# Applicability of the instrument "Payment for Watershed Protection Environmental Services" (PWES) for the Conservation of Watersheds in the Churia Region of Nepal

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During the research work, I have contacted different individuals from different universities and conservation organizations from around the world. Many have responded and provided ideas and insights, links to interested colleagues and scientific literature and project descriptions. I greatly benefited from their kind support and I hope to be able to give some insights and experience back to them.

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# ABSTRACT

The novel approach 'Payment for Watershed Protection Environmental Services' (PWES) has received considerable attention globally as a new way to improve environmental conservation and watershed management. PWES schemes, which are based on the 'beneficiary pays' principle, channel payments for environmental services from beneficiaries to service providers. Even though there is a relatively good theoretical understanding of the PWES concept in Nepal, there are hardly any practical experiences on the ground.

This qualitative research was carried out to study the applicability of the PWES approach for conservation of watersheds in the Churia Region of Nepal. A conceptual framework was developed and used as an analytical lens throughout the entire study. First, the study analysed global experiences and, building on this, identified success factors for PWES implementation. Hereafter, the current context of Churia watersheds was compared with these success factors to identify opportunities and challenges and to derive recommendations for the research area. Tools and methods such as literature reviews, interviews, and one workshop were used to conduct the research.

The study comes to the conclusion that the instrument of PWES should be in principle applicable to Churia watersheds. Increased demand for environmental services, provision of new financial sources for conservation and positive spin-offs to different sectors are key opportunities. However, there are a few challenges that need to be overcome such as time gaps in the production of environmental services; traditional land rights and; the lack of willingness and capacity to pay. In short, PWES is a complex approach, which has to be implemented carefully starting at small scales and adapting it to the specific local context of the Churia area.

# ZUSAMMENFASSUNG

Das neue Instrument „Zahlungen für Umweltdienstleistungen für Wasserschutz (Payment for Watershed Protection Environmental Services (PWES)) erhielt in den letzten Jahren große globale Aufmerksamkeit. Sie gilt als neuer Weg, um Umweltschutz und das Management von Wasserschutzgebieten zu verbessern. PWES-Projekte beruhen auf dem so genannten „*beneficiary pays*"-Prinzip, d.h. die Nutzer von Umweltdienstleistungen zahlen die Dienstleistungsanbieter für die in Anspruch genommenen Leistungen. Während zum Konzept von PWES in Nepal relativ viel Wissen vorhanden ist, fehlt es derzeit noch an praktischen Erfahrungen.

Diese qualitative Studie wurde durchgeführt, um die Anwendbarkeit der PWES-Ansatzes zur Erhaltung von Wasserschutzgebieten in der Churia Region in Nepal zu studieren. Ein konzeptueller Rahmen wurde entwickelt und als analytischer Referenzrahmen in der ganzen Studie verwendet. Die Studie analysierte zuerst globale Erfahrungen, welche dazu beitrugen, die Erfolgsfaktoren für den Einsatz von PWS zu identifizieren. Diese Erfolgsfaktoren wurden dann mit der gegenwärtigen Situation im Churia-Einzugsgebiet verglichen, wobei sowohl Erfolgsfaktoren als auch potenzielle Problembereiche identifiziert und darauf aufbauend Empfehlungen für das Forschungsgebiet abgeleitet wurden. Die Forschung bediente sich verschiedener wissenschaftlicher Methoden wie Literaturrecherche, Interviews und der Durchführung eines Workshops.

Diese Studie kommt zu der Schlussfolgerung, dass PWES grundsätzlich im Einzugsgebiet der Region Churia anwendbar scheint. Erhöhte Nachfrage nach Umweltdienstleistungen, Bereitstellung von neuen finanziellen Ressourcen für Umweltschutz und positive Auswirkungen in anderen Sektoren stellen erfolgversprechende Rahmenbedingungen dar. Das Projekt erkannte jedoch auch einige Herausforderungen, wie zum Beispiel das Problem von Zeitverzögerungen bei der Produktion von Umweltdienstleistungen; traditionelle Landrechte und der mangelnde Wille bzw. die Möglichkeit Zahlungen zu leisten. Zusammenfassend lässt sich sagen, dass PWES ist ein komplexer Ansatz ist, der sorgfältig implementiert werden muss; es muss im Kleinen begonnen werden und es ist jedenfalls auf die spezifische Situation im Churia-Einzugsgebiet Rücksicht zu nehmen.

# ACRONYMS

| | |
|---|---|
| **CARE Nepal** | Cooperative Alliance for Relief Everywhere, Nepal |
| **CATIE** | Tropical Agriculture Research and Higher Learning Centre |
| **CFUG** | Community Forest Users' Group |
| **CVC** | Cauca Valley Corporation |
| **DADO** | District Agriculture Development Office |
| **DDC** | District Development Committee |
| **DEO** | District Education Office |
| **DFCC** | District Forest Coordination Committee |
| **DFE** | Danish Forestry Extension |
| **DFO** | District Forest Office |
| **DLSO** | District Livestock Services Office |
| **DNPWC** | Department of National Park and Wildlife Conservation |
| **DoF** | Department of Forest |
| **DSCO** | District Soil Conservation Office |
| **DWSCM** | Department of Watershed and Soil Conservation Management |
| **ESPH** | Empresa de Servicios Públicos de Heredia |
| **FAO** | Food and Agricultural Organization of the United Nation |
| **FECOFUN** | Federation of Community Forest Users of Nepal |
| **FFD** | Danish Folk High Schools Association |
| **FONAFIFO** | The National Forest Office and National Fund for Forest Financing |
| **GEF** | Global Environmental Facility |
| **GoN** | Government of Nepal |
| **HEP** | Hydroelectricity Project |
| **ICDP** | Integrated conservation and development project |
| **ICIMOD** | International Centre for Integrated Mountain Development |
| **ICMS** | Income from the Circulation of Goods and Services |
| **ICRAF** | The World Agroforestry Centre |
| **IIED** | International Institute for Environment and Development |
| **INGO** | International Non Government Organization |
| **IUCN** | IUCN - The World Conservation Union |
| **JIWAN** | Jaladh Integrated Watershed and Natural Resources Co-Management Program' |
| **MoFSC** | Ministry of Forest and Soil Conservation |
| **NEA** | Nepal Electricity Authority |
| **NGO** | Non Governmental Organization |
| **NTFP** | Non Timber Forest Products |
| **NTNC** | National Trust for Nature Conservation (Past named King Mahendra Trust for Nature Conservation, KMTNC) |
| **PES** | Payment for Environmental Services |
| **PWES** | Payment for Watershed Protection Environmental Services |
| **RUPES** | Rewarding Upland Poor for the Environmental Services They Provide |
| **SDC** | Swiss Agency for Development and Cooperation |
| **Sq. km** | Square Kilometre |
| **TNC** | The Nature Conservancy |
| **US** | United States of America |
| **VDC** | Village Development Committee |
| **WDO** | Women Development Office |
| **WUA** | Waters Users Associations |
| **WWF** | World Wide Fund for Nature |

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# 1. INTRODUCTION

## *1.1. BACKGROUND*

Lying in between two giant countries, India and China, Nepal seems to be a comparatively small country. But, it has great physical diversity ranging from the Terai plain in the south with successive hill and mountain ranges uprising toward the north reaching the World's highest mountain, Mount Everest. Roughly eighty five percent of the country's land is rugged with hills, mountains (Khanal et al., 2007) and thousands of watersheds varying greatly in size from large river basin to micro-watershed. High dependency on natural resources, rapid population growth and insufficient agricultural production led to progressive degradation of upland areas. This degradation causes adverse effects on adjoining lowlands (Singh et al., 2004). The trend of increasing hill landslides and silt loads in major rivers systems are the main indicators of serious watershed degradation.

Within this mountain landscape, the Churia Range covers 13% of Nepal's total land area (1879 sq km extends from east to west). This range is geologically fragile and prone to erosion. On the south, the Terai plain runs parallel to the Churia range. The Terai, where half the population of the country settles, is also known as the food basket of the country. High erosion rates, landslides and stream bank cutting are aggravating sedimentation. Flood hazards on downstream plains are degrading agricultural lands. Watershed deterioration in Churia is further accelerated by improper landuse practices upstream. (Singh et al., 2004)

During the beginning of watershed management in Nepal in 1966, the Department of Soil and Water Conservation (DSWC) was established under the Ministry of Forests in 1974. During 1980s, a participatory and integrated watershed management approach was implemented in large watersheds by the newly established Department of Soil Conservation and Watershed Management (DSCWM) under the new Ministry of Forest and Soil Conservation (MFSC). However in the mid-1980s, sub-watersheds were considered as the appropriate units for management. The importance of people's participation has been emphasised by the Master Plan for the Forestry Sector of 1988, and thus local people started to be actively involved in sub-watershed activities. Despite these efforts, Nepal is still struggling for effective watershed management approaches and has limited resources to reduce erosion and improve conservation. (Singh et al., 2004)

Globally, the Payment for Environmental Services (PES) approach has received considerable attention as a new way of improving environmental conservation (Wunder, 2005). PES operates under the principle of protector-receives. In such a scheme, resources are transferred from those who benefit from environmental services to those who aid nature. This approach can produce or maintain the conditions that guarantee those provisions (Rosa et al., 2003).

In the literature, different terms are used for PES by different authors (Wunder and Vargas, 2005). In some cases PES is used interchangeably with other terms such as Compensation for Environmental Services (Rosa et al., 2003), Market for Environmental Services (MES) (Shilling and Osha, 2003) and Reward for Environmental Services (Shilling and Osha, 2003). However, in other cases a clear distinction is tried to be made among these terms. MES is widely used to indicate an approach associated with economic incentives in the presence of multiple actors, choices and competition (Landell-Mills and Porras, 2002a). The term reward is used in place of payment to overtone entitlement and justice for service providers (Tomich et al., 2004). Compensation for environmental services indicates payment provision to service

providers who bear costs for supplying environmental services (Rosa et al., 2003). In this Master's Thesis, the generic term Payment for Environmental Services (PES) will be used. The Thesis will more narrowly focus on mechanisms under which those who provide environmental services are compensated for doing so, usually through payments from the beneficiaries.

Until now, the PES approach has been established for four environmental services, carbon sequestration, biodiversity protection, watershed protection and landscape beauty (Wunder, 2005). It is very difficult to separate these environmental services in practice. For example, forest protection in a watershed not only provides water related environmental services (e.g. water quality), but also increases biodiversity due to improvement in habitat of flora and fauna (Gouyon, 2003). However, this Master's Thesis focuses on Payments for Environmental Services for Watershed Protection or Payment for Watershed Protection Environmental Services (PWES).

Provision of watershed protection environmental services such as water regulation, water quality, erosion control, etc. to downstream are reduced due to mismanagement of land upstream or lack of incentives. PWES schemes compensate those who assist nature to provide watershed protection related environmental services. Those who benefit by those services make payments for these services. For example downstream water users are paying upstream farmers for adopting land uses that limit deforestation, soil erosion, flooding risks, etc.

Appreciating the opportunities of a PES approach, this Master's Thesis carries out a study on the applicability of the PES approach for watershed conservation (PWES) in the Churia region of Nepal. Since successful examples of PWES exist in other countries, the research will analyse global experiences with PWES and its likelihood to be applied in watersheds in the Churia range. The PWES approach promises to provide a great opportunity to address watershed related problems such as fund scarcity for watershed conservation or downstream watershed damages from flood and sedimentation in Churia watersheds. Furthermore, this approach assists to merge positive aspects of PWES implementation, which traditional watershed management approaches do not provide. Finally, this study will provide guidance for the application of PWES in Churia watersheds.

## 1.2. RATIONALE

Although various successes have been demonstrated in other parts of the world, PWES is a new conservation approach for Nepal. Review on watershed management strategies and approaches in Nepal done by Singh et al. (Singh et al., 2004) highlights the need of coordination between upstream and downstream. Additionally, this review recommends the development of a mechanism from which revenues generated from watershed services are to be invested proportionately in watershed management. A PWES approach has also recently been drawing the attention of policy makers and resource managers as an advantage of integrating conservation with sustainable management.

However, Nepal lacks a detailed study of the feasibility and applicability of PES in the nation's specific context. Therefore, this study will analyse global experiences to identify success factors for PES for watershed protection. Moreover, the context of Churia watersheds (in their geographical dimension, social dimension, policy dimension etc.) is explored and compared with the global experience. Consequently, the study will analyse opportunities and challenges and eventually derive recommendations for the application of PES in watersheds of the Churia area in Nepal. The study will eventually help to fill the gaps between the theoretical concept of PWES and the practical implementation in the field. At the end of the

thesis, the author will provide practical recommendations for the design of PWES schemes for conservation organizations in Nepal.

## 1.3. OBJECTIVE

The objective of this research study is to analyse the applicability of PWES for the conservation of watersheds in the Churia Region of Nepal. This study assesses the global experience of PWES implementation; identifies success factors for effective PWES implementation; compares these success factors with the context of Churia watersheds; and develops a possible PWES framework for Churia watersheds.

Thus, the Master's Thesis will answer the following research question:

**'How can the instrument of 'Payments for Watershed Protection Environmental Services' (PWES) be applied to the conservation of watersheds in the Churia region of Nepal?'**

This study will provide an overview of concepts, experiences and perspectives based on global experience. The comparison of global success factor for PWES implementation with the Churia watershed context will ensure a realistic evaluation of the feasibility and provide different design options for implementing PWES. Recommendations will give direction to policy makers and planners, who aim towards integrating environmental conservation with the economical development of the community through natural resource management.

Various international organizations such as WWF, CARE and IUCN, who are working with a number of local partner organizations in Nepal on introducing PWES approaches in Nepal, will hopefully benefit from this study. This study will provide direction for the implementation of PWES schemes to these organizations. Finally, the study will also recommend further areas of research.

## 1.4. THESIS STRUCTURE

This Master's Thesis consists of seven chapters. Following this '**Introduction**', the second chapter describes the **'Methodology'** and methods used for carrying out this research. The third chapter describes the **'Conceptual Framework'** and provides the theoretical background or lens for the research study. The forth chapter '**Analysis of Global Experience**', first provides information on organizations working with the PWES approach and gives some PWES examples. Then, experiences with PWES schemes in the different parts of the world are analyzed and success factors for PWES implementation are identified. Advantages, critiques and difficulties are also discussed in this forth chapter. The fifth chapter '**Research Area**' provides a description about the study area – the Churia region of Nepal. The sixth chapter '**Research Results and Discussion**' presents results in the following logical and progressive sequence in the form of sub-chapters:

- ***Current status of PES in Nepal:*** The knowledge about and the understandings of the PES concept among experts of Nepal are discussed. Furthermore, organizations working in Nepal with this concept are also illustrated.

- ***Relevant Factors of PWES:*** Using the conceptual framework as a lens, relevant factors for PWES in the Churia watersheds are studied. This study explores the context of the Churia watersheds in six dimensions - environmental services, geographical dimension, landuse dimension, social dimension, PWES schemes and legal dimension.

- ***Relevance of Global Success Factors:*** The above discussed context of the Churia watersheds is compared with factors crucial for the successful implementation of PWES (described in chapter four). This comparison identifies overlays and gaps between these success factors identified from global experience and the context of Churia watersheds.

- ***Opportunities and Challenges:*** The previous comparative analysis assists in the exploration of opportunities and challenges for the implementation of PWES schemes in Churia watersheds. Opportunities to be utilized and challenges to be overcome are presented in two separate sections.

- ***Recommendations:*** Furthermore, based on the findings of the previous chapters, some recommendations are developed. These recommendations provide one major outcome of the whole research process.

Finally, the sixth chapter, **'Final Conclusions'** summarizes the study and provides concluding remarks about the entire research study.

# 2. METHODOLOGY

As stated in Kothari (2002), research is done to gain familiarity with or to achieve new insights into a subject. This research study 'Applicability of the instrument of 'Payment for Watershed Protection Environmental Services' (PWES) for the Conservation of Watersheds in the Churia Region of Nepal' is oriented to get insights into the PWES approach. It is *applied research*, which explores the applicability of PWES for the conservation of Churia watersheds. According to Neuman (2006), exploratory research gives major emphasis on the discovery of ideas. Exploratory research studies the little understood issues to develop preliminary ideas with creativity and an open mind adopting an investigative stance. Since the concept of PWES is relatively new in Nepal, this research study is *exploratory* and *descriptive*. It explores PWES and gives a detailed picture of its applicability in Churia watersheds.

## 2.1. RESEARCH METHODOLOGY

Scientists from different disciplines (e.g. economics, environmental science) contributed to the development of a theoretical understanding of the PWES concept. Simultaneously, practitioners worldwide have gained practical experience by implementing PWES schemes in different countries. The approach of this research study is to build on PWES theory and global experience and assess the feasibility of PWES in the context of watersheds in the Churia region. The conceptual representation of this study is presented in Figure 1.

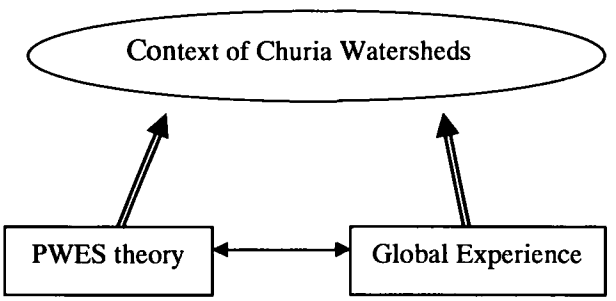


**Figure 1: Conceptual Representation of the Study**

Systematic steps are adopted to carry out this study scientifically which is presented logically below:

1. Concept of PWES and its working definition was developed for the clear understanding in the beginning of the study.
2. The global experience in PWES schemes was reviewed identifying the success factors for PWES schemes implementation.
3. The Context of Churia watershed in Nepal was analysed and PWES framework is prepared for Churia watersheds
4. The context of Churia watersheds was compared with previously identified success factor for PWES schemes implementation.
5. Finally, the comparative study with global experience drew up opportunities, challenges and recommendations for successful PWES implementation to conserve Churia watersheds of Nepal.

## 2.2. TOOLS AND METHODS

This research study uses a qualitative approach since it is concerned with a subjective assessment. The methods and tools used in this study are:

### 2.2.1. Literature Review

Literature review is one of the methods used in this research to seek information and critical appraise the theoretical concept and global experience of PWES. Gouyon (2003) pointed out that a review of the experience from PWES schemes in different countries is useful before developing new schemes. Various books, articles from journals, reports and publications of various organizations, and reports prepared by researchers with experience of PWES scheme in different countries are reviewed and synthesized in the third chapter 'Conceptual Framework' and the fourth chapter 'Analysis of Global Experience'. Furthermore, various publications of the Government of Nepal, local governments, national and international non-governmental organizations in Nepal, and magazines and journals published with context of Nepal are reviewed to obtain adequate information for this study.

### 2.2.2. Expert Interviews

Interviews are an appropriate tool to capture information about people's personal experiences, their perception and thoughts (Weiss, 1994). Therefore, personal interviews have been adopted as a method for an intensive investigation of the current context of Churia watersheds (esp. in the sixth chapter 'Research Results and Discussion'). PES experts in Nepal have been interviewed personally using a set of predetermined open-ended questions. The interview guideline is presented in annex 1. The interview guideline was used in a flexible way, i.e. the interviewer allowed some freedom to change the sequence of questions, omit certain questions and add supplementary questions if the interview situation required to do so. The interviews were recorded with the agreement of interviewees in order to avoid losing information. For this study, 18 interviews with experts from different fields such as hydrology, environmental science, geology and watershed management were taken. These experts are either employed by the government (e.g. Ministry of Forest and Soil Conservation, Tribhuwan University, Department of Watershed and Soil Conservation, Ministry of Environment, Science and Technology, and Department of Electricity Development) or by non-government organizations (NGOs e.g. WWF Nepal, ICIMOD, Winrock International, National Trust for Nature Conservation, CARE Nepal, Nepal Water Conservation Foundation, Biodiversity Sectoral Programme) in Nepal.

### 2.2.3. National Level Sharing Workshop

A 'National Level Sharing Workshop' was organized with the joint assistance of CARE Nepal and IUCN Nepal in Kathmandu. Participants of the workshop were representatives from different ministries and departments, journalists and non-governmental organizations. The PWES framework (See fig 2), which was prepared based on a first summary and synthesis of the interviews was presented in this 'National Level Sharing Workshop'. Likewise, the comparative study of global success factor for PWES scheme with Churia watershed context, along with opportunity and challenges for implementation of PWES were presented in the workshop. The comments and suggestion provoked by the presentations were collected, analysed and integrated into this thesis.

## 2.3. JUSTIFICATION

A qualitative research approach provides an opportunity to achieve in-depth information and examples, explanations and discussion (Weiss, 1994). Therefore, a qualitative research methodology was adopted for this study.

The review of national and international literature helped to provide a clear concept about PWES and assisted to develop the conceptual framework for the research. Furthermore, this method aided to collect critical arguments from experienced experts working in this field worldwide.

PWES is a broad approach, which links ecological aspects with economic and social aspects within watersheds. Therefore, to obtain more information in greater depth within a limited time period, methods such as personal interviews and workshops seemed to be more convincing. Additionally, interviews with experts and workshops also help to integrate multiple perspectives in this research study.

Thus, the methodology chosen and methods provided systematize effort to achieve the objective of this study.

## 2.4. PROBLEMS ENCOUNTERED

There are only few experts with adequate knowledge in PWES in Nepal. Furthermore, those experts are not easily approachable for interviews within a limited time period because of different locations of the experts. Hence, the research study included only a limited number of experts for interviews.

These research findings came from a broad range of experience from different countries. Therefore, it required reviews of a large amount and diverse range of literature, which has been a time consuming task.

The volatile political situation of Nepal has been another problem during the field study and has hampered the interviews and workshop as planned. The date of workshop had to be postponed twice in order to avoid bandas or 'vehicle stoppage strikes' in Kathmandu.

# 3. CONCEPTUAL FRAMEWORK

In this chapter, the conceptual framework is described which forms the theoretical foundation for this study. This framework, presented diagrammatically below in Figure 2, consists of six dimensions: environmental services, geographical dimension, landuse dimension, social dimension, PWES scheme and policy dimension. The following graphic includes an overview of the theoretical aspects of the conceptual framework as well as some specific example of the research context, the Churia watersheds. These specific examples will be explained in further detail throughout the thesis.

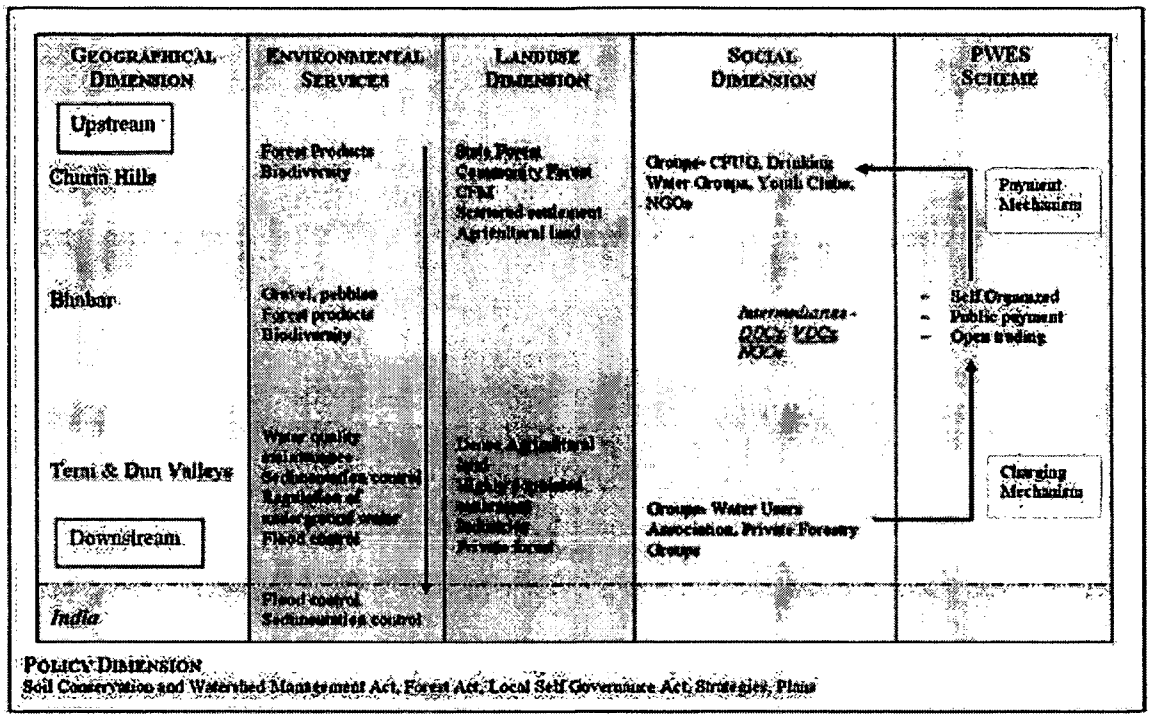


**Figure 2: Conceptual Framework of PWES with Example of Churia Watersheds**

*1. Environmental services*: The services provided to the benefit of human societies by natural ecosystems are called environmental services and include services such as clean water, timber, habitat for fisheries and flood control etc. (ESA, 2000).

*2. Geographical dimension*: These environmental services are sometimes stationary (i.e. they can be consumed in the same place as they were produced). However, sometimes the place of production and the place of consumption of environmental services do not coincide. Especially water-related environmental services are often flowing from the point of production to a distant point of consumption disregarding the political boundaries created by humans. The doted line in the Figure 3 above shows this aspect.

*3. Landuse dimension*: Human activities can modify the various flows of environmental services from upstream to downstream through landuse, for example conversion of forest into agricultural land influences the hydrological flow in watersheds. Therefore, landuse development should be considered as a key factor for the sustainable provision of environmental services. (Daily et al., 2002)

*4. **Social dimension***: Landuse and its changes are induced by social systems of humans to meet their rapidly growing demands (Millennium Ecosystem Assessment, 2005b). Additionally, communities develop various forms of social organization to manage natural resources in watersheds (e.g. community forestry, irrigation systems). These factors are summarized in the social dimension in this thesis.

*5. **PWES scheme***: The failure of society to compensate upstream land users is seen as a key contributory factor for rapid change in landuse damaging the environment (Pagiola et al. 2005 in Duncan, 2006). In such a case, additional incentives for landuse can encourage land users to maintain and restore natural ecosystems so that the provision of environmental services continues (Duncan, 2006). This can be executed through various arrangements that transfer incentives from downstream residents, who benefit from a specific environmental service to upstream land users who conserve, restore, and manage the natural ecosystem and provide these services (Wunder, 2005). Such a system of transfers is referred to as the PWES scheme in this thesis and is shown by the double line in the diagram above.

*6. **Policy dimension***: In broader terms, policies have effects on planning and management decision in watersheds (Emerton and Iftikhar, 2006a). Thus, different regulatory and other policy-related drivers (e.g. land rights, forest law) also influence PWES scheme (Landell-Mills and Porras, 2002a) and are summarized as policy dimension throughout the thesis.

This theoretical framework will be used for the purpose of describing the geographical context and the practical aspects of PWES throughout the thesis and is therefore described in detail below.

## 3.1. ENVIRONMENTAL SERVICES

Humans benefit from ecosystems and their life depends on the services provided by these ecosystems (Duncan, 2006). Such services are acknowledged as ecosystem services (or environmental services) according to the Millennium Ecosystem Assessment. However, there is no well accepted and agreed on definition on environmental services (Rosa et al., 2003). The term "environmental services" was first used in 1970 to describe benefits received from well-functioning ecosystems such as food, pest control, flood control, climate regulation, and recreation (SCEP, 1970 in Meyerson et al., 2005).

