

Managing Watershed Externalities In India

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CURRENCY EXCHANGE RATES

Currency Unit: Indian Rupee per US\$ (annual average)

2000	47.0
2001	48.5
2002	49.3
2003	46.7
2004	45.0
2005	44.1

WEIGHTS AND MEASURES

The Metric System is used throughout this report

FISCAL YEAR

April 1 to March 31

ACRONYMS AND ABBREVIATIONS

CAPART	Council for Promotion of Participatory Action and Rural Technology	IWDP	Integrated Wastelands Development Program
CBNRM	Community Based Natural Resource Management	JGSY	Jawahar Gram Samridhi Yojana
CBO	Community Based Organization	MDT	Multi-Disciplinary Team
CRIDA	Central Research Institute for Dryland Agriculture	MHA	Million Hectares
CSE	Centre for Science and Environment	MOA	Ministry of Agriculture (superseded MOAC)
CSWRTI	Centre for Soil and Water Conservation, Research and Training Centre	MOAC	Ministry of Agriculture and Cooperation
DDP	Desert Development Program	MORAE	Ministry of Rural Areas and Employment
DOLR	Department of Land Resources	MORD	Ministry of Rural Development
DFID	Department for International Development (UK)	NAS	New Agricultural Strategy
DPAP	Drought Prone Areas Program	NGO	Non-Government Organization
DPIP	District Poverty Initiatives Project	NLBA	Non Land Based Activity
DRDA	District Rural Development Agency	NWDP	National Watershed Development Program
EAS	Employment Assurance Scheme	NWDPPRA	National Watershed Program for Rainfed Areas
FAO	Food and Agriculture Organization of the United Nations	PMP	Panchayat Micro-Plan
GOI	Government of India	PIA	Project Implementation Agency
HRC	Hanumantha Rao Committee	RTDC	Rural Technology and Development Centre
ICAR	Indian Council of Agriculture Research	SPS	Samaj Pragati Sahyog
ICRISAT	International Crop Research Centre for the Semi-Arid Tropics	SWC	Soil and Water Conservation
		WSD	Watershed Development
		WDT	Watershed Development Team
		ZP	Zilla Panchayat

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GLOSSARY

Adivasi:	Indigenous ethnic groups outside of the mainstream of society, often referred to as “tribals” or “scheduled tribes.” The latter refers to a government policy that grants them certain affirmative action rights.
Block:	A block is an administrative level of government between the panchayat and the district.
District:	India is divided into states and states are divided into districts. Many government development programs operate at the district level under the district collector, who is the top civil servant at the district level.
Gram Panchayat	Village-level elected body
Gram Sabha	Gathering of all villagers within the jurisdiction of a gram panchayat
Joint Forest Management:	A government program in which the state Forest Departments, which officially control all Indian forest land, partner with local communities to protect forests. Community members share the proceeds of timber and other forest products as part of a joint agreement. Specific terms vary by state.
Nalla:	Drainage line through which water in the watershed flows. In India’s semi-arid areas many drainage lines contain seasonal streams.
Panchayat:	A local unit of government covering a small number of contiguous villages.
Scheduled caste (SC):	Low caste groups, also called dalit, untouchable, or Harijan, who traditionally have been at the bottom of the social hierarchy in India. “Scheduled caste” is the official and most socially acceptable term used for these groups. “Scheduled” refers to government policy that grants these groups certain affirmative action rights.
Scheduled tribe (ST):	see Adivasi.
Taluk panchayat:	Block-level elected body
Tribal:	see Adivasi
Zilla panchayat	District-level elected body

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India

Managing Watershed Externalities in India

Executive Summary

Background

1. **In India, current watershed projects are located mainly in semi-arid areas, where rainfed agriculture is the predominant land use and watersheds are densely populated.** A typical watershed in semi-arid India contains good quality agricultural land in the lower watershed; these areas are likely to be relatively flat and more likely to be irrigated or have potential for irrigation. Upper watersheds often contain small farms on poorer soil, common lands, and uncultivated land which, in the Indian context, is often degraded due to overgrazing of pastures and excess harvesting of forests. Degraded land in upper watersheds reduces infiltration of water when rain falls, thus increasing the rate of runoff, which in turn can lead to soil erosion, and downstream siltation.

2. **Watershed Development (WSD) was initially understood as a soil and water conservation program by implementers in India and worldwide, but this focus has changed.** It is now being projected by Government of India (GOI), state governments, donors and non-government organizations (NGOs), as a comprehensive program for rural development that promotes rural livelihoods, especially of the poor and disadvantaged. WSD programs represent a significant investment in India. Yet, the sustainability of these investments and their long term capacity to address poverty are not assured due to the presence of externalities¹.

3. **This study addresses two major questions around WSD and externalities.** First, if watershed externalities are important, why don't current projects address WSD from an externalities perspective? Second, do WSD projects lead to further uneven distribution of costs and benefits and if so, under what conditions? Answers to these questions should help guide watershed policy and program reform from community to national levels.

Key Challenges in WSD Projects

4. **Watershed externalities prevent the most productive overall land use from being put in place, and skew the distribution of benefits among land users, often in ways that can harm the poor.** Better land management practices upstream can lead to reduced soil erosion and improved agricultural productivity on downstream lands. However, because poor people typically have limited or no access to downstream private land and often rely heavily on common resources on the upland areas, they tend to bear the economic costs from such WSD programs. Mechanisms to internalize externalities, or manage them to promote better overall productivity, are essential to realize the promise of watershed development. Developing these mechanisms requires a much better

¹ **What are externalities?** An externality occurs when the activities of one person affect the welfare of others who have no control or influence over those activities. Externalities can be positive or negative. A simple example of a negative externality is where poor land-use practices in upper watersheds cause increased water run-off and land degradation for downstream farmers. Changing those land use practices in ways that benefit people downstream could impose costs on upstream land users, who would be providing positive externalities for others. Watershed projects need to pursue innovative approaches to ensure that all watershed users personally benefit from pursuing land uses that support the greatest overall benefit, and that they do not personally benefit from land uses that impose costs on others without compensating them.

understanding of externalities and cost/benefit distribution in watershed development in India. Progress is clouded however, by a lack of robust, empirical economic analyses. While many studies reviewed for this report provide evidence of gross economic benefits from WSD in India, few offer a rigorous comparison of project costs and benefits. Even fewer incorporate externalities.

5. **Current monitoring programs do not appear to provide sufficient information in a systematic framework to support effective economic analyses and policy review.** Monitoring tends to focus on basic physical and financial criteria and usually excludes data on implementation quality and impacts. In addition, while information tends to move upward to central agencies, it is not usually returned to implementing agencies on a regular basis, or in analytical reports that can help underpin improved project planning and design to minimize externalities. Further, remote sensing could be coupled with monitoring programs to help identify sites with greater potential for externalities in WSD as well as aiding in project planning and design. However, the use of remote sensing, based on local technology and expertise, is not universally applied in WSD in India.

6. **The past decades of accumulated experience in WSD have shown that the uneven distribution of benefits, in which the poor are ‘losers’, is common.** This has led to ‘watershed plus’ programs incorporating complementary non-land based activities, such as thrift or ‘self-help’ groups, income generating activities, and institutional capacity building initiatives. The record of WSD in meeting poverty alleviation objectives, either directly through technical measures, or indirectly through watershed plus activities, is mixed. On the one hand, these non-land based activities can improve rural livelihoods for poor and landless people, particularly through employment as laborers for private farmers investing in cost-shared soil and water conservation civil works in WSD projects. On the other hand, this employment is often short term and may not provide sufficient incentives for poor and landless people to give up access to common lands or modify land use practices in upper watershed areas.

7. **The new Government of India watershed policy guidelines present progressive goals, site selection criteria and institutional reforms for WSD, but several issues remain.** First, policy goals focus more on promoting rural development, which may obscure soil and water conservation problems, including externalities. There may need to be a review of the policy to distinguish more clearly between soil and water conservation, and rural livelihood support. Second, site selection criteria do not orient soil and water conservation investments to areas with steeper slopes and less stable soil types, where there is greater potential for water harvesting and higher impacts from externalities. Limited soil and water conservation budgets may in fact be spent in areas where the environmental benefits are less apparent, and where rural livelihood projects might best be implemented on their own. Third, the guidelines reduce the role of NGOs and community associations as project implementation bodies and shift delivery responsibilities to local authorities. At the same time, the capacity of local authorities to effectively deliver large watershed programs is uncertain and may need strengthening in many states.

8. **Addressing watershed externalities rests on compensating those who incur costs, charging those who benefit, and achieving this in practice.** Incentive structures must be developed to encourage participation of those who gain and lose from externalities in WSD. A range of policy and program options are available, based on the literature and examination of cases from other contexts and other countries. Successful examples have several common themes.

- Watershed projects work best with clear upstream-downstream water linkages, particularly opportunities for water harvesting where success requires internalizing externalities.
- Internalizing watershed externalities requires a proactive implementation agency that is aware of externalities and committed to address them.

- Externalities can be successfully addressed where project implementation is contingent on advance agreement to share the benefits of enhanced natural resource productivity. Losers from WSD must be compensated while those who benefit should pay for their gains.
- Building local organizational skill and facilitating negotiations among groups in a watershed can support innovative local institutional arrangements for collective action.
- Clearly specifying common property rights to water could create a more supportive environment and encourage innovative local programs.
- Programs to address externalities need to be supported by sound monitoring and evaluation systems.

9. **Very few of the available approaches to address externalities in WSD projects are being used in India.** Application of more innovative options is hindered by resource rights issues for water and common lands, weak monitoring and evaluation systems in current projects; and poor awareness of externalities among the major actors in WSD. Building on examples of success, both from India and abroad to develop win-win situations at the community level, will require further policy and program reform at different planning and implementation levels.

Key Recommendations for Addressing Externalities in WSD

National Level – short term

10. **Commission independent research to assist central and state governments in addressing externalities.** The research could be led by MORD under the auspices of the National Watershed Committee, in partnership with reputable national research institutions. Studies are required in two critical areas:

- i. Identifying key research questions and data requirements to better understand watershed externalities at the field level, guide project design, and inform a short-term program of data collection. The work would support drafting new policy recommendations and design criteria for WSD projects to address externality issues.
- ii. Examining the application of remote sensing in watershed planning to account for potential externalities, and strengthen monitoring and evaluation. The work could draw heavily on current projects such as Karnataka Watershed Development where monitoring and evaluation programs are well-established and operating effectively.

11. **Develop an externalities or ‘Impacts Tree’ as a decision support, training and planning tool, and mandate its application in new WSD projects.** This would identify positive and negative externalities, and community groups affected over time by the main project interventions being planned. MORD could lead this initiative by contracting an independent research organization, with assistance from consultants familiar with approaches used in other countries.

12. **Develop a policy paper for Government of India on matching national goals of devolution and watershed program delivery through Panchayat Raj Institutions, and the ground realities of weak institutional capacities in many local authorities.** MORD could lead this work under general guidance of the National Watershed Committee, which represents all central agencies involved with WSD. The policy paper should build on recent work by the World Bank on decentralization capacity and lay out a framework for a gradual transition from registered watershed committees and user groups to local authorities for fund flows. The paper should also identify criteria to assess the financial management and human resource capacity of local authorities to effectively deliver watershed development projects.

National Level – Medium term

13. **Review and reform the national ‘Hariyali’ policy guidelines for WSD projects to reduce the impact of externalities.** The common guidelines for WSD as well as the individual guidelines governing watershed projects by MORD, MOEF, and MOAC, need to be reviewed, taking greater account of externalities. It is suggested that MORD lead the reform process, in collaboration with the National Watershed Committee and state watershed agencies. A stronger focus is needed on water management, targeting soil and water conservation on appropriate sites and promoting watershed management in blocks of contiguous villages. It is also suggested that a sufficient preparation phase be applied in new watershed projects to allow sufficient time for certain readiness filters and actions to take place that would reduce externalities such as reviewing the existing resource rights regime, completing an externalities review, developing a compensation policy for ‘losers’ in WSD, and a drafting a written agreement concerning activities to be carried out on common state land.

14. **Develop national standards for project monitoring and evaluation systems for watershed programs that incorporate impacts of major externalities.** The system should be linked to the proposed national initiative on program review and analysis. MORD can lead this initiative with close collaboration from state WSD agencies and NGOs involved with monitoring and evaluation. The new system would contain national guidelines for core data sets, collection methods and general responsibilities for input, output, impact and outcome indicators, and externalities. The data should support national efforts on policy and program analyses.

15. **Establish a national level multi-stakeholder watershed network and associated innovation fund.** The network would collect and disseminate information on thematic issues and innovative solutions for WSD, education and communication, and training materials; create and manage focused e-discussion groups on watershed issues with one group looking at externalities; organize national workshops to review progress and make fresh action plans. The network could be funded by MORD allocating a small percentage of project funds earmarked for watershed development, and outsource the implementation to a lead national NGO or institute on a competitive tender basis. Materials should be available on a national web site for access by state watershed agencies, NGOs, research institutes, etc. MORD could also manage a new WSD incentives fund for applied research on innovative solutions to equity problems/externalities on a competitive basis.

