when the consumers of the services cannot be prevented from enjoying the good or service in question, even if they do not pay for the privilege. For instance, it is difficult, if not impossible, to exclude downstream communities from benefiting from improved water quality associated with forest regeneration upstream (Landell-Mills and Porras, 2002).

The failure of markets also means that the better off are able to capture the greatest benefits at the expense of the poorest. This insight has been brought out by Byron and Arnold (1997) who have shown that even though it is the poorest that tend to be most dependent on forests, it is often the better off who benefit most from forest use. This is due to a variety of factors including the latter's greater access to complementary assets (e.g. machinery and skills), better training and education, preferential access to markets, and informal arrangements which allow them rights to the most valuable forests (e.g. through connections with those with authority over the resource).

The markets have failed in the past in equitably distributing benefits due to a number of reasons. Often watershed services can't be bought and sold and so the market doesn't get the correct signals to ensure adequate supply. In addition there can be interference with the market and incorrect and incomplete valuation of watershed services.

The value of water and watershed services

Watershed functions are attributed to the natural capital available (climate, geology, soil structure, land form) as well as to land use and

management (either through guardianship of protected areas or stewardship activities that provide livelihoods while still protecting the environment). Although not the only ecosystem that provides watershed functions, forests and agroforests are key components in providing watershed services in the developing world.

However, watershed functions cannot be considered "services" unless they also have some form of economic significance for identifiable stakeholders. Although services need to be defined in a site-specific context, they can be generally classified in two broad categories, those that have a use value (either direct or indirect) and non-use value.

Direct benefits can take the form of timber and food they provide, or indirect through their contributions to production processes, e.g. the protection of valuable agricultural land. There is also an option value associated with watershed functions in providing future opportunities that are both direct and indirect. Non use values are often intangible and include the value of leaving opportunities for future generations (bequest value) and the value from knowing that the watershed function exists (existence value). Recognition of all the values of a watershed is capture as their "Total Economic Value".

However, in most cases today, the cost of protecting water at its source is not included in the price paid and water prices typically only reflect the costs of delivery, at best. In other words, the hydrological benefits, and therefore, the economic value of watershed protection, are not fully appreciated nor reflected in the pricing of water. The failure to understand and value the watershed services provided by healthy ecosystems results in land-use choices that degrade watersheds. With little economic incentive to protect natural ecosystems upstream, land users are likely to adopt practices offering the most tangible, direct and immediate economic benefits to them, for example, converting forests for grazing and farming (The Conservation Alliance, 2003).

However, experience has shown that well-designed market-based instruments can achieve environmental goals at less cost than conventional "command and control" approaches, while creating positive incentives for continual innovation and improvement (Landell-Mills and Porras, 2002).

In the forestry sector, governments around the world have heeded this advice and taken responsibility for forest protection in areas high in biodiversity, landscape beauty or critical for their watershed protection functions. For the most part governments have taken direct control for forest protection through public ownership and often elaborate regulation of extractive uses.

Using market mechanisms - opportunities and pitfalls

Forest conservation advocates support market approaches because it is thought that capturing the financial value of forest services will promote good stewardship and discourage more degrading uses of forests. Market approaches have gained prominence as frustration has increased with regulatory approaches - often thought to be inefficient, expensive and inequitable (Forest Trends, 2002).

It is worth pointing out that although the costs of identifying potential trading partners, negotiating to implement a trade, monitoring and analysing service delivery, documentation and record keeping and administration of trades exist in all commodity and service markets, they are particularly high in markets for watershed protection. This is partly a reflection of the nature of the product and the large numbers of participants involved, but it is also the result of an underdeveloped market infrastructure.

There are lots of stakeholders involved in watershed markets making it a complex activity. The intermediaries need the right set of skills to be cost effective and it becomes costly if a new group has to be set up and trained. In most cases insecure tenure remains the principle constraint to market creation.

