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**DEVELOPING A FRAMEWORK FOR
PAYMENTS FOR CATCHMENT PROTECTION SERVICES
IN SOUTH AFRICA**

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EXECUTIVE SUMMARY

The South African context creates a complex and yet opportunistic environment for implementing payments for catchment protection services. Water scarcity and water quality issues are evident and projected to become even more important as demands on water resources continue to increase. Typical supply side solutions are no longer as viable as they once were due to increasing infrastructure costs and declining suitable sites for dams and other large scale developments. As a result demand side solutions such as market-based mechanisms or payments for catchment protection services have an increasingly significant role to play in addressing water supply and quality shortfalls. These mechanisms allow for the development of incentives that encourage actors to engage in changing their behaviour so as to effect positive change and impact on water resources.

Environmental services have traditionally been regarded as public goods and hence have been used and managed in the absence of payments as ‘free’ goods and services. However, conservationists and the business sector alike are now recognising that this practice is no longer sustainable. New approaches that are based on incentives rather than command-and-control measures are necessary to promote the sustainable use of natural resources and environmental services. One such approach is the use of ‘payments’ or ‘market-based-mechanisms’ for the conservation or sustainable use management of these services. The increasing number of research and applied initiatives in this area of work provides evidence that the topic of ‘payments for environmental services’ is recognised as an emerging topic of interest in southern Africa. Although various approaches to implementing payments exist, a framework for developing payments for catchment protection services in the southern African context has not been developed yet. This paper suggests such a framework to facilitate the implementation of initiatives.

TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	WHAT ARE PAYMENTS FOR ENVIRONMENTAL PROTECTION SERVICES?	1
3.	THE CURRENT STATUS OF PAYMENTS	4
3.1	INTERNATIONAL PAYMENTS FOR CATCHMENT PROTECTION SERVICES, LESSONS LEARNED....	4
3.2	PAYMENTS FOR CATCHMENT PROTECTION SERVICES IN SOUTHERN AFRICA	5
4.	A FRAMEWORK FOR PAYMENTS FOR CATCHMENT PROTECTION SERVICES ...	8
4.1	SCOPING: CONCEIVING THE CATCHMENT PROTECTION SERVICES TRADE	9
4.2	EVALUATION: SITE ELIGIBILITY	10
4.3	SITE ASSESSMENT	12
4.3.1	<i>State</i>	12
4.3.2	<i>Pressures and/or drivers of change regarding environmental goods and services</i>	15
4.3.3	<i>Implications</i>	16
4.3.4	<i>Stakeholder acceptance</i>	16
4.4	ASSESSING THE TRADE	17
4.4.1	<i>The market</i>	17
4.4.2	<i>Stakeholder acceptance</i>	19
4.5	PRODUCT DEVELOPMENT	19
4.6	TRADE DESIGN	21
4.6.1	<i>Activity</i>	22
4.6.2	<i>Service</i>	22
4.6.3	<i>Product</i>	23
4.6.4	<i>Certification</i>	23
4.6.5	<i>Payment</i>	23
4.7	OUTCOME: MONITORING AND EVALUATION	23
4.7.1	<i>Monitoring process</i>	24
4.7.2	<i>Monitoring activity & land use change</i>	24
4.7.3	<i>Monitoring the product flow</i>	24
4.7.4	<i>Monitoring payments</i>	24
4.7.5	<i>Monitoring objectives achieved</i>	25
5	WORKING TOWARDS IMPLEMENTING A FRAMEWORK FOR PAYMENTS FOR CATCHMENT PROTECTION SERVICES IN SOUTH AFRICA	25
6	CONCLUSION	26
7	REFERENCES	26

TABLE OF FIGURES

Figure 1: Generic framework for payments for catchment protection services	9
Figure 2: Conceptual flow of goods and services between producers and consumers of environmental goods and services	18
Figure 3: Identifying the role players.....	18
Figure 4: Hypothetical case of various land owners and resource users within a river catchment.....	20

TABLE OF TABLES

Table 1: Environmental services, commodities and land use interventions.....	1
Table 2: Payments for environmental services initiatives in southern Africa.....	6
Table 3: Criteria for site-selection in South Africa.....	11
Table 4: Specific site eligibility criteria	11
Table 5: Themes, focus points and indicators for defining the environment	13
Table 6: Selection of socio-economic indicators	14
Table 7: Environmental service table.....	19

1. INTRODUCTION

Environmental services have traditionally been regarded as public goods and hence have been used and managed as ‘free’ goods and services using command-and-control measures only. Conservationists and the business sector alike are increasingly recognising that this practice is no longer sustainable. A much more prudent and market-friendly approach that is based on a system of incentives towards the sustainable use of natural resources and ecosystem services are being explored. One such approach is the use of ‘payments’ or ‘market-based-mechanisms’ for the conservation or sustainable use management of environmental goods and services.

Evidenced by the number of research and applied initiatives being developed, ‘payments for environmental services’ is recognised as an emerging topic of interest in southern Africa (see Table 2). Although various approaches to implementing payments are recognised, a framework for developing a payment for catchment protection services in southern African has not yet been developed. Such a framework could help to fast track the implementation of initiatives. The development of such a framework is the focus of this paper.

2. WHAT ARE PAYMENTS FOR ENVIRONMENTAL PROTECTION SERVICES?

Payments for environmental services (PES) have increasingly been used to finance conservation initiatives as well as rehabilitation initiatives over the past few years (Landell-Mills & Porras, 2002). They are broadly defined as incentives that aim to encourage land users, land owners and land managers to undertake land practices that support the development, protection or conservation of environmental services such as landscape beauty, carbon sequestration, biodiversity conservation and watershed protection (Landell-Mills & Porras, 2002; Pagiola & Platais, 2002). Typically, land owners, users or managers receive no compensation for the environmental services generated by their land and hence have no economic incentive to manage it in such a way that ensures the continued provision of environmental services. Due to the failure to generate income from managing land for environmental services, land owners, users or managers typically tend towards productive activities such as agriculture and forestry that generate greater economic returns (Pagiola & Platais, 2002). Payments for environmental services aim to address this failure to conserve environmental services by creating incentives for land owners, users or managers to internalise both the benefit and the costs of environmentally prudent land management practices. Such payments, at least theoretically, have the potential to change land use practices to become more environmentally advantageous (Pagiola & Platais, 2002).

Typical environmental services rendered by ecosystems and ecosystem functioning is outlined in Table 1 below. Payments are made for the associated commodities and land use interventions that support the provision of these services.