16. **Create national training programs for watershed management among the civil services at the university level.** The training should encompass traditional civil engineering for soil and water conservation, as well as social sciences (economics, institutional analysis, social mobilization and group formation). It is suggested that the National Watershed Committee strike a sub-committee to develop concrete proposals, identify suitable national institutions, and core curricula.

National Level – Long term

17. **Property rights reform:** Property and natural resource use rights issues arise at all levels and contribute to watershed externalities due to lack of clarity. GOI should consider specifying resource rights for water resources in watershed contexts and examine how Panchayats can be assigned authority over local water rights. Revision of fragmented legislation governing land rights is similarly long overdue, particularly for common lands. The recent dialogue on national land policy is a step in the right direction, which should be continued and when appropriate, expanded to examine policy measures that address rights issues and externalities in a WSD context.

State and District Level – Short term

18. **Revise operational planning guidelines for WSD and where necessary, adjust state policy and regulatory frameworks to account for revised national guidelines.** State implementing agencies must identify and address inter-village, inter-generational and intra-village equity issues using the proposed “Impacts Tree” tool. In addition, a comprehensive resource inventory must be applied to support WSD planning and identification of externality issues. The system should use a combination of participatory methods, GIS and satellite mapping, to identify areas within watersheds where interventions are feasible and where there are risks of causing or worsening externalities. A number of good examples can be found in externally-funded projects, for example by DFID, GTZ, and World Bank.

19. **Establish financing mechanisms to compensate people giving up major livelihood activities and income as part of resolving externalities in specific WSD projects.** Where externalities are a potentially serious issue in soil and water conservation, long-term financing is needed to compensate people who must alter their livelihood systems, beyond any short-term employment they may enjoy during the project. Compensation needs to be sustained. Pilot projects to introduce new funding mechanisms to compensate land users on the basis of conservation performance should be encouraged in state delivered WSD programs. A basic framework can be found in payment for environment service (PES) models operating in other jurisdiction. Possible options for sustained financing include annual land charges on private land owners in lower watershed areas that are redistributed to poor and landless people in upper watershed areas; establishing a local environment fund through WSD project budgets; earmarking a proportion of watershed budgets allocated to local authorities for compensation payments. These approaches and others, need to be tested on a small scale to evaluate performance and budget implications.

Local Authority Level – Medium term

20. **Assist local authorities (Gram Panchayats) to build capacity and gain confidence in helping implement WSD projects with communities.** Local Authorities are identified as the primary implementing agency in the national Hariyali Guidelines, but service delivery capacity in many Panchayats may be weak. Indicators need to be developed to help assess the capacity of Panchayats to deliver WSD programs. Many Panchayats will need to be supported by appropriate training through existing and new WSD programs. District level technical committees can still deliver advisory services to Panchayats and communities.

India

Managing Watershed Externalities in India

Introduction

21. A watershed is an area that drains to a common point, and watershed projects aim to manage water and supporting land resources for various objectives. In India, current watershed projects are located mainly in semi-arid areas, where rainfed agriculture is the predominant land use and watersheds are densely populated.² Here the main focus is to harness water resources for maximum agricultural productivity. The semi-arid landscapes where most watershed projects are found are nearly devoid of perennial streams, so water harvesting takes place in very small catchments, covering 500-2000 hectares, typically within a single village.

22. Given high population densities, limited arable land in most states, and policies governing maximum land ownership, private land holdings in rural areas are usually small and fragmented. Most farmers cultivate less than one or two hectares. Livelihood strategies are often complex, drawing on multiple sources of income including agriculture, livestock, and labor, including seasonal migration.³ Potential productivity of rainfed agriculture varies greatly in these areas of India, partly with rainfall but also with topography and soil type. Where rainfall is generally assured and soils are deep and fertile, rainfed agriculture is reasonably productive. Where rainfall is less assured and soils are poor, rainfed agriculture is quite unproductive and most farmers try to gain at least a small area of irrigated land.

23. Central and State Governments in India are committed to Watershed Development (WSD) as a priority approach to improve the social and economic conditions of people living in resource poor, rainfed areas (Government of India 2001), covering approximately two-thirds of the country's agricultural land. Three Union Ministries (Rural Development, Agriculture & Cooperation, and Environment & Forests) actively promote watershed approaches in their development programs. Therefore, in addition to achieving biophysical objectives, contemporary watershed development aims to promote the rural livelihoods of people, especially the poor and disadvantaged (Farrington et al. 1999, Hinchcliffe et al. 1999, Sinha 2002, Turton 2000).

24. A typical watershed in undulating areas of semi-arid India contains good quality agricultural land in the lower watershed; these areas are likely to be relatively flat compared to those in the upper watershed. They are more likely to be irrigated or have potential for irrigation. Upper watersheds often contain small farms on poorer soil, common lands, and uncultivated land which, in the Indian context, are often degraded due to overgrazing of pastures and excess harvesting of forests. Degradation in upper reaches can contribute to increased water run-off and erosion in lower areas of the watershed.

25. Externalities are an important feature of the basic watershed project scenario described above. An externality is said to occur when 'the activities of one person affects the welfare or production functions of other people who have no direct control over those activities' (Dorfman and Dorfman 1977). In the pre-project scenario, poor land use practices in the upper watershed can impose a negative externality on downstream land users through increased run-off and erosion, which in turn

² These areas are known as B2V in the Ministry of Rural Development's classification of agroclimatic zones.

³ If state forests are located nearby, these may form part of a household livelihood strategy, through Joint Forest Management programs where benefits are shared with communities in return for protection responsibilities. Alternatively, private farm forestry can be developed.

reduces production opportunities. When a watershed project is introduced however, an externality can be imposed on upstream land users if land-use practices are restricted, and in the absence of compensation.

26. Externalities are widespread in watersheds due to two main factors: hydrological linkages between upstream and downstream use of natural resources, and socioeconomic linkages across property boundaries and common lands. Hydrological linkages among natural resources in a watershed create the initial rationale for watershed development, which harnesses these linkages to maximize the overall productivity of natural resource-based economic activities. Socio-economic relationships within a watershed, particularly property boundaries and diverse, often conflicting uses of natural resources, are what change spatial biophysical/technical relationships into externalities. When there are multiple land owners within a watershed, changing land use combinations will spread local and external costs and benefits unevenly among different people. Decisions on land-use by one owner can easily affect the welfare of others in the watershed. Implementing the combination of aggregate land-uses that yields maximum watershed benefits becomes difficult since those who would realize more costs than benefits from the plan will not likely agree to it. As a result, whereas watershed development is relatively straightforward from a technical and biophysical perspective, it can be extremely complicated from a socioeconomic viewpoint (box 1).

Box 1. Watershed externality scenarios in India

Every watershed can have a different externalities situation. In the most famous Indian watersheds like Sukhomajri, Ralegaon Siddhi and some others, restricted land use upstream supports re-vegetation that encourages water infiltration and reduces soil erosion, thus enhancing downstream groundwater recharge and protecting downstream water bodies from infiltration. In this case the watershed treatment creates a positive externality from upstream to downstream. In some other cases the distribution of costs and benefits may be the opposite: harvesting water in an upstream area could impose a negative externality by reducing the flow further downstream, for example to an irrigation tank (runoff pond) used for surface irrigation. Finally, in many places watershed projects are implemented in relatively flat areas without discernible soil and water management problems. In some cases these projects more closely resemble standard rural development projects than actual watershed development. Externalities may not be a major issue in such cases.

27. As will be explained in detail in this report, watershed projects are rarely approached from an externalities framework, and efforts to reduce negative impacts on some groups of watershed inhabitants are largely indirect. As a result, projects may not adequately provide incentives for all land users to pursue land uses that serve the greater good, and they may fail to deliver equitable sharing of costs and benefits. That externalities exist is not in doubt as suggested by a detailed assessment of watershed projects in two states in India (box 2).

Box 2. Externalities in Indian Watershed Projects

“Externalities of watershed development are now beginning to show up at the basin-scale in the form of decreased flows into downstream tanks and reservoirs. Simultaneously, inter-sectoral externalities are also created: for example, the over-exploitation of recharged aquifers for agriculture resulting in drinking water needs having to be met from deeper aquifers. Inequitable impacts even within the watershed are another major concern. Conventionally, since watershed development activities are land-based, the benefits flow to the landed, and particularly to those having land in the lower reaches. And, since it increases water availability mainly as groundwater, it favors those who have the wherewithal to invest in wells and pumps. Current attempts to address equity issues take the form of non-land based income generation activity, which is often unrelated to watershed development. It is necessary to see that the poor also get a share of the increased resources that the watershed generates.” (Joy et al. 2003).

28. This study seeks to address two broad questions surrounding WSD and externalities in India, with a principal focus on drylands areas:

Question 1: If watershed externalities are important, why don't current projects address WSD from an externalities perspective? Three factors appear to explain the lack of attention to externalities; these will be explored in this study:

- i. The natural resource management component of watershed management is often focused on civil works such as building bunds, digging trenches and planting vegetation; technical people don't always have the relevant knowledge and skills to appreciate the more problematic socioeconomic aspects surrounding WSD.
- ii. From the early days of watershed projects it was assumed that after a few years, vulnerable people such as landless and women would benefit directly from more productive common pastures and forests in upper watershed areas, in addition to increased employment on private farms in lower watershed areas due to more intensive and productive agriculture.
- iii. These benefits did not always occur, so the 1990s saw a proliferation of indirect ways of generating benefits for the poor, including project-funded employment and a variety of non-land based socio-economic activities dubbed 'watershed plus;' there was virtually no talk of more direct approaches that would give everyone in a specific watershed an incentive to work toward watershed development as a common goal. Watershed projects became the repository of a wide range of rural development activities, many of which had nothing to do with land management.

Question 2: Can WSD projects lead to further uneven distribution of costs and benefits and if so, under what conditions? If WSD projects do succeed in raising land productivity through improved natural resource management, they risk creating a situation of even more skewed distribution of income and control over natural resources. A number of reasons have been identified for this situation and will be examined in detail in this paper:

- i. A technocratic perspective often fails to address the reality that powerful people (village elites in India) may appropriate common resources like pastures, forests and groundwater after WSD has made them more productive. The assumption by governments that the poor would be the main beneficiaries of more productive pastures and forests, usually in upper watershed areas, has not always been borne out.
- ii. Where groundwater problems are addressed through WSD, wealthier people have more financial resources to dig wells and appropriate an inequitable share of ground water in the watershed. Incentives created by national and state subsidies on irrigation water and electricity tariffs only exacerbate the situation. Although the poor may enjoy higher employment in the resulting irrigated agriculture lands, the proliferation of wells can also cause the water table to decline again, raising concerns about long-term sustainability of water supply and irrigated agriculture.
- iii. Non-land based activities in watershed projects to address poverty and social development may act as a smoke screen that hinder people from addressing the central problem of access and control over natural resources. Insecure access rights to the key resources of groundwater and uncultivated uplands compound this problem by making it more difficult to develop long-term solutions. In addition, where WSD projects lack adequate funds for group formation and social mobilization, local institutions may not develop sufficiently to allow poor groups in society to challenge village elites over resource access and use.
- iv. Institutional arrangements for program delivery are shifting from government technical agencies to local authorities. The local authorities may require awareness

and capacity building programs to improve understanding of watershed development and externalities.

- v. Once a project ends in a government watershed program, project staff may move to a new watershed and have few opportunities to look back at long-term outcomes in previous sites. Without effective monitoring and evaluation systems, information to learn lessons from past projects may not be available to develop effective solutions to address inequalities and externalities in new projects.

29. The study addresses these key questions based on a broad stakeholder workshop in India, an extensive literature review, and several case studies in the field to help identify and understand the types of externalities generated within watersheds in different institutional and agro-ecological contexts, as well as the circumstances under which these may have been internalized. At the concept stage, it was envisioned that field studies could gather detailed household and biophysical data to quantify distributional aspects of costs and benefits in WSD and the economic impact of externalities. However, based on an initial literature review, the stakeholder workshop, and resource limitations, it was agreed that this study should focus more on the nature of watershed externalities, project efforts to successfully manage or “internalize” them, and the implications for equitable distribution of costs and benefits in WSD projects. The ultimate objective is to evaluate whether an ‘externalities entry-point’ is useful in enhancing the effectiveness of WSD as an approach to improve natural resource management, raise agricultural productivity, and benefit poor people and, if so, how this can be incorporated into the institutional framework of WSD in policy and practice.