So why use market mechanisms? Because, unlike financial incentives, which depend on government subsidies, markets require that beneficiaries pay for the service provided. In addition because markets determine the "price" of a good or service by equating demand and supply, they are thought to offer important efficiency gains over government set "prices". Good market development will promote recognition of the economic and ecological value of watersheds and ensure that producers of watershed services are compensated -

Table 1. Potential advantages and disadvantages of using payment for watershed services mechanisms

Potential Advantages	Potential Disadvantages
• Improve or maintain water quality • More efficient allocation of water supplies • Maintain or re-establish natural flow regimes • Reduce secondary costs of filtration and sediment control • Reduce secondary health costs • May be able to provide essential services to industrial and residential users more efficiently and at lower costs than regulatory command and control approaches • Potential for sustainable source of financing to protect large areas that include critical ecosystems • Promotes recognition of the economic and ecological value of watersheds • The benefits and costs of watershed services are more equitably shared • May begin to reduce urban-rural disparities and increase equity • Provides an opportunity to develop more participatory and cooperative institutional arrangements that are of broader social benefit • May result in improved regulations and legal structure for protection of water and watersheds • Improved communications between stakeholders • Producers of ecosystem services are compensated. This may improve livelihoods of the rural poor by providing new sources of income – if their rights are recognized and tenure security is increased • Capacity building in rural communities through the development of skills in sustainable land-use practices, project management and through new business opportunities that may be presented • Increased political representation for the rural poor. • Improved scientific understanding • Protection of cultural heritage • Improved recreation and cultural opportunities • Improved delivery of watershed services • Potentially large markets for hydrological services	• Complexity of watershed management problems makes it difficult or impossible to obtain complete information linking causes and effects and to measure impacts • The development of markets and other institutional arrangements is a slow and iterative process that takes time • High transaction costs associated with the development of markets for public goods that may include: • Planning & Negotiation • Monitoring & Enforcement • Multiple stakeholder agreements and collaboration to overcome free-riding • Gathering of scientific and other information needed to support decision-making • Informing stakeholders and making them aware of uncertainties so as to avoid unrealistic expectations • Clarification of property rights • Strengthening of legal and regulatory framework • Development of intermediary organizations • Overcoming barriers to market access that include: • Low education • Geographic isolation • Lack of property rights • Unequal bargaining power • The cost of implementing protection measures • Inequity may be increased – existing inequities may be reinforced if they are not explicitly addressed in the design of the initiative • Opportunity costs of forgone land uses • Water users may lack ability to pay • Potential for loss of informal use rights as a result of increased competition and use restrictions • Complicated economic valuation procedures of the services

Source: Conservation Alliance 2003 and adapted in part from Landell-Mills and Porras, 2002

contributing to improving the livelihoods of the rural poor by providing new sources of income (if their rights are recognized and tenure security is increased). In addition, there is opportunity to develop more participatory and cooperative institutional arrangements that are of broader social benefit and secure sustainable sources of funding to protect critical ecosystems. Expected cost savings and efficiency gains have meant market development is receiving unprecedented attention from policy-makers.

Different types of market mechanisms

In the same way that ecosystems and watersheds vary, so to will economic, social, political and ecological context will determine the most appropriate market mechanism.

These can broadly be categorized as self-organized (often voluntary) private agreements, public payment schemes and open trading schemes. The following categorizes different types of market mechanisms by the level of public involvement.

Self-organized private deals

This approach includes direct, usually closed, transactions between those who benefit from forest services and those who provide them. This includes deals such as voluntary certification and eco-labeling schemes, direct purchases of land and purchases of development rights to land, as well as direct payment schemes between offsite beneficiaries of watershed services and landholders responsible for the services.

Private deals, typically limited in scope and transparency, benefit from clear property rights and enforceable contracts, although clear rights and enforcement mechanisms are not always necessary. In most cases, little other public involvement is warranted.

Contractual agreements tend to work better at smaller scales. This allows for face-to-face negotiations, and enables stakeholders to know what they are getting, because there is less uncertainty about the links between watershed management actions and their consequences. A smaller scale also allows agreements to be more complex and more tailored to local conditions (Conservation Alliance, 2003).

Public payment schemes

Because watershed services are often considered a "public good," public payment schemes are the most common financial mechanism used to protect watershed services (Conservation Alliance, 2003). This approach is used when a government provides the institutional foundation for a program and directly invests in it as well (Powell *et al.*, 2002).