The Millennium Ecosystem Assessment (2005) has outlined four types of ecosystem goods and services which include (i) provisioning services, such as food and water; (ii) regulating services, such as water regulation and disease control; (iii) cultural services, such as recreational, spiritual, religious and other non-material benefits; and (iv) supporting services, i.e. services that support the whole system, such as soil formation and nutrient cycling.

Figure 3 shows this categorization of ecosystem services and their linkages.

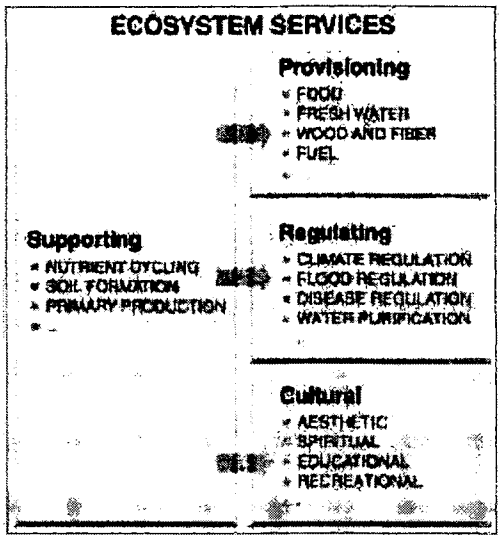


**Figure 3: Types of Environmental Services**
Source: Adapted from Millennium Ecosystem Assessment (2005b)

Clean and adequate water is the most basic requirement for human survival. It is also currently one of the most challenging topics on the sustainable development agenda (Emerton and Bos, 2004). Therefore, hydrological services from watersheds are one of the most valuable among the wide range of ecosystem services (Johnson et al., 2001 in Verweij, 2002). Examples of environmental services from watershed protection are (Johnson et al., 2000; Pagiola and Platais, 2002; Powell et al., 2002):

- *Hydrological benefits and services:* water-flow regulation, water quality maintenance or improvement, water table regulation and improvement in water recharge, water quantity, land salinisation reduction
- *Erosion and sedimentation control:* avoiding damage to downstream reservoirs and waterways and so safeguarding uses such as hydroelectric power generation, irrigation, recreation, fisheries, and domestic water supplies
- *Disaster prevention:* preventing floods and landslides
- *Maintenance of aquatic habitat:* aquatic productivity, fish habitat
- *Biodiversity conservation:* increase in diversity of flora and fauna, habitat conservation of fauna

## 3.2. GEOGRAPHICAL DIMENSION

In the context of watersheds, the modification of landuse upstream affects the availability of watershed environmental services downstream. The upstream population, who cultivate the land are called 'service providers' while downstream populations who benefit from these services by upstream landuse are called 'beneficiaries' (Landell-Mills and Porras, 2002a). Within an implemented PWES scheme, these service providers become 'sellers' and beneficiaries 'buyers' (Landell-Mills and Porras, 2002a; Wunder, 2005). Beneficiaries from watershed environmental services can be identified at various scales within the geographical dimension i.e. local (e.g. micro-watershed), national (e.g. river basin) or international (Mayrand and Paquin, 2004). The above mentioned nomenclature will be used throughout this study for consistency.

As shown in the example in Figure 4, there can be a series of service providers supplying benefits to beneficiaries. The uppermost forestland filters water flowing to farmland downstream. The farmers graze cattle on the bank of the stream, which flows to the reservoir. Here farmers can be both beneficiaries as they are benefited by erosion control from upland

forest and service providers as vegetation on the farmland help to improve the water purification through a reduction in siltation in a reservoir downstream. Thus, downstream population nearby a reservoir benefits from the activities at upstream - forest and farmland – in the form of clean drinking water. Therefore, service providers and beneficiaries are relative terms. (Salzman, 2005)

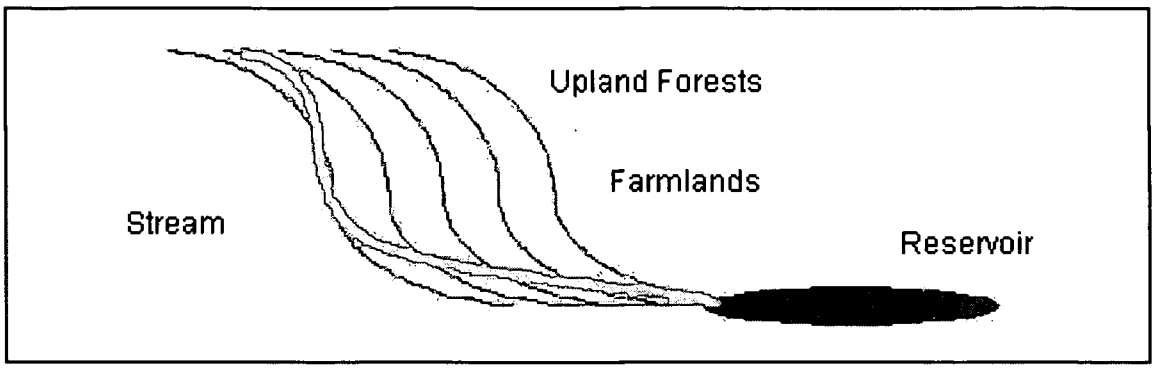


**Figure 4: Water Flow in Watershed Catchments**
Source: Salzman (2005: 10)

In certain cases, beneficiaries of environmental services may be ***well defined,*** for example if they benefit directly. An example would be a company for bottled mineral water that reaps direct benefits from watershed conservation services resulting from for example agro-forestry practices upstream. While in other cases, beneficiaries may be ***loosely defined,*** such as in the case where they obtain benefits indirectly and at different degrees. An example for this case would be a situation where the whole population and all industries in the downstream area enjoy good water quality resulting from upstream land users refraining from intensive cultivation (Gouyon, 2003).

The trade of environmental services in a specific PWES scheme can be local, state-wide, provincial, national, regional or even international depending on size and location of a watershed (Landell-Mills and Porras, 2002a). In addition, the scale of a scheme depends on the considered goods for trade. Some environmental services are concentrated at the ***local scale*** (e.g. sedimentation control) while others such as landscape beauty are available at ***national scale.*** Environmental services, such as carbon sequestration, can benefit not only people at local and national scale, but also at ***international*** or global scale (Gutman, 2003; Gutman, 2006). Thus, the monitoring of flows of environmental services in the geographical dimension can help to identify the beneficiaries and the scales for a new PWES scheme (Jack et al., 2007; Meyerson et al., 2005).

## 3.3. LANDUSE DIMENSION

In principle, ecosystems function and sustain themselves and provide a flow of environmental services even in the absence of human interference (WWAP, 2006). For example, primary untouched forest at upstream can avoid erosion and siltation downstream.

However, in most present ecosystems, land use practices of rural upland populations can have a significant effect on soil conservation and water cycles (Gouyon, 2003). Diverse land uses such as forests, wetlands, pastures, different types of farming, human settlements, etc. coexist in a complex mosaic of natural and intervened ecosystems where rural communities seek their livelihood in a rural space (Rosa et al., 2003). The interference of humans such as landuse changes, urban development and river diversion generally disrupts the natural pattern and rhythm of natural processes (WWAP, 2006).

These different landuse patterns and their interactions may result in positive or negative impacts on the capacity of ecosystems to generate environmental services (Rosa et al., 2003). Landuse in upstream of watershed catchments not only affects the land users themselves but their decisions also influence the allocation and use of environmental services downstream through for example hydrological processes (Tognetti, 2001).

As these hydrological processes are extremely complex and sometimes counterintuitive, a analysis of the cause-effect linkages needs to be conducted carefully (Chomitz et al., 1999). Linkages in processes are difficult to establish, because impacts depend on interactions among a large number of land uses including the vegetation and geological characteristics that occur over a range of different spatial and temporal scales (Aylward and Tognetti, 2002). As a consequence of the complexity of these hydrological linkages, controversies about linkages between types of land uses and the provision of environmental services continuously arise (Gouyon, 2003).

Upstream land users are usually less interested in landuse oriented towards conservation and sustainable management (e.g. forest conservation or conservation farming) because they receive less benefits from them compared to alternative land uses (e.g. intensive agriculture or commercial forestry) (Pagiola et al., 2005). In such a case, the interests of downstream beneficiaries and upstream land users may be misaligned (Millennium Ecosystem Assessment, 2005b). Such differences in interest can provide the basis for the establishment of PWES schemes in which upstream land users are paid to adopt land uses, which provide environmental services to downstream (FAO, 2004b).

This demonstrates the scientific importance of well identified cause and effect relationships between the land use that generates the service, the service itself, and the change over time to increase the production of required environmental services (Johnson et al., 2000; Rosa et al., 2003).

All stakeholders, service providers, beneficiaries, intermediaries, technical experts should agree on and realize the biophysical linkages between different land uses and environmental service benefits before establishing a PWES scheme. These linkages are the basis for the implementation of PWES schemes. However, establishing these scientific linkages can be costly and time consuming and demands trained individuals. Therefore, in watersheds with a high degree of trust between buyers and service providers and outcomes of landuse change are easily observable, the scientific proof of landuse and environmental services linkages may be less important (FAO, 2004a; Mayrand and Paquin, 2004; Scherr et al., 2006).

## 3.4. SOCIAL DIMENSION

Decision-making and social behaviour related to landuse of upstream populations influences the generation and maintenance of different environmental services downstream and hence the opportunities of downstream populations in ecological, economic and social terms (Rowcroft, 2005). According to Rosa et al. (2003), not only the upstream landuse activities, but also the use of the environmental services by downstream users generally depend on the interests and visions of the different stakeholders. Therefore, generating and conserving environmental services demands social capital in order to coordinate and harmonize the different stakeholders and to be able to manage issues of distribution and conflicts that arise within the communities.

The capacity of communities to organize themselves as well as the ability to secure resources (knowledge, collective action, market access, etc.) as the result of their belonging to social networks and other social structures is referred to as ***social capital***. The capacity of

communities to use their organizational structure to discuss, agree, implement and monitor actions and activities among its members (***social organization***); and the quality and density of its external social network employed for receiving support and resources to achieve community goals are the two key dimensions of social capital. These social organizations and external linkages influence especially the rules, which are developed during the implementation of PWES schemes. (Rosa et al., 2003)

The development of PWES schemes can be started either by the beneficiaries or by the suppliers or even by third institutions, called intermediaries, that facilitate the development of schemes (Johnson et al., 2000). Governments and NGOs usually play a critically important role as intermediaries, initiating the debate on the environmental service cost and establishing linkages between service providers and beneficiaries (Johnson et al., 2000). In many cases, new institutions ranging from private sector organisations to public entities facilitate and establish PWES schemes and can help in financing, verification, monitoring and capacity building (Powell et al., 2002). Social organization in upstream and downstream is also needed for negotiation with these intermediaries for the trade of environmental services (Rosa et al., 2003).

## 3.5. PWES SCHEME

The basic principle behind the PWES approach is that resource users that are in the position to provide environmental services should be compensated for their cost of provision, while those who benefit from those services should pay for them, internalizing those received benefits (Pagiola and Platais, 2002). From this perspective, PWES is an approach that mirrors the "beneficiary pays" principle by creating positive incentives to environmental conservation (Mayrand and Paquin, 2004; Pagiola 2004 in Warner et al., 2004)

The features of PWES can be distinguished from other conservation approaches according to the degree to which they rely on economic incentives and the extent to which conservation is targeted (see Figure 5). Command-and-control approaches use legal instruments and prohibit environmentally damaging uses, create strictly protected areas or support other interventions directly targeted to resource protection. Approaches such as sustainable forest management (SFM) and similar resource-use improvements directly pursue conservation by influencing production and extraction. Integrated conservation and development (ICDP) approaches are less directed towards conservation as they integrate conservation with development concerns such as poverty reduction. All these approaches require investments for carrying out activities. (Wunder, 2006)

In contrast to these approaches, a PWES approach should, in principle, generate sufficient internal and sustainable flows for day to day operational management of the scheme - independent of external funding sources. However in many cases, funding is required to start up and establish specific PWES scheme due to high investment costs.

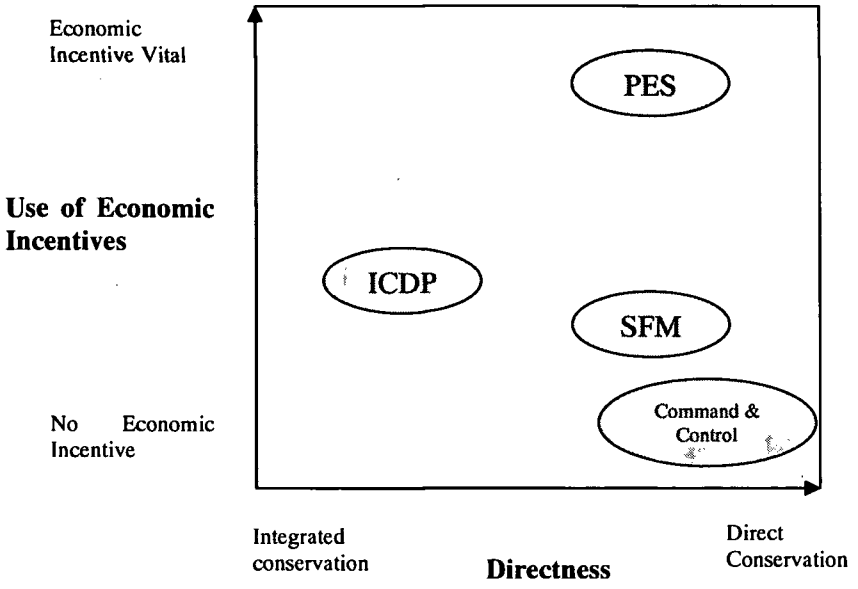


**Figure 5: Comparing PES to Other Approaches**
Source: Adapted from Wunder (2006: 3)

### 3.5.1. Theoretical Perspective

According to Shilling and Osha (2003), economic theory characterizes goods on the basis of two basic features: (i) *rivalry,* i.e. a good is said to be rival when one uses a good and the good is no longer available for others; it is said to be non-rival if consumption by one person does not prevent other persons from also benefiting from the good; and (ii) *exclusion,* i.e. a good is said to be exclusive when others can be prevented from having access to the good; it is said to be non-exclusive if others cannot be prevented from having access. Goods that lack rivalry and exclusion are called public goods and goods that are rival and exclusive are called private goods. Table 1 shows different goods that fall in between the two extremes- public and private goods.

| | **Non Exclusive** | **Exclusive** |
|---|---|---|
| **Non rival** | Public goods | Sovereign resources |
| **Rival** | Common Pool Resources | Private goods |

**Table 1: Classification of Goods**
Source: Adapted from Aylward 1992 in Barbier et al. (1994: 168)

Shilling and Osha (2003) describe environmental services as having - to a greater or lesser extend - the properties of public goods. Ostrom et al. (1994) (cited in Tognetti, 2001) put environmental services into the category of 'common pool resource' because of the difficulty to exclude free-riders from obtaining benefits from environmental services. Additionally, decisions about their consumption can increase or decrease its availability to others such as water quantity. Therefore, it can be concluded that the environmental services can either be a public good or a common pool resource depending on the environmental services considered.

The concept of environmental services is associated with positive externalities from an economic perspective. Benefits not acquired by producers and obtained by others but not captured in normal market transaction are positive externalities (Mayrand and Paquin, 2004; Rosa et al., 2003; Shilling and Osha, 2003). Positive externalities can also be described as uncompensated benefits, e.g. positive externalities associated with forest protection include erosion control, reduced risk of flooding downstream and water quality maintenance

(Rowcroft, 2005). From an economic perspective, the term PWES refers to the approach that internalizes external benefits and follows the principle that people who benefit form the consumption of environmental services should compensate those who make it possible to generate environmental services (Rosa et al., 2003).

The PWES approach is partially a market-based approach because buyers and sellers do in many cases not come together to trade voluntarily as in a perfect market e.g. municipality increase water supply price to water users in order to pay upstream land users for conserving forests (Gutman, 2003). To rectify such market imperfections, external interventions ranging from command-and-control legislation (e.g. Clean Air Act) to creative instruments that use market incentives (e.g. creation of $SO_2$ permits) are applied in PWES schemes (Shilling and Osha, 2003).

In PWES schemes, payments provided to service providers must ensure that the net benefits from one landuse are at least equal or greater than those derived from an alternative land use (Duncan, 2006; FAO, 2004a). In economic theory, such benefits from alternative landuse are called *opportunity costs*. Figure 6 illustrates the interactions between downstream benefits and upstream opportunity costs.

A scheme is likely to be effective when downstream benefits are high and upstream opportunity costs are low. It is possible, but difficult to implement a PWES scheme when both downstream benefits and upstream opportunity costs are high since margins will be small. If both downstream benefits and upstream opportunity costs are low, PWES can be created but will hardly be effective. Where upstream opportunity costs are high and downstream benefits are low, PWES is not feasible. (Pagiola et al., 2002)

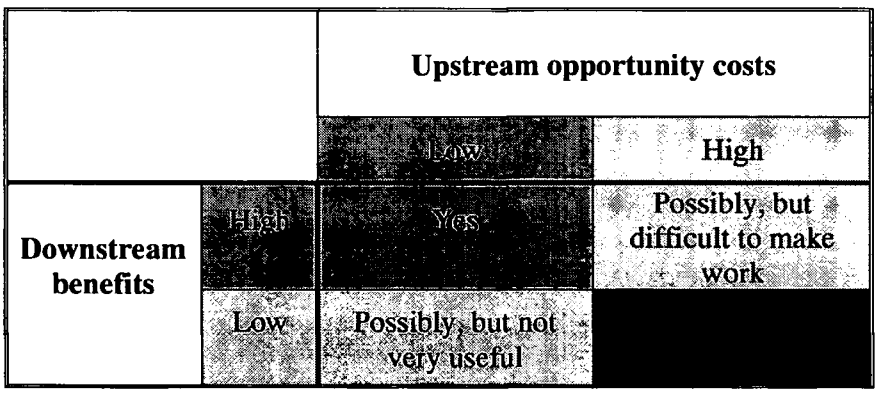


**Figure 6: Applicability of PWES**
Source: Pagiola and Platais (2005: 55)

Similarly, payments must be less than the value of benefits to downstream populations otherwise they would not be willing to pay for it. This aspect is referred to as *willingness-to-pay* in economics (Mayrand and Paquin, 2004; Pagiola et al., 2005).

### 3.5.2. Practical Perspective

Upstream land users can enhance the flow of environmental services to downstream beneficiaries through adopting environmentally benign land uses. However, such land uses usually gives fewer benefits to upstream land users than other alternative land uses. Therefore, upstream land users tend to adopt a type of landuse that provides more benefits for them resulting in higher costs for the downstream population. Payments by downstream

beneficiaries can help to make conservation attractive to upstream land users. This is the practical basis for PWES implementation. (Pagiola et al., 2005)

PWES can be clearly described through graphical presentation (see Figure 7). Deforestation upstream imposes costs to downstream people, who are deprived of environmental services such as water filtration, soil conservation. In many cases, implementation of conservation programs at upstream reduces the benefit to upstream land managers. Therefore, they are reluctant to implement such programs. Payments by downstream beneficiaries to upstream land users can help make conservation a more attractive option for land users. However, payments must obviously be more than the additional benefit of the alternative land use to land managers and less than the value of the benefit to downstream populations. (Pagiola and Platais, 2002)

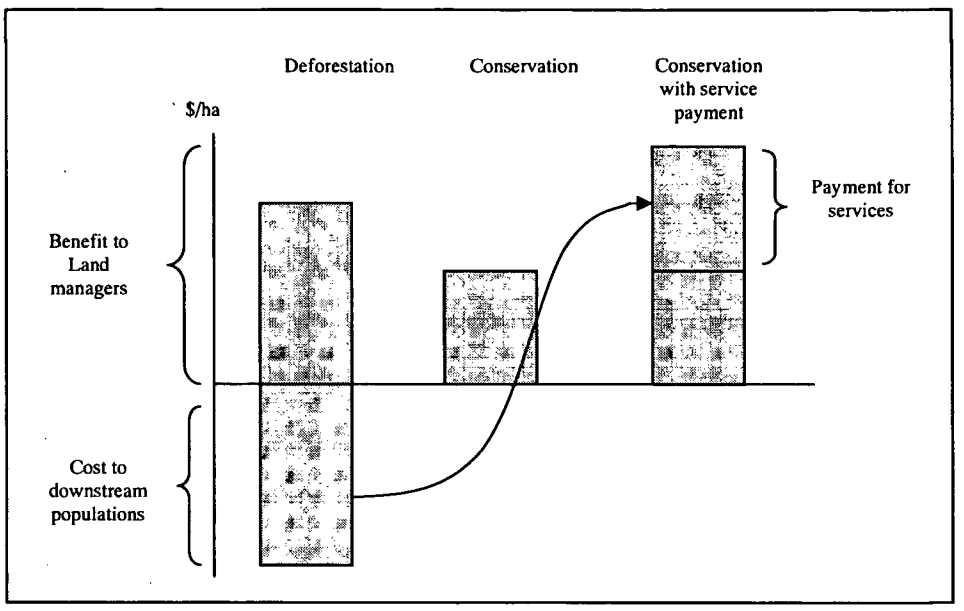


**Figure 7: Graphical Representation of Logic behind PES**
Source: Adapted from Pagiola and Platais (2002:2)

Compared to the theoretical perspective, in practice the specific level of payment, which encourages service providers to provide a specific service is decided through a trial and error process based on political or business negotiations (Johnson et al., 2000). In practice, the beneficiaries' willingness to pay depends on their confidence that the payment flow is actually ensuring the maintenance or enhancement of environmental services (Johnson et al., 2000). Therefore, a balance is needed between the maximum payments that beneficiaries are willing to provide and the minimum payments that will ensure the provision of services by land users (Mayrand and Paquin, 2004).

Where payments are insufficient to compensate for the opportunity costs, service providers may lose the interest in land uses producing the required environmental services (e.g. in Costa Rica, land users did not enrol in PWES schemes since they obtain high revenues from other productive land use) (Mayrand and Paquin, 2004). This is more likely to happen where the payment level is determined administratively or through political negotiation, rather than on the basis of cost-benefit analysis (Gutman, 2003). Therefore, the level of payments must be high enough to cover the costs of implementing new land use practices and the opportunity costs of foregone land uses (Mayrand and Paquin, 2004).

The implementation of PWES schemes is impossible without sellers able to deliver environmental services and buyers financially able to pay for it (Powell et al., 2002). Usually beneficiaries may not show the willingness to pay for those services considering they have rights on those services as traditional users (Powell et al., 2002).

There can be different methods to obtain environmental services. For example installation of water filters instead of forest protection to improve water quality. Therefore, the cost of desirable environmental services provision by service providers should be lower than other possible alternatives methods of obtaining those services (Jack et al., 2007).

Beneficiaries can make their payments in various forms. They can use tax systems, a fraction of existing users' fees or raise additional fees for payment for environmental services. Service providers on the other hand can get payments in terms of cash (e.g. subsidies, transfer payments, certificates, credits) or in-kind (e.g. technical assistance, equipments) (Perrot-Maître and Davis, 2001).

## 3.6. POLICY DIMENSION

Laws and policies can be important drivers influencing the success of PWES schemes through specific rules, frameworks and compensation mechanisms (Landell-Mills and Porras, 2002a; Rosa et al., 2003). Although specific policies are usually not required for the implementation of PWES schemes, the recognition of PWES as an instrument in the legislation may facilitate the dissemination and implementation of the schemes (FAO, 2004a).

Richardson (1982) defined policies as the reflection of a government's approach to problem solving and its relationship to other actors in the policy-making and implementing process (Bemelmans-Videc et al., 1998). According to FAO (2004a), governments can assist the implementation of PWES schemes through the establishment of policy and regulatory frameworks. Such frameworks can for example properly regulate the implementation of PWES schemes or the level of payments has to be based on technical studies and agreements between relevant actors. Furthermore, the government can play the role of a regulator in order to avoid wrongdoing in the trade of environmental services in schemes. One key role of the government in this aspect is to insure property rights through laws (Rosa et al., 2003).

The lack of ***property rights*** can be one obstacle to the implementation of PWES schemes as they determine the use and control over natural resources (Rosa et al., 2003). In many cases, payments to service providers can fail due to the absence of property rights and other legal means to channel these payments (Rowcroft, 2005).

One important point to be noted is that if policies are not in favour of poor and rural communities, PWES schemes can generate and enhance inequities and social exclusion. Capacity building and participation of poor and rural communities in rule-making processes is therefore a very critical factor (Rosa et al., 2003).

In conclusion, the policies favouring PWES and supporting the allocation of rights as well as public attitude toward fairness and equity determine the successful implementation of PWES schemes (Johnson et al., 2000).

# 4. ANALYSIS OF GLOBAL PWES EXPERIENCE

This chapter is divided into four subchapters, which are based on a literature review of global experiences in PWES. The first subchapter provides information about key organizations working on PWES and some examples of PWES schemes in different countries. The second subchapter gives an overview of global experiences, followed by a third subchapter throwing some light on the lesson learnt from those experiences. The final fourth chapter describes factors important for the successful implementation of PWES.

## 4.1. KEY ORGANIZATIONS AND EXAMPLES

Realizing the potential of PWES to encourage and finance conservation efforts, several schemes are running in different countries worldwide involving governments, business, government aid agencies, and non-governmental organizations. Some well known NGOs, governmental and aid agencies and other organizations involved in PWES are listed in Box 1 (Duncan, 2006):

**Box 1: NGOs, INGOs, and Government and Aid Agencies Involved in PES schemes**

- CARE
- Center for International Forestry Research (CIFOR)
- Centro Agronómico Tropical de Investigación y Enseñanza (CATIE)
- Conservation International (CI)
- Danish International Development Agency (DANIDA)
- Directorate-General for International Cooperation (DGIS) of the Netherlands Ministry of Foreign Affairs
- Edinburgh Centre for Carbon Management
- Forest Trends
- Global Environment Facility (GEF)
- German Technical Cooperation (GTZ)
- Inter-American Development Bank (IDB)
- International Fund for Agricultural Development (IFAD)
- International Institute for Environment and Development (IIED)
- IUCN–The World Conservation Union
- Katoomba Group
- Rewarding the Upland Poor in Asia for Environmental Services They Provide (RUPES)
- The Nature Conservancy (TNC)
- United Kingdom Department for International Development, Forestry Research Programme (DFID)
- United Nations Environment Programme (UNEP)
- United Nations Food and Agriculture Organization (FAO)
- Wildlife Conservation Society (WCS)
- Winrock International
- World Agroforestry Centre (ICRAF)
- The World Bank
- WWF

Source: Duncan (2006: 4)

Below is a detailed description of key organizations, selected from the above box:

**1. International Institute for Environment and Development (IIED)** is a non-profit research institute, which runs an "Environmental Economics Programme" seeking to develop and promote the application of economics to environmental issues in developing countries (IIED, 2005a). Within that programme, it implements different projects concerned with marketing of watershed and other environmental services. The programme covers countries like the Philippines, Brazil, Costa Rica, Ecuador, Bolivia etc. (IIED, 2005b).

**2. World Wild Fund for Nature (WWF)**, one of the world's largest and most experienced independent conservation organizations, is also working with PWES schemes aiming to balance poverty reduction with conservation, social justice and equity (WWF, 2007a). In partnership with other organization, like CARE and IIED, it has work experience in countries like Guatemala, Tanzania, the Philippines, Peru, Indonesia and eastern European countries such as Bulgaria, Moldova, Romania and Ukraine (Duncan, 2006).