30. The report organization is as follows:

- Section 2 reviews the evolution of the watershed management approach in India from a soil and water conservation approach to a broader rural livelihoods program. It also describes the institutional arrangements for watershed programs and identifies the range of technical solutions used for land-based treatments that are still the core of WSD projects and how these address land degradation issues.
- Section 3 provides a conceptual framework for an understanding of externalities based both on the literature and deliberations amongst the study team. The section describes externalities, why they are an essential part of the watershed problem, and then examines various ways of addressing externalities.
- Section 4 examines in more detail externalities in watershed management in India and how, or even if, some of these externalities are being addressed. This section draws both on published literature, unpublished material, results from a two-day day national workshop on watershed management and externalities, and primary evidence on externalities collected in case studies conducted in Karnataka, Himachal Pradesh, Madhya Pradesh, Gujarat and Orissa.
- Section 5 presents opportunities for action to address externality issues in watershed development at the national, and state/district levels.
- Finally, Section 6 draws out the main conclusions.

The Evolution of Watershed Development in India

The Colonial Period⁴ - Focus on Soil and Water Conservation Works

31. In the early 20th century, colonial regimes in India and Africa regarded erosion as both costly and damaging. State intervention nearly always embodied the view that erosion occurs because ‘farmers were poor managers of soil and water’ (Pretty and Shah 1997). This view echoed dominant narratives of global environmental change that attributed environmental degradation to demographic pressure and later poverty, while disregarding sophisticated indigenous understandings of local environments⁵. Powerful parallel technology developments influenced the formulation of a definite ‘top-down’ soil and water conservation (SWC) strategies with complex multiple objectives for checking degradation and increasing land productivity⁶. Conservation became an important area for colonial state intervention in the 1930s⁷. In India, the Royal Commission on Agriculture (1928) recognized soil conservation as a problem of special importance, and noted work already in progress⁸. The Bombay Land Improvement Scheme Act of 1942 was a prominent Indian initiative. The Famine Enquiry Commission of 1945 later indicated that the large-scale experiments conducted in Bombay had produced results sufficient to warrant replication on a wider scale (Hinchcliffe et al. 1999: 5-6). Projects initiated in this period focused on SWC civil works, improved rainfed farming methods, and controlled grazing. Implementation was largely top-down, with a technical focus and little participation from local communities.

After Independence – Focus on Food Production in the 1960s and 1970s

32. Following Indian Independence in 1947, the emerging food crisis in the early 1960s marked a turning point in Indian agricultural policy towards developing irrigated lower river basins Rao (1995, 1997), Vaidyanathan (1994). The first major government response, the Soil Conservation Works in the Catchments of River Valley Projects Scheme (RVP), was launched in 1962. A national policy on watersheds was declared in 1967, followed by the New Agricultural Strategy (NAS), which concentrated activities on high productivity areas, and heralded India’s famous ‘Green Revolution.’ In 1971, the GOI introduced the Drought-Prone Areas Program (DPAP), covering a wide range of labor-intensive soil and water conservation civil works, afforestation, and development of irrigation

⁴ This section draws heavily on chapter 3 of Chhotray (2004).

⁵ The link between poverty and environmental degradation is the subject of an enduring debate in development. Conventional wisdom that poverty causes environmental degradation has been challenged by environmental scholars more recently, and subsequently, the reverse causal link is being established. The Rio Summit in 1992 arrived at the view that ‘effective environmental management’ can reduce rural poverty as well as conserve the natural resource base. The neo-Malthusian perspective on demographic pressure has also been contested along with these later critiques. Refer to Blaikie and Brookfield (1987), De Janvry and Garcia (1992), Leach and Mearns (1996), Woodhouse et al. (2000), Peet and Watts (1996).

⁶ Mazzucato and Niemeijer (2000, p 834), Hinchcliffe et al. (1999), Farrington et al. (1999), Pretty (1995), Pretty and Shah (1994), Kerr and Sanghi (1992)

⁷ In India, this was true with respect to forestry as well. Sivaramakrishnan writes, ‘The rhetoric of conservancy espoused the “environmental” tones of watershed management, species conservation and wildlife protection; but it also expressed the strident political-economic realities of territorial expansion, the establishment of British rule in strategic regions, and laying down infrastructure for administering empire’ (2000: 70).

⁸ The earliest accounts show that in 1888, nearly 1200 hectares of ravines in Uttar Pradesh were treated with conservation measures to protect the adjoining town of Etawah from water erosion (PRAI 1963).

and infrastructure, mainly in the more productive lower reaches of watersheds.⁹ The country's drylands, which occupied nearly 52 percent of the total geographical area were not given significant prominence (Vaidyanathan 1994).

The 1980s – Renewed Attention to Drylands

33. Prolonged droughts in Africa through the 1970s and 1980s were largely interpreted as 'increased poverty and recurrent famine' on account of 'declining productivity of the biophysical resource base generated by population pressure on fragile ecologies' (Cleaver and Schreiber 1994).¹⁰ This thinking influenced Indian agriculture policy in the 1980s with refocused attention¹¹ on dryland areas¹² for food production. A further stimulus was the apparent leveling off in agricultural production on irrigated lands and a recognition that rainfed food production from dryland areas needed to expand. A subsequent policy shift was made to focus development in these areas on appropriate land management systems to ensure improved soil and water conservation (Chopra 2002). During the 6th five-year plan (1980-1985), the government initiated the Integrated Watershed Management in the Catchments of Flood Prone Rivers (FPR). By the late 1970s and into the 1980s, watershed programs were rapidly extending into dryland areas. For example, in 1982 the Indian Council for Agricultural Research initiated 46 watershed projects in dryland areas across India (Chopra 2002). With the assistance of the World Bank in the mid-1980s, a more integrated approach to watershed development was initiated on a pilot basis in four projects and later scaled up to extend to over 2,000 watersheds in 99 districts across 16 states. In this approach, soil and water conservation, pasture development, new cropping systems, horticulture and afforestation activities were taken up simultaneously. The Ministry of Agriculture and Cooperation initiated the National Watershed Development Program for Rainfed Areas (NWDPA) in the late 1980s following a similar technical approach to the World Bank-assisted projects.

1990s – Transition to Rural Development and Greater Community Participation

34. In 1993, the GOI constituted the CH Hanumantha Rao Committee (HRC) to review the workings of watershed programs under the Ministry of Rural Development. It advocated that a number of ongoing schemes, like the Integrated Wastelands Development Program (IWDP), Desert Development Program (DDP), and Drought Prone Areas Program (DPDP), with common objectives such as soil and water conservation, wastelands development and drought-proofing, be consolidated as a National Watershed Development Program (NWDP), funded and implemented by the Ministry of Rural Development (MORD) in nearly 25 states across the country.

⁹ DPAP started as a Rural Works Program (RWP) in 1971. Over time, RWP gradually focused on area development for drought proofing through land and water resource development, eliminating activities such as the construction of rural roads, from its agenda. By the late 1980s, the DPAP became almost exclusively a WSD program. The Desert Development Program (DDP) was launched in 1978 and aimed to mitigate the adverse effects of desertification and restore the ecological balance of the area.

¹⁰ Cleaver and Schreiber comment that alternative interpretations that linked Sahelian destitution to patterns of commoditisation were in a minority.

¹¹ The global rate of expansion of irrigated area, which was 1% per annum in the early 1960s, peaked between 1972 and 1975, at a rate of 2.3 % per annum, after which it has steadily declined, falling to below 1% in the late 1980s (Food and Agricultural Organisation Study, 1990 as cited in Shah et al. 1998). FAO estimated that to meet future food requirements in developing countries, irrigated area was required to grow at 2.25% per annum between 1982/84-2000. Since actual rates are not even half of this figure and are declining, it is clear that the necessary rise in output cannot be achieved through increased in irrigated area.

¹² For example, the Central Soil and Water Conservation Research and Training Institute (CSWRTI) and All India Coordinated Research Project for Dryland Agriculture (AICRPDA) – later the Central Research Institute for Dryland Agriculture (CRIDA), were established in the 1970s and affiliated to the Indian Council of Agricultural Research (ICAR) with the specific mandate to promote research in dryland farming in India. In 1972, the International Crop Research Centre for the Semi-Arid Tropics (ICRISAT) was established in Hyderabad.

35. MORD's guidelines list three principal sets of objectives for NWDP. First, to promote the 'economic development' of the village 'community' which is directly or indirectly dependent on the watershed, through optimum integrated use of its biophysical and human resources (through employment generation).¹³ Second, to encourage the 'restoration of ecological balance' through 'easy and affordable technological solutions and institutional arrangements that make use of local technical knowledge and available materials' and 'sustained, community action for the operation and maintenance of assets created'. Third, to improve the 'economic and social condition' of the 'resource poor' and the 'disadvantaged sections of the watershed community' such as the asset-less and women through more 'equitable distribution' of the benefits of land and water resources development and greater access to 'income generating activities' (GOI 1994, p 5-6).

36. Several prominent NGOs, like MYRADA in southern India, and the Aga Khan Rural Support Program in Gujarat, pursued watershed development as part of a larger set of rural development approaches, and various donor agencies followed their cue by introducing micro-credit and other enterprise development measures under watershed programs. DFID took this approach under the Western Orissa Rural Livelihoods Project and the Andhra Pradesh Rural Livelihood Project, and referred to the additional non-land based development activities as "watershed plus" (Turton 2000). By the end of the 1990s, watershed development in India was synonymous with poverty alleviation.

37. In 1994, the GOI constituted a High Level Committee on Wastelands Development (the Dharia Committee), to analyze the results from the latest Land Use Survey (Dharia Committee 1995). The results showed that two-thirds of India's agricultural lands of 142.2 million hectares were degraded and in danger of being converted to wastelands. Given the high cost of rehabilitating wastelands, the protection of erosion-prone lands was critical. The degradation of village common lands in particular, posed a serious problem throughout the country (Jodha 1986, Blair 1996), although the causes were widely disputed Gadgil and Guha (1992). The conventional view was that increasing rural populations were responsible for deteriorating soil and water resources. But this was challenged by an alternative perspective, borne out of research in Kenya (Tiffen et al 1994) showing cases where improved soil and water conservation was possible in conditions of population growth coupled with agriculture intensification. Subsequent studies in Burkina Faso, Ghana, Nigeria, Senegal, Tanzania and Uganda (Boyd and Slaymaker 2000) confirmed this relationship, particularly when key conditions are met (box 3). The Dharia Committee also pointed out that soil and water conservation provided benefits to poor people, who typically owned marginally productive arable land, or exploited common land in the upper reaches of watersheds. While poor people were often held responsible for depleting commonly owned resources, there was an inadequate consideration of the factors explaining this viewpoint (Farrington et al. 1999).

Box 3. Conditions for reversal of natural resource degradation under conditions of high population and increased agriculture intensity:

- Market access and attractive prices for increased production
- Agriculture is important in rural livelihoods
- Shortage of agricultural land
- Access to labor from high population density
- High awareness of soil and water conservation as a solution to the degradation process

38. The Dharia Committee put forward three principal recommendations. First, SWC should encompass degraded and non-degraded lands. Second, a more integrated approach was needed to

¹³ MORD programs have long focused on employment generation as an important means of alleviating poverty, and the opportunity to combine employment generation with drought-proofing seemed to address both short- and long-term rural development needs.

transform the watershed from a 'geo-hydrological divide to 'integrated watershed development', comprising more complex development objectives. Third, the Committee proposed a single government body to address conservation issues on all types of land, called the Department of Land Resources (DOLR). Greater local participation in project implementation was also emphasized.

39. In 1994, MORD issued the recommendations of the HRC as 'Common Guidelines' for NWDP. The guidelines articulated watershed development as a rural development program with a wide range of objectives. MORD's guidelines listed three principal sets of objectives for NWDP. First, to promote the 'economic development' of the village 'community' which is directly or indirectly dependent on the watershed, through optimum integrated use of its biophysical and human resources (through employment generation). Second, to encourage the 'restoration of ecological balance' through 'easy and affordable technological solutions and institutional arrangements that make use of local technical knowledge and available materials' and 'sustained, community action for the operation and maintenance of assets created'. Third, to improve the 'economic and social condition' of the 'resource poor' and the 'disadvantaged sections of the watershed community' such as the asset-less and women through more 'equitable distribution' of the benefits of land and water resources development and greater access to 'income generating activities' (GOI 1994, p 5-6). The proposed DOLR was officially formed in 1999 and housed in MORD with the responsibility for watershed development in waste, degraded, drought prone and good quality lands that may simply be vulnerable to degradation.

2000 and Beyond - The Hariyali Watershed Guidelines

40. On April 1, 2003, MORD issued a revised set of common guidelines for watershed development. The so-called 'Hariyali' Guidelines (box 4) introduced several significant changes in the program's structure and procedure prescribed by the 1994 guidelines, and a subsequently modified version in 2001¹⁴. The guidelines provide a framework for program implementation, and consequently, allow scope for subjective interpretation. The objectives of the Hariyali Guidelines encompass rural development, water management, natural resource conservation, and community mobilization. While soil and water conservation are implied in many of the objectives, this fundamental goal of watershed management is never explicitly stated as a goal. In the priority actions however, many of the traditional activities associated with watershed management emerge, for example soil and moisture conservation, drainage line repair, small water harvesting structures, and renovation of water sources such as tanks. The priority actions also cover those typically implemented in upper watershed (pastures, common lands), and those often associated with lower watersheds (tanks, check dams, farm ponds, contour bunds and terracing). It would appear that although the objectives in the guidelines appear to favor broad rural development, more traditional soil and water conservation activities tend to dominate the list of priority actions. One possible gap in the priority actions is the lack of specific reference to water demand management. Many of the listed actions are related more to increasing ground and surface water supply (tanks, small water harvesting structures, drainage lines, and village ponds). Better balance might be achieved if actions that reduced water demand from ground and surface water supplies were also included, such as small-scale drip irrigation, kitchen garden irrigation, roof water harvesting, etc.