In a public payment scheme, the government or a public sector organization can generate funding through some type of fee or tax. The government may also create an institutional arrangement to provide or maintain watershed services. This has been done in a variety of ways: at the agency level, such as the department of forestry, fisheries, or environment; a contract with an NGO; working with a university; or quite often a combination of all of the above.

In almost all cases there has been a need to make changes or additions to legislation or policy. These policy decisions can be made at the local, municipal, or regional level; whichever is most appropriate for the geographic scope of the watershed. Examples of new policies include:

- creation of or increases in water fees;
- the ability to apply water fees directly to watershed protection;
- means to provide incentives to land owners
- the ability to apply and enforce environmental easements
- establishing oversight, monitoring and regulation compliance mechanisms
- implementing fines for non-compliance to with agreements on land use or discharge limits by either "buyer" or "seller."

Prices paid by governments are often determined by political or budgetary considerations, rather than strict economic evaluation of the environmental benefits involved. As with private schemes, public payment schemes often require intensive upstream / downstream negotiations to establish the amounts that will be paid to private landowners and / or private or public resource managers. Payments may be used to fund management activities such as the purchase of conservation easements or development rights, or to pay landowners / resource managers to change land-management practices (Conservation Alliance, 2003).

In China, ecological degradation has become recognized as a major obstacle to their socioeconomic development, and forest loss is believed to be closely associated with ecological degradation. Consequently, forest conservation has gained increased attention. In particular, the Natural Forest Protection Program and the Sloping Farming Lands Conversion Program signify a fundamental transition from valuing solely forests' economic benefits toward valuing their economic, ecological and social benefits. It was against this general context that China 's Forest Ecological Benefit Compensation Scheme was developed. This public payment scheme was established under law and has an established legal framework with a specified state budget as the primary source of capital. A total budget of 1 billion Yuan has been earmarked under this fund for the pilot implementation for the FEBSF to begin in 24 state- level nature reserves and 658 counties of 11 provinces (Changjin Sun, and Xiaoqian Chen, 2003).

In addition to the state component there are also local initiatives where general funds are raised from local budgetary allocations (Guangdong) and charges / fees collected on beneficiaries (organizations, enterprises and individuals) of forest ecological benefits according to the whoever-benefits-pays principle, such as in Hubei and Xinjiang. The FEBCF is usually carried out by various levels of fiscal departments and specifically used for ecological forest construction and wildlife protection by the forest department.

Open trading schemes

Trading schemes are the least common of these three market mechanisms, and tend to be used more in developed countries. The government defines and sets the limits on the environmental service commodity to be traded and then devises regulations to create demand. In these cases a strong regulatory framework is required. In addition any market-based system of trading credits requires a transparent framework, accurate accounting and verification systems (Powell *et al*., 2002).

In New South Wales, Australia, the government is piloting proposals for salinity credit trading rooted in broader basin-wide salinity targets. Based on these targets, the government has allocated licenses to dischargers of salinity. The idea is that those wishing to exceed their salinity quota can do so if they purchase salinity credits from those who have taken action to reduce salinity, e.g. by protecting and managing

native vegetation. Other examples include tradable development rights pioneered in urban areas of the U.S., the trading of wetland mitigation credits and emerging nutrient trading schemes in some U.S. states.

What's needed to make market mechanisms work for watershed protection

As has been noted earlier, markets, like government interventions can be prone to failure if a number of factors are not considered. In designing the project "Rewarding Upland Poor for Environmental Services they Provide " (RUPES), the World Agroforestry Centre recognized that there are a number of steps and processes that have to be undertaken to put in place successful watershed services agreements. These include identification and confirmation of the environmental service(s) being provided, the providers of the services and the users. It also entails finding the appropriate reward mechanisms - be that financial or otherwise, as well as creating a supporting and enabling institutional and policy framework that can encourage effective environmental transfer schemes.

