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Discussion paper

*Developing markets for  
watershed protection  
services and improved  
livelihoods in India*

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### Developing markets for watershed protection services and improved livelihoods

This study is part of a cross-country initiative coordinated by the International Institute for Environment and Development (IIED) with the above title.

IIED carried out a global review of markets for forest environmental services and their impacts on the poor, as part of its Instruments for sustainable private sector forestry project. Amongst the forest environmental services considered was watershed protection services. The review showed that markets are emerging around the services provided by watershed land use, particularly water quantity and quality. However, there has been little regard for the actual impacts of such markets, particularly upon those who manage the land in watershed areas. Thus there is a need to explore mechanisms for ensuring that these markets can both improve watershed services as well as contributing to poor people's livelihoods.

With support from DFID, IIED and its partners in the Caribbean, India, Indonesia and South Africa have been investigating these issues through the preparation of diagnostic studies, which look at the issues, demands, players and potential ways forward. These countries are home to watershed contexts where markets are showing signs of emerging and key actors recognise that such markets will need to be shaped if they are to deliver good land use and poverty reduction. The research has also produced detailed case studies of the impacts of existing watershed market mechanisms in Costa Rica and Ecuador, and a core of partners in further countries eager to expand links and seize opportunities in Peru, Mexico, China, the Philippines and Vietnam. The work has also developed an effective network - an incipient "policy community" - amongst those in a wide range of institutions around the world engaging with these issues.

Reports in this series are available from IIED on request, and are soon to be downloadable from [www.iied.org/forestry](http://www.iied.org/forestry). They include initial diagnostic analyses of markets for watershed protection services and improved livelihoods in the Caribbean, India, Indonesia and South Africa; as well as detailed case studies on the social/ poverty impacts of markets for watershed services in Costa Rica and Ecuador.

For a wide range of published reports from IIED's previous 3-year initiative on *Instruments for sustainable private sector forestry*, including the global review of markets for forest environmental services and their impacts on the poor ("*Silver bullet or fools' gold?*") see [www.iied.org/psf/publications\\_def.html](http://www.iied.org/psf/publications_def.html)

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### List of Abbreviations

BBMB	Bhakra Beas Management Board
BMC	Bhopal Municipal Corporation
CA	Compensatory Afforestation
CAT	Catchment Area Treatment
CSWCRTI	Central Soil and Water Conservation Research and Training Institute
DDP	Desert Development Programme
DoH	Department of Horticulture
DPAP	Drought Prone Area Programme
DRDA	District Rural Development Agency
EAS	Employment Assurance Scheme
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
EPCO	Environmental Planning Coordination Organisation
FCA	Forest Conservation Act
FD	Forest Department
FPR	Flood Prone Rivers
FSI	Forest Survey of India
GoHP	Government of Himachal Pradesh
GoMP	Government of Madhya Pradesh
HEP	Hydro-electricity Project
HPEPPCB	HP Environmental Protection and Pollution Control Board
HP	Himachal Pradesh
HPFD	Himachal Pradesh Forest Department
HPFSR	Himachal Pradesh Forest Sector Review
HPSEB	Himachal Pradesh State Electricity Board
HRMS	Hill Resource Management Society
ICAR	Indian Council of Agricultural Research
ICFRE	Indian Council for Forestry Research and Education
IFA	Indian Forest Act
IGCEP	Indo-German Changar Eco-Development Project
IIED	International Institute for Environment and Development
IPH	Irrigation and Public Health Department
IWDP	Integrated Wasteland Development Programme
IWRMS	Integrated Water Resource Management Strategy

JFM	Joint Forest Management
LIS	Lift Irrigation Scheme
MoA	Ministry of Agriculture
MoEF	Ministry of Environment and Forests
MoRD	Ministry of Rural Development
MoWR	Ministry of Water Resources
MP	Madhya Pradesh
MPSPCB	Madhya Pradesh State Pollution Control Board
NABARD	National Bank for Agriculture and Rural Development
NCA/ISCB	Narmada Control Authority/ Inter State Control Board
NHPC	National Hydro Power Corporation
NTFP	Non Timber Forest Product
NVDA	Narmada Valley Development Authority
NWDpra	National Watershed Development Programme in Rainfed Areas
PHED	Public Health and Engineering Department
PIA	Project Implementation Agency
PIM	Participatory Irrigation Management
PSEB	Punjab State Electricity Board
RGNDWM	Rajiv Gandhi National Drinking Water Mission
RGWSM	Rajiv Gandhi Watershed Mission
RSEB	Rajasthan State Electricity Board
RVP	River Valley Projects
SHGs	Self Help Groups
SLCUWR	State Level Committee on Utilisation of Water Resources
SWC	Soil and Water Conservation
TD	Timber Distribution
UPSEB	Uttar Pradesh State Electricity Board
VDC	Village Development Committee
VWC	Village Watershed Committee
WDF	Watershed Development Fund
WDPSCA	Watershed Development Programme in Shifting Cultivation Areas
WRD	Water Resources Department
WUA	Water Users Association

## Executive Summary

While forests have traditionally been known to provide goods such as timber, fuelwood, fodder, medicinal plants and other non-timber forest produce, in recent years there has been growing awareness around the world of the role played by forests in providing important environmental services such as carbon sequestration, landscape beauty, biodiversity conservation and watershed protection. Markets for these services are increasingly generating real payments for forest owners and managers, in many cases poor communities, providing them with increased incentives to maintain their forests, thereby, directly improving their livelihoods.

This scoping phase study on *'Developing Markets for Watershed Protection Services and Improved Livelihoods in India'*, is a part of a larger international study being carried out by the International Institute for Environment and Development (IIED), London in several parts of the world and focuses primarily on the potential of developing markets for one such service, watershed protection, in India.

Watersheds, and the services provided by them, are today facing increasing threats in various parts of the world, and there is growing concern that existing regulatory approaches to address these threats may be insufficient on their own. This is especially true in the case of India, where over two-thirds of the country's total cultivable land is environmentally fragile and facing different degrees of degradation. Forests, which legally constitute around 23% of the country's total geographical area, and comprise some of the most important watersheds, also face severe pressures from the growing human and livestock population that depend on them for their subsistence needs. Realising the limitations of the regulatory approach and the fact that it is impossible to protect forests without the full and active participation of local communities who depend on them, the Government of India has in recent years, tried to adopt a more participatory approach to natural resource management through initiatives like Joint Forest Management and Participatory Watershed Development, which seek to provide local communities with sufficient incentives to participate in forest protection efforts. While these have indeed been successful in many respects, there are also cases where the incentives offered have not been sufficient enough to alter the land use practices of poor forest dependent communities. Many instances of watershed protection have faced serious problems with regards to equity, with benefits of forest protection going mainly to rich landowners, and costs being borne mainly by the poorer and landless forest-dependent communities. In the case of larger downstream beneficiaries such as hydropower projects and urban water supply agencies too, there are no payments made to upstream communities for the watershed protection services that they provide to the former in the form of

reduced siltation, improved water flows, etc. It has therefore been argued that perhaps market-based approaches can offer alternative, yet complementary, solutions in this regard.

However, the purpose of this study is not to promote the use of market-based approaches in watershed protection services. The main focus is instead to explore the potential and limits of this approach vis-à-vis other existing approaches such as regulation and collective action to see what can best improve the provision of these services and the livelihoods of the poor.

The main objectives of this scoping phase study have thus been:

- To assess the current status and context of watershed protection and development in India in detail and consider the relevance and applicability of markets for watershed protection services in the country
- To identify and present some of the examples of market-like mechanisms for watershed protection services that already exist in India and have helped to improve the livelihoods of the poor
- To conduct a brief field-based diagnostic of the two states of Himachal Pradesh (HP) and Madhya Pradesh (MP) to study the links between providers, managers and users of watershed protection services in these states and to assess the potential for developing market-based approaches to improve these services and the livelihoods of the poor.
- To identify some of the main constraints, knowledge gaps and research needs that need to be considered while developing market-based payment systems for watershed protection services and identify key partners and resource people for the next phase of the study.

This study has considered the potential of developing market-based approaches for watershed protection services at three different levels - micro, meso and macro respectively. While the micro and meso levels focus on existing and potential 'market like' transactions occurring for watershed protection at a local scale, within and between villages, the macro level looks at these watershed protection services from a wider perspective in terms of payments that are being made, or could be potentially made, by the larger beneficiaries located downstream to poorer upstream communities (or the Forest Department) that provide these services.

At the micro level, market-based mechanisms for watershed protection services that are embedded within a larger collective action process appear to have significant potential to improve livelihoods and equity at the village level. For example, in the cases of Sukhomajri and Nada in Haryana and Pani Panchayats in Maharashtra, the allocation of equal water rights to all villagers, irrespective of whether or not they own land, in return for their participation in watershed protection activities on common lands, have enabled the landless and the land poor to sell their

water rights to larger landowning farmers who need the surplus water. This market-based mechanism has significantly increased equity and improved livelihoods at the village level. However, examples where such trading of water rights have taken place are more of exceptions rather than the rule, and more research is needed to find out why such market-based mechanisms have not occurred at a larger scale in other parts of India, such as MP, where landholding is still very iniquitous.

At the meso level, the study identified a number of interesting inter-village transactions involving cooperative arrangements for watershed protection and water sharing between upstream and downstream villages that hold valuable lessons for the development of more formal market-like mechanisms in the future. For example, the 200-year old traditional community-based *kuhl* (or canal) irrigation systems in Himachal Pradesh are based on an elaborate and well-defined system of rules, rights, and responsibilities of water allocation between various upstream and downstream villages. What is interesting is that it is commonly perceived among the local people that community-based "private" *kuhls* are far more effective than those *kuhls* that have been taken over by the government in the past few decades. Similarly, other traditional incentive-based arrangements between villages exist for other natural resources in the form of grazing rights, tree rights, etc., and useful lessons can be drawn from these examples too for the future development of market-based approaches for watershed protection services. However, an important issue to consider and research further is whether it is desirable to replace collective action transactions that are currently based on principles of informality, goodwill and reciprocity with more formalised market-based arrangements.

The highest potential and desirability of developing market-based payments for watershed protection services has been observed at the macro level in both HP and MP. Payment systems between large downstream beneficiaries such as hydropower projects and urban water supply agencies, and poor communities living upstream, can definitely provide the latter with an additional incentive to participate in watershed protection activities and thereby improve their livelihoods. Though there are substantial payments that are currently being made by hydropower companies, big dam projects, etc. for catchment area treatment, compensatory afforestation, etc., these payments are essentially regulatory in nature, without anything ever reaching the local communities on the ground. Further, their effectiveness is also quite uncertain, since in many cases, they are commonly perceived to be either lying unused or used for purposes other than what they were originally intended for. Similarly, in the case of municipal water supply agencies, even though there appear to be direct linkages between the presence of forests in upstream catchment areas and the quality and quantity of water supplied to cities and towns downstream, there are no payments being made to poor communities living in these upstream forested areas as



of yet, for the watershed protection services that they (and the local Forest Department) provide. Given the water crisis that many Indian cities are increasingly facing and the severe biotic pressure that forests in India generally face, there is certainly potential to develop payment mechanisms - market-based or otherwise - between the downstream beneficiaries of watershed services and the upstream providers. However there is very little awareness amongst policymakers and the general public of the concept of making or receiving payments for environmental services and more awareness will have to be created about the relationship between upstream watershed protection and downstream benefits if effective payment systems are to be established. Political acceptance and presence of appropriate institutions are the other necessary preconditions that will also need to be met for such payment mechanisms to work in the future.

On the whole thus, there is a certainly a potential for developing market-based mechanisms and payment systems for watershed protection services in India to complement the existing regulatory and collective action approaches, and to improve the livelihoods of the poor. However, there is a definite need to undertake more comprehensive research on this subject to address the constraints and knowledge gaps that have been identified during this scoping phase, and these have been listed in the report as future research activities that need to be taking up in the next phase of this project.

## Introduction

The concept of markets for environmental services has been gaining ground in recent years and the role of forest ecosystems in providing these services has been attracting widespread recognition and growing financial flows in various parts of the world. Markets for forest biodiversity (e.g. bio-prospecting), recreational value (e.g. ecotourism) and more recently carbon sequestration (e.g. tradable carbon offsets) are increasingly generating real payments for forest owners and managers, and in many cases poor communities, providing them with increased incentives to maintain their forests, thereby, directly improving their livelihoods.

Watershed protection services have so far received less attention, although in certain regions, markets for such services are now emerging (often at local levels), indicating that the hydrological functions of land use may be gradually gaining the recognition they deserve. It has been realised that better access to reliable supplies of clean water and reduced vulnerability to environmental risks such as flooding, landslides and water pollution can lead to improved livelihoods for local people. But this requires better management of watersheds. Today watersheds, and the services provided by them, are facing increasing threats in various parts of the world, and there is growing concern that existing regulatory approaches to address these threats may be insufficient on their own. It has therefore been argued that perhaps market-based approaches can offer alternative, yet complementary, solutions in this regard.

However, while market-based approaches are often credited with promoting efficient resource allocation, it is not clear how they may be best employed to improve the use of water resources and land management in watersheds. Another major concern relates to how markets for watershed services impact local livelihoods and, in particular, poorer groups, especially in a country like India, which has undertaken significant economic reforms since the early nineties and has been steadily moving towards a free market economy. Also a key concern regarding market-based approaches remains their equity impacts. This is more so in the case of natural resources since they support the basic livelihood needs of millions of poor Indians. Therefore, despite the considerable interest expressed in the potential of market-based approaches to more effectively manage natural resources, much uncertainty still prevails.

This scoping study on *'Developing Markets for Watershed Protection Services and Improved Livelihoods in India'*, is a part of a larger international study being coordinated by the International Institute for Environment and Development (IIED), London. A four-year programme of research and action is being coordinated by the IIED in a range of countries with the objective of increasing the understanding on how market-based approaches can support better

watershed land use and improved water services for the benefit of poor people – and where they cannot. The programme includes international network building, experience sharing, and an action-learning component involving people in regions that can gain from working together. Four action-learning regions have been taken up – South Africa, India, Indonesia and the Caribbean. The India component takes a first preliminary look at the potential and desirability of using market-based approaches to provide watershed protection services in India from the point of view of improving equity and livelihoods. The study does this in two broad ways. Firstly it assesses the current status and context of watershed protection and development in the country in detail and presents some of the examples of market-like mechanisms for watershed services that already exist in the country and have led to improvements in livelihood and equity. Secondly, it undertakes in depth field-based scoping research in the two states of Himachal Pradesh (HP) and Madhya Pradesh (MP) to study the potential that exists for developing market-based approaches for watershed protection services and prepares a brief diagnostic of the same. The findings of this study is thus structured into five main chapters:

- Chapter 1: Overview of Watershed Protection and Development in India and existing examples of market-based mechanisms
- Chapter 2: Methodology adopted for Scoping in Himachal Pradesh and Madhya Pradesh
- Chapter 3: Diagnostic of Himachal Pradesh (HP)
- Chapter 4: Diagnostic of Madhya Pradesh (MP)
- Chapter 5: Summary of Findings and Next Steps

A broad definition of '*market-based approaches*' has been adopted for this study, which includes all incentive-based arrangements, transactions, payments, and compensation systems (monetary or non-monetary) for watershed protection services that are 'market-like' in nature and have the potential to develop into more sophisticated mechanisms in the future. The findings of this study, given in the following chapters, draw not only on review of available literature, but also on interviews and discussions with key individuals and stakeholders, and visits to different field sites in HP, MP, and elsewhere, details of which are provided in the Annex. It is important to emphasise that this study is *not* aimed at promoting the development of markets for watershed protection services. Its primary intent is only to explore the potential and limits of a market-based approach, particularly in the context of other existing approaches, such as regulation and collective action, and identify areas where adoption of such approaches can benefit poor people – and where they cannot.

## Chapter 1

### **Overview of Watershed Protection and Development in India**

Watershed protection and development have gained tremendous importance and relevance in India over the past few years. This has been due to the increasing realization of the alarming state of India's natural resources – land, water and forests, which have witnessed rapid degradation as a result of the immense pressures that have been put on them by the country's growing human and livestock population. Dry lands, for instance, which account for almost two-thirds of India's total cultivated land, are among the most environmentally fragile lands. These support a large number of India's poor and contribute a significant proportion of the country's agricultural output (Ninan & Lakshmikanthamma, 1994). Owing to the intensification of agriculture, extension of cultivation to marginal lands, perverse incentives that encourage the over-exploitation of natural resources<sup>1</sup>, rapid degradation of forest resources, overgrazing and diminishing common lands, much of these lands are in various stages of degradation. According to an estimate made by the National Commission on Agriculture, 175 million hectares of land in India is under some form of degradation or the other (Planning Commission, 2002). This is easily visible in the form of increased soil erosion, declining groundwater tables, decrease in drinking water availability, desertification, etc. in different parts across the country (Ninan & Lakshmikanthamma, 1994). Furthermore, frequent occurrences of either floods or droughts are evidence of improper land use in the catchments, and of the inadequate conservation of forests (MoA, 2002). Since more than two-third's of India's one billion-strong population depends heavily on the primary sector – agriculture and forestry – to meet their daily survival needs, this degradation of the natural resource base has thus seriously impacted the well being and development of the majority of the country's population, especially the poor, who depend on these resources the most. The degradation of land and forest resources in the upper watershed catchments have also negatively affected other urban downstream stakeholders such as hydropower companies, municipal water supply corporations, fisheries, downstream states, etc. through increased siltation in reservoirs, dams, and natural water bodies, reduction of water flows, increased occurrences of floods and landslides, etc. However, the primary focus of watershed protection and development in India, till date, has mainly been on reversing the negative impact of land degradation on the rural poor at the local level rather than at a wider macro scale. As Kerr & Chung (2001) point out, in much of semi-arid India off-site concerns are typically limited to the local intra or inter-village level itself. Nonetheless, in recent years, there has been growing awareness of the watershed services that are

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<sup>1</sup> For example in dryland areas, the pumping of ground water has proceeded at a faster rate than the rate at which it has been recharged. This is due to the availability of electricity at a flat rate regardless of the amount of electricity used for pumping water (Hanumantha Rao Committee Report, 1994)

provided by the upstream managers of natural resources to larger off-site downstream beneficiaries.

### 1.1 Transition From Regulatory to Collective Action Approaches

Historically, ever since the breakdown of traditional resource management systems took place in colonial times (Guha, 1991, Gadgil & Guha, 1992), regulation has been the main approach followed for natural resource management in India, with ownership, management and control of natural resources vested almost entirely in the hands of government. According to official sources, around 93% of India's forests are solely under the administrative and legal control of the Forest Department, with 4% under the control of the Revenue Department (ICFRE, 1996). Until recently, the main approach to forest management was that of '*departmental policing*' of forests forbidding local communities of access to them in the classical '*fences and fortresses*' mode. Similarly, in the case of watershed protection and development activities, it was only the line departments and government staff of the Ministries of Agriculture, Rural Development, and Environment and Forests that carried out watershed treatment work in a centralised top-down manner under a regulatory framework. There was very little community participation, with the role of communities in most cases, limited only to that of providing cheap labour. Further, watershed development was undertaken in a completely sectoral and piecemeal manner by each of the concerned departments and ministries, with each implementing programmes and guidelines separately, without any coordination among themselves. Financing of these programmes too was supported mainly by the government - either central or state - on the basis of annual budgets and allocations, with no contribution from the communities themselves, which resulted in a total lack of ownership of these programmes among the local people. The watershed treatment interventions were highly mechanistic, focusing primarily on technical engineering works such as construction of check dams, contour trenching, gully plugging, plantation works, etc. without paying much attention to community mobilization and social organisation. Given this highly regulatory, centralized and target-driven approach, and the emphasis on the quantity rather than the quality of interventions, it was unsurprising that government supported programmes in watershed development were unable to halt the rapid degradation of the country's natural resources. Acknowledging this failure, the Hanumantha Rao Committee, which was set up in 1994-95 to review watershed development programmes in the country, noted that these programmes had made very little impact on the ground despite having been in operation for over two decades (Planning Commission, 2002).

Realizing the limitations of the regulatory approach in reversing the degradation of natural resources, and learning from successful experiments of community-based watershed and forest

protection in Sukhomajri, Ralegaon Siddhi, Arabari, etc. in the 1970s (Agarwal & Narain, 1999), the government made serious efforts to secure community participation in the management of the country's land, water and forest resources through the programmes of Joint Forest Management (JFM), Participatory Watershed Development, and Participatory Irrigation Management in the 1990s. Watershed development in India has, since then, made three important transitions. Firstly, there has been a shift from a top-down, command-and-control regulatory approach to a more people-centred, bottom-up and participatory approach, which recognizes that watershed protection and development is impossible to undertake and sustain successfully without the active participation of local communities. Secondly, and related to the first, it has been realized that *technical* solutions that normally characterize watershed protection activities in India such as building of engineering structures, policing of forests from local people, etc. are by themselves insufficient, and that *social* solutions involving collective action by the communities, and offering them suitable incentives to participate in watershed development and natural resource management, are far more sustainable in the long run. Thirdly, it has been accepted that watershed development is far more effective when done in an integrated and planned manner, following a logical ridge-to-valley approach, rather than in isolation by each government line department separately. Unlike earlier approaches where the revenue or administrative boundary was adopted as the unit for development purposes, under the participatory watershed development programmes today, the entire watershed is chosen as the appropriate unit area for development. This new approach seeks to improve and develop all types of lands - government, forest, community and private lands - that fall within a particular watershed, and is thus a holistic approach to improve and develop the economic and natural resource base of dry and semi arid regions (Ninan & Lakshmikanthamma, 2001). Further, it is widely accepted that watershed development has to be conceived as a broad strategy for protecting livelihoods of the people inhabiting fragile ecosystems, especially the poor, rather than just the physical resources alone (Rao, 2000). Thus the overall objective and rationale of watershed development in India is no longer limited to scientifically determined methods of soil and water conservation, but has gone far beyond that, evolving instead into a form of '*Watershed Plus*', which seeks to ensure not only the availability of drinking water, fuelwood and fodder for the poor, but also raise their income and employment opportunities through improvements in agricultural productivity, better access to markets, extension services, etc (Shah, 2000). Hence, integrated natural resource management and watershed development has become a larger paradigm for achieving sustainable development in the country.

## **1.2 Watershed Development Programmes and Agencies**

The earliest watershed development programme in India can be traced back to the pre-independence period, when soil erosion in ravine areas was recognized as a problem, and Soil and Water Conservation (SWC) works were initiated by the Royal Commission of Agriculture in the 1920s (Sharma & Sharma, 2001). However, such work was done only on a scattered basis and this piecemeal pattern followed until late after Independence.

The first concrete steps in watershed development after Independence were undertaken through the enactment of various land development and land preservation acts by different state governments and the creation of land development banks in several states (Rao, 2000). Thereafter, in the 1960s, special schemes for SWC were undertaken in desert and drought prone areas, though mainly as relief programmes. A national scheme for watershed development in ravine areas was also initiated in 1967, which was followed by a programme for soil conservation in river valley projects in 1974. The Central Soil and Water Conservation Research & Training Institute (CSWCRTI) also initiated a number of watershed management projects in the 1970s in different parts of the country. Hence, as an official programme, watershed development has been more than three decades old in India (ibid).

The Ministry of Agriculture (MoA), the Ministry of Rural Development (MoRD) and the Ministry of Environment and Forests (MoEF) along with their respective line departments, are the three main government ministries in charge of watershed protection and development in India, though each of them focuses on different areas. Over the last decade, there have been substantial investments made in watershed development under different programmes run by each of these ministries. According to one estimate by Farrington et al, 1999, over US\$ 500 million a year is being allocated for watershed development programmes in India by government agencies alone.

### Ministry of Agriculture

The MoA focuses on watershed protection and treatment activities on cultivated areas and private lands. The main watershed programmes initiated by the MoA include the National Watershed Development Programme in Rainfed Areas (NWDPA), Watershed Development Programme in Shifting Cultivation Areas (WDPSA), and other smaller schemes initiated by the Department of Agriculture and Cooperation, Soil and Water Conservation Division, Rainfed Farming Division, NABARD, and research institutes of the Indian Council of Agricultural Research (ICAR), etc.

- The main aim of the NWDPR is to increase agricultural productivity in rainfed areas through the sustainable use of natural resources. Launched in 1990-91, the project is currently being implemented in 28 states and 2 Union Territories and has been allocated Rs. 1020 crores<sup>2</sup> to treat 22.5 lakh<sup>3</sup> hectares under the Ninth Five Year Plan (MoA, 2002).
- The WDPSCA focuses on the development of shifting cultivation areas on a watershed basis<sup>4</sup>, especially in the North East. This scheme is being implemented since 1994-95 and in the first three years of the 9<sup>th</sup> Plan (1997 – 2002), nearly one-lakh hectares have been treated at a cost of Rs. 48.41 crores (ibid).

### Ministry of Rural Development

Watershed development projects run by the MoRD focus on the treatment of common lands and other areas of difficult terrain. The main programmes of the MoRD, under which watershed development activities are taken up, are the Drought Prone Area Programme (DPAP), the Desert Development Programme (DDP), the Integrated Wasteland Development Programme (IWDP), and the Employment Assurance Scheme (EAS).

- The DPAP is an area development programme that focuses on those fragile areas that are constantly affected by serious drought conditions. Since its inception in 1972-73 until 1992-95, the DPAP has successfully treated 30 lakh hectares under land resources development, 9.26 lakh hectares under water resources development and 17.82 lakh hectares under afforestation and pasture development. Since 1995, this programme is being implemented on a watershed basis and at present, 5965 watershed projects out of 6265 are under implementation at various stages.
- The DDP focuses on reforestation to arrest the spread of both hot and cold deserts. Since its inception in 1977-78 till 1992-95, the DDP has successfully treated 1.85 lakh hectares under land resources development, 0.83 lakh hectares under water resources development and 2.85 lakh hectares under afforestation and pasture development. Since 1995, this programme is being implemented on a watershed basis and 2202 projects sanctioned so far are at various stages of implementation.

<sup>2</sup> 1 Crore = 100,00,000

<sup>3</sup> 1 Lakh = 100,000

<sup>4</sup> Treatment on a 'watershed basis' refers to the new approach, which emphasises on undertaking watershed activities in an integrated manner and based on community participation. It follows the new watershed development guidelines that were first introduced in the mid-1990s and have been explained in the following sections.



- The IWDP was launched in 1989-90 with the aim of developing wastelands in India on a watershed basis. Up to May 1999, 228 IWDP projects have been sanctioned in 25 states with a total outlay of Rs. 778.12 crores to treat a total project area of 15.98 lakh hectares.
- Recognizing the vast employment generating potential of watershed development work, a substantial amount of watershed development projects have also been undertaken through the EAS with 50% of its total allocation (Rs. 1990 crores in 1998-99) earmarked for this purpose alone.

#### Ministry of Environment and Forests

The Forest Department, under the MoEF, plays a crucial role in watershed protection and development; firstly by protecting forests in upper catchment areas, and also by undertaking soil and water conservation and watershed development works on degraded forest lands as part of its regular ongoing forestry activities. In fact, since most of the land in the upper slopes is typically under forests and the Forest Department is solely responsible for maintaining and managing the approximately 76 million hectares of legally classified forest land in India i.e. about 23% of the country's total geographical area (FSI, 1999, MoEF, 2002), of all the different government departments and agencies, it is the Forest Department, which is considered to be the most important provider of watershed protection services to all downstream beneficiaries, be they rural or urban. Despite the lack of enough hard scientific and hydrological evidence connecting forests to the provision of these services, the perception that forests provide watershed services in the form of greater availability of water, lesser soil erosion, more rainfall, flood and landslide control is widespread in the minds of most people, across all departments and at all levels, in the country.

Forest management, like the management of other natural resources was, until recently, highly regulatory in India. However, realising that sustainable forest management could not be achieved without the active participation of the local communities, and that the Forest Department on its own could not prevent the rapid degradation of the country's forests under the growing biotic pressures, the programme of Joint Forest Management (JFM) was initiated in 1990 in different parts of the country as a community-state partnership that involved local communities in forest management and protection, and provided them direct benefit-sharing incentives with regard to fuelwood, fodder, NTFPs and timber. Alongside JFM, the MoEF is also implementing an Integrated Afforestation and Eco-Development Scheme to promote the development of degraded forests. However, JFM today is the largest forest management programme in the country covering around 18% of the country's total forest area. According to latest estimates, there are over 63,000 village level institutions all over the country involving 2.8 million poor families who are

protecting and managing over 14 million hectares of forestlands (MoEF, 2002). These forest-dependent communities are hence important watershed protection service providers to all downstream beneficiaries of such services.

#### Inter-Departmental Cooperation

Apart from the flagship programmes of these different ministries, there are also other important watershed protection programmes running in India, such as the *Centrally Sponsored Scheme of Soil Conservation for Enhancing Productivity of Degraded Lands in the Catchments of River Valley Projects and Flood Prone Rivers (RVP & FPR)*, which is financed by both the central and state governments on an 80:20 basis and is being currently implemented in 45 catchments spread over 22 states in the country. This programme is being implemented not by one department alone, but by different nodal departments of the state government including the Forest, Agriculture and Soil Conservation Departments. In fact, it was the management of forests and natural resources in medium or large river valleys, that was originally the main motive behind watershed rehabilitation in India, so that it would prevent rapid runoff of water (and concomitantly soil erosion), slow down the rates of siltation of reservoirs, and limit the incidence of potentially damaging flash flooding in river courses (Paul 1997 cited in Farrington et al, 1999). It was only subsequently that watershed development evolved into a larger vehicle for rural development.

The main objectives of this scheme are thus to enhance productivity of degraded lands, improve land capability, prevent soil erosion from the upper catchments/ watersheds and ultimately increase the life of reservoirs. To do so, soil and water conservation measures such as agro-forestry, horticulture development, afforestation, pasture development, and silvi-pastoral development are undertaken in an integrated manner with due support from drainage line treatment measures like earthen loose boulder structures, check dams, sediment retention structures, percolation tanks, etc. (MoA, 2002). Since its inception in the 1970s, a total of 42.84 lakh hectares has been treated under this scheme with a total expenditure of Rs. 945 crores (MoA, 2002).

#### Other Watershed Development Programmes

In addition to the above Centrally Sponsored Schemes, several state governments are also implementing their own state-level schemes for soil and moisture conservation on a watershed basis; Maharashtra, Karnataka, Andhra Pradesh and Madhya Pradesh being the notable ones in this regard (Planning Commission, 2002).

A number of international donor agencies, including the World Bank, DANIDA, GTZ, DFID and EC, also support watershed development programmes in several parts of the country. Numerous non-governmental organizations (NGOs) such as AKRSP, MYRADA, Tarun Bhagat Sangh, etc. are also actively involved in various watershed development activities and programmes all over India, especially after the shift from the regulatory to the community-based approach that has taken place in the last decade.

There are a multiplicity of watershed development programmes in different parts of the country undertaken directly by the government or through NGOs or externally donor driven interventions. However, this very multiplicity often leads to tremendous confusion on the ground. The most commonly visible sign of this is the formation of several village level committees, which have overlapping or similar mandates. Not only is there a general lack of coordination between different implementation bodies, but also often a duplication of effort. This leads to a wastage of funds, which could instead be put to better use in other areas. The only possible advantage of a multiplicity of programmes is that a vast and diverse geographical area would get covered under programmes which have a mandate and whose guidelines demand treating particular categories of areas – for example drought prone areas, or wastelands or rain-fed farming areas. Nonetheless, a significant degree of overlap remains and more coordination would always enhance efficiency and promote cross-learning.