41. The criteria for site selection in the guidelines are a mix of social and geophysical aspects. The latter are fairly broad, for example a preponderance of non-forest wastelands, degraded lands and common lands; and contiguous watersheds that can be developed, with an average size of 500 ha. On

¹⁴ The guidelines of 2001 retained the basic policy orientation of the 1994 guidelines, while introducing important changes like increasing the unit cost per hectare of land treated from Rs. 4000 to 6000, and extending the duration of the project from 4 to 5 years (Government of India 2000).

a technical basis, these may not readily lend themselves to identifying sites where soil and water conservation measures could achieve the greatest success and where environmental impacts from poor land-use practices may be more pronounced, for example in watersheds with steeper slopes (where water run-off and erosion might be a greater problem than compared to flatter areas), in certain soil types more prone to erosion, or in areas where watershed topography and hydrology are conducive to successful water harvesting. Criteria around water storage potential (such as soil percolation) could also be considered. The site selection criteria may also need to focus more on the watershed – groundwater link since tubewells are now a major technological option favored by farmers in watershed projects.

Box 4. Hariyali watershed development guidelines 2003	
Objectives	<ul style="list-style-type: none"> • Rainwater harvesting for domestic and productive uses • Overall development of rural areas through Gram Panchayats • Employment generation, poverty alleviation, community empowerment • Mitigating adverse climatic conditions on crops, people and livestock • Restoring ecological balance by conserving natural resources • Encouraging sustained community action for asset creation and O&M • Promoting simple, easy and affordable technology and institutional arrangements
Watershed selection criteria	<ul style="list-style-type: none"> • People willing to contribute cash and kind for asset creation, Operation & Maintenance • Acute shortage of drinking water • Large population of scheduled castes and scheduled tribes • Preponderance of non-forest wastelands, degraded lands and common lands • Actual wages less than minimum wages • Contiguous watersheds that can be developed, average watershed size of 500 ha
Implementation agencies	<ul style="list-style-type: none"> • District level: Zilla Panchayat or District Rural Development Agency • Field level: Gram Panchayat
Role of NGOs	<ul style="list-style-type: none"> • Can be contracted for group formation and social mobilization • Implementing agency where GP and/or ZP capacity is not adequate
Flow of funds	GOI – MORD – DRDA/ZP – Gram Panchayat – Community
Priority action	<ul style="list-style-type: none"> • Development of small water harvesting structures (farm ponds, check dams, etc) • Renovation and augmentation of water sources, desilting tanks • Fisheries development in village ponds and tanks • Afforestation including agro-forestry, horticulture, block plantations, etc • Pasture development, independent or in conjunction with plantations • Soil and moisture conservation (contour bunds, terracing, planting on bunds, etc • Drainage line treatment with vegetative and engineering structures • Repair, restoration and upgrading existing common property assets • Crop demonstrations • Promotion of energy saving devices, energy conservation, bio-fuel plantation, etc
Funding pattern	<ul style="list-style-type: none"> • 85% Watershed treatment, development, works • 5% Community mobilization and training • 10% Administrative overheads
Project duration	5 years
Cost sharing	10 % for work on private land, and 5 percent for common property land
Cost ceiling	Rs 6,000 (US\$133) per ha at ZP/DPRA level
<i>Source: Government of India 2003</i>	

Institutional Frameworks

42. At the national level, the Wastelands Development Division in the Department of Land Resources, Ministry of Rural Development in New Delhi, coordinates three national-level area

development programs: 1) the Drought Prone Areas Program (DPAP); Desert Development Program (DDP); and Integrated Wastelands Development Program (IWDP) through the watershed approach, under the Hariyali Guidelines for Watershed Development. National watershed development programs are also implemented by MOAC and MOEF, and a common approach was worked out in 2000. However, there have been problems in replicating this commonality of purpose and approach on the ground, with Forest Department often showing reticence to let watershed projects treat forest land falling within the watershed area. While progress has been made towards institutional unity that is congruous with the objectives of integrated land use, it is not always reflected on the ground. A new National Watershed Committee, representing all line agencies involved in WSD at the Secretary/Joint Secretary level offers a forum for improved coordination at the national level.

43. At the state level, the Department of Rural Development normally deals with watershed projects, although they have little to do with funding arrangements, which are directly between the central and district governments. Some states such as Karnataka, have created Watershed Development Departments to coordinate watershed programs in the state. The main function of the state government department is to provide policy and technical support to on-going watershed programs to influence and improve the manner in which they are implemented. This includes facilitating, for instance, training programs for NGOs implementing WSD projects (this is usually done through the State Institutes for Rural Development), deciding on the flexibility to be given to district-level Project Directors and their staff (e.g., providing funds to purchase computers, hire additional temporary staff and obtain satellite maps and other information), and holding seminars and workshops to promote cross-learning by senior district level staff. They also negotiate with donor institutions for special externally-aided projects to experiment with different implementation options.

44. At the district level, the District Rural Development Agency (DRDA) is a conduit for watershed development project funding in the district. The DRDA receives funds from the DOLR/MORD, and transfers it to watershed development committees in project villages. If a government department prepares the project and receives approval, it becomes the Project Implementing Agency (PIA). In many cases (e.g., Hissar, Haryana), no NGO is involved, and government officials implement projects through line department staff. A typical project may cover 10 micro-watersheds, each about 500 ha. Line department officers are also responsible to provide technical approval for designs and construction of structures (e.g., check dams, nala plugs, water harvesting structures, etc.). District-level coordination may occur through a separate committee to facilitate joint decision-making and discussion of inter-related issues, or through the Zilla Panchayat.

45. Field implementation is through a community organization or user group. In larger watersheds, a group (sometimes called an area group) representing each participating community may be organized to provide an institution for more integrated planning across the watershed. These committees would be registered through the Societies Registration Act, to facilitate the group in opening a bank account to receive project funds. Area groups and community organizations would have an executive committee, often with a stated percentage of representation from women and landless, to ensure the views of the more disadvantaged groups in the villages were heard. Project implementation is usually a partnership between state watershed departments, NGOs at the field level, an association representing participating communities across the watershed, and finally the communities themselves. Within communities, various groups are often formed as part of the rural development objectives, for example self-help groups that may receive training and seed funds to establish small income generating businesses. Many donor-funded projects have stressed this aspect.

46. The Hariyali Guidelines introduced some significant institutional reforms. First, Gram Panchayats were identified as primary project implementers in the village as opposed to specially constituted and registered watershed committees (Government of India 2003). This supported the

GOI devolution program, enabled through the passing of the 73rd Amendment of the Constitution of India in December 1992, which empowers Panchayat Raj Institutions (PRIs) as bodies of local self-government. The devolution process has taken time to evolve as some states have only recently organized Panchayat elections, and others (such as Jharkhand) have yet to organize elections. The Hariyali Guidelines suggest WSD project funds be transferred directly from the Zilla Panchayat (ZP) or District Rural Development Agency (DRDA) to the Gram Panchayat, but maintained in a separate account. Second, intermediate local authorities, like Block or Taluk Panchayats, and government line departments were identified as primary Project Implementing Agencies (PIAs) rather than NGOs.¹⁵ Third, the district continued to be the most powerful tier in the administrative hierarchy. Finally, participatory decision-making was emphasized through the continued involvement of user and self-help groups in project operations.

47. The new guidelines have been criticized in some circles for limiting the role of NGOs, and also by reducing project funds for group formation and social mobilization from 10 to 5 percent. Several factors are likely to mediate immediate adoption of this policy shift however. First, the capacity of PRIs to effectively implement social mobilization and group formation activities in communities will take further time and resources to develop. People centered approach such as WSD may be different than many other programs delivered by local authorities and new skills may need to be acquired in social mobilization and group formation techniques. Recent studies (World Bank 2004a, b) have shown that in many local authorities, financial management systems and human resource capacities are often weak, roles and responsibilities remain unclear, and capacity to generate local revenues is quite low. The resources allocated under WSD can be significant compared to normal PRI budgets. According to some national experts, this raises the possibility of interference by village elites. Shifting implementation from a system of registered user groups and NGOs to one focused on local authorities will take time as local authority capacities are strengthened and experience in service delivery gained. Second, a single national policy directive will not suddenly alter the entire range of institutional structures in the watershed development sector at the state level in India. Widespread acknowledgement exists of NGOs as effective agents for participatory development.¹⁶ Third, there is still support for watershed committees in program implementation (Hulme and Woodhouse 2000: 227) across some states. Current institutional arrangements within the watershed development sector are complex, and although they are shifting towards delivery through local authorities, the transition may not fall exactly in line with national policy in any straightforward or predictable manner. Finally, having four levels of government involved in fund disbursement (GOI-MORD-ZP/DRDA-Gram Panchayat-community) between GOI and the community raises questions about high transaction costs, duplication of effort, and undue delays. These critiques suggest a need to review institutional arrangements in national watershed policies and guidelines.

Program Monitoring

48. There are two ways in which the DOLR monitors its watershed development projects on the ground. First, monthly/quarterly physical and financial reports are collected from the NGO or government PIA, containing basic input information such as the number of structures constructed along with their dimensions, area of plantations, survival percentage of plants, expenditures, etc. Second, concurrent evaluation is obtained by Independent Evaluators appointed by the DOLR or alternatively through field visits by area officers or other officers of the Department. Concerns are

¹⁵ NGOs can be used as PIAs if local government capacity is deemed too weak for effective implementation. The justification for scaling down NGOs as implementing agents was the desire by GOI to channel rural development through local authorities (or PRIs in the Indian context) as part of central government decentralization policy.

¹⁶ DFID's Andhra Pradesh Rural Livelihoods Project (APRLP) in partnership with the Andhra Pradesh State Government, and WASSAN in Andhra Pradesh are befitting examples of this. The World Bank is funding three Watershed Development projects in India, all with strong NGO participation in social mobilization and group formation with communities.

sometimes raised about the effectiveness of current monitoring programs. The Zilla Panchayat/DRDAs, who lead the implementation of watershed projects, often face capacity limitations in drafting watershed plans, implementation and monitoring. Consequently, monitoring programs may not be as robust as desired and data collection on physical progress and financial performance may be limited. Monitoring tends to focus on basic physical and financial criteria and usually excludes data on implementation quality and impacts. In these situations, monitoring tends to be oriented to showing compliance in meeting physical and disbursement targets. The flow of information tends to be upward only. Analysis is limited due to the poor quality of information and the lack of mechanisms that encourage regular analysis of monitoring information. Some donor funded projects such as the Bank-supported Karnataka Watershed Development Project, have invested heavily in establishing comprehensive monitoring systems and capacity (see box 5). There is wide scope to improve WSD monitoring programs, particularly through the use of communities to help gather relevant information on an ongoing basis. Collecting high quality information across the wide geographic coverage of WSD programs in India would facilitate comparison of results and analyses across agro-climatic regions.