Table 1: Environmental services, commodities and land use interventions

Service	Commodity	Land use intervention
Carbon sequestration	Trees per hectare	Planting of trees
Biodiversity conservation	Biodiversity protection	Set aside land for conservation
		Maintenance of hedge rows between agricultural fields
	Biodiversity offsets	Protection of alternative biodiversity rich areas
Landscape beauty	Open space	Conservation or parks
	Habitat protection	Conservation
Catchment protection	Water quality	Soil erosion control
		Sediment reduction
		Wetland rehabilitation
		Reduced overgrazing
	Water quantity	Removal of alien invasive plants
		Reduced planting in the riparian zone
		Efficient irrigation practices
	Aquatic ecosystem goods and services protection and maintenance	Environmentally sensitive water releases
		Monitoring of aquatic stocks
		Controlled harvesting
		Protection and rehabilitation of aquatic habitat

Source: (Claasen *et al.*, 2005),

The development of payments for catchment protection services system requires certain conditions to be met. These are:

- There need to be a distinct group (which could consist of one or many people or legal entities) of both buyers and sellers for a specific service and commodity and who are interested in trading (one can conceptualise a ‘buyers forum’ and ‘sellers forum’ to wedge the different parties who has the same objective together);
- Costs of participating in trading (transaction costs) need to be covered either from an external source or within the confines of the purchase itself, but as a general rule of thumb should be as low as possible;
- A legal or supportive institutional framework that supports trading needs to be active and enjoy the broad-based support of both the buyers and the sellers;
- The specific service and/or commodity to be traded should be clearly defined, universally accepted, quantifiable and be subject to monitoring and evaluation – in a strict economic sense this implies that property rights must be clearly defined, which is often the most difficult part when considering markets for environmental services;
- Both the buyers and the sellers have to agree on a price for the goods and/or services to be traded and this price have to correspond to the benefit the buyers are going to enjoy from the trade and the cost incurred by the sellers to be able to offer the goods and services; and
- There must be an open communication platform between the buyers and the sellers to facilitate the dissemination of information – this platform should preferably be linked to the active institutional framework mentioned above.

Even where these conditions are met, the economic, social and environmental landscape specific to a country may prove to be less supportive of payment

mechanisms. As a result, the following issues and objectives need to be clarified before embarking on a trade:

- The inter-linkages between watersheds and watershed activities;
- Social equity needs within and between watersheds;
- Discrepancies in power bases between demanders and suppliers of watershed services;
- National water use efficiency requirements;
- The legal and institutional issues pertaining to water and environmental services trading; and
- Broader national objectives relating to water and land use as well as development.

Landell-Mills and Porras (2002) have identified a series of payment instruments applicable to developing countries to develop markets for watershed protection services that also improve livelihoods. These instruments are:

- Tradable licences or rights;
- User charges;
- Intermediary based transfers;
- Pooled transactions;
- Internal trading;
- Clearing house mechanisms; and
- Retail-based market.

The role of government in these payments and markets can vary greatly. It covers a spectrum that includes roles such as:

- Government managing transactions;
- Government serving as an intermediary between buyers and sellers (which could include assisting with transactions or simply providing training);
- Government overseeing contracts;
- Government “making the market” by setting up a cap and trade system, and
- No government involvement—other than overall legal sanction—as payments may focus on informal agreements.

It is important to note that payments for catchment protection services can be negotiated between any market transactor (whether a demander or supplier) of the service. However, for the purpose of this project, one of the important elements considered in evaluating the potential sites was the extent to which poor or marginalised groups could be encouraged or supported to provide the required catchment protection services. By doing so, would the poor be able to gain access to another form of income and potentially improve their livelihoods? Against this background, this component of the project aims specifically to address the question: “Is it feasible to develop payments for catchment protection services in South Africa?”

3. THE CURRENT STATUS OF PAYMENTS

3.1 International payments for catchment protection services, lessons learned

Payments for catchment protection services have been widely recognised internationally. One of the early initiatives carried out by IIED was a review of 287 payments for environmental services across a wide range of both developed and developing countries. These included payments for watershed services, biodiversity services, carbon sequestration and landscape beauty (Landell-Mills and Poras, 2002). Since then, interest in the applicability of market-based instruments for environmental management has increased and studies are now being conducted in many countries by a broad range of funding agencies and research organisations. Typically the types of payments observed in developed countries rely on government subsidies or grants for setting land aside for the protection of watersheds or biodiversity, many of these initiatives target the agricultural sector. In developing countries, however, the payment mechanisms tend to rely more heavily on the participation of the private sector.

Overall, the enthusiasm for the use of these instruments is matched by limited knowledge and practical understanding of how they work and what the implications are for using these instruments over resource management tools. Examples of the practical application of payments for environmental services, especially focusing on the linkages between the use of these instruments and their ability to improve livelihoods in developing countries are limited.

As a result the lessons learned to date have been very site specific and have tended to conclude with similar findings:

- Stakeholder processes are very important, setting up these instruments takes time and extensive education, capacity building and negotiation;
- Beneficiaries of services need to be educated about the benefits of these services to encourage willingness to engage in the use of market-based instruments for these services to be protected or effectively managed;
- The broader impacts of market-based instruments are not always clearly understood, for example, the impacts on livelihoods, value added, or the long-term sustainability of the environment;
- One of the key issues affecting both developing and developed countries is the issue of equity and the use of market-based mechanisms to manage environmental resources;
- The use of these mechanisms requires extensive data collection, reliable hydrological data and land use data is imperative. Many of the developing countries introducing these mechanisms are forced to do so in the absence of this kind of data which may potentially limit their long-term sustainability as buyers want proof of environmental service improvements;
- Secure property rights are a necessary condition for establishing payments for environmental services.

3.2 Payments for catchment protection services in southern Africa

During the last three years several payments for environmental goods and services (PES) initiatives have been initiated in South Africa. Many of these payment systems are still in their planning phases. They cover all spheres of environmental goods and services including catchment protection services, carbon sequestration, biodiversity protection services and landscape beauty. Some of the initiatives seek to harness not one, but several, environmental goods and services simultaneously. These services include water quality and quantity, carbon sequestration, combating biodiversity loss and desertification and soil stabilisation and productivity. Another common characteristic is that by far the best part of environmental goods and services are rendered by untransformed land, this is land that is not converted to either crop production or for construction purposes of any kind. Such land is almost exclusively available in rural areas. These are areas where income and food insecurity are at its most prevalent. Neither would the current, nor any future, initiative work should this aspect not be fully internalised within the design, implementation and operation of the payment system. The initiatives referred to in southern Africa include:

Table 2: Payments for environmental services initiatives in southern Africa

Country	Partners	Funder	Environmental Service	Description	Implementation region / area
South Africa	CSIR & IIED	DFID	Catchment protection – water flow improvements	This project focuses on how payments for catchment protection services can be used to improve livelihoods in South Africa. The broader project is being conducted in six other countries and is funded by DFID.	Olifants catchment (GaSelati River) and Sabie-Sand Catchment (Sand River)
	Resource Africa and Award	Ford Foundation	Catchment protection services, landscape beauty, biodiversity services and carbon sequestration	This initiative looks at developing payments for environmental services and equity.	Sabie-Sand Catchment
	Maluti-Drakensberg Transfrontier Park, Futureworx, Beatus	World Bank, DEAT & DBSA	Catchment protection – water supply improvements	Investigation of market-based options for improved land management of the water catchment areas for the major Kwa-Zulu Natal rivers such as the uTugela	Maluti-Drakensburg
	DWAF	DWAF and water users	Catchment protection – water supply improvements	Removal of alien plant species from watersheds and riparian zones	National
	Environmental Offset Investments & GreenGrowth Strategies	DEAT	Carbon sequestration & protection of riparian zone and water catchments	Under the umbrella of the ARISE (Africa's Rural Initiatives for Sustainable Environments) project communities are mobilised to restore degraded landscapes as an extended public works programme	Eastern cape & Limpopo province
	SANBI	World Bank	Biodiversity protection	The CAPE initiative focuses on land use changes that serve to increase the area under biodiversity protection. Once such mechanism is to get farmers to set aside land under 'conservation trusts', the other is to encourage potato farmers to adopt practices that are more biodiversity 'friendly'.	Western Cape province