### 1.3 Legal and Policy Environment

To understand the overall context within which watershed protection and development activities have been undertaken in India, it is important to understand the changes that have taken place in the legal and policy environment. Over the last decade, a number of policies and guidelines have guided the shift in natural resource management and watershed development, from a *regulatory* to a more community-based *collective action* approach.

In the case of forests, even though legally most forests in India are still very much owned by the state, administered by the Forest Department, and governed by various acts and regulations<sup>5</sup>, the National Forest Policy of 1988 and the JFM Notification of 1990 clearly recognise the right of local communities to have the '*first charge*' on forests. This is a significant shift from the Forest Department's earlier approach of physically preventing local people from entering forests. The forest policy environment today strongly encourages the participation of local communities, especially women, in forest management and places an emphasis on establishing a collaborative partnership between the Forest Department and the local people to help the latter meet their

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<sup>5</sup> The primary ones being the Indian Forest Act (IFA) 1927 and the Forest Conservation Act (FCA) 1980

genuine fuelwood, fodder and small timber needs in a sustainable manner. Specifically from the point of view of providing watershed protection services, the forest policy has laid particular stress on the maintenance of environmental stability and on arresting soil erosion and denudation in the catchment areas. Further, through the JFM guidelines of 1990, the MoEF has strongly encouraged afforestation and forest protection in denuded areas through people's participation and microplanning, in a way that it not only meets the needs of the local communities but also fosters watershed and ecosystem stability at a larger scale<sup>6</sup>.

The regulatory framework of the MoEF is also very elaborate with regard to watershed protection. It contains several regulations to safeguard watershed areas having a large forest coverage. Of the various acts and notifications, the Environmental Protection Act (EPA), 1986 and the Environmental Impact Assessment (EIA) Notification, 1994 are especially relevant as they make EIA clearance and Catchment Area Treatment (CAT) mandatory for all major development projects. Also, wherever such projects involve diversion of forest land, the FCA, 1980 comes into force as well making compensatory afforestation mandatory in all such cases. Further, as will be shown subsequently, in the case of HP, there are a number of other rules and *payments* imposed on development projects wherever they negatively impact forests.

In the case of watershed development activities undertaken under the MoRD programmes, the ministry, on the recommendations of the Hanumantha Rao Committee, issued common guidelines in 1994, which called for an integrated and participatory approach to undertake watershed development on a '*watershed basis*'. Unlike previously, when each programme of the MoRD had its own separate guidelines, the 1994 Guidelines were applicable to all the watershed development programmes of the MoRD. Further, under these guidelines, a multidisciplinary team from different departments could provide advice to the Project Implementation Agency (PIA)<sup>7</sup> in a coordinated manner instead of on a piecemeal basis, as was the case earlier (Planning Commission, 2002). Hence, many evaluation studies that compare the impacts of watershed development programmes, make it a point to differentiate between those projects that were implemented before 1994-95 in the old 'regulatory style', and those that were implemented on a '*watershed basis*' after the new guidelines came into force.

Realising the need to adopt a similar integrated approach in implementing the watershed projects under its own programmes, the MoA also issued a unified guideline for NWDPR in 2000 that recommended the use of the watershed as a unit for the development of those areas that were prescribed for treatment under the NWDPR. Subsequently however, in 2001, the MoRD issued

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<sup>6</sup> These have been reiterated in the revised JFM guidelines issued in 2002.

<sup>7</sup> This could either be a line department, NGO, Panchayat or any other User Group

a fresh revised set of Common Watershed Development Guidelines that also included NWDPPRA alongside its own programmes, and it is these guidelines that are being followed in most of the watershed development projects in the country today. While the focus of the different guidelines issued by the MoEF, MoRD and MoA still differ somewhat in relation to their specific areas of interest, the common chord that underpins all of them today, is their uniform and unambiguous commitment to undertake land and water management in an integrated manner using community-based participatory approaches.

From the point of view of *payments* for watershed protection services, the common MoRD guidelines call on local communities to make mandatory contributions to meet the costs of watershed treatment activities, unlike previously, where all watershed development activities were funded entirely by the government schemes themselves. However, it should be noted that these payments are more in the nature of those being made by rural beneficiaries for the direct *on-site* services that they receive, rather than for more distant *off-site* services received by other larger beneficiaries further downstream. Hence, under the MoRD guidelines, communities have to make compulsory contributions at the rate of at least 10%<sup>8</sup> from direct beneficiaries for the works done on individual lands, and 5% from the village community/ users for the works done on community lands. The government does not take the proceeds of these contributions away, but they instead go to the Watershed Development Fund (WDF) of the relevant village for future maintenance of watersheds after the conclusion of the project. The watershed development fund is basically an account held by the village watershed committee at a local bank. A treasurer and president selected by the village are signatories to this account jointly with the Project Officer, usually from a government line department. At the same time, the receipt of contribution from the community/ individuals does also mean that the government lessens its own investment to that extent; an amount equal to the amount received in the form of such contributions, is deposited separately by the government into the WDF as well for future maintenance. In addition, the guidelines also recommend charging of user fees for the use of assets such as water for irrigation, fuelwood, fodder, etc. that are generated as a result of watershed projects. However, in reality, there has been very little implementation of the same on the ground.

The common MoRD watershed development guidelines also encourage undertaking afforestation activities including block plantation, shelterbed plantations, sand dune stabilisation, agroforestry, horticulture development, pasture development and development of nurseries for fodder, fuelwood, timber and NTFPs, thereby highlighting the positive role of woody vegetation in providing watershed protection services. Further, whenever forest lands fall within the watershed areas selected for treatment under the common guidelines, the guidelines recommend its inclusion

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<sup>8</sup> 5% for poorer sections

in the watershed treatment plan and call on the concerned forest officer to grant sanction for the treatment plan of that particular forest area. In fact, it even mandates the JFM committees existing in those areas to undertake the watershed implementation work, and recommend the setting up of such committees, if none exist so far. However, whenever this is not possible, the guidelines call on the Forest Department to undertake the watershed treatment activities themselves, and allow MoRD funds to be used by the Forest Department for this purpose. However, unlike the MoRD, no similar initiative exists in the Ministry of Agriculture yet and the Planning Commission acknowledges that this is one area where the complementarities between forests and agriculture need to be strengthened further so that that local communities can develop a stake in the preservation of forests (Planning Commission, 2002).

Apart from the policies and guidelines of the MoEF, MoRD, and the MoA, the National Water Policies of 1987 and of 2002 issued by the Ministry of Water Resources (MoWR) also recognise the role of forests in providing watershed protection services. Both policies recognise that generation of water is one of the important services provided by watershed protection and development activities in upstream areas. While the 1987 Water Policy calls for the preservation and increase of forest cover to reduce the intensity of floods (*para 16*), the 2002 policy strongly encourages watershed management through extensive soil conservation, catchment area treatment, preservation of forests and increase in forest cover (*para 3.4*). For the first time ever, the National Water Policy, 2002 has also asserted the '*polluter pays*' principle to manage polluted waters besides encouraging private sector participation in planning, development and management of water resources, wherever feasible. In line with the policies and guidelines of the other ministries, the latest water policy also calls for a participatory approach through greater community involvement in the management of water resources<sup>9</sup>.

On the whole thus it is evident that policy environment governing natural resources and watershed development in India has shifted significantly from a '*regulatory*' approach of resource management to a more participatory '*collective action*' approach. Further, in the current scheme of things, elements of user-contributions/ payments have also been built in to overcome the subsidy-mentality that has for so long dogged most government-supported programmes in India. Another notable feature of these policies is the clear value that they all place on forests in the provision of watershed protection services.

However, on the flip side, the reality on the ground in the case of many of the government programmes shows that the degree and quality of community participation in the implementation

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<sup>9</sup> While the 2002 National Water Policy, which has recently come into force, replaces the first National Water policy for the country drawn up in 1987, many tenets of the old policy have remain unchanged.

of natural resource management and watershed development projects is still quite limited, despite the focus on community involvement that is given in all of them. Many of the government programmes are still quite target-driven and regulatory in nature. Also on the whole, in spite of all the efforts made to manage natural resources in an integrated manner, and the recognition among premier policy bodies like the Planning Commission that such integrated management through peoples' participation can alone ensure sustainability of the various government efforts in watershed protection, in practice the three life support systems - land, water and forests - still remain unintegrated both administratively and management-wise to a large extent (ibid).

#### **1.4 Impact of Participatory Watershed Development Projects**

Participatory watershed development projects that have been undertaken in India on a watershed basis after the issuance of the new guidelines in 1994 are generally considered to have had significant positive impacts when compared to the period before that (Rao, 2000). Typically, watershed development activities done through soil and water conservation measures such as afforestation, banning of grazing and tree felling in village common lands, construction of check dams, contour trenching, gully plugging, etc. on a '*watershed basis*' have aided ground water recharge leading to increased water tables, which have improved drinking and irrigation water availability in several parts of the country, even in traditionally drought-prone areas. Greater water availability and less soil erosion have in turn increased crop yields and agricultural productivity, which have in turn increased rural employment opportunities and decreased out-migration of agricultural labour. Increased fodder availability for livestock due to better protection of village commons and development of fodder crops, have also increased milk production significantly. All of these together have substantially increased the income of rural households leading to better overall village development. Other important, though indirect, benefits of watershed development that have been noted in different places have been higher enrolment of children in school and empowerment of women with regard to decision making. All of these benefits have been well documented in various impact studies that have been carried out in different parts of the country (Rao, 2000, Shah, 2000, Shah 1998, Farrington et al 1999).

Evaluation studies (Farrington et al, 1999, Kerr et al. 1998), have however shown that such positive impacts have occurred primarily in those watershed development projects, which have enjoyed the full participation of the local communities, where farmers themselves have financially contributed to the costs of watershed development, and where the project has paid sufficient attention to issues of social organization - and *not* otherwise. Further, on the whole, it has been observed that villages with projects operated by NGOs or in collaboration between NGOs and government agencies have performed significantly better than those having purely government

projects since the former have paid more attention to issues of people's participation than the latter (Planning Commission, 2002). Also, despite the widespread acknowledgement that participatory watershed development programmes, wherever properly implemented, have generally had positive impacts in rural India, a number of problematic issues still remain with regard to their sustainability and equity, and it is gradually being realised that the '*collective action*' approach has some limitations too.

## 1.5 Problems in Participatory Watershed Development

### The Question of Sustainability

As Farrington et al, 1999 emphasize, sustainability of watershed development programmes beyond the life of the project is a major issue confronting the future of watershed development in India. As noted earlier, it is being increasingly accepted that for watershed projects to be sustainable, people's participation in terms of financial contribution and their commitment with reference to time and resources is absolutely essential. Most projects have failed to generate sustainability because of the failure of government agencies to involve the people. Though the common guidelines, as described previously, prescribe that both beneficiaries and the village community/ users contribute to the treatment work on private and common lands respectively in government-supported projects, in practice it has been difficult to collect these charges in full, or the recovery is shown on paper but deducted by the contractor in his bill (Kerr et al 1998). This is to a large extent a result of the unwillingness of the local communities to financially contribute to government-aided projects, having become used to a subsidy-driven system over the years in which they benefit from government schemes for free (Shah, 1998). However, a number of other projects, for instance, those undertaken by MYRADA, which insist that all work on private lands should be financed entirely by the individual beneficiaries, have been highly successful in ensuring that farmers pay up their dues. The fact that farmers are, and will be willing to pay for watershed protection activities that directly benefit them in a tangible and substantive manner is evident from the fact that farmers in the MYRADA projects have even taken loans for investing in watershed development activities<sup>10</sup>. Kolavalli (1998) provides a good review of the various cost-sharing arrangements and contributions made by farmers in different government, donor and NGO supported watershed development projects in India. In most cases it is seen that there is a significant positive correlation between the extent and nature of cost sharing, the effort put in, and the benefits realized. These contributions, which are made either in the form of cash, free labour, or through deduction of wages, represent, in many ways, direct *payments* made by communities

<sup>10</sup> It must however be noted that the loans were taken not from the banking system but from self help credit-and-saving schemes run by the local watershed development association. As of now, it is almost impossible to obtain bank credit for soil and water conservation works, even on private land (Farrington et al, 1999).



for the 'on-site' watershed services that they receive. As, Anil Shah (1998) concludes, the extent of willingness of farmers to contribute towards the cost of works is thus a 'litmus test' of their level of interest and commitment to watershed development and it is being increasingly appreciated today that this factor will have to be considered seriously if watershed development projects are to remain successful in the long run.

### The Problem of Equity

Another major problem confronting watershed development in India today is that of equity. Most of the positive benefits associated with participatory watershed development projects - such as increased availability of water, decreased soil erosion, higher crop yields, increased household income, etc. - have gone almost entirely to medium and large landowning farmers, and the small and marginal farmers and the landless, who are much poorer have benefited far less in comparison. This is due to the simple fact that watershed development is essentially a land-based activity. Worst of all, in many cases the small and marginal farmers and the landless have even incurred considerable losses as a result of watershed protection and development programmes. By imposing grazing and tree felling bans and by cutting off access to village common lands, watershed development projects have negatively impacted the income and livelihoods of the poorest landless villagers, who depend the most on these common lands for grazing their livestock and for collecting fuelwood, small timber and NTFPs. This has thus resulted in a situation where while the rich landowning farmers are benefiting tremendously from the closure of village common lands and the watershed protection activities that are being carried out therein, the costs of providing these benefits are borne by the poorest landless sections to a great extent<sup>11</sup>. In many instances, the landless have even been forced to sell off their livestock or switch to cut-and-carrying systems, which has increased the workload of the women (Turton & Farrington, 1998). Further, in a study carried out in Maharashtra, the landless revealed that they had very little say in watershed project decisions and felt threatened by them (Kerr and Chung, 2001). Similarly, poor nomadic graziers also tended to lose out as a result of watershed development projects since they would typically lose access to their traditional grazing lands as a result of watershed development activities on those lands (Farrington et al, 1999). Another interesting example where this inequity has been noted is in Bhaonta-Koylala village in Rajasthan, which has been lauded for its water harvesting and watershed protection efforts. The decision to close off the village common lands (*sawai chak*) for watershed protection activities in Bhaonta-Koylala was very much resented by the poorer and lower caste Balai community living there since not only did the benefits of doing so go only to the richer Rajput and Gujjar castes of the village, but also because

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<sup>11</sup> Jodha (1986) notes that poor households depend far more on village commons than the richer ones, since the latter often produce fodder in their own fields.

it prevented them from using the same land for creating a new settlement for their increasing population, something which they had planned to do (Shresth & Devidas, 2001). Thus watershed development programmes, as they currently stand are thus heavily skewed in the favour of the landed and the costs and benefits are unevenly distributed among the people affected. This inequity gets accentuated even further by the fact that the marginal farmers and the landless also make a contribution to the cost of the watershed treatment work, which is usually deducted from their wages.

However, it is also incorrect to conclude that the landless and poor have not benefited at all from watershed development. In many cases they have, though these benefits are largely indirect, marginal, and Rawlsian<sup>12</sup> in nature. While the landless and land poor have not received any of the direct benefits that have gone to the landowners, they have nonetheless benefited from the increased, and better, labour opportunities that have been generated as a result of the watershed development programmes. Increased crop yields and agricultural productivity in treated areas, have boosted demand for agricultural labour, and since marginal landowners and the landless constitute the bulk of the agricultural labour force, they have benefited the most from this. This has consequently lowered out-migration rates at several places. Apart from employment benefits, overall village-level improvements that have occurred as a result of watershed development - in the form of increased drinking water availability, micro-enterprise development, higher economic activity, etc. - have benefited the landless as much as they have the landed. In some cases, as in Hiwri Bazaar in Maharashtra, the participation of the landless in watershed activities has also improved the social standing of the landless in the village - something that they value a lot, since it creates a great deal of goodwill for them among the rest of the villagers, which that they can tap into later (Gupta & Tiwari, 2001). However, on the whole, employment is the only major benefit for the landless, with other benefits rarely being reported (Kerr et al, 1998).

On the other hand, it would also be wrong to read too much into the employment benefits that the landless receive. Though watershed development programmes have definitely increased employment opportunities for the landless, in many cases these employment opportunities have still not adequately compensated the landless enough for their loss of access to common lands. The sustainability of employment benefits is also highly questionable, since such labour opportunities are largely temporary in nature and tend to dry up at the end of the project, whereas, on the other hand, the grazing bans that are imposed at the beginning of the projects still remain (Farrington et al 1999). In several instances, the increased demand for labour in watershed development programmes has also been countervailed by an increased supply of labour from other places, thereby leaving no net positive impact on the local landless, as can be seen in the

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<sup>12</sup> According to Rawlsian economics, it is ok if some benefit more than others, so long as everyone benefits.

case of MP later on in the report. There are hence serious concerns about the equity of watershed development programmes in India. However, as we will see in the subsequent sections, the use of *market-based* mechanisms and approaches have been found to reduce this problem of inequity in some parts of India, and have contributed towards improving the quality of watershed protection and the livelihoods of the poor.

### 1.6 Developing Market-based Approaches for Watershed Development in India

The concept of market-based approaches in the natural resources sector is not a new one in India as such. Well-developed markets for water and forest produce - timber, NTFPs, fuelwood, fodder, grasses, etc. have existed in the country for many decades, and even centuries (Shah, 1989, Chambers, Saxena & Shah, 1989). Water markets existing in rural India, especially, are a highly illustrative example since they are widely prevalent in many parts of the country. Contrary to the common perception that markets inherently are exploitative and anti-poor, the evidence from water markets shows that in most cases, the resource-poor themselves prefer to buy water from private tubewell owners and Lift Irrigation Schemes (LISs) rather than from state-provided supplies because the services provided by the former are considered to be far more superior, both in terms of adequacy and reliability (see Box 1). Further, it is also seen that despite the fact that water markets in the country are generally oligopolistic, in most cases the situation of water buyers is not that bad, with the market-based system leading to livelihood improvements for all, including the rural poor.

Apart from these water markets in rural areas, there is growing realisation of the value of water in urban areas as well. A number of studies on water and sanitation show that many urban and rural communities, including even the poor, are willing to pay more than the prevailing rates for water and sanitation, to ensure a better and more reliable service (Shah, 1998, WSP, 1999). However, governments - both central and state - seem unwilling to match this with a willingness to charge consumers for these services and the result is a continuing cycle of low revenues, high costs, unsatisfactory services and financial crises (ibid). Politics is the primary reason behind this unwillingness on the part of the government to charge consumers the '*real*' price of utilities such as electricity and water, with state governments rolling back on price hikes in numerous instances. Rich farmers in states like Punjab and Haryana, even today, are provided with almost 100% free electricity and water, with the costs being borne by the common taxpayer and society at large. However, attempts to do away with these subsidies have been severely resisted by various lobby groups, and are politically extremely contentious issues. However, the attitude of people and the state governments is now slowly changing over time, and the successes of many recently privatised electricity utilities in large metros such as Mumbai, Kolkata, etc. in providing better

### **Box 1: Experience of Water Markets in India**

In the case of water markets, the trading of water can be traced back to Kautilya's *Arthashastra* in 400 BC, which specified the royalty to be paid for water, and to south Indian inscriptions of 1202 AD, which noted the practice of selling surface water even as far back as then (Maloney and Raju, 1994). In more recent times, well-developed water markets have existed in many parts of Gujarat for the last 70-80 years (Shah, 1989).

Even though these water markets are generally localised, fragmented and uneven across regions, given the increasing scarcity and growing demand for adequate and reliable water supply in both rural and urban India in today's context, markets for water are growing in both magnitude and significance (Saleth, 1998). Water markets are particularly well established in the agricultural sector, where it is estimated that at the national level, the area irrigated through water markets, in the form of lift irrigation schemes, is around 50% of the total gross irrigated area, and even up to 80% in some parts of Gujarat (Shah, 1989, Shah, 1993). Water rates charged on an hourly basis are common in most places, with rates varying from about \$0.10 to \$1.30 for electric pumps and \$0.20 to \$0.60 for diesel pumps (Saleth, 1998). Payments are also made on the basis of area irrigated (from \$6.40 to \$105 per hectare) and on the number of irrigations (ibid). Although payments for water are mostly in cash, payments in kind involving a water rent in the form of a given share of the crop output are also common. Apart from these payment systems, there are also a variety of other water-based tenancy contracts, such as the three-party contract in parts of Gujarat, Andhra Pradesh and elsewhere, where a water seller, a land owner and a labourer share equally in the cash expenses and also in the crop output (ibid).

At the national level, there are some 5-7 million well owning rural families in India involved as water sellers; and more than 15-25 million involved as water buyers. The scale of private participation in groundwater development is evident from the fact that in 1988 itself the 10 million plus private owners of LISs in rural India accounted for over 95% of the total ground water development that had taken place till then (Chambers, Saxena and Shah, 1989). Evidence shows that farmers in many areas prefer purchasing water from private tubewell owners to depending on state owned tubewells and public LISs because of both adequacy and reliability factors. Further, in places where water selling by private LIS owners is substantial and pervasive, the overall benefits to the community far exceed the benefits to the LIS owners (ibid). Moreover, even though water markets in India tend to act as natural oligopolies, the fact that the resource poor gain better access to groundwater from private sellers rather than from public schemes, means that the sellers often compete amongst themselves to sell more water, and in the process improve the quality of irrigation service and also push the water price down, which means that being a resource poor water buyer is not particularly bad. For example, as water markets have become more competitive, there have even been cases where resource-poor buyers have boycotted a seller for not selling water adequately (Chambers, Saxena and Shah, 1989, Shah, 1989). That said, there are also some cases where private owners of LISs have used their monopoly of access to ground water as 'water lords' to force buyers into exploitative transactions, but these are not very common.

From the buyer's point of view, the best aspect of dealing with private water markets is the informality, flexibility and promptness with which they can obtain irrigation services from them (ibid). Apart from the direct output impact on farms, water markets have also led to other beneficial multiplier effects such as employment and income benefits for the landless, especially in areas of water scarcity (Saleth, 1998).

At the larger aquifer-level scale, the presence of water markets have positively impacted resource sustainability, especially in areas of serious depletion, by placing a value on water and by providing farmers an option to buy water instead of each of them digging a well. Unfortunately, this is not true in a number of other areas where water trading has led to significant ground water depletion due to the absence of an institutional and legally enforceable withdrawal limit for ground water. In such cases, water rates have not reflected scarcity-levels adequately, and water sales have occurred by simply pumping additional water rather than by saving water through efficient use<sup>13</sup> (ibid). In some of these situations, poorer farmers and those depending on traditional water-lifting mechanisms have been unable to compete with larger farmers in deepening wells, and this has led to some inequity effects as well.

On the whole however, the presence of water markets in India has enhanced the value of ground water and has generated substantial efficiency and productivity gains; according to one estimate to the extent of \$1.38 billion per annum (Saleth, 1998). Nonetheless, water markets in India are still very much sub-optimal due to the legal and institutional vacuum within which they exist.

<sup>13</sup> As a form of a common property resource, ground water is unique in that legally it is considered to belong only to whoever owns the land above it (Chambers, Saxena and Shah, 1989)

services, along with the larger ongoing reforms process in the country, is encouraging the government to consider more realistic 'market-based' and scarcity-linked pricing policies.

Also, even within the participatory approach in the case of watershed development itself, the evidence shows that watershed development and forest protection has been much more successful in places when sufficient incentives have been provided to the local people to participate in such activities. Furthermore, the commitment of communities to watershed development projects has also been significantly higher wherever the beneficiaries themselves have contributed to the costs of the project activities. Hence, even though there is still a huge mental dependency of people on government subsidies and the perception that government projects are for free, wherever sufficient awareness has been created, and right incentives have been provided, the people are willing to contribute (and do contribute) to the costs of watershed development, at least at the local level, provided that doing so results in direct benefits for them and makes them better off than before.

However, at a wider *off-site* level concerning beneficiaries located further downstream, the idea of receiving or making payments for environmental *services* is still a relatively new one.

Some of the watershed services that typically accrue to farmers living in downstream villages or to other larger beneficiaries such as hydropower companies and water supply agencies located downstream, as a result of the watershed protection and development work carried out by local communities or line departments in upstream forest/ catchment areas include the following:

- Soil & water conservation/ ground water recharge
- Provision of drinking and irrigation water
- Control of siltation in dams, reservoirs, etc.
- Water quality and quantity regulation to downstream areas/ states
- Flood control
- Landslide control
- Wetland conservation

Many of these *off-site* services however, have either never been really been accounted for till now in India, and are undervalued in the sense that their provision is encouraged only through government regulation. This has resulted in a situation where the downstream beneficiaries hardly ever pay anything for these services, even though they enjoy the benefits of the same. As seen in the earlier description of watershed development programmes in India, it is only recently that the idea that beneficiaries too have to contribute to the costs of watershed protection and development has entered into the policy debate, but here too, the beneficiaries are visualised in a narrow and

localised micro-scale in terms of the particular village-community or communities that are located *on-site*, rather than the larger macro-level downstream beneficiaries such as dams, hydropower companies, municipal water supply corporations, etc. who are located *off-site* but nonetheless benefit significantly as a result of the watershed protection and development activities that are undertaken upstream. Though, as we will discuss in detail in later chapters, some of these larger beneficiaries do make certain regulated and compulsory payments for the protection of the upstream watershed catchments, there are several shortcomings in the existing system, including the fact that such payments hardly ever go towards improving the livelihoods of the poor upstream communities. Thus, having more direct market-based mechanisms in place can perhaps overcome some of these shortcomings.

Nonetheless, there are some highly interesting real-life examples at the micro scale itself, where *market-based* mechanisms have been developed within a collective action framework at the local village-level, to successfully resolve, to some extent, the problem of inequity that has characterised participatory watershed development projects in India. These cases explode the myth that market-based solutions are inherently iniquitous and anti-poor and hold lessons for the development of such market-based mechanisms for watershed protection services at the larger scale.

### **1.7 Examples of Existing Market-based Mechanisms for Watershed Protection Services**

With benefits of watershed protection within a village generally going to rich landowning farmers, and costs being borne by the poorest landless villagers, most watershed development projects in India, as explained earlier, have serious problems with regard to equity. A few examples of market-based arrangements from different parts of the country that are "embedded" within the broader *collective action* approach show how such mechanisms can not only correct these imbalances and inequities, but also directly improve the quality of both watershed protection and the livelihoods of the poor.

#### **The Case of Sukhomajri, Haryana**

The case of watershed protection in Sukhomajri village in Haryana is especially relevant from the point of view of developing *market-based* approaches for watershed protection services and improved livelihoods in India, since it offers a live example of how market-like arrangements can lead to significant equity and livelihood benefits for the poor. Moreover, in this case, the potential for payments and market-like arrangements for watershed protection services can be observed at two levels simultaneously, one between the downstream city of Chandigarh and upstream villages

like Sukhomajri, and secondly through an "embedded" market for water within Sukhomajri village itself.

#### Level 1: Watershed Protection Services provided by Upstream Village to Downstream City

Watershed development and forest protection in Sukhomajri originated as a result of a problem that was being faced by a downstream beneficiary - the city of Chandigarh. In the early 1970s, it was realised that Sukhna Lake, an artificial water body, which was one of the most popular recreational facilities in Chandigarh, was rapidly silting up as a result of the severe degradation of its surrounding catchment areas. Over 68.5% of the storage capacity of the lake had already been filled with silt and faced imminent extinction (Sarin, 1998). Confronted with this crisis, the Chandigarh Administration had sought urgent help from the CSWCRTI, a research institute, to find a solution to this problem. On conducting a survey of the entire catchment of the lake in the nearby Shiwalik hills, the CSWCRTI team found that the most acute degradation had occurred in the hills near the village of Sukhomajri, which constituted only 20% of the catchment area, but was contributing to 80-90% of the total silt flowing down to the lake. On going to the village, it was found that barely 5% of the slope had any vegetative cover left, big gullies had formed and the farmers of Sukhomajri were rapidly losing their fields.

Most families in Sukhomajri owned small landholdings on which they practised rainfed agriculture, but being traditional pastoralists, they also had large herds of local cattle and goat which they were letting loose for free grazing in the surrounding hills. The degradation of their agricultural lands was forcing the villagers to bring more hill slopes under agriculture, but their indiscriminate practices of free grazing, land clearance and tree-felling was also creating a vicious cycle of unending land degradation and poverty. Under these circumstances, it was soon realised that no amount of technical soil conservation measures and watershed development could prevent the flow of silt to Sukhna Lake, unless the villagers could first be motivated to give up free grazing and tree felling in the hills. To motivate them to do so, the CSWCRTI and the Chandigarh Administration, helped by the Ford Foundation, built two earthen dams in the catchment of Sukhomajri village and Sukhna Lake. When water collected in these dams after the monsoons, the villagers of Sukhomajri were able to derive direct irrigation benefits from it, which resulted in a fourfold increase in their agricultural production. The water collected in the dams thus created an immediate incentive for them to stop grazing in the surrounding hills and initiate watershed protection activities through the 'social fencing' of forests and planting of trees, grasses, etc instead. The logic was simple. If the villagers wanted water to keep collecting in the dams, they would have to prevent the dams from silting up, and this could happen only if they protected the vegetation of the surrounding catchment areas and hills. Unlike earlier, when the villagers really

did not care about what was happening to Sukhna Lake because it was not affecting their daily lives in any way, once the dams were constructed they saw immediate benefits of maintaining it for themselves, and hence started protecting the catchments. This in turn benefited the Sukhna Lake downstream and the inhabitants of Chandigarh as well. The investment and efforts made by various parties such as the Ford Foundation, CSWCRTI, Chandigarh Administration, etc. in Sukhomajri village can thus, in a sense, be construed as a payment for the watershed service that it received<sup>14</sup>.

Based on the success of Sukhomajri, similar initiatives were taken up in other surrounding villages as well. As a result of the social fencing and forest protection activities carried out by the villagers, the average rate of siltation in Sukhna Lake came down from an average of 141 tonnes per hectare during 1958-78 to between 13-19 tonnes per hectare during 1979-92. This reduction of 90% saved the Chandigarh Administration Rs. 7.6 million each year in dredging and other costs (Agarwal & Narain, 1999). Over this period the surrounding hills have witnessed a dramatic transformation from being totally barren and degraded to having a lush green forest cover, with tree density increasing from 13 per hectare in 1976 to 1292 per hectare in 1992 (ibid).

However, it must be noted that local benefits, rather than any external payment from Chandigarh, has been the main motivating factor for the villagers in Sukhomajri in sustaining their watershed protection efforts. Between 1977 and 1986, because of the availability of irrigation water from the dams, wheat production increased from 40.6 tonnes in 1977 (with a productivity of 0.68 tonnes per hectare) to 63.6 tonnes in 1986 (with a productivity of 1.43 tonnes per hectare) and maize production increased from 40.9 tonnes in 1977 (with a productivity of 0.61 tonnes per hectare) to 54.3 tonnes in 1986 (with a productivity of 1.22 tonnes per hectare). Further, protection of the watershed has led to increased grass production, which steadily went up from 40 kg per hectare in 1976 to 3 tonnes per hectare in 1992. Increased availability of fodder, in turn, led to a transformation in the livestock composition. The number of goats went down from 246 in 1975 to 10 in 1986 while the number of buffaloes went up from 79 in 1975 to 291 in 1986. This led to increased milk production, which increased, from 334 litres per day in 1977 to 579 litres per day in 1986. The economic benefits of all these have been substantial. By the mid-1980s, Sukhomajri turned from a food-importing village to a food-exporting village! In just five years, from 1979 to 1984, its household income went up from about Rs. 10,000 to Rs. 15,000, with villagers earning about Rs. 3,50,000 from sale of milk and another Rs. 1,00,000 or so from the collective sale of *bhabbar* grass (ibid).