Economic Benefits of Watershed Development in India

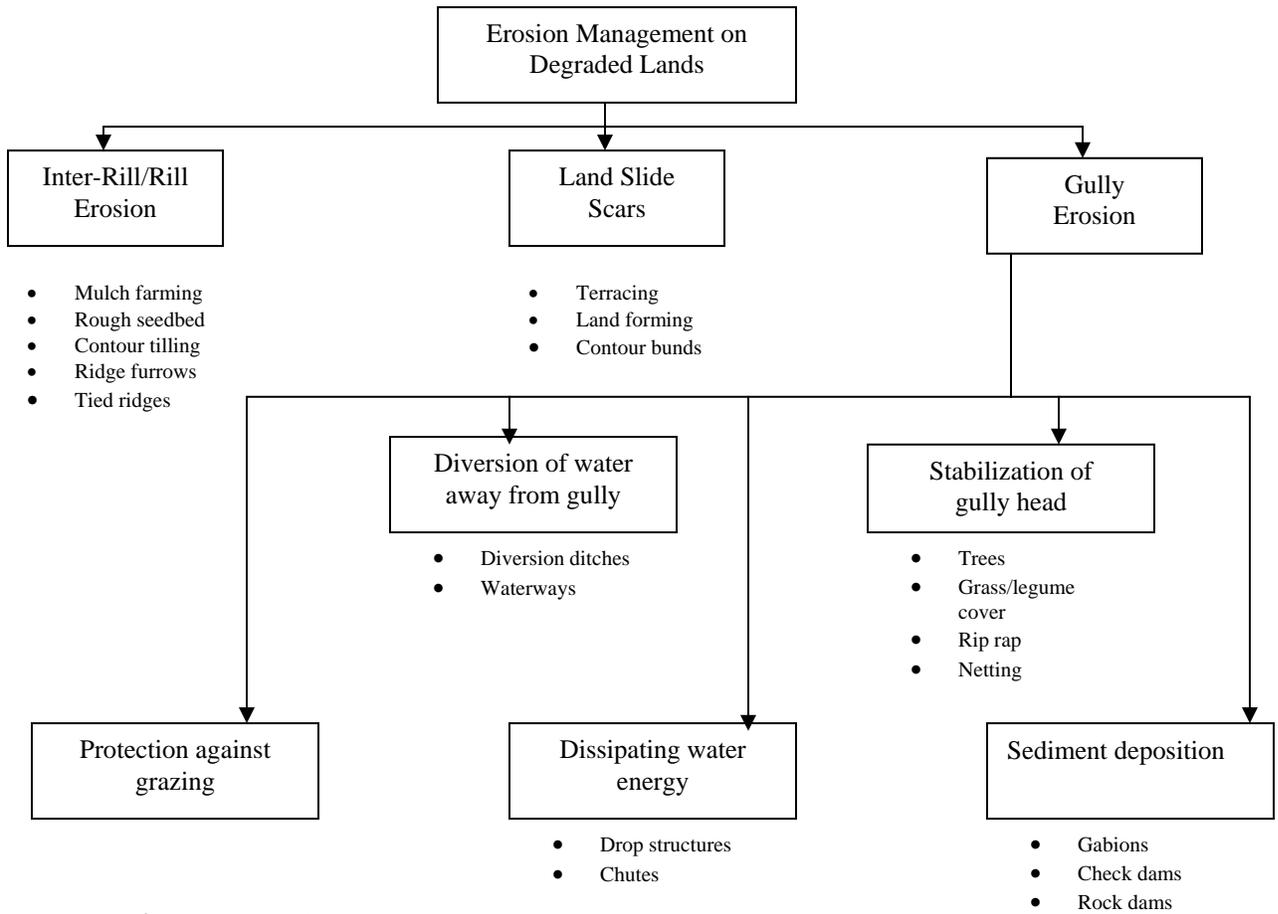
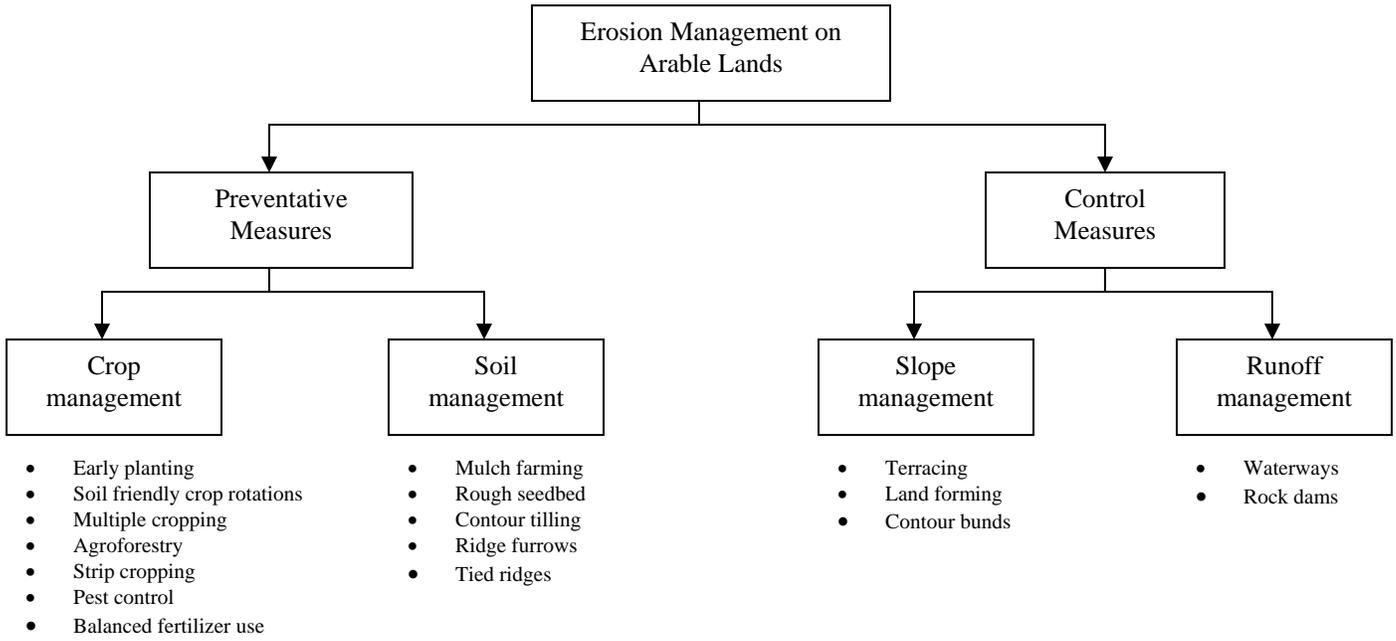
49. As described earlier in this chapter, watershed management has gradually evolved in India from primarily a technical focus on soil and water conservation and restoring degraded lands in more productive irrigated areas, to a broader approach for rural development with local participation, spanning both irrigated and drylands, and encompassing lower and upper watershed reaches. In both government and donor-funded programs however, land-based treatments usually account for the majority of project budgets. As an example, the Bank-supported Karnataka Watershed Development Project (2001-2007), has high levels of investments in social mobilization, group formation, monitoring and evaluation, yet approximately 82 percent of the total funding is for watershed treatments, including civil works for soil and water conservation, forestry, and horticulture. Figure 1 illustrates the usual suite of physical treatments used for arable and degraded lands. Watershed projects aim to improve economic conditions by expanding irrigation, raising the productivity of rainfed agriculture, increasing the stock of biomass in uncultivated areas, and creating higher employment in larger farms that scale up irrigation. Treatments to improve rainfed agriculture include field bunds and interbund treatments such as contour plowing.

Box 5. Monitoring and evaluation in KWDP

In addition to developing a computer based system for gathering and managing information on project inputs and outputs, the monitoring and evaluation system tracks project impacts and outcomes to answer questions about progress against broad development indicators. The system looks at changes in cropped area, plantations, land cover transformation to agro-horticulture and agro-forestry, the number and spread of water bodies, reclamation of wastelands, and biomass changes. Remote sensing is used to support the monitoring system, and is also applied to the preparation of different thematic maps and bench mark details, including individual farmer plots, to support preparation of micro-watershed plans.

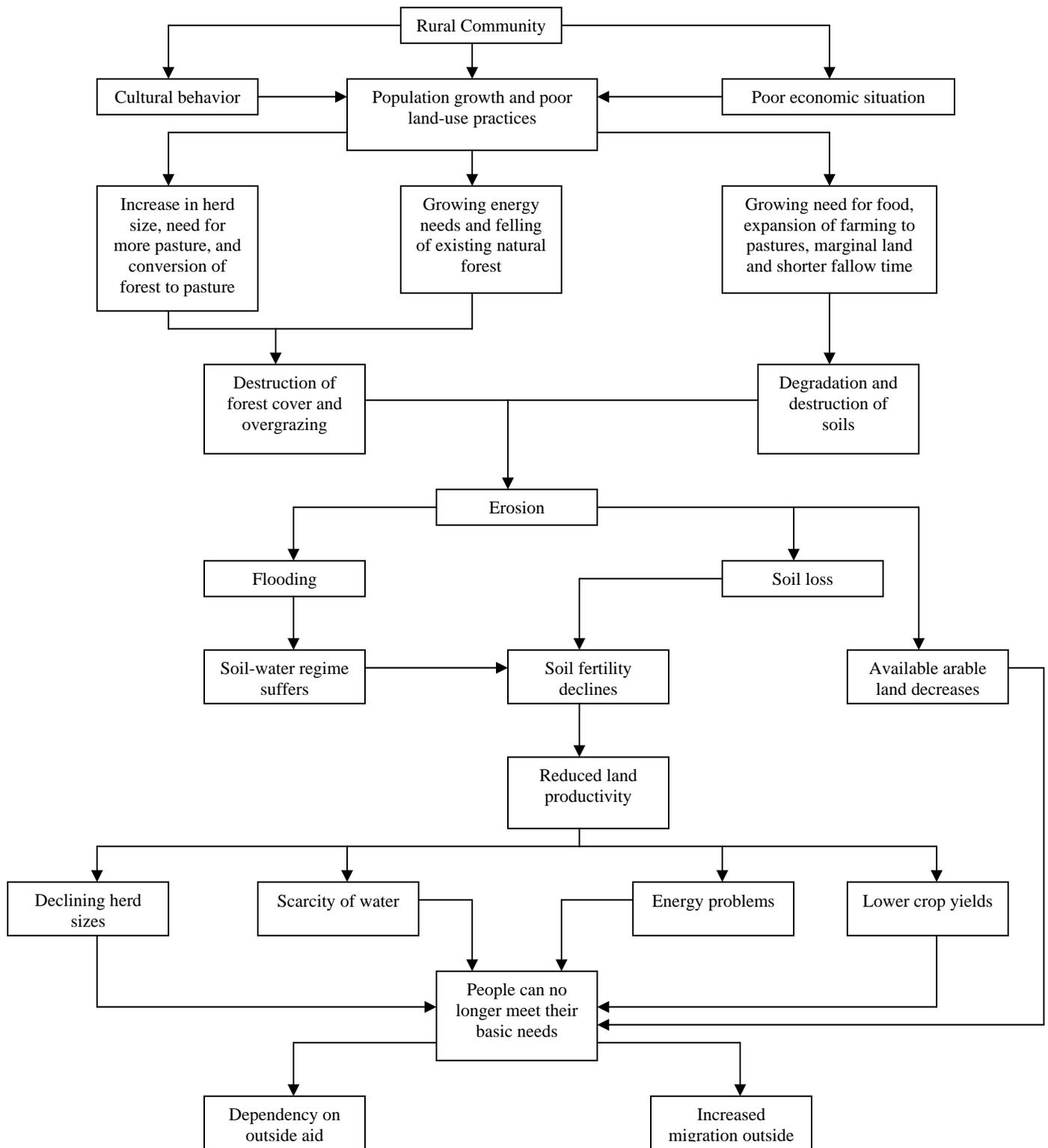
50. Watershed development programs represent a significant investment in dryland areas. A major rationale for investment is to reduce the intensity of water run-off and subsequent soil erosion. Average soil erosion in India is estimated at 16.75 tonnes/ha/year (Honore 1999). Land degradation from natural or human causes can reduce soil nutrients and productivity, crop yields and farm income. Longer-term impacts can be increased poverty and dependence on outside aid, and out-migration (figure 2). The level of land degradation is due to a number of variable socioeconomic factors such as population and economic conditions, as well as cultural norms regarding land-use. Degradation rates on arable land can also vary depending on soil structure, slope, annual rainfall, and farming practices.

Figure 1. Typical land-based treatments in watershed development on arable and degraded areas



Source: from Honore (1999)

Figure 2. The causes and impacts of human destruction of natural resources in watersheds



Source: From Honore (1999)

51. Agus et al (2003) estimated a range in average soil loss across 19 sites and land-use systems in South-East Asia¹⁷ from less than 1 to over 50 tonnes/ha/year. Using the replacement cost approach, the on-site cost of lost nutrients ranged from US\$0.30 to US\$68 per ha/year.¹⁸ For other sites in these same countries, Biltonen (2003) estimated on-site erosion costs tended to represent less than four percent of household income based on the cost of replacing lost nutrients with purchased fertilizer. Lutz et al (1994) show that in selected Latin American countries, average soil erosion rates ranged from 2 to over 1,000 tonnes/ha/year. In the absence of conservation measures, crop production was estimated to decline by as much as 59 percent after ten years when compared to normal yields.¹⁹ Assuming no change in crop type, constant real crop prices and input costs over the same period, it can be inferred that farm income could decline by a similar level.