Country	Partners	Funder	Environmental Service	Description	Implementation region / area
Mozambique			Catchment protection – water quality improvements	Almost 15% of total population of Mozambique resides in Maputo, but less than 20% have access to grid electricity. This results in a thriving charcoal trade. Rural communities harvest biomass in southern Mozambique, produce charcoal and sell it to the urban dwellers. Current extraction rates exceed regeneration rates by several orders of magnitude. It has been estimated that Maputo consumes 2 million m ³ of charcoal annually. This land use practice affects the water quality and availability in both the Incomati and Limpopo rivers. A study is currently being launched to plan a sustainable land use option based on a payments scheme.	National
Malawi			Catchment management – water quality improvements	The vegetation in southern and central Malawi has been negatively affected by the civil war in Mozambique, which lasted for longer than two decades. Many Mozambicans found refuge in Malawi during the time, utilising biomass as their sole energy source. This pressure is in addition to the existing harvesting of biomass for energy from local citizens themselves. Consequently the biomass has become severely depleted leading to land degradation and a reduction in water quality and water availability. An initiative, driven by the local chief, is underway to secure finance for a rehabilitation study.	National
Uganda	NEMA	NA	Catchment protection services	Payments for environmental service are an emerging area of interest in Uganda. Areas of need and focus relate to catchment protection services and biodiversity protection specifically through offsets for development initiatives.	
Kenya	Various	NA	Catchment protection services	Payments for environmental service are an emerging area of interest in Kenya. Areas of need and focus relate to catchment protection services.	National

4. A FRAMEWORK FOR PAYMENTS FOR CATCHMENT PROTECTION SERVICES

Various frameworks for payments for catchment protection services have been identified and developed for implementation of payments in different countries. Most of these frameworks contain similar core activities such as the identification of appropriate services, buyers, sellers, implementation sites, financing mechanisms, institutional arrangements and various supporting mechanisms. Although payments for catchment protection services have been implemented in South Africa through the Working for Water and Working for Wetlands programmes, no specific framework exists for the implementation of payments for services that fall outside of these programmes. As there is growing interest in the role of this mechanism to address water supply and quality shortfalls in the country, this paper aims to provide a generic framework for implementing payments for catchment protection services.

The framework has been divided into eight sections, each addressing specific stages that need to be addressed when developing a payment for catchment protection services. These stages though distinguishable cannot be separated and therefore could, in some instances, run concurrently or in parallel. The stages are listed here and discussed in sections 4.1 through to 4.6:

- Conceiving the catchment protection services trade (This is a scoping phase identifying environmental services and commodities, possible buyers and sellers and the identification of various market-based options);
- Eligibility of the site (Based on the outcome of the scoping phase an evaluation has to be made whether a market-based solution is possible at that particular site and whether trade options should be explored further, if so, then the study continues to the next phase);
- Site assessment (Description of the current environmental state, pressures and drivers of change);
- Assessing the trade (Identification of the trade of options);
- Product development (Identification of land use and technology change options and associated costs and benefits that are linked to the provision or increase in environmental goods and services);
- Trade design (Identification of transaction mechanisms, legal and financial implications); and
- Outcome (Monitoring and evaluation).

The framework is shown diagrammatically below and then each phase is discussed in detail.

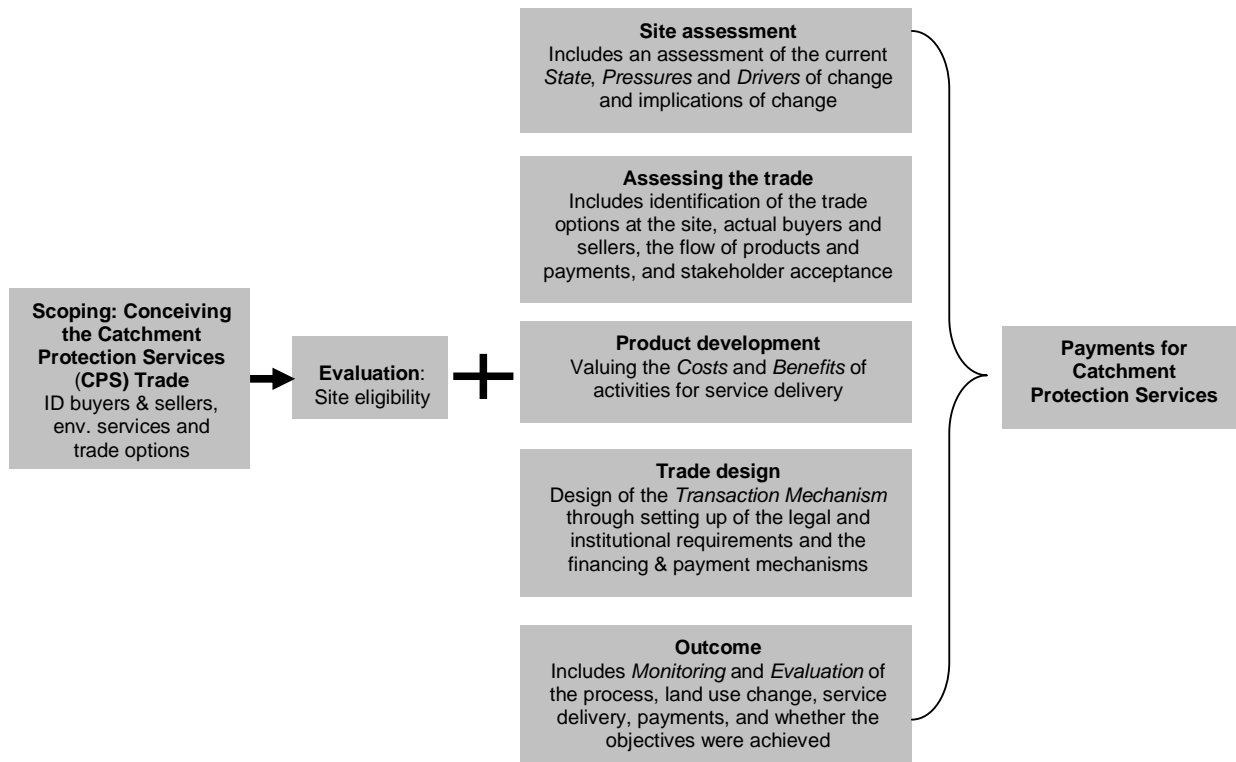


Figure 1: Generic framework for payments for catchment protection services

Source: Own analysis.