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<sup>14</sup> However, it must be noted that the funding for building the dams came primarily from the Ford Foundation.



The involvement of the Chandigarh Administration in tackling the siltation problem of Sukhna Lake has not been limited to its initiatives in Sukhomajri alone. The beginning of social fencing work also coincided with substantial technical soil conservation work done in the lake's catchment from 1977 to 1983 under a central government funded River Valley project, with the Haryana Forest Department itself spending Rs. 35.71 lakh on soil conservation in area of the lake's catchment falling in Haryana during that period, and the Chandigarh Administration spending a proportionally larger amount of the remaining 75% of the lake's catchment coming under its jurisdiction. From 1983-84 to early 1996, when the Haryana Forest Department did not invest anything, either on the maintenance of the soil conservation structures or on any additional watershed protection work, the Chandigarh Administration however continued to spend Rs. 25-30 lakh per annum in its portion of the lake's catchment.

However, today the situation is such that even though siltation has been considerably reduced due to the social fencing and catchment treatment efforts of the upstream villagers, and due to various measures undertaken by the Chandigarh Administration, wet-dredging has been decided as the only solution to tackle the silt that is already accumulated in the lake (Chopra, 2000). A Rs. 38 crore composite plan was submitted to the Planning Commission in 1998, which included the complete desiltation of the lake and steps to avoid its further siltation. The MoEF sanctioned Rs. 4 crores to the Chandigarh Administration in 2000 to carry out wet-dredging of the lake to remove 9 lakh cubic metres of silt and increase the depth of the lake by 4 feet. However, this has not yet been utilised due to bureaucratic red-tapism (Bannerjee, 2001).

Nonetheless, despite the fact that mechanical dredging will have to be carried out to restore Sukhna Lake to its original status, its linkage with Sukhomajri clearly brings out the desirability of developing 'market-like' incentive based systems and payment-mechanisms between the upstream providers and downstream users of watershed protection services and the potential of such mechanisms to directly and substantially improve the livelihoods and well-being of the poor rural communities who provide these services.

#### Level 2: "Embedded Markets" improving equity and livelihoods within Sukhomajri village

Though social fencing and the ban on free-grazing by the villagers of Sukhomajri was crucial to the protection of the catchments of Sukhna Lake, the most critical factor that made this initiative work was the principle of equitable sharing of the resources that accrued as a result of the collective watershed protection work done by all the villagers and the market-based mechanism that was utilised to achieve this.

Under the concept of social fencing, all the villagers were expected to give up their grazing rights in the hills. In 1978, out of the 59 families in Sukhomajri, only two owned more than two hectares of agricultural land. Ten families owned less than 0.2 hectares each and the rest somewhere in between. Unlike the typical Indian village structure, practically all families in Sukhomajri owned at least some land, with only six landless families. Moreover, Sukhomajri was an almost homogenous one-caste village with 57 of the 59 families being Gujjars (Sarin, 1998). However, despite these factors, in the beginning problems arose because only some of the landowning farmers had access to the water collected in the dams, and benefited from their construction. All the others lost out in comparison as they were all sacrificing their traditional grazing rights in the surrounding hills to prevent the dams from silting up.

To overcome this problem of inequity in sharing of benefits (in this case, access to the water collected in the dam and the consequent increased agricultural production), and to give everyone an equal incentive to participate in the protection of the surrounding forests, an ingenious solution was adopted, wherein all the households of the village, irrespective of landownership or size of landholdings, were allotted an equal share of the water that collected in the dam, in return for stopping grazing in the hills. To operationalise this, the villagers constituted a Water Users' Association (WUA) - later renamed as the Hill Resource Management Society (HRMS) - to take up the responsibility of water allocation. Under this arrangement, each household would become a member of the WUA and would be entitled to an equal share of water in return for their participation in watershed protection activities. However, under the rules and regulations of the society, any member whose cattle were found grazing in the hills would lose his/her share of the water. Thus, in the system that subsequently evolved, those not owning lands or with very small holdings, sold their share of the water to larger landowners (who needed water beyond their own entitlement) either for cash or on a sharecropping basis, or used it directly on land rented from larger landowners, thereby gaining a share of the increased agricultural production in the village (Chopra et al, 1988, Sarin, 1998, Iyer & Roy, 2000). The WUA coordinated this trading of water rights, distributing water at Rs. 16 per hour and deducting Rs. 4 per hour towards meeting its own administrative expenses<sup>15</sup> (Chopra et al, 1988, Sarin, 1998). Hence this market-like mechanism *de-linked* water rights from land rights and allowed the landless and the land poor to capitalise on their share of the water by selling them to the larger landowners, thereby not only providing the former with a direct incentive to participate in watershed protection activities and financially

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<sup>15</sup> Initially, each member was issued a coupon for a fixed quantity of water, and if the family did not require the water it could sell it back to the society at a price decided by the latter, or to any other family at a price that was mutually agreed upon (State of India's Environment, CSE, 1999). Later on, this system was abandoned in favour of a simpler system of water user fees, which was channelled by the HRMS to employ the landless in dam maintenance and watershed protection activities (Landell-Mills & Porras, 2002).

compensating them for their loss of access to traditional grazing lands, but also solving the problem of inequity in benefit sharing.

However, the system is not totally unproblematic. It has been argued that Sukhomajri represents a unique case because of its homogeneity and not-too-unequal land distribution, and also because there was strong external motivational leadership and assistance. Further, even though a recent field visit to Sukhomajri found that the basic rules regarding catchment protection, social fencing and resource utilisation and distribution remain more or less unchanged despite the numerous factors that have affected the lives and livelihoods of the people there over time, the sale of water from the dam is drying up, with people shifting to digging tubewells to irrigate their fields. Four such wells have come up over the last couple of years (Down to Earth, 2002). These wells are privately owned and water extracted from them is sold at a Rs. 30 per hour, double of that from the dam, and this is slowly leading to cultivation of water intensive crops like paddy and sugarcane (ibid). However, even though the rules of common property resource are gradually being eroded<sup>16</sup>, water from the earthen dam is still distributed as per the requirement of the farmers and, more importantly, the landless still have access to and rights over this water. Another observation made is that, even though the principle of equitable sharing of water is still very much present in the village, in practice there is not much actual sale of water taking place and the coupon system has also fallen into disuse. However, this has not led to serious discord, because further increase in income, including those who do not benefit any more from water, has been sustained by higher yields of *bhabbar*<sup>17</sup> grass and fodder (State of India's Environment, CSE, 1999). However, the most important learning is that this system of buying and selling of water rights between the landed and the landless/ land poor, brings to the fore the immense potential and power that such market-based mechanisms have in promoting equity within a village and in improving the livelihoods of the poorest, even within an overall framework of collective-action.

### The Case of Nada, Haryana

To test the replicability of the 'Sukhomajri experiment' in other situations, a similar initiative was launched in another village, Nada, located at a distance of 15 kms from Chandigarh. However, unlike Sukhomajri, Nada is a highly stratified two-caste village of upper caste Lavanas and lower caste Harijans (the so-called "untouchables"), with three of the four village hamlets belonging to Lavanas, and one to the Harijans. Following Sukhomajri, three dams were constructed here as well - two for the Lavana hamlets and one for the Harijan hamlet. While, after a few initial

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<sup>16</sup> This is due to a number of other reasons as well. See Sarin 1998, DTE, 2002 for details

<sup>17</sup> *Eulaliopsis binata*

hurdles, the concept of water trading worked quite well in the Lavana hamlets, the experience in the Harijan hamlet was quite different and interesting (Sarin, 1998). With 5 of the 17 Harijan families landless, 52 cattle, only 2.5 hectares of unirrigated land, the Harijan hamlet faced a problem of surplus water and less land! All the landowners had more than enough water from their own water shares itself for meeting their irrigation needs, and there was no demand/market for the water share of the landless (ibid). Thus, while abundance of water led the landowners to grow vegetables in addition to foodgrain, allowing the hamlet to achieve food security, new incentives such as rope-making using *bhabbar* grass and limited cutting rights, had to be developed to offer sufficient incentives to the landless families to continue the protection of the surrounding forests and stop free grazing of their cattle therein. An alternative (and elegant) solution could have been the development of water markets between the land-surplus Lavana farmers and the landless Harijans. Though such trading did occur, it did not develop as a regular practice – due to the inherent social unwillingness of the higher caste Lavanais to buy water from the "untouchable" Harijans, and because, as non-members, they were being charged water at the rate of Rs. 7 per hour by the Harijan HRMS, instead of Rs. 4 per hour for the members, with the surplus Rs. 3 going to the individual member who was selling the water. This was resented by the Lavanais, who preferred to steal the water from the Harijans instead (State of India's Environment, CSE, 1999).

The case of the earthen dam at Harijan Nada is also a good example to show the relationship between watershed protection and the services provided. Until 4-5 years back the dam was functioning well and the households received sufficient water to irrigate whatever amounts of land that they possessed. On some occasions, they even sold their surplus to the *Lavana* community. The HRMS also used to regularly levy a charge from anyone from outside of Harijan Nada who wanted to collect wood from their catchment area at Rs. 10 per bundle. However, ever since a portion of their dam collapsed under the pressure of the water retained behind it, the Harijan HRMS stopped meeting and even levying the above-mentioned charge. Further, with the loss of water, they no longer have any incentive to protect the surrounding catchments. This has had a direct adverse impact on the condition of their catchment area, the same one that they had once helped to afforest. However, last year (2002) the Forest Department again constructed a check dam in Harijan Nada, to encourage the villagers to start forest protection work again.

### Pani Panchayats in Maharashtra

Similar market-based mechanisms for watershed protection services have been found to exist under the umbrella of collective action in the case of *Pani Panchayats* in the Purandhar block of Pune district in Maharashtra as well. Facing a situation of severe drought in the early 1970s, the villagers of Naigaon, Mahur and others, under the dynamic leadership of Vilasrao Salunke, took up participatory watershed development work, in the form of farmers' collectives - called *Pani Panchayats* - to address the severe degradation of the watersheds and the problem of water scarcity confronting them. Conserving soil and harvesting water was given top priority and a series of contour bunds were raised along the slopes facing the villages for this purpose. At the same time, trees were also planted on rocky areas, with fruit trees being planted on more fertile lands. With people's participation in watershed protection efforts, grasses and shrubs started regenerating over time. Percolation tanks that were constructed at the bottom of the hills also started accumulating water that accrued as a result of the watershed protection efforts. This water was used to irrigate the fields of the villagers. As in the case of Sukhomajri, here too, the collected water was treated as a common property resource and each member of the *Pani Panchayat* (including the landless), was given an equal right to it i.e. water and land rights were *de-linked* (see Box 2). These water rights were then sold (for cash or sharecropping) by the landless and small farmers to the large landowners who needed more water (Rai, 2001, Chambers, Saxena & Shah, 1989). This *market-based* trading mechanism solved the problem of water scarcity and created a powerful incentive for the landless to carry out watershed protection work, and subsequently resulted in reverse migration and economic development in the village.

#### **Box 2: Key Principles in the Pani Panchayat Model**

- Irrigation schemes are undertaken for groups of farmers, rather than for individuals. Water is allocated on the basis of the number of family members rather than in proportion to land holding. A family of five is given water rights to irrigate one hectare.
- Cropping is restricted to seasonal crops with low water requirement. Crops that require perennial irrigation and large amounts of water, like sugarcane, banana and turmeric, cannot be cultivated in the *Pani Panchayat* areas.
- Water rights are not attached to land rights. If the land is sold, water rights revert back to the farmers' collective.
- All members of community, including the landless, have right to water.
- The beneficiaries of the panchayat have to bear 20% of the cost of scheme. They have to plan, administer and manage the scheme and distribute water in an equitable manner.

Source: SDNP website

## Other Examples

Other examples of such allocation of water rights are available in other parts of the country as well. For example, in the group lift-irrigation scheme supported by the AKRSP in Parodi village in the Bharuch district of Gujarat, about 150 families have formed a cooperative, which represents all landholding classes including the landless, and each member household is entitled to water for irrigating 2.5 acres of land irrespective of its landholding. This enables the landless and land poor to sell their shares of water to the large landowners in a manner that results in greater equity and livelihood benefits for the former. Similar 'market-like' water allocation schemes have been initiated in some of the Sadguru Seva Sangh groups in the Panchmahal district of Gujarat as well (Chambers, Saxena & Shah, 1989).

## Summary of Findings

Despite its obvious equity and livelihood benefits, the concept of de-linking land and water rights has still not caught on in India, and successful and durable examples of such 'market-like' mechanisms are, on the whole more exceptions rather than the rule. For example, in other villages in Punjab and Haryana - such as Lohgarh, Bunga, Relmajara, etc. - where the Sukhomajri model was tried out, the results were dismal in the sense that watershed development work resulted in the same kinds of impact that are typical in the rest of India. While it resulted in tremendous direct benefits to the landowners, the landless invariably lost out as a result of their loss of access to village commons, and gained only marginally, if at all, through employment

(see Box 3). In many cases thus, the concept of de-linking land and water rights and the trading of the water between the landed and the landless or land poor, has simply not taken off in the way that it did in the case of Sukhomajri, with the result that watershed development still has a serious problem of inequity built in. Though heterogeneity in village composition has indeed been put forward as one of the possible reasons for failure, it would be interesting, from the point of future research, to see why this concept has not been successfully replicated in any meaningful scale so far.

### Box 3: Voices of the Landless

Lohgarh, Haryana: *"we have to find jobs outside as there is no benefit to us... money invested by society is spent on structures that benefit only the landowners"*

Bunga, Haryana: *Though this has tried to replicate the Sukhomajri experience, dalits, or the so-called untouchables, have been excluded from water rights and forest produce: "We don't get enough benefit from the dam since we have no land. We cannot even take our animals to the forest area any longer"*

Relmajara, Punjab: *"we have little to gain from the project, except increased fodder availability...the project has created a gap between the beneficiaries and others, which is difficult to bridge"*

Source: State of India's Environment, CSE, 1999, Iyer & Roy, 2000

Given the evidence, it seems hard to dispute the desirability of having such mechanisms at a wider scale all through out India, not only from the point of view of providing incentives for watershed protection, but more so because of the positive livelihood and equity benefits that they have for the poorest landless and marginalised communities. Nonetheless, it is also important to be cautious before making any widespread generalisations. Each village in India has its unique social, political and economic contexts and what works in one place may not necessarily even be applicable in another. However, contrary to the common perception that '*markets*' and '*market-based*' approaches are anti-poor and iniquitous, these village-level mechanisms that are nested within larger collective action approaches, show how watershed protection activities can be made more equitable to benefit the livelihoods of the poor by providing sufficient incentives to different groups to cooperate in a desirable manner. Hence market based approaches, and the concepts of private water rights and water markets etc. do not seem to be inherently anti-poor or incompatible or antithetical in any way with the other general concepts of collective action that are often considered more acceptable. Regulatory, market-based, and participatory approaches can be complementary to one another and combinations may be better than an 'either-or' approach alone.

The table below summarises the key factors that seem to be significant in market development and compares them across the three cases discussed above.

Key Factors	Nada	Sukhomajri	Pani Panchayats
Delinking of land and water rights	Was attempted but did not succeed due to caste differences	Succeeded and is still adhered to	Succeeded and is still adhered to
Community composition	One dominant, higher caste community, and a smaller Harijan community	Largely homogenous	Largely homogenous
Economic incentives	Agricultural intensification: sale of agricultural produce	Agricultural intensification: sale of agricultural produce, plus bhabbar grass	Agricultural intensification: sale of agricultural produce
Social cohesion	Average	High	High
Level of external inputs (time / effort / money)	High	High	High

## Chapter 2

### Methodology adopted for Scoping in Himachal Pradesh and Madhya Pradesh

To explore the potential of market-based approaches for providing watershed protection services at greater depth, the scoping phase focused on the states of Himachal Pradesh (HP) and Madhya Pradesh (MP) for undertaking fieldwork. While the rationale behind selecting these two states, and the findings from the states, are given in the form of diagnostics in the chapters that follow, the methodology adopted while undertaking the scoping work in each of the states, was informed by the earlier findings from the literature review and the existing examples of market-based mechanisms for watershed protection services in India.

The study began with an extensive literature review of the process of watershed development in India and was followed by similar reviews of the two selected states. The literature referred to in these cases ranged from government (Central as well as State) reports, to reports developed by donor agencies that had worked in the area, to studies carried out by research agencies, NGOs and individuals. Where examples of potential market-based mechanisms for watershed protection services existed (e.g. Shimla catchment) the concerned people were contacted and all available literature on that case was collected.

A "Learning Group" was established to guide the scoping phase work. This group comprised of a few key individuals and institutions, who had relevant research interests or who were otherwise well-placed to advise how best to develop this research. The role of the learning group was to discuss and develop the concepts underlying this research, to share information on market-based approaches to watershed protection across India (whether deemed successful or not), to ensure that the work complements but does not duplicate other watershed based research projects, to provide advice on further development of the project, and to help gradually build a constituency for taking this type of work forward. This group met in January, 2003 after the completion of the field work in Himachal Pradesh and several members subsequently also attended the Findings-Analysis workshop in March 2003. A list of Learning Group members is given in Annex.

In addition to the scoping activities in HP and MP, as described below, visits were also made to other parts of the country where examples of market-like arrangements for watershed protection services existed, e.g. Sukhomajri and Nada in Haryana, and the Pani Panchayat in Maharashtra. These subsidiary visits enabled us to update our information on these cases and draw lessons from them that could be tested during the scoping phase.



Thus, the scoping activities in each state included:

- Gaining a preliminary understanding of the history and status of watershed protection and development in each state
- Identifying and mapping of the main players involved in supplying, using, managing and governing watershed protection services and understanding the interactions between them
- Exploring the relevance, desirability, and potential of using market-based approaches for watershed protection services at different levels, especially with reference to their livelihood and equity impacts. This was done by analysing the policy environment within each state and gathering the perceptions of key stakeholders as well as through visits to selected field sites, and
- Highlighting the main constraints facing the future development of such market-based approaches, identifying the existing learning gaps, and outlining the future research opportunities and next steps

Analytically, the potential of developing market-based mechanisms have been considered and assessed at three broad levels or scales – micro, meso, and macro, in each state.

**Micro-level:** At the micro-level, the scoping work has focused on identifying whether or not there are any Sukhomajri or *Pani Panchayat*-like examples available in HP or MP, where market-like arrangements for watershed protection and development have led to equity and livelihood improvements within a village itself. However, the scoping has not limited itself to the trading of water rights between the landed and the landless/land poor alone, but has also tried to look at other market-like systems and payments that exist on an *intra-village* basis for other natural resources, which may indicate a potential for the future development of such mechanisms in the case of watershed protection and development as well. For example, it has considered the degree of cost sharing that is taking place at the village level for watershed development activities in each state.

**Meso-level:** Since, according to the new guidelines, watershed development activities are supposed to be undertaken on an integrated 'watershed basis' following a ridge-to-valley approach, the scoping work also focused on whether or not there were any systems of cooperation in watershed protection – market-based or otherwise – already existing at the *inter-village* level between the upstream and downstream villages, and what the level of consciousness was among the rural communities themselves of the nature of upstream-downstream linkages.

**Macro-level:** Here the study focused entirely on the larger macro-level downstream beneficiaries who are receiving *off-site* watershed protection services from upstream service providers in each

state, such as the hydropower companies, urban water supply agencies, recreational lakes, wetlands, dams, reservoirs, etc., to see whether these beneficiaries were making any payments at all towards these watershed services, and if so, what the nature of these payments were and how they worked. The scoping also focused on understanding the perceptions of the downstream beneficiaries with regard to these services and towards paying for them, the overall desirability of developing market-based approaches, and some of the problems that would require being resolved before such mechanisms could start working.

Other details, such as the list of people interviewed, workshops, questionnaires, etc. are given in the Annex.

## Chapter 3

### A Diagnostic of Himachal Pradesh

#### 3.1 Rationale for selecting Himachal Pradesh

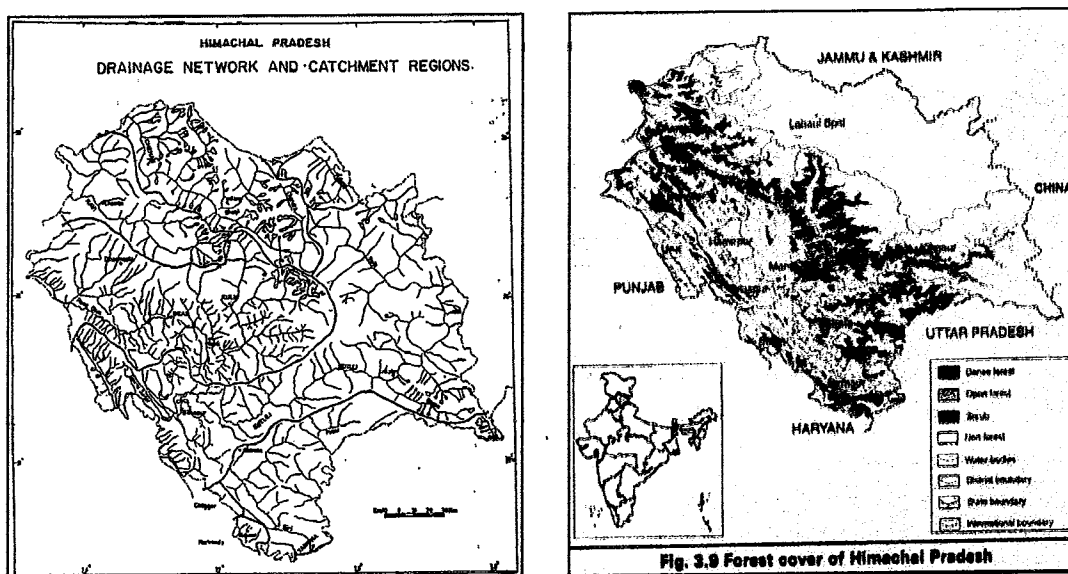
There are a number of reasons why Himachal Pradesh (HP) was selected for the purpose of undertaking field-level scoping work for understanding the potential for developing market-based approaches for watershed protection services and improved livelihoods. Situated in the North West corner of India, HP is a mountainous Himalayan state, which constitutes a major natural watershed for the entire North India region. All of HP forms the watersheds of four major tributaries of the river Indus (the Chenab, Ravi, Beas and Sutlej) and of the river Yamuna that feeds into the Ganges<sup>18</sup>. These rivers provide water supply not only to the Indian capital city of Delhi but also to a number of key agricultural states located in the north Indian plains. Hence the downstream impacts of land use in the upper watersheds of HP are potentially very significant.

A large portion of the land in HP also falls under forests. Of its total geographical area of 55,673 sq. kms, 36,986 sq. kms or 66.43% of the state is legally defined as forestland. However, of this, only 13,082 sq. km, i.e. around 23.50% is actually under tree cover (FSI, 1999). It should, however, be noted that as much as 20,511 km<sup>2</sup> of HP's land is both uncultivable and cannot sustain forests, comprising of barren land, alpine pastures, snow covered peaks and areas above tree line - though many such areas are legally classified as forest land (HPFSR 2000). These forests provide a number of goods and services, not only to over 90% of the state's population, which lives in rural areas and depend on forests for meeting their livelihood needs through the collection of fuelwood, fodder, small timber, NTFPs, medicinal plants and grazing, but also to many other downstream beneficiaries such as the horticulture, agriculture, power, water supply, irrigation sectors, etc., and also other downstream states, who receive the watershed protection services provided by HP in the form of conservation and supply of freshwater, prevention of soil erosion, landslides and floods, and control of siltation in dams, reservoirs etc (HPFSR, 2000). In a study undertaken by the Indian Institute of Forest Management (IIFM), Bhopal to estimate the total economic value of HP's forests, the value of watershed services provided by forests alone was estimated to be Rs. 73,972 crores – the highest among all the other forest goods and services (Verma, 2000).

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<sup>18</sup> Details of all major rivers in HP and their catchment regions is given in the Annex

One significant downstream beneficiary of these watershed protection services is the hydropower sector. For example, the longevity of hydel power projects like the Bhakra and Pong dams, depend directly on controlling the amount of silt coming from the catchment areas. Of the total hydroelectric potential of 97,000 MW in the country, 21,229 MW lies in HP alone. But of this, only 3935 MW has been harnessed as of yet by various central and state government agencies (State of the Environment Report-HP, 2000). Given the acute power shortage in the North Indian region, there is great interest in the future development of the hydropower sector in HP, both within the HP state government itself and also among the national and the state governments in downstream states. Expecting to gain financially from the sale of power, and also by way of increased agricultural and industrial production within the state itself, the HP government sees great potential in the expansion of hydropower schemes, and is actively encouraging private sector investment and participation in smaller mini and micro-hydel projects in the state as well. Since all these hydroelectricity power (HEP) projects that are operated in HP by various government and private entities are located in downstream areas and receive watershed protection services from the upstream forests of HP, the state thus offers an ideal setting to explore the potential of developing market-based approaches between these HEP projects and the local communities (and the government line departments) that depend on and manage the forests located in upstream areas.



Finally, there is a very good "policy window" for the development of such market-based approaches for watershed protection services in HP. There is widespread awareness of the fact that many downstream states are receiving water flow and other benefits as a result of the forest and watershed protection work being done in HP. People are aware of the fact that HP is not receiving any significant payments or benefits for providing these services to downstream states

and there is a good deal of resentment among many government officials because of the opportunity-cost that they perceive HP is incurring by providing these services for free, or, for less than what they are truly worth. Hence, there is much interest in the potential for claiming compensation from the Central Government for providing watershed protection services to beneficiary states. The HP state government has also introduced some recent policies and regulations that focus precisely on the provision of these environmental services, and these are discussed in the following sections.

### 3.2 Watershed Protection in HP: History and Programmes

The history of watershed development in HP more or less coincides with that of watershed development in India, and has moved in recent years from government regulation to a more people-centred participatory approach.

Realising as far back as in 1900 that while villagers would look after their private lands, other means had to be adopted to control soil erosion on common lands, the Punjab Land Preservation Act, 1900 was enacted specifically to regulate grazing, enforcing closures and taking up plantations and other soil conservation measures. After the re-organisation of the states, this act was replaced by the HP Land Development Act, 1973, and later by the HP Land Preservation Act, 1978. Given that a number of large river projects were also coming up on the Sutlej, Beas and Ravi rivers the major catchments of which were in HP, the Government of India also thought it prudent to provide funds for the stabilisation of the slopes and for soil conservation activities thereon. From the 1960s onwards thus, the centrally-sponsored scheme on '*Soil Conservation in the Catchment of River Valley Projects Projects (RVP)*' started being implemented in HP, particularly in the susceptible sub-watersheds of the river catchments. After devastating floods inundated Delhi in 1978, a similar scheme on '*Integrated Watershed Management in Catchment of Flood Prone Rivers and the Indo – Gangetic Basin (FPR)*' was launched during 1981-82 in the catchments of the Yamuna and its tributaries. Both these schemes were, and are being, undertaken jointly by the Department of Agriculture (DoA), the Himachal Pradesh Forest Department (HPFD) and the Department of Horticulture (DoH), with the DoA acting as the nodal Department. While the Forest Department carries out its activities on forest lands, the other two departments are restricted to private farmlands and orchards.

Several other centrally sponsored schemes for watershed rehabilitation work are also concurrently running in HP. Initiated by the MoRD, the Desert Development Programme (DDP) was started both in the hot desert areas of Rajasthan, Gujarat and Haryana and the cold deserts of Jammu & Kashmir and Himachal Pradesh in the 1970s. Based on the recommendations of the Hanumantha

Rao Committee, since 1994-95, this programme's main thrust has been area development on a watershed basis through people's participation. Currently, this programme is being implemented in the districts of Lahaul & Spiti and in the Pooh sub-division of Kinnaur district as a 100% centrally sponsored programme. Besides this, the HP government is also the recipient of central government assistance under the Drought Prone Area Programme (DPAP) and the Integrated Wastelands Development Programme (IWDP). Like in the rest of the country, in HP too, the DPAP is basically an area development programme and covers 9 blocks of the state receiving funding both from the centre and the state on a 50:50 sharing basis. The IWDP, on the other hand, is totally financed by the central government and is being implemented in the districts of Kangra, Chamba, Solan, Sirmour and Mandi respectively. All these watershed development programmes in HP are being implemented with the aim of promoting economic development of village communities directly or indirectly through watershed development, mitigation of adverse effects of drought, ecological restoration and employment generation, and are being executed through the District Rural Development Agency (DRDA), Project Implementation Agency (PIA) and Watershed Development Committees. Other state-level schemes for watershed development are also being undertaken in some places.

Besides the government-supported schemes for watershed development, two major donor aided watershed protection and development projects are also currently underway in HP. These are the World Bank supported *Integrated Watershed Development Project (IWDP)*, popularly referred to as the Kandi project and the Indo-German Changar Eco-Development Project which is supported by the GTZ.

The Kandi project was initiated in 1990 in the Shivalik region, one of the most degraded ecosystems of the state. The first phase of the project ran from 1990 to 1999. Currently, the second phase of the project is under implementation and has a time period of 5 years (1999 – 2004). The project covers an area of 93,850 ha in 32 sub-watersheds located in the five watersheds of Markanda, Ghaggar, Sirsa, Swan and Chakki rivers, all of which originate in HP. The project is being implemented on an integrated basis drawing on the expertise of the Agriculture Department, the Animal Husbandry Department, the Department of Horticulture and the Forest Department. The main activities undertaken in this project include improvement in agriculture, horticulture and livestock development practices, afforestation, soil and water conservation measures to check erosion, siltation and flooding, and the development of water resources. The involvement of people and local village level institutions in planning, implementation and maintenance of assets is the cornerstone of the project strategy.

The Indo-German Changar Eco-Development Project (IGCEP) is being implemented in the district of Kangra in Palampur jointly by the Himachal Pradesh Eco-Development Society and the German Agency for Technical Cooperation (GTZ). Both the HP and the German governments are providing funding for the project. The overall objective of the project is to reduce the imbalance between production and use of renewable natural resources in the Changar area - a highly degraded hilly belt - focusing simultaneously on several inter-disciplinary measures such as land husbandry, soil and water conservation, forestry and animal husbandry in an integrated manner. The project assists local communities to develop operational strategies and technologies for the rehabilitation and management of village areas in the context of small watersheds.

Apart from these, with forest lands accounting for over two-third's of the state's total land area, the normal protection work done by the HP Forest Department itself constitutes a large part of the watershed protection activities carried out in the state.<sup>19</sup> The role of forests in controlling floods and landslides, and in preventing soil erosion and siltation of dams and reservoirs, is largely accepted by everyone even though there is not much scientific evidence to substantiate the same<sup>20</sup>. Further, the drying up of springs - a source that rural communities depend on to a large extent for meeting their drinking and household water requirements - are to a large extent attributed to the disappearance and rapid degradation of forests and, on a wider basis, to climate change by local people in various parts of HP. The forests of HP, otherwise too, are intimately interwoven with the livelihoods of the rural population, with most people depending on forests to meet their daily sustenance needs through collection of fuelwood, fodder, NTFPs, Timber Distribution (TD) rights, etc. The highest dependence on forests is seen among the economically vulnerable lower castes and tribes and among the nomadic pastoralists, and especially the women in each of these cases. However, the economically privileged sections of the rural population too, by virtue of their economic and political power over resources, cause a significant proportion of forest resource exploitation and depletion, even though their main income invariably comes from agriculture, horticulture, trade and commerce (HPFSR, 2000). These dependencies have, like in the rest of India, placed severe biotic pressures on the forest resources of HP. For example, the livestock population in HP is well over 5 million, which is considered to be three times more than the carrying capacity of the forests (ibid). While it is acknowledged that in some forest areas of the state grazing could very well be a good land use activity<sup>21</sup>, unregulated grazing, along with mining, clearing of forest land for agriculture/ horticulture, encroachments, etc. have nonetheless led to severe forest degradation in many parts of the state.