52. While there is little doubt that land degradation has negative economic costs due to social and environmental impacts, data on the overall economics of watershed development in India are relatively scarce despite the vast experience over the last two decades. Specific cases infer mixed results. On the one hand, a number of studies in India suggest biophysical and economic conditions improve from the intervention of watershed development projects. The famous Sukhomajri project in Haryana is often touted as a model of high economic benefits (box 6). A recent review of ten watershed projects generally showed positive changes in crop yields, groundwater levels, and household income (Kumar et al 2002). Another study (Reddy et al 2003) examined project impacts on sustainable livelihoods across four villages in Andhra Pradesh, based on changes in physical, natural, social,

Box 6. Sukhomajri – an example of positive economic impacts

The famous watershed village of Sukhomajri in Haryana, which helped inspire watershed projects elsewhere, involved important watershed benefits. An economic analysis of the project estimated a rate of return of around 10 to 19 percent depending on the assumptions made (Chopra et al. 1990). According to Agarwal (1999), re-vegetation of the upper watershed increased the tree density by about 100-fold between 1976 and 1992, and production of useful grasses rose from 40 kg/ha to three tons on average; harvests of bhabbar grass yielded an average income of \$3,000/year for the village in the 1990s. The increase in irrigated area enabled a major increase in crop production, with maize and wheat yields more than doubling within ten years. Cropping patterns diversified. Irrigation enabled a transformation of the livestock population from grazing goats and local cows to mainly stall-fed buffaloes and improved dairy cows. The number of goats fell from 246 in 1975 to 10 in 1986, while the number of buffaloes rose from 79 in 1975 to 291 in 1986. This led to an increase in milk production from 334 litres per day in 1977 to over 2000 in the late 1990s (Mahapatra, 1998). This transformation enabled the village to become a major producer of milk, with annual sales of about \$8,000. Higher dairy and crop production and employment and wages, all made possible by protection of the Sukhomajri watershed, led to greatly improved living standards in the local area. Household incomes rose by an average of 50 percent between 1979 and 1984, with all households gaining (Agarwal, 1999). Before the project most people lived in mud-and-thatch houses, but by 1998 89 percent of people lived in modern brick and mortar houses, with the remainder living in semi-modern houses (Agarwal and Narain, 1999). A 1998 survey showed that Sukhomajri contained a smaller proportion of people living below the poverty line than in the state of Haryana as a whole (Agarwal, 1999, citing Gulati and Sharma, 1998), even though Haryana is one of the richest Indian states and Sukhomajri lies in one of its poorest regions. Sukhomajri's watershed project also offered economic benefits 15 km downstream in Chandigarh. Siltation into Sukhna Lake on the edge of the city declined by about 95 percent, saving the city about US\$200,000 annually in dredging and related costs (Chopra and others, 1990). In effect, the project saved the lake, because it is not clear that the city would have been willing to invest so much to maintain the lake's recreation benefits.

¹⁷ Indonesia, Philippines, Vietnam, Laos PDR

¹⁸ Based on the estimated cost of replacing lost nutrients with purchased organic fertilizer

¹⁹ For maize and sorghum in Haiti. Other estimated declines included 18-47 percent for maize in Honduras; 11 percent for coffee in Costa Rica; 23 percent for beans in Dominican Republic.

human and financial capital. Selected results show that over a period of five years, watershed development contributed to positive biophysical and socioeconomic change in over 1,000 households across four watersheds. For example, average land values increased by US\$296/ha and US\$114/ha for irrigated and dryland respectively against civil works investments of approximately US\$67.²⁰ The area under irrigation increased by 37 to 176 percent. The number of wells increased by 64 percent and ground water levels rose from approximately 37 meters to 28 meters below ground. Average household income increased from between 54 percent and 101 percent. A study by Rao (2000) reviewed several projects and found increases in crop yields, the area under cultivation in the post-rainy season, availability of fodder, employment, and milk production, and a reduction in migration.

53. Despite the strong suggestion that watershed development can contribute to improved soil and water conservation, and strengthen livelihood opportunities and income in India, some watershed projects on the other hand, appear to have little economic impact whatsoever. In a study of 86 villages in Andhra Pradesh and Maharashtra, for example, Kerr et al. (2002) found that in many cases there was no difference in a range of performance indicators between villages with and without watershed projects.

54. There is an urgent need for more rigorous and comprehensive economic analyses comparing costs and benefits. A review of empirical economic studies of watershed projects (Venkatachalam 2004) suggests that most tend to focus on a small number of villages and use a wide variety of analytical methods. They also concentrate mainly on quantifying varying baskets of project benefits rather than apply a proper cost-benefit analysis. Most did not apply the concept of marginal opportunity cost, which would consider the actual value of the benefit, the cost of foregone opportunities from alternative investments, and the user cost. Very few of the studies examined evaluated both on-site and off-site impacts, and costs and benefits. In some cases, the differences between the “before” and “after” situation were not statistically significant. A rigorous analysis from Latin America (Lutz et al 1994) suggested that technically based conservation works such as check dams are usually economically inefficient in addressing soil erosion problems.

55. Only a few studies were found in the Indian literature that provide a more balanced view of costs and benefits. Shah (2001) examined the economics of civil works for one project covering five districts in Gujarat and derived a benefit-cost ratio of 4.07/1 for investment in check dams but this was based on gross values and undiscounted cash flows. A financial analysis at household level, showed positive increases in net returns three years after the project, ranging from 42 to 99 percent. Another study by Ninan and Lakshmikanthamma (2001) in Karnataka showed that the internal rate of return on watershed project investments can range from 19 to 75 percent²¹. Lower rates of return were derived as the level of achieved benefits was reduced by 25 percent (IRR between 3.8 and 15.5 percent). Most of the studies from India did not even mention the issue of externalities. None of the studies tried to address externalities in any systematic way. As discussed by Venkatachalam (2004), many watershed projects, by treating upper reaches and increasing water retention, deny downstream farmers the opportunity to use the same level of water before the project. This problem is to be expected in red soil areas of South India where irrigation tanks are fed by runoff water. Estimation of economic costs and benefits should account for such externalities (box 7).

²⁰ These figures should be viewed with caution. Kerr and Pender (2005) found that farmers in Andhra Pradesh and Maharashtra expected land values to rise even if they were subject to erosion. In one Maharashtra village, plots protected against soil erosion with rising yields were expected to rise in value by 10.1% annually while erosion-prone plots with declining yields were expected to rise in value by 8.5% annually.

²¹ The higher IRR was based on full benefits achieve net of costs, including the opportunity cost of grazing benefits foregone, imputed value of farm-produced inputs and owned animal labor. The lower range included rental value of owned land, interest on fixed capital, and imputed value of family labor.

Box 7. Upstream-downstream relationships vary

In some cases externalities from soil erosion are positive and in others they are negative. Where erosion creates gullies or deposits silt into downstream water bodies the externalities are decidedly negative. In other cases, however, downstream farmers trap silt that originates from upstream soil erosion; in this case the externality is positive. A similar situation holds for water harvesting: impounding water upstream will increase groundwater recharge but reduce surface flows. This creates positive externalities for downstream groundwater users but negative externalities for downstream surface water users.

56. Analysis is complicated because of the need to account for the many variables that affect benefits and costs such as topography and slope of the watershed, scale and size of the basin, geology, soil types, total rainfall and distribution, location of forests and other vegetated areas, and the type and location of human activities (Church 2001). The analyses also must examine the trade-offs inherent (and usually assumed) between different groups such as rich and poor, and between people in upper and lower watershed. Where data are available in India²², projects in India tend to show a higher benefit flow to larger landowners in the lower reaches of the watershed. Intuitively, this makes sense because these individuals often occupy areas of higher productivity. They have higher incomes and can better afford to participate in cost-shared civil works programs for soil and water conservation including bunds, well recharging, horticulture, etc. These landowners also enjoy secure land titles, providing a strong incentive for investing in long-term conservation works. By contrast, poorer people tend to occupy less productive sites in higher elevations. Landless people earn their livelihoods through labor services to titled farmers and by exploiting common areas, usually in the upper reaches of the watershed. A central question is whether or not the employment created for poor and landless people on more productive private farms is long-term and compensates for any restrictions imposed on land-uses in upper watersheds where these disadvantaged groups normally access resources. A holistic watershed management approach would usually identify lands in the upper reaches of the watershed as a top priority for soil and water conservation treatments to reduce downstream impacts, or negative externalities. Yet, the ability of larger farmers to more easily contribute cost-sharing funds to watershed projects often means that lower reaches of the watershed, where larger private farms tend to be located, may be treated first and/or have higher levels of investment funds directed to them. There are few data available from past and current watershed projects to assess the scope of this problem, but it would be important to do so because of the impact it might have on the efficacy of current projects in addressing downstream environmental impacts. Current government and donor-funded projects try to compensate the reduced investment flows to poorer and more disadvantaged community members by giving them priority for project labor opportunities, and encouraging them to participate in self-help groups where income generating activities may develop. But as will be seen later in the report, this does little to provide long-term solutions to negative externalities originating from land-use practices in upper watershed areas.

57. Clearly, two kinds of analysis are required; a cost-benefit analysis on the technical investments such as civil works, and a broader socio-economic analysis that looks at household income changes and equity issues. But to undertake high quality analysis, better data from across a range of watershed sites in India is required either through a separate data collection exercise, or through improved project monitoring systems. The issue of sustainability also comes into play. If civil works are not maintained after the project, they will degrade and reduce the estimated project benefits. Varadan (2002) provided a stark comment on the sustainability of watershed programs,

²² A case in point is the Karnataka Watershed Development Project, where in most districts covered in the project, more than 90 percent of soil and water conservation expenditures have been directed to private land, with the remainder on common lands. A significant share of the project investments on private lands were on larger farms, as a result of owners being in a better position to provide their cost-share contribution.

when he indicated that by the end of the eighth plan period, 16.5 million ha of rainfed /degraded land had been developed under different watershed schemes, yet the area of net sown land had not increased. According to the author, this suggested poor sustainability. The urgency of undertaking more rigorous economic analysis based on improved monitoring data is mandated by the huge public investments taking place through watershed development. The high level of current annual investments suggest that GOI needs to put more emphasis on rigorous analytical work to help prioritize watershed project siting, physical treatments, and add an economic dimension to the issue of externalities, which is discussed in the following section.

Conceptualizing Externalities in Watershed Development

Key Characteristics of Externalities

58. This section briefly introduces the concept of externalities and discusses general approaches to ‘internalize’ them or, in other words, make those who generate externalities account for their effects on others. An externality occurs when ‘the activities of one person affect the welfare or production functions of other people who have no direct control over those activities’ (Dorfman and Dorfman 1977). Externalities can be either positive or negative and represent a form of market failure when the price mechanism does not account for social costs and social benefits²³ of private production and consumption. For a given economic activity or decision by an individual, there is a divergence between the private costs (or benefits) that the individual would recognize, and the social costs (or benefits) incident on other groups in society. The decision-maker does not bear all the costs of his/her actions (negative externality), or alternatively does not capture all the benefits generated (positive externality). Externalities represent an inefficient economic situation.

59. As an example, if one person has a nice garden, which is pleasing to see, it generates a positive externality for neighbors because it improves their welfare at no cost to them. They enjoy improved aesthetics and perhaps the fragrance of the flowers for free. The social benefits exceed the garden owner’s private benefits, and he/she is unable to capture monetary values from these additional benefits. On the other hand, if the person’s garden is full of weeds and rubbish, it is displeasing for neighbors and generates a negative externality. In this case, there is a divergence between the garden owner’s private costs and the broader social costs imposed on neighbors. There are no market price signals or other mechanisms to make the garden owner clean up my garden and thereby reduce the negative social costs. Similarly, imagine a paper mill next to a river with fisheries upstream and downstream. When the mill dumps chemicals into the river it imposes a negative externality on the fishery downstream because it may slow the growth of the fish stock or cause mortality. The mill’s costs and returns do not account for the external costs of water pollution. On the other hand, the pollution can raise the production costs of the downstream fishery. Meanwhile, the upstream fishery is not affected. Paper mills need clean water for production. Economic activities further upstream, say additional industrial producers, could impose externalities on the paper mill and fisheries. If the mill owners paid the upstream industrial polluters to protect the quality of water flowing toward the mill, this would create a positive externality for the fishery just upstream of the mill, since the improved water quality could increase fish stocks and reduce average fishing costs.

60. Four key factors combine to make these examples of externalities. First, in each example, there are at least two separate parties. Second, in each case, one party’s welfare was impacted by the other’s activity. Third, the affected party had no control over the other party’s action. Fourth, there was no compensation paid. People impacted by negative externalities were not compensated by the other party for the loss in welfare. Similarly, people enjoying positive externalities did not pay the other party for these benefits. If any of these four factors did not hold there would be no externality. Considering the garden, if I had no neighbors, the beauty or ugliness of my garden would affect only me. If the view in question were that of a mountain rather than my garden, there would be no externality because the mountain was there naturally, not as the result of anyone’s activity. And if my neighbors paid me to keep my garden looking nice, there would be no positive externality since the

²³Private costs and benefits of an activity are those affecting the person who undertakes the activity. Social costs and benefits are those that affect everyone, including the one who undertakes the activity but others as well. By definition, externalities are characterized by a difference between private and social costs/benefits.