4.1 Scoping: Conceiving the catchment protection services trade

The scoping phase is extremely important since it has to identify who the possible member(s) of a ‘buyers forum’ and ‘sellers forum’ might be and for what environmental service and/or commodity. After assessing these, the question is whether a trade in catchment protection services, which is defined as any land use or technology change that brings about an improvement to either water quality or water quantity or the protection and maintenance of aquatic ecosystem goods and services, is indeed possible or not at a particular site. For payments for catchment protection services to be viable at any particular site, a clearly defined land use and/or technology change that results in improved water resources must be identifiable and there needs to be a demand for these services downstream. Willing buyers needs to be able to recognise the economic value in obtaining the delivery of these services and a willing seller or provider needs to be able to make the required land use change actions upstream.

“It is important to note that the definition of payments for ecosystem services does not include transactions in which money exchanges hands but there is no associated requirement that the recipient of funds actively takes particular natural resource management actions. For example, if a community were to allow a conservation organization to use and manage their historical common property for wildlife protection and revenue sharing, it would not necessarily be a payment for ecosystem service. In

this case, the community is not specifically taking action (and/or foregoing other practices) to maintain a particular set of ecosystem services. Rather, the case of wildlife protection and conservation undertaken by an outside group that pays a community is simply a separate kind of transaction” (Quibell, 2005).

If the scoping phase is an interactive process involving the various stakeholders, then the ‘assessing the trade’ phase should be much easier. Should a trading arrangement not be feasible or only possible at huge transaction cost, then the study and/or project cannot commence to the next phase until such time that the barriers to the trade has not been removed.

4.2 Evaluation: Site eligibility

The implementation of payments for catchment protection services deals with complex and diverse processes. It takes into account the social, economic, physiological, environmental, institutional and legal issues that define the relationships along a river system and the demands on the water resource itself. It is important for ensuring a successful outcome that clear and measurable criteria are set up as guidelines for site selection, based on what the objective for using market-based instruments is. These criteria include a range of issues and can be prioritised according to the needs and goals of the policy-maker, project objectives or expected outcomes and Table 3 provides an example of some.

Within the context of the general site selection criteria as per Table 3, there is also a set of site-specific criteria relevant to payments for catchment protection services. These are relevant due to the unique mix of characteristics that need to be present in order for a trade to be a viable water management option. A grid, such as the one outlined in Table 4 below, can be developed based on the project criteria and the specific criteria required to implement a payment. These grids need to be simple but effective and can be used as a checklist when evaluating a number of potentially viable sites as options, where only one or two sites can be implemented due to capacity or funding constraints. A tick represents that trade-favouring conditions exist whereas a cross signifies the opposite. The results of the scoping phase should inform the completion of Table 4.

Table 3: Criteria for site-selection in South Africa

Criterion	Explanation
Administrative capacity	There should be regional capacity in the regional DWAF office to support the process
Strategic area issues	The area should be identified for strategic development needs, either as a Presidential lead project, or Integrated Development Zone (IDZ), or be an ISRDP node. Other agencies should be active in the area to support building the capacity to use water productively (co-operative governance).
Significant RDM requirement	There should be a significant reserve requirement, or special needs for the protection of the environment, i.e. sensitive river systems. The intention of this is to test the balance between the ecological reserve, the need to make water available for rural development, and the curtailment of existing lawful use.
One catchment	There should be an effort made to do the full compulsory licensing process in at least one catchment, and to integrate all the relevant aspects of IWRM (quantity and quality).
Stressed catchments	The catchments selected should experience water stress i.e. the demands for water should exceed the available water, and WC/DM and curtailment of existing use will be necessary to provide water to the rural poor. There should be an existing demand from users for new licences.
Institutional arrangements	There should preferably also be a CMA board established – and the establishment of Water User Associations should have progressed well.
	Where a CMA cannot play the role of an administrative intermediary, other institutions need to be well positioned and accountable to play this role
Rural socio-economic development needs	There should be a significant rural population, preferably with clearly articulated plans for development. Other agencies should be focussing on rural development. Specifically where the goal of PES is for livelihoods improvement.
Surface and groundwater interactions	There should be groundwater allocation problems. The water allocation plan should require conjunctive use of surface and groundwater resources to support rural development needs.
Water quality constraints	There should be water quality related problems. Watershed services should be able to address the nature of the water quality need and the associated drivers.
Broad land-use activities	A wide range of land-use activities should be evident. These activities should be cross-cutting from livelihoods dependant use to commercial use.
Hydrological information available	Well-documented, quantifiable and accessible hydrological information should be available, supported by local beliefs and priorities.
Project linkages	There should be clear and supportive linkages with other initiatives in the region.
Demanders and sellers	Demanders and sellers of watershed goods and services should be evident and willing to support the broader initiative.
Tangible goods and services	The identified watershed services should be tangible within the context of the catchment. Benefits should be clearly evident to all.
Water trading	Informal markets for water trading should be evident. These trades may be temporary or permanent.

Table 4: Specific site eligibility criteria

Name	Evaluation criteria							
	SA conditions	Willing sellers	Capable buyers	Incentive	Government policies	Research opportunities	Measurable change	Large (appropriate) scale
Site 1	√	√	√	X	X	√	X	√
Site 2	√	X	X	√	√	√	√	X

It is then up to the project manager and stakeholders to make a specific selection based on which site would be the most likely in terms of a successful outcome where the use of payments for catchment protection services would be a viable economic tool for water management.

4.3 Site assessment

The purpose of the site assessment component of the framework is to, for a given trade-eligible site, enlighten interested and affected parties as to the current state of the economy and the environment and all its implication regarding environmental goods and services, socio-economic well being and the prevailing legislative and institutional setting. The pressure and/or drivers that could potentially affect changes in environmental goods and services should also be identified. The plausible implications of such change should also be discussed qualitatively.

The site assessment needs to take into consideration a review of the current state, pressures and drivers of environmental change (what are the current activities prevailing on the land and what are their implications in terms of impacts on water quality and quantity). This component involves scientists and technical experts to describe the prevailing state of the environment, the pressures that it is under and the drivers of the environmental change and suggest interventions that could mitigate the negative environmental impacts. The four components of the site assessment phase is: 1) State of the resource base and the economy, 2) Pressures and drivers of change, 3) Implications and 4) Stakeholder acceptance. These are all discussed in greater detail below.

4.3.1 State¹

Four aspects should be considered here, namely i) the state of the environment, ii) the environmental goods and services produced by the system within the demarcated boundaries of the site, iii) the state of the economy and general welfare of the people, and iv) the prevailing legislative and institutional context. These four aspects will subsequently be discussed separately.