Watershed services - separating the fact from the fiction

Disentangling facts from fiction, and establishing cases where forests play a positive role in the provision of watershed services must be the point of departure for market development. In a recent study on what has been learned from the Costa Rica experience with PES (arguably one of the most advanced countries in the developing world on PES), it has been shown that development of markets and payments systems that are based on sound underpinnings stand the greatest chance of thriving and being replicated. This is followed by those that rely on facts as generally accepted (conventional wisdom). Where markets and payments are developed on demonstrably false or inherently unreliable estimates of the importance of ES, not only is there potential for failure and disenchantment of those involved, but eventually for the larger process of market development and, indeed, the larger environmental agenda to be discredited (Rojas and Aylward, 2003).

In the development of sites for the RUPES Program, it has been learned that the cause and effect links between land use / management

and provision of environmental services is in many cases not clearly understood. Disaggregating the man made influences on a watershed (deforestation, grazing, slash-and-burn agriculture, soil compaction, road building and other construction activities) from natural conditions is a challenge.

It is not only difficult, but may not always be necessary to undertake a precise measurement of all the various linkages between land use practices and their impact on water-related services, as long as there is a common understanding between upstream and downstream stakeholders on the most significant linkages. However, users need to be made aware of the range of natural variability and uncertainty in watershed processes, and that results may not appear immediately, so that expectations remain realistic. This implies a need to conduct site-specific assessments, so that management plans can be developed that are based on the best information obtainable using available resources (The Conservation Alliance, 2002).

Providers

Sellers or providers of watershed services tend to be the land use decision makers. The distinguishing characteristic of land-use decision-makers is their ability to support the hydrological services of a watershed by engaging in sustainable land-management practices, or to diminish those services, through activities that lead to land degradation (The Conservation Alliance, 2003).

However, the providers of the ES are not a homogenous group. Depending on their current wealth, access to land, land title, availability to provide ES (due to land capability e.g. soil structure, slope) they may have a different view of the service being provided. It is important to ensure that the providers are aware and knowledgeable about the service they provide and that there is a market for the service. To ensure the markets work for the providers they must be able to deliver the service (and so know what it is and how they contribute to its creation and maintenance). They must also be involved in monitoring the watershed functions for without this level of accountability, the relationship with the buyer can become strained.

Users

In their review of markets for watershed protection, Landell-Mills and Porras (2002) noted that the majority of buyers for watershed services were local in origin. This is not surprising given the constraints associated with geographically dispersed markets. In larger catchments not only are hydrological linkages between upstream actions and downstream water impacts increasingly tenuous, but also perceived links by beneficiaries and suppliers are less likely. Ultimately, unless downstream communities believe they gain from upstream watershed protection, they will not be willing to pay for supply. Furthermore, even where there exists a willingness to pay, where watersheds span political boundaries (e.g. national or even state borders), the risks involved may prevent payments emerging.

Demand is the main driver behind watershed market establishment, accounting for over 50% of the cases reviewed by Landell-Mills and Porras. The perception that forests play a critical role in maintaining water quality and ensuring supplies is the major factor behind growing demand for forest management in key catchments. Willingness to pay is growing amongst government and private entities responsible for providing clean drinking water and managing hydropower plants, downstream farming communities that wish to guarantee continued water for irrigation and broad groups of industrial and domestic users willing to pool payments.

However, it is also important to understand that different stakeholders in the watershed will have their own unique requirements. Domestic water supply, irrigation, hydropower, navigation, fisheries and ecosystem maintenance are just a few uses - each with their own requirements of water quality and water quantity. Even in hydropower use - a run-of-river plant is interested in maximizing water retention in the watershed and providing a regular flow of water throughout the day - a peaking hydropower plant with daily storage facility is more concerned with maximizing daily inflows during the dry season - an inter-annual storage reservoir is most interested in maximizing total annual water flow given its ability to store water across seasons (Rojas and Aylward, 2003).

Ultimately, users need to be confident that funds raised for improving watershed management are actually maintaining or enhancing the

watershed and the quality of watershed services. They need to remain confident that the water source will remain reliable and that the implementing organization is acting fairly and equitably.