<sup>19</sup> This is excluding the watershed development projects such as the Changar and Kandi projects where the forest department is playing a major role.

<sup>20</sup> However, whatever impact studies have been carried out on this, such as those undertaken by the Changar Project, have found a strong positive correlation between vegetation cover and watershed services.

<sup>21</sup> About 35% of the state comprises subtropical, temperate and alpine grasslands.

Realising that forest protection is impossible without the involvement of the local communities, and in line with the overall shift towards participatory forestry in the country, the Forest Department of HP too has initiated JFM through the *Sanjhi Van Yojana* programme in 1998. There are currently over 900 village level institutions involved in forest and watershed protection under this JFM programme and under the other watershed development projects that are being implemented in the state (MoEF, 2002). While it is still early to comment on the effectiveness of these institutions, poor rural communities are beginning to realise the importance of forest protection and watershed development, and are emerging as important and primary protectors of forests along with the Forest Department – and consequently also, as key providers of watershed protection services to the other larger off-site macro-level beneficiaries of such services. An important point to note, is that even though forestry is the biggest land use in HP, investments in forestry have been grossly inadequate in the state, to the tune of only Rs. 100 crores per annum, which is hardly 1% of the state's GDP (GoHP, 1999). This in a scenario where the direct revenue from forests – even leaving aside environmental services – amounts to over Rs. 700 crores a year (State of the Environment Report-HP, 2000)! The development of payment mechanisms, market-like or otherwise, between the macro-level, and richer, urban downstream beneficiaries of watershed protection services and poor rural communities who are providing these services, are thus highly desirable not only from the point of increasing the level of investment in the forestry sector to enable the effective maintenance of forest resources on a sustained basis, but also for enhancing equity and the livelihoods of the poor.

### **3.3 Policy Environment for Watershed Markets in HP and Existing Payment and Incentive Mechanisms**

Being an upstream state providing watershed services to several downstream states there is a high awareness in HP at the macro-level for the need for receiving payments for the services provided by the state's forests. Especially in the case of large HEP and big dam projects, where the benefits largely go to downstream states, and the costs are borne by HP there is a growing feeling that the state is not being adequately compensated. This is reflected in the current policy environment in HP as well.

For instance, HP has recently imposed an Environmental Value Tax on all agencies using forest lands based on the findings of the valuation study carried out by IIFM, Bhopal to correct the distortion that is present in the current system of valuing forests<sup>22</sup>. This one-time levy has been

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<sup>22</sup> For example, in the case of the Kol Dam project, the National Power Thermal Corporation diverted 1000 ha of forestland, paying only Rs 1.2 crore at the rate of Rs. 12000 per hectare as compensatory afforestation charges, while they were paying Rs. 60 lakh per hectare in the case of private land (Makhaik, 2002).



fixed at Rs 8 lakh per hectare where forest density is above 10% and Rs 5 lakh per hectare for other forest areas.

Apart from this, there are several other regulatory payments imposed by the Forest Department on large-scale hydroelectricity/ dam/ road/ mining/etc projects for the purpose of compensatory afforestation, catchment area treatment, rehabilitation of dumping sites, etc. which are essentially one-time payments. These payments are all compulsory in nature and mandated by national legislation such as Forest Conservation Act, 1980, Environment Protection Act, 1986 and the Water Cess Act, 1977. Hence, if any of these projects involve diversion of forest land, the law requires them to undertake compensatory afforestation on an equal area of land if done within forest areas, or on twice that amount of land if done outside forest areas. In case of catchment area treatment (CAT), private hydropower companies are supposed to compulsorily earmark 10% of the total project cost for this purpose, whereas for government-supported projects this fluctuates between 1-5% of the total project cost depending on the extent of area that is required to be treated. Under the Water Cess Act, the government of HP, through the State Pollution Control Board, is able to levy all industries including hydropower projects a cess of Rs. 0.04 per kilolitre of water utilised thereby generating an annual income of Rs. 360 crores for the state exchequer, some part of which is supposed to go in for the treatment of the watershed catchments<sup>23</sup>. Similarly, the state government also charges a royalty of 12.5% from all hydropower projects operating in the state that are not owned by it, through the Himachal Pradesh State Electricity Board (HPSEB) and some part of this too is said to be earmarked for watershed protection. Other than these there are also a number of other payments imposed by the Forest Department before they grant environmental clearance to any project, which are regulatory in nature, but nonetheless also negotiated between the Forest Department and the concerned project. However this system of payments as such is not perfect, and there are several constraints and problematic issues surrounding these payments, which are detailed in a later section.

HP has also recently formulated a Draft State Water Policy for the first time in 2001. While recognising the growing demand for water in diverse urban and rural sectors in HP and its increasing scarcity, the draft policy calls for an integrated, multidisciplinary and participatory approach in which the primary consideration is given to maintaining the environmental quality and the ecological balance of the state (*Paras. 4.1, 6.1, 6.4, 12.1*). Further, acknowledging the role of forests in providing watershed services, especially in flood control, soil conservation and drought management, it explicitly makes a case for promoting watershed management through catchment area treatment, preservation and increase of forests, and the development of pasture

lands (*Paras. 17.1, 19.1*). More significantly, the Draft State Water Policy also clearly recognises the need to put in place market or market-like mechanisms to sustain these services recommending firstly that any adverse impacts on the environment should be minimized and be offset by adequate compensatory measures and secondly calling for water charges to cover at least the full operation and maintenance costs of providing the same and also part of the capital costs subsequently – which would include the maintenance of the watershed catchments as well (*Paras. 6.3, 11.1*). Currently water supply in HP is heavily subsidized and is provided by the Irrigation and Public Health (IPH) Department in rural areas and by City Municipalities in urban centres. However, even though this water often originates from well-protected catchment areas, which in many places are specifically reserved for the purpose of water provision<sup>24</sup>, there are hardly any payments being made for the protection of these catchment areas by the service beneficiaries. Finally, the draft policy also encourages private sector participation, not only in planning, development and management of water resource projects, but also to introduce innovative ideas in generating new financial resources, which signifies a shift in thinking of the government towards adopting more market-based approaches (*Para. 3.1*).

It is interesting to also take note of some of the comments of the Himachal Pradesh Forest Department on the Draft State Water Policy. Firstly, the HPFD notes that water, as a good and service in HP, is a product of the dynamic interaction between forests, grasslands, alpine pastures and glaciers and that the key to sustain fresh water availability hinges on the sustainable management of forests and watersheds. Secondly, the Forest Department strongly articulates the need to sustain water supplies by linking its management to market-based approaches. Focusing on the growing priority that is being given to promoting hydroelectricity power projects in HP as a case in point, it notes the link between forests and the quantity of water required by hydroelectric projects, especially in summer months, and raises the need to establish market-based mechanisms where the latter would pay for the protection and sustainable management of the watersheds. Interestingly, it also acknowledges that compensatory provisions for watershed management are not being adequately carried out by the present system of catchment area treatment, and that a more participatory process which has the complete involvement of the local communities has to be developed. Further, it also raises questions whether an upstream 'watershed' state like HP should get larger budgetary allocations from the central government for

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<sup>23</sup> This water cess may however no longer be applicable in the case of hydropower projects, since the Lower House of Parliament recently passed a Bill in February 2003, which while proposing a three-fold increase in the water cess for all categories of industry, has exempted hydropower projects from this payment altogether.

<sup>24</sup> Two specific examples of such forests that we have studied in this project are the Shimla Catchment Forests and the Oak forests in Dharamsala, details of which have been given in later sections.

providing watershed services and also from downstream states like Punjab, Haryana and Delhi for providing them with water<sup>25</sup>.

The existence of a good “policy window” for exploring the potential and promoting market-based approaches for watershed protection services and livelihood improvement is also evident in the Guidelines drawn up by the Department of Science and Technology to develop an Environment Policy for the state. These guidelines also note that forests are water reservoirs, natural sources of soil nutrition, soil creators and soil binders and recommend the development of appropriate mechanisms to provide sufficient incentives to local communities to participate in forest protection and afforestation (*Paras. 8.C.1 and 8.C.3*).

At a micro-level however, the main motivation of local communities for undertaking forest protection and watershed development is, like in the case of other states, still local benefits and village-level development rather than the potential of receiving payments from providing watershed services to the larger downstream beneficiaries. Thus under the JFM programme in HP, the incentives offered to local communities in return for their participation in forest protection activities include the right to collect fodder, fuelwood and NTFPs from the forest totally free of cost, entitlement to the full sale proceeds of the intermediate harvest and to 75% of the final harvest<sup>26</sup> (PFM Rules, 2001, GoHP). However, the same rules also call for the communities to reinvest up to 40% of their share in forest conservation activities in their area of operation.

### **3.4 Stakeholder Analysis in HP**

The major stakeholders in the water cycle, and in the potential development of markets for watershed protection services in HP, can be classified into two broad categories: (1) the watershed service providers and managers, (2) the watershed service users. In each of these categories, apart from the direct providers and users there are also a number of institutions – primarily government departments and agencies (but also external donors and NGOs) – who either support the former in their respective functions, or enable interactions and, at times, transactions, between the two.

#### **Watershed Protection Service Providers:**

These include primarily forest dependent communities such as the poor scheduled castes and tribes and traditional graziers, and more broadly speaking, the entire rural population of HP itself, which depends, and places significant pressure on the state’s forests, in some way or the other.

<sup>25</sup> Since the question of inter-state payments is a hugely complex and politically contentious issue in India, we have not considered it within the scope of our present study. Nonetheless it is an important factor that has to be considered.

<sup>26</sup> The Village Panchayat gets the remaining 25%

Through JFM, many of these communities are today being enabled to use forests in a sustainable manner, and are being provided with incentives (in the form of benefit-sharing mechanisms) to participate in forest protection and watershed development efforts. It has been recognised that it is impossible to protect forests and pasturelands without the participation of these local communities, and they are therefore the primary providers of watershed protection services. Along with forest protection activities, treatment of private agricultural lands is also important considering the fact that the catchment area of a river increases as it descends towards the plains, covering more diversified land use practices. A significant section of the population is involved in horticulture<sup>27</sup> in HP, which is widely known as the 'fruit state' of India. The area under horticulture now accounts for around 25% of the total cultivable land in HP (Sharma, 2000). Being essentially a tree-plantation activity, the farmers involved in horticulture too are providers of watershed services to other downstream users. However, it must be kept in mind that these providers of watershed services are themselves also the users of the same to some extent.

The Forest Department, being formally charged with the responsibility of protecting the forest resources of the state, is the primary government agency responsible for providing watershed protection services in HP. It is also responsible for carrying out compensatory afforestation work and implementing catchment area treatment (CAT) plans developed under the various hydropower generation projects, etc. for which they receive funds, not directly from the projects themselves, but routed instead through the State Treasury. Similarly, as explained earlier, the Departments of Agriculture, Horticulture and Rural Development are also involved in watershed development work through their various programmes and schemes, which are implemented through the DRDAs. Likewise, there are a number of integrated watershed development and natural resource management projects that are supported by international donor agencies – like GTZ, DFID, World Bank – and also a number of NGOs who are active in this work.

The HP Environmental Protection and Pollution Control Board (HPEPPCB) is also involved in regulating the management of water resources in the state in terms of pollution and control of pollution and is in charge of administering the various acts such as the Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Water (Prevention and Control of Pollution) Cess Act, 1977, among others. The HPEPPCB is the agency responsible for charging various levies such as the water cess, consent fees, etc. from industries, commercial organisations, etc.

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<sup>27</sup> In HP 'horticulture' refers to the cultivation of fruits. The production of flowers is termed as 'floriculture'

### Watershed Protection Service Users

The Irrigation and Public Health (IPH) Department is the main institutional abstractor of water in HP and is responsible for the management of water resources and for looking after infrastructure of water supply, sewerage, irrigation and flood control works in the state. Farmers involved in agriculture and horticulture, as mentioned earlier, themselves also use some water for irrigation, but irrigation in HP as such is very limited with most of the agriculture being rain-fed. In urban centres and cities, the Municipal Corporations are the main agencies responsible for supplying water. As will be detailed later on, there are some cases where towns/cities in HP directly receive water from springs located in catchment forests. In these cases, the IPH Department is responsible for tapping these sources of water and transmitting it to a centralised point from where the town/city municipalities take on the charge of distributing the water to the domestic and commercial users at fixed tariffs. There are also a number of industries in HP that utilise water. Of these tourism is one prominent industry that plays a major role in the economy of the state. Another significant, and growing industry that is directly benefiting from water extraction in HP is the mineral water industry with a number of private mineral water companies such as the Manali Mineral Water, Catch. etc. In most cases, these companies are directly extracting ground water in a totally indiscriminate manner and there are no payments being made by them in any way for catchment area protection.

Another very important industrial user of water and watershed protection services in HP is the hydropower sector with both run-of-the-river schemes and dam projects depending significantly on quantity of water flows and control of the quantity of sedimentation for running their operations. Hydropower projects in the state include not only state-owned projects like the Larji Project, which is owned by Himachal Pradesh State Electricity Board (HPSEB) and is currently under construction, but also national projects like those undertaken by the National Hydro Power Corporation (NHPC), autonomous bodies like Bhakra Beas Management Board (BBMB)<sup>28</sup>, and projects that are run by electricity agencies of other downstream states such as the Punjab State Electricity Board (PSEB), the Uttar Pradesh State Electricity Board (UPSEB), the Rajasthan State Electricity Board (RSEB), etc<sup>29</sup>. Further, there are also a number of private companies involved in hydropower projects in HP, especially in the micro-hydel segment. As mentioned earlier, HP has a vast hydel potential to the tune of 21,229 MW in the five river basins of which only 3,935 MW

<sup>28</sup> For example, the Dehar Power House, Slapper, the Bhakra Nangal Power House and the Pong Dam Power House all come under the management of the BBMB.

<sup>29</sup> This can be seen as a precursor to inter-state market-based transactions, presently restricted to contributing to capital costs but with the potential to attract investment in watershed protection subsequently. In a recent development, the Government of Delhi has expressed interest in not only fully financing the Renuka Dam, that will augment drinking water supply to Delhi, but to invest substantially in the extension and protection of the Renuka Wildlife Sanctuary that comprises a part of the dam's catchment.

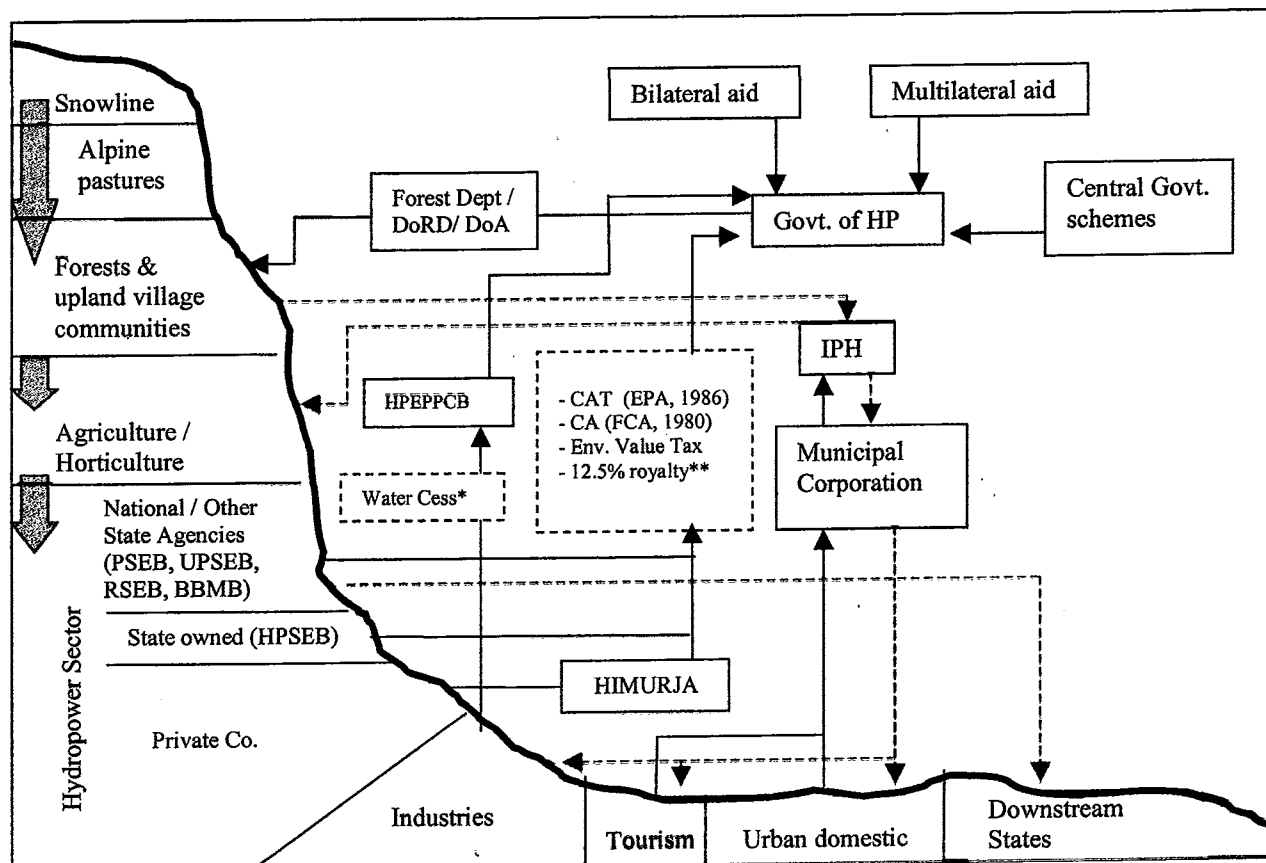
has been harnessed so far. Hence in the coming years there will be much greater dependence of the hydro sector on water resources.

Of the other institutions, involved in the hydropower sector, the main ones include HPSEB, which in addition to generating power also manages its distribution and transmission throughout the state and receives royalties from the other hydropower projects, HIMURJA, which is primarily responsible for commissioning the tapping of small hydro potential in the state and for providing escort services to private companies, and the HP Electricity Regulatory Commission, which regulates power purchase and determines tariffs for electricity in the state.

Several downstream states such as Punjab, Haryana, Rajasthan and Delhi also benefit from protection of forests and watersheds in HP in the form of power and water supplies. However, there is a strong feeling amongst politicians, government officials as well as the public in HP that their state is not adequately compensated for the services that it provides to its neighbours. However, this is a politically contentious issue, which makes progress towards some sort of a resolution difficult.

Figures 1 and 2 broadly indicate the current interactions between these various stakeholders and the watershed services that they receive. The purpose of this schematic is to try and provide a macro understanding of the current scenario. An attempt has also been made to indicate stakeholders between whom potential market-based systems could possibly be considered. However, intermediary institutional mechanisms will need to be developed in order to operationalise any potential market-based arrangements, which could include one or more of the other stakeholders. As of now, there are no direct payments made by the watershed service users to the watershed service providers except those prescribed by the various rules and regulations such as the provisions for compensatory afforestation, CAT, water cess, etc. Even in these cases the payment do not flow directly, but are routed through the government treasury with the Finance & Planning Departments allocating the relevant amounts to the concerned departments sometimes, as part of their annual budgets or more usually as ad hoc releases to the concerned department depending upon utilization status of the budget and / or the ways and means position of the Treasury.

**Figure 1: Diagram of Stakeholders in the Water Cycle of HP**



—▶ Money flows

-----▶ Water flows (supply)

➡ Natural water flows

\* Currently under consideration for Hydropower projects

\*\* Provided only by National / Downstream State owned projects & Private sector projects

DoRD: Department of Rural Development

IPH: Irrigation & Public Health Department

HPEPPCB: Himachal Pradesh Environmental  
Protection & Pollution Control Board

HPSEB: Himachal Pradesh State Electricity Board

UPSEB: Uttar Pradesh State Electricity Board

CAT: Catchment Area Treatment

RSEB: Rajasthan State Electricity Board

CA: Compensatory Afforestation

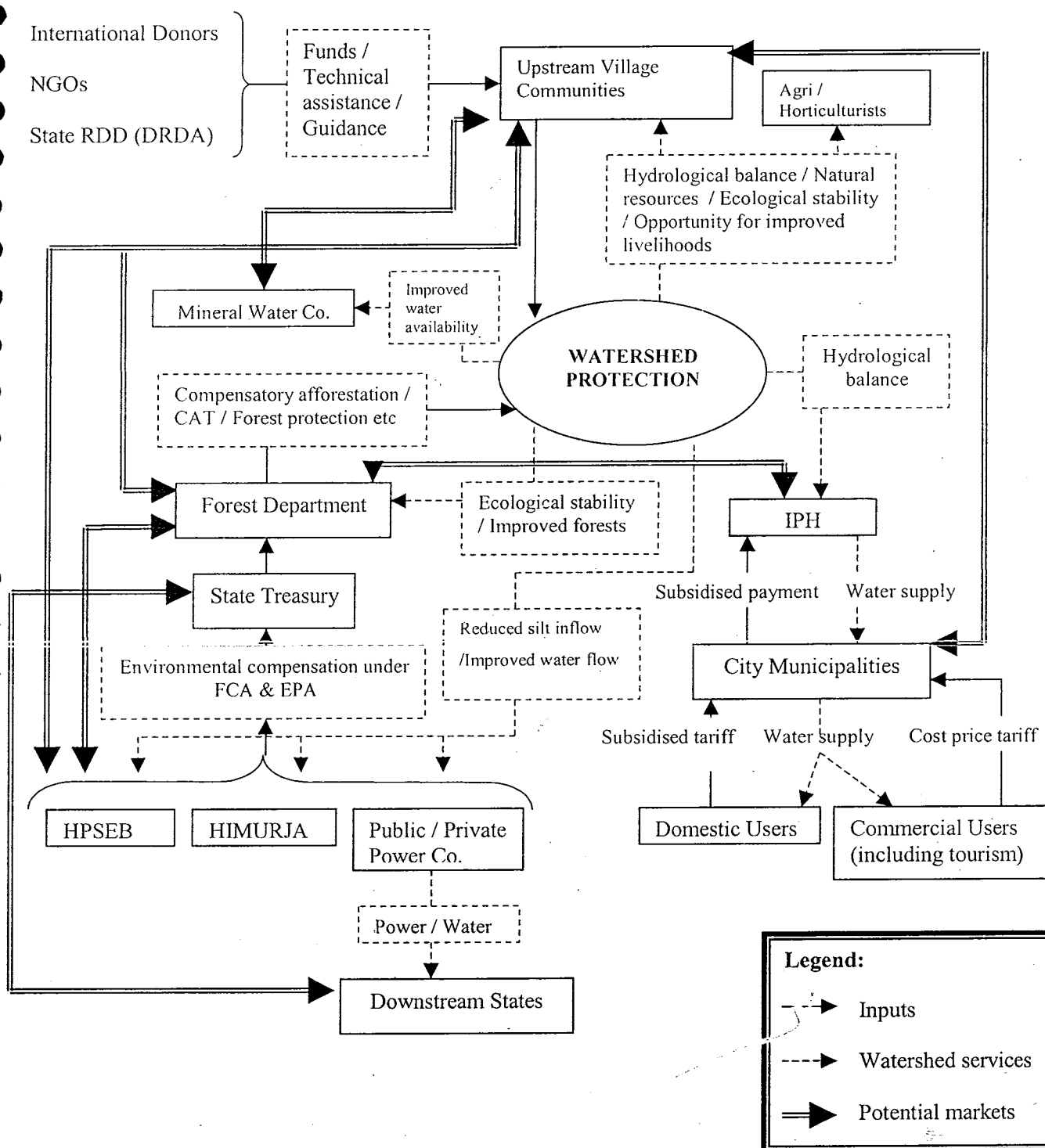
BBMB: Bhakhra Beas Management Board

DoA: Department of Agriculture

PSEB: Punjab State Electricity Board

HIMURJA 'Himachal Pradesh Energy Development  
Agency'

Figure 2: Stakeholder interaction and potential markets in HP





### 3.5 Potential of using Market-based Approaches for Watershed Protection Services in HP: Findings from the Field

To study the potential of developing market-based approaches for watershed protection services in HP, the scoping team visited several field sites in HP, which appeared to have direct relevance to the project, either because watershed protection and development work were already being undertaken in those sites and there was a great deal of understanding of the issues involved among the local people along with availability of hydrological and impact data, or because by virtue of their location, these sites were examples where watershed protection services were directly being provided to downstream users. Hence the field sites visited in HP included the following:

- The GTZ supported Indo-German Changar Eco-Development Project situated in Palampur in the Kangra district, where watershed development work has been in operation for several years now and hydrological and socio-economic data is also readily available.
- The World Bank sponsored Integrated Watershed Development Project (IWDP) in the Kandi belt in Solan District where watershed development activities have been going on since 1989
- The Great Himalayan National Park in Kullu district, which is a totally protected natural forest area and encloses the catchments of five rivers which flow down to several hydropower projects located downstream
- The Shimla Catchment Forests in Shimla, the capital of HP which provides water supply to the city
- The Dharamsala Forest Division which provides water and landslide protection services to the towns of Dharamsala and McLeod Ganj
- The Dehar Power House of the BBMB in Slapper in Mandi district

As mentioned in the methodology section earlier, the potential of developing market-based approaches was examined at three different levels:

- Micro-level: Involving intra-village transactions
- Meso-level: Involving inter-village *upstream-downstream* transactions
- Macro-level: Involving transactions between larger downstream beneficiaries e.g. hydropower projects, irrigation dept, municipal water supply agencies, mineral water companies, etc. and the upstream watershed protection service providers

Considering that no pure market arrangements for watershed protection services currently exist in HP, a very broad definition of markets covering any kind of transaction, monetary or otherwise, between providers of watershed protection services and the users of the same was adopted. The

potential and constraints at each level are discussed as follows. In case of the micro and meso-levels, the constraints have been clubbed together after outlining the potential in each case first.

### **Micro Level: Intra-village Transactions**

Unlike, the several cases of 'embedded' markets like Sukhomajri and Nada in Haryana, and *Pani Panchayats* in Maharashtra, etc., where some form of intra-village trading of water rights has taken place between the landed and the landless/ land poor villagers as an incentive for the latter to participate in watershed protection activities, there is not much evidence of the same in HP. The reason for this is two-fold. The first and primary reason is that since extensive land reforms have been carried out in HP only about 15% of the total population is landless (Changar Project, 1997). Secondly, even though agriculture provides employment to over 70% of the state's population (State of Environment Report-HP, 2000), immigration to urban centres, jobs in the military etc. are increasingly becoming the preferred livelihood options in much of rural HP. Nonetheless, in the villages where landless are present and where land reforms processes have not yet been completed fully, developing such intra-village market-based mechanisms that involve the de-linking of land and water rights may have a significant potential to provide the landless with sufficient incentives to participate in forest and watershed protection<sup>30</sup>. This option is however, not limited for the landless alone and such transactions can also be considered between the large and medium landowners and the land poor. Over 80% of the farmers in HP are small and marginal landholders and they too may be willing to participate in forest and watershed protection activities if this leads to increased irrigation and drinking water availability for them. Over the past few years, availability of drinking water has become an increasingly important issue in rural HP, with a number of traditional water sources such as springheads, locally known as *bhawdies* drying up. In some of the villages that were visited during the scoping work, the local villagers themselves expressed their willingness to pay up to Rs. 100-150/ month for assured water supply as against the prevalent government rate of Rs. 40 every 3 months that they are currently paying in spite of an unreliable service.

There are also several villages in HP where the link between watershed and forest protection and the benefits of doing so are very clear in the minds of the people, and this is an important factor to keep in mind, especially for the Forest Department, to encourage local communities to change unsustainable land use practices and participate more directly in forest protection, perhaps through JFM (See Boxes 4 and 5 for Case Studies).

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<sup>30</sup> These are poor households who generally subsist on few remittances from migrant labour and are highly dependent on forest resources for their livelihood needs. Mostly they are highly indebted as well (Changar Project, 1997)

#### Box 4: The Case of Anji Village

Anji is a village of 40-45 households, a few kilometres from Solan town, where the villagers are maintaining and utilising a *kuhl*, a traditional irrigation channel, which is fed by a stream tapped within a forest area that is managed by the Forest Department. The people of Anji have a right over this water as per the Land Settlement Records. The water from the *kuhl* is used for vegetable cultivation – a profitable venture in which farmers can earn up to Rs. 15,000 per *bhiga* (0.08 ha) [the landholding within the village varies from 1 to 70 *bhigas*]. This is therefore sufficient incentive for them to continue the traditional practice of maintaining the *kuhl*. Currently, panchayat funds are utilised to maintain the *kuhl* and a tank for storing water has been constructed through the same funds. Apart from these funds from the panchayat, the farmers also contribute free labour for the maintenance of the *kuhl*. There are landless households within Anji who apparently had received land allotments from the government, but many of them have sold off their lands and work as labour within Solan town. The down side of the present system is that only the landed benefit from the use of the panchayat funds for *kuhl* maintenance, whereas these funds are supposed to benefit everyone.

The villagers of Anji have noted that the quantity of water in the stream had decreased over the past decade and they attributed this to climate change, deforestation and urbanisation. There is a clear consciousness of the link between forest protection and water services in the minds of the villagers. When asked whether they would be willing to take the responsibility of protecting the forestlands from which they received water in return for the profits that they were making, the answer was in the affirmative. This basic willingness holds great potential for involving the people of Anji in JFM.

There are also other villages located downstream of Anji that depend on the water from the same *kuhl*. However, according to the villagers of Anji it is codified in the records that as the uppermost village they have the first right to the water. As of now there are no arrangements over water sharing between any of the villages even though they all fall under the same panchayat. However, when asked if all the villages in the drainage line could get together and protect the forest area, the villagers seemed doubtful as they are currently divided along political lines. This fragmentation along political lines is a widespread and very real constraint against cooperation / transactions between villages / communities in many parts of India.

In some of the villages where watershed development work has been undertaken through the Kandi Project the landed households have contributed towards the cost of the watershed treatment activities in proportion to the land that they own<sup>31</sup>. A rate per *bhiga*<sup>32</sup> was decided upon by the user groups within each village and the money, varying from Rs. 37,000 to Rs. 1.15 lakh, was contributed towards the laying of the water supply pipes from the earthen dams / lift schemes. Apart from this cost sharing, no other-market-like arrangements were found in any of these villages and the idea of the landless having any rights over water seemed bizarre to the people<sup>33</sup>.

<sup>31</sup> Three of these villages - Khabra, Nanowal and Jodiyan - were visited during the study.

<sup>32</sup> 1ha = 12.5 *bhigas*

<sup>33</sup> There were practically no landless households in these villages, barring a few nomadic pastoralist *Gujjar* households.

However, there are some migratory *Gujjar* households who spend the winter in some of these villages and depend on the catchment areas above the village for grazing their herds. The watershed development activities in the village have a potential to adversely affect the livelihoods of these poor nomadic communities. For example, in the case of Khabra village 40 ha out of the 100 ha of common lands have already been cordoned off, despite the Gujjars having a right to graze in them. Though this had not yet led to any conflicts, it brings out the desirability of developing appropriate incentive systems to compensate them for their loss of access to traditional grazing lands.