4.3.1.1 State of the environment

The state refers to the condition of the environment. A study of various conditions or states over time should provide a trend regarding environmental change. Such a trend analysis should also indicate how quickly or at what rate these changes occur and whether they are increasing or decreasing. Themes and focus points that should be used to describe and analyse the state of the environment is provided in Table 5.

¹ This section is partially based on the National State of the Environment reporting guidelines of the Department of Environment Affairs and Tourism.

Table 5: Themes, focus points and indicators for defining the environment

Theme	Focus point	Indicators (for example)
Terrestrial ecosystems	Land cover Land use Biodiversity integrity in terms of biodiversity loss and/or intactness Solid waste removal & land fill sites	No of ha under the Landsat classification No of ha under agriculture/industry/mining, etc No of species per ha/spatial unit as a ratio to number required Tons of waste per capita or per storage capacity
Inland water	Water availability Water quality State of the fish resources	Water per capita Water quality per m ³ No of a species harvested as a ratio of species growth
Coastal and marine	Fisheries Ecosystem health	Harvesting and species trends
Atmosphere	Indoor and ambient air quality Climate change Depletion of stratospheric zone	Air quality per capita Temperature increase per annum/ region

4.3.1.2 Environmental goods and services

Describe qualitatively the environmental goods and services provided within the demarcated site area. A possible list of such goods and services are given below.

- Direct consumptive use
 - The direct or extractive and consumptive use of natural biota, e.g.:
 - Food, e.g. Edible fruit, herbs and vegetables, game, livestock
 - Raw materials, e.g. fuelwood, timber, crafts, thatch, reeds, fibre
 - Genetic resources, e.g. drugs and pharmaceuticals
 - Medicinal resources
 - Ornamental resources, e.g. flowers
- Direct non- consumptive use
 - Non-consumptive use comprises those non-extractive direct use values, e.g.: Tourism/recreation, e.g. eco-tourism, adventure tourism, passive tourism (incl. aesthetics)
- Indirect use from ecosystem functioning

Indirect use values correspond closely to so-called ‘ecological functions’, e.g.:

 - Regulation functions:
 - Gas regulation
 - Climate regulation, incl. carbon sequestration
 - Disturbance prevention
 - Water regulation
 - Water supply
 - Watershed protection
 - Water purification
 - Soil retention
 - Soil formation
 - Nutrient regulation
 - Waste treatment
 - Pollination

- Honey production
 - Biological control
 - Milk production and livestock grazing
- Habitat functions:
 - Refugium function
 - Nursery function
- Non-use values
 - Option, bequest and existence values
 - Cultural & historic values
 - Spiritual and religious values
 - Future use values

4.3.1.3 Socio-economic state

The socio-economic state refers to the state of the economy and human well being within the designated area. Table 6 provides a list of themes and possible indicators that could be used to analyse an area.

Table 6: Selection of socio-economic indicators²

Theme	Indicator
The economy	Level of unemployment Dependency ratio Income distribution Economic growth rate
Human resource potential	Net enrolment ratio in primary education Proportion of pupils starting grade 1 who reach grade 5 Literacy rate of 15- to 24-year olds
Health and social status of the population	Under-five mortality rate Infant mortality rate Proportion of one-year-old children immunized against measles Maternal mortality ratio Proportion of births attended by skilled health personnel HIV prevalence among 15- to 24-year pregnant women Number of children orphaned by HIV/AIDS ^a Condom use rate of the of the contraceptive prevalence rate ^b Prevalence and death rates associated with malaria Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures ^c Prevalence and death rates associated with tuberculosis Proportion of tuberculosis cases detected and cured under directly observed treatment short courses
Crime and corruption	Violent crime (murder, attempted murder, culpable homicide and rape) per 1000 of the population Robbery per 1000 of the population Number of child abuse cases per 1000 of the population Fraud per 1000 of the population
Basic needs of the population	Proportion of population with sustainable access to an improved water source, urban and rural Proportion of population with access to improved sanitation Proportion of households with access to secure tenure

² This table is partially based on the Millennium Development Goals.

Theme	Indicator
Safe and healthy environment	Proportion of households using wood, paraffin and/or LPG as primary energy source Ratio of area protected to maintain biological diversity to surface area Proportion of highly degraded land surface area Proportion of land area covered by indigenous biomass
Status of specific segments of society	Proportion of population living in poverty Share of poorest quintile to provincial consumption Prevalence of underweight children (under five year old) Proportion of population below minimum level of dietary consumption Ratio of girls to boys in primary, secondary and tertiary education Ratio of literate females to males among 15- to 24-year-olds Share of women in wage employment in the non-agricultural sector

- a The proportion of orphan to non-orphan 10- to 14-year-olds who are attending school.
- b Among contraceptive methods, only condoms are effective in reducing the spread of HIV/AIDS.
- c percentage of children under five sleeping under insecticide-treated bed nets (prevention) and appropriately treated.

4.3.1.4 Legislative and institutional context

The legislative and institutional contexts are fundamental to the viability of any payment system. For catchment protection services in particular, the National Water Act (Act no 36 of 1998) clearly identifies a number of activities that are regarded as water use activities and hence are governed by specific laws. These activities include planting crops or grazing cattle in riparian zones; alien plant species growing in riparian zones, sponges or along watersheds; unauthorised diversion of a water course; among others. As such payments cannot specifically be made to discourage behaviour that is effectively already unlawful, thereby creating rewards and incentives for unlawful behaviour. Payments can only be made to encourage alternative land use options that are lawful. Nothing in the act specifically prohibits payments for catchment protection services but in many cases these payments are made as additions beyond current water and catchment management charges.

The institutional environment is also important as it will define how the buyers and sellers are grouped, whether existing forums may potentially take on new roles or whether authorities such as the newly implemented catchment management agencies may play the role of intermediaries and monitors.

Issues that should be clarified include:

- Land tenure regimes;
- National and provincial legislative context;
- Current by-laws in addition to the national and provincial acts prevailing within the designated area; and
- Current land users organisations and/or practises.

4.3.2 Pressures and/or drivers of change regarding environmental goods and services

Pressures and or drivers of change can be defined as that sequence of events that affects the state and trends discussed above and can therefore be divided into three groups, namely:

- Environmental changes;
- Socio-economic changes; and
- Legal and institutional changes.

The pressures are derived from the information obtained in the state and interpreted within the context of which of the respective changes (or combination of changes) in the state of either the environment, the socio-economic context and/or institutional and legal context are likely to exert increasing pressure on the provision and delivery of the environmental goods and services rendered within the demarcated area.

4.3.3 Implications

Once the state and the pressure or drivers for the delivery of environmental goods and services have been identified, it is necessary to take a step back and ask the following questions:

- What is the likely impact of these drivers of change on the extent and quality of environmental goods and services?
- What is the strategic importance of the likely changes in the extent and quality of environmental goods and services?
- How important and how urgent is intervention required and why?

Answering these three questions should provide an adequate justification, based on the information gathered, why a change in resource management regime (which could include a land use or technology use change) is pertinent or not. This should provide the necessary base whether or not further action is required and whether the design and institution of a payment system is warranted or not.