Supporting institutions and policies

Establishment of watershed reward and recognition schemes depends on the existence of an adequate legal and regulatory framework. For any environmental service transfer mechanism to work, it is essential that the overall policy environment is conducive and in order for systematic transfers of rewards to communities for the environmental services they provide to take place, constraints that inhibit such transfers must be identified and addressed. These constraints can take the form of a lack of political will, institutional capacity, lack of a supportive legal framework, financial resources and even limited community interest and commitment. Institutional constraints, such as conflicting and competing government agency jurisdiction over the regulation of the environment services that upland communities are providing will be examined.

Watershed management in Indonesia and the Philippine is a good example. In each country several government agencies are responsible for maintaining or regaining watershed environmental services, potentially complicating the reward negotiation process. Another example is potential opportunity costs will be forfeited by some or all of these institutions whose staff at times depend on rent seeking activities to supplement incomes. An extension of this example is the lack of institutional transparency in the management of financial rewards leading to a lack in confidence in the process. Other institutional questions may concern the lack of capacity of community-based institutions to manage the rewards in a transparent and equitable way. Political constraints can take the form communities receive rewards for services provided only in exchange for support on Election Day.

Environmental services agreements involving rural communities may be most likely to be successful when they are created and administered at the supra-village level. This is due to the presumed high transaction costs of implementing separate agreements with large numbers of local units. Bodies that are set up at the supra-local or even national level may be effective in bundling investments from national or global stakeholders and distributing them through to communities under the terms of the agreements. Such an approach is being implemented in Costa Rica.

It is important to point out that these policies can take time to develop and will need to be made at various levels.

Markets for watershed services in Indonesia

Stages in developing watershed markets

Developing markets for forest services is, in many senses, similar to developing any new market. However, as outlined by Powell *et al*., (2002) the process differs in some key aspects. It is similar in that entrepreneurship, local constraints and opportunity will decide the speed and extent to which a market is developed. Because most forest services are currently treated as free goods, it is perhaps most different in that developing a market often requires converting these freely-accessed goods and services into commodities and property. This is inherently a political process, whereby different stakeholders' rights and responsibilities are questioned, new rules are established, and new entitlements are established. This process occurs in three broad phases.

In the first phase, the linkages between forest actions and their consequences are emerging and gaining attention. In all cases, an entrepreneur operating either in the public or private sector, and operating as an individual or an entity, shows leadership and mobilizes action by informing stakeholders of the existing problems and opportunities. This action generates willingness to pay for protection from the problems and provides a basis for interested stakeholders entering into negotiations.

In the second phase, the structure is defined. Supporting rules and processes begin to emerge.

Except in purely private deals, drafting regulations requires a political process. The regulations define the service, settle the particular rights and duties of the stakeholders and provide a platform for negotiating payments.

In the final phase, the market becomes live. Transactions take place and money changes hands. Service contracts and agreements are established, along with supporting institutions, such as accounting standards, monitoring and certification mechanisms.

In reality, this clear-cut pattern is clouded by the many stakeholder interventions and activities happening within the different phases. Moreover the process is iterative, progressing at different speeds in different contexts, and in some cases involving setbacks (Powell *et al.*, 2002).

Case studies in Indonesia

In a recent review of watershed markets in Indonesia (Suyanto *et al.*, 2004, in prep) it seems that the development of environmental services in Indonesia is still in its early stage. There are very few cases studies where an environmental service market has been implemented. Similarly, the studies that proposed the environmental service initiatives are also rare. However, there are increasingly many more initiatives, emerging projects and research related to the development of market of environmental services.

Contributing to this exploration of market mechanisms for environmental services in Indonesia is the change in national policy in several sectors to provide a more supportive setting for locally based natural resource management and financing. In April 1999 the Government of Indonesia formulated the Letter of Sector Policy and Policy Reform Matrix, which forms the basis of the ongoing Indonesia Water Resources Sector Adjustment Program (WATSAP). The reform of Law no 11/1974 on water resources, and relevant regulations deriving from that law, will re-align the role of the government. Most fundamentally, the devolution of many decision-making and budget control functions from central government to district governments (Otonomi Daerah) since 2000 - one of the most ambitious decentralization exercises ever undertaken by any country - facilitates local solutions to natural resource management problems. In the water sector, the ongoing policy reform process has as its center the theme of integration in water management - integration among sectors and among stakeholders. In the forestry sector, central government is beginning to invest in its stated commitment to community-based forest management (Munawir, 2003 unpublished).