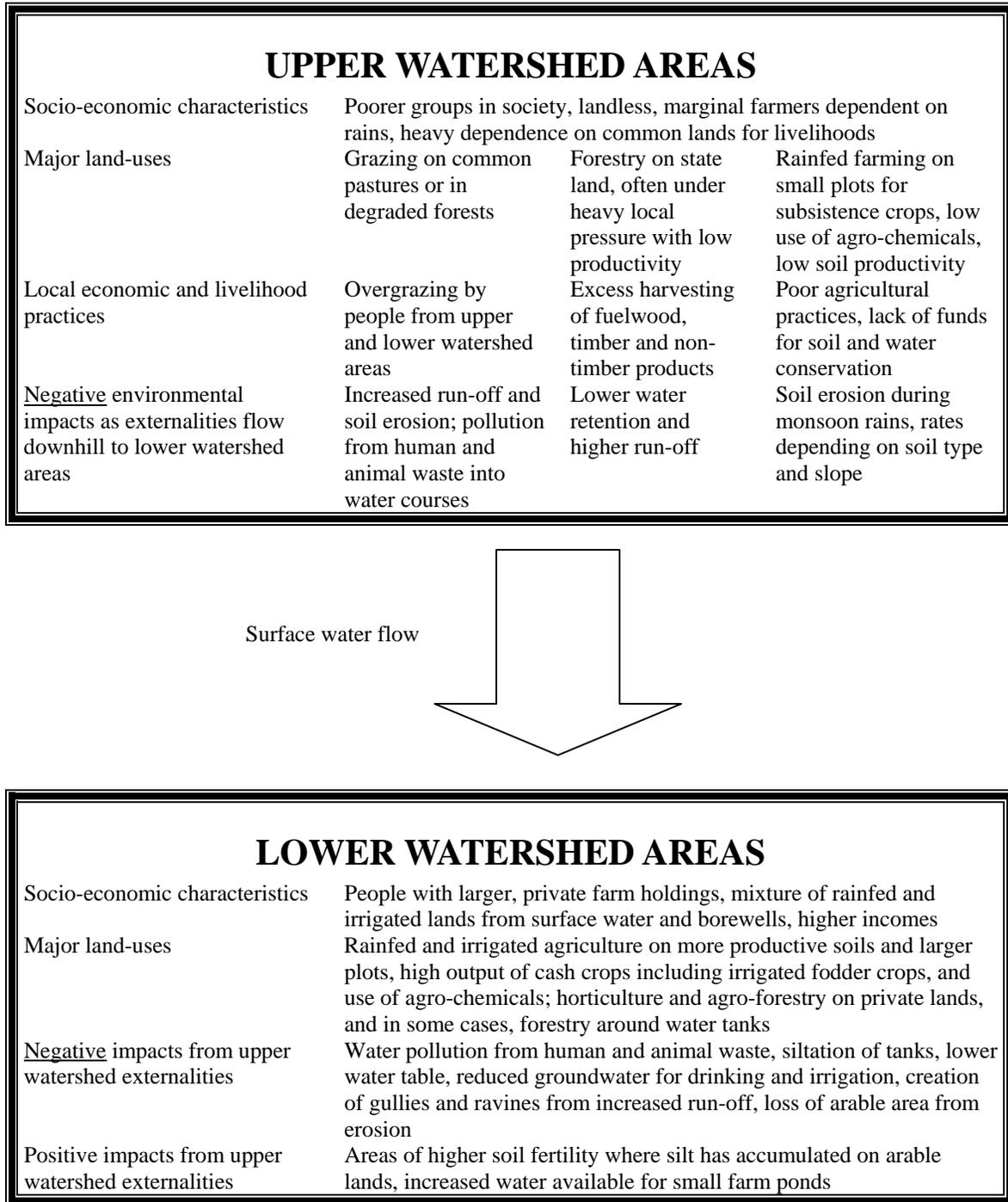
neighbor did influence my action by compensating me for the amenities he or she enjoyed. Another case would be if I paid my neighbors to put up with the negative externalities of a messy garden. The externality would also disappear if a city ordinance required me to keep my garden neat and I had to comply as a matter of law. A similar situation holds for the paper mill and the fisheries. If the paper company owned the downstream fishery, it would aim to adjust the level of pollution to maximize the combined net income of output from both the paper mill and the fishery. Or, if the fish were immune to emissions from the factory, there would be no relationship between the mill's pollution, the growth of the fishery, and the fishing production costs. If the factory compensated the downstream fishery for reducing its productivity (or for the higher fishing costs), the externality would disappear. Finally, legal provisions establishing either the mill's right to pollute or the fishery's right to clean water would resolve the externality by recognizing one party's control over the situation.

61. In the examples given so far, one party's activity takes place without restraint and affects another's welfare in the form of the externality. Specification of rights that suddenly restrained the offending activity, could change the direction of the externality. Consider the example of cigarette smoking in a restaurant. If patrons are allowed to smoke without restriction, it imposes a negative externality on nonsmokers who may be sensitive to smoke and wish to visit the restaurant. However, if the restaurant changes its policy and makes smokers go outside the building to have a cigarette, the externality is suddenly reversed. Smokers will not enjoy the restaurant as the new policy will have imposed a negative externality on them.

Watershed Externalities

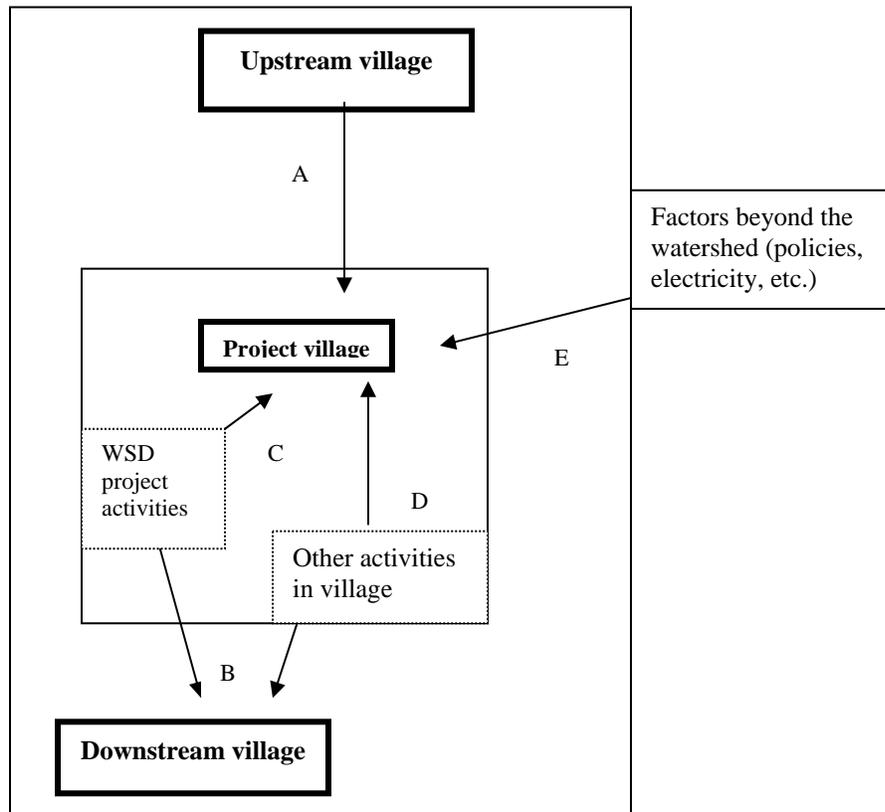
62. As introduced in Section 1, two sources of natural resource management problems in a watershed context are linked to externalities: biophysical (including hydrological) and socioeconomic. The biophysical problems stem from interconnectedness of land uses and productivity of resources between upstream and downstream areas. The socioeconomic problem results because these spatial biophysical relationships transcend land and resource access/ownership boundaries; any given land use in the upper watershed will usually generate unevenly distributed costs and benefits among people living in the lower watershed. A good example is where serious deforestation in the upper watershed leads to increased seasonal water flows and erosion in the lower watershed. Given these biophysical and socioeconomic characteristics, it is challenging to create effective incentives for collective action to maximize the overall productivity of natural resources in a watershed. If a watershed were owned by one person this problem would disappear. Socioeconomic factors complicate watershed management in any situation where there are multiple owners. Add Indian context issues such as poor people who don't own land but live in the watershed and use common resources, and the situation becomes even more complex (figure 3). It is clear from figure 3 that the main concern with watershed development is how to deal with negative externalities generated from upper watershed areas and incident on lower watershed areas. Taking this logic an additional step, externalities will also be created by economic and livelihood activities in the lower watershed, which will impact on people living even further downstream, for example through pollution of ground and surface water systems due to agro-chemical use associated with more intensive agriculture.

Figure 3. Upper and lower watershed linkages and typical externalities



63. Introduction of WSD programs may simply reverse the direction of the externality. The typical WSD package in semi-arid India involves re-vegetating uplands to slow the rate of runoff, building water harvesting structures in streambeds that impound water to encourage groundwater recharge, and constructing bunds (or earthen barriers) across gently sloping farm fields to slow runoff. A critical factor in this WSD approach is to reduce or prohibit grazing and timber harvesting in the upper watershed in order to give vegetation a chance to regenerate. In the absence of compensation to people using these upper watershed resources (often poor and landless), this WSD approach immediately reverses the direction of the externality. Figure 4 demonstrates these spatial relationships in the context of a hypothetical watershed project in an area that contains three villages, in the upper, middle, and lower watershed, with a primary focus of the project on the middle village. Watershed relationships are framed in the context of other factors affecting conditions in the village. Arrow A shows effects of upstream activities on conditions in the project village, while Arrow B in turn represents the effects of activities in the project village on the downstream village. Effects represented by Arrows A or B could be land use practices that affect erosion, runoff, groundwater recharge, or access to certain resources; they could also result from a watershed project or from other activities. Arrow C represents within-village effects of watershed project activities, while Arrow D represents other activities in the village that also have a local effect. Finally, Arrow E represents remote activities that do not have a direct spatial effect on the village but affect local natural resource management and its accompanying externalities. These could include policies related, for instance, to groundwater pricing or electricity pricing.

Figure 4: Spatial framework of watershed externalities with a watershed development project



Internalizing Watershed Externalities

64. The WSD challenge is to improve management of the watershed natural resources and ensure that existing externalities contributing to environmental impacts are addressed rather than simply reversing the direction of the externality. For positive externalities, this involves ensuring that those who may provide them have an incentive to do so. For negative externalities, institutional and economic arrangements need to be designed so that people undertaking activities that impose externalities on others are made accountable for these impacts. In the watershed case, the economic returns arising from a natural resource management/land-use decision should incorporate costs and benefits not only incident on the individual(s) making the decision, but also those incident on others who are affected. In the language of economics, this is termed “internalizing” an externality. An optimal point is reached when the marginal net private benefits accruing to the person undertaking an activity (and generating an externality) equal the marginal social costs, which are the costs that the activity imposes on others (Pearce and Turner 1990). Further, the action should be Pareto optimal, meaning that it should maximize overall welfare of all people in watershed without making anyone worse off than before. It implies that, for example, if improving the productivity of a watershed requires prohibiting grazing in the upper reaches, then the people who stand to lose from the grazing ban should be compensated to maintain their welfare level. Arguments for addressing watershed externalities, particularly negative externalities, can be based on both equity and productivity criteria. On the equity side, land use restrictions that impose burdens on a particular group of people can be seen as unfair. This is particularly so in the case of land use restrictions in the upper watershed, since the poorest people depend most heavily on marginal arable lands and/or common pasture and forest resources. On the productivity side, restricting access to the upper watershed to facilitate vegetative growth may maximize the overall productivity of the entire watershed, but if poor people are not compensated, they may refuse to abide by the restrictions. This will prevent the productivity gains from occurring.

65. A number of approaches exist for internalizing externalities (Hueth 1995; Gibson 1996; Milne 2002; Pagiola and Platais 2002). These include: 1) moral suasion and social conventions; 2) mergers; 3) regulatory limits and economic penalties; 4) taxes on negative externalities; 5) subsidies; 6) indirect incentives; 7) strengthened property rights and liability systems; 8) creating markets for externalities; 9) payments for environmental services; and 10) creating markets for environmental services. Many of these approaches can be (and typically are) used in combination with each other. These are briefly described below along with examples of application from India and other regions:

66. ***Moral suasion and social conventions:*** This approach consists of activities that encourage private individuals to internalize negative environmental externalities as a matter of doing the right thing. These activities can include public awareness programs, capacity building and training. The approach relies on voluntary changes in behavior, and to some extent a willingness to bear incremental costs, to achieve environmental improvements and thus reduce negative externalities affecting public goods such as air and water quality, and solid waste management. Box 8 describes such a program to reduce littering in the United States. Other successes evident in more developed countries include voluntary recycling and reducing pesticide use in home gardens. Moral suasion and social conventions can be an important component in efforts to improve natural resource management. However, it is

Box 8. Give a Hoot, Don't Pollute

In the United States in the 1960s, campaigns to discourage dumping of trash combined penalties (fines) with an educational campaign on why littering was wrong. The campaign, which exhorted people to “Give a hoot, don't pollute,” was extremely successful. While the fine may have been a particularly important deterrent in the early years, today it would not even occur to most people to dump trash in the open because it is seen as morally wrong with wider impacts on society.

limited as a stand-alone approach to watershed development, especially where it contradicts economic incentives. Changing mindsets and social norms is always a gradual process. Also, low income groups, marginal farmers and landless people may find it difficult to absorb higher economic costs of alternative production systems. Further, in common areas with an open access situation, there may be less inclination to modify behavior such as reducing grazing pressure, given the uncertainty that other users may not follow suit. However, a logical recommendation is that WSD programs include a component to educate villagers about externalities and trade-offs.