**3. The Nature Conservancy (TNC)** is a conservation organization working around the world for nature conservation. PES including other work approaches are part of its central set of strategies (The Nature Conservancy, 2005). Examples of recent projects can be found in Mexico, Honduras, Ecuador, and Sierra de la Minas, Guatemala. (Grain, 2005)

**4. IUCN - The World Conservation Union** is a union of members from government agencies, state members, national and international NGOs (IUCN, 2007b) that are concerned with species loss and ecosystem integrity. IUCN emphasizes sharing of knowledge about incentive and financing mechanisms to support effective biodiversity conservation and integrating social, economic and environmental aims. (IUCN, 2007a)

**5. The World Agroforestry Centre (ICRAF)** is an international research centre and it's South East Asia Regional Office hosts a PES programme named "Rewarding the Upland Poor for Environmental Services" (RUPES). The goal of RUPES is "to enhance livelihoods and reduce poverty of the upland poor while supporting environmental conservation at local and global levels." RUPES has six action research sites (two in the Philippines, one in Nepal, and three in Indonesia). It also works in other south eastern countries like in India, Vietnam, Thailand, and China. (RUPES, 2007)

**6. The World Bank** is a market-based non-profit organization, using its high credit rating to make up for the low interest rate of loans. Consisting 185 member countries as shareholders, it focus its activities on the reduction of global poverty and implementation of sustainable development. (Wikipedia, 2007b) It has a policy of promoting PES around the world through IFC, the International Finance Cooperation (The World Bank, 2007). It is also working with several countries like Costa Rica, Columbia, Mexico to develop PES systems to ensure the maintenance of environmental services (Pagiola and Platais, 2002).

**7. United Nations Food and Agriculture Organization (FAO)** is a specialized agency of the United Nations that leads international efforts to defeat hunger. The FAO also helps developing countries improve agriculture and forestry to ensure food security. FAO is also a source of knowledge and information. (FAO, 2007) The FAO has published several documents regarding PES.

**8. Tropical Agriculture Research and Higher Learning Centre (CATIE)** is academic and technical research centre based in Costa Rica. This centre is dedicated to improve the standard of living of rural families in the American tropics embracing a holistic vision of human activity and its environment (CATIE, 2007). It provides technical support to different projects that include PES. The institute has also created a "Group on the Socio-economy of Environmental Services" dedicated to research and teaching on this topic.

**9. Others**: Support also comes from various regional banks, foundations like Ford, Rockefeller and Summit, and business organizations like the Ford Motor Company, American Electric Power (Grain, 2005) and Coca Cola (WWF, 2007b). Many intergovernmental agencies are also involved, such as the United Nations Environment Programme and the United Nations Development Programme (Grain, 2005).

Many cases of PWES schemes have already been implemented globally but most of the implemented cases are only in an initial phase. Therefore, it is unrealistic to have full evaluations of their effectiveness (Rowcroft, 2005). However, there are some PWES schemes, which are models in themselves. The most important are presented below (see Perrot-Maître and Davis, 2001 for detail and more examples):

- One of the most often cited examples in the literature is the PWES scheme of Costa Rica. The payment is made by Energía Global, a private hydroelectric company located in the Sarapiqui watershed to The National Forest Office and National Fund for Forest Financing (FONAFIFO) established by the government of Costa Rica. The PWES scheme finances a conservation program that aims to increase stream flow regularity throughout the year and to reduce reservoir sedimentation. FONAFIFO makes cash payments to upstream lands owners who agree to reforest and/or conserves forest.
- In France, Perrier Vittel, the world's largest bottler of natural mineral water pays landholders surrounding the springs for improvement of agriculture practices and reforestation of sensitive infiltration zones in order to improve water quality.
- In Cauca Valley (Columbia), downstream water users' associations voluntarily agreed to increase the user fees paid to the Cauca Valley Corporation (CVC) in order to improve the watershed management in upstream of Cauca Valley so that water users in downstream can have increased water quality and quantity. CVC is responsible for allocating water between the different water users. For the improved watershed management, CVC carries out programs such as reforestation, particularly on steep slopes, erosion control, and protection of springs and waterways.
- The State of Paraná in Brazil has developed a redistribution mechanism for revenues in the form of an indirect tax charged on the consumption of goods and services. The scheme comes under the name 'Income from the Circulation of Goods and Services' (ICMS). The revenue distribution among municipalities by the State of Paraná is organized on a competitive basis with those municipalities getting more funding which have more water reserves, conservation and protected areas. This mechanism is developed to encourage municipalities and private forest owners to promote and rehabilitate watershed areas and areas for biodiversity conservation.
- New York City agreed to invest $1.0 to $1.5 billion over ten years in the Catskill and the Delaware watershed programmes principally financed by a 9 % percent increase in the taxes on water bills over a five-year period. The watershed program consists of purchasing conservation easements from farms, promoting forest and agricultural best management practices, and other conservation programs. Building a new filtration plant would have required a two folds increase in taxpayers' water bills.

These and other examples are used in the following analysis of global experience:

## 4.2. Global Success Factors

The theoretical proposition of the PWES approach is to make payments to individuals or communities in order to increase the level of desired environmental services (Jack et al., 2007). In practice, existing PWES schemes share the common objective of providing environmental services that are otherwise undersupplied due to lack of compensatory mechanisms. PWES promotes mechanisms which provide services cost effectively and in a sustainable way. Thus, PWES schemes try to establish appropriate payment mechanism which change the behaviour of land users and improve the sustainable provision of environmental services (Mayrand and Paquin, 2004).

Although PWES schemes have some commonalities, variations exist in these schemes in different watersheds (Rowcroft, 2005). Considering these variation, the global experience in PWES analysed in this chapter, is using the conceptual framework as a lens for the six

dimensions: environmental services, geography, land-use, social system, PES scheme, and legal and policy environment.

Although the concept of PWES is in a relative infancy stage, some documents on empirical studies and experience in PWES schemes implementation are available (Alix-Garcia et al., 2005; Gouyon, 2003; Mayrand and Paquin, 2004; Pagiola et al., 2002; Scherr et al., 2006; Wunder, 2007). While analysing global experience, the success factors for PWES are also identified from the perspective of each dimension. The success factors are numbered with the code "SF" (for success factor). (FAO, 2004b; Landell-Mills and Porras, 2002a; Mayrand and Paquin, 2004; Quesne and McNally, 2005; Rosa et al., 2004; Verweij, 2002; Warner et al., 2004)

### 4.2.1. Environmental Services

The concept of environmental services has been developed in the late 1950's by ecologists, who at that time mainly considered the ecological importance of them. The understanding of its economical and political importance has emerged only recently. Costa Rica has been one of the first countries, which gave environmental services even legal recognition. In order to support the implementation of PES, environmental services have been encoded in the Forest Law of Costa Rica in an amendment in 1996. This law defines 'environmental services' as "those provided by forests and forest plantations and which have a direct effect upon the protection and improvement of the environment". It is to be noted that Costa Rica is the country, which is well known as a pioneer in PES. (Rosa et al., 2003)

Environmental services for watershed protection are well-recognized environmental services because they are linked with water-related services, whose demand are continuously increasing (UNECE, 2006). Based on 61 case studies from 22 countries, Porras and Landell-Mills (2002b) grouped watershed protection environmental services into five categories: water flow regulation, water quality maintenance, erosion and sedimentation control, water table regulation and maintenance of aquatic habitats.

In PWES schemes, payments are made for various watershed protection environmental services depending on the needs of beneficiaries. In France, for example, upstream dairy farmers and forest landholders are paid by Perrier Vittel bottled natural mineral water company for increase the quality of drinking water. In another example, a private hydroelectric company and the Costa Rican Government Fund make payments to upstream forest land owners for regularity of water flow to generate hydroelectricity. (Perrot-Maître and Davis, 2001)

The success factors for PWES implementation under the dimension of environmental service are as follows:

**SF 1: Requirement of Well-defined Environmental Services**

While designing a PWES scheme, usually intangible and vague environmental services to be provided to beneficiaries should be well defined. In this way, such environmental services can be transformed into clearly defined products. These defined products can be later exchanged for payments e.g. downstream users may spend money on 'best management practices contract' rather than intangible water quality. However, care must be taken that these designed commodities and the resulting services suit the needs of the beneficiaries. Some of identified commodities are listed in Table 1. (For further details see Landell-Mills and Porras, 2002a)

| Service | Commodity |
|---|---|
| Water quality | Watershed protection<br>Best management practices contracts<br>Water quality credits<br>Land acquisitions<br>Conservation easement |
| Water table regulation | Salinity credits<br>Transpiration credits<br>Salinity-friendly products<br>Stream flow reduction licenses |
| Aquatic habitat protection | Best management practice contracts<br>Salmon safe products<br>Salmon habitat credits<br>Water rights<br>Land acquisition |
| Soil contamination control | Ecolotree plantings |
| Water quality and regulation | Watershed protection contracts<br>Protected area<br>Land acquisition<br>Water rights<br>Watershed lease |

**Table 2: Watershed Services and Their Commodities**
Source: Landell-Mills and Porras (2002a: 116)

### SF 2: Well informed Service Providers and Beneficiaries

Conservation activities in watersheds can either have an objective to preserve existing land use practices or change them in order to improve the provision of environmental services. Therefore, services providers and beneficiaries should be well informed in order to be able to reach an agreement about the objective of a specific PWES scheme. Accordingly, payment systems can be designed to achieve both of these objectives.

In order to be able to understand and agree on objectives requires the flow of information between service providers and beneficiaries (FAO, 2004b). Service providers should be well informed about the services paid by the beneficiaries (Van Noordwijck 2003 in Gouyon, 2003). Similarly, beneficiaries benefiting from environmental services also need to be aware that those services exist and are the result of upstream land use practices (Van Noordwijck 2003 in Gouyon, 2003).

### SF 3: Long-term Demand and Ability to Supply

Long-term demand for as well as the ability to supply environmental services are crucial factors for the sustainability of PWES schemes (Gutman, 2003). Demand for environmental services depends on factors such as the needs of the population, economic growth, or competition from low-cost alternative technologies (Gutman, 2003; Powell et al., 2002). The ability to supply environmental services depends for example on the reliability of the scientific links made between landuse activities carried out upstream and services provided downstream, as well as the nature of the economic incentives created. (Gutman, 2003)

The establishment of PWES usually starts with the identification of the environmental services in demand (FAO, 2004b). However, on the ground, beneficiaries can be present without an explicit demand for environmental services. Even if a demand of environmental services exists, specific interventions by intermediaries may be needed to transform implicit demands into explicit willingness to pay for services. These interventions include stakeholder consultations, information sessions, institution creation, financial support or technical training. (Mayrand and Paquin, 2004)

### 4.2.2. Geographical Dimension

One complexity of managing environmental services is the geographical distance between the supply and demand of environmental services (Millennium Ecosystem Assessment, 2005a). In such cases, PWES schemes capture the benefits derived from environmental services and channel them to the service providers in order to increase incentives to conserve those services (Pagiola et al., 2005). However, it is not easy to encourage service provider and beneficiaries located in a distant to share costs and benefits from the provision of environmental services (Salzman, 2005). A long process of dialogue and negotiation among beneficiaries, service providers and intermediaries can help to address such problems. For example, the New York City's PWES scheme is the outcome of seven years' long negotiations among several stakeholder groups: the New York City, the watershed communities, the New York State Department of Health, several environmental NGOs and others (Rosa et al., 2003).

The scale of watersheds considered for PWES schemes can be local, national or even international (Landell-Mills and Porras, 2002a). PWES schemes have been effectively implemented at both small scales (e.g. local) and large scales (e.g. national, international). For example, the New York City PWES scheme is located at local scale (in this case a city) while the Costa Rican example (see above) is at the national scale (Mayrand and Paquin, 2004).

**SF 4: Higher Feasibility of Small-scale PWES**

PWES are generally considered to be more feasible at small-scale (Johnson et al., 2000; Landell-Mills and Porras, 2002a; Pagiola and Platais, 2002; Tognetti et al., 2004). One reason is that transaction costs are usually lower at small-scale (FAO, 2004b). As the scale of a PWES scheme increases, the number of participants increases and hence the costs for organizing the participants also increase. Small scale also ensure better information flows among providers and beneficiaries (FAO, 2004b).

Another reason is that linkages between land uses and effects on environmental services are easier to demonstrate at small scale. These linkages are harder to establish at larger scales due the higher distance between upstream and downstream and resulting higher impacts of climate and topography. (Tognetti, 2001) Therefore, complexity of designing and maintaining the PWES schems in general and financial mechanisms in particular increases with scale. (Johnson et al., 2000)

### 4.2.3. Landuse Dimension

Within PWES schemes, payments are not directly transferred for the specific services such as water quantity or water quality. Rather, they involve 'selling' specific commodities such as land uses that are thought to generate desired water services (Pagiola et al., 2002). For example in Costa Rica, FONAFINO sells reforestation and conservation of the existing forest area.

In principle, PWES schemes try to influence landuse decisions in order to improve the provision of environmental services (Grieg-Gran et al., 2005). This can be achieved by encouraging land users to either keep the same landuse practice or to change to a more favourable one. For example, in the case of Costa Rica, land users in upstream are being paid to keep their lands forested by maintaining current practices. In this case, conservation payments are made to ensure land users to *not* change the land use. In the case of New York City, payments are made both for maintaining the status quo and in some cases, for changing land use practice. (Salzman, 2005)

In general, it is difficult to establish biophysical links between landuse and water related environmental services because impacts of land use on water related services depend on interactions among a large number of land uses, vegetation and geological characteristics of watershed over a range of spatial and temporal scales (Aylward and Tognetti, 2002). Therefore, PWES schemes for water related services are site-specific (Powell et al., 2002) and cannot be standardized and replicated easily form one site to the other.
Forests, one of the important landuses, have major effects on hydrological processes of watersheds. There is currently an extensive scientific debate on the biophysical linkages between forest and water related environmental services (e.g. do forests help to increase water quantity in downstream). Depending on types of forests in watersheds, PWES schemes exist for different water related environmental services.

For example, in the Mullay-Darling watershed of Australia, native tree species with high transpiration rate are encouraged for reforestation to control salinisation (Perrot-Maître and Davis, 2001). On the other hand, in Cape Town's watershed in South Africa, restoration of native vegetation with removal of thirsty alien tree species are encouraged for water production (Gelderblom and van Wilgen 2000 in Johnson et al., 2000).

According to Salzman (2005), it is critical to identify the exact location for a certain type of land use within a watershed, which is eventually responsible for providing the specific environmental services. Contrary, it is also necessary to identify the exact location susceptible to landuse changes resulting in a decreased provision of environmental service. Ignorance of these facts can lead to the failure of PWES schemes. A review of Costa Rican PWES schemes identified that payment went to upstream areas, which have not been prone to exploitation (Chomitz et al. 2006 in Scherr et al., 2006).

**SF 5: Extensive Knowledge about Relationship between Landuse System and Environmental Services**

PWES schemes should be based on clear and consensual scientific evidence about the linkages between land uses and the provision of environmental services (FAO, 2004b; Mayrand and Paquin, 2004; Powell et al., 2002; Tognetti et al., 2004). Therefore, studies and models to demonstrate these linkages are required (FAO, 2004b; Quesne and McNally, 2005). Demonstrations of such linkages can facilitate the development of payment schemes and help to identify certain land use activities required to ensure the provision of the demanded environmental services (Johnson et al., 2000).

Furthermore, different environmental services are provided in one single watershed. The production of one service can preclude the production of another (Jack et al., 2007). For example, forest conservation in the upper watershed with the objective to reduce soil erosion may increase biodiversity, but may reduce beneficial water quantity downstream. For interconnected services, bundling of services, where payments are provided for groups of services (e.g. like biodiversity conservation and erosion control) simultaneously, can provide a solution (Landell-Mills and Porras, 2002a). Moreover for competing environmental services, tradeoffs are required (Carpenter et al., 2006; Rodríguez et al., 2006) such as giving up water quantity services for erosion control in the above example.

**SF 6: Comprehensive Hydrological Databases**

A lack of hydrological data demonstrating the hydrological or water related benefits derived from a specific landuse could hamper the development and sustainability of a PWES scheme. For example, in Ecuador, a PWES scheme was established through political negotiation based on the common perception that forest ensures water quality and flow, particularly in dry season. In the scheme, service providers are not satisfied with the payment amount and the

payments of service by beneficiaries do not cover the cost to be paid to service providers. Thus, there is question mark on the viability of the scheme. (Gutman, 2003)

Therefore, in addition to scientific knowledge on the linkages between landuse and environmental services, the establishment of a hydrological database and its analysis increases the confidence in the proposed service delivery (Powell et al., 2002). A comprehensive hydrological database is crucial tool for PWES to understand the hydrological processes in watersheds (Quesne and McNally, 2005). A hydrological data can support the payment mechanism as it provides the proof for it (Gutman, 2003).

### 4.2.4. Social Dimension

The social dimension in PWES schemes covers issues of social organization, stakeholders and equity.

**Social organization**

According to Pagiola et al. (2002), one of the most remarkable points in PWES implementation is that water related environmental services cannot be confined to those who pay to enhance the flow of those services. Hence, those who don't pay enjoy the benefit without payment and can undermine motivation to pay for others. In such situations, the importance of coordination, linkage and unification (called social capital) among service providers require to ensure sufficient landuse changes which result in the required environmental services (Huang, 2007). Similarly, coordination among beneficiaries is also required to identify and cluster the demand of environmental services downstream.

Beneficiaries and service providers, already socially organized in groups, enables the transfer of charges for services and the distribution of payments to service providers. For example, downstream water users associations in Cauca Valley of Columbia voluntarily agreed to increase the user fees in order to improve watershed management upstream. Therefore, it is better to mobilize existing groups for the implementation of PWES schemes. In the case of the inexistence of such groups, it is necessary to organize beneficiaries and service providers in groups and strengthen their functional role in the scheme (Scherr et al., 2006).

A survey by Forest Trends found out that major constraints for buyers and seller to organize PWES schemes are a lack of awareness of their roles and the values of environmental services to their business; unclear evidence of financial benefits; challenges of aggregation to achieve ecosystem services at the necessary scale; and coordination capacity to protect own interest (Scherr et al., 2006).

Building on existing organizations or management systems can facilitate the set up of PWES schemes. For example, if similar types of charging mechanisms already exist for another purposes, additional charges for environmental services can be added to the existing mechanism. For example, the tax rate has been increased on water bill by 9% in New York City for the promotion of watershed conservation programs upstream (Perrot-Maître and Davis, 2001).

In conclusion, where beneficiaries and service providers are not already organized or a payment mechanism does not exist, the cost for capturing such payment can be substantial (Pagiola et al., 2002).

**Stakeholders**

Stakeholders (such as buyers and sellers of environmental services) for PWES schemes can be communities, local NGOs, governments, private corporations and private individuals. In a

study of 61 PWES schemes done by Porras and Landell-Mills (2002a), the majority of buyers are private corporations and the public (e.g. individual drinking water users) while individual landowners are the main actors on the supply-side.

Additionally, the study showed that public enterprises and government departments are important buyers of watershed services such as water boards, electricity suppliers and recreation agencies. All of them are interested in maintaining water-related services. However, people are usually reluctant to pay for these water-related services as they are perceived as public goods flowing from private and public lands. As a result, the responsibility for maintaining supplies is shifted to governments (Johnson et al., 2000). Governments can play the role of buyers of environmental services to landowner, especially in critical watershed areas (Landell-Mills and Porras, 2002a). For example, in Vietnam, the barren forestlands are allocated to household through land tenure certificates and contracts for protection through 'people's forestry' initiative by the government (Morrison and Dubois, 1998).

Payments are usually channelled though intermediaries who play a critical role to bring buyers and sellers together for negotiation, dealing contracts, overseeing implementation and enforcing (Landell-Mills and Porras, 2002a). These intermediaries are entities mediating the transfer of resources between beneficiaries and service providers (Rosa et al., 2004).

Governments in many cases act as such intermediaries in a wide range of PWES schemes in countries such as Australia, US, Brazil, China, Colombia, Costa Rica, Guatemala, Malawi and Vietnam (see Landell-Mills and Porras, 2002a). In other cases, community-based organization can be intermediaries such as a water users' association in the Cauca Valley of Colombia, where they channel users' fees from beneficiaries to upstream service providers. (Landell-Mills and Porras, 2002a).

NGOs or private companies provide other good examples of intermediaries. In case of Heredia, Costa Rica, the water supply company, the Heredia Public Utilities Company (Empresa de Servicios Públicos de Heredia - ESPH) acts as intermediate. This company has been charging extra fees for 'environmentally adjusted water' which go into a trust fund run by the company. This fund invests in PWES in the mountainous region of Heredia province since 2000. (Rosa et al., 2004)

**Equity**

One of the key debates in relation with PWES is about the impact on poor people. The PWES approach was conceptualized as a mechanism to improve the efficiency of natural resource management, and not as a mechanism for poverty reduction (Pagiola et al., 2005). However, many proponents have argued that PWES can also have positive impacts on poverty (Landell-Mills and Porras, 2002a; Wunder, 2006).

In most cases, PWES schemes are assumed to contribute to poverty reduction through the payments themselves, which are thought to go mainly to poor land users (Pagiola et al., 2005) In Costa Rica's Oca Peninsula for example, a small survey found that PES recipients are often under the poverty line, that the scheme lifted half above it and that payments became the primary household cash income source (Muñoz 2004 in Wunder, 2005).

Landell-Mills and Porras (2002) warn that PWES scheme can however also increase benefits to powerful groups with control over the scheme. In the official PES scheme of Costa Rican for example, small-scale farmers and indigenous communities were widely excluded from the scheme because agroforestry carried out by small farmers has not been made eligible for payments (Grieg-Gran et al., 2005). It is pointed out that limiting the use of forest for

conservation in upstream can hamper the livelihoods of the poor who are not participants in PWES program but dependent on forest resources for non-timber forest products (Kerr, 2002).

Based on this practical and theoretical background, the success factors in social dimension for PWES schemes are as following:

**SF 7: Well-identified Service Providers and Users or Beneficiaries**

Service providers and beneficiaries of environmental services should be properly defined in PWES schemes or otherwise may cause conflict due to exclusion (FAO, 2004b). Furthermore, improper identification of the actual service providers can lead to the failure of a scheme (Scherr et al., 2006). For example, a PWES scheme in Mexico identified improved water quality and quantity as the targeted environmental services and delineated a conservation area located within a watershed. From the viewpoint of controlling deforestation, the program has been declared a success. However, later studies showed that only 18% of the area conserved was in high risk for deforestation. (Alix-Garcia et al., 2005)

**SF 8: Presence of Intermediaries**

As PWES schemes depend on negotiating agreements, the presence of trustworthy intermediary, who can facilitate the establishment of a scheme are crucial (Gutman, 2003; Landell-Mills, 2002; Shilling and Osha, 2003). Governments or NGOs (local, national and international) can provide this function. Local NGOs have the advantage of more local knowledge and a better rapport with local communities. On the other hand, national or international NGOs may have access to resources and contacts for the implementation of the scheme. (Shilling and Osha, 2003)

**SF 9: Multi-stakeholder Consultation**

Multi-stakeholder consultations are a participatory method to bring all parties - buyers, sellers and intermediaries - together for dialogues (Gouyon, 2003; Landell-Mills, 2002). The objective of dialogues is to harmonize opposing interests between land users and beneficiaries and to establish a scheme that is adapted to local priorities (Rosa et al., 2004). During a dialogue, efforts to capitalize on the enthusiasm of stakeholders and avoid alienating groups are crucial (Landell-Mills, 2002).

**SF 10: Strengthened Social Organization**

Since service providers and beneficiaries within a watershed need to act in a collective fashion, organizational capacity is crucial for successful PWES. Without strong internal organization, communities will not be able to influence rule making while designing a PWES scheme. In addition, collective approaches are required to defend their interests during negotiation as well as to address internal distributional issues and conflict. (Rosa et al., 2004; Rosa et al., 2003)

**SF 11: Existence of Good Governance**

Good governance plays a central role in the successful design and implementation of PWES schemes. Good governance in PWES includes financial transparency (e.g. fee collection), public participation in decision-making (e.g. fee assessment) and equity in benefit sharing (e.g. disbursement of payment) during implementation of schemes (Landell-Mills, 2002; Landell-Mills and Porras, 2002b; WWAP, 2006). Therefore, PWES schemes require governance structures that supervise the appropriateness of negotiations, monitoring systems, and enforcement mechanisms (Mayrand and Paquin, 2004).

Since more powerful groups generally have greater influence over rule formulation, special efforts are required to ensure the participation of poor and marginalized service providers in defining mechanisms and rules (Rosa et al., 2003). Similarly, a danger can be that powerful members of a community appropriate payment mechanisms (Quesne and McNally, 2005). To avoid such situations, it is necessary to identify appropriate types of compensation that strengthen community livelihood strategies of poor while at the same time ensure the provision of the environmental services (Rosa et al., 2003).

**SF 12: Clearly Defined Rights and Responsibilities**

Rights and responsibilities of all parties, including intermediaries, should be clearly defined (Warner et al., 2004). Conflict may arise due to lack of a clear understanding, transparency and admiration of each others role and responsibility. Clearly defined responsibilities of each stakeholder also facilitate the smooth operation of PWES schemes. Public discussions and decisions on rights and responsibilities can prevent perverse effects and help to achieve effective PWES scheme (Rosa et al., 2003).

**SF 13: Strong Integration of Livelihoods with service provision**

The provision of environmental services will be more sustainable if PWES schemes give priority to strengthening livelihood strategies of poor and rural service providers (Rosa et al., 2003). Payments to service providers must be flexible in terms of eligible activities and allow various sustainable landuse practices and other income generating activities rather than restricting to payment for core conservation activities. Approaches focusing only on conservation can be detrimental to poor and marginalized communities that depend on landuse to support livelihoods.

Therefore, support to practices such as agro-forestry or silvo-pastoral practices are preferred as they can maximize environmental services as well as economic benefits for poor communities (Mayrand and Paquin, 2004). It is also crucial to orient PWES schemes toward simultaneous progress in strengthening rural livelihood and the provision of environmental services (Rosa et al., 2003; Warner et al., 2004). For example, a PWES scheme in Salvador focused on improvements in land use practices such as silvo-pastoral practices and agro-forestry that generate environmental services while maintaining land under production (Pagiola. 2002 in Mayrand and Paquin, 2004).

### 4.2.5. PES Scheme

In principle, PWES schemes consist of two transfer mechanisms - charging beneficiaries who benefit from environmental services and paying to service providers who supply those services (Pagiola and Platais, 2005). In practice, charging beneficiaries in many cases already exists in at least two forms – either in form of taxes due to the ability to generate income or in form of service charges such as users' fees (Kosoy et al., 2007). Examples are indirect tax charges (ICMS) in the state of Paraná in Brazil or users fees for water users in Cauca Valley of Columbia.

Collected resources are usually redistributed to service providers - either directly earmarked to service providers or indirectly through the government budget (Kosoy et al., 2007). The redistribution of payments to service providers are made either to maintain certain landuses, or to carry out specific activities which ensure provision of environmental services. The redistribution can also be done in the form of subsidy and compensation for asset building, which improve environmental services (Rosa et al., 2004). For instance, the company Perrier–Vittel in France provides direct payments through 18 to 30 year contracts to farmers who agreed to switch to less intensive dairy farming technology and pasture management. In addition, the company also provides farmers with free technical assistance and pays for new

farm equipment and the modernization and construction of farm buildings. (Perrot-Maître and Davis, 2001)

Depending upon the degree of government interventions in administration and the level of public involvement, various transfer mechanisms in PWES scheme exist. They can be clustered into three types of categories (Johnson et al., 2000; Perrot-Maître and Davis, 2001; Powell et al., 2002):

1. PWES schemes such as the ones done by Perrier-Vittel bottled Water Company in France or by the associations of irrigators in Cauca River in Colombia are *self-organized private deals*. These schemes have been initiated by private corporations or civil society organizations. They encompass little or no government involvement and beneficiaries make payments voluntarily.