Four examples of watershed payment schemes are presented as an indication of the growing trend in Indonesia.

Annual fee paid by PT INALUM to the North Sumatra District Government for conservation of land around Lake Toba

PT Indonesia Asahan Alumunium (INALUM) - an aluminum refining and power generation corporation - is a Japanese overseas investment in North Sumatra, Indonesia. The electric power is produced in Asahan Hydropower Plant using the water from Toba Lake. The supply of electric power is for use in the aluminum industry and for sale for public use (80% from the total production in North Sumatra). Starting in 1985, INALUM contributed to the conservation costs of Lake Toba yearly through Dana Konservasi Alam Danau Toba (Nature Conservation Fund for Toba Lake). The focus of the fund provided by INALUM is to rehabilitate critical lands in five districts on the catchments areas of the Toba Lake and on the watershed areas in Asahan and Tanjung Balai.

Four components of annual fee are put aside to conserve the Lake Toba. The first three components are fixed payments of as much as 2.6 million US Dollar; those are Pajak Bumi dan Bangunan (land and building tax), Iuran Jasa Air (retribution of water service) and other taxes both from provincial level and district level governments. The fourth component is an additional one as the result of the difference between the exchange value of Rupiah and US Dollar in selling the products of PT INALUM.

In 2002, the additional payment was 23 billion rupiah. Accordingly, the total fund from PT INALUM was 49 billion rupiah. Despite this large amount, there is no real cost-benefit measurement of the environmental impacts of this company as its cost in consuming the water is very cheap (Rp. 5.18 per cubic meter) compared to regular tariff that is Rp 75 - Rp 100 per cubic meter). In one year, Asahan Hydropower Plant uses approximately 2,9 billion cubic meter of water.

Land lease of state land to the local community for providing watershed functions in the upper Besay watershed of Sumberjaya, Lampung

In this area, there are four state forest zones that form part of the upper watershed ecosystem. Population pressure on the state forestlands is high as a result of forest status disputes, poverty, lack of rural economic infrastructure, market drivers for coffee, and man-agriculture land ratio. Forest conversion has been blamed as a source of erosion and

sedimentation to Way Besay, affecting the hydropower plant downstream. There is also distrust by the local communities of the government as a result of previous governmental repressive policies used to evict people from the forest.

In 2000, ICRAF and a local NGO, Watala, collaboratively began developing mutual trust and dialogue between local people and government to build social capital and create space for dialogue, negotiation and collective action (Negotiating Support System for Integrated Natural Resource Management. The Hutan Kemasyarakatan (HKm), in English 'Social Forestry' program - a program promoted by the government - was used as policy entry point for reconstructing mutual trust based land tenure conflict resolution.

The most current policy on Community Forestry (HKm) from the Indonesian Forestry Service is Surat Keputusan No. 31/Kppts-II/2000 which allows permits in gaining the HKm Initial License. This policy obligates forming community groups among the communities who are willing to gain the HKm License. The process followed includes formulation of the group rules and working plans. These community groups then determine the management area though participatory mapping. After completing these requirements, the community group can make a proposal to the Forestry Service.

In operating the HKm, some constraints are caused by inconsistency of policy and limited resources. The national level of Forestry Department has not approved legal locations of HKm proposed by district/province. In addition, the Forestry Department admits that currently they only have very limited human and financial resources in developing the HKm. From the community perspective, there is still limited socialization about the HKm policy and the process in applying the license is considered too long and tedious. Supports from external parties such as research centers or NGOs are still needed. In term of monitoring and evaluation process of HKm, no participative process is in operation yet. ICRAF and its partners are working on how to develop the mechanism of participative monitoring and evaluation process of this HKm including its criteria and indicators.