4.3.4 Stakeholder acceptance

Once the analysis has been done, the relevant stakeholders should be involved in accepting and/or amending the descriptive analysis done concerning the current state of their economy and environment, existing pressures and driving forces that affect the delivery of environmental goods and services, and the importance and urgency of the need for change.

This phase of the study is essential not only to secure stakeholder buy-in, but also stakeholder participation! Once the payment system has been designed, it is the stakeholders themselves that are to participate in the trade and not necessarily those preparing the reports.

4.4 Assessing the trade

The trade assessment phase provides the required information on who the potential buyers and sellers of catchment protection services are. This includes an assessment of the suitable suite of options available at the site, identification and engagement with actual buyers and sellers, designing the flow of products between buyers and sellers and the payment mechanism used to facilitate trade. Finally, this includes a review of all stakeholders and process engagement with stakeholders towards stakeholder acceptance.

Based on the information of the three preceding phases that have lead the process towards site selection and the identification of potential buyers and sellers, one then has to:

- Engage with the most likely buyers and sellers to form the buyers and sellers forums;
- Identify the most feasible suite of intervention and/or land use and technology change options available at the site;
- Determine what the environmental benefits of these changes would be;
- Determine the best payment mechanism to facilitate trade;
- Design a possible trade between the buyers and the sellers and.
- Engagement with buyers and sellers to assure buy-in and acceptance of the system.

This component of the framework for payments of environmental goods and services comprises four aspects, namely, i) understanding the basic trading system, ii) the identification of the suite of environmental goods and services and the plausible respective buyers and sellers of the product, iii) the compilation of a table of buyers and sellers regarding each product, and iv) the acceptance of the market analysis by the stakeholders. The first three components form a unit and will be discussed as such.

4.4.1 The market

To establish a market for environmental goods and services one needs a willing buyer and a willing seller who agrees on the product quality and quantity and the market price. This is no different from any other commodity in the market, though the institutional set-up and the determination and quantification of the product is much more complex. The challenge is to keep the system as simple, though adequate and appropriate, as possible. Therefore, the well-known double-loop circular flow diagram which is often used in basic economic text books to describe the flow of payments, factors and goods and services through the economy could usefully be applied within a payment for environmental goods and services framework, but only after some adjustment. This amended framework is provided here as Figure 2.

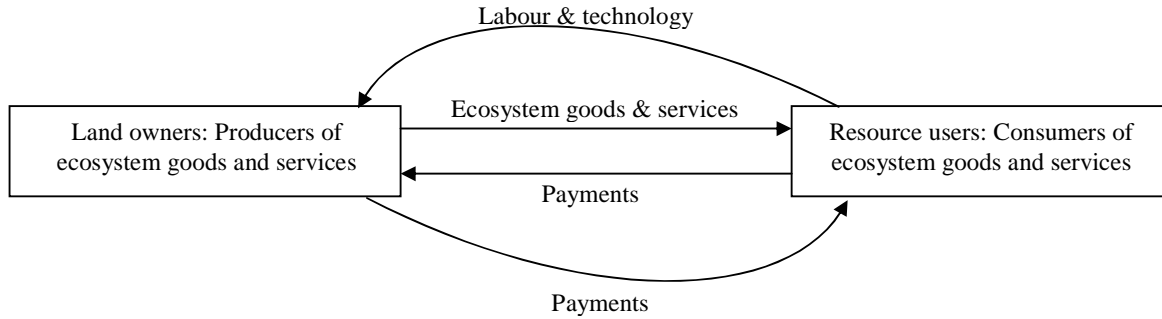


Figure 2: Conceptual flow of goods and services between producers and consumers of environmental goods and services

The first loop (straight arrows) indicates the flow of goods and services from land users producing environmental goods and services to the consumers of these services with and payments for these goods and services flowing back in the opposite direction. The second loop (curved arrows) indicates the flow of labour and technology to assist in the change of land use with resultant payments flowing back to the providers of these services. In some instances the direct beneficiaries of the improved quality and quantity of environmental goods and services and those providing the labour (advice or otherwise) and technology might be the same individuals, but it is not necessarily the case. The delivery of environmental goods and services has therefore both a private benefit (to the individual user), but also a public or common benefit as it provides opportunities for others to become involved as service providers to the producers of these environmental goods and services as well.

Following this, it is necessary to identify the specific role players and the list of goods and services that could potentially be traded. This will require that the template provided below in Figure 3 be completed.

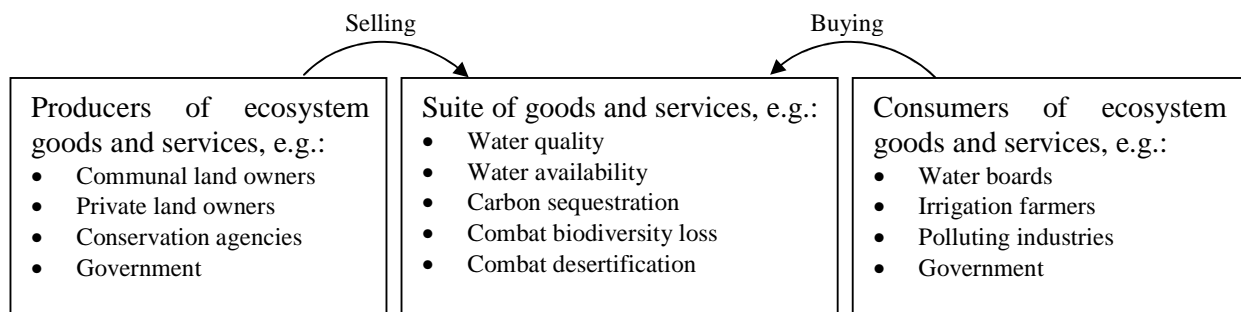


Figure 3: Identifying the role players

Ideally one should be able to compile a table that resembles Table 7 below.

Table 7: Environmental service table

Environmental service	Area or specific site applicable	Habitats of importance	Potential buyers	Potential sellers	Notes
Catchment protection					
Carbon sequestration					
Landscape beauty					
Biodiversity protection					

4.4.2 Stakeholder acceptance

As was previously the case, stakeholder acceptance of the discussed market analysis is essential. It is recommended that stakeholders be involved during this process and that their views are incorporated.

Should there be general agreement among the stakeholders regarding the sketched context, component one, and who the most likely buyers and sellers of environmental goods and services are, then the likelihood of the next components to succeed in their objective should be good. If, however, such agreement is absent, the likelihood of successful trade is slim.

4.5 Product development

Once the stakeholders agree, at least in principle, to the above it is necessary to do the actual product development. This implies linking a specific land use or technology use change to a specific service or commodity. Once that is done, it is necessary to quantify the cost of the land use or technology change (for the sellers) and the benefit of such a change (to the buyers). This quantification of the options could entail a cost-benefit analysis, a cost-effectiveness analysis, and a marginal cost versus a marginal benefit analysis or any other suitable project appraisal method. Once the costs and benefits have been valued it is possible to re-engage with buyers and sellers to establish the feasibility of meeting the opportunity cost of land use change to provide catchment protection service delivery and create incentives for action by the sellers.