2. In the United States, the government has fixed the standard for water quality levels of discharge for particular pollutants, called nutrient trading scheme. In this scheme, polluters with low chemical nitrogen or phosphorus discharge can sell 'water quality credits' to polluters with 'water quality deficits'. However, land users can decide themselves if it is cheaper to change their own process to meet the regulatory standard or to buy 'water quality credits'. Such a scheme is called an *open trading scheme.* In this type of scheme government defines the environmental service commodity to be traded and devises the regulation to create demand. Open trading schemes are still in a pilot phase, even in developed countries.

3. The example of PWES in New York City falls under the category of *public payment schemes*. In this type of scheme, either governments or public sector institutions pay for environmental services to service providers. The financing for such payments can come from various sources such as general tax revenues, bond issues or user fees. Public payment schemes are the most predominant in the world in comparison to the two previous schemes.

Additionally, PWES schemes with a combination of different mechanisms involving public and private actors exist (Johnson et al., 2000). From studies of 61 PWES schemes, Porras and Landell-Mills (2002a) have described eight types of transfer mechanisms which are presented in Box 2.

**Box 2: Categories of transfer mechanism**

- Direct negotiation between buyers and sellers - These involve either detailed contracts setting out best management practices to be undertaken to achieve improved watershed benefits or land purchase agreements. More recently conservation easements have been negotiated between buyers and sellers.
- Intermediary-based transactions - Intermediaries are used to control transaction costs and risks, and are most frequently set up and run by NGOs, community organizations and government agencies. In some cases independent trust funds are created.
- Pooled transactions - Pooled transactions control transaction costs by spreading risks amongst several buyers. They are also employed to share the costs of a large transaction as often required in the watershed markets.
- Internal trading - Transactions within an organisation, e.g. intra-governmental payments.
- Over-the-counter trades/user fees - These occur where the service is pre-packaged for sale, e.g. water quality credits. Watershed services are frequently offered at a standard rate for different beneficiaries through user fees. This rate is normally not negotiable and imposed on all beneficiaries.
- Clearing-house transactions - A more sophisticated intermediary that offers a central trading platform for buyers and sellers is a clearing-house. This mechanism depends on the existence of a standardised pre-package commodity, e.g. salinity credit, water quality offset.
- Auctions - Often associated with clearing-house mechanisms and over-the-counter trading, auctions attempt to move a step closer to a competitive market for watershed services. Auctions are proposed for determining the supply of watershed services as well as for allocating obligations to pay.
- Retail-based trades - Where payments for watershed protection are attached to existing consumer purchases, e.g. Salmon Safe agricultural produce. Normally associated with certification and labelling schemes that generate consumer recognition and willingness to pay.

Source: Landell-Mills (2002: 124)

In order to be able to successfully implement a typical PWES scheme, disregarding a particular type of transfer mechanism, the following success factors have been identified:

**SF 14: Flexible and Locally Adapted Payment Mechanism**

Charging and payment mechanisms (as explained above) should be adapted to the local situation and flexible enough to allow adjustments and improve their effectiveness and efficiency (FAO, 2004b; Mayrand and Paquin, 2004; Warner et al., 2004).

PWES schemes should also be adapted to the local environment (i.e. societal, cultural and political environment) in terms of transfer mechanisms (Powell et al., 2002). In many cases, direct payment and charging mechanisms may not necessarily be the most favourable and appropriate PWES scheme. Therefore various forms (e.g. payment in kind, skill development) should be considered as options (Rosa et al., 2004).

**SF 15: Self Financing Systems with Local Financial Resources**

The design of PWES schemes should reflect the availability of local financial resources in order to ensure sustainable schemes independent of external aid. Because of the lack of local financial resource, many existing schemes risk dependence on external resources in the long term. Therefore, PWES schemes should be designed in such manner that it will operate independently without external finance outside previously determined timeframe (FAO, 2004b). For example, Costa Rica's FONAFIFO receives one-third of the country's fuel sales tax which is secure financial source for administration of the scheme (Gutman, 2003).

**SF 16: Diverse Charging Mechanism for Sustainability**

PES schemes tend to work best when they rely on multiple sources of charge (revenue) systems delivering continuous flows of money that are sufficient for payments to service providers. Therefore, diversification in charging beneficiaries can play significant role for the sustainability of PWES schemes (Mayrand and Paquin, 2004; Rosa et al., 2003). Revenue diversification can also help PWES schemes to reduce their dependence on a single fund, resulting in reduced vulnerability to failure due to the lack of funds for payments (Mayrand and Paquin, 2004). Thus it is recommended to explore options to obtain complementary finance from various beneficiaries at different levels from local to national and international (Gutman, 2003; Verweij, 2002).

The National Forestry Fund (FONAFIFO) in Costa Rica for example was created for the implementation of PES schemes. The main source of this fund is a fossil fuel consumption tax. In addition, it obtains funding through agreements negotiated by Costa Rican government with international agencies, such as GEF and the World Bank; bilateral agreements with governments; internal funding through voluntary agreements with decentralized public institutions, such as the National Power and Light Company; and agreements with private electric utilities or industries. (Rosa et al., 2003)

**SF 17: Transaction Costs not Exceeding Potential Benefits**

Keeping transaction cost low is one of the challenges in PWES schemes in order to optimize the use of resources collected from beneficiaries (Mayrand and Paquin, 2004). Transaction costs include the costs for the set-up, management and monitoring of PWES schemes. However, there is a risk that transaction costs exceed the potential benefits of the scheme. Therefore, managing transaction costs becomes a priority of PES schemes (Mayrand and Paquin, 2004). To ensure the successful implementation of a PWES scheme, care should be taken that transaction costs do not exceed potential benefits in the scheme (Mayrand and Paquin, 2004; Warner et al., 2004).

Working with a few large land users is less costly than with hundreds of smaller landholders. As a result, a program may focus on contracting larger landholders at the expense of smaller holders. Therefore, there can be a trade-off between transaction cost and maintaining equity in PWES scheme (Shortle and Horan 2001 in Jack et al., 2007). However, when land users are numerous, collective contracting can also reduce transaction costs. Thus, one way to reduce transaction costs will be to organize beneficiaries and service providers in groups in order to be able to charge and distribute payments ((Mayrand and Paquin, 2004).

Working with third party groups such as intermediaries between landowners and the payment organization may also reduce overall transaction costs (Kerr et al. 2005 in Jack et al., 2007). For example, in New York City, the city works directly with the Watershed Agricultural Council, which represents rural farmers (Jack et al., 2007).

**SF 18: Effective Monitoring Mechanism**

Effective monitoring mechanisms are needed in PWES schemes to, for example, scrutinize whether those receiving payments comply with agreed actions and to evaluate the effectiveness of environmental service provisions and their relationship to social justice (FAO, 2004a; Rosa et al., 2003). However, monitoring mechanisms may be difficult, expensive and time consuming to implement (Gouyon, 2003; Mayrand and Paquin, 2004; Quesne and McNally, 2005).

Therefore, monitoring can be carried out through developing criteria and indicators to assess the environmental quality, performance of land user and beneficiaries who are making payments. Development of such criteria and indicators improves monitoring. (Jack et al., 2007; Meyerson et al., 2005; Verweij, 2002). These methods and tools for monitoring mechanism should be defined during the design of a specific PWES scheme (FAO, 2004a).

Monitoring is also important to ensure that services are generated, payments adjusted and technical assistance provided as required. Usually, initial payments are established based on *ex ante* assessments of the costs associated with land use changes and benefits generated. Effective monitoring practices can assist to adjust these initial payment levels and contribute optimizing the effectiveness of a scheme. In addition, effective monitoring is essential to prove beneficiaries that their investments are generating the desired land use changes. (Mayrand and Paquin, 2004)

**SF 19: Reliable Baseline Assessment**

Reliable baseline assessments are essential to measure the impact of PWES schemes. There should be consensus among stakeholders to monitor the effectiveness of a scheme with respect to the assessed baseline. This will avoid breaches and assure achievement of agreed goals (FAO, 2004a; Warner et al., 2004). Baseline assessments are also necessary to avoid wasting funds to be paid for the land use practices that would have been selected anyway (Wunder, 2005). In Costa Rica for example, payments have been transferred to forest owners who had no intention to exploit forest resources even in the absence of payments (Chomitz et al. 2006 in Scherr et al., 2006).

PWES schemes can also create perverse incentives. Service providers can start to shift to undesirable land uses in order to leverage additional compensation from service providers. For example, if a PWES scheme targets a forest at high risk with the objective to enhance environmental services, an individual can intentionally clear a forest to qualify as high risk and become eligible for payment. Thus, a baseline can help to prevent such perverse incentives. (Jack et al., 2007)

As payments for service providers are defined relative to a baseline state, there are chances of baseline manipulation. This can be achieved for example by establishing the baseline based on historical data. (Jack et al., 2007)

**SF 20: Economic Valuation of Environmental Services**

The valuation of environmental services is a central element of PWES schemes. Trade in environmental services requires a price or proxy price of services (Brüschweiler et al., 2004). In practice, this price is usually decided based on joint negotiations between the two parties – the service providers and beneficiaries. Back-of-the-envelope calculations can certainly help each side to strengthen their negotiating positions or to predetermine whether a PWES scheme is a realistic option or not (Shilling and Osha, 2003; Wunder, 2005). Additionally, valuations of environmental services can also help beneficiaries to recognize the economic value of services. Awareness about the economic value can help to generate the required willingness to pay by beneficiaries of environmental services (Powell et al., 2002).

### 4.2.6. Legal and policy dimension

Policies can provide an important foundation and starting point for PWES, especially for public and open trade schemes (Scherr et al., 2006; Verweij, 2002). One example is a new regulation, the Surface Water Treatment Rule introduced by the US Environmental Protection Agency (EPA). This rule forced New York City to consider various options to comply with the regulation at the lowest cost possible. After analyzing the relative costs of building a new water treatment plant or land management alternatives, the city eventually established a PWES scheme to improve the management of the Catskills watershed to obtain clean drinking water. (Mayrand and Paquin, 2004)

On the other hand, policies can also put limitations on the potential to implement PWES schemes (Verweij, 2002). At a meeting in Locarno, Switzerland (2003), The Katoomba Group, which is a network of global innovators in ecosystem service markets, concluded that a lack of policy frameworks supportive to PES was one of the two most critical overall barriers to the expansion of PWES (the other was market information) (Scherr et al., 2006).

For self-organized schemes, policies can also help to establish rights to buy and sell ecosystem services (Scherr et al., 2004). Furthermore, policies are also helpful to monitor and supervise a scheme (Landell-Mills and Porras, 2002a).

Many authors agree that issues of property rights are very important for PWES schemes (Brüschweiler et al., 2004; Huang, 2007; Landell-Mills and Porras, 2002a; Scherr et al., 2006). Where property rights are clear and distinct, PWES schemes are easier to implement. For example, the Perrier Vittel Bottled Water company directly pays to upstream land users with clear land titles. However, most of the rural poor in developing countries do not have land titles and few rural dwellers have legal rights to natural resources from the land (Shilling and Osha, 2003).

A lack of defined property rights can create confusion during the identification of upstream service providers during the development of a PWES scheme (Scherr et al., 2004). Considering this issue, barren state forestland has been allocated to households under the programme "peoples' forestry" in Vietnam through the distribution of Land Tenure Certificates and through contracts for protection and regeneration activities. This initiative was carried out after recognizing the role of forests in controlling dam sedimentation and supplying other environmental services. (Morrison and Dubois 1998 Rowcroft, 2005)

However, PWES schemes may also spur the formalization of resource tenure as well as the clarification of property rights over environmental services (Landell-Mills and Porras, 2002a; Scherr et al., 2004). For example, in the irrigation system of Sukhomajri village in Haryana State of India, landholders below the reservoir benefit from irrigation water while landless individuals who depended on common lands above the reservoir are restricted from their access for grazing and the collection of NTFPs.

To gain the support of the landless households for the conservation of common land, the Water Users Association introduced a tradable water rights scheme, which gave every household the same rights to water -including the landless. These landless people got rights to sell water rights to others, thereby gaining a financial compensation for complying with watershed protection. (Landell-Mills and Porras, 2002a)

Based on this background about the legal dimension, the following success factors are identified and presented below:

**SF 21: Favourable policy environment**

Although it is not essential to formulate specific laws for PWES implementation, favourable policies support the development of PES schemes (FAO, 2004b; Mayrand and Paquin, 2004; Warner et al., 2004). Formulation of supporting regulations for PWES schemes could also smoothen the progress during the implementation (Landell-Mills and Porras, 2002a). An example by Scherr et al. (2004), explains that the Columbian law compelled hydroelectric and water utilities to allocate a fixed percentage of revenues to an ecosystem fund. This fund pays private landowners for watershed management and purchases hydrologically sensitive land to be managed by government agencies. Additionally, the existence of strong legal frameworks favouring PWES schemes reduced the transactions costs of the scheme (Johnson et al., 2000).

On the other hand, rigid or bureaucratic legal frameworks may provide obstacles for PWES schemes (FAO, 2004b). Modification of policies that are obstacles for PWES schemes such as clarification of land rights and clarification of the duties of the stakeholders can provide a platform for a PWES scheme (Powell et al., 2002). The Costa Rican Forestry Law for example was amended in 1997 to allow land users to receive payments for specified land uses, including new plantations, sustainable logging, and conservation of natural forests (Mayrand and Paquin, 2004).

**SF 22: Cleared and Well-defined Landuse Rights**

In the absence of control over land, land users cannot act as reliable service providers because they cannot effectively exclude external actors who might endanger the provision of services. In addition, the distribution of payments to land users can also be problematic when property and access rights are not well defined. Therefore, property rights play a central role in the establishment of PES schemes. (FAO, 2004b; Mayrand and Paquin, 2004; Rosa et al., 2004; Warner et al., 2004; Wunder, 2005)

Even if rights over land and services are not previously obvious, clarification is required to design PWES schemes (Powell et al., 2002). In most cases, establishing these rights requires specific legislation clarifying the rights to exercise control over the critical environmental services (Shilling and Osha, 2003). It should be noted that PWES does not require land sale rights or even fully formalized land tenure rights. It is sufficient that the landowner has effective rights of exclusion[1] for PWES scheme implementation. (Wunder, 2005)

[1] The literature differentiates between five types of property rights: *Access rights* include the operational right to enter into defined areas and enjoy non-extractive benefits such as recreation activities. *Withdrawal rights* give, in

## 4.3. ANALYSIS OF GLOBAL EXPERIENCE

PWES has been assessed extensively in developed countries (Rowcroft, 2005). However, it is a relatively new approach in developing countries and poorly tested particularly in South East Asia countries (Landell-Mills and Porras, 2002a; Rowcroft, 2005). The theoretical concept of PWES has been admired for its advantages over the traditional conservation approaches. Nevertheless, practitioners and participant of pilot PWES schemes still remain sceptical about this concept. (Wunder, 2005)

It would be erroneous to copy a successful PWES scheme from one context to another and expect that it will work well. Nevertheless, lesson learned derived from different experiences can help to identify key issues to be considered for PWES implementation (Rosa et al., 2003). Therefore, global experience suggests the implementation of PWES schemes at small pilot scales and the incorporation of feedback from these schemes for learning and improvement. The success behind PWES schemes is learning by doing. Usually, the establishment of a PWES scheme is a long process with a number of steps involving for example the identification of services, the linkages between landuse and service provision and the valuation of services. Thus the process demands long time and effort. (Landell-Mills and Porras, 2002a; Rowcroft, 2005)

Some advantages, critiques and difficulties experienced in PWES implementation are presented below.

### 4.3.1. Advantages

It is difficult, and sometimes even impossible, to enforce conservation measures, land use regulations or specific agricultural or forest management practices upon poor communities who depend on resource exploitation for their livelihood. Regulatory approaches sometimes hurt these populations by banning activities that are essential for their livelihoods and pushing them toward illegal survival patterns. In such cases, PWES schemes are potentially more effective, flexible and cost-efficient than such regulatory instruments because they allow a more flexible range of land uses and extractive activities, which are better able to promote both socioeconomic development and environmental protection. (Mayrand and Paquin, 2004)

Furthermore, based on this literature review (FAO, 2004b; Kosoy et al., 2007; Landell-Mills and Porras, 2002a; Quesne and McNally, 2005; Rosa et al., 2003; Rowcroft, 2005; Wunder, 2006) the following additional advantages and opportunities of PWES are identified:

1. PES schemes can generate new sources of funding for the conservation and restoration of natural resources. They can provide not only direct benefits from watershed protection (e.g. more efficient hydropower and water supply systems) but also provide positive spin-offs for forestry, agriculture, fishing and recreational activities.
2. PWES schemes have the potential to transfer resources to socially and economically vulnerable sectors, which support environmental services provision. Thus, PWES scheme can provide opportunity for poverty reduction.
3. Since PES schemes set prices for environmental services, which were previously priceless, they can raise the awareness of people about the value of those services. This can lead to more efficient use of the services and recognition of the benefits of those land uses, which provide the required environmental services.

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addition, the right to extract different products. *Management rights* refer to determination of patterns of resource use. *Exclusion rights* confer the power to decide who else can have access and extract resources. Finally, *alienation rights* exist when holders of these other rights can transfer them to others. (Rosa et al., 2004)

4. PES schemes can contribute to the mitigation of conflicts about alternative uses of land and water resources by facilitating negotiations between service providers and beneficiaries of environmental services.
5. In addition, PWES approaches tend to provide significant non-income benefits such as strengthened land tenure, training courses and improved internal organization or the expansion of social capital in PWES scheme area.
6. One advantage identified by FAO (2003) is that PES schemes can operate properly at small scales and relatively low operating costs when there is sufficient information flow between service providers and beneficiaries.

### 4.3.2. Critiques

Karsenty[2] (2004) (in Wunder, 2006) criticised PWES schemes because payments for conservation activities can trap local people in poverty because they will be forced to abandon local development and get paid to do nothing. Thus, there is a danger that such communities will lose dynamism, learning-by-doing, and innovation which demoralize their aspiration to eliminate poverty. However, Wunder (2006) argues that PES schemes provide inflows of financial capital, a shortage of which often limits local production and welfare.

It is argued that cash transfers make local inhabitants more dependent on rent reducing their freedom of landuse without true progress in life (Karsenty 2004 in Wunder, 2006). In response, Wunder (2006) clarified that PWES established based on negotiations increase land users freedom and capability of choices if it is carefully designed. Although direct cash transfers sometimes have negative side effects, in many cases they also do a great deal to alleviate poverty.

PWES may pose a problem known as 'moral hazard'. If people are paid to provide environmental services then, we are ignoring those who are already providing services. If PWES systems are paying off bad actors, it can encourage undesirable behaviour. However, a proper baseline survey before starting a PWES program and encouragement to the land users who are already providing services can make a difference. (Salzman, 2005)

The repeated payments for environmental services may also raise the problem of rent-seeking. When funds are made available for such payments, one can expects continuity of these payments for a longer time period or to increase payments. This may lead scarcity of fund for payments for schemes. For example, The Conservation Reserve Program in the US launched as short-term program to control soil erosion, improve water quality and regulate stream flow. However, now it is a huge stable $1.6 billion annual farm subsidy program. Hence in principle, the repeated payments for services should not be expensive. Even if the initial payment covers the investment cost of service providers, the following payment should not be more that maintenance cost for land use. (Perrot-Maître and Davis, 2001; Salzman, 2005)

The concept of PWES is also sometimes criticized for the intention to privatise and exploit natural resources by making payments to those who have claimed property rights over the resources such as land. These payments are often obligatory because one cannot be excluded from drinking clean water or from flood protection. However it is required to accept that although environmental services like pure drinking water and safe health is the essential human rights, service provider cannot suffer for own basic needs by providing services to other. (Rowcroft, 2005; Salzman, 2005)

[2] The document by Karsenty is in French: Karsenty, A. 2004. Des rentes contre le développement? Les nouveaux instruments d'acquisition mondiale de la biodiversité et l'utilisation des terres dans les pays tropicaux. *Mondes en développement* 127(3):1-9

### 4.3.3. Difficulties

Although there is a high potential for PWES schemes, implementation is not easy in practice. The analysis of difficulties and challenges of implementing PES schemes are as follows (Chomitz et al., 1999; FAO, 2004b; Kosoy et al., 2007; Landell-Mills and Porras, 2002a; Landell-Mills and Porras, 2002b; Mayrand and Paquin, 2004; Rojas and Aylward, 2003; Rowcroft, 2005);

1. There is a lack of scientific clarity regarding the cause-and-effect linkages between upstream landuse and downstream environmental services. These results did allow a number of schemes to develop on the basis of myths, half-truths on assumptions about land use impacts on water related environmental services. In such cases, it is difficult for service providers to specify actions that alter the service delivery and for beneficiaries to be persuaded that their payments make a difference.
2. Another common difficulty is the lack of recognition of the services targeted by a PWES scheme. In a specific watershed, different users have different needs in terms of hydrological services. However, each service requires a different strategy for landuse management.
3. Because beneficiaries used to receive watershed protection services for free as traditional users or don't have capacity to pay, they don't show willingness to pay.
4. Perverse incentives are an inherent risk for PWES schemes. For example, upstream landowners may accelerate land clearing which would not have been occurred in the absence of the scheme. Such land clearing occurs in order to benefit from higher payments offered under the scheme to restore deforested lands, as compared to conservation of existing forest.
5. Lack of appropriate forms of property rights or tenure security can create confusion and conflicts to define the responsibilities of landuse required to ensure the provision of service. Without clear land titles, upstream land users cannot enter into contractual agreement thus enabling to benefit from payment.
6. PWES schemes can be expensive and unaffordable by communities due to high transaction cost involved in designing and maintaining such schemes. The adoption and use of new land uses depends on how long it takes the new land use to become profitable in comparison to the traditional or next best use of the land. If payments do not continue until profitable, the risk to revert to previous landuse increases.
7. While the promotion of payments for watershed protection has been gaining impetus over recent years, little concern had been given toward a critical assessment of the effectiveness of PWES schemes. In some cases, PWES schemes have been found not to be the most cost-effective method to attain watershed management objectives, since there may be other more efficient management mechanisms to guarantee delivery of the environmental service.
8. Generally PWES schemes are difficult to implement at large scales. At larger scales, there is a greater diversity of environmental conditions and socioeconomic interests. Moreover, it is harder to establish causes and effects linkages between landuse and watershed protection services in large scale.
9. Another major challenge in PWES implementation is the difficulty to measure and value services and to assess the costs incurred by rural people providing them.

# 5. RESEARCH AREA

The research area of this Master's Thesis is the Churia region in Nepal. A detailed description is provided below in the following subchapters.
The Siwalik Hill Range (as the Churia range is called outside Nepal (Amatya and Shrestha, 2002; Laubmeier et al., 2004; Sharma et al., 2005; Upreti, 1999)) is the southernmost range of the Himalayas extending 1690 km in central Asia. The range is paralleling the main Himalayan range at a distance of 140 km. (Columbia Encyclopedia, 2007) It extends from the Tista River of Sikkim (India), through south Nepal, across north-western India, and into northern Pakistan (Wikipedia, 2007a).

Nepal, with an area of 147181 sq km, is divided into five physiographic regions – Terai region, Churia region (Siwaliks), Middle Mountains region (Mahabharat Range), High Mountains region and High Himal region as shown in Figure 8 and briefly described in Table 2. The Churia region lies in between the Mahabharat Range on the north side and the Terai Plain on the southern side (LRMP 1986 in Khanal et al., 2007).

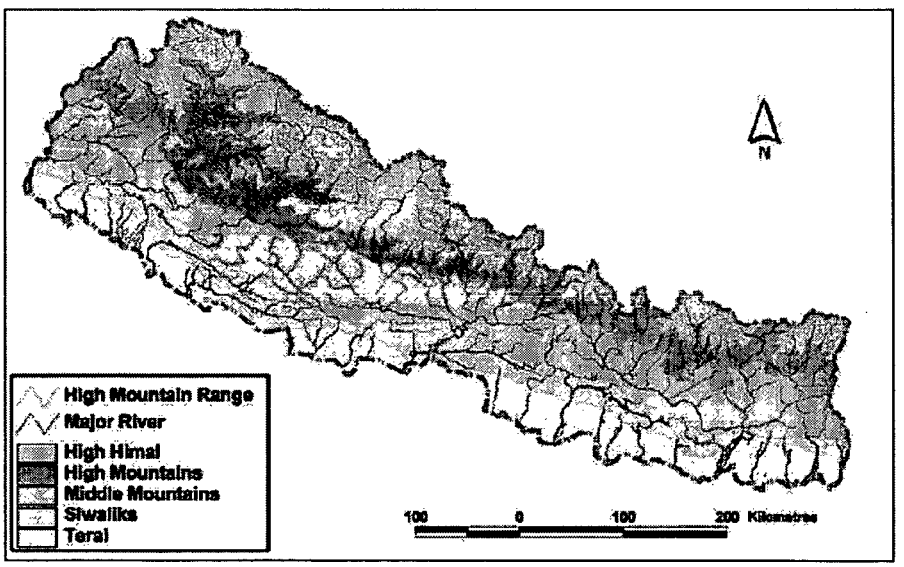


**Figure 8: Physiographic Regions of Nepal and Drainage Network**
Source: DWIP in Khanal et al. (2007:5)

The elevation of the Churia Range in Nepal varies from 700 to 1500 meters while extending from east to west (Amatya and Shrestha, 2002; Sharma, 1999). With only 10-30 km width, the range is narrow in the east while wider in the west and far west of Nepal (Amatya and Shrestha, 2002; Sharma, 1999). The range follows a linear pattern with enclosing lesoidal valleys called Dun ('Bhitri Madesh' in Nepali) (Sharma, 1999). The Churia Range merges with the Mahabharat Range in the eastern Nepal and is separated in the central and the western while again in the far west they are mixed with the Mahabharat Range (Sharma, 1999). The transition zone from steep southern slopes of the Churia Range to the Terai plains is known as the 'Bhabar' (Wikipedia, 2007a). The Bhabar is also described as the foot hill of the Churia Range.

| S. N. | Physiographic Region | Average altitude (m) | Approximate area coverage (%) |
|---|---|---|---|
| 1 | Terai Plain | 60-300 | 13% |
| 2 | Churia or Siwaliks | Less than 1000 | 12% |
| 3 | The middle mountain (Mahabharat Range) | 1000-3000 | 30% |
| 4 | High Mountains | 2000-4000 | 20% |
| 5 | Highland or Great Himalayas | Above 4000 | 24% |

**Table 3: Physiographic Regions of Nepal**
Source: Khanal et al. (2007: 5)

In this study, the term Churia region will be used to indicate the Churia hill range including the Dun Valleys and the foot hills of Bhabar[3]. The research study will analyze the applicability of PWES in the watersheds of the Churia region of Nepal.

## 5.1. BIO-PHYSICAL CONTEXT

To be familiar with in biophysical context of Churia area, information about its origin is very important.