**Box 5: The Case of Mansar Village**

The case of this village is a demonstration of the fragility of water regimes in the area due to disruptions in the ecology of the area and the perception / belief in the minds of the local community of the linkage between forest vegetation and water supply. Mansar is a village near Solan town, which used to have a *kuhl* system for water distribution at one time. According to the villagers of Mansar when the road above their village was constructed 30-40 years back, and the hillside was dynamited, their main source of water dried up and shifted to a new location below their village. Since a lift irrigation scheme was far too expensive for them to afford they are no longer able to tap this water source.

Below the road, there is a forested patch adjoining their village where there is another smaller water source that the people currently utilise. This water collects in a tank and is used for irrigation in the fields below. For drinking water the villagers are dependent on a lift scheme installed by the IPH department. The farmers at Mansar, like those in Anji, grow tomatoes and green peas, which are cash crops. Water is distributed according to landholding from the uppermost fields to the lower ones. However, no charge is levied for this water. In case of a breakage in the distribution system the villagers contribute cash or labour as required. There are no landless households. The most striking feature of Mansar village is the sacred status that has been accorded to the forest area from where their water source originates and the villagers believe that if this forest were ever cut down this source of water would dry up too. The villagers therefore protect these forests fully even though JFM has not been initiated.

There is also some interesting current thinking amongst the officials of the Kandi Project which points in the direction of developing market-like systems to improve the effectiveness of watershed maintenance. The Kandi Project is currently thinking of motivating User Groups formed within the villages to sub-contract the running and maintenance of the schemes to one person from within the group, who will pay the User Group to take on this responsibility of maintenance. This person can then earn a profit by charging farmers for the water supplied. Such an arrangement is based on the philosophy of privatisation. It however runs the risk of being exploitative unless the User Groups retain the right to withdraw this contract when such a situation develops.

## **Meso Level: Inter-village Transactions**

Here the focus was on identifying cases of upstream-downstream transactions between villages and a number of different cases and situations emerged during the fieldwork.

### Bhodi-Ropri Case Study

In this case, two downstream villages - Suan and Ropri - located in the Changar Project region were facing a problem of water scarcity. After their local interventions did not help, the Changar Project staff who studied the area, found the genesis of their problem and traced it back to the degradation and open-access use of a stretch of common lands located about 7 kms upstream along the same drainage line, which was adjoining and belonged to a village called Bhodi. Realising that they needed the support of the upstream villagers in solving their water scarcity problem, the villagers of Suan and Ropri then got together and went upstream to discuss this problem with the villagers of Bhodi. On reaching there, they found that since the villagers of Bhodi were not facing any problem with regards to water availability of their own, they were not interested in protecting the adjoining common land. The villagers of Suan and Ropri then agreed to contribute free labour for the treatment of the degraded Bhodi common land themselves. Further, to enlist the support of the villagers of Bhodi, they even agreed to have the payment that was due to them from the government/ project funds for doing this labour work, go to the Village Common Fund of Bhodi instead of to their own. In return for this "payment", the villagers of Bhodi agreed to regulate their own collection of grasses, fuelwood etc. from the common land and also to prevent the access of other nearby villages on the other side of the hill who had been accessing the same common lands. In addition to the indirect monetary incentives and goodwill that they received from the downstream villagers, the villagers of Bhodi also benefited from the increased income that accrued from the sale of grass that had started regenerating after protection. The villagers of Suan/ Ropri on the other hand benefited from the increased supply of water downstream.

However, on delving deeper, it was found that this was only a one-time co-ordination effort or "payment" on part of the villagers of Suan and Ropri towards Bhodi. Their logic for not continuing their original efforts was that it was simply not needed anymore; because the upstream villagers of Bhodi, having reaped the benefits of the protection work through additional income from grass, etc., would not stop protecting their common lands, as they would then be harming their own interests. Nonetheless, despite the one-time nature of this market-like mechanism, it brought out quite well the potential of how such mechanisms can encourage such win-win situations to emerge. From a future research point of view, it would be very relevant to study this

case in a more in-depth manner to thoroughly understand the exact processes that occurred and the role played by various other associated factors that enabled such a development. For example, some of the villagers of all the three villages had earlier visited *Ralegaon Siddhi* in Maharashtra on an exposure visit to see the watershed programmes there. The Changar project staff had also given them a basic conceptual understanding of upstream-downstream linkages. Further, there were good underlying social relations between the three villagers who regularly met each other on festive occasions and the direct benefits of upstream protection could be visibly seen on the ground by the downstream villagers in the form of better water availability.

### The Kuhl System in HP

Another interesting meso-level system in HP is the 150-year plus old community irrigation system of *Kuhls* which have an elaborate inter-village system of management with intricately defined upstream-downstream rules, rights, and responsibilities that have been negotiated over the years. For example, if there are 10 villages along a particular *kuhl*, there is a well-established system by which it is known precisely how much water has to be released when, to which downstream village, and to what extent the different downstream villages have to provide free labour for the maintenance of the upstream stretch of the *kuhl*<sup>34</sup>. For instance, in case the downstream beneficiaries refuse to participate in the upstream maintenance of the *kuhl*, penalties are levied both financially and also in the form of other social sanctions.

However, over the last 3 decades, many of these so-called community-managed *kuhls* - which are popularly referred to locally as "private" *kuhls* - have been taken over by the Irrigation & Public Health Dept. of the HP government<sup>35</sup>. The overwhelming perception among the local communities and NGOs is that the traditional system of "private" *kuhls* was, and wherever they still exist, is far more effective than the ones taken over by the government. Even though these community-managed *kuhls* are in reality more a form of *collective action* rather than a *market-based* mechanism, it however does seem to be conceptually closer to a market-like system involving formal and informal upstream-downstream transactions, rather than to a state-controlled regulatory framework. More research on how *kuhls* work could thus definitely offer useful insights for developing other related forms of upstream-downstream transactions for watershed services in HP.

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<sup>34</sup> These are well documented in the '*Riwas-i-Abpashi*' - a traditional record of rights

<sup>35</sup> The reason for this can be traced back to the political promises made in the 1960s and 70s promising tap water to every household in HP

Another potential area lies in the institutional arrangements set up by the project officials in the Kandi project areas. The project selects sub-watersheds that encompass three to seven villages and a Village Development Committee (VDC) is formed with representative(s) from each of these villages. The project hopes to strengthen the VDC sufficiently so as to tackle matters that affect the entire sub-watershed. But since some of these villages are located upstream and some downstream, it is possible that market-like incentive mechanisms between the User Groups in each of the villages, can improve the quality of treatment and maintenance of the sub-watersheds.

Apart from these cases, there were a number of other examples available, both in Changar as well as in Kullu, where some sort of local exchange-based mechanisms were being used both within and between villages for protecting other natural resources in the form of trading of tree rights, grass collection rights, etc. Research into such cases would also yield rich learning for the development of market-based approaches for watershed protection services.

However, as of now there are no real markets for watershed protection services as such at the micro and meso-levels, though as can be seen through some of the cases elaborated above, in some places some sort of a latent demand does seem to exist. However, in most of these cases the existing way of meeting this demand takes the form of informal transactions based on collective action rather than on a purely market-based mechanism. Hence it is more of a pre-market situation at this stage. However, this may change as water scarcity increases in the villages with the drying up of the hillside springs (as is happening now). Indeed, in some of the cases the villagers are willing to pay much more than they currently do for water. Thus if it can be demonstrated that watershed protection can help generate water, there is no reason why beneficiaries will not be willing to pay the necessary amount to whoever does the protection. This could possibly lead to livelihood improvements for nomadic grazier communities for instance, though the trade-offs involved for them will have to be carefully studied first before any conclusive statements can be made in this regard.

### **Constraints at the Micro and Meso Levels**

There are a number of constraints present for developing market-based systems for watershed protection services at the micro and meso levels.

- The concept that watershed services are something that one has to pay for or can receive payment for is something that is still not there in the minds of the local people and institutions. A strong awareness of upstream-downstream linkages has to be created before any such payment mechanism can evolve. Also it has to be seen whether any such

development would be desirable or not, since currently a lot of such work done between villages is on the basis of goodwill, collective action and quid pro quo understandings.

- Though in some cases such as Mansar, village communities do perceive a positive linkage between upstream forest vegetation and the quantity of water in their springs (*bhawdies*) in downstream areas, this is not quite evident in every case. On the whole, the realization of upstream-downstream linkages is still quite weak among the villagers. The reasons for this include, the peculiar geology of the mountainous region in HP that makes it difficult to ascertain the flow of water, the fact that irrigation is not really an issue in the state, and that villages invariably procure drinking water from local sources. Hence local people are really not that interested in issues beyond their village unless they are directly affected by it and can visibly see the changes/ benefits from upstream watershed protection on the ground.
- Divisions at the village level and among villages especially along political lines (as in the case of Anji) is one of the constraints that adversely impact the setting up and smooth functioning of village-level institutions, which would be necessary for any kind transactions to take place.

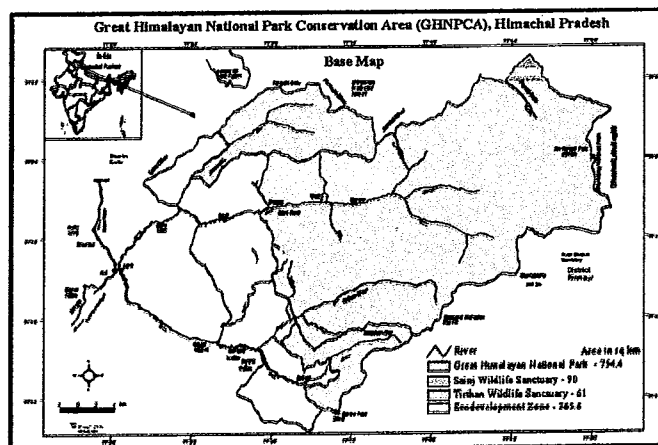
Thus, even though there are seeds of market-like behaviour in the case of watershed protection in some parts of the state at the micro and meso-levels, the overall potential of developing more sophisticated markets for the same is hard to judge and generalise, because of the multiplicity and complexity of the situations that exist at these levels. A far greater potential for the development of markets for watershed protection services exists at the macro-level between the urban beneficiaries and the upstream watershed protection service providers as is discussed in the following section.



## Macro-Level: Upstream-Downstream Transactions

At a larger macro level, forest and watershed protection activities provide valuable watershed services to major downstream beneficiaries such as hydro-electricity projects and water supply agencies in urban areas. It is at this level that the potential for developing market mechanisms for watershed protection services and improved livelihoods is the greatest, albeit also being far more complex in nature, involving a wider catchment area, a larger number of stakeholders and larger volumes of payments.

To examine the potential of developing market-based payment mechanisms between the large downstream beneficiaries of watershed protection services such as hydropower projects, mineral water companies, municipal water supply agencies, etc., the scoping work and field visits focused on the areas that included the Great Himalayan National Park in Kullu<sup>36</sup>, the Shimla and



Dharamsala Catchment Forests and the Dehar Power House at Slapper. Perceptions and inputs were also gathered from discussions with the officials from the Forest Department, Himachal Pradesh State Electricity Board (HPSEB), Bhakra-Beas Management Board (BBMB), Larji & Parbati Hydropower Projects, private micro-hydel operators, HIMURJA, Manali Mineral Water Company and the Shimla Municipal Corporation.

The two major macro-level downstream beneficiaries of watershed protection activities carried out upstream are the hydropower sector, who receive the watershed services of water flow regulation and reduced sedimentation in dams/reservoirs, and urban centres which receive regulated flow of water and, in some cases, landslide prevention services respectively. The potential and constraints of developing market-based payment systems for each of them are discussed in the sections to follow.

<sup>36</sup> The rationale for selecting this site was that GHNP being a totally protected natural forest area, was the catchment of 5 major rivers/ tributaries that supplied water to a large number of national, state government, and privately owned hydropower and micro-hydel projects

## Hydropower Sector

As mentioned earlier in the report, there are already several payments that are being made by the various hydropower projects that operate in HP for the purpose of forest and watershed protection. The amount of money generated for this purpose is quite substantial (see Box 6 for example of Parbati Stage-II HEP project) though not many detailed studies have carried out to the best of our knowledge to aggregate the total revenue that is being generated through all these payments and much of the information available on this is scattered. In most cases these payments are made on a per project basis with the records present only in those particular project files. However, the extent to which such payments are being made is shown in Table 1 below, which is taken from the State of Environment Report of HP (2000).

### **Box 6: Payments made for forest protection purposes in the Parbati Stage-II HEP project**

- Approval given by Central Govt. for diversion of 87.795 ha of forest land
- Compensatory afforestation of 175.59 ha at cost of NHPC
- Penal compensatory afforestation of 20.50 ha at cost of NHPC
- Rs. 1 crore as condonation cost for afforestation, boundary demarcation, etc.
- Catchment area treatment scheme of Rs. 25.69 crores as per CAT plan given in Environmental Clearance order (NHPC to transfer funds to HPFD in a phased manner)
- Under EMP Rs. 15.40 crores for conservation of flora and fauna
- Rs. 20 crores for conservation of endangered species, afforestation, habitat improvement, etc.
- Additional commitment of upto 5% on above two payments plus costs for other environmental protection measures as enumerated in the EMP

As seen in the table, almost all these payments go first to the State Treasury, from where they are subsequently reallocated to the relevant line departments, in most cases the Forest Department for implementation. However, under the existing system there are no direct transactions taking place between the Forest Department and the respective hydropower projects. The procedure that is usually followed is that the Forest Department submits its Annual Plan of Operations to the state government for procuring its yearly budgetary allocation from the state treasury, and all watershed treatment and protection activities such as compensatory afforestation, CAT, etc. are all included in the various plans made by the different forest divisions. Based on this, funds are then released by the Finance Department to undertake the necessary watershed protection activities. Hence the onus for undertaking these activities lies on the Forest Department. There is no proper mechanism to ensure that the payment made by the hydropower project for the treatment of its specific catchment area treatment is actually used for that purpose itself. Further, during interviews with various officials, it was also expressed that much of the money reserved for CAT, compensatory afforestation, etc. is allocated to be used by the Forest Department for other purposes such as payment of salaries, buying of equipment, etc. and it is difficult to monitor the use of the same. In some cases it was also expressed that the money allocated for CAT purposes was lying unused in the local forest department office year after year.

**Table 1: Status of Provision of Environmental Safeguards in On-Going And Proposed Hydel Projects. (Afforestation And CAT Plan)**

Sr. No.	Name of Project	Estimated Cost (Rs. in Crs.)	Provision for environment/ afforestation (Rs. in Crs.)	Portion of CAT Plan (Rs. In Crs.)
1.	Larji HEP (126 MW)	971.31	1.70	0.50
2.	Ghanvi HEP (22.5 MW)	94.64	0.34	0.15
3.	Bhaba Aug. Scheme (54 MW)	24.00	—	—
4.	Bhaba Aut. PH (3 MW)	13.80	—	—
5.	Holi HEP (3 MW)	11.25	0.25	—
6.	Gumma HEP (3 MW)	15.26	—	—
7.	Sal-II HEP (2 MW)	8.20	—	—
8.	Nathpa-Jhakri HEP (1500 MW)	7179.64	143.6	86.16
9.	ParbatiHEP-II (800 MW)	1504.61	11.62	9.00
10.	Parbati HEP-I (501 MW)	891.71	6.55	5.00
11.	Baspa-II HEP (300 MW)	949.23	24.00	23.0
12.	Dhamwari-Sunda HEP (70 MW)	385.00	0.56	—
13.	Malana HEP (86 MW)	380	1.13	0.59
14.	Uhl Stage-III HEP (1000 MW)	796.54	5.45	5.00
15.	Karcham-Wangtoo HEP (1000 MW)	4397.00	21.00	20.00
16.	Hibra HEP (231 MW)	1481.69	8.23	4.41
17.	Allain Dhamgaon HEP (192 MW)	777.19	4.00	1.82
18.	Neogal HEP (15 MW)	87.69	1.01	0.75
19.	Bhudil HEP (70 MW)	290.00	1.5	0.52
20.	Khauri HEP (12 MW)	69.00	0.24	0.056
21.	Swara Kuddu HEP (144 MW)	587.00	11.74	7.00
22.	Renuka Dam (40 MW)	200	4.00	2.40
23.	Kol Dam (800 MW)	1793.93	119.47	5.13
	<b>TOTAL</b>	<b>22908.69</b>	<b>354.77</b>	<b>171.48</b>

The major types of payments that are currently being made are summarised in Table 2 below<sup>37</sup>.

Table 2: Types of payments currently being made by HEP projects for the purpose of forest/ watershed protection in HP				
Name of Payment	Nature of Payment	Payment made to	Reason for Payment	Amount of Payment
Compensatory Afforestation (CA)	One-time mandatory payment for all projects diverting forest land as per the Forest Conservation Act, 1980	State Treasury	To compensate for diversion of forest land	Cost of undertaking plantation work on equal area of land if within forest area or double the area if outside forest area. Also all costs involved in the diversion of the agreed forest land. The total cost is worked out by the local forest department officials.
Catchment Area Treatment (CAT)	One-time mandatory payment for all HEP projects under the Environment Protection Act, 1986	Usually to State Treasury. In some cases, the larger hydro projects have their own divisions for this purpose	To protect the catchment areas of the dam/ reservoir through afforestation and other watershed treatment work	Compulsory 10% of the total project cost in case of private sector projects <sup>38</sup> , and usually ranging between 1-5% for other national and state government supported projects
Environmental Value Tax (EVT) <sup>39</sup>	One-time mandatory payment for all projects diverting forest land in HP	State Treasury	To correct distortions in forest valuation and generate revenue for forest protection	Levy has been fixed at Rs 8 lakh per hectare where forest density is above 10% and Rs 5 lakh per hectare for other forest areas
Royalty	Mandatory for all non-state projects	State Treasury through HPSEB	Part of it is supposedly for CAT	12.5% of total power generated

<sup>37</sup> The request of the HP government to levy a power generation cess on downstream beneficiaries states like Delhi and Haryana was not agreed to by the Central Government.

<sup>38</sup> Needs to be verified

<sup>39</sup> This tax is currently levied on the electricity board and the private sector and not government departments making the application of the tax to the State Electricity Board a contentious issue

Table 2: Types of payments currently being made by HEP projects for the purpose of forest/ watershed protection in HP (Contd.)				
Name of Payment	Nature of Payment	Payment made to	Reason for Payment	Amount of Payment
Water Cess <sup>40</sup>	Mandatory payment for 29 industries under the Water Cess Act, 1977	HP Environmental and Pollution Control Board	Part of it is supposedly for CAT	Rs. 0.04 per kilolitre
Other Payments for dump-yard reclamation, development of a green belt, biodiversity conservation, etc.	Some mandatory under EPA, 1986 and some are imposed/ negotiated by the Forest Department	State Treasury	For specific environmental purposes	Variable

<sup>40</sup> This is currently under consideration

From the point of view of many hydropower projects too, such a situation is quite favourable, since they have to often make these mandatory payments in instalments, and unless a utilisation certificate is issued for the first instalment, they do not have to release the subsequent instalments. There is also a problem of interdepartmental coordination, with different departments/divisions being responsible for issuing different clearances and a lack of sufficient information sharing and interaction between them (See Box 7). Thus, the whole regulatory system governing the payments made by hydropower projects towards watershed protection activities has a number of institutional weaknesses and many of the processes involved have been quite convoluted and disjointed and driven by perverse incentives and interests.

#### **Box 7: Lack of Departmental Coordination**

Before any hydropower project is set up two clearances have to be obtained: Environmental Clearance and Diversion of Forest land Clearance. Until 4-5 years ago the process of obtaining these clearances was routed through a fragmented institutional set-up – through two separate entities – the Forest Department looking after the diversion for forest land cases and the Environment Division of the MoEF looking after the environmental clearance part. The applicant hence had to request the Forest Department for site clearance and then fulfil the requirements of the Environmental Division by undertaking an EIA (Environmental Impact Assessment) and providing a CAT plan and an Environment Management Plan (EMP) among other things. However, no specific department was allocated responsibility for overseeing this process. All clearances were sent to the Principal Secretary – Science and Technology based on the recommendations of the HP Environment & Pollution Control Board (HPEPPCB). Parallel clearance proposals would be sent to the Forest Secretary for diversion of forest land. As a result the Forest Secretary was unaware of the CAT plans submitted even though the Forest Department would ultimately be responsible for implementing them. The absence of a well-defined institutional set-up and the concomitant lack of information sharing can partially account for the lack of actual catchment area treatment on the ground in many of the hydropower projects in HP. However, some institutional changes have been made towards streamlining this process in recent years. A forester has now been placed in the HPEPPCB. Further the portfolio of Principal Secretary - Science and Technology has also been expanded to include environmental concerns. There is also an implementation committee that has one member from the Forest Department that oversees all the works undertaken under the hydropower projects, including implementation of the CAT plans and compensatory afforestation. But it remains to be seen how well this new system will work, given that some of the other larger problems still persist.

#### **Potential of Developing Market-based Payments in the Hydropower Sector**

Given that there are several problems with the current system of payments being made by the hydropower projects for watershed protection services, there is certainly a need to improve the current system. However, it must be noted that the regulatory system by itself is not replaceable, and that may neither be desirable. Whatever payments are happening now are taking place only due to the fact that these are mandatory in nature and cannot be circumvented. The concept that one has to *pay* for upstream watershed protection is still a very new one in the hydropower sector,

and had these mandatory regulations not been in place, it is difficult to say whether the hydropower companies would have made any contribution for upstream watershed protection on their own.

However, there is a definite perception of the link between catchment treatment/forest protection and the functioning and efficiency of powerhouses amongst most officials working in the hydropower sector. The most important perceived service of watershed treatment/catchment area protection to a hydropower project, be it a 'run of the river' type or a dam, is the control and reduction in silt inflow, which is a major problem faced by all hydropower projects. For example, one of the major dams of the BBMB silted up in only 9 years instead of the projected 28 years because of heavy siltation from upstream areas. Hydropower projects are thus currently incurring heavy costs for desilting. For the Larji project with an installed capacity of 126 MW the cost of desilting is estimated to be around Rs. 50 crores, as per the project design, which is more than 5% of the total project cost. Compared to this, the Larji project has currently allocated only Rs. 0.50 crores for CAT and Rs. 1.70 crores for compensatory afforestation. On the other hand in the case of the 1500 MW Nathpa-Jhakri project, the estimated cost of desilting activities amounted to over Rs. 200 crores i.e. approximately 3% of the total project cost but in this case the project has also allocated an equivalent amount for compensatory afforestation and CAT. The Pandoh dam provides yet another clear case of heavy siltation. This is also evident in BBMB's Dehar powerhouse in Slapper (which is a run of the river model), where the machines need to be opened up and thoroughly cleaned to remove silt every three years. Quartz particles in the sediment damage stainless steel parts, which then need to be replaced. This is a high recurrent cost that BBMB has to incur on a regular basis. Though there is generally a positive perception about the role of forests in upstream areas in reducing siltation, if this can be proven conclusively, the BBMB officials (and also other officials in the Larji project, Parbati project, etc.) agreed that they could consider making additional payments on a regular basis for upstream catchment protection services, potentially by diverting some of the funds currently allocated for desilting activities. BBMB has now established monitoring centres at different points to maintain a log of water and silt inflows. These can be good starting platform for further scientific studies<sup>41</sup>.

Another important watershed protection service that is received by hydropower projects, though mostly by the 'run of the river' and the small micro hydel projects, is that of water flow regulation. As mentioned earlier, in the analysis of the micro and meso levels, a number of springs and

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<sup>41</sup> A point to keep in mind here is the fact that there is a natural silt flow (with seasonal variations) in the two rivers - Beas and Sutlej - that are connected for power generation at Slapper. Apparently, the Sutlej is more dependent on snowmelt and the Beas on water from various macro-catchments. Therefore a ratio of the natural silt inflow to the preventable erosion would need to be computed. The Beas River, for the above-mentioned reason could possibly be a good site for this study.

smaller tributaries are gradually drying up in HP, and this is attributed, by some of the local people, to changes in climatic factors and the disappearance of forests. However, this must also be balanced by the fact that most of the major rivers in HP are snowfed, and it is therefore unclear as to what extent the quantity and quality of the water flows really depends on the presence of forest vegetation.

Some other ideas and opportunities for potential recurrent transactions also emerged from the discussions:

- Introduction of an environmental cess as part of the electricity tariff which could be ploughed back into watershed / catchment area protection. In such a case the end user of electricity would be paying for the environmental costs of power generation through the state electricity board. This cess would also generate revenue in perpetuity. However, the problems in implementing such a cess would be that it would further add to a number of hidden costs (such as the cost of infrastructure facilities, roads, staff housing, etc.) that are already included in the electricity tariffs and would make the hydropower sector further lose its competitiveness vis-à-vis thermal power plants, which are anyway favoured by industries.
- Transactions and payments between power houses: For example, according to the officials of BBMB at Slapper it has been estimated that the life of the Bhakra dam will increase by 18 years due to reduction of silt inflows as a result of the construction of the Kol Dam upstream which will now take up much of this sedimentation. This scenario portends the possibility of 'cap-and-trade' type transactions taking place between powerhouses themselves, wherein the Bhakra dam makes payments to the Kol dam or contributes to its CAT costs.

#### Forests and Urban Water Supply

In addition to the hydropower sector, another major macro-level downstream beneficiary of watershed protection activities carried out upstream are the municipal water supply agencies of urban centres and the various people who live therein. Two such cases where a direct link between forest / catchment protection and water shed services to urban areas can be seen in HP are in Shimla and Dharamsala/ McLeodGanj respectively. Currently there are no market-based payments in place for catchment protection services in either of these places. Indeed there are no payments taking place at all for these services, and the HP Forest Department and local communities living upstream are essentially providing these services for free. However, there is a significant potential, and a definite desirability of developing payments for the same that can



place an adequate value for the services that these catchments provide to these urban, and considerably richer, downstream beneficiaries.

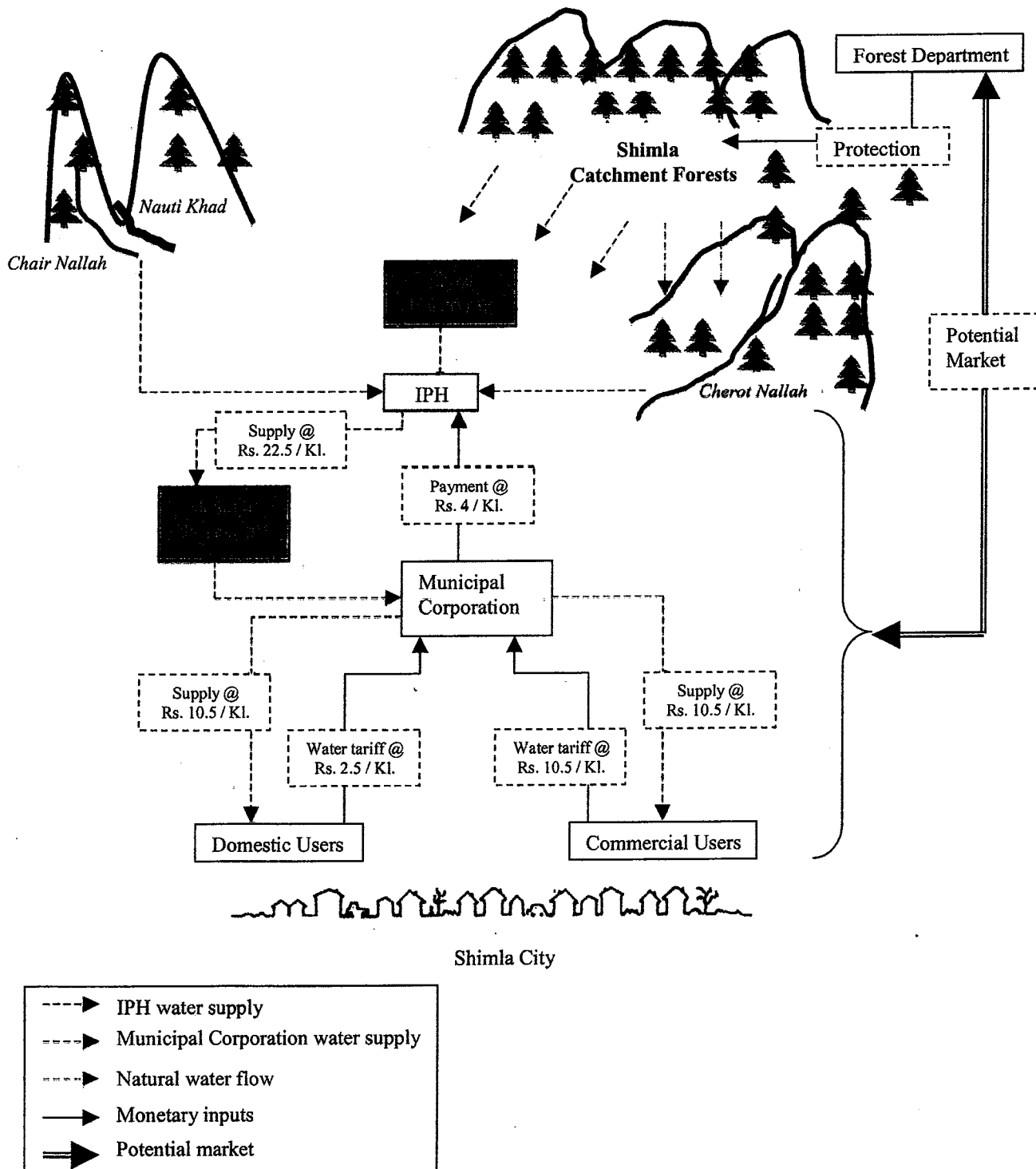
### *The Case of Shimla Catchment Forests:*

The forest catchment from which the drinking and domestic water supply of the capital city of Shimla is drawn is a real life example proving the direct link between catchment area/ forest protection and water supply. The Shimla Catchment Forests are a compact block of forests lying 8 kilometres to the east of Shimla in the mountainous tract descending from Kufri to the Giri River. The total area of the catchment forest is 1,015.02 hectares. It is predominantly a temperate coniferous forest dominated by young deodar (*Cedrus deodara*) with varying proportions of Mohru Oak (*Quercus dilatata*), blue pine (*Pinus wallichiana*) and the Spruce (*Picea smithiana*).

These forests are being managed in the classical 'old style' regulatory manner even today. The forest area had been leased in perpetuity by the British Government from the *Rana of Koti* on behalf of the Shimla Municipal Committee in 1878 and 1891 and all local people who had rights within this forest had been divested of their rights at that time itself. In 1952, the area was declared as a protected forest and more recently in 1982 as a Wildlife Sanctuary by the Government of HP and is managed under the Indian Forest Act, 1927 and the Wild Life Protection Act, 1972. Thus, the Shimla Catchment Forest is free of any habitation and consequently from all biotic pressures. No felling or subsidiary operations are carried out and uprooted/ fallen trees are left to add to the biomass of the forest. Thus, no specific and regular protection or conservation activities are undertaken in these forests and the only recurrent cost incurred by the Forest Department is that of the deploying four forest guards.