After the list of possible environmental goods and services and their potential buyers and sellers have been identified, it is necessary to link every specific site to a specific management intervention strategy that would yield the desired product and/or service. This is essential to the purpose of this phase: The establishment of the link between management intervention (and land use or technology use change) and service delivery, which will provide a tradable product, and quantify both the costs and the benefits of such an intervention strategy. To consider this question, consider Figure 4.

In this case, the mine, the water board (providing water to a major town) and Farmers Dick and Tom (who does not like each other since Dick (who irrigates heavily) cut Tom (who wish to irrigate) from the river front) are willing buyers of an intervention strategy that will yield silt reduction and stream flow variance risk mitigation as major products. Farmer Pete, who is a businessman residing in a distant city does not occupy his land, (he uses it as weekend retreat) and it is of no concern to him what happens, Farmer Joe and Chief Happy overgraze and over burn their land heavily (which as a result is severely degraded) while Chief Vitalstatistics has got a highly valuable plantation with exotic species on his land. In between is a conservation area, but with little or no management structure due to a lack of funds, but are increasingly negatively affected by the spread of invasive alien plants from the neighbouring farm.

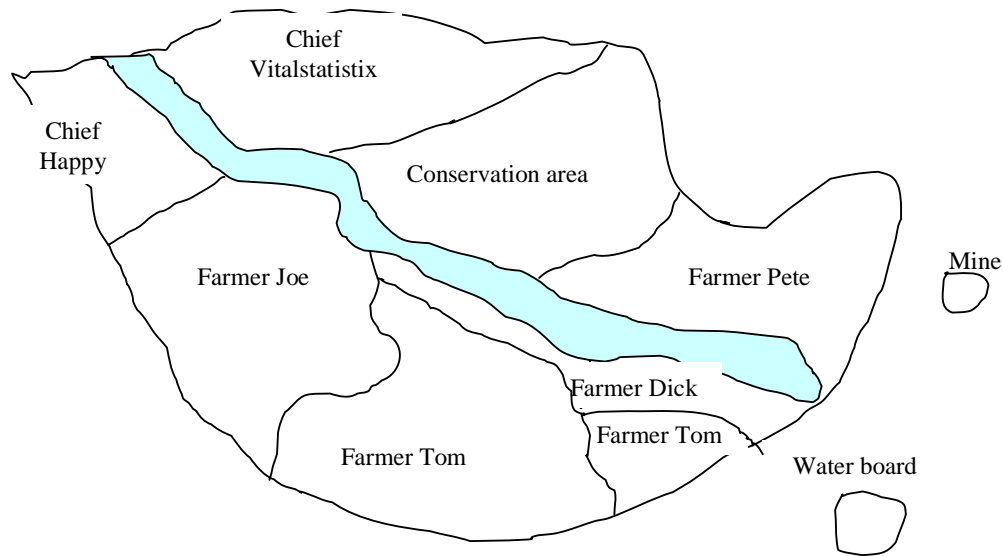


Figure 4: Hypothetical case of various land owners and resource users within a river catchment

The potential buyers of water security (reduced incidences of both flooding and droughts) and silt reduction are the mine, the water board and Farmer Dick (Farmer Tom has got no legal right to the water despite his claims). The potential sellers are Farmer Joe, Chief Happy, Chief Vitalstatistics and the conservation area. Farmer Pete is not interested to partake in any activity.

To design the market for the environmental services identified, the following questions should be asked, and adequately answered:

- What is the continuum of management interventions (or activity) available to induce improved environmental goods and service delivery? In the example provided above, this could imply the following: Improved fire regimes, lower stocking levels, build gabions and re-vegetate the land of Chief Happy and Farmer Joe respectively and clear the invasive alien plants within the riparian zone of both Chief Vitalstatistics and the conservation area.
- What is the likely extent or impact of the land management and use change be on the stream flow and silt concentration levels?

- What is the opportunity cost for introducing the intervention, i.e. potential loss in valuable plantation material for Chief Vitalstatistics and reduced stocking levels for Chief Happy and Farmer Joe.
- What is the opportunity cost for not introducing the intervention, i.e. mine closure and increased cost to the water board and reduction in the irrigation potential for Farmer Dick.
- What is the direct cost of these management interventions?
- What is the direct benefit to the resources users?
- Based on this new incentive, what is the potential of improving the management system of the conservation area?
- Could Farmer Pete, as businessman, be enticed to become involved in improving his resource management regimes as well?
- Could Farmer Pete and the conservation area's land be managed as a unit to improve the feasibility of the conservation area under a profit sharing agreement?

4.6 Trade design

The previous phases should render the scientific base on which the trading system can be designed. All the stakeholders should agree, a priori, on the specific objectives of the trade and, if they agree to the outcome of the previous phases, provide a commitment to participate in the trading system.

Following such a commitment the specific transaction mechanism should be designed, which comprises two phases, namely the establishment of the necessary legal and institutional requirements and the design of the specific trading regime.

Firstly, the legal and institutional arrangements require the answering of the following questions adequately:

- Are there existing institutions that could act as project management agency and are they appropriate and adequate to facilitate the payment and service delivery exchange?
 - If yes, which institution should be used?
 - Is that institute willing and able to perform such a function?
 - If not, what should be done?
 - What would the appropriate institution be?
 - Where should the institution be housed?
- Are the existing institutions appropriate and adequate to manage the certification procedure?
 - If yes, are the individuals capacitated to perform the operation?
 - If no, which institution should perform this role?
 - According to which standard will the management institution certify service delivery (any local, international or any other agreed upon system)?
- How, when, where and by whom are the service delivery and payments to be monitored and evaluated?
 - Should monitoring and evaluation be performed by the project management agency or by an external institution?

- If it is a third party, who should this be?

After this phase, all the participants to the project should have a clear idea as to the functioning of the trade. The last remaining activity is the design of the specific payments and financing mechanism. This concerns the finalisation of who pays whom; when; and based on what activity.

Implementing the trade requires the site assessment, trade assessment, product development and trade design components to be brought together so as to provide the necessary information and buy-in to facilitate active trading. For the trade to work an implementation strategy must be clearly developed and a system for monitoring and evaluation must be structured so as to monitor the trade outcome.

The implementation strategy refers to the timing and structure of the role out of setting up a trade. This includes agreed dates for signing of letters of commitment and contracts for service delivery, commencement of pre-defined activities, certification requirements, and payment structures.

4.6.1 Activity

The require activity needs to be clearly identified for the implementation strategy. A land use plan and required land use change needs to be developed. This will include what activities must be changed or stopped and what activities must be commenced. Phasing out and phasing in must be clearly explained so that the changes can be implemented strategically and sustainably with limited costs to society and those individuals directly impacted.