Some initiatives in supporting the development of HKm have been done by the government (the Forestry Service) and the communities. The government has started to do some socialization of this HKm and

provides supports by supplying the multi purpose tree species (MPTS) seedlings. The communities response these efforts by actively joining in forest rehabilitation under HKm either using the seedling from the Forestry Service or initiatively obtaining seedlings in groups. Currently there are 12 HKm groups (about 1035 farmers as members) facilitated by ICRAF and Watala. Three groups of them had have HKm Initial License valid for 5 years issued by Bupati Lampung Barat and become the first HKm groups licensed by Bupati in Indonesia under Ministry of Forestry Decree No. 31/Kpts-II/2001.

Preserving natural spring water through cultivating local varieties plants

In Bandung, West Java, almost half of the 23 water springs are vanishing because of water pollution as well as excessive draining and exploitation. Decreases in water biodiversity, low quality of water and high water pollution dominantly caused by farming chemicals and domestic waste indicate that the deteriorating quality of water is already at an alarming stage. In addition, there is insufficient information on how to use and manage the water resources.

The project intends to conserve spring water sources involving the communities surrounding the springs as well as to give additional income for their livelihood. It would increase the level of information and awareness of the importance to conserve the environment among the communities. As an indication of the success of the program, there has been replication of the activities in several areas in West Java.

The potential buyer, in this case the state-owned water supply enterprise (PDAM) and its consumers, would provide a reward to the communities surrounding the spring in the form of in-kind rewards, such as training in how to increase their income through agroforestry and to apply simple technology in maintaining the environment. Nine farmer groups (total of 125 members) have been formed in five locations of the project. They have been encouraged to plant productive perennial plants such as fruit trees, coffee, cocoa and clove, combined with shade tolerant medicinal herbs and food crops, using organic manure. An efficient system of 'longyam' (balong ayam), putting poultry cages above fishponds was introduced to eliminate water pollution from the poultry waste and excessive evaporation of the water pond. Other activities included building infrastructure such as sanitation and clean water

system, and to purify organic liquid waste using simple methods. In line with these activities, the communities were trained not to throw away their domestic waste to the rivers or water bodies.

Action-learning to develop and test upstream-downstream transactions for watershed protection services: a diagnostic report from Segara River Basin, Indonesia

The overall goal of this project is to promote maintenance of water services that support local livelihoods. It is aimed at increasing the understanding of the potential role of market-based approaches in promoting the provision of watershed services for improving livelihoods in Indonesia, especially in Segara River Basin, Lombok.

Despite its early stage and lack of accurate hydrological information, the mechanisms for linking downstream water users to upstream land managers in the Segara Watershed exist. For example, a number of payment schemes to finance irrigation infrastructure (Sawinih, Irrigation Service Fees, and operational fee) contributed by farmers with irrigated land are already managed by the six associations of irrigation water users, but nothing yet is transferred to upstream communities.

PDAM pays a land tax to the local government of the Bantek village to compensate the individual landowners that are affected by its water pipeline. Together with the Lombok Inter-Rafting Company, some financial payments are delivered to contribute to village development through the village administrators. The amounts transferred from PDAM are Rp 2 million in 2001 and Rp 5 million in 2002, while the Lombok Inter-Rafting Company contributes Rp 600,000 / village / year. Basically, the funds are used to cover forest guard salaries, to plant trees and to subsidize various social activities in the village.

Community tradition in Bentek shows their strength in protecting forest. The community holds regular ritual celebrations through Sedekah Gumi Paer. This activity stems from both customary law and religion, which aims to protect community members from natural disasters and diseases. Both the Muslim and Hindu communities of Bentek participate in this occasion.

Bentek Village has adopted its own long-standing customary law as a basis for drafting local law on natural resources management, which is commonly called "awiq-awiq" to protect the watershed. Furthermore,

this effort also intends to develop good relations between upstream land managers and downstream water user in synergy with the programs of the local government, as they have not involved in current developed mechanism.

Conclusions

The role of markets and market mechanisms to ensure a fair and equitable distribution of benefits and costs for watershed services will depend on a number of factors, and government's role in funding watershed protection will remain an important one. Many of the broad social benefits provided by water resources may never be fully captured through the use of market mechanisms. However, given the constraints under which government finds itself and the move towards more local governance of natural resources - including watershed goods and services - what will be important is ensuring that all stakeholders are involved, engaged and capable in the process of finding the most appropriate mechanism and institutions.