### 5.1.1. Origin of Siwalik Ranges

According to Valdiya (Valdiya, 2002), by breaking away from Madagascar, India converged toward mainland Asia and collided with it about 65 millions years ago. About 35-46 millions years ago, this process lead the northern part of the Indian Crust bulge up as the Himalaya and a depression along the southern margin of the emerging the Himalaya. The rivers carried detritus generated by the denudation of the fast emerging Himalaya and deposited it in foreland basin. In this way, the foreland basin in the south – the Siwalik basin - was formed 18 millions year ago.

provides a sketch map of the excessive delivery of sediments by the fast-rising the Himalaya and deposition of sediments in the foreland basin. The sediments are then, spilled over onto the Indian Ocean. When the Himalaya range was uplifted, the mountain front virtually collapsed with landslides. The resultant debris flows carried the gravel and mud to dump in the Siwalik basin. (Valdiya 1998 in Valdiya, 2002)

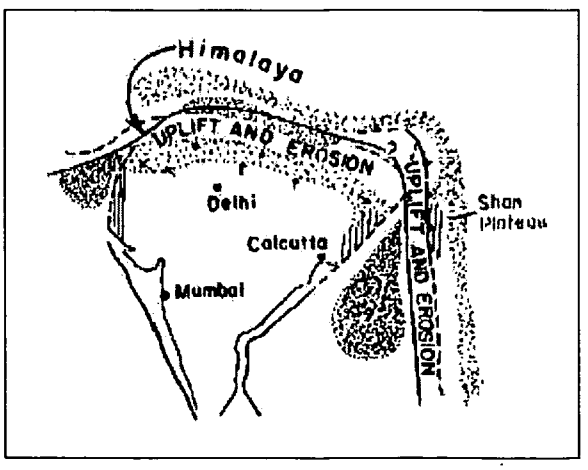


**Figure 9: Creation of Himalaya Range**
Source: Graham *et al.*, 1975 in Valdiya (2002: 379)

[3] The Land Resources Mapping Project (LRMP) combined the Churia hills, narrow valleys and dun into the Churia and included Bhabar into Terai Plain region. However, Churia Area Strategy Programme denote Churia hill, narrow river valleys, Dun, Bhabhar and Terai as Churia Area. (MoFSC, 2006)

Probably about 0.8 millions years ago, strong tectonic movements caused an uplift of the Siwalik Basin into the Siwalik hill range. The southern part of the range developed into the huge depressed basin. This basin was later filled up with sediments and converted into the Indo-Gangetic Plain. Figure 10 shows the hilly Siwalik range by horizontal lines and the Indo-Gangetic Plains shown by stipples. As the northward movement or push of the Indian plate is still continuing, the Siwalik range and the Himalaya range are said to be still rising. (Valdiya, 2002)

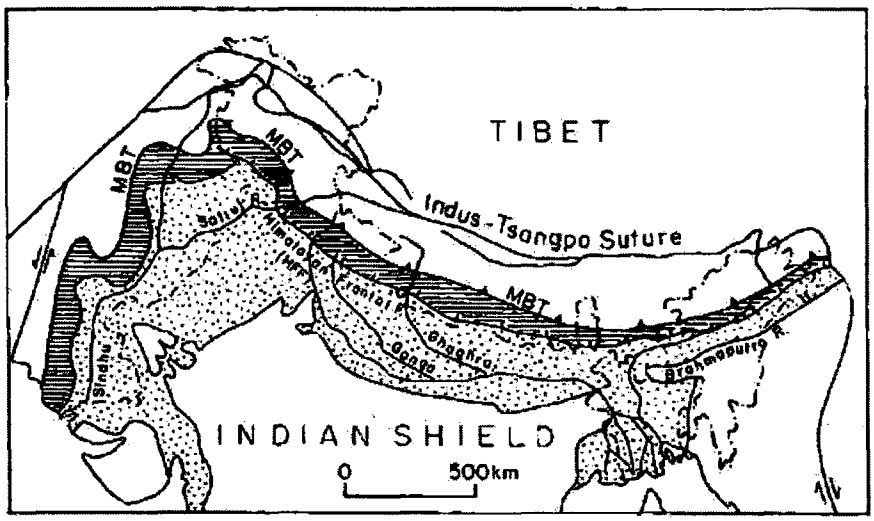


**Figure 10: Development of Siwalik Range**
Source: modified after Burbank 1992 in Valdiya (2002: 383)

### 5.1.2. Bio-physical Characteristics

**The Churia Range**

The Churia Range is the geologically youngest mountain chain of the Himalayan System (shown in Figure 11). It is chiefly composed of sandstone, mudstone, shale and conglomerate which are the solidified detritus of the Himalaya range but poorly consolidated (Upreti, 1999). The result of tectonic movement and loosely consolidated soil make the Churia range vulnerable for natural erosion. Therefore, the Churia range contributes maximum loads of sediments to the rivers of Nepal (Sharma, 1999). The erosion is further accelerated by deforestation and destructive human activities. Therefore, it is misleading to attribute negative effects of such erosion solely to human activities overlooking natural causes (Laubmeier et al., 2004). The foot hills of the Churia Range, the Bhabhar, are geologically made up of boulders, cobbles and pebbles. Its formation is coarse, hence highly pervious (CAPST, 2006).

The Churia region has sub-tropical climate, warm temperate and high rainfall intensity in the higher hills. Sal (*Shorea robusta*), mixed hardwoods and Pine forests are the main vegetation in the Churia Region (HMGN/MFSC, 2004). The Bhabar consist of narrow but continuous belt of forests, which are about 8-12 km wide. This belt of forests is locally known as '*Char Kose Jhadi*' (literally means four kos[4] long forests) (Amatya and Shrestha, 2002).

**The Terai**

The Terai plain is the northern part of the Indo-Gangatic plain which is about 30-40 km wide lowland extending from east to west of Nepal along the border with India (Sharma, 1999).

[4] One kos is equaling about two miles.

The alluvium plain Terai consists of coarse gravels near the foot of the mountains, gradually becoming finer southward (Upreti, 1999). Because of the high productivity of the Teria, it is also named as food basket of Nepal (HMGN/MFSC, 2004). The Terai also having sub-tropical climate consist of hardwood forest with Sal, while Sisso-Khair (*Dalbergia sisso-Acacia catechu*) forests are present along the riverine belts (MoFSC, 2006).

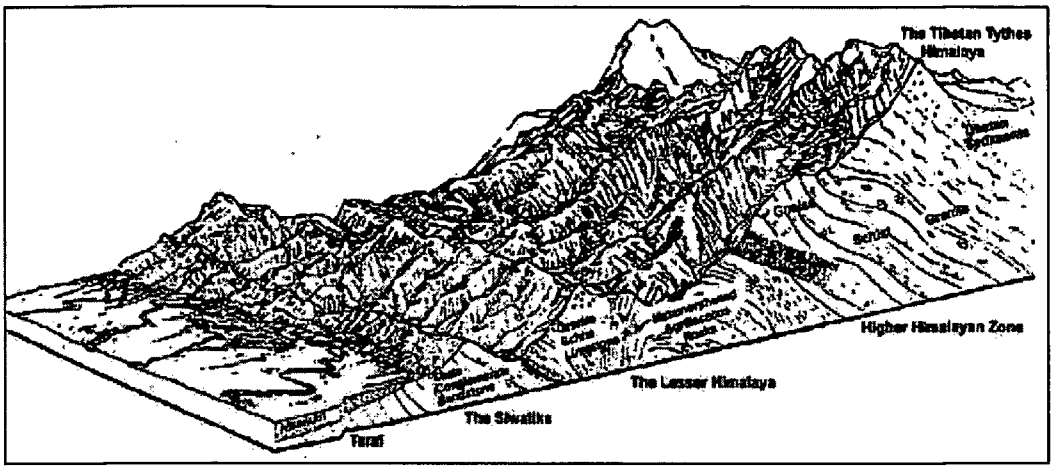


**Figure 11: Cross-cutting along Longitude of Nepal Showing Physiographic Regions**
Source: DWIP in Khanal et al. (2007: 5)

**Linkage between the Churia range and the Terai**
The ecological, hydrological and biological linkages between the Churia hills and the Terai plains is well appreciated in the literature (CAPST, 2006; CWMP, 2006; HMGN/MFSC, 2004; Laubmeier et al., 2004; MoFSC, 2006). Surface water percolates through coarse surface of the Bhabar and recharges in the Terai feeding the groundwater reservoir (Dahal, 2006). Additionally, any destructive activities in the Churia hills leads to soil erosion resulting extreme floods, sedimentation and destruction in downstream area of the Terai and the Dun valleys (CAPST, 2006).

Forests corridors, which maintain the connectivity among protected areas of the Terai help to maintain genetic variability, population viability and ecological integrity. The importance of Churia forests increase as these forest corridors lies in the Churia region.

## 5.2. SOCIO-ECONOMIC CONTEXT

**The Churia Range**
Many parts of the Churia hills are unsuitable for agricultural cultivation and settlement because of shallow soil and steep slopes. Therefore, a large part of the Churia range remains under forest cover (Laubmeier et al., 2004). Due to coarse textured soil, quick percolation of rainwater and low water table, the Bhabar is also not productive for agriculture (Dahal, 2006). Therefore, thick forests (Char Kose Jhadi) existed in the past in Bhabar as well. Fed by the watershed of Churia range, the Terai plain is very fertile and provides food for the whole country (MoFSC, 2006).

The settlements in the Churia hills are scattered (MoFSC, 2006). Despite the carrying capacity of the Churia hills is low, people with high dependency on natural resources for survival heavily populate some parts of the area. Population pressure is increasing, mostly through migration from the Middle Mountains and the Terai, either in search of new land or displaced by natural hazards such as floods and landslides (CWMP, 2006; HMGN/MFSC, 2004).

Therefore, several parts of the Churia hills have been encroached for settlement and cultivation, especially by those with few other livelihood option (HMGN/MFSC, 2004). Therefore, most settlers in the Churia region are squatters without legal land rights. (CSRC et al., 2005)

Since East-West and north-south highway crosses through the Bhabar, new markets have been created and attracted new settlements. The gravel from the foothill Bhabar supplies urban areas with essential construction materials - negatively effecting the environmental conditions of this area. Landuse changes in the Bhabar decrease the water feeding capacity to the Terai underground water reservoir, resulting in water scarcity for agriculture. (HMGN/MFSC, 2004)

The majority of households in the Churia hills are very poor and do not have sufficient food for the whole year. They are highly dependent on agricultural land or forests or both. Most households sell timber and other forest products for their livelihood. Illegal timber harvesting, firewood and NTFPs collection, manual work in nearby market areas or remittances from the foreign employment are the additional livelihood sources in the Churia hills (MoFSC, 2006). The ethnic composition varies from eastern to western Nepal with the major ethnic groups of Tamang, Magar, Chepang, Danuwar, Brahmin and Chhetri (MoFSC, 2006). Infrastructure such as water supply, irrigation facilities, electricity, roads, schools, health posts and market centres, and services are poorly developed in the Churia hills (CSRC et al., 2005; MoFSC, 2006).

**The Terai**

In the Terai region, settlements are confined to densely populated villages. Some major cities and industries of Nepal are situated in the economically active Terai. Major ethnic groups are Yadav, Tharu, Tatma, Kurmi, Mandal, Teli, Chamar, Kalwar, Brahmin, Rajput, Thakur, Mushahar, Dom and hill migrants, which include Brahmin, Chhetri, Newar and Thakuri (MoFSC, 2006).

The lower caste group locally named 'dalit' are the most marginalized and disadvantaged groups in the community who are highly dependent on natural resources for their livelihood. Amongst the lower caste Damai (tailors), Sarki (leather workers), Kami (metal workers) and Sunwar (gold workers) inhabit the Churia area while Mushar, Chamar and Dhusar live in the Terai plain (CWD, 2003). Problems such as deforestation, over grazing, shifting cultivation in Churia hills triggers soil erosion resulting in flooding and sedimentation of agricultural land in the Terai, ultimately changing it into unproductive land (Tembe, 2001).

# 6. RESEARCH RESULTS AND DISCUSSION

This chapter presents the results of this research and is structured in five subchapters. The first subchapter 6.1 describes the current status of PES in Nepal. The second subchapter 6.2 identifies factors for PWES in the Churia region. This chapter is followed by the third subchapter 6.3 which compares the important factors for PWES with the context, the watersheds of the Churia region. The fourth subchapter 6.4 presents opportunities and challenges for the application of PWES in Churia watersheds. Finally, subchapter 6.5 provides recommendations for the application of PWES in Churia watersheds.

## 6.1. CURRENT STATUS OF PES

A wide range of experiences for exploring and testing PES schemes have been gained in different sites around the world, especially in developed countries. Nevertheless, the PES concept is relatively new and still evolving. Therefore, a key step to analyse the applicability of PWES in Churia watersheds is to be informed about the current status of knowledge and practice of PES in Nepal. Therefore, this chapter will present the current understanding of PES by individuals and organizations, including current practices and projects in Nepal.

### 6.1.1. Current Understanding of the Concept

This chapter will provide a synopsis of the understanding of the PES concept among experts from government and non-government organizations in Nepal collected through interviews[5].

The approach of public participation in natural resource management partly replaced the previous command and control approach using regulatory instruments. More recently, new market-based approaches to ensure sustainable funding for environmental services are developed. Within these market-based approaches, PES is recognized in Nepal as a new and innovative approach, linking environmental services provision with economic incentives (DNPWC, 2007).

An analysis of the experience and personal views of the interviewed expert reveals that there is high variation in the understanding of PES among these experts in Nepal. One interviewee rightly defined service providers and beneficiaries as follows: *'People who benefit from the use of services are known as beneficiaries; and those who take action for the provision of those services and bear the cost are called service providers.'* (N, 17)

Interviewees from both government and non-government organizations have stated that the supply of environmental services in the past surpassed the demand. All of these services have been available to people free of cost. A shortage of environmental services due to an increase in population and resulting degradation of these services, led people realize the value of these services. As a consequence, people and the government started to take action to conserve the services. However, interviewees from NGOs (N, 10; N, 11; N, 13; N, 15; N, 17) pointed out that those who help providing environmental services discontinue their support due to a lack of rewards.

Interviewees from government organizations (G, 1; G, 3) stress the appropriateness of the PES approach to convince individuals to mitigate degrading and maintain environmental services for future generations. Additionally, this approach internalizes the recognition of

[5] Interviewees are categorized into two groups - interviewees from government organization are indicated by the letter 'G' and interviewees from NGOs by the letter 'N'. Each interviewee is additionally numbered (e.g. N, 1).

equity in cost and benefit sharing because users who are beneficiaries of environmental services negotiate to provide part of their benefits to service providers as payments. Interviewees added that payments could be provided in two different forms, either cash or kind (N, 8; N, 11).

One interviewee from an NGO (N, 10) put forward his view about the motivation to apply PES approaches in a developing country like Nepal. In the usual case, the responsibility for the high investments required to maintain environmental services and related natural resources lies with the government. Especially for governments of developing countries, this is a big challenge due to the shortage of funds. In case of PES schemes, sustainable finance sources are secured from payments from beneficiaries to service providers for provision of environmental services.

One interviewee from a government organization (G, 1) stated that payments for environmental services should be channelled back to either ecosystems (or ecological systems) or to service providers assisting the provision of services (or social system). In rural communities of Nepal, social systems are very closely integrated with ecological systems (e.g. high dependence on forest for livelihood). The interviewee stressed the point that exclusive payments to only one of the two systems will not sustain service provision. Therefore, payments should be transferred to service providers, who eventually can invest into ecosystem management.

According to two interviewees (N, 16; N, 17), who have been involved in the start up of a PES project, landuse has peculiar characteristics or effects within PES schemes. Positive or negative effects from landuse are not localized but rather spread widely, mostly within the watershed. For example, deforestation in upstream can increase sedimentation in downstream areas. Therefore, affected residents downstream are required to be involved in decision making for such landuse in addition to the land owners upstream. The concept of PES provides opportunities for downstream beneficiaries to make contributions in landuse in upstream.

Furthermore, one interviewee (N, 17) mentioned PES as one measure to address the previously mentioned concern (spreading of landuse effect) and correctly summarized PES as follows: Beneficiaries of environmental services downstream can be convinced to make payments to upstream land users. These payments are paid to cover either the costs of upstream landuse or the loss that land owner bear for provision of environmental services. Such a mechanism is called Payment for Watershed Protection Environmental Service (PWES).

### 6.1.2. Practice of PES

Government of Nepal has followed different watershed management approaches over the last years and decades. Experience ranges from participatory watershed management, sub-watershed management (i.e. an approach considering sub-watersheds as functional units) to integrated watershed management (i.e. an approach integrating forestry, agriculture, livestock etc. in watershed management) over the last decades (Singh et al., 2004). However, the concept of PWES is very new for watershed protection and management in Nepal. Hence, there is hardly any practical experience with PWES schemes on the ground.

In the study carried out by Porras and Landell-Mills (2002b), out of 258 cases studies of PES, six cases were from Nepal which is shown in Table 3. However, all six cases fall into the category of paying for landscape beauty. The details of the six schemes are presented in annex 2.

| Schemes | Commodity |
|---|---|
| Annapurna Conservation Area | Access rights & management agreements |
| Ghalekharka-Sikles Area, southern Annapurna ecotourism | Package of services |
| Royal Chitwan National Park | Buffer zone ecotourism services |
| Lodge tax in Langtang National Park | Management projects |
| Muir's Tours | Natural resource management projects |
| National Park payments for landscape beauty | Access rights |

**Table 4: PWES Schemes in Nepal**
Source: Landell-Mills and Porras (2005: 233)

The fourth amendment of 'National Park and Wildlife Conservation Act' in 1993 made provision for buffer zones around protected area as the peripheral area of national parks or reserves. The same amendment required 35-50% of the revenue generated by a protected area to be shared with local communities (Thapa et al., 2007). In the example of the Royal Chitwan National Park, 30-50% of the revenue goes to local communities. These examples show that those policies create niches for PES implementation in Nepal.

Similarly, with support of NGOs and donors as intermediary, local communities share benefits with protected areas through community-based eco-tourism (Landell-Mills and Porras, 2002a). For example, in the Annapurna Conservation Area, revenues generated through a permit fee charged to visiting trekkers are used to establish and maintain the Conservation Area and to increase the income supporting the livelihoods of local communities. An NGO, National Trust for Nature Conservation (NTNC) which is managing the park, acts as intermediary for the scheme (Quesne and McNally, 2005; Shilling and Osha, 2003).

Another example is the Langtang National Park in Nepal (Landell-Mills, 2002). In the past, lodge operators in Syabrubensi village feared that rapid deforestation and degradation of forest will undermine the interest of tourist in the Langtang National Park in the future. Therefore, lodge operators in Syabrubensi village agreed to pass on payments to local communities to protect over 170,000 hectares area, including some of the best preserved silver fir and rhododendron forests in the country. Based on the brief illustration of these examples, it can be claimed that PES for landscape beauty exists in Nepal.

Recently, Nepal succeeded to obtain funds from the Community Development Carbon Fund (CDCF) of The World Bank (UNFCC, 2005). This fund is received for the installation of biogas plants in rural areas of Nepal. Following the Clean Development Mechanism, such projects will reduce greenhouse gas (GHG) emissions by displacing conventionally used fuel sources for cooking, such as fuel wood and kerosene. Furthermore, according to the information provided by one interviewee (N, 14), National Trust for Nature Conservation (NTNC) is also working for drawing international attention to community forestry of Nepal in order to ensure carbon trading according to the Kyoto protocol.

### 6.1.3. Organizations Working on PES in Nepal

Despite the current political situation of Nepal, several preparatory works to develop PWES schemes have been started by different national and international NGOs. WWF, which supports specific PES projects related to the conservation since 2000 in different countries worldwide, is carrying out capacity building, valuation of services and other activities in Nepal in collaboration with other organizations such as IUCN and CARE Nepal (WWF, 2007a; WWF Nepal Program, 2004). Organizations such as the International Centre for Integrated Mountain Development (ICIMOD) and the Swiss Agency for Development and

Cooperation (SDC) working in Nepal have also recognize PES as one of the tools for linking conservation with livelihood of people depending on natural resources (SDC, 2006; N, 9).

Three specific examples of work, carried out by different organizations, are presented below.

The World Conservation Union (IUCN) in partnership with ICIMOD carried out a study investigating the delivery of ecosystem economic benefits for upland livelihoods and downstream water users in Nepal. The study involved the formulation of a conceptual framework for economic evaluation of watersheds and used the framework to address issues of water catchment management in the Shivapuri National Park (Emerton and Iftikhar, 2006a). The study found that local communities living in the park and managers of the park from the Department of National Park and Wildlife Conservation (DNPWC) are bearing the overall management cost. However the management costs are nominal in comparison to the high net benefits received downstream for users such as irrigation, drinking water for residents of the Kathmandu valley and the generation of electricity by a hydropower plant in Sundarijal. The study also indicates the potential for the development of mechanisms, which ensure that a proportion of benefits return to the managers of land and resources in the upper catchment as rewards for the conservation of environmental services. Interviewees also indicated the need to further investigate these issues. (Emerton and Iftikhar, 2006b; N, 8)

In Dhanusha district, the Jaladh is one of the many rivers that originates in the fragile *Churia* range and flows down through the *Bhabar* and *Terai*. The second example describes the efforts of the Danish Forestry Extension (DFE) and Danish Folk High Schools Association (FFD) alliance together with CARE Nepal. These organizations currently design and implement the 'Jaladh Integrated Watershed and Natural Resources Co-Management Program' (JIWAN Program) with the objective 'to contribute towards sustainable livelihoods of the people of the Jaladh watershed area through establishing synergetic linkages between upstream and downstream stakeholders for sustainable management of watershed resources'. The program has also planed to introduce and experiment with the concept of co-management[6] of watersheds in order to pave the way to introduce PWES in future. (CARE et al., 2004)

The third example is about the Kulekhani River and its tributaries, which have been dammed to create a Kulekhani reservoir in Makwanpur district. This hydropower scheme generates electricity amounting to a total of 92 MW, which is currently about 17 percent of Nepal's total installed hydropower capacity. Upland areas of the Kulekhani watershed are however not only the source of water, but also the source of sedimentation in the Kulekhani reservoir. The state-owned Nepal Electricity Authority (NEA) is the owner of the Kulekhani Hydroelectricity Project (HEP). Proper management of the Kulekhani watershed benefits the NEA by reducing siltation. This furthermore reduces maintenance costs and makes water more available in the dry season for the generation of electricity thereby increasing the revenue of the NEA. Upstream land users are service providers not only for the Kulekhani HEPs but also for the electricity consumers in Nepal by ensuring a reliable supply of electricity. Winrock International Nepal is implementing the 'Rewarding Upland Poor for the Environmental Services They Provide' (RUPES) program in the Kulekhani watershed since 2003. The program is an action research program that proposes to develop and test PWES mechanism with the objective of promoting sustainable livelihoods among upland communities. The activities of the program involve the identification and valuation of environmental services, the identification of buyers and sellers and activities to raise awareness. This program is part

[6] Co-management in this context is defined as the management of Churia hills resources through collaboration of upper, mid and lower catchment populations, civil society organizations and government agencies. (CARE et al., 2004)

of the Asia regional RUPES program which aims to develop mechanisms for rewarding upland poor in Asia for the environmental services they provide. (Upadhyaya, 2005; N, 10)

## 6.2. RELEVANT FACTORS FOR PWES

For the purpose of this study, it is required to have a better understanding about the characteristics and features of the watersheds in the Churia area. In line with the conceptual framework describe in Figure 4 in the third chapter, relevant factors for PWES for the Churia watersheds are scrutinized in the six different dimensions (environmental services, geographical dimension, landuse dimension, social dimension, PES scheme and legal dimension). This exploratory research is based on interviews with experts as well as on a review of literature concerned with the Churia region.

### 6.2.1. Environmental Services

The interviewees provided a list of environmental services obtained in Churia watersheds, which are clustered into four categories- provisional, regulatory, supportive and cultural environmental services. Environmental services in Churia watersheds lying in those four categories are presented in Figure 12 below.

| **Provisional Services**<br>*Services focused on direct supply* | **Regulatory Services**<br>*Services related to regulating flows or reducing hazards related to water flows* |
|---|---|
| - Surface water supply such as provision of water for irrigation, drinking water and household use<br>- Provision of products from land use from forest (e.g. timber, fuel wood supply and Non timber forest products- fodder, medicinal and aromatic plants) or from pasture land<br>- Gravel, sand and pebbles (as construction materials) carried by rivers flowing downstream | - Groundwater recharge in lowland Terai<br>- Protection from natural disaster such as flash flood, landslide<br>- Control of sedimentation on productive lands<br>- Regulation of hydrological flows such as Water regulation<br>- Control of water quality<br>- Erosion control and protection from land degradation<br>- Local climate modulation due to Churia hills<br>- Protection of productivity of Terai and protection from desertification |
| **Supporting Services**<br>*Services provided to support habitats and ecosystem functioning* | **Cultural Services**<br>*Services related to recreation and spiritual inspiration* |
| - Flow of soil nutrition to downstream through nutrient cycle<br>- Carbon sequestration<br>- Provide wildlife habitat protection increasing<br>- Biodiversity | - Aesthetic value of recreation<br>- Cultural value of cultural heritage such as temples (e.g. Churia Mai) |

**Figure 12: Watershed Protection Related Environmental Services in Churia Watersheds**
Source: Adapted from Smith (2006:16) for Churia Watersheds

The graphical representation of environmental services in Churia watersheds according to a number of interviewees from government and non government organizations mentioned those services are presented in Figure 13.

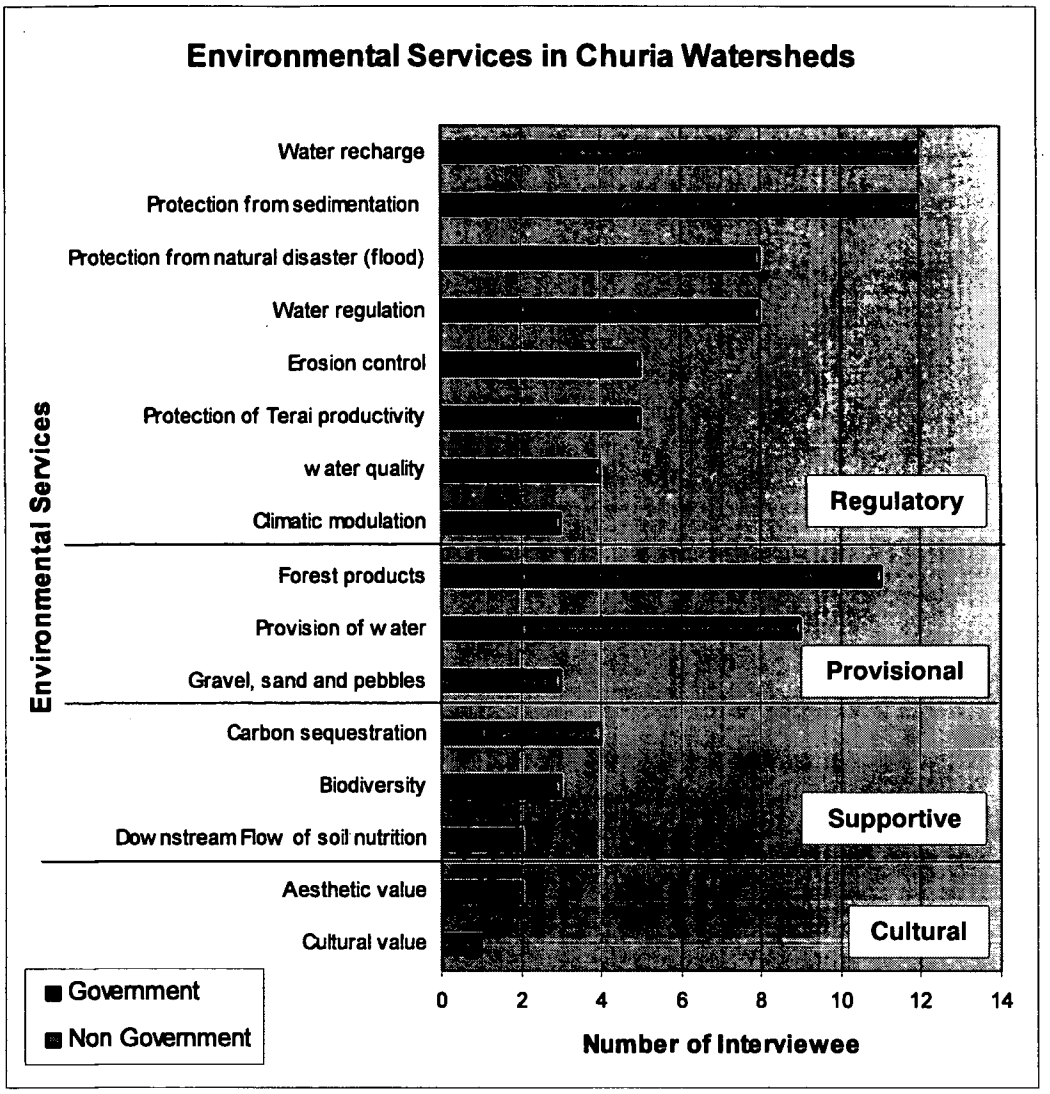


**Figure 13: Graphical Representation of Environmental Services in Churia Watersheds as Mentioned by Interviewees**

### a) Regulatory Environmental Services

The majority of interviewees mentioned regulatory environmental services in Churia watersheds more than any other category of environmental services. Interviewees identified regulatory environmental services such as water recharge in the Terai, sedimentation control and protection from natural disasters as important environmental services.