The main and original source of water supply to Shimla town is from the Seog Reservoir and Cherot nallah (stream), which are both located in the upper catchment forests (see Figure 3). Water from these sources is collected through piped gravity schemes by the IPH Department and is brought to the main collection point in the Dhalli Reservoir. Originally this water supply to the Dhalli Reservoir was meant to support a population of 16,000 people, but over the years, as the population in Shimla has increased (to approximately 110,000), the supply to the reservoir has been augmented by lifting water from the Chair nallah and the Nauti Khad, which are fed by the Sutlej catchment, as well. More recently, since 1992, water is also being tapped from the Ashwani Khad that is fed by multiple catchments. This water however does not go into the Dhalli Reservoir but is pumped directly to the newer sections and satellite towns of Shimla City.

**Figure 3. Pictorial Representation of the Shimla Catchment Forests**



While the IPH Department is responsible for the supply of water up to the main collection point at Dhalli, beyond this point it is the responsibility of the Shimla Municipal Corporation to look after the supply and maintenance of piped water distribution within the city. Water supply in Shimla is highly subsidized. The total cost incurred by the IPH Department for supplying water up to Dhalli is Rs.22.50 / 1000lts. The cost that the Shimla Municipal Corporation incurs is Rs.10.50/ 1000 lts with Rs. 4 going to the IPH and Rs. 6.50 towards distribution costs. However, the domestic consumer in Shimla pays only Rs. 2.50 / 1000 lts, hence receiving a subsidy of almost 96%. On the other hand, the Municipal Corporation is able to recover the full cost from commercial establishments who pay at the rate of Rs. 10.50/ 1000 lts. Nonetheless, if we include the costs incurred by the IPH Department, commercial consumers too receive a subsidy of approximately 47%. As of yet, there are no monetary, or other, transactions taking place between the Shimla Municipal Corporation and the Forest Department.

In the first analysis it may appear that the potential for putting in place any market like arrangement/ payment for catchment protection is non-existent as the forests supplying water to Shimla come under the category of reserved forests where local communities do not have any rights. In fact, there are no local communities in the Shimla Catchment Forests. However, it must be noted that given the clear linkage between the forests and water supply, it is highly desirable that the people and commercial establishments in Shimla recognise the value of these catchment forests and make an appropriate payment for their continued protection and improved management. For example, increasing water tariffs and using the additional revenue for catchment treatment and forest protection, by developing a mechanism between the Municipal Corporation of Shimla and the Forest Department, is certainly a possible option that needs to be explored further.

### ***The Case of the Dharamsala Catchments:***

The forests of the Dharamsala catchment are another example of the link between forest protection (by the Forest Department) and watershed services accruing to an urban settlement located downstream. Two watershed protection services - water supply and landslide prevention - are discussed here.

The water supply in Dharamsala is met from the *Bhater* and *Charan Khads*<sup>42</sup>, which originate in the *Ilka* and *Triund* watersheds respectively (see Figure 4). The responsibility for tapping storing and supplying this water to the final consumers lies with the IPH Department. Rural areas are charged Rs.10 per tap per month and urban areas Rs. 40 per tap per month. In Dharamsala town

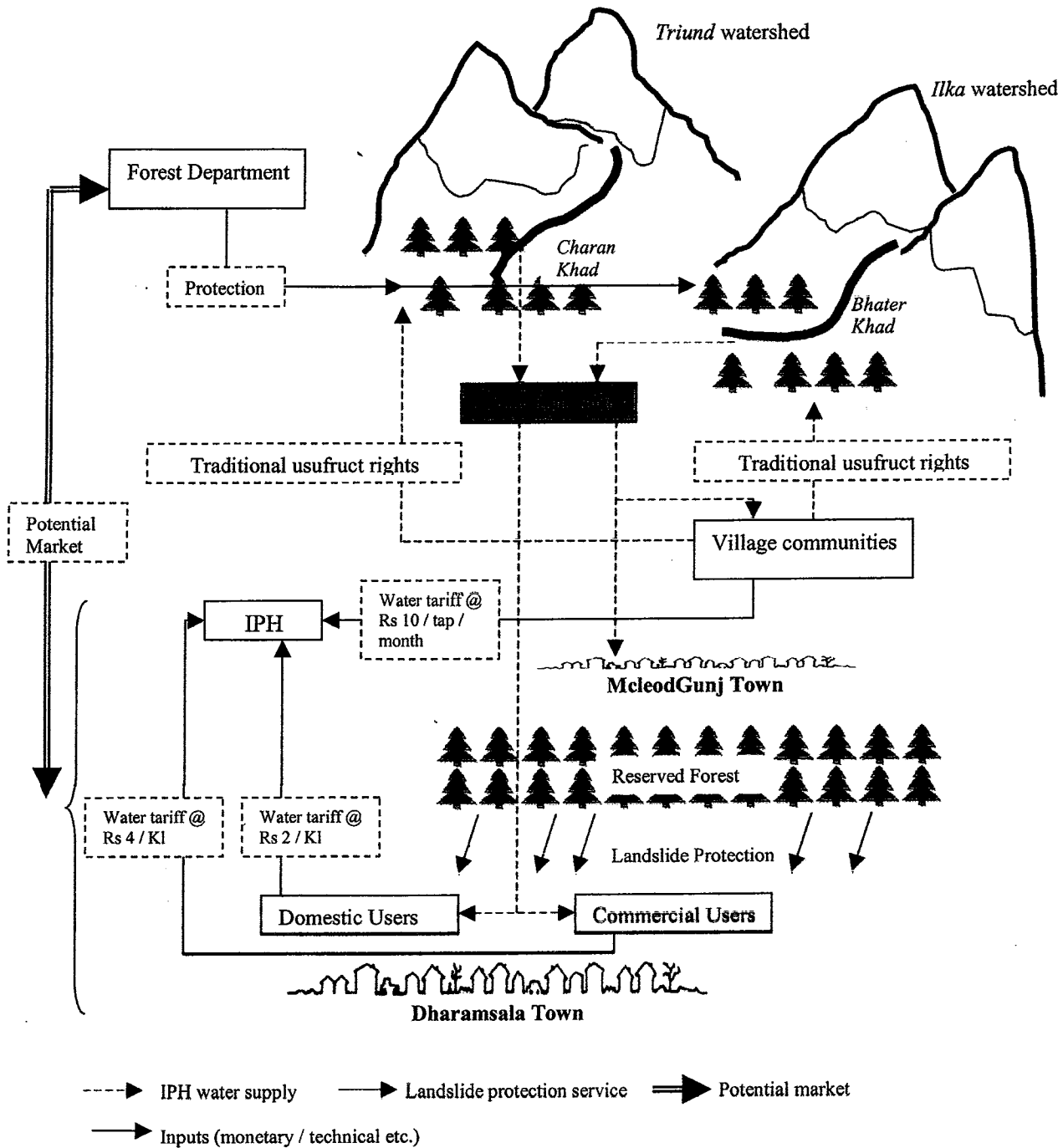
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<sup>42</sup> A *khad* is a main drainage line.

itself, domestic metered water supply users have to pay Rs.2 per 1000 litres and commercial users Rs. 4 per 1000 litres. As in the case of Shimla, water supply here too is highly subsidized with the actual beneficiaries not contributing anything to the cost of maintaining and protecting the catchment areas. A part of the watersheds that supply water to Dharamsala comprise forests consisting predominantly of *Kharsoo* oak and, in lower areas, *Baan* oak. It is generally believed that oak forests are good for water retention and augmentation. However, unlike the Shimla catchment, a large part of water supply to Dharamsala is dependent on melting snow rather than sources from within the forested areas. Over the years the snow line in the area has been gradually receding. It would therefore be interesting to see to what extent the presence or absence of forests has an impact on the microclimate of the area and on water flows. As of now, the people of Dharamsala do not make any contributions/payments for the protection of these watershed forests. A number of nomadic pastoralists, *Gaddis*, have traditional seasonal grazing rights in these forest lands and depend on them for their livelihoods. But if it can be shown that forests play a key role in supplying water supply to the town, a good case can be built for developing market-based systems between the Municipal Corporation/ people of Dharamsala and the nomadic graziers in the forests upstream.

Along with water supply from forested areas, there exists another example of a different watershed protection service in Dharamsala. Between upper Dharamsala (McLeod Ganj) and lower (main) Dharamsala town there is a tract of about 141 hectares of reserved forest, which is a man-made plantation done on private lands by the Forest Department during the British Raj. While this forest is not a part of the catchment supplying water to Dharamsala town, this land was acquired and forested with the specific purpose of preventing landslides in Dharamsala town. As of today, the people of Dharamsala are not making any contribution for the protection of these forests. Therefore, here again there exists a potential of developing a market-like mechanism between the Municipal Corporation/ people of Dharamsala and the Forest Division for maintaining this forest tract. Being a reserved forest, there is not so much pressure on these forests from the rural community, but wherever there is such dependence, adequate payment mechanisms can also be considered for them to improve their livelihoods.

**Figure 4. Pictorial Representation of the Dharamsala Catchments**



## Constraints for Development of Market-based Mechanisms at the Macro-level

It is clear that both the hydropower sector as well as urban towns such as Shimla and Dharamsala located downstream derive substantial benefits from watershed protection activities that are undertaken upstream. It is also clear that under the current system while no payments are made by the downstream towns at all in return for the watershed services that they get, there are several problems with the payments that are made by the hydropower projects. Therefore there certainly appears to be a role of market-based mechanisms in improving the existing system. Further, in cases where poor communities depend on and manage these upstream forests, such mechanisms can even lead to substantial livelihood improvements. However, the constraints that are in the way need to be taken note of as well.

### **Box 8: Perceptions of various stakeholders on the forest-hydrology linkages**

**Rural communities:** there is an awareness of the linkages between forests and water in the minds of villagers. The cases of Anji (Box 4), Mansar (Box 5) and Bhodi-Ropri (HP Diagnostic) validate this

**HPFD:** Senior officers of the forest department iterated the need to recognise the role of forests in water retention and conservation. They stated that forestry activities should be undertaken keeping in mind the important role played by forests in the hydrological cycle.

**Executive Engineer, Larji Project:** Afforestation and catchment area treatment (upstream) does not necessarily mean that the water (available) for a particular dam increases because majority of the flow in most cases is due to snowmelt. However, it reduces silt inflow.

**BBMB officials:** were willing to consider some kind of compensatory mechanism to upstream communities if the forest-hydrology linkage could be scientifically proven.

For instance, even if the hydropower companies/ municipal corporations do agree to make these payments for watershed protection services, how much would they pay for these services and who would they make these payments to (the local Forest Division or local communities) is still very uncertain. Also, how would they regulate and monitor these payments? For example, even if they were to make payments directly to the poor and rural communities living in and around the upstream forest areas how would they differentiate between the people who are actually protecting the forests and those who are not? One major concern therefore is that such a system could be very difficult to control and verify. There is a need therefore, if any market mechanism is to work for the development of a transparent and accountable institutional mechanism which ensures that money is actually put towards catchment protection / treatment.

Another point that was brought up was that some of the problems such as siltation, water flow regulation, landslides, etc. are also caused by other non-forest non-human related natural factors such as climate, terrain, slope, geology, rainfall, glacier movement, etc. and very little can

actually be done about these. This is especially more so in the case of HP, where due to the fractured geology of the land, perceived linkages between forests and water may required to be scientifically validated before the macro-level beneficiaries are willing to make payments for them.

Further, getting beneficiaries to pay more for the watershed services can prove to be a hurdle unless more awareness is created first about the relationship between forests and the downstream watershed services that they provide in the both the public and political domain to increase willingness to pay levels for this purpose. There would also be a need to demonstrate the linkage between forest protection and downstream watershed services in quantifiable and noticeable improvements in these services. Such payments would also entail the removal of subsidies, which is also a contentious political issue in India and can act as a constraint towards establishing payment mechanisms for watershed protection services.

However, the potential for developing market-based payment mechanisms for watershed protection services and for improving the livelihoods of the poor is definitely far higher, and more desirable, at the macro level than at the micro and meso levels, through the latter too can provide useful lessons. Transactions, although limited in nature and governed by statutes, are already taking place in HP at the macro level. However, there are many problems with these and market-based mechanisms may provide a better alternative to them. There are however, a number of gaps in knowledge that will require to be addressed before such payment mechanisms can be actually implemented on the ground. A number of such areas have therefore been identified in the case of HP where more research is required and these have been presented in the Chapter 5 of the report.

## Chapter 4

### A Diagnostic of Madhya Pradesh

#### 4.1 Rationale for selecting Madhya Pradesh

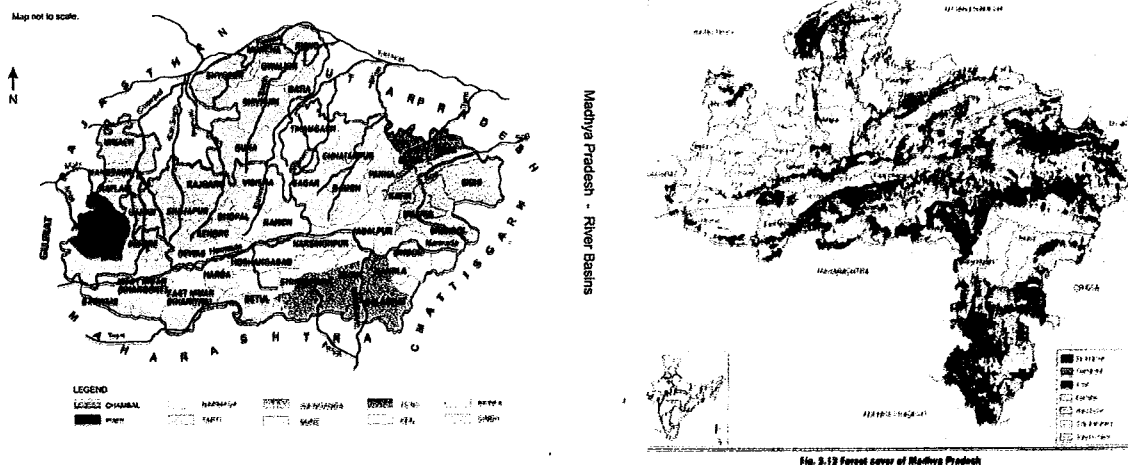
In addition to Himachal Pradesh, a diagnostic to explore the potential of using market-based approaches for providing watershed protection services to downstream beneficiaries was also undertaken in the central Indian state of Madhya Pradesh (MP). It was felt that doing the scoping work in two states located in different parts of India having different physical and socio-economic settings would enable a much better and more complete understanding of the topic rather than by focusing on one state alone. Also covering two different states meant that the initial assumptions and findings from each state would be subject to more rigorous scrutiny to discern those characteristics having general applicability throughout the country from those that are more specific to a particular state. Further scoping two states located in different parts of India would offer much greater learning opportunities and better insights into the applicability and desirability of market-based mechanisms at a wider scale.

Some of the key characteristics that made MP especially suitable for undertaking this scoping study were the following:

- MP is the second largest Indian state in size with an area of 308,000 sq. kms. having a population of about 60 million (Census 2001) which comprises an amalgam of numerous and diverse communities. With varying rainfall distribution patterns and 12 different agro-climatic zones, the state offers a whole range of socio-economic and natural resource situations that is, in many ways, representative of India itself.
- Physically and topographically too, MP offers a geography of both plains and undulating landscapes. Large parts of the state lie in the upper watershed regions and all the rivers of MP in fact originate in these upland regions itself. MP also forms the major part of the highlands of central India, including the upper catchment areas of its five principal river systems: the Yamuna, Ganga, Mahanadi, Godavari and the Narmada, all of which flow, not only to downstream regions within the state, but also into the bordering states of Uttar Pradesh, Chhattisgarh, Maharashtra, Gujarat and Rajasthan, making it a highly relevant upstream state that provides watershed protection services to other downstream states.



- More significantly, 35% of the total geographical area of the MP, or 15.4 million ha, is legally forest land<sup>43</sup> (FSI, 1997), which is the largest of any state in the country. Most of these forest areas are located in the upper watershed catchments, with almost all the main rivers of MP and their tributaries (for example the Narmada) originating from in and around forests, unlike the case of HP, where the major rivers are mainly snow fed.
- MP has long been recognised as a BIMARU (or *sick*) state - along with states such as Bihar, Rajasthan and UP - for its limited achievements on the human development front and its high incidence of poverty<sup>44</sup>. Over three-fourths of the working population of MP, including almost 90 percent in rural areas, is engaged in primary sector activities including agriculture and agricultural labour. There is a very high livelihood dependence of these rural communities, and of their substantial livestock populations, on forests, which creates tremendous pressure on the state's natural resource base. Furthermore, MP has the highest tribal population of India comprising 23.27% of its total population, and of the 45 districts of MP, 14 forest-rich districts have a tribal population of almost 80 percent. Thus if one overlays the forestry map, the drainage map, and the poverty map in MP, a high positive correlation can be noted among all these three different factors, which makes it in many ways ideal from the point of view of this study.



- There is also a great deal of focus on water issues at present in MP, since over the last few years water scarcity is rapidly becoming a major problem in the state and people are beginning to slowly realise the value of water. At least one part of the state invariably experiences drought every year. Irrigation infrastructure is poorly developed and several parts of the state show severe overexploitation of groundwater

<sup>43</sup> However, actual forest cover constitutes only around 13.1 million ha or 29.73% of the geographic area (FSI, 1999)

<sup>44</sup> The state is one of the poorest in the country, with an estimated 37 percent of the population below the officially accepted 'poverty line', as against 26 percent for the country as a whole (MPHDR, 2002).

(ODI/TARU Study, 2002). There is consequently, a growing realisation among policy makers and the state government of the need to undertake integrated land and water management in the state. This is evident, for example, in the fact that an Integrated Water Resource Management Strategy (IWRMS) is currently being prepared for the MP State Government by the Halcrow Water Group under an ADB/DFID supported project<sup>45</sup>. The state government, which has made significant strides in decentralising governance and management of natural resources to local communities, is also beginning to show considerable interest in encouraging private sector participation especially in the water resources sector.

- MP has the largest watershed development programme in the country in the form of the Rajiv Gandhi Watershed Mission (RGWSM) involving rural communities all over the state. Likewise, in the case of forest management and irrigation management, there are a number of local level community-based institutions already in place as a result of the Joint Forest Management (JFM) and the Participatory Irrigation Management (PIM) programmes respectively.
- There are also a number of big and medium-size dam projects in MP, which cater to the irrigation and drinking water needs of the rural and urban populations of the state. The Government of MP (GoMP) also sees substantial potential for developing Hydropower (HEP) projects in the state.

MP is thus a state where both upstream-downstream scenarios are widely available at various scales, starting from the micro and meso-watershed levels to the larger macro river-basin and inter-state levels, with different sets of downstream beneficiaries – landowning villagers, farmers in downstream command area villages, urban water supply agencies, reservoirs, wetlands, HEP projects, etc. Further, the hydrological linkage between the presence of forest vegetation in upstream catchment areas and the watershed services accruing to downstream beneficiaries (in terms of soil and water conservation, silt control, flood and landslide prevention, water quality and quantity regulation, wetland maintenance, etc.) is much clearer, and easier to establish, in MP, as compared to the snow fed Himalayan rivers in HP. Most importantly, MP offers a scenario wherein the providers of such watershed services are not just the state forest department alone, which legally owns the forests, but rather poor rural communities and marginalised tribals as well who depend heavily on these upstream forests to sustain their daily livelihoods, and who, through programmes like JFM and the RGWSM, have in recent years, been actively protecting these forests in a participatory and sustainable manner. All these characteristics hence offer an ideal

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<sup>45</sup> This diagnostic of MP draws extensively from the recent findings of this project especially in the stakeholder mapping and policy environment sections, where Halcrow Water has carried out a detailed analysis of the same.

setting for exploring the potential of developing market-based or market-like mechanisms for watershed protection services for improved livelihoods.

#### **4.2 Watershed Protection in MP: History and Programmes**

Historically watershed development in MP dates back to the 1950s. MP was one of the states chosen immediately after Independence for centrally sponsored programmes for the River Valley Project (RVP) and ravine reclamation. As in many tropical and sub-tropical environments, MP has suffered large-scale deforestation, mostly from the 1960s onwards as a result of growing pressures from rapidly increasing human and livestock populations. This deforestation has had severe effects on ecosystems, climate and populations, with several parts of the state suffering from widespread soil erosion, overgrazing and inappropriate land use, that have resulted in barren landscapes. Districts experiencing particular damage are those in the western part of MP, where rainfall is less and the monsoon less dependable. To counter this problem of land degradation various watershed development programmes such as the Drought Prone Area programme (DPAP), Integrated Watershed Development Programme (IWDP) and National Watershed Development Project for Rain-fed Areas (NWDPRA) have, like in the rest of India, also been initiated in MP by the Department of Rural Development (DoRD) and the Department of Agriculture (DoA) respectively. Till the 1990s, these programmes were taken up as departmental works and programme activities typically concentrated on constructing structures to arrest soil erosion, water harvesting and reducing biotic pressure to enhance land productivity. However, as elsewhere, much of the watershed development work in MP too was done on a piecemeal basis with very little inter-departmental co-ordination and limited community participation, which led to many of these programmes being only partly successful in meeting their objectives (TARU/Sanket, 2001, ODI/TARU, 2002).

To resolve some of these problems, and drawing on the national watershed guidelines of 1994, the MP State Government, using the Department of Rural Development as the nodal agency, launched the Rajiv Gandhi Watershed Mission (RGWSM) in 1994 to lend fresh impetus and focus on watershed development in MP. Reflecting the state government's decision to undertake watershed intervention in a 'mission mode' to combine concerns of poverty reduction and environmental regeneration through integrated and 'people-centred' watershed management, the RGWSM pooled together all available sectoral funds under the DPAP, NWDPRA, IWDP and 50 percent of the funds available under the EAS and combined the various watershed development programmes that were being run separately by the different line departments in MP. By focusing action on degraded areas and dry land areas, the RGWSM's primary aim was to build environmental and livelihood security in an integrated manner to improve agricultural production

and rural incomes. Further, the RGWSM aimed to maximize people's participation in planning, implementation and maintenance of soil and water conservation activities in the watershed area and bring about equitable distribution of resources and sharing of benefits to improve the lives of disadvantaged communities. The RGWSM is currently operational in all districts of MP and with a coverage of nearly 35 lakh hectares and 7600 villages, making it the largest watershed development programme in India today. The arrangements, procedures and processes adopted in the RGWSM mark a reversal from the 'regulatory' system of management in the past and reflect instead a participatory bottom-up approach in which communities exercise control over programme activities at each stage, with government and non-government agencies, working as PIAs, playing catalysing, facilitating and coordinating roles. However, a comprehensive evaluation study of 58 project villages of the RGWSM spread over 30 milli-watersheds<sup>46</sup> and 13 districts spread across 12 major agro-ecological zones of undivided Madhya Pradesh that was recently carried out revealed that environmental and livelihood-related impacts have been generally limited in scale even though there have been significant improvements in the same both at the village and household levels (TARU/Sanket, 2001).

Apart from the RGWSM, other programmes like the *Pani Roko Abhayan* and Joint Forest Management (JFM) are also other initiatives launched for watershed protection in MP. JFM especially, which has been undertaken by the Forest Department in MP since 1991 to involve the local communities in the management and development of forest resources of the state, is a major watershed protection activity in the state and accounts for about 44% of the total forest area in the state<sup>47</sup>. These communities, which are arguably the poorest and most marginalised people in MP, are together with the MP Forest Department currently managing about 5.80 million ha of forest area in the state through approximately 12,000 Forest Protection Committees/ Villages Forest Committees (FSI, 1999)<sup>48</sup>. They are hence primary providers of watershed protection services to all beneficiaries located downstream.

However, the main motivation of these poor communities to participate in forest protection activities is the direct benefits that they receive in return for protection and as of now there are no payments being made to them (or to the Forest Department) for any of the watershed protection services that they provide. Hence, their own incentives to participate in JFM are the rights to collect fuelwood, fodder and NTFPs free of cost, 100% of the net value of all forest produce obtained from plantations/ degraded forests, 10% of the net value of forest produce obtained from

<sup>46</sup> A milli-watershed covers approximately 5000 – 10000 ha and is subdivided into micro-watersheds (approx. 500 ha each)

<sup>47</sup> JFM in MP has also received considerable support from the World Bank under the MP Forestry Project

<sup>48</sup> In the post-reorganisation scenario, where a new state Chhatisgarh has been created in the year 2000, the total number has reduced to 10,443 FPCs protecting 4.3 million ha under JFM (MoEF, 2002)

final felling of timber coupes and 20% of the value of forest produce obtained from the final felling of bamboo coupes in well-stocked forests (JFM Resolution, 2001). Like elsewhere in the country, in MP too forests are facing immense biotic pressures in terms of unsustainable collection of fodder, fuelwood, NTFPs, illegal logging, encroachments etc. as a result of the large human and livestock population that depends on these resources for survival, and JFM is being implemented with the hope that providing incentives to local communities will help reverse this trend.

#### **4.3 Stakeholders involved in Watershed Protection and Development in MP**

Water is rapidly emerging as a major development issue in MP. The economy of the state is highly dependent on water not only as a direct natural resource, but also indirectly in that the effects of limited access to water, or poor water quality reduce the productivity and economic well-being of all the people in MP, especially the poorest sections. Given that there is a common perception in the state that links the growing scarcity of water to forest degradation and, more widely, to climate change, various stakeholders who benefit directly or indirectly from water thus have a stake in the protection of the watershed/ catchment areas as well. The main stakeholder groups are as follows:

*Forest Department and Local Upstream Communities:* The MP Forest Department and the forest dwelling and forest dependent communities involved in protecting forests under JFM are the primary watershed protection service providers in MP. However, other communities and agencies participating in watershed development activities in the state, such as rural farmers involved in agriculture and government agencies like the RGWSM, are also important watershed service providers from the point of view of the larger macro-level downstream beneficiaries. The latter however, are also *on-site* users or beneficiaries of these services in the sense that watershed protection and treatment activities in areas above agricultural lands, either in forests or otherwise, have numerous direct impacts in terms of improved agricultural productivity, increasing water availability for irrigation, etc. Watershed protection services are however widely used by a range of other *off-site* downstream beneficiaries as well for a variety of purposes as seen below.

*Water Supply and Sanitation:* Most of MP is covered by some sort of facility intended to provide safe and relatively accessible drinking water. These include: 356,000 hand pumps intended to supply 40 lcd<sup>49</sup> to 123,000 settlements; and 5,850 piped supply, mostly from tubewells to all villages having a population greater than 2000. However, of these, 43,000 tubewells and 850 piped systems are considered inoperable as a result of water table drawdown due to uncontrolled

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<sup>49</sup> Litres per capita per day

irrigation abstraction; poor maintenance; inadequate recurring cost recovery; increasing saline contamination of the aquifers and normal wear and tear (Halcrow/ADB, 2003). The Public Health and Engineering Department (PHED) is the main government agency responsible for drinking water supply and sanitation. It procures water from the Water Resources Department (WRD) on a bulk delivery system, for distribution to the urban centres. As the main agency in charge of water issues in the state, the WRD also acts as a price setter and regulator<sup>50</sup>. Rural water supply demand is usually met through local resources. Only about 35% of MP's urban population has access to treated piped water supply through house connections or public stand-posts. The rest rely on handpumps, shallow wells or surface water sources. Numerous problems exist with the supply and distribution of water in the cities and include low pressure, leakage, waste from public standposts; and unauthorised tapping of water mains. In some cases like in Bhopal, as will be subsequently discussed in detail, a major problem facing urban water supply is also the siltation and eutrophication of major water sources such as reservoirs and wetlands due to bad land use practices in upstream catchment areas.

*Agriculture and Irrigation:* As mentioned above, agriculture, which provides employment to nearly 80% of the population in MP and contributes around 35% to the state's GDP, is also an important user of water resources (Halcrow/ADB, 2003). In fact, despite widespread rainfed practices during and immediately after the monsoon, agriculture in MP is significantly dependent on irrigation and alone accounts for around 90% of all water use in the state (ibid). Hence it is not surprising that much of the watershed development programmes and activities in MP focus on benefits at the local rural level, rather than on larger macro-level upstream-downstream scenarios. However, a significant area under the upper catchment regions has been bypassed, as large-scale irrigation projects are feasible only in the middle and lower parts of basins. Irrigation facilities are thus confined mainly to low lands owned predominantly by the more affluent farmers. Irrigation water is abstracted from both surface and groundwater sources. Irrigation technology in MP ranges from traditional water harvesting systems to modern drip systems and includes flood, furrow and sprinkler systems; with schemes being found in both the private and public sectors. Public sector schemes tend to be dilapidated and approximately 45% under-utilised (Halcrow/ADB, 2003). Various reasons have been cited for this, including: inadequate maintenance leading to degraded facilities; low levels of participation in operation and maintenance; ineffective initial designs and limited to nil remedial follow up; excessive abstraction in the upstream portions of the distribution systems; waterlogging and salinisation/sodification; and, unreliable power supplies. Typical schemes are also inefficient in terms of water use at both scheme and basin levels and typified by inequitable and anarchistic water

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<sup>50</sup> It is also perceived as being overstaffed, with establishment costs utilizing most of its funding (Halcrow/ADB, 2003)

distribution. Groundwater abstraction is not subject to any rules at all (at least not until recently with the introduction of a draft regulatory framework<sup>51</sup>). As a result, groundwater is being mined at alarming rates in over some 75% of the State while rising in the rest due to waterlogging<sup>52</sup>. These therefore constitute a major challenge for water resources in MP.

*Hydropower:* The hydropower sector is another important user of watershed services in MP. Given the increasing agricultural and rural demand for power in MP, the hydel potential in MP is substantial and a number of projects have been identified for this purpose in the state. Hydropower is also used to cover thermal shortfalls during routine maintenance of thermal stations in MP and therefore has sustainability implications for the entire energy sector of the state as a whole. The current hydropower generation status in the state is given in Table 3.

Table 3: Hydel Power Generation in Madhya Pradesh					
Name of Project	Installed Capacity (MW)	MP share (MW)	Name of Project	Installed Capacity (MW)	MP Share (MW)
Gandhi Sagar	115	57.5	Bargi	90	90
Rana Pratap Sagar	172	86	Bir Surajpur	20	20
Jawahar Sagar	99	49.5	Bansagar	315	315
Pench	160	107	Rajghat	45	22.5
Bansagar (Deolore)	40	40	<b>TOTAL</b>	<b>1056</b>	<b>787.5</b>

*Industry:* The current industrial demand for water is small. Most small-scale industries have their own ground water resources and recycle and reuse water. In major and medium industries, the outflow of water is reputedly treated either for use in the same factory/plant or used for irrigation purposes. However, it is worth noting that industrial water charges in MP are highly subsidised being charged at only Rs 1 per cubic metre<sup>53</sup>.

*Fisheries and Other Uses:* Along with Chhattisgarh, Madhya Pradesh contributes about 5% of the total freshwater fish in India<sup>54</sup>. There is nonetheless significant potential for increasing the production of fish in the state. While the present production (1999-2000 figures) is at 127,429 metric tonnes, the target was set at 130,000 metric tonnes (ibid). Apart from fishing, there are also a number of sites of tourist and recreational interest on the existing water systems and

<sup>51</sup> Draft Bill to Regulate and Control the Development of Groundwater; GOMP 1999

<sup>52</sup> Environmental Status Report, EPCO, 2000

<sup>53</sup> A survey of industrial water tariffs in some 20 widely distributed countries suggests that average water charges are around Rs. 62 per m<sup>3</sup> (Halcrow/ADB, 2003)

<sup>54</sup> Environmental Status Report, EPCO, 2000

wetlands in MP. However, both fisheries and tourism can be adversely affected by increased siltation, eutrophication, reduced waters flows, etc. as a result of poor land use practices in upstream areas and therefore have an important stake as well in watershed protection activities undertaken upstream.