A management plan also needs to be set up to address issues of concern from a legal and policy perspective, as well as human capital and physical capital needs and how the will be provided and by whom, over what time frames, at what cost. Deadlines for making the land use changes need be set up as well as timeframes for monitoring and feedback. The management plan is a very comprehensive plan and has to be developed through a stakeholder participation process, as all stakeholders will have some role in the successful implementation of such a plan. In the case of direct negotiations these plans can be developed between the associated individuals with inputs from the respective government departments, however where the negotiations are multi-stakeholder negotiations it may be more appropriate to have a facilitated process via an intermediary (either government such as a CMA or an existing NGO in the region).

4.6.2 Service

The catchment protection service demanded needs to be something that can be addressed and measured. The strategy needs to clearly identify the links between the service supplied and the land use changes required to deliver the service.

4.6.3 Product

The product needs to be structured in such a way that it is clearly defined and measurable. It also needs to be able to be packaged so that it can be sold to downstream buyers. The impacts and outcomes and the cost savings of the selected land use changes for water investment strategies must be clearly established.

4.6.4 Certification

For some environmental goods and services delivery requires certification. For example the planting of trees for carbon sequestration can be taken to another level where the process of planting and later harvesting is done under an international system of FSC certification. This process provides greater credibility to the product and may encourage willing buyers to demand more of these products and the related environmental service.

4.6.5 Payment

It is critical to this process that any payments in cash or kind are tracked and carefully monitored to limit any forms of misconduct and to ensure that the payments are received by the sellers providing the service.

4.7 Outcome: Monitoring and evaluation

The outcome of a payments for environmental services scheme is dependent on many interlinked yet independent activities, the progress and delivery of each needs to be monitored and payments need to be made based on contingent actions. The outcome includes: 1) the monitoring and evaluation of the process; 2) land use change; 3) service delivery; 4) payments; and 5) whether or not the objectives were achieved.

Critical to the success of payments for catchment protection services is the monitoring and evaluation of the outcome. This includes a broad assessment of issues such as:

- Are all stakeholders supportive of the initiative? Are there appropriate buy-in at all necessary levels?
- Are the providers engaging in the appropriate land use change activity, over the agreed period of time?
- Does the land use change activity render the expected catchment protection service?
- Is the product clearly defined and the solution simply deliverable?
- Are the payments structured appropriately and are they made contingent on delivery?
- Does the mechanism meet the required objectives set out by the project managers, communities or decision-makers upfront?

Specific indicators can also be developed in the early stages of the project to assist with the monitoring process, for example those identified in table 4 above.

4.7.1 Monitoring process

Monitoring of the process followed includes an assessment of the stakeholder and scientific process followed in order to come to the point of setting up a trade. For the process to be viable continuous and active engagement with all stakeholders needs to have been established and ongoing. All stakeholders need to be aware of the trade options and the expected outcomes; they need to be allowed access to all related information and be clearly informed of what activities will be expected, for what period of time, in which areas; at what cost and how the changes will be measured.

Further the scientific process followed to select a certain land use change activity over another needs to be clear and measurable. The linkages between land use change and water supply or quality improvements need to be broadly accepted. For example in Costa Rica there is a generally accepted principle that planting trees creates water and watershed protection, whereas in South Africa, there is an accepted principle that alien invasive plant species deplete watersheds of water flow and hence the one country plants trees and the other removes alien tree species.

4.7.2 Monitoring activity & land use change

The appropriate activity for maximizing the desired catchment protection service needs to be clearly identified and the land use change required to deliver that service needs to be provided simply and effectively, for example clearing so many hectares of trees or planting a certain number of hectares of grassland or harvesting at certain times of the year instead of continuously. The activity needs to have a clearly defined provider and must be simple enough so that it can be monitored either by aerial photography, or other forms of digital technology, or by individual site observations.

4.7.3 Monitoring the product flow

The product needs to be clearly defined in terms of what catchment protection service is being delivered and a means of measuring the delivery of this service must be established. This can range from water flow improvements, to water quality improvements to flood mitigation. The scale at which this product delivery is measured must also be agreed upon. This may be delivery or flow from one village to the next covering a distance of a few kilometers or it may be from one upstream provider to a downstream demander covering a distance of many kilometers. Obviously the scale of impact will affect the timescale of delivery and these issues need to be taken into consideration when designing the product and how it will be monitored.

4.7.4 Monitoring payments

The payments may be made as once off payments upfront, or they may be structured in such a way as to allow for a capital investment component upfront and recurrent

cost payments at annual intervals for a defined period of time based on delivery of the defined activity or land use change. Typically where there are multiple buyers or multiple sellers these payments are made through an established reliable and transparent intermediary who in many cases will also take on the role of monitoring delivery of the service. In other cases where the trade is made directly between one buyer and one seller the transaction costs are reduced and an intermediary is not necessary.

4.7.5 Monitoring objectives achieved

Specific objectives will have been set up prior to establishing a payment mechanism. These objectives may range from simply improving the current situation of water scarcity by monitoring changes in water flow or quality to broader social objectives such as improving livelihoods, injecting revenue into rural economies, or improving health conditions through water supply.

5 WORKING TOWARDS IMPLEMENTING A FRAMEWORK FOR PAYMENTS FOR CATCHMENT PROTECTION SERVICES IN SOUTH AFRICA

The South African context creates a complex and yet opportunistic environment for implementing payments for catchment protection services. Water scarcity and water quality issues are evident and projected to become even more critical as demands on water resources continue to increase. Typical supply side solutions are no longer as viable as they once were due to increasing infrastructure costs and declining suitable sites for dams and other large scale developments. As a result demand side solutions such as market-based mechanisms or payments for catchment protection services may have a role to play in addressing water supply and quality shortfalls. These mechanisms allow for the development of incentives that encourage actors to engage in changing their behaviour so as to effect positive change and impact on water resources. The generic framework outlined above, including the phases of: scoping, evaluation of site eligibility, site assessment, assessing the trade, product development, trade design, outcome and an implemented payment, can be applied in South Africa. As it stands it is broadly transferable across all types of environmental services and land use change activities. However there are some serious contextual considerations that need to be carefully assessed within South Africa if these payment mechanisms are to be used. The following contextual issues may potentially hinder progress and service delivery within a “payments for catchment protection services framework” if they are not specifically addressed where applicable:

- Undefined or insecure property rights such as the re-allocation of water rights and land rights;
- Stakeholder involvement and participation - process, process, process;
- Changing policy and regulations;
- Income and power discrepancies;
- Inequitable access to resources;

- Historical dependency on regulatory mechanisms not market-based-mechanisms;
- Issues of scale;
- Positions of scarcity versus surfeit in water supply; and
- Language barriers and education barriers.

6 CONCLUSION

Despite their complexity and dependency on process-orientated approaches, payments for catchment protection services offer a viable tool for meeting water quality and quantity improvements in South Africa. It is however only viable in situations where there are clear gains to be made by investment in land use change or technology improvements upstream due to alternative water treatment or supply-side solutions being too expensive downstream. The opportunity cost of land use change upstream also needs to be low enough to encourage a shift from one activity to another.

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