Water recharge in lowland *Terai* has been identified as an important environmental service by about two thirds of the interviewees. They stated that the foot hills of Churia, called Bhabar, are feeding ground water that is recharged into the Terai. Since the Bhabar consist of a layer of coarse soil on the top, water infiltrates rapidly into the Bhabar, resulting in a deep water table in the Bhabar zone. However, infiltrated water appears again as groundwater in the Terai. Underground water is the main water source in Terai flatlands ranging from drinking to irrigation in farms.

According to some interviewees, the Churia hills are also the source of sediments that flow into the Terai through surface water runoff. Therefore, conservation activities in upstream Churia hills can reduce sedimentation in productive land downstream. About two thirds of the

interviewees recognized that this form of protection from sedimentation is another vital environmental service provided by the Churia watersheds.

Interviewees also identified siltation of sediments brought by water-flows from Churia region as one root cause of floods and other natural disasters in lowland Terai. Since the Churia hills are weak and fragile, they are prone to erosion. Therefore, sedimentation of debris from such erosion on riverbeds reduces the capacity of rivers to hold river water. As a result, water overflowing from the main course of rivers floods villages, agricultural land and cities on the riverside. Floods in the lowland repeatedly destroy property, livelihoods and infrastructure such as bridges, electric poles etc. Furthermore, the lowland population has to bear the costs of thousands of rupees for the removal of sediments from irrigational canals. Sedimentation on fertile cultivated land in lowland furthermore decreases agricultural productivity. Thus, about half of the interviewees from government and about two fifth of the interviewees from non-governmental organizations stated that conservation of the Churia hills can potentially reduce sedimentation and consequently control flood and other natural disasters.

**b) Provisional Environmental Services**

According to two interviewees (N, 13; N, 15), people depend on the Churia region for provisional environmental services such as forest products (e.g. timber, fuel wood and other non timber forest products such as fodder, medicinal plants). Residents from the Churia region are as much dependent on these services as people from the Terai. The absence of sufficient forest to fulfil the needs of the Terai population causes an increased dependency on forests in the Churia region. As forests nearby settlement area (villages) are handed over to users groups as Community Forest Users Groups (CFUGs), people from Terai and Bhabar (also known as distant users of Churia forest) in many cases have to acquire forest products from state forests in the northern part of the Churia region.

Similarly, gravel, pebbles and boulders flowing from Churia to the Terai and Bhabar regions are used as construction material. About one fifth of the interviewees identified the Churia region as the source of these materials, provided through the provisional environmental services of the Churia.

**c) Supporting Environmental Services**

The Churia area and the Terai compromise five protected areas, out of which two are national parks - Royal Chitwan National Park, Royal Bardiya National Park and three wildlife reserves - Koshi Tappu Wildlife Reserve, Royal Shuklaphanta Wildlife Reserve and Parsa wildlife reserve (CAPST, 2006). These protected areas are home of many endangered and protected species such as Asia Elephant (*Elephas maximus*), Gangetic Dolphin (*Platanista gangetica*), Ghadial Crocodile (*Gavialis gangeticus*), Royal Bengal Tiger (*Panthera tigris*), One-horned Rhinoceros (*Rhinoceros unicornis*) (HMGN/MFSC, 2004).

Churia forests play a crucial role in providing biological connectivity between protected areas called biological corridors. Forest corridors are natural habitats of wildlife that contain the ecological condition of wildlife necessary for potential wildlife movement (HMGN/MFSC, 2004). Such corridors are crucial for the maintenance and preservation of biodiversity. As informed by one interviewee (N, 10), most of these corridors close to national parks lie in the Churia region (e.g. the corridor joining Bardia National Park and Royal Shuklaphanta National Park). Thus, the Churia region provides habitat for wildlife and plants increasing biodiversity, which are supporting environmental services.

This fact has been recognized by about one fifth of the interviewees (mainly non government employees). They stated that the Churia Region is famous for its high biodiversity due to the

high number of species (flora- medicinal and aromatic plants, fauna- wildlife) – an important aspect for tourism (N, 11; N, 14).

In principle, it is difficult to separate environmental services related to watershed protection from other environmental services. Other environmental services, which are obtained from the watersheds of the Churia region have been identified by several interviewees such as are carbon sequestration and biodiversity habitat.

**d) Cultural Environmental Services**

One interviewee (N, 14) also pointed out the presence of religiously and culturally important temples and other cultural heritage in the Churia region. Even the name 'Churia' has been derived from the name of Goddess *Churia Mai*, whose temple is located in the Churia hills near Hetauda (MoFSC, 2006). Thus, the Churia region provides cultural services with spiritual and aesthetic values.

As mentioned by Landell-Mills and Porras (2002), the identified environmental services can be possibly converted into commodities. Possible commodities are such as best management practice contracts, water rights, water quality credits and watershed protection contract etc.

### 6.2.2. Geographical Dimension

**a) Characteristic of Watersheds in the Churia Region**

Watersheds in the Churia region are mainly fed by heavy monsoon rains resulting in many streams, which drain into the lowlands of the Terai and the dun valleys. These streams are in full spate during the monsoon season, but have very little or no flow during the rest of the year. These streams' water is harnessed for household and irrigation use in the rich agricultural lands of the Terai and the Dun valley. Almost all of these are widening and changing their courses rivers in the plains as a result of excessive sedimentation. (Singh et al., 2004)

According to Krishnan and Villholth (2005), Nepal can be divided into four major river basins – the Saptakosi, Gandaki, Karnali and the Mahakali – apart from some small south-flowing rivers like the Bagmati, Tinau etc. (see Figure 14). These rivers flow north to south, crossing the Churia, Bhabar and Terai regions before leaving Nepal.

Apart from rivers that arise from the high Himalayas and the Mahabharat, there are numerous streams and rivers that also originate from the Churia range itself. These rivers originate from Churia hills and flow south with wide valleys while rivers generated from the Mahabharat Range make narrow and deep valleys in rivers (Sharma, 1999). The coarse Bhabar zone absorbs water from these rivers and feeds Terai aquifers as underground water (Krishnan and Villholth, 2005). One interviewee from a NGO (N, 7) expresses identical view on the importance of the foothill of Churia for underground water supply in Terai.

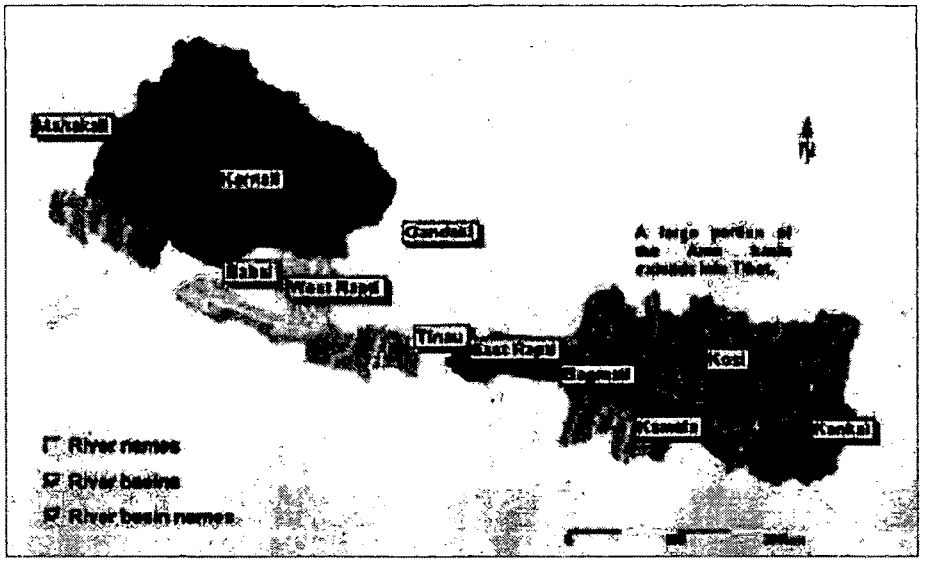


**Figure 14: River Basins of Nepal**
Source: ICIMOD 1996 in Singh (2004: 8)

In several watersheds of the Churia region, upland to lowland can be described in descending order as Churia hills, the Bhabar, the Terai or the Dun valleys. If political boundaries of countries are disregard, the list can be expanded by adding India and Bangladesh. This results in a high variation in the provision of environmental services in the Churia watersheds. Environmental services can therefore be categorized according to geography. This categorization has been developed in a 'Sharing workshop' and the results are presented in Table 4 below:

| Geography | Environmental Services |
|---|---|
| *Churia* hills | Forest Products<br>Biodiversity (Corridors) |
| *Bhabar* | Forest Products<br>Sand, gravel, Pebbles<br>Flow regulation<br>Landscape beauty<br>Biodiversity |
| *Terai or Dun valleys* | Water quality maintenance<br>Erosion and sedimentation control<br>Water table regulation and improvement in water recharge<br>Maintenance of aquatic habitat<br>Biodiversity<br>Landscape beauty |
| Outside international boundary (India, Bangladesh) | Sedimentation control, flood control<br>Other services |

**Table 5: Environmental Services in Churia Watersheds according to Geography**
Source: Sharing Workshop (2006)

### b) Scale of PWES Schemes

Some interviewees provided various options for the different scales at which PWES schemes can be implemented in the Churia watersheds. Schemes can be applied in different scales based on either political division or watershed size. From the perspective of political divisions, PWES schemes can be applied to the international, national or local government level (e.g. district or DDC).

Most interviewees, both from government and non-governmental organizations (G, 1; G, 3; N, 10; N, 11; N, 14; N, 15; N, 16; N, 17) emphasized the importance of PWES schemes at the local government level. DDCs are the main coordinating body for development of the district and are headed by a politically elected chairperson. These DDCs can act as intermediaries who provide forums for discussion and negotiations, because they coordinate the various government and non government agencies at the local level. Another interviewee (N, 12) suggested the establishment of district level environmental funds from taxes and revenues to pay upstream service providers.

One respondent from a NGO (N, 13) proposed to initiate a PWES scheme at the national, not district level. He suggested the establishment of a national Churia conservation fund to collect funds from revenues and taxes. Similar to the district level fund, this fund could be used to pay service providers in the Churia region.

As stated by another interviewee, PWES schemes could also be applied at the international level to large rivers flowing from Nepal to countries like India and Bangladesh (N, 9). However, one other interviewee (N, 15) stressed the difficulties of unclear scientific linkages between landuse and environmental services as well as the importance of clear international policies for international scale PWES schemes. The same interviewee also stresses the obvious difficulty of the Government of Nepal to negotiate these laws with India.

From the perspective of watershed size, PWES schemes can be applied to from sub-watershed to river basin level depending on the catchment area of a watershed[7]. Most interviewees from NGOs (N, 10; N, 14; N, 15; N, 16; N, 17) stated the possibility of PWES schemes initiation in sub-watersheds of the Churia region. For example, corporations such as hydroelectricity power plants, industries relying on Churia regional resources, irrigation water users etc. could pay upstream service providers.

PWES schemes could potentially also be initiated in river basins in Churia regions such as Kamala or Kankai river basins. However, implementation of a PWES scheme at river basin scale in the Churia region can be complicated. Difficulty in establishment of landuse and environmental services provision linkages; social diversity along river basins; and longer distances between beneficiaries and service providers can cause those complexities.

### 6.2.3. Landuse Dimension

#### a) Change in Landuse

According to MoFSC (2006), the major landuse in the Churia hills in 2001 has been forests with few patches of cultivated land. The area of cultivated land in the Churia hills has increased between 1975 and 2001 and the rate of increase of cultivated land is higher in comparison to the rate of decrease in forest. The practice of shifting cultivation puts additional pressures on the land in the Churia region. In Bhabar, cultivated land and forests both are the major forms of land use. However, cultivated land is the major landuse in the Terai and small patches of forest left. The deforestation rate in the Terai is higher compared to the Churia and Bhabar areas (see Table 5).

[7] Personal communication with an environmental economist

With respect to the legal status, forests in the Churia region and Terai can be categorized into different types, such as Community Forest (CF)[8], State Forest, Collaborative Forest Management (CFM)[9], Private Forest and Protected Area (PA).

| Region | Cultivated land (%) | Forest (%) | Degraded forest (%) | Riverbed (%) | Decrease in forest (%) | Increase in cultivated land (%) |
|---|---|---|---|---|---|---|
| Churia hills | 8.5 | 74.3 | 13 | 1.2 | 3.1 | 52.3 |
| Bhabar | 31.8 | 42.6 | 15 | 7.6 | 7.2 | 18.7 |
| Terai | 81 | 6.9 | 3.8 | 5 | 27.8 | 6.9 |

**Table 6: Landuse and it Changes in Different Regions of Nepal**
Source: Created from MoFSC (2006)

Increased population in the Churia hills causes deforestation by converting land into agricultural land and settlement areas. One major reason for the increase in population in the Churia hills is migration from mountains. Lack of knowledge, skill and credit along with low productivity of Churia hills locks these migrants into poverty. However after the introduction of Community Forestry concept in 1992, the high rate of deforestation has been decreased. (Gautam, 2001; Ghimire and Higaki, 2004)

Large forest patches in the Churia range are unmanaged because residents have neither access to nor control over these forests. They also lack awareness about the need to manage them properly, and unsurprisingly have no motivation to do so. Thus, the forest, "the wealth of the nation," is being destroyed on a daily basis. (Gautam, 2001)

**b) Linkage of Landuse and Environmental Services**

It is stated by one respondent (N, 7) that cause-effect relationships between land use and water availability and quality are difficult to assess and often uncertain due to the large number of variables and complex relations. Variations in geographical and climatic conditions in the different watersheds of the Churia region make generalizations about landuse and its impact on environmental services unrealistic. Therefore, verification about landuse impacts on water resources in each watershed is very crucial. Nevertheless, certain linkages could be identified though interviews.

Owing to weak geological formations, such as shallow coarse soil and loosely compacted rocks, the Churia hills are more vulnerable to rainfall. As a result, the bare or less vegetated slopes of Churia hills are more vulnerable to erosion in the rainy season (ADB, 2006). Therefore, the highly rugged terrain of the Churia range is dissected by numerous deep, unstable, eroded channels called gullies. At catchment scale, the contribution of gullies for erosion is about 13 times more than the surface erosion. These gullies serve as significant and dominant sources of sediment in downstream of degraded watershed catchment. (Ghimire et al., 2006)

[8] In Nepal, community forests as defined by the Forest Act (1993) are national forests handed over to users groups (Community Forest Users Group, CFUG) under specified rules and regulation for its development, conservation and utilization for collective benefits. (GoN, 1993)

[9] In Nepal, CFM is an approach of sustainable forest management in collaboration with local people to achieve multiple benefits, maintaining ecological balance, generating economic returns and improving livelihood from the government managed forests. (Sah et al., 2006)

The erosion rate in the Churia range varies between 7.8 and 200 tons/hectare/year depending on the specific land use. For forests, the erosion rate is around 7.8, for grazing area 36.8, for degraded forests 20, for gully land 40 and for degraded heavily grazed gully land about 200 tons/hectare/year season (ADB, 2006). Generally, the soil erosion rate is higher in unmanaged land and on steep slopes than in managed land. Slash and burn cultivation, inappropriate agriculture practices, uncontrolled and over grazing, encroachment and unplanned settlement accelerate soil erosion and landslides in watershed of Churia region (CSRC et al., 2005).

The eroded debris from the Churia range increases sedimentation downstream in the lowlands of watersheds, the dun valleys and the Terai. According to many interviewees (G, 5; G, 3; G, 6; N, 8; N, 16; N, 18), sedimentation on productive land downstream destroys large areas of cultivated land. Moreover, increased sedimentation causes a rise in riverbeds and resulting flooding. Every year thousands of people in the Terai and the Dun valleys lose their lives and properties due to these floods. Therefore, conservation measures in the Churia hills can help to reduce the impacts of erosion downstream by providing environmental services such as sedimentation control, flood control, water quality etc. to downstream in a watershed.

According to several interviewees (G, 3; G, 6; N, 8; N, 14; N, 16), the relationships between forests and water flows are complex and require rigorous studies to obtain credible measurements. Despite the lack of information, the public, NGOs and government officials have a strong perception that forests play an important role in protecting downstream water resources. Interviewees suggested that forests in the Churia hills control soil erosion in comparison to bare land. Some literature confirms the view, for example the experience in Community Forestry in the Churia region, which shows one example where an increase in forest cover has improved the water regime (both yield and quality) and hence reduced erosion at the micro-watershed level (Mathema et al. 1998 in ADB, 2006). However, one respondent (N, 18) clarified that if the amount of precipitation is higher than absorbing capacity of soil, trees cannot protect the saturated soil from erosion.

Interviewees from government and non-government organizations (G 3; G, 5; N, 15; N, 17; N, 18) furthermore state that water infiltrates the Bhabar, the foothill of the Churia range, and reappear again in Terai. Thus, the Bhabar is the recharge zone of the Terai. After malaria eradication, forests in the Bhabar zone have been replaced by settlements and agricultural land. This changed the coarse of the soil cover of the Bhabar zone and reduced the infiltration capacity resulting in a decline of the water table and in a shortage of groundwater in the Terai. However, one respondent (N, 7) stated a different opinion namely that rivers flowing through Bhabar are the main source of water to recharge in Terai groundwater. Thus, a clear identification of the linkages between Bhabar and Terai are very important to ensure groundwater through PWES schemes.

### 6.2.4. Social Dimension

The description of the beneficiaries in Churia watersheds can be clustered into three groups, based on three broad scales: local (e.g. drinking and household water users, local governments), national (e.g. Nepal's population depending on food from Terai) and international (e.g. international tourists). They can also be clustered according to their role in PWES schemes. The following description follows the latter cluster.

#### a) Beneficiaries

Interviewees agreed to the view of the FAO (2004b) that those who benefit from environmental services are creators of demand and users of those services. One interviewee from a governmental organization (G, 1) stressed a high number of downstream beneficiaries depend on environmental services from the Churia watersheds. For example, beneficiaries

can be urban water user's in need for the environmental service 'water quality' while the whole country population can be a beneficiary if food production in the Terai is improved due to the Churia conservation.

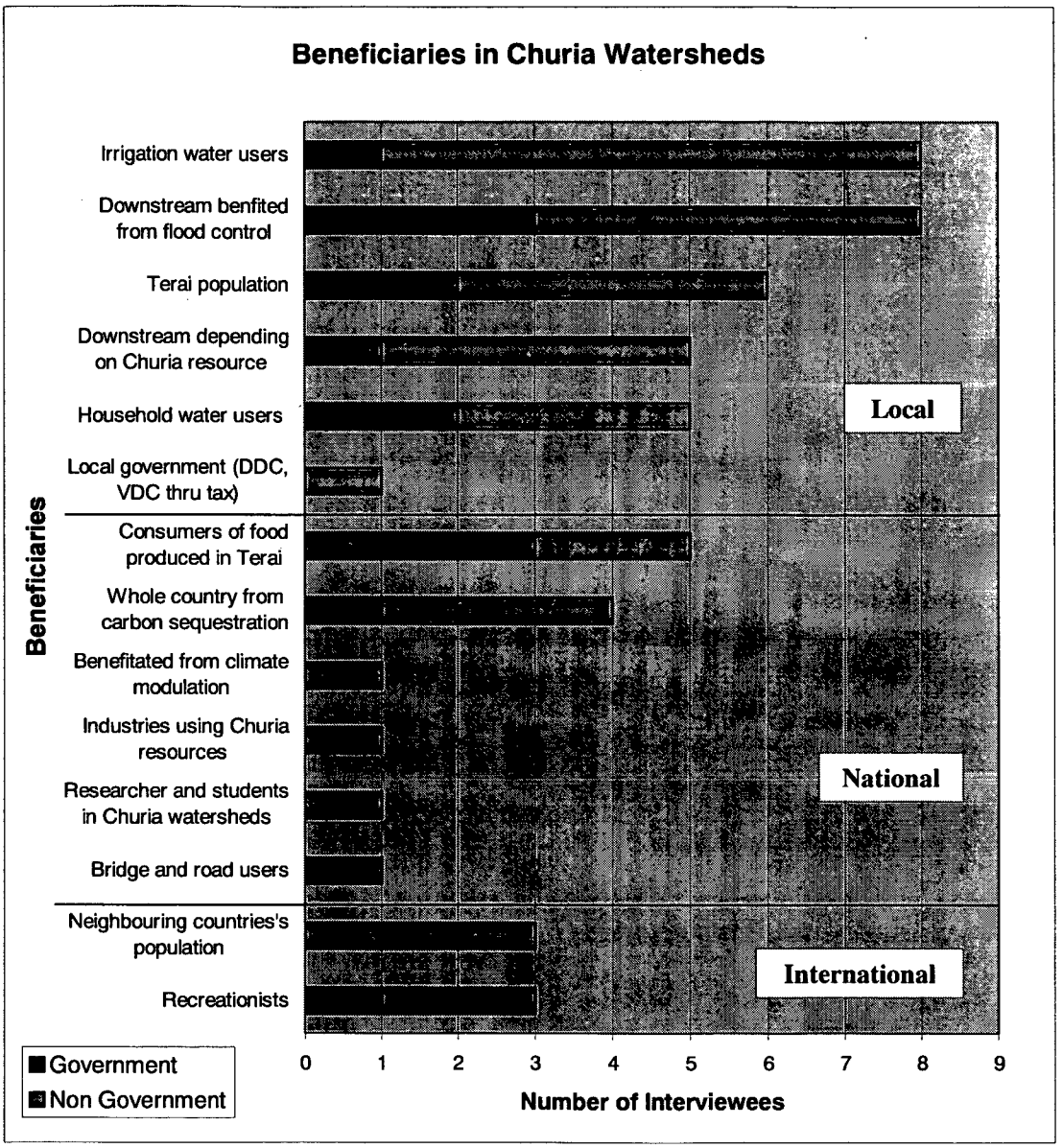


**Figure 15: Beneficiaries in Churia Watersheds according to Interviewees**

The beneficiaries identified by interviewees in Churia watersheds are clustered into three broad scales - local, national and international as presented in Figure 15. The majority of interviewees identified beneficiaries at the local scale in Churia watersheds such as

- Terai and Dun valley farmers depending on water for irrigation flowing from *Churia* watersheds
- Residents in low land i.e. whose life and properties (house, farm and livestock) are saved from natural hazard such as flash floods, riverbank cuttings etc.
- About fifty percent of the country's population living in Terai who are dependent on environmental services obtained from different management activities on the Churia region
- Downstream communities depending on Churia resources for livelihood
- Drinking and household water users

- Local government i.e. Village Development Committee (VDC) and District Development Committee(DDC) who are collecting revenue from sand, gravel collection, land tax and other taxes in lowland

Shifting the focus to the national scale, about one fourth of the interviewees identified the whole population of the country as beneficiary because many depend on the food produced in Terai. Similarly, one fifth of the interviewees stated that the whole country (in addition to the global community) benefits from carbon sequestration from forests of the Churia region. Other national scale beneficiaries identified are users of bridges and others infrastructure (e.g. roads, electric poles) on highways which are shielded from flooding; industries depending on Churia resources for raw materials; people who benefit from climatic modulation; and researchers and students in Churia area.

Interviewees also identified beneficiaries at international scale. One interviewee from a government organization and two from two NGOs (G, 1; N, 8; N, 11) recognized that the population of neighbouring countries such as India and Bangladesh benefit from environmental services of the Churia region. Three out of 18 interviewees (N, 11; N, 15; N, 16) stated that tourists from around the world who visit protected areas are also beneficiaries of the Churia watersheds.

Beneficiaries of environmental services in Churia watersheds can be partly clearly defined (so called well-defined). For example, irrigation water users in the Terai are clearly defined users who benefit from reduced sedimentation in irrigation canals due to watershed conservation measures upstream. In other cases, beneficiaries cannot be clearly defined (so called loosely-defined) as they may benefit in varying degrees and in non-obvious ways from environmental services. For example, population of India who benefit from flood control due to Churia conservation.

**b) Service Providers**

According to FAO (2004b), service providers are those agents whose activities generate environmental services, which satisfy the demand of beneficiaries and for which a payment system can be created.

According to a number of respondents, service providers in Churia watersheds are as presented in Figure 16 below:

1. Upstream dwellers and land users: About three fifths of the interview respondents stated that service providers in Churia watersheds are upstream dwellers and land users.
2. Upstream resident bearing conservation cost: About two fifth of the respondents think that only those upstream residents who are bearing costs for the provision of environmental services and losing opportunities are service providers.
3. Nature: Two interviewed respondents from government organizations (G, 1; G, 2) argued that nature is the actual service provider. The land users are only the ones who regulate them. Therefore, those land users can be referred as service regulators rather than service providers.
4. Community Forest Users Groups (CFUG): Patches of state forests in the Churia region have been handed over to the upstream as CFUGs. Since CFUGs are responsible for protection, conservation, management and utilization of community forest, these groups have also been identified as service providers. (N, 17)
5. The State who is managing Churia forests: Large parts of upstream forests in the Churia region are owned by the state. According to two respondents from NGOs (N, 16; N, 17), the state is obviously a service provider in the case forests are owned by the state. However, government could not demonstrate efficiency in forest the protection from illegal collection of

forest products by downstream population in the Terai and Bhabar. Thus, the downstream population themselves are responsible for the destruction of the Churia area. In such exceptional cases, the downstream population is both, beneficiary and service provider (for themselves).

6. Upstream natural resource managers: Upstream natural resource managers whose livelihoods depend on upstream resources (such as fuelwood collectors and NTFP collectors) are also identified as service providers. (N, 16)

7. Landowners of upstream watersheds: According to one interviewee from a NGO (N, 17), the term land users and landowners indicate different meaning in Churia watersheds because majority of residents in upstream lack legal land rights. Therefore, he emphasised that those having land titles can be identified as service providers.