*Downstream States:* An important class of watershed beneficiaries and water users are those states that are located downstream from MP and benefit from its forests and rivers. Five riparian states - Gujarat, Rajasthan, Uttar Pradesh, Chhattisgarh and Maharashtra - are thus stakeholders in watershed protection activities in MP. Some formal linkages do exist between these states as in the case of the Narmada Control Authority or the Intra State Control Boards of various basin projects, but the strength of these linkages varies. The National Water Policy of 2002 has acknowledged problems in this area and has noted that the Inter-state Water Disputes Act 1956 may be "suitably reviewed and amended for timely adjudication of water disputes".

#### **4.4 Current System of Interaction between Stakeholders and Policy Environment**

Recognising the need for having an apex coordinating body in the water sector for regulating and managing water resources in the state, the State Level Committee on Utilisation of Water Resources (SLCUWR) was established in 1973. The Chief Secretary chairs this committee and members include the Secretaries of the Revenue, Industries, Public Health Engineering Departments (PHED), Major Projects Control Board Secretaries, and the Chief Engineers of the Water Resources Department (WRD) and of the major river basins and projects. The Committee vets requests for water supplies *inter alia* from industries, irrigation, the power sector, cooperatives, housing projects and municipalities. These requests are first submitted to District Water Utilisation Committees and Departmental Engineers, and on approval, are sent to the State Level Committee. Approvals are usually accompanied by directives that users would bear all the costs of bringing water to the project sites, water charges and caveats reducing supply quantities if needed for drinking water or other purposes. However, even though the SLCUWR has direct linkages with most major users it meets infrequently and hence approvals are often delayed. Also surprisingly, the WRD, the lead department in charge of water resources in MP has no direct linkages with many of the water users (e.g. tourism), except indirectly through the SLCUWR. Government departments in general seem unaware of each other's plans and activities in the water sector and there is no single source of information for users resulting in general consumer unhappiness with the levels and quality of public services (Halcrow/ADB, 2003).

Also, as of now, there is no representative from the State Electricity Board in the SLCUWR, nor are Rural Development or Forestry or Fisheries Departments represented. Though this reflects some of the institutional weaknesses present in MP with regard to the integrated management of

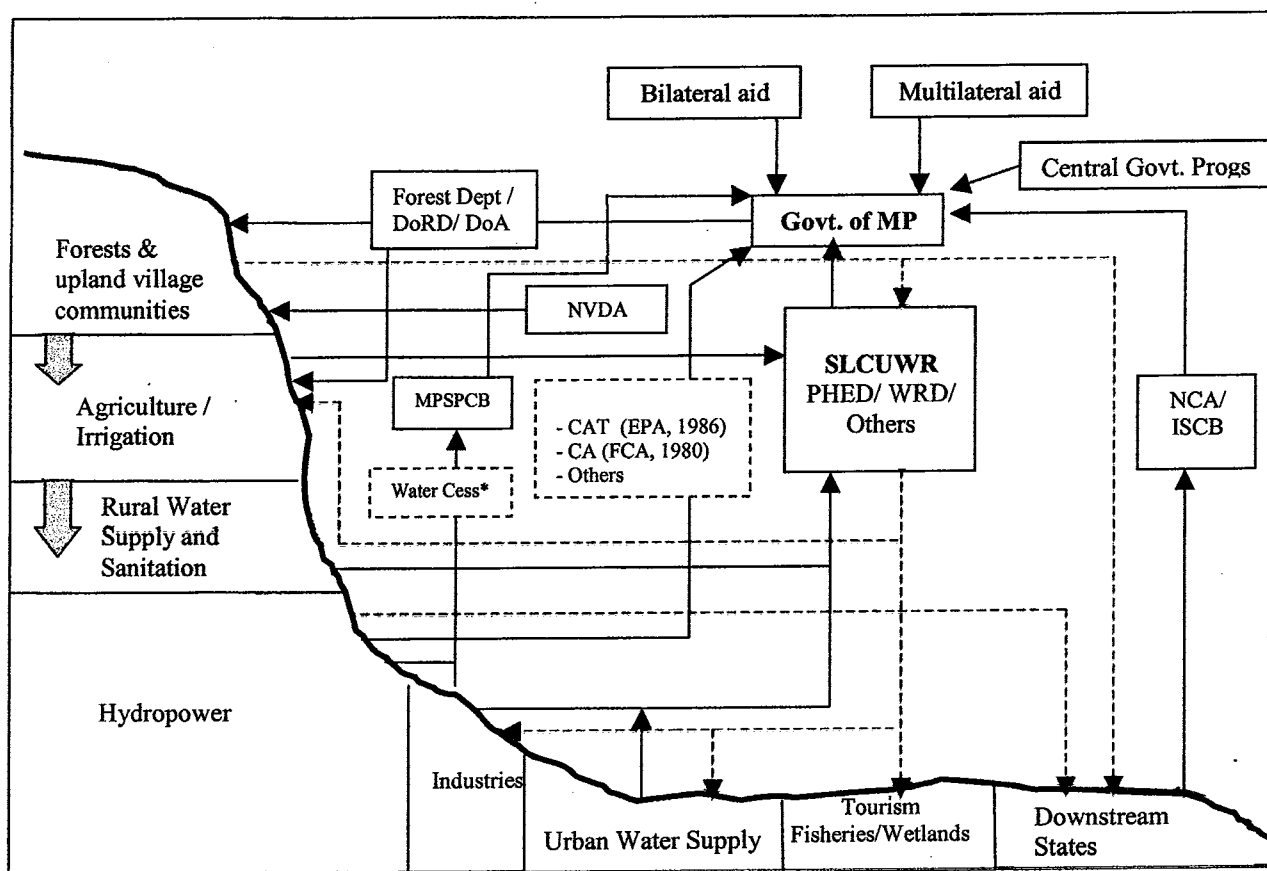


land and water resources, the absence of the Forestry and Rural Development departments may also be explained due to the fact that it is only recently that people, especially those living in rural areas, have started connecting the scarcity of water to the degradation of the forest ecosystem. Nonetheless, forestry in the state is still largely looked upon as an isolated activity existing independently of all other natural resources and is neither perceived conceptually and scientifically, nor legally and administratively, as one component in the totality of the natural resource base, with close inter-linkages with the use of other land and water resources (ODI/TARU, 2002). Though the RGWSM, following the national watershed development guidelines, do recognise that the administration of forest areas in MP is of direct relevance to watershed development in the state at the micro and meso levels by reason of the fact that as many as 30000 villages – 75 percent of the total villages MP – are located within 5 kilometres of forest areas, the awareness of the watershed protection services provided by forests are much more limited at the macro level, with hardly any interaction ever taking place between the most of the macro-level beneficiaries of watershed protection and the Forest Department.

The interactions that do take place are those that are mandated by legislation and regulations like in the rest of the country. For examples, the same laws that apply in the case of hydropower dam/mining/road/etc. projects in HP such as compensatory afforestation under FCA, 1980, catchment area treatment under EPA, 1986 and the water cess under the Water Cess Act, 1977 are equally applicable in MP as well and constitute the regulatory payments made for watershed protection in the state. Any other payment for watershed protection services between the larger macro-level beneficiaries, for example between the urban water supply agencies, wetland management authorities, etc. and the Forest Department/JFM communities are practically non-existent. Even in the case of the regulatory payments that do occur, like elsewhere in the country these are generally made to the state exchequer first from where they are reallocated to the Forest Department following an annual budgetary process, but never directly to the local communities. There is no guarantee that this money would even be spent in the area that is providing watershed services. For instance, the compulsory compensatory afforestation under the Forest (conservation) Act may be carried out in another area where state government is able to identify suitable land.

The nature of stakeholder interaction taking place with respect to the watershed protection services and the water cycle in general in MP is represented pictorially in Figure 5.

**Figure 5 - Diagram of Stakeholders in the Water Cycle of MP**



—→ Money flows .

- - - - -→ Water flows (supply)

→ Natural water flows

\* Currently under consideration for Hydropower projects

DoRD:	Department of Rural Development	PHED:	Public Health Engineering Department
MPSPCB:	Madhya Pradesh State Pollution Control Board	NCA/ISCB:	Narmada Control Authority/ Inter State Control Board
SLCUWR:	State Level Committee on Utilisation of Water Resources	CAT:	Catchment Area Treatment
NVDA:	Narmada Valley Development Authority	CA:	Compensatory Afforestation
WRD	Water Resources Department	DoA:	Agriculture Department
NCA	Narmada Control Authority	ISCB	Inter State Control Board

The policy environment governing forest management, watershed development and water resources management in MP is thus not very different from that in the rest of the country. One notable feature is that the shift from regulatory and centralised approaches of natural resource management and governance to a more participatory and bottom-up approach is much more advanced in MP as compared to many other states in India. In line with the recommendations of Central Government as promulgated in 1993, MP decentralised its civil administration along democratic lines by means of the 1994 Panchayat Raj Act which established a 3-tier system of civil administration, while allowing much development planning and indeed financing to be carried out at District level. Responsibility for the operation and maintenance of water sector assets as well as aspects of natural resource management are now being decentralised to civil society institutions many of which are being established for the purpose. Most significant among these have been the shift in the areas of participatory watershed development, JFM and participatory irrigation management. Although the feedback of these shifts, at least from the NGO community, is not discouraging, it is however too early to evaluate the success of these measures.

Some of these shifts from a regulatory to a participatory approach have market-like elements in them as well, with each of the policies and guidelines governing participatory forestry, watershed development and irrigation management calling on local communities and *on-site* beneficiaries, not only to share the benefits, but also contribute to the costs of these activities. Thus the 2001 JFM resolution in MP calls for 25% contribution of free labour in implementing activities listed in the microplan prepared by JFM villages and reinvesting up to 20% of the total amount received from final felling in forest development. Similarly, in the case of watershed development, farmers are expected to contribute to 10% of the total cost of watershed development activities. Likewise, important provisions of the Participatory Irrigation Management (PIM) Act, 1999 include transfer of powers from the state to farmers; right to raise funding resources; social and financial audits and equitable distribution.

Similarly in the Water Supply and Sanitation sector too, traditionally there has been little community or other stakeholder participation sector in the post-independence era in MP. Water supply systems were designed and constructed by the PHED according to established norms and design criteria, and operated and maintained by departmental staff. The advent of the Rajiv Gandhi National Drinking Water Mission however, is changing this "traditional" approach to the extent that its emphasis on community participation is engendering a gradual attitudinal change amongst departmental staff as regards community, and particularly, NGO participation (Halcrow/ADB, 2003). The Sector Reform Program of the Rajiv Gandhi National Drinking Water Mission (RGNDWM) is of particular interest. Launched in five districts (Gwalior, Sehore, Narsingpur, Hoshangabad and Raisen), the scheme provides for community inputs starting right

from the design stage of a water supply/sanitation system, including the choice and location of technology and infrastructure respectively. The community is expected to contribute 10% of capital costs and take responsibility for operation and maintenance.

However, there is no specific state Water Law in MP as such. Under the existing laws (M.P. Irrigation Act, 1931), all rights in the water of any river, natural stream or natural drainage channel, natural lake or other collection of water vests in the Government and is sovereign in character. The act is silent on the rights of users save for their right to enter into contracts with the state government for supply of water, and the fact that the act mentions that the state may administer and regulate water subject to the right of a riparian to get the customary quantity of water acquired prior to the date of notification, and should not inflict injury to riparian users or diminish the supply hitherto utilised. Individual usufructuary rights for surface water are unclear and there is no clear legislation and there is no system for providing secure, defensible and enforceable laws. Any attempt to secure such (even traditional) rights inevitably results in protracted litigation. Water trading rights and water markets, though they exist informally, have no legal basis and there is no formal, organised inter-sectoral trading. There is no restriction on the quantities of groundwater that can be extracted at present, bore well owners can extract as much water as they want to without thought to social or environmental issues. MP has also recently come out with a Draft State Water Policy that recognises the link between healthy ecosystems and sustainable economic development and consequently increases the emphasis given to the environmental and social consequences of water sector development. It recommends that water resources planning should be multi-purpose and include not only potable supply but also irrigation, flood control, hydroelectricity, boating, fisheries, afforestation and recreational use in an integrated manner. The draft policy further calls for a tariff system that prevents wastage, but at the same time also suggests subsidised rates for water uses that have environmental benefits. It also encourages increased private sector participation, especially with respect to supply of bulk water supplies. Other laws relevant to water resource management include the (draft) Ground Water Regulation Act<sup>55</sup>, the M.P. Fisheries Act, 1948 and MP Fisheries

<sup>55</sup> A draft bill to regulate and control the development of ground water was introduced in 1999. The State Assembly has not yet approved this. The draft bill includes the following provisions:

- Every existing user of ground water is to apply for a certificate of registration from the Gram Panchayat recognising existing use, quantity of water extracted, pump horse power, and total period of use.
- Any user of ground water desiring to sink a borewell shall apply to the Gram Panchayat/ Municipality for permission and may not proceed without a permit. This permit is not required for manual pumps or motorised pumps of 1Hp or less.

The owner of such bore wells has rights to the water but the Government levies the revenue derived from water from these sources at Rs. 0.30/cu.m. However, no limit has been placed over the abstraction of privately owned groundwater.

Development Act, 1979, and various pollution control Acts such as Water (Prevent and Control of Pollution) Act, 1975. Additionally, water resources are also managed through manuals, and rules including Public Works Department Manuals, M.P. Financial Code, Land Acquisition Act, M.P. Treasury Code, Pollution (Procedure for the Transaction of Business) Rules, etc. The notable feature in these laws and regulations is that they are generally concerned with quality and institutional issues and are silent on water management, conservation, rational pricing and wise use (Halcrow/ADB, 2003).

The Environmental Planning Coordination Organisation (EPCO), located in Bhopal, has also drafted a State Environment Policy on behalf of the Housing and Environment Department of MP in 1999, which emphasises the need to protect and conserve the natural environment to alleviate poverty and facilitate economic growth in an economy that is highly dependent on natural resources.

Current policy objectives also recognise the need to consolidate and build on successes to date while expanding the overall coverage of institutional reform and capacity strengthening initiatives in the context of the water sector in MP. To this end the steps that have been taken by the state government and are now being emphasised upon are summarised in Table 4.

Table 4: Key Policy Reform Steps taken by the MP State Government		
OBJECTIVE	STAKEHOLDER	RELEVANT PROTOCOL
• Enhanced cost recovery in the water sector by means of annual 5% increases in irrigation water tariffs;	• Water Resource Department	• Gazette Notification • No 431
• Increased democratisation of and gender participation in Joint Forest Management Committees;	• Forest Department	• Government Order • Serial No F16/4/91/10-2
• Increased private sector participation in water sector operations;	• Water Resources Department	• Economic Policy Thrust for Development
• Strengthening and autonomisation of cooperatives;	• Cooperative Department	• Economic Policy Thrust for Development
• The establishment of high quality and focussed agronomic research services with maximised private sector participation;	• Agriculture Department	• Economic Policy Thrust for Development
• Improved marketing arrangements and opportunities for high value agricultural and horticultural products.	• Agriculture Department	• Economic Policy Thrust for Development

Source: Halcrow/ADB, 2003

#### 4.5 Private Sector Participation in the Water Sector in MP

Notwithstanding the increasing acknowledgement in the official rhetoric of the opportunities that it supports private sector investment, private sector involvement in the water sector in MP remains limited at present and furthermore, current planning envisages only limited future roles (Halcrow/ADB, 2003). There is as yet no private sector participation in urban water supply and sanitation, and although there is some limited participation in the Rural Drinking Water sector it is largely limited to private domestic hand pumps and again planning for future involvement remains limited. Similarly, there is little private sector involvement in irrigation apart from informal water trading from tube well operators. Since the advent of tube-well irrigation, it has been observed that many farmers have abandoned earlier dug well irrigation sources and “upgraded” to tubewell sources. However, since not all the farmers are prosperous enough to own and operate their own tubewell and pumpsets, it has become a common practice now to share water from one source between several farmers (See Box 9). There are as yet no private service or bulk water suppliers for irrigation schemes although transfer of lift schemes has effectively privatised the operation of the pump stations involved. This has not been entirely successful as field observations indicate that private lift irrigation places a very heavy economic burden on the small and marginal farmers who become members of the schemes. The Power Sector is particularly interesting as there is evidence that private interests once attracted to a region’s power sector, can be attracted later to the water sector, perhaps as bulk suppliers or even as service fee collectors. However, apart from a 15MW windfarm near Dewas city, the private sector is only marginally involved in this sector. The State Government has tried to encourage entrepreneurs to participate in mini hydel projects but without much success, as private parties have not responded to tender opportunities, unlike in HP where private sector participation in the hydropower sector has been much stronger. The MP state government is also positive about private sector involvement in

##### **Box 9: Different Water Sharing Modalities in MP**

**Water shared as a free resource:** in some select instances it is not uncommon for a farmer with excess water at his disposal to share it with downstream farmers on the basis of friendship or familial obligations. Water is given freely in these cases and the provider does not expect anything in return.

**Water supplied on an hourly basis and charged as per usage:** in cases where crops which consume a lot of water are grown, such as wheat, the water provider levies an hourly charge for the water supplied on an hourly basis. Such charge ranges between Rs.50/- to Rs.100/- per hour.

**Water charges based on land holdings of the receiver:** In some cases, the water provider charges farmers using his water around Rs.30/- per bigha (approx  $\frac{1}{5}$  of a hectare).

**Water traded for shares in produce:** the most used method perhaps, is the barter system whereby a farmer providing water typically receives one-third of the final crop yield irrespective of the actual quantity of water delivered. This method is more popular because the receiver does not have to pay cash.

Source: Halcrow/ADB, 2003

urban infrastructure projects, especially in water supply and sanitation, but it is still at a very nascent stage as of now.

#### **4.6 Potential of using Market-based Approaches for providing Watershed Protection Services in MP**

The potential of developing market-based approaches for watershed protection services in MP, was examined, as in the case of HP, at three different levels - micro (within the village), meso (between upstream and downstream villages) and macro (between the larger beneficiaries such as hydropower projects and urban water supply agencies) respectively.

The RGWSM is the primary agency working in the area of watershed development and treatment at the micro and meso-levels in MP. The MP Forest Department too is a key player in the process since in many (if not most) of the cases where watershed development activities have been initiated by the RGWSM using an integrated 'ridge-to-valley' approach, the ridges have invariably been located in lands that are under the administrative control of the Forest Department<sup>56</sup>. Apart from this, the Forest Department has itself undertaken a lot of watershed protection and development work as part of its own activities all through out the state. Since the RGWSM is the main agency involved in watershed development programmes in MP at the local level, the scoping team visited some of its project villages in the Raisen District to examine the potential of market-like arrangements for watershed services at the micro and meso levels and also interacted with the local forest department officials.

At the macro-level, the potential of developing market-based payment mechanisms between larger urban downstream beneficiaries and the watershed protection service providers was discussed in detail with a number of agencies including not only the MP Forest Department but also agencies such as the Bhopal Municipal Corporation (BMC), the Narmada Valley Development Authority (NVDA) and the Bhoj Wetlands Project. Numerous discussions were also held with a number of non-governmental organizations such as Sanket, Centre for Advanced Research and Development (CARD), National Centre for Human Settlement and Environment (NCHSE), Samarthan, Eklavya, etc. and academic and scientific institutions such as the Indian Institute of Forest Management (IIFM), Water and Land Management Institute (WALMI), and Regional Research Laboratory (RRL), Bhopal, among others and details of the same have been provided in the Annex.

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<sup>56</sup> Following the watershed development guidelines, the RGWSM and the local people have undertaken treatment work in these cases in collaboration with the local forest division officials.

The main field site that was identified and visited at the macro-level was the catchment area of the Kolar Dam in Sehore District which supplies around 60% of the water received by Bhopal, the capital city of MP. Some of the other the catchment areas around the Bhoj Wetlands which supply the remaining 30-40% of Bhopal's water supply were also visited. The findings of the micro and meso levels are discussed first followed with those from the macro level. Both the potential and constraints for the development of markets from the point of view of improving watershed protection services and livelihoods of the poor have been considered in each case.

### **Findings from the Micro Level (Intra -village Transactions)**

Currently the only payment that is being made for watershed protection services at the micro intra-village level is the compulsory 10% contribution that all the user groups/project beneficiaries have to make, either in the form of cash or through free labour, to the cost of watershed treatment activities under the RGWSM project. This can be considered as a payment made by the project beneficiaries for the direct *on-site* watershed protection services that they receive and has positive benefits in the sense that it creates a feeling of ownership of the project among the people and reduces dependence on external assistance to some extent. However, apart from this there are no other payments existing for watershed services at the micro-level.

As mentioned earlier, in an evaluation study undertaken by TARU/Sanket on the RGWSM watersheds in MP in 2001, it was found that even though there have been a number of significant improvements with regard to livelihoods, water availability, etc. in a number of villages in the state as a result of the watershed development activities undertaken by the RGWSM, at an overall level the livelihood impacts of the programme have been only limited in scale. Moreover, with the ownership of better quality low-lands in MP largely restricted to the large land holders, watershed activities have benefited different segments within a village differentially, with most of benefits going almost entirely to the more affluent landowning classes. This has raised serious concerns about the intra-village equity impacts of the watershed development programme in MP<sup>57</sup>. The fact that accentuates this inequity even further is the widespread practice of deducting the labour wages of the landless participating in watershed development programmes as their contribution to the Village Development Fund, which means that the poor landless labourers end up paying for the future maintenance of assets that they are least likely to benefit from (TARU/Sanket, 2001). The main benefit that has accrued to the landless as a result of the watershed development

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<sup>57</sup> Large parts of MP have a long history of feudalism, and weak land reforms have resulted in iniquitous holdings in the state. It is common knowledge that a number of erstwhile *zamindars* and *jagirdars* (or landlords), among others still continue to occupy large holdings far beyond the stipulated norms. Land fragmentation has further aggravated this inequity in land distribution and this is widely acknowledged to be one of the principal reasons for rural poverty in the state (TARU/ Sanket, 2002).



programme of the RGWSM has been that of employment. Against a usual daily agricultural labour rate of Rs. 20-22 prevalent in MP, under the RGWSM programme the landless get between Rs. 40-50 even after deducting their contribution of 5-10% from the official rate of Rs. 52.87 from the programme. This makes a significant contribution to their household income and is the biggest direct benefit that they derive from watershed development projects. The other, less direct, benefit for them is that when watershed development programs positively impact agricultural productivity in the village that in turn creates more demand for labour and increases local wage rates. However certain factors that constrain these benefits must also be noted. Firstly, the long-term wage employment benefits are less than clear because the increase in wage employment opportunities in the agricultural sector accompanying watershed development projects are often *not* significant enough to neutralise the accompanying growth in workforce that also usually takes place, leading to no net effect on their out-migration rates. More than 75% of landless have reported no significant increases in employment opportunities, and for most of them such opportunities have been short-term (ODI/TARU, 2002). Secondly, the RSGWSM was originally planned for 6 years, and is now into its eighth. The sustainability of such labour opportunities beyond the life of such government programmes is thus highly uncertain. Thirdly, even though the use of machinery for watershed development activities has been discouraged by the RGWSM, it has been used in many instances where it was not required, and this has affected the extent of employment opportunities available for the landless as well. Finally, most of the Self Help Groups (SHGs) that were set up by the RGWSM with the intention of providing credit/loan facilities to the landless to help them set up their own enterprises for income-generation have been unsuccessful, with insufficient assistance given for the establishment of a business venture (TARU/Sanket, 2001). Thus, even though employment has been cited as a big benefit received by the landless under watershed development programmes in MP, it is clear that this gain is limited by several other factors. Also, given that in many cases the landless have lost access to village common lands as a result of watershed development activities in villages without gaining any significant compensation in return has meant that the watershed programme in MP has had negative equity impacts in many cases.

However, no evidence of the type of intra-village market-based mechanisms<sup>58</sup> that successfully addressed this problem of inequity of watershed development programmes to some extent in Sukhomajri and in Maharashtra, have been found in MP as of yet. While a few sporadic examples of recent experiments undertaken by the RGWSM where the landless are being provided with fishing rights have been reported, on the whole there is very little awareness of the concept of providing water rights to the landless in return for their participation in watershed protection

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<sup>58</sup> Involving de-linking of land and water rights and allowing the landless/land poor to sell their share of the water to the larger landowners in return for watershed protection in common lands.

activities, both at the field and at the policy levels. While it has been indeed acknowledged by top officials in charge of the watershed development programme in MP that there are serious equity problems at the intra-watershed level, especially with regard to the landless, and that rights have to be created in the community for the water that they have generated and conserved through collective action, there is no such explicit policy guideline that calls for the de-linking of land and water rights as seen in the case of Sukhomajri, etc. Rather a defence is offered that watershed development "*...cannot be a panacea for inequities that exists on account of skewed ownership of land...*" and that efforts to tackle the problem of iniquitous landholdings must be dealt with separately<sup>59</sup> (R. Gopalakrishnan<sup>60</sup> in TARU/Sanket, 2001). While the merits of this defence are open to debate, there does seem to be a case for at least experimenting with the concept of de-linking land and water rights in the micro-level in MP, which has a problem of iniquitous land holdings. Hence on the face of it, there does seem to be considerable potential for the development of Sukhomajri/Pani Panchayat-like market mechanisms that allow the trading of water rights between the landless /land poor and the large landowners in MP. However, at the same time it is important to recognise that cases where these mechanisms have worked have been exceptions rather than the rule, and there are a number of social, economic, and political variables (all of which may not be controllable) that will determine the actual implementability of these mechanisms.

### **Findings from the Meso Level (Inter -village Transactions)**

Despite the undulating lay of the terrain in many parts of MP the awareness of upstream downstream linkages at the local inter-village level is generally limited in the state, and with most villagers being concerned with problems within their own village boundaries, there is not much in the nature of transactions taking place between upstream and downstream villages in a watershed context in today's situation. For example, in the RGWSM villages those were visited in the Sehore District during the scoping work, it was found that though the villagers are definitely protecting the forest patches adjoining their own villages, there is very little coordination between them and other villages which are located upstream or downstream. This is despite the fact that the RGWSM typically tries to start watershed treatment activities by first treating the village/s that fall on the ridge and then moving down to those in the middle reaches and the valley.

<sup>59</sup> In realisation of the fact that land is an effective instrument for mitigating poverty, the MP state government has decided to provide land *pattas* (plots) to the landless families of Scheduled Castes and Tribes. The *Charnoi* (grazing) land has been reduced from 7.5 percent to two percent for this purpose and so far, 126,428 landless agricultural workers have been allotted 3.24 lakh acre of land (Malviya, 2003).

<sup>60</sup> Secretary to the Chief Minister and Coordinator RGWSM

However, '*collective-action*' cost-sharing arrangements have indeed been worked out between different villages in some cases where, for example, a construction of a check dam has led to water being available for irrigation in those villages. But even in these cases no transactions have been reported between the beneficiary villages and other villages upstream whose watershed/forest protection activities are restricting the flow of silt into the dam. This may be due to a number of reasons. Firstly, the idea that such watershed protection services are being provided to downstream villagers is still very much new, and even non-existent, in the minds of both the upstream as well as the downstream villagers. Secondly, no need has been felt as of yet among the downstream villagers to interact with upstream villagers on this as their *on-site* watershed protection and development activities themselves are generating enough direct benefit for them, which they can see first hand, and there is no need thus for them to pay or contribute for upstream watershed protection work. Finally, as in the case of micro-level interactions, here too, interactions between villages are governed by a range of social, economic and political factors such as caste, balance of power, etc. For instance, in one case even though the watershed protection efforts of poor upstream villagers in the catchment area of a dam was also directly benefiting farmers located in the downstream command area, when asked about the possibility of the latter making some contribution to help the efforts of the former, the upstream villagers said that it was totally unthinkable because the downstream farmers were not only far more affluent and powerful but also belonged to a higher caste, and would never agree to this.

However, like elsewhere in the country, there are inter-village arrangements with regard to water sharing, grass collection, etc. that though based more on principles of collective action, have elements of market like behaviour in them as well. For, example after the recent shift that has taken place in MP with regard to participatory irrigation management, there are many cases where water-sharing modalities have been worked out between the farmers at the head and tail-ends of the canals, and useful lessons can be learnt from these. Similarly, another interesting case of an arrangement between two villages<sup>61</sup> in Jhabua District, which is of relevance to development of markets for watershed protection services, was pointed out to us. Here, the upstream and downstream villagers worked out an agreement between themselves to utilise their natural resource endowments in a manner that best reflected their comparative advantages. Since both the villages needed both fodder and foodgrain, they decided that the upstream village would grow only fodder species (which would also protect the watershed), and the downstream village would grow only foodgrain and that they would barter half of their respective produce with each other such that both would be better off in the end! These can hence be interesting examples of inter-village arrangements and transactions that can be looked into in greater detail in the next phase of the project.

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<sup>61</sup> In Khatawala, Jhabua District, MP

## **Findings from the Macro-Level**

As in the case of HP, the highest potential and desirability of developing market-based payments for watershed protection services from the point of view of improving livelihoods and the quality of watershed protection, exists at the macro-level – between the hydropower sector and city municipalities in charge of water supply and the upstream communities participating in JFM in collaboration with the forest department.

As of now the only payments that are taking place in this regard are those between the hydropower projects, such as the ones run by the Narmada Valley Development Authority (NVDA) involving mandatory allocations for catchment area treatment and compensatory afforestation, as have been explained in detail previously. One interesting point however to be noted here is that the NVDA does not make payments for catchment area treatment either to the MP Forest Department or to the State Treasury. Instead, there is a Forest and Environment Division within the NVDA itself that undertakes catchment area treatment activities at its project sites, to which the concerned forest and agriculture department officials from those respective areas are deputed. However, as elsewhere local labour is made use of while doing the actual catchment treatment activities in the field. Hence it is more of an intra-departmental transfer of funds in this case. No payments are being made at all for upstream watershed protection in the case of urban water supply agencies on the other hand. Such payments however have significant potential and are highly desirable as can be seen, for example in the case of Bhopal City.

### **Payments between Municipal Water Supply Agencies and Forest Dependent Communities: *The Case of Bhopal City***

Bhopal, the capital city of MP provides an ideal example for developing a case for market-based payments between upstream providers of watershed protection services and downstream beneficiaries.