8. Conservation agencies: Conservation agencies involved in conservation and management of resources like protected areas, national parks etc. are also important service providers. (N, 8)

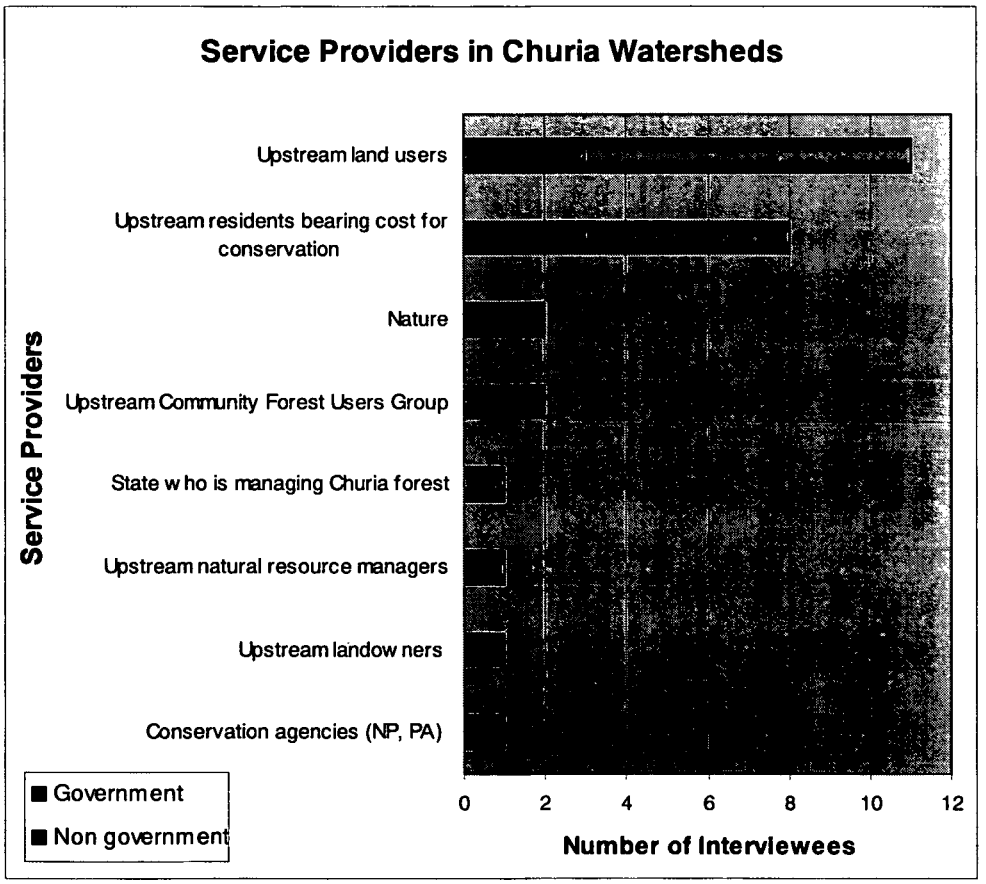


**Figure 16: Service Providers in Churia Watersheds according to Interviewees**

One respondent from a NGO (N, 18) emphasized that upstream and downstream is relative in Churia watersheds because Churia hill resident can be upstream for Bhabar population, while Bhabar can be upstream for Terai people. Hence, the term service provider and beneficiaries is better in comparison to upstream and downstream for PWES scheme in Churia watersheds.

### c) Institutions and Organization

The establishment of a separate department – the Department of Soil Conservation and Watershed Management (DSCWM) under the Ministry of Forest and Soil Conservation (MFSC) shows the emphasis given to the watershed management at the national level. At the

district level, District Soil Conservation Offices (DSCOs) are located in 55 districts under the supervision of the DSCWM. DSCOs are responsible for carrying out programs for soil conservation and watershed management (DSCWM, 2007).

Several interview respondents (G, 1; G, 3; G, 4; N, 11; N, 13; N, 15) claim that existing local level institutions such as local governments and line agencies in the Churia region are the key stakeholders (as mediator, service providers or beneficiaries) for PWES scheme implementation. An autonomous local government body at the district level is the DDC. It is responsible for the overall development of the district through planning, coordination, implementation, monitoring and evaluation of development programmes. Village Development Committees (VDC) and Municipalities are the lowest level local government bodies formed with elected representatives.

Government District line agencies such as the District Forest Office (DFO), the District Soil Conservation Office (DSCO), the District Agriculture Development Office (DADO), the District Livestock Services Office (DSLO), the District Water Supply Office, the District Education Office (DAO), the Small Scale Industries Development Office and the Women Development Office (WDO) carry out sectoral developmental programs. (DFCC, 2006)

Interviewees (G, 1; N, 13; N, 15; N, 16) stated that apart from these institutions, the existence of different civil society organization could strengthen coordination required for the implementation of PWES schemes. Some of these organizations are mentioned below:

- Users Groups such as Community Forest Users Group (CFUG), Private Forest Users Group, Drinking Water Groups, Irrigation Users Group, Soil Conservation Groups, Income generating groups and different farmers groups
- Cooperatives and saving credit groups/ organizations
- NGOs and clubs
- Associations and federations such as NGO federations, Nepal Community Forest Users Group Federation (FECOFUN), Water User's Association (WUA)

Some respondents (G, 3; N, 9; N, 17) explained that community-based organizations such as users groups are possible social organizations, which can act as buyers or sellers of environmental services. DDC/ VDC, government line agencies and NGOs on the other hand can act as potential intermediaries. They are able to assist in awareness raising, knowledge transfer, and coordination and negotiation activities. One suggestion by most of the respondents from both government and non-government organization (G, 1; G, 3; N, 8; N, 15; N, 16) is that service providers such as Community Forest Users Group or Farmers Group at upstream can sell environmental services to Water Users' Association downstream in facilitation of local NGOs in downstream.

**d) Benefiting the Poor**

Most of the people residing in the Churia hills are poor. Hence, engaging those poor and marginal people in conservation without compensation can push them more toward poverty. Therefore, the issue of conservation in the Churia has been a major concern of governmental and non-governmental development agencies. It has been realized lately that without tying up conservation issues with the livelihoods of people in the Churia region, effort of conservation might not yield expected result. (CSRC et al., 2005)

Some interviewees (N, 8; N, 13; N, 15) stressed the same point and emphasized that environmental services should be tapped in such way that it can provide economic and livelihood opportunities to service providers. As communities in Churia hills are leading a hard life, only a small contribution to their livelihood opportunities can already uplift their

living standard while at the same time improving environmental services to downstream.

One interviewee (N, 16) pointed out that both, the distribution of payments to service providers and charging for environmental services from beneficiaries should be on a proportionate basis and take into consideration the needs and rights of poor, vulnerable and socially excluded communities (PVSC).

### 6.2.5. PES Scheme

#### a) Payment Mechanism

Considering the issues raised under the chapters environmental services, geographical dimension, landuse dimension and social dimension, it becomes obvious that the conservation of the Churia hills upstream is required for the provision of environmental services downstream. Many interviewees (G, 1; G, 3; N, 10; N, 11; N, 14; N 15; N, 16; N, 17) mentioned that land users in upstream Churia hills, who agreed to carry out conservation programs, need to be compensated. This compensation should be provided by the population from downstream Terai or lowland Dun valleys who benefit from improved environmental services. Such compensation or payment mechanisms can boost the effort toward conservation activities in upstream.

*"If lowland people want to get services from Churia, they have to invest in Churia management and conservation. Scolding and blaming upstream for all the disaster in downstream will not solve the problem. Instead payment mechanism will encourage upstream land users to participate in Churia conservation which will indirectly provide benefits downstream."* (N, 13)

Two interviewees from NGOs (N, 16; N, 17) added that since downstream beneficiaries make payments for upstream Churia conservation, PWES schemes can provide funds for Churia conservation. Thus, these schemes can be a self-sustaining alternative to conservation through government funds.

According to some other interviewees from NGOs (N, 13; N, 16), the contribution for payment or charging mechanisms can be either in cash (monetary) or in kind (e.g. labour, goods (wheat, rice)). In rural Nepal, in kind contributions are in many cases more acceptable than monetary contributions. Therefore, it is required to explore different payment or charging mechanism, which are culturally, traditionally and ecologically feasible rather than initiating direct monetary payments.

One interviewee (N, 11) described an example of PWES in Saptari district of Nepal. In the past, migrants have been settled in the degraded Churia hills by district administration. The settlement areas were previously Sisso (*Dalbergia Sissoo*) plantations area in Mahuli of Saptari district on the border to India. These migrants utilized these plantation patches for livestock rearing as livelihood alternative. After the introduction of the Community Forestry Policy, forests were handed over to them as CFs forming groups such as Malati CFUGs, Mohanpur CFUGs etc. CFUGs initiated grass cultivation in forests for their livestock along with the protection and management of forests.

As forest rejuvenated, downstream Terai communities claimed their share on forests since they used to be traditional forest users before deforestation. This claim initiated a conflict on resource use. Periodic discussions occurred between upstream and downstream communities and reached a negotiated agreement. It has been decided that upstream CFUGs will provide forest products at a discounted price to downstream population including other environmental

services such as sedimentation control from forest conservation. In return for the payments, downstream Terai communities agreed to control illegal fuelwood collectors from neighbour India. This story provides a good example of self- organized PWES scheme adapted to a specific local situation. (N, 11)

Another interviewee (N, 11) emphasized that PWES schemes should be based on mutual understanding and negotiation between environmental services providers and beneficiaries rather than on compelled deals. Therefore, two major recommendations for PWES schemes are the recognition by beneficiaries of their dependency on environmental services and the awareness by upstream service providers of the effects of landuse on the provision of environmental services. Additionally, instead of promoting conservation of the Churia upstream, downstream people insist on the construction of engineering structures such as riverbank wall, spur and river control to controls disasters downstream (e.g. flooding). Nevertheless, despite all these efforts, the same problems still exist. It is therefore suggested that efforts and investments are shifted from downstream Terai to upstream Churia.

Two interviewees from government organizations (G, 2; G, 3) suggested that the mobilization of existing mechanisms can be the entry point for the establishment of PWES schemes. For example, in many cases mechanisms to collect land tax to users' fees (drinking water, electricity fees) already exist downstream. Those revenues can be channelled to service providers upstream and improve the conservation of the Churia area.

**b) Economic Evaluation**

Churia has vital economic functions. Economic evaluation can be used as a tool to asses the economic value of these functions. A study called 'Economic valuation of Churia region' has been undertaken to assess the economic value of ecosystem services of Churia Watersheds and to develop a basis for a strategy for future conservation initiatives. This study is carried out in collaboration by three organizations with a long history of working in Nepal - IUCN Nepal, WWF Nepal and CARE Nepal. Therefore, the study 'Economic valuation of Churia region' can be a stepping stone for the introduction of PWES schemes in Churia watersheds.

### 6.2.6. Policy Dimension

**a) Existing Policies**

All interviewees of the study mentioned that there is not a single clear statement about PWES in the existing policies of Nepal. However, some first pilots are emerging on the ground. It is possible to implement PWES schemes with existing supportive policies. One of the interviewees (N, 13) from a NGO notified that only the formulation of the specific policy for PWES scheme cannot achieve success and in absence of such a policy, the scheme won't fail. Hence, the most important requirements are awareness and capacity building of the people at policy and ground level about the PWES approach for its implementation.

According to Chapagain et al. (Chapagain et al., 1999), the National Conservation Strategy for Nepal (1988) has given importance in the protection of the Churia hills. It promotes the integration of conservation with development to meet the basic needs of the people. The Master Plan for the Forestry Sector (1989) is the first comprehensive plan for the forestry sector in which soil conservation and watershed management are included as programs. The Soil and Watershed Conservation Act (1982) identified control of natural disasters (e.g. floods, landslides and erosion) and the work for benefit of the public as important objectives. However, one interviewee from a NGO (N, 17) stated that this act is not alive as it is stagnant and without any application. It was argued that the PWES concept should be promoted by these two policies and acts.

According to another interviewee (N, 15), there are few environmental related policies such as the Forestry Act (1993), the Water Resources Act (1992), the National Parks and Wildlife Conservation Act (1973), and the Environment Protection Act (1996). All these acts are regulatory instruments directing to carry out specific activities and provide authorities to stop activities that have adverse effect on the environment.

These acts follow the polluter pays approach rather than the PWES approach. For example, in Environment Protection Act 1996, there is provision that one who suffers any damage from prohibited actions can (if desired) obtain compensation from the proponent who is doing those acts. Therefore, these sectoral policies are required to be linked to the PWES approach. There is need to establish linkages among these policies in order to be able to implement PWES schemes.

However, two interviewees from NGOs (N, 9; N, 10) stressed that the fourth amendment to the National Parks and Wildlife Conservation Act (1973) had stated that 35-50% of revenues generated by Protected Areas should be transferred to the communities residing in buffer zones[10]. This policy can be verified as recognition of the PES approach in landscape beauty. However, there is lack of such clear stated policies for watershed management and soil conservation.

The Local Self-Governance Act (1999) promotes utmost participation of people in decision-making through decentralization. According to this act, a DDC can impose taxes on wool, turpentine, herbs etc. or selling of sand, gravel etc. resources. Thirty to fifty percent the revenue earned through such taxes should be provided to the concerned Village Development Committees and the Municipalities[11].

Similarly, there is a provision in the act that 12 % of revenue obtained by the government from hydropower should be provided to DDC where the plant is located and 38% is divided among DDCs present in the same development region[12]. Interviewees (N, 16; N, 10) suggested that those revenues could be used for payments to communities who assist in the provision of resources. For example, revenues obtained from hydropower can be used to pay upstream land users for sedimentation control. However, there is lack of clear guideline about expenditure of those revenues by DDC, VDC or municipality.

**b) Contradictory policies**

Kanel and Kandel (2004) state that there are several conflicts and gaps in the various government documents (e.g. Master Plan for Forestry Sector) and different sectoral policies (e.g. Forest Act, Local Self Governance Act, Land Act, Mine Act). According to two interviewees from NGOs (N, 15; N, 16), this circumstance can hinder the implementation of PWES schemes. For example, the Forestry Act (1993) is conflicting with the Local Self Governance Act (1998) (Ohja, 2003). The Local Self Governance Act identifies local government units (DDCs and VDCs) as key players in resource management (such as forest, water) while the Forest Act promotes handing over forests to community forest users groups (CFUG). Therefore, interviewees pointed out that conflict over control rights over forests between local governments and forest users group can create difficulties in identification of service providers (CFUGs or local government units) in PWES scheme implementation.

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[10] Coded in section 25 (a) of National Park and Wildlife Conservation Act (1973), 4th amendment (GoN, 1973)

[11] Coded in section 215 and 218 of Local Self Governance Act 1999 (GoN, 1999a)

[12] Coded in rule 211 of Local Self Governance Regulation 1999 (Annex 26) according to section 220 of Local Self Governance Act 1999 (GoN, 1999b)

Similarly, an interviewee (N, 15) stated that the Agricultural Perspective Plan (APP) emphases the intensification of agriculture while forest policies emphases forest development. Therefore, in the Churia hill, where populations of squatters are increasing, these contradictory policies can create confusion in landuse planning. One first step has been taken to address this issue through recently prepared the 'Strategic Plan for Terai Arc Landscape'. This strategic plan has made indication to include biodiversity conservation in APP which controls intensified agriculture (HMGN/MFSC, 2004).

One interviewee from a NGO (N, 10) stated that ambiguities in policies can hold back the implementation of PWES schemes. For example, although there is clear statement in the Local Self Governance Act (1998) about the sharing of revenues by hydroelectricity power projects with local government units (DDC, VDC), it is not specified where thus obtained fund to be expended (either in upstream watershed conservation or other downstream development).

**c) Land Rights**

Land ownership appears to be the trickiest issue, which could hamper the establishment of PWES schemes in the Churia region. Most of the local population in the Churia region lives there without legal recognition (called squatters), but in hope of obtaining these rights in the future (Bhatta, 2006). Land being cultivated for years has not been legally recognized (land certificates), putting land users in an insecure position.

For example, in ward number 5 of Gauribas VDC 165 out of 168 household do not have legal land rights although they are living on the land, building houses and cultivating the area for the last 40 years. The Government of Nepal has periodically formed various squatter committees to register the land not only in this VDC, but in the Shuria area in general. However, land has actually never been distributed and registered. Unplanned settlements, encroachment and clearing forests are the results.

Due to the lack of legal recognition on the other hand, people are not willing to be involved or invest in soil conservation efforts (CSRC et al., 2005). Due to lack of land rights, contracts required for PWES schemes are hard to negotiate. These conditions resulted in negative impacts on the conservation of soil and the livelihood security of people.

Additionally, confusion about the actual cultivators on the ground and the owners in official documents makes this issue even more complicated. The lack of proper landuse practices database, unplanned and scattered settlement resulted into arbitrary utilization of land in Churia region. Unmanaged utilisation of land cause higher risk in soil conservation in the Churia region. (CSRC et al., 2005)

## 6.3. Relevance of Global Success Factors

The aim of the study is to analyze the applicability of PWES in watersheds of the Churia region. In order to achieve this aim, success factors for the implementation of PWES schemes are compared with the context of Churia watersheds. The factors are compared within the framework of the six dimensions of the conceptual framework depicted above. Based on the following comparison, the subchapter 6.4 explains the opportunities and challenges for PWES scheme implementation on Churia watersheds.

### 6.3.1. Environmental Services

Based on global experience, the successful establishment of PWES schemes requires **well-defined environmental services (SF 1)**. Interviewees identified the larger categories of environmental services in the Churia region such as erosion and sedimentation control or

recharge of groundwater for the Terai plain. However, specific environmental services within a specific watershed in the Churia region vary according to watershed conditions. Additionally, the actual importance of these environmental services depends on the needs of the beneficiaries, which can be identified and prioritized through participatory methods. Accordingly, studies should be done to determine possible landuse changes and conservation activities required in upstream to obtain the identified environmental services downstream for PWES scheme in a specific watershed.

Global experiences states that **service providers have to be well informed about the services they provide as well as beneficiaries about the services they receive (SF 2)**. The interviews with respondents from government and NGOs proved that there is awareness at the policy level about environmental services and benefits provided by the Churia region. However, interviewees (G, 1; G, 3) put emphasis on a lack awareness at the ground level about these issues. Raising awareness of beneficiaries about environmental services is important at ground levels to enhance willingness to pay to service providers.

**The long-term demand of environmental services and the ability to supply these services (SF 3)** is necessary for PWES approach development. There is hardly literature to be found about demand and supply quantification. Hence, interviewees and participants in the 'sharing workshop' highlighted the importance of preliminary studies for identification and quantification of demand and supply of specific environmental services for the development of PWES schemes in watersheds of the Churia area.

### 6.3.2. Geographical Dimension

Global experience stresses the **higher feasibility of PWES at small scales (SF 4)** because working with a small number of stakeholders is easier. However, interviewees raise the issue that the inability of beneficiaries to pay can cause great challenge for PWES development in small scales. Interviewees also shed some light on the opportunities of PWES at the international level such as payment by downstream neighbours like India or Bangladesh to Nepal as service provider. However, due to the lack of clear international policies for such a payment scheme and unclear scientific linkage between upstream and downstream, this option will be challenging to implement. Therefore, payment by diverse stakeholders such as individual farmers, industries and state at the small-scale is suggested for Churia watersheds by a majority of interviewees and participants of the 'sharing workshop'.

### 6.3.3. Landuse Dimension

Global experience stresses the **requirement for extensive knowledge about the relationships between landuse systems and environmental services (SF 5)**. Interviews indicated that there is an understanding at the policy level about the function of the Bhabar as feeding ground for water recharge in the Terai. It is accepted knowledge that degradation of Bhabar reduces the Terai water table. Additionally, forest degradation in the Churia hills causes soil erosion and increases sedimentation and flooding in the Terai. However, the level of understanding about those linkages at grass-root level is unknown (Ghimire et al., 2006). Only few studies have been carried out on erosion and landuse change in the watersheds of the Churia region (Ghimire and Babel, 2004).

Thus, interviewees also stressed the lack of studies and demonstrations about the ecological inter-relationships and interdependencies between upstream and downstream in Churia watersheds. One interviewee for example stressed that: *'These existing linkages between upstream and downstream in Churia watersheds should be seen, realized, understood, highlighted, demonstrated and proven. Then only, dialogue and negotiation among both*

*parties for identification of roles, responsibilities and benefit sharing is possible for PWES in Churia watersheds.'* (N, 13)

A **comprehensive hydrological database (SF 6)** is another requirement for the successful implementation of PWES schemes. Very few hydrological stations have been conducted in Nepal and only 156 of the country's 6 000 rivers and streams are gauged (Sharma 1977 in Singh et al., 2004). Due to the high diversity in climate, topography, geology and land use practices in the Churia range, it is difficult to standardize the measurements and results of hydrological data from watersheds (Ghimire and Babel, 2004). Therefore, the hydrological measurement for the assessment of erosion hazards and their mitigation in specific climates, topographies and land uses can be complicated.

### 6.3.4. Social Dimension

According to global experience, it is necessary to **identify the actual upstream service providers and downstream beneficiaries (SF 7)**. Interviews with experts state that in most watersheds of the Churia region, service providers and beneficiaries are distinct. However in certain cases of the Churia watershed, beneficiaries are service providers at the same time. Despite they reside downstream, they utilize upstream resource and thus influence their own benefits from environmental services. Since there is hardly any case of a similar situation described in the literature, this raises the question of applicability of PWES from theoretical perspective. Apart from this, the participants of the 'National level sharing workshop' notified that the absence of land tenure in the Churia hills can create confusion while identifying the service providers.

Global experience stresses the importance to the **presence of mediators or intermediaries (SF 8)** for the establishment of PWES schemes. Interviewees state that local governments i.e. DDCs and VDCs including sectoral line agencies at district and regional level can be possible intermediaries. Literatures from different projects and programs in watersheds of the Churia region provide evidence of the presence of local and national level NGOs with the potential of working as partners (CSRC et al., 2005; CWD, 2003; CWMP, 2001; Laubmeier et al., 2004). Such organizations having experience on working with local communities can act as a bridge to bring environmental service providers and beneficiaries together for dialogue. For example, in the DDC of Mahottari district, VDCs agreed on allocating a share of their total budget from the district to the conservation of Churia watersheds recognizing their role for the betterment of downstream Terai. (Maharjan, 2006)

According to global experience, **multi-stakeholder consultations (SF 9)** are another requirement for the successful implementation of PWES schemes. According to interviewees (G, 3; N, 16; N, 15), DDCs are major coordinating bodies for political decisions as well as development activities at the district level. The Local Self Governance Act (1999) has given authority to DDCs for the formation of coordination committees of certain sectors with representatives from government line agencies (DSCO, DADO, DLSO and WDO) and NGOs at the district level to coordinate programs of certain sectors (DFCC, 2006). Thus, DDCs can provide platforms for diverse stakeholder consultations. For instance, the District Forest Coordination Committee (DFCC) in Mahottari district chaired by the chairperson of DDC includes office heads of district line agencies, representatives of political parties, users groups and NGO federation as members. Interviewees have suggested that such committees can provide fora for round table discussions among stakeholders at the district level.

**Strengthened social organization (SF 10)** is another requirement for PWES development. There are claims that Churia watersheds communities are fragmented, not organised and weaker in making any claim or defending their rights (CSRC et al., 2005). However,

interviewees identified informal groups organized for different purposes, interests and objectives such as farmers groups, Soil Conservation Groups, Income Generating Groups without having legal status. However, interviewees also clarify that only legally authorized groups and associations can increase collective bargaining power, increase legitimacy and increase self-esteem. Examples of legitimized users group are CFUGs, Waters Users Associations (WUA) and the Federation of Community Forest Users of Nepal (FECOFUN) etc.

**Existence of good governance (SF 11)** is the must for the success of PWES as indicated by global experience. In Nepal, the Tenth Plan (2002–2007) has envisioned "good governance" as one of the four strategic pillars of development objectives (NPC, 2002). Although the issues of good governance are raised by both government and civil society, the implications of good governance on the ground is a matter still to be studied.

**Clearly defined rights and responsibilities (SF 12)** and **strengthened livelihoods integrated with service provision (SF 13)** are factors required for successful implementation of PWES as indicated by global experience. In the Churia region, physiographic (topography, climate) and resulting social diversity (culture, religion etc.) are high. In such a diverse context, clearly defined rights and responsibilities can help to reduce conflict among PWES scheme participants. Furthermore, since most economically vulnerable people tend to be located in the upstream Churia hills, it will be difficult to convince these upstream people to provide environmental services and reduce livelihood options. Therefore, activities, which strengthen the livelihoods of upstream people, but are linked with service provision, will encourage them to participate in PWES scheme. As PWES schemes are not implemented at the moment in Nepal, these two concerns should be considered while designing PWES depending on site condition.

### 6.3.5. PES Scheme

Global experience stressed the following factors to promote a successful implementation of PWES schemes:

- Flexible and locally adaptable financial mechanism (SF 14)
- Self financing system with local financial resources (SF 15)
- Diverse charging mechanisms for the sustainability of resources (SF 16)
- Transaction costs do not exceed potential benefits (SF 17)
- Effective monitoring mechanisms (SF 18)
- Reliable baseline assessments (SF 19)

Due to the absence of any implemented PWES scheme in Nepal, the actual application of the above mentioned factors cannot be verified on the ground.

With respect to the **organizational set up of PWES schemes (SF 20)**, there is a possibility of the application of self-organized, open trading or public payment systems depending on the local situation. However, which one out of these payment systems is actually applicable in a specific watershed has to be decided at the beginning of the implementation of a PWES scheme.

The **economic value of environmental services (SF 20)** has also been identified as an important factor by global experience with PWES schemes. The outcome of on going study 'Economic valuation of Churia region' can be one of the stepping stone for PWES scheme implementation in Churia watersheds.

### 6.3.6. Legal Dimension

Specific laws on PWES schemes are not needed, however supporting policies provide flexibility when implementing PWES schemes. Therefore, a **favourable policy environment (SF 21)** is one of the most important success factors for PWES. Several interviewees (G, 1; N, 11; N, 14; N, 15) stated that in the absence of a clear notation of PWES in the policies of Nepal should not prohibit the piloting of PWES schemes. One interviewee (N, 13) pointed out that policy formulation mechanism exist in Nepal, however, there is excessive delay in translation of policies into legislation and then to operation. Furthermore, there is lack of practice for monitoring and evaluation of the formulated policies. Therefore, the idea given by many interviewees (G, 1; G, 3; N, 9; N, 10; N, 14) is to pilot PWES schemes first with the help of existing policies. Subsequently, policy feedback is provided for the future development of PWES schemes in Churia watersheds base on the experience of those pilot schemes.

**Cleared and defined landuse rights (SF 22)** are the last factor for successful implementation of PWES described in this chapter. Most of the Churia hills residents do not have land titles and are living as squatters. A lack of formal land titles (land certificates) may hinder them to participate in PWES schemes as service providers. Furthermore, and users with unclear title may fear that land will be returned to the state, which increases their unwillingness to invest in conservation oriented landuse on a long term basis. Another issue pointed out by one interviewee (N, 10) is that CFUGs have rights on forest and their products but not on land. Therefore, he is sceptical if CFUGs in the upstream Churia hills can be identified as service providers and how they can bargain since they do not have rights to change landuse other than forestry.

## 6.4. Opportunities and Challenges

The comparison of global experiences with the context of the Churia region in the previous subchapter has confirmed the principle applicability of PWES in the Churia region. However, as with any new approach, there are opportunities and challenges, which have to be addressed during the design and implementation. Some of them will be described in the following sub-chapters.

### 6.4.1. Opportunities

Based on the analysis of interviews with PES experts, the following opportunities can be pointed out:

#### a) Increased demand for environmental services

Inappropriate land use in the Churia hills upstream can have problematic impact on downstream areas, the Terai and Dun valleys. Therefore, more than half of the country's population residing in the Terai and the Dun valleys demand solutions for the problems (e.g. sedimentation, flood, water scarcity etc.) caused by incompatible land management upstream. Solutions for these problems are proper landuse in the Churia hills, which can result in the provision of the much-needed environmental services. Under such conditions, PWES schemes can be the best option to meet the demand of the Terai and Dun valley's population. (N, 15)

#### b) Provision of new finance sources for conservation

Currently, funds for watershed conservation and management in the Churia range come from the general revenue of the government. However, as these funds are not sufficient, the government requests the assistance from donor agencies and NGOs (e.g. Churia Watershed Management Project obtains assistance from donors like Danida, CARE Denmark, CARE

USA (CARE Nepal)). PWES schemes can provide an opportunity for new finance sources and therefore overcome serious revenue shortfalls for Churia watershed management (N, 11; N, 16). For PWES schemes in the Churia region, public payment systems can be a possible type of PWES. Such types of schemes provide less economic pressure to beneficiaries who are also too poor to pay for environmental services. (N, 11; N, 16)

**c) Complementing traditional watershed management**

Traditionally, watershed management is concentrated in either upstream or downstream. In upstream, conservation programs are concentrated in areas of landslides or erosion. In downstream, investments are channelled into the construction of engineering structures in order to solve problems with flooding and sedimentation. Thus, watershed management without considering the linkages between upstream and downstream management are generally considered ineffective (N, 13). A study to assess watershed strategies and approaches in Nepal indicated the need for policy development that strengthens coordination between upstream and downstream (Singh et al., 2004). Thus, PWES schemes provide an opportunity to compliment traditional watershed management approaches by linking upstream and downstream.

**d) Positive spin-offs in different sectors**

PWES schemes can provide positive spin-offs in other sectors such as forestry, agriculture and socio-economic activities. For example, conservation farming may reduce the use of chemical use like pesticides, which in turn has positive spin-offs on local health. Similarly, eco-tourism through biodiversity conservation may bring improvements in the livelihood of the poor. In addition to those positive spin-offs, PWES schemes can raise human capital through investments in education, training and improving effects on health. Social institutional development is another area that can benefit from PWES schemes. PWES may particularly benefit marginalized groups who often lack the organizational and management skills needed for cooperative action. Since land rights are one of the burning issues in the Churia range, groundwork for the initiation of a PWES scheme may address this issue.

**e) Supportive change in resource governance**

Good governance is an integral part of any development process with emphasis on civil society participation, rule of law, negotiated solutions, transparency and equity (Graham et al., 2003). PWES schemes provide supportive change in resource governance by improving the efficiency in resource allocation, resolving conflicts and increasing people's participation in resource management.

Conflicts arise due to different interests in development and conservation. For example upstream Churia land users are interested in intensive agriculture while downstream beneficiaries may concern with conservation farming for clean drinking water. Such conflicting interests can provide the *raison d'être* for the establishment of PWES schemes (Robertson and Wunder, 2005). In general, there is an opportunity for PWES implementation in the Churia watersheds by negotiating win-win situations among land users and beneficiaries.

In the case of Churia watersheds, marginalized poor residing upstream can play the role of service providers if properly involved in the conservation of the Churia region. Within PWES schemes, payments are transferred from beneficiaries to service providers. Thus, PWES schemes have the potential in equitable benefit sharing through the transfer of resources to socially and economically vulnerable service providers.

Participation of all caste, gender (male/female) and economic status (rich/ poor) is one of the principles of good governance. Within PWES schemes, compensation of foregone income to the poor service providers improves the willingness to participate in conservation activities of the Churia region. Thus, PWES schemes encourage those people to participate in conservation programs.

**f) Poverty alleviation**

In principle, the motivation for the establishment for PWES schemes is not poverty alleviation. However, poverty alleviation can be pursued through pro-poor activities at upstream such as income generating activities to poor service providers (Landell-Mills and Porras, 2002a; Pagiola and Platais, 2002; Wunder, 2005). For upstream poor communities potential benefits include increased income, improved diversity of forest-based livelihoods, or stronger cooperative institutions.

Additionally, downstream residents can also improve their livelihoods through the utilization of environmental services (Gouyon, 2003). For example, improved irrigation can increase agricultural production downstream. Although, PWES may initially look like investments into the *Churia* hills, actually it is also an investment for wellbeing of whole watershed stakeholders including downstream.

**g) Interest of development agencies**

Development and aid agencies including INGOs such as IUCN Nepal, WWF Nepal, and CARE Nepal are interested in the development of an PWES approach for the Churia area. According to several interviewees (N, 9; N, 14; N, 15; N, 16; N, 17), these agencies can provide assistance to PWES schemes such as knowledge transfer and capacity building; financial support covering transaction cost; acting as mediator and facilitator by providing negotiation platforms between service providers and beneficiaries; policy feedback to the government for developing supporting policy for PWES; and scientific assistance of research of linkage between landuse and environmental services.

Therefore, these development and aid agencies can provide technical and financial support to implement pilot PWES schemes. Memorizing the success of CF programs and its expansion, an interviewee (N, 9) stated that if a scheme succeeds, people will replicate the success model themselves following the history of the community forestry program.

### 6.4.2. Challenges

The challenges in implementing PWES schemes in Churia watersheds have been identified as follows:

**a) Time gap in the production of environmental services**

The adoption of prescribed land uses in Churia hills can provide desired environmental services at downstream if linkages between upstream and downstream have been clearly identified. However, there will be time gaps between implementation of prescribed landuse in upstream and availability of environmental services downstream. For example, only after five years of deforestation control in upstream, water quality may improve downstream. Therefore, the challenge of the management of payments to land users during this time gap has to be solved. (N, 16)

**b) Land rights**

Land right issues are critical in the Churia hills and without addressing them, the implementation of PWES is nearly impossible. Without legal land rights for upstream land users, PWES stakeholders will not be able to enter into contractual agreements for the

prescribed landuse. On the other hand, land users in Churia hills may not show willingness to implement long-term conservation activities in land without legal rights for the sake of providing environmental services to downstream.

Since the majority of land users in the Churia range are devoid of legal land rights, the challenge will be in identifying the individual to whom payments can be directed. Therefore, this situation may create conflicts over claiming rights over land while identifying payment receivers. Therefore, addressing issues of land rights are a key challenge for the successful implementation of PWES implementation.

**c) Willingness and capacity to pay**

In Churia watersheds, downstream beneficiaries can be reluctant to pay to upstream service providers as they are receiving watershed services for free (e.g. clean drinking water) or they are unaware about the benefits received from environmental services (e.g. reduction in sediments). Downstream beneficiaries as much as upstream service providers are also not well-off and the economic value of the benefits downstream people obtain from those environmental services may be much less. Therefore, the ability and willingness to pay for environmental services is also a major challenge to implementing PWES in Churia watersheds.

**d) Identification of workable model**

As described above, three broad models of PWES schemes (self organized, open trade and public payment) exist worldwide. Additionally, Porras and Landell-Mills (2002b) have described eight different types of transfer mechanism, which exist in different combinations on the ground (See 4.2.5). However, the concept of PWES is new in Nepal and there is absence of PWES schemes. Therefore, the identification of a workable model, which is acceptable economically and socially to both service providers and beneficiaries is a major challenge.

**e) Economic valuation**

Economic valuation of natural resources allows expressing the value of natural resources in monetary terms. Economic valuation includes the actual valuation of environmental services as well as the costs related to the protection and conservation of those services and depletion or degradation costs (FAO, 2004b). However, valuation of environmental services is a complex task. Despite sophisticated techniques, the value of some environmental services might be difficult to quantify in monetary terms (Mayrand and Paquin, 2004) such as in the case of indigenous knowledge or cultural and religious importance. Additionally, each stakeholder values the benefit of environmental services based on particular condition and objective, which make valuation more challenging.

**f) Insufficient financial resource**

There are significant costs including transaction costs involved in designing and maintaining PWES schemes. Additionally, transaction cost of PWES, which include research on linkages between environmental services and landuse, negotiation between service providers and beneficiaries, monitoring and analyzing service delivery, and administration of schemes are particularly high. These are not only costs in term of cash, but also in kind and time value (e.g. negotiation with service provider and beneficiaries can take long time). Development and conservation organizations such as CARE or WWF are interested to invest into PWES approach. However, there will be limitation of financial aid to initiate and establish PWES scheme covering all those costs.

**g) Lack of human resource**

Skilled human resources are required for the implementation and monitoring of PWES schemes. Especially payment systems should be monitored and enforced appropriately; otherwise there will be problems of cheating. As a result, PWES schemes can be ineffective. For instance, the lack of manpower and technical knowledge has been blamed for impeding the introduction of the Forest Benefit Compensation Funds in China (Landell-Mills and Porras, 2002a) .Since PWES is an innovative approach in Nepal, skilled manpower and scientific knowledge may be a scarce resource. For example external human resources maybe required for economic valuation, negotiation and establishment of scientific linkages between upstream and downstream. Therefore, the shortage of skilled manpower can be a great challenge for the success of PWES schemes in Churia watersheds. (N, 9)

**h) Perverse incentive**

PWES schemes in Churia watersheds may have perverse incentives. For example, forest encroachment in the Churia hills for settlement to obtain benefit from schemes as service providers or the promotion of deforestation in nearby areas are usually not intended by PWES schemes. Perverse incentives can be avoided through a detailed assessment of schemes and the careful implementation and design of effective monitoring systems (FAO, 2004b). Therefore, the design of assessment and monitor systems for PWES schemes in Churia watersheds that are capable of avoiding perverse incentives are a major challenge.

**i) Contradictory policies**

Contradictory policies can also hinder the successful implementation of PWES in Churia watersheds. Gaps and conflicts among policies lead to unclear authority over natural resources, unclear property rights and the creation of confusion in communities. Thus, it can increase risks as well as imposes costs for the implementation of PWES schemes in Churia watersheds.

## 6.5. RECOMMENDATIONS

Considering previously mentioned opportunities and challenges, this research study identified the following recommendations:

**a) Build on previous lessons learned**

It is recommended to create and strengthen networks within national and with international organizations (e.g. RUPES program, Kotoomba group and organization working in this approach), which can help to share experience and lessons learned from existing PWES schemes. These networks can also disseminate knowledge and help to develop PWES schemes in Nepal. Therefore, the exchange of experience including technical and managerial information concerning PWES should be fostered at national and international levels.

**b) Pilot schemes at small scale**

Initially, a new approach like PWES should be carried out in small-scale PWES schemes as pilots. Pilot schemes can support testing mechanisms, building skills and identifying impacts. Additionally, such schemes can help to pin-pointing constraints such as unclear land rights, resistance to participate and negative impact on poor communities etc. The successes of pilot PWES schemes can encourage others to replicate schemes following as examples (G,1; G, 3). Pilot schemes can be supported by conservation and development agencies (e.g. WWF, CARE, Winrock International, IUCN, ICRAF and other INGOs) with funding, providing expertise, accessing international knowledge, raising awareness (of policy makers and general public) and providing policy feedback for improvement in PWES schemes.

### c) Adapt PWES scheme to local context

PWES approaches, like most other conservation approaches, are not blue print approaches which can be implemented without considering the specific local context. For example, small changes in natural resource management policies at the national level (such as property rights, access to and control over resources) can have considerable impact on poor and resource dependent households. Such change can contribute, for example, to the widening of income inequities between rich and the poor. Therefore, it is recommended to adapt PWES schemes to the local complexities of specific sites. The before mentioned pilot approach could facilitate learning processes to improve local adaptation.

### d) Integrate schemes into existing mechanism and practices

In countries like Nepal, where environmental services are enjoyed freely, it is not easy to convince people to pay for such services. Therefore, it is recommended to integrate charging mechanisms into existing mechanisms (e.g. additional fees can be easily added to existing water bills). Additionally, payments should be in accordance to local social practices. For example, payments in kind such as grain (called '*mana pathi bharne*' in local language) or labour (e.g. one day labour from each beneficiary household for plantation in upstream).

### e) Create trust fund

To reduce the dependency on the external donors' aid, it is required to explore mechanisms capturing state funds, which can be utilized in Churia conservation (as practiced in Costa Rica for biodiversity conservation). Therefore, it is recommended to establish a 'Churia Conservation Trust Fund' at district or national level, which collects government revenue (e.g. taxes and charges) and other diverse funds (e.g. international grants, development aids) and channels them to service providers as payments for Churia conservation.

### f) Address livelihoods of upstream service providers

Integration of income generating activities (e.g. agroforestry, tourism) with production and conservation of environmental services can enhance the effectiveness of PWES schemes. Therefore, it is recommended to create payment packages in the form of non-monetary benefits that address livelihoods of upstream service providers complementing the provision of environmental services. For instance, skill development (e.g. medicinal and aromatic plants cultivation training, agroforestry training), market information and linkages for their products in-kinds (e.g. productive cattle breed, bees hives), and promotion of products produced upstream. However, these non-monetary benefits should insure the sustainability of landuse changes that promote environmental services.

### g) Study of landuse and environmental service linkages

The public perception about linkages between land uses and environmental services between Bhabar and Terai existed. However, little scientific evidence is available for Churia watersheds. These linkages are influenced by geology, morphology and ecology of watersheds[13]. Therefore, it is recommended to conduct empirical research and impact studies on these linkages in each watershed before initiation of PWES schemes. It is critical to note that PWES schemes based on the assumption and belief about relationships between land uses and environmental services may have a high risk of failure (Rosa et al., 2003).

### h) Clarification of land rights

Ambiguity in land rights in the Churia hills is one of the key challenging factors for the implementation of PWES in Churia watersheds. Land rights control access to payments and

[13] According to an email correspondence with one respondent from a government organization

also define responsibilities for actions needed to insure environmental service provision. Therefore, it is recommended to clarify land rights before designing PWES schemes.

**i) Assess economic feasibility of PWES schemes**

Payments provided to land users for providing environmental services should be equal or greater than those derived from other alternative land uses. On the other hand, benefits to downstream beneficiaries by environmental services should cover opportunity cost of upstream service providers. These are the requisitions for sustainable application of PWES schemes. Therefore, it is highly recommended to assess the economic feasibility of PWES schemes in Churia watersheds.

**j) Effective monitoring systems**

Effective monitoring systems are needed for land user's landuse practices at upstream that they do no promote destructive practices as well as for beneficiaries that they provide continuous inflow of payment to land users (Kerr et al., 2007). There is no shortcut to a successful implementation of PWES schemes, continuous integration of feedback from monitoring can improve effectiveness of PWES schemes. The success of schemes depends on the monitoring of those performances. Therefore, it is recommended to plan the arrangement of monitoring systems while designing PWES schemes.

**k) Conduct further research studies**

The comparison of factors for successful PWES implementation with the context of Churia watersheds indicates the requirement to conduct some further research studies. Service providers for example should be aware about upstream landuse by service providers and beneficiaries about environmental services from which they are obtaining benefits. Before the design of PWES schemes, it is recommended to conduct studies in order to know the awareness level of service providers and beneficiaries at ground level. These studies also help to identify further requirements for awareness raising programmes.

Service providers will carry out prescribed land uses for environmental services provision as they obtain payment. Beneficiaries also will show willingness to pay when they obtain environmental services. Therefore, it is recommended to conduct studies to assess the amount of willingness to pay by beneficiaries.

# 7. FINAL CONCLUSIONS

This chapter will provide final conclusions of the entire research study including further research recommendations.

## 7.1. EVALUATION OF RESEARCH

The research study for this Master's Thesis has been carried out with the objective of analysing the applicability of PWES in Churia watersheds of Nepal aiming at its conservation. Hence, the research question of this research was 'How can Payments for Watershed Protection Environmental Services (PWES) be applied to the conservation of watersheds in the Churia region of Nepal?'

By critically addressing both opportunities and challenges, this research study has come to the conclusion that the instrument of PWES in principle seems to applicable in watersheds of the Churia region. However, PWES is not a simple tool but a complex approach which has to be implemented carefully in a specific context. Therefore, the actual applicability of PWES depends on how well specific implementing agencies are adapting the concept to the specific location at a specific time. Altogether, the research study succeeded in achieving the objectives set in the beginning.

The production potential of the Terai and Dun valleys are linked with the conservation of Churia regions. Therefore, the Churia region conservation has been a great challenge for the prosperity of the Terai, called the 'Rice Bowl', and then of the whole country. Since the Churia region provides and has potential to provide several environmental services, PWES can be an innovative approach for the conservation of the Churia region and the environmental services it provides. Additionally, people are trying to grasp the potential mode in which PWES can help in watershed conservation side by side with the improvement of human well-being. Under such circumstances, this research can be taken as a first stepping stone towards the establishment of this innovative PWES approach in watersheds of the Churia region.

The entire field study of this research has been based on interviews with experts in Nepal who are working in government and non government organization. So far, PWES schemes have not been implemented in watershed management in Nepal. Thus, one of the limitations of this research study is that interview responses have been rather hypothetical, i.e. based on the concept of the PWES approach without practical experience in Nepal. Therefore, this research may have some gaps when it comes to the question of the practical implementation of PWES in Nepal; the use of a rigorous conceptual framework may have alleviated this methodological drawback.

## 7.2. FURTHER RESEARCH SUGGESTIONS

This research study on the 'Applicability of the instrument 'Payment for Watershed Protection Environmental Services' (PWES) for the Conservation of Watersheds in the Churia Region of Nepal', on the one hand, promises to add value for the application of this innovative concept for watershed management in practice. On the other hand, this research triggers ideas for further research on the PWES approach.

During this research, the research idea to explore the possibility of PWES schemes in other geographical areas has been identified. In addition to the Churia range, other mountain chains are also extended from east to west of Nepal such as the Middle Mountains, the High Mountains and the Himalayas. To bring more effectiveness in watershed management, studies can be done on the feasibility of this new PWES concept in watersheds of the Middle Mountains, the High Mountains and the Himalayas region.

Most of the rivers originated in the snow capped Himalayas flow into rivers of India and Bangladesh. Therefore, it is suggested to investigate the transboundary nature of upstream and downstream linkages to widen the scope of the PWES concept application at international levels.

Very little studies have been done regarding the actual effectiveness of PWES systems. There is a significant number of examples of PWES schemes, particularly in Latin America. However, those schemes have not been inventoried and few studies have been done on socioeconomic and environmental impacts (Rowcroft, 2005). Therefore, it is recommended to do further studies on the effectiveness and impact of PWES in achieving environmental and economic goals.

## 7.3. CONCLUDING REMARKS

PWES provides a promising approach for the conservation of the Churia region and probably also other mountainous areas in Nepal. However, as mentioned above, the success very much depends on the capability of implementing organizations to address the challenges and opportunities described in this research study.

It is hoped that different implementing organizations in Nepal will collaborate and take up these challenges, build on the lessons learned of past experience and continue with the implementation of this approach. In this way, there is a high potential that this approach will contribute not only to the conservation of the Churia region, but also to sustainable livelihoods and social equity of poor and marginalized people in the Churia and elsewhere in Nepal.

# 8. ANNEXES

## 8.1. ANNEX 1: INTERVIEW GUIDELINE

*1. Information about Interviewee*

Name:
Organization or Institution:
Designation:

*2. Questions to national or central level interviewer (GO and NGO staff) while analysing internal experience of Nepal on PES implementation –feasibility and applicability*

a. PES concept (general)
   1. What is your understanding about PES? (to clarify the concept of PES)
   2. What are the important characteristics of PES according to your experience?
   3. What are the challenges and opportunities (social, economical, political and cultural) for implementing PES in general?

b. PES model for Watershed of Chuira area
   4. What are the characteristics of PES approach in Watershed of Churia?
   5. What is the linkage between upstream and downstream in Churia Watershed?
   6. What are environment services and resulting benefits?
   7. Who are receiving those benefits?
   8. Who are providing this benefits and what is its cost?
   9. What are the challenges and opportunities (social, economical, political and cultural) for implementing PES in that apply in Churia area?

c. Stakeholders
   10. Who are the possible stakeholders/ actors for the implementation of PES approach? (Community Forest Users Group, Water Users Group, Intermediatories such as local government, NGO or private sector )
   11. What facilities can the district line agencies provide for the promotion and implementation of PES?
   12. How can the beneficiaries be convinced to pay for environmental services?
   13. How can the local government (District Development Committee) influence the process and mechanism (structure) of PES approach in watershed area of a district?
   14. How could poor and marginalized people be involve and benefited from this approach?

d. Policies
   15. What are the supportive policies and the legal system (law and policies) existed in the context of Nepal for PES implementation? Especially Forest law, Watershed Management acts, Self Governance Act?
   16. What are the policies hinder the implementation of PES approach (if any)?
   17. What reformulations of the policies are required in order to promote PES approach?

e. Implementation
   18. What role can the International NGOs and donors play for PES implementation?
   19. What may be the possible steps for PES implementation? (for the framework to be designed for PES implementation in Nepal)
   20. What are the human capacities required for the implementation of PES in Churia area? (Training packages, tour)?

Whom s/he refer for the further interview?

## 8.2. ANNEX 2: COMPARISON – GLOBAL EXPERIENCE & CHURIA WATERSHEDS

**Comparison of Global Experience with the Churia Watersheds context for PWES**

| Successful Factors | Comparison to Nepal | Challenges |
|---|---|---|
| ***Environmental services*** | | |
| Requirement of well defined Environmental services (Opportunity, Challenges, Recommendation) | Can be identified for each watershed<br>a) Increased demand of environmental services | 1) Production of services<br>On initiation of conservation activities, the environmental services can be produced. However, the effect of such conservation activities will be longer and payment will not be done until service is realized. Requirement to identify in participatory way |
| Well informed service providers and beneficiaries | Presence of information at expertise level | Requirement of study to know the level of awareness at ground |
| ***Geographical dimension*** | | |
| Well identified service providers and users or beneficiaries | Confusion in identification of service providers | 2)In lack of land rights , conflict on resource rights |
| Feasible with small-scale local level PWES | Ability to pay cause susceptibility on application in small scale in Churia watershed | 3)Capability to pay |
| ***Landuse dimension*** | | |
| Extensive knowledge about relationship between landuse system and environmental services | Presence of perception about forest cover and service provision<br>d) positive spin-off | Requirement of detail study on relationship of landuse and environmental services |
| Require comprehensive hydrological database | Lack of database | Research required |
| ***Social dimension*** | | |
| Presence of mediator / intermediaries | Local government, I/NGOs can be possible mediators | |
| Strengthened social organization | Presence of users group<br>e) participation of poor in conservation | |
| Existence of good governance | c)Supportive changes in resource governance | Governance should be considered while designing the scheme |
| Clearly defined rights and responsibilities | | Clearly defined rights and responsibilities while designing the scheme |
| Strengthening livelihood integrated with service provision | e)Poverty alleviation | Provision of strengthening livelihood while designing scheme |
| ***PES scheme*** | | |
| Flexible and locally adapted Payment mechanism | | 4) Identification of workable model |
| Self financing system with local financial resources | | Self financing system should be considered while designing |
| Diverse charging mechanism for sustainability | | Diverse charging mechanism should be considered while designing |

| Successful Factors | Comparison to Nepal | Challenges |
|---|---|---|
| Transaction costs do not exceed potential benefits | b) provision of finance source for conservation<br>g)Interest of INGOs | 5) Lack of financial assistance |
| Willingness and ability to pay | | 3)To convince to pay or willingness to pay since uncapable to pay |
| Payment should be more than opportunity cost | | |
| Effective Monitoring mechanism | | 6) Can be challenge |
| Reliable baseline assessment | | |
| Economic valuation of environmental services | On going project | 7) Integration of non tangible value in valuation is challenge |
| ***Legal and policy dimension*** | | |
| Favourable policy environment | Not direct prohibition against PWES approach | Contradictory policies |
| Cleared and defined landuse rights | Lack of clearly defined land rights | 2)Issue of land rights |

## 8.3. ANNEX 3: CASE STUDIES – LANDSCAPE BEAUTY PES SCHEMES

| Country | Project/ Market commodity | status | Market demand | Market supply | Mechanism |
|---|---|---|---|---|---|
| Nepal | Annapurna Conservation Area - access rights & management agreements | Mature - initiated in 1986 | Annapurna is a popular trekking destination. In 1997, over 50,000 international trekkers visited the area. Foreign visitors pay $20/head. Donations by WWF for biodiversity. In 1996 over $400,000 had been collected and the WWF had committed to donating an additional $1.3 m over ten years | The King Mahendra Trust for Nature Conservation got a Conservation Area established in 1992. Local communities work with the King Mahendra Trust to protect local landscape beauty and biodiversity. | Entrance fees/over-the-counter & trust fund intermediary - revenue from tourists and donations is channeled to an endowment fund managed by the King Mahendra Trust for Nature Conservation. Funds are allocated to local communities through project-based activities. |
| Nepal | Ghalekharka-Sikles area, southern Annapurna - package of ecotourism services | Emerging - initiated in 1992 | Foreign trekkers. Approximately 1,000 visitors passing through the Ghalekharka-Sikles area every year. | Local community natural resource management in the Ghalekharka-Sikles area, southern Annapurna. Activities include forest protection, afforestation, tree nursery establishment, environmental education, etc. The community has also invested as a group in ecotourism facilities, e.g. campsites, lodges, etc. | Community enterprises/vertical integration & fund intermediary. Payments for landscape beauty are embedded in payments for tourism services, e.g. campsite use, lodge stays. Revenue is channeled into a central community fund to be allocated to: the Conservation and Development Committee (15%); the repair and maintenance of tourism facilities (35%); and to community development (50%). |
| Nepal | Royal Chitwan National Park - buffer zone ecotourism services | Mature - initiated in 1995 | Tourists that wish to experience beautiful landscapes and view wildlife. | The Royal Chitwan National Park, a World Heritage site, has been threatened by local encroachment. The King Mahendra Trust for Nature | Community enterprises/vertical integration. To visit the buffer area tourists must pay entrance fees to the Royal Chitwan National Park, and since 1996 30-50% of the revenue from the Park must go to local communities. Revenue is channeled to the |

| | | | | | |
|---|---|---|---|---|---|
| | | | | Conservation, with support from the Biodiversity Conservation Network, has helped develop ecotourism in buffer areas. Local community groups invest in forest protection and regeneration, and offer wildlife viewing towers and elephant treks. | Baghmara Users Committee. This money is then redistributed to the community and towards conservation activities. |
| Nepal | Lodge tax in Langtang National Park - management projects | Mature | Lodge operators in Syabrubensi village through a Partnership for Quality Tourism Project. The project is managed by a lodge management committee, which agreed that a charge of two Nepali Rupees would be imposed per trekker per night. | Community protection of Langtang National Park, which covers over 170,000 ha and includes some of the best preserved silver fir/rhododendron forests in Nepal. | Fund intermediary - the Lodge Management Committee "pays" local communities to conserve valuable tourist areas through local development projects. Payments made into a central fund managed by a Lodge Management Committee, which allocates money to appropriate community development projects. |
| Nepal | National Park payments for landscape beauty - access rights | Emerging - amendment in 1993 | National Parks through revenue sharing with local people in buffer zones. | Local communities living in buffer zones protection of landscape beauty valued by tourists. | Over-the-counter/entrance fees & fund intermediary - Fourth Amendment (1993) to the National Park and Wildlife Conservation Act 2029 includes a new regulation requiring 30-50% of national park entrance fees and other park revenue to return to local people living in buffer zones. |
| Nepal | Muir's Tours-natural resource management projects | Emerging - Muir's Tours has been operating since 1999 | Muir's Tours commits to investing in conservation and development in countriesin which it operates. It raises funds for its Nepal conservation efforts from ecotourism operations | Local communities that protect landscapes through careful natural resource management. In Nepal, Muir's is co-financing one project in Panglang village near the Tibetan border. In 2000, over 10,000 trees were planted to reverse significant deforestation. | NGO intermediary & project based - Muir Tours will channel 100% of its profits to conservation and development goals. Funds are channeled via the Nepal Kingdom Foundation, a UK charity. To date projects have been undertaken in collaboration with other NGOs, including the Mountain Institute |

Source: Landell-Mills and Porras (2002) in http://www.iied.org/SM/eep/documents/MES_case_studies.pdf

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