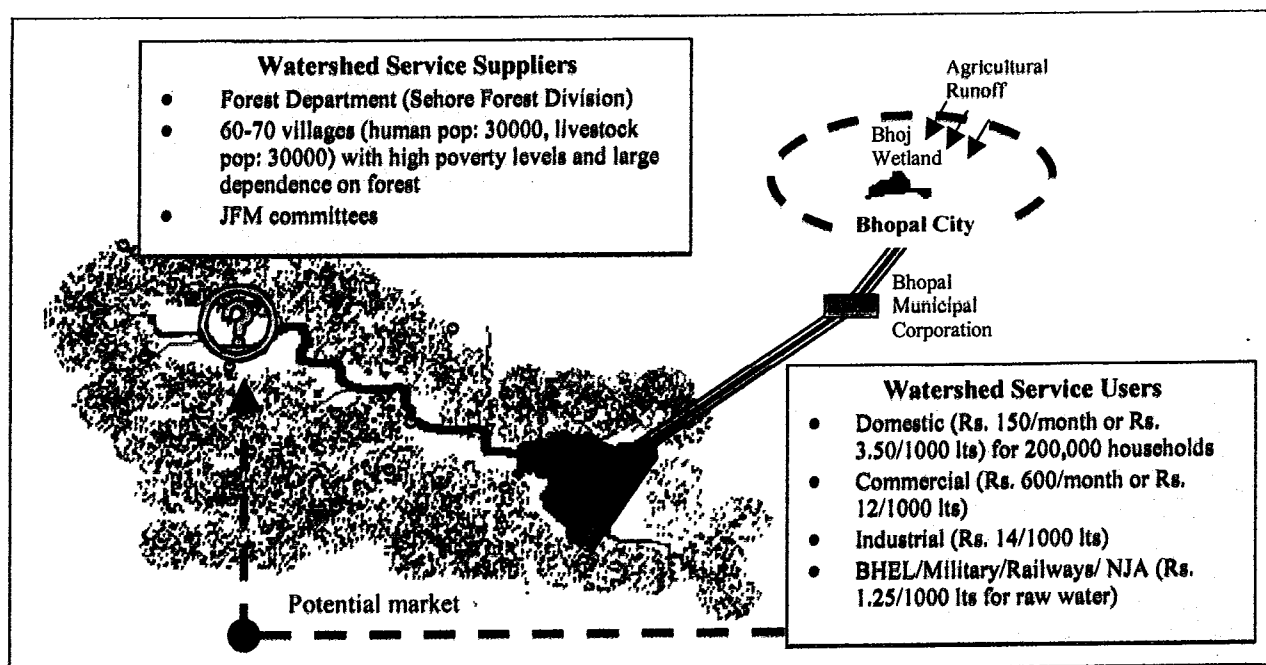
The city, which has over 200,000 households, receives its water from two major sources – the Upper Lake of the Bhoj Wetlands which supplies around 30% of the total water supply and the Kolar Dam, located at a distance of about 30 kms away which supplies up to 60% of the city's total water supply, as can be seen in the diagram given below. The remaining 10% is taken from private tubewells and other sources.

The main agency in charge of providing and distributing water supply to the city is the Water Supply Department of the Bhopal Municipal Corporation (BMC) and it supplies nearly 57 million gallons of water per day to the city. The different users who receive this water from the BMC

include domestic users, commercial agencies, industries and other government institutions such as the Military, Railways, BHEL and the Judicial Academy. Each of these different user groups pays different water tariffs, which have also been given in Figure 6 below.

In recent years, Bhopal has been facing an increasing water crisis with the drying up of the Upper Lake during summer. This has been due to a number of factors, the most important of which is the increased siltation that has occurred in the lake as a result of the intensive agricultural practices

**Figure 6: Pictorial Representation of Bhopal Water Supply Catchments**



being undertaken in its catchment areas. Earlier, about 30-40 years back, almost the entire catchment of the Bhoj Wetland comprised of forests. But with increasing population pressures, many of these areas slowly came under agriculture with the passage of time. In many cases, agriculture practices have involved the heavy use of fertilisers and agricultural pesticides, which have run off into the lake and have resulted in its increased eutrophication over time. Though efforts have been made through initiatives such as the Bhoj Wetlands Project to tackle this problem by undertaking desilting and dredging activities in some parts of the lake, and also by carrying out afforestation and plantation activities in some parts of its catchments, not much concerted effort has been made as of yet to change the land use practices of the poor farmers who are contributing to much of this problem in the first place. Hence this offers an interesting scenario from the point of view of developing some incentive-based transaction system between the people who benefit directly from the Upper Lake and the farmers living in the catchment areas of the lake. While interviewing some of these farmers, it was found that in the current situation,

they had no other alternative but to continue intensive pesticide/fertiliser-based farming in order to increase agricultural yields, even though they themselves knew that all its health and environmental effects were not always favourable. When asked why they did not consider alternative options like horticulture, they said that the initial investment required for doing so was far greater than they could afford. However, if they received sufficient financial incentives or support to undertake horticulture, or even organic farming, to the level that it would ensure that they were not made worse off than they currently are, they said there was no reason why they would not make this shift.

More interesting is the case of Kolar Dam, where the stake of the people living in Bhopal is even higher since they receive the bulk of their water supply from here. The dam itself receives water from the Kolar River, which originates from the forests located in the Ichhawar Range of the Sehore Forest Division at a distance of 70 kms upstream from the dam. As of today, the entire catchment area of the Kolar Dam and the Kolar River is thickly forested with the forests designated as Reserved Forests and falling under the jurisdiction and administrative authority of the MP Forest Department. However, these forests are certainly not undisturbed and face a variety of local biotic pressures. There are about 60-70 villages located all over these forest areas in the catchment area of the river as well as the dam having a total estimated population of about 30,000 humans and an equal amount of livestock. These are poor tribal communities who are dependent on forests for meeting all their livelihood needs in the form of fuelwood, fodder, NTFPs, etc. Despite the fact that JFM has been initiated by the MP Forest Department in a number of these villages, the department concedes that the forests of this area are still facing tremendous pressures as the poor villagers often collect fuelwood not for their own use, but also to sell in nearby towns and cities.

Given the extent of these pressures, it is not surprising that the Forest Department fears that these forests too may soon disappear within the next 20-30 years, like those located around the Bhoj Wetlands/Upper Lake previously had a few decades back. What may then happen to the Kolar River and to the Kolar Dam and to the citizens of Bhopal, who increasingly depend on the dam for water, thus becomes a moot question. It is indisputable that the people of Bhopal are receiving a substantial amount of watershed protection services from the forests existing in the catchments of the Kolar River and Dam, for which they are currently making no payments at all to anyone. Nonetheless, considering the fact that it would very much be in the interest of the BMC and the citizens of Bhopal to protect the forests in these catchment areas and to change the current behaviour of the poor local communities who are exerting pressure on these forests, the potential of developing market-based payments between the BMC and the latter (or even to the Forest Department to strengthen JFM) seems high and very much desirable.

However, there are a number of practical constraints as well which have to be taken into account before such payment-mechanisms can be fructified.

- The BMC is currently a loss-making utility. As against an annual income of Rs. 34 crores it has an annual expenditure of Rs. 50 crores in 2001-02 (BMC, 2002). Its Water Supply Department too is a loss-making unit with an annual income of Rs. 15 crores against an annual expenditure of Rs. 26 crores in the same year. Hence, it is in no position to make any payments for watershed protection services to anyone else.
- The level of awareness of the city receiving such watershed protection services is still very limited not only among the general public but also among many policy makers. While the link between upstream activities and downstream effects is quite apparent in this case, not much attention has been drawn to this fact. Scientific studies that conclusively prove this specific linkage have also never been carried out, to the best of our knowledge, though such studies may definitely be very useful to raise levels of awareness.
- As of now, the water tariffs being charged of different consumers by the BMC are highly subsidised and increasing tariffs, like in the rest of India and MP, is a politically contentious issue in Bhopal too. There are several other reasons why people are unwilling to pay higher rates primary among which is the fact that there is very little trust in the BMC, which is commonly perceived to be a corrupt and inefficient entity. In many of the places where meters have been installed they are not working properly. Distribution is a problem area too, since while everyone pays an equal rate for water, affluent areas within the city receive water on a more regular basis than areas that are not. Given this lack of transparency the people have no confidence that paying extra to the BMC will lead to better services. And given that they are not willing to pay the BMC extra for the services that they do receive, it seems unlikely that they will pay for the watershed protection services that they are not even aware of till now. However, this does not imply that people in general will be unwilling to pay for these services under all circumstances. In a valuation study of the Bhoj Wetlands that was recently carried out, it was found that each household was willing to pay up to Rs. 241 per annum for conserving the Bhoj Wetlands if it was to be made as a voluntary contribution to an independent institution set up for this purpose, as against Rs. 29.50 per annum if a compulsory tax were to be levied by the BMC for this purpose (Verma, 2001).
- A point was also raised that even if the people of Bhopal/downstream beneficiaries did make an extra payment for the watershed protection services that they received, would the aggregate of these payments taken together be enough to change the behaviour and land use patterns of the upstream agriculturists and forest dwellers? If not, would the people of Bhopal be willing to pay as much as was required to bring about this change?

- Other usual constraints such as who would these payments be made to, how would they be monitored and how would one know whether they were resulting in anything tangible in return or not were also raised.

Despite all these constraints, there however definitely seems to be a potential of markets being developed for these watershed protection services in the future. A key reason for this is that as water gets increasingly scarce as in the case of Bhopal, or alternatively, siltation starts increasing for dams/hydropower projects, policy makers will start looking at catchment area treatment/watershed protection as a practical and cost-effective method to remedy the same. The other alternatives however, that are also being currently considered in the case of water supply to Bhopal include the desiltation and dredging of the Upper Lake, and getting water directly from the Narmada River. Though no rigorous costing exercises comparing these various options have been undertaken yet, to the best of our knowledge, a rough estimate that was offered put the cost of dredging activities at Rs. 5-6/1000 lts and that of getting water from the Narmada<sup>62</sup> at Rs. 12-15 per 1000 lts. Hence in comparison, undertaking watershed protection activities in upstream areas may work out to be a much more cost-effective option, but more substantive research is required on this.

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<sup>62</sup> It is pertinent to note that the Narmada River, which is the largest river in MP, also originates from a forest area with its southern source in fact coming out from the Kanha National Park.



## Chapter 5

### Summary of Findings and Next Steps

The primary objective of this scoping study was to examine the potential of developing market-based approaches for providing watershed protection services and improved livelihoods in India, vis-à-vis other existing regulatory and collective action approaches. While the actual scoping work was carried out in two states – Himachal Pradesh and Madhya Pradesh – the study also drew on findings from field visits and examples available in the literature from other parts of the country. Three levels – micro (intra-village), meso (inter-village) and macro (larger off-site downstream beneficiaries) – were considered for examining the potential and appropriateness of using market-based mechanisms for improving watershed protection services and livelihoods, and a number of gaps and research questions were also identified at each of these levels for future investigation in the next phase of the project.

The key findings and next steps to be taken in terms of future research are summarised as follows:

#### 5.1 At the Micro-Level

##### Key Findings:

- The mainstream approach for undertaking watershed protection and development in India has shifted in recent years from a regulatory to a more participatory approach as is reflected by the JFM, participatory watershed development programmes, etc.
- It has been demonstrated that watershed development has had the most lasting impacts only where community-participation has been achieved, where incentives have been provided for forest protection, and where the beneficiaries have themselves contributed to the cost of the watershed activities undertaken.
- Watershed development programmes, while having significant benefits in general, have also been inequitable in the sense that while most of the benefits of such projects have gone to rich landowners a large part of the costs have been borne by poor marginalized farmers and landless communities who have lost access to common lands as a result.
- Market-based mechanisms embedded within collective action processes involving de-linking of land and water rights and allowing the landless and land poor to sell their water rights to the larger landowners in return/compensation for their participation in watershed protection services has significant potential to improve watershed protection, livelihoods as well as equity at the village-level,

- However, there is a need to be cautious on this. Places where such market-based mechanisms have worked like Sukhomajri, *Pani Panchayats*, etc. have been exceptions rather than the rule. Hence even though the desirability of such mechanisms cannot be questioned, there is a multiplicity of factors at the village-level in India, each case is site and context-specific and the concept and practicality of de-linking land and water rights and promoting the trading of these rights would have to be thought through carefully before generalising any such principle at a wider state or country level.

#### Next Steps:

- Undertake detailed field studies and documentation of the specific cases identified above (*Pani Panchayats* in Maharashtra, Sukhomajri/ Nada in Haryana, and others), where such intra-village market-based mechanisms have improved livelihoods and equity, to understand exactly how and under what circumstances these mechanisms work, and the role of the local institutions that manage these mechanisms.
- To understand why, despite their obvious livelihood/ equity benefits, such de-linking of water and land rights, has not occurred at a wider scale throughout the country, especially in states like MP, which have highly inequitable landholding patterns.
- To see to what extent awareness of such mechanisms exists among key policy makers (for example, there was very little awareness of this concept in both MP and HP<sup>63</sup>) and find ways by which such awareness can be created.
- To examine the hypothesis that de-linking of land and water rights can pave the way for larger land reform processes to occur in the future, rather than waiting for the latter to take place first.

## 5.2 At the Meso-Level

#### Key Findings:

- There are a number of interesting examples of inter-village co-operation with regard to water sharing, water markets, watershed protection, grazing rights and, more generally, natural resource management, both traditional and otherwise, which are based on incentive mechanisms that closely resemble market-like arrangements and are perceived to be more effective, equitable and beneficial for livelihoods rather than alternative "state-controlled" regulatory systems.

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<sup>63</sup> However in HP, the applicability of this mechanism is limited since extensive land reforms have already been undertaken and there are very few landless.

- However, it is often difficult to draw the conceptual and definitional boundary between what constitutes a collective action mechanism and what constitutes a market-based mechanism at this level.

#### Next Steps:

- There is a need to carry out more in-depth and rigorous examination of existing community-based 'market-like' arrangements in water and watershed management (and also other natural resources) to see how well these arrangements work, and what their respective strengths and weaknesses are vis-à-vis regulatory systems, especially from the point of view of livelihoods.
- For instance, it would be illustrative to study the *Kuhl* system in HP in detail, and compare *kuhls* managed privately by the local communities to those that are managed by the Irrigation and Public Health Department of the HP state government. It would also be useful to draw on experiences from water markets for irrigation/ inter-village water-sharing mechanisms that widely exist in other parts of India too and examine their relevance to the future development of markets for watershed services, wherever appropriate.
- Also, since interactions between villages appear to be less common in MP as compared to HP, it would be interesting to examine why this is so, and whether physical topography and hydrology play any significant role in determining relationships between upstream and downstream villages (or whether there are other factors such as caste, power relations, etc. that determine co-operation between villages).
- To prepare a typology of different arrangements and mechanisms to clarify what sort of arrangements fall under 'market-like arrangements' and what fall under collective action, and how (and whether) the two can be differentiated.

### 5.3 At the Macro-Level

#### Key Findings:

- Payment mechanisms (though not necessarily market-based) involving payments for watershed protection services to poor communities protecting/ depending on forests located in upstream areas (or to the local Forest Department to initiate JFM) by larger downstream beneficiaries such as Hydroelectricity Projects (HEPs), Municipal Water Supply agencies, etc. have significant potential (and desirability) to develop in the medium to longer run, and have substantial livelihood and equity benefits.
- As of now no such explicit payments for watershed protection services exist between large downstream beneficiaries and poor upstream watershed protection service providers in either HP or in MP. The only known example where something like this happened was in Sukhomajri when the Chandigarh Administration encouraged the building of dams for the

villagers in upstream villages to stop silt from flowing down to Sukhna Lake. Otherwise though substantial compulsory and regulatory-driven payments are being made by hydropower projects etc. to the state governments for the purpose of watershed protection, very little, if any, is going towards supporting the livelihoods of the poor local forest-dependent communities who live in the upstream catchment areas.

- The effectiveness of these regulatory payments is also uncertain, since in many cases, they are commonly perceived to be either lying unused, or used for purposes other than what they were originally intended for. In case of urban water supply agencies, there are no payments for watershed protection services being made at all.
- The level of awareness about the concept of paying for off-site watershed protection services received by the larger downstream beneficiaries is generally very limited, though in HP the awareness that downstream states benefit from the forests and rivers of the state is very much there within the public and political consciousness. However, much more awareness needs to be created first on this subject if markets for the same are to develop in the future. Also, markets can develop only in a situation of scarcity, when people face a problem of either water shortage or of excessive siltation, and connect it back to the quality of watershed protection being carried out in upstream areas; it cannot be imposed from the top.
- Though the perception that the presence of forest vegetation in upstream areas results in several watershed benefits downstream is quite common all through out the country, there are very few studies that have actually established this linkage scientifically at any meaningful scale.

#### Next Steps:

- There is a need to carry out in depth research to study the effectiveness of various environmental payments/taxes currently being made for CAT, compensatory afforestation, etc. by HEPs under the existing regulatory system and assess whether alternative market-based approaches can lead to potential improvements, not only in the effectiveness of watershed protection, but also in the livelihoods of poor forest dependent communities. The Great Himalayan National Park (GHNP) in HP, which is a totally protected natural forest ecosystem enclosing the catchments of four rivers and having numerous downstream HEP beneficiaries, is a good site to undertake this research.
- To analyse existing institutional set-ups for managing payments for watershed protection services at both state and central levels and to identify the institutional gaps, redundancies and disjunctions that exist.
- To study the catchment/ water supply sources of Bhopal city in detail and use it as a research/ pilot implementation site to examine whether and how using market-based approaches can

help the various stakeholders that currently provide, manage or use the watershed protection services and also study the appropriateness of the existing local institutions in each case.

- To undertake WTP studies among various downstream users of watershed services/ water supply in Bhopal (such as households/ industries/ commercial enterprises, etc.) for the protection of the Kolar river/ Kolar dam catchment areas.
- To compare the economics of various future options for ensuring reliable and regular water supply in Bhopal that are currently under consideration by policy makers. For example, comparing the costs and benefits (including intangible ones) of bringing water to Bhopal from the Narmada River v/s dredging of Bhoj Wetlands & Kolar Dam v/s catchment area treatment/ maintenance of forests around Kolar Dam (by providing incentives to local communities, perhaps through JFM) and around Bhoj Wetlands (by providing incentives to farmers currently using pesticides to shift over to horticulture and organic farming, etc.).
- To carry out further research on the hydrological and scientific linkages relationship between forests and watershed protection services such as quantity of water flow, silt load, etc., both in the Bhopal-Kolar catchment and elsewhere in HP<sup>64</sup>. This would draw on the DFID supported Forest-Water Flows Project that is being done in India, again in HP and MP, by the University of Newcastle, UK and IIT, Delhi.
- To examine the applicability of cross-country learning, such as the market-based mechanisms used in Indonesia and Costa Rica, in developing similar systems for providing watershed services in Bhopal and other places in India that offer a similar setting (such as Shimla - Shimla Catchment Forests, Nagpur - Pench Tiger Reserve, Mumbai - Borivli National Park, Dharmashala - Oak forests, etc.)

Apart from these, there is also a need to carry out more theoretical analysis at a broader level to elaborate on what are the *enabling* conditions for markets for watershed protection services to develop and function in the future and what sort of institutions will be required to support these. Further, there is also a need to develop a comprehensive conceptual framework or model where the various findings can be fitted and studied in a logical manner.

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<sup>64</sup> This could, for example, include a study comparing the projected and actual water flows/electricity generation figures in 2/3 selected HEPs from their time of commissioning till date. It would also be interesting to study the impact of silt load on freshwater fauna, esp. fishes in the streams of HP & how it has impacted the livelihoods of the poor.

Lastly, there are still a number of unanswered "sticky questions" or "grey areas" that are unresolved and remain to be addressed (see Box 10). Future research will hence need to focus on these issues as well.

**Box 10: Some sticky questions...**

How will the off-site downstream buyers of watershed services know what they are paying for? How will they measure their benefits? *Need to develop suitable measurable indicators*

What should be the unit of exchange / form of payment between downstream users and upstream providers? Are recurrent payments better or one-time payments? Should they be monetary or otherwise?

Who should the payment be made to? Individuals or to a collective village institution? How should this institution be structured?

What happens if upstream watershed service suppliers are rich and downstream watershed service users are poor? Will markets be equitable then?

Is it desirable to replace collective action transactions that are based on principles of goodwill and reciprocity with more 'market-like' arrangements?

What if, unlike *Sukhomajri*, there are many scattered watershed protection providers upstream? Similarly what if there are many downstream beneficiaries?

Is using market-based mechanisms really the best approach? What happens to transaction costs? Is it more practical to have an intermediary, say the government? Or maybe inter-departmental markets? Or perhaps just old-fashioned taxation?

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## **ANNEX**

### **Scoping study to examine the potential of using market-based approaches for providing watershed protection services and improving livelihoods in India**

#### **1. Checklist of issues discussed with Changer Project Director and staff in HP**

- Rationale and history of the project, implementation strategies and the process adopted
- Who are the main stakeholders in the project?
- What have been the benefits of the project?
- Who have the benefits of the project gone to? How have the benefits been distributed between the different sections of the community? What has been the impact of the watershed protection work on the landless and poorer sections? Are there any special safeguards to protect the interests of these sections?
- Has implementation of this project affected access or other rights of any section of the community?
- If a village downstream is benefiting from work upstream, would there be any willingness to pay / compensate/provide incentives to the upstream village/s by the downstream one for the catchment area protection? If yes, how will the system work? If not, why not? Further, are there any instances of any such arrangement (present or past) in this area? Has concrete evidence been gathered for establishing hydrological links between upstream treatment and downstream benefits?
- At a larger scale, if an entire catchment upstream is providing a benefit (a watershed service) to a nearby town downstream or to other projects (such as hydro-electricity schemes, water supply, irrigation agencies, etc.) – can any market system be evolved for provision of the service to upstream communities? If yes, how could this system be organized? If not, why not? What could the other alternatives be?
- Have any market like arrangements emerged at any of the above three levels (i.e. within a village / community, between two villages/communities- upstream/downstream, and between an entire catchment area and an urban settlement/ hydropower company, etc.)? What are the opportunities and constraints for the emergence of market like mechanisms at each of these levels? What other practical alternatives can be worked out for compensating upstream communities for providing these services? Is any compensation necessary?
- Can watershed services be measured and monitored?
- What problems have been faced in the implementation of the project? How can these be addressed?
- What have been the main learnings for watershed treatment that have come out of this project? How do you plan to ensure the sustainability of the project?

## **2. Checklist of issues discussed in MP**

- History of watershed development in MP including the different programmes and schemes (of various ministries) under which w/s development activities have been carried out -- the level of investment, the main stakeholders involved, the process of implementation, successes/ failures etc.
- Listing of the various policies, laws, regulations, guidelines. etc. that have a bearing on watershed development in MP
- Rationale and history of the RGWM, implementation strategies and the process adopted
- Who are the main stakeholders in the RGWM projects/ other projects?
- What have been the benefits of WSD in general and esp. of the RGWM areas?
- Who have the benefits gone to? How have the benefits been distributed between the different sections of the community? What has been the impact of the watershed protection work on the landless and poorer sections? Are there any special safeguards to protect the interests of these sections?
- Has implementation of this project affected access or other rights of any section of the community? Has anyone lost out from watershed development activities?
- Is there a consciousness of upstream-downstream linkages among the various stakeholders. esp. the local communities?
- If a village downstream is benefiting from work upstream, would there be any willingness to pay / compensate/provide incentives to the upstream village/s by the downstream one for the catchment area protection? Is yes, how will the system work? If not, why not? Further, are there any instances of any such arrangement (present or past) in this area?
- Has concrete evidence been gathered for establishing hydrological links between upstream treatment and downstream benefits?
- At a larger scale, if an entire catchment upstream is providing a benefit (a watershed service) to a nearby town downstream or to other projects (such as hydro-electricity schemes, water supply, irrigation agencies, etc.) – can any market system be evolved for provision of the service to upstream communities? If yes, how could this system be organized? If not, why not? What could the other alternatives be?
- Have any market-like arrangements emerged at any of the above three levels (i.e. within a village / community, between two villages/communities- upstream/downstream, and between an entire catchment area and an urban settlement/ hydropower company, etc.)? What are the opportunities and constraints for the emergence of market like mechanisms at each of these levels? What other practical alternatives can be worked out for compensating upstream communities for providing these services? Is any compensation necessary?

- Have market-like mechanisms ever evolved for management of other natural resources such as grass rights, tree rights, etc.? If they have, how have they worked and what are the learnings from the point of view of using similar approaches for providing watershed services?
- Can watershed services be measured and monitored?
- What problems have been faced in the implementation of the project? How can these be addressed?
- What have been the main learnings for watershed treatment that have come out of this project? How do you plan to ensure the sustainability of the project?

### **3. Checklist for Macro-Level Beneficiaries**

- Is there a clear link between upstream land-use practices and downstream benefits? Are these real or perceived? What does the hydrological data indicate?
- Can the watershed services (if any) be measured and monitored? Are such services scarce and, and when so, how is this scarcity signalled?
- Information availability on water sources and flows, and trends over time
  - Water flow (flood control, dry season flow maintenance)
  - Water quality (sediment, nutrient, chemical, salinity control)
  - Erosion and sedimentation control
  - Water table regulation
  - Salinisation reduction
  - Freshwater habitat protection
- What is the system of compensation under the FCA and EPA that hydropower and microhydel projects have to pay?
  - Is this compensation sufficient?
  - What is the routing system of these compensatory funds? Is this system efficient and effective?
  - Apart from these compensatory funds are any other funds ploughed back into catchment treatment / protection? Is there a need for this? If yes, what mechanisms can be developed to ensure this?
- What kind of monetary or non-monetary mechanisms can be developed to ensure continued catchment protection?
- Is the policy environment conducive to this?
- Are the institutional environment and capacities conducive to this?
- What transaction costs are or may be involved? Is there a simpler system, perhaps through taxation, already in place, which can be used more effectively?

- What are the opportunities and threats present in developing market-based approaches for watershed protection services? Do these enjoy have any advantages or disadvantages vis-à-vis other approaches such as regulation or collective action? What can work best at the given site?

#### **4. List of people interviewed in Himachal Pradesh**

1. Mr. T. D. Sharma, Project Director, IGCEP
2. Dr. Rajan Kotru, GTZ
3. Mr. A.S. Thakur, IGCEP
4. Mr. Sanjeeva Pandey, Director GHNP, HPFD
5. Mr. A. R. Khan. ACF, GHNP
6. Mr. Vinay Tandon, APCCF, HPFD
7. Mr. Rajiv Ahal. Navrachna
8. Mr. Rajender Chauhan. Director. Sahara
9. Manali Mineral Water Co./ Micro-Hydel
10. Mr. S. K. Kaul. Supt. Engineer, Larji Project
11. Parbati Project
12. S.K Dhar – Project Director, Community Forestry Projects (Haryana)
13. Alok Nagar- D.F.O, Solan
14. Mr. R.K Gupta – Director, IWDP – Kandi Project
15. Mr. J.S Walia – C.F, HPSEB
16. Mr. J.S Chauhan – D.F.O – municipal Corporation, Shimla
17. Mr. V.P Jain – chief Engineer, BSL, Sundernagar
18. Sh. S.K Mittal – Superintending Engineer. BSL. Sundernagar
19. Mr. S.P Vasudeva – C.F Dharamsala
20. Mr. R.K Sood – D.F.O, Dharamsala
21. Mr. R.K Sharma – Member, Civil - HPSEB
22. Mr. P.S Khurana – Chief Engineer (Projects), HPSEB
23. Mr. R.K Gupta – Director, IWDP. Kandi Project
24. Mr. Alok Nagar – D.F.O, Solan
25. Mr. Vinay Sood – Range-officer. Solan
26. Mr. Hitender Sharma – Range Officer, Parwanoo
27. Mr. Satish Sharma – H.D.O, Nalagarh
28. Dr. Harish Gajju – Project Officer, DRDA, Solan
29. Mr. Anil Manuja – A.E, IPH Division III, Solan
30. Dr. Gurnam Singh – Asst. Project Director, Kandi project
31. Mr. Pradeep Kumar Bhardwaj, D.C.F, IWDP – II, Solan
32. Ms. Nandita Gupta – I.A.S Probationer
33. Ms. Halima Devi – Nalagarh User group
34. Ms. Rani Devi – Nalagarh user group
35. Ms. Sudha Sharma – Facilitator, Nalagarh
36. Mr. Gulzar Mohammad – Nalagarh unit
37. Mr. Balakrishnan – Nalagarh Unit
38. Mr. Bhupinder Singh, Ex – pradhan- Anji Panchayat

39. Mr. Yoginder Datkar – Jabli
40. Mr. Baldev Singh – Pradhan

**5. List of people interviewed in Madhya Pradesh**

1. Mr. Manish Rastogi, Project Director, RGWM
2. Mr. C. V. Deshpande, Joint Development Commissioner, RGWM
3. Ms. Ritu Bharadwaj, Manager, RGWM
4. Mr. Sharad Jain, WDT Member
5. Mr. P. K. Dash, Secretary, Dept. of Rural Development
6. Mr. Gulshan Bamra, Director, Bhoj Wetlands Project
7. Mr. A. K. Thakur, Bhoj Wetlands Project/EPCO
8. Dr. Ram Prasad, PCCF, MP Forest Dept.
9. Mr. Chitwadgi, Retd. IFS Officer, MPFD
10. Mr. V. B. Singh, Range Officer, Bilkisganj, Sehore Division, MPFD
11. Mr. M. M. Khaira, Superintendent Engineer, Bhopal Municipal Corporation
12. Mr. C. B. Rao, Superintendent Engineer (BODHI), NVDA
13. Mr. K.N. Dubey, NVDA (Dept. of Agriculture)
14. Mr. Philip J. Riddell, Team Leader, Halcrow-ADB IWMS Project
15. Dr. R. N. Yadava, RRL Bhopal
16. Prof. Vivek Bhat, WALMI
17. Mr. Vivek Sharma, CARD
18. Mr. Manish Shankar, Sanket
19. Dr. Anwar Jaffrey, Director, Eklavya
20. Mr. Yogesh Kumar, Director, Samarthan
21. Sachin Dubey, Coordinator, AideAction
22. Dr. A. K. Gupta, Director Projects, NCHSE

## 6. Details of Major River and their Catchment Regions in HP and MP

Major River and their Catchment Regions in Himachal Pradesh		
Name of the River	Area in sq.km.	Area in percent
Sutlej	20,398	36.6
Beas	13,663	24.5
Chenab	7,850	14.2
Yamuna	5,872	10.6
Ravi	5,528	9.9
Indus	1,450	2.6
Markanda	360	0.6
Ganga	290	0.6
Ghaggar	262	0.5
<b>Total</b>	<b>55,673</b>	<b>100.0</b>

Source: State of the Environment Report - HP

Main River and their Catchment Regions in Madhya Pradesh							
Basin	Source		Length of River (KM)		Catchment (Sq. Km.)		Remark
	District	State	Overall	In MP	Overall	In MP	
Narmada	Shadol	Madhya Pradesh	1312	1077	98976	85930	Direct
Tapti	Betul	Madhya Pradesh	721	322	65145	9800	Direct
Mahi	Dhar	Madhya Pradesh	583	158	34543	6700	Direct
Ganga	Gangotri	Uttaranchal	2525	-	1086000	202070	Indirect
Godawari	Nasik	Maharashtra	1465	-	32181	13360	indirect

Table 1.3 Major State Tributaries of National Rivers

National River	Significant tributaries originating in or flowing through Madhya Pradesh
Ganga	Chambal, Betwa, Yamuna <sup>1/</sup> , Sone, Ken, Tons, Sindh
Godaveri	Wainganga, Pench, Bawanthedi, Thauwar
	<sup>1/</sup> The Yamuna is in reality a major river in its own right, but is including here as a tributary of the Ganges as it does not have an independent estuary.

Source: Halcrow/ADB, 2003



## 7. List of Learning Group Members

1. Dr. NC Saxena, Former Secretary, Planning Commission
2. Mr. Anil Shah, Development Support Centre
3. Dr. Kanchan Chopra, Institute for Economic Growth
4. Mr. Kevin Crockford, DFID -India
5. Mr. AJ James, Independent Consultant
6. Mr. Vinay Tandon, Himachal Pradesh Forest Department
7. Dr. Madhu Verma, Indian Institute of Forest Management
8. Dr. AK Gosain, Indian Institute of Technology, Delhi
9. Dr. Rajen Kotru, GTZ Changar Project
10. Mr. TD Sharma, Project Director, Changar Project
11. Mr. DN Pandey, Indian Institute of Forest Management
12. Mr. Rahul Sen, DANIDA