67. Another form of moral suasion can apply among groups of villagers who appeal to each other for fairness. Some NGOs, such as MYRADA in Karnataka, help organize villagers into self-help groups to work toward common objectives such as savings and credit (Fernandez 1999). The groups are often affinity-based, i.e. they contain people with common backgrounds and common objectives. MYRADA's approach is to help them learn to get organized, both to help directly with the problem at hand such as learning how to manage savings and investments, but also indirectly, so that they are in a better position to negotiate with other. This in turn can help them apply moral suasion to other groups.

68. In India, moral suasion components and social conventions of watershed development can be found widely in small scale programs. Among NGOs, moral suasion may be the most widely pursued approach to encourage equitable solutions to internalize externalities. In Maharashtra and some other states, for example, projects have drawn upon the social tradition of *shramdan* or voluntary community labor to undertake labor intensive watershed investments, maintain certain physical structures and vegetative measures, and provide guard duty against intrusions on protected vegetation. This approach has been documented under the Indo-German Watershed Development Program (IGWDP) (Farrington and Lobo 1997) and Adarsh Gaon Yojana (AGY or Ideal Village Scheme) (Hazare et al. 1996). Similarly, in both of these programs a moral appeal is made to watershed inhabitants not to exploit common pool resources for disproportionate individual gain. Seva Mandir, an NGO active in Udaipur district of Rajasthan, appeals to people's sense of personal responsibility to refrain from intruding on common pastures under regeneration (Kerr and Pender 1996). Under Seva Mandir's projects, the job of guarding the common pasture rotates daily among all the villagers. Religious imagery is used to convey the idea that protecting the pasture is a sacred duty that must not be forsaken. Every day a "sacred" staff is passed from one member of the village to another, and it is the responsibility of the bearer to protect the pasture. Villagers reported that they took protection of the Seva Mandir pastures much more seriously than those developed by a nearby government project, where a guard paid under the project was responsible for protecting the pasture. In Bank-funded WSD projects, education and awareness programs for participants are an important part of project design. Programs try to help people understand the impact of their individual land-use decisions on others in the watershed.

69. **Mergers:** Encouraging parties involved in negative production externalities (those generating the externality and those bearing the costs) to merge, would provide an institutional framework to internalize the negative effects (box 9). In the example of the paper mill and the fishery, if both economic activities were merged, or undertaken by a common owner, the joint production decisions would take account of the impact of mill water pollution on fish production. An efficient solution would have the marginal cost of pollution abatement equal the marginal benefits of improved fish production. Can this work in watershed development? While a merger in its pure form may seem unrealistic in densely populated Indian watershed characterized by multiple and often conflicting land uses, some of the most successful watersheds have used a variant of this approach. In particular, the key social innovation in the famous Sukhomajri village watershed in Haryana was to share the ownership of water, forest and pasture resources among all inhabitants of the village, regardless of whether they owned land (Kerr 2002). Proceeds of forest products such as bhabbar grass (used in rope

making) were also distributed evenly among all households. This approach gave everyone an intrinsic interest in protecting the upper catchment, both for the forest products and the environmental services it provided. The Pani Panchayat program of western Maharashtra followed a similar approach; all members of a lift irrigation program owned equal shares of water on a per capita basis; this gave everyone an incentive to protect the water source. In principle, turning water into a de facto common property, owned by all watershed inhabitants could be a good way to merge interests and help internalize externalities. However, in practice it is very difficult, despite the two outstanding cases of Sukhomajri and Pani Panchayat. Many attempts have been made to replicate the Sukhomajri program. While a small number of villages in nearby areas took up the same approach, elsewhere it has not proven feasible to establish joint ownership rights over water. Where the watershed is large, characterized by many small land owners and landless people, combining all the different actors into a collective system of production where decision-making is shared and binding, would be extremely difficult. Another problem with a merger focused around water is that landowners may refuse to share water, let alone pay a fee for withdrawals; water is often regarded as a public resource, free of cost²⁴.

Box 9. Mergers

Managing watersheds would be much simpler if people didn't live in them. In Arizona in the arid southwestern United States, there are major efforts to harvest water from hillside runoff. In this case watershed management is just a technical problem, since the land is barely used and contains no occupants. Watershed management can never be so simple where the land is densely populated, but if water and common land resources were owned jointly by all occupants of a watershed, at least they would all share a common interest in how it was managed.

70. **Regulatory limits and economic penalties:** This approach is often characterized by the traditional 'command and control systems' for air or water pollution, and particularly for highly toxic pollution. One example is where the government will establish ambient and point source pollution limits, followed by a system of fines for people or organizations exceeding these limits. Heavy fines provide an incentive for compliance but in the absence of effective monitoring and enforcement, also create an incentive to illegally dispose of the waste materials. In developing countries, while strict laws and regulations over emissions or solid waste management may exist, there is usually weak government capacity for monitoring and enforcement for this approach to succeed. In rural areas, this capacity is especially weak or non-existent, making effective monitoring impossible. Despite these constraints, examples have existed in WSD. Pretty and Shah (1997) document approaches taken in Sub-Saharan Africa and South Asia whereby farmers were obliged under law to adopt terraces and other practices, or face various penalties. In all of these cases, the stimulus for conservation programs was widespread concern that soil erosion would sweep through the countryside, with disastrous consequences both on- and off-site. In Ethiopia in the 1980s, terracing programs covered 1.5 million km under compulsory programs that sometimes offered compensation (Pretty and Shah 1997). These government-driven approaches have largely been unsuccessful as a long-term solution to address conservation and negative externalities. As Pagiola et al. (2005) point out, regulatory approaches are impractical in the case of highly dispersed non-point sources. Monitoring a large number of land users, each contributing only very slightly to what becomes a large externality in the aggregate, is not feasible. They cite the fact that although many countries forbid cutting trees or cultivating land above a certain slope, these laws have proven impossible to enforce.

²⁴ This perception is compounded by policy in some states such as Andhra Pradesh, which after the recent national elections have announced that electricity for irrigation would be free, thus encouraging farmers to dig borewells and pump additional water from their land.

71. While regulatory approaches are unlikely to work as a matter of state policy, they can be an important part of local, community-level arrangements. Where the monitoring and enforcement can be transferred to communities, a simplified regulatory approach for certain environmental issues such as overgrazing or deforestation, can work. Informal community institutions and management structures have been successful in restricting harmful activities that can cause externalities, for example with Joint Forest Management (JFM) in India where communities protect forests from unregulated harvesting. There is also a traditional policy that livestock found illegally grazing are impounded by the Panchayat and returned to their owner only upon payment of a fine. Many NGOs aim to build on this tradition to form practical local approaches for improved land management. According to Kerr and Pender (1996), some villages report charging very high fines to act as a deterrent against grazing, while others charge low fines in hope of collecting revenue from offenders. While these approaches have shown promise in some locations, they suffer from the weakness that they may not always be backed by the law. Matta (2003) cites a case in Tamil Nadu, India, where the president of a village's JFM committee tried to impose a fine on someone who had intruded into a protected forest. The JFM authorities encouraged such arrangements but the local police were not aware of it, and they arrested the JFM committee president for taking the law into his own hands.

72. **Taxes on negative externalities:** Another approach to internalizing externalities is for the government at some level (national, state, or local) to introduce corrective taxes that alter the incentives for undertaking activities that produce an externality. Taxes increase the private costs of the activity to reflect the social costs imposed on others. In economic terms, a tax equal to the marginal cost of environmental damage from the externality shifts the supply curve of the production activity up, causing an increase in price and reduction in demand. Production will decline to match the change in demand, thus resulting in less environmental damage. Taxes raised can then support improved monitoring and enforcement in a regulatory 'command and control' system. A tax on negative externalities essentially follows the polluter pays principle. This is distinct from the approach of banning an activity with enforcement through the threat of financial penalty. While the taxation approach has been used with some success in air and water pollution in developed countries, in the context of watershed management and externalities, there are several limiting factors. First, it can be extremely difficult to trace the downstream environmental impact of activities by any one individual, among all the small land holders and resource users. Second, even where a system could be implemented, the gainers may be difficult to identify, while the losers could generate political support against the tax. Politicians are not likely to favor new taxes. Third and most important, applying a tax system in a situation where people living in a watershed are not paying any taxes is a non-starter.

73. There are constraints to making externality taxes work at a large scale, on a small scale they are common in India. In particular, some projects have introduced user fees on common resources, with the fee charged in proportion to the amount of use. This can be considered a form of tax. The World Bank-assisted Integrated Watershed Development Project (Plains), or IWDP, encouraged villages to implement fee-based systems for access to common pastures (Kerr and Pender 1996). The idea behind this approach was to raise the cost of grazing (and discourage overgrazing), instill a sense that the productive common pasture was a valuable resource, and help the village raise money for further investment in protection and maintenance of the pasture. A survey of 87 villages in the project area found that a few villages in Bhilwara district of Rajasthan had adopted such a system, devoting the proceeds to construction of a new village temple or other small investments supported by the villagers (Kerr and Pender 1996). In the Sukhomajri village watershed cited earlier, those who utilized irrigation water from the catchment pond at the bottom of the watershed had to pay a fee commensurate to the amount of water used, with the proceeds divided evenly among all households.

74. **Subsidies:** Subsidies have long been used as a mechanism to change behavior and encourage adoption of alternative management practices.²⁵ In the watershed context, subsidies to encourage people to adopt soil conservation practices or plant trees provided free or at minimal cost are familiar examples. It is important to note that such payments could be input based, i.e. it covers the costs of installing a conservation measure or planting trees, or performance based, i.e. payment is made only if successful soil conservation or afforestation actually takes place. Reliance on subsidies to promote conservation investments such as terraces and bunds is found in government programs worldwide. Typically such programs help pay for the cost of installing the conservation measures itself, to cover materials, labor, etc. In developing countries including India, such programs often fall under Food for Work (FFW) or other employment programs.

75. Subsidies for soil conservation have a poor performance record (box 10). It is difficult, given the shortage of monitoring data, to know whether poor performance is intrinsic to the subsidy approach or if it can be avoided with good program design (Sanders et al. 1999). Holden et al. (2004) examined the prospects of FFW programs to promote sustainable land use, using empirical evidence from Ethiopia. They concluded that FFW can potentially contribute to long term development, but that poor design and implementation can easily lead to the opposite result. They recommended careful targeting at investment in relevant land conservation problems, appropriate technology design based on local participation, local involvement in implementation and maintenance, and good timing of projects to minimize labor competition with other constructive activities. Often such conditions do not hold; for example, research around the world has found that farmers often reject recommended soil conservation practices that do not fit well into existing farming systems (Reij 1991, Fujisaka 1990).

Box 10. Plant trees this year, replant them next year

Everyone is familiar with tree planting projects that succeed in getting seedlings into the ground but do not result in successful afforestation. In some cases local people's main interest in planting trees is the payment they receive for doing so. Lack of interest in maintaining them, particularly where environmental conditions are harsh or grazing pressure is intense, will likely lead to high mortality rate of trees. Clearly the initial subsidy for planting the trees cannot ensure that they survive in the future.

76. The performance-based approach is growing rapidly throughout the world and will be discussed below. In India, however, investment subsidies are the most commonly used mechanism to encourage soil conservation. Subsidies to farmers for conservation investments are often offered on a cost-sharing basis for selected activities. They rest on the initial lack of reconciliation between private and social gain, aiming to ensure that the private benefit (including the subsidy payment) exceeds the private cost.²⁶ The Indian experience has shown a number of shortcomings. First, some subsidies may effectively cover close to 100 percent of the investment cost. Farmers may invest in the conservation measure, for example planting trees or building bunds with no intention of maintaining these assets later (Kerr et al. 1999). Second, subsidies are often tied to particular practices, so they may result in stifling local initiative (Pretty 1995). Third, subsidies may be wasteful if there are other feasible approaches to internalize watershed externalities. Fourth, subsidies have also been used to 'coerce ignorant farmers to do what the project management know is best' (Smith 1998: 2). This has led farmers not to expect any benefits from such programs apart from the cash input; it has engendered a 'tendency amongst farmers to expect subsidies from the government or other sources

²⁵ In the context of industrial pollution, theoretically conditions could arise where targeted subsidies can replace taxes to internalize negative externalities. These conditions include zero transaction costs in the regulating agency and restricted entry into the market. In reality, such situations do not exist.

²⁶ Technically speaking, the idea is to raise the marginal net private benefit to the point that it is equal to the marginal net social benefit. Thus, even if an activity is privately profitable for farmers, a subsidy could be justified to raise its profitability even more in order to achieve even higher social benefits.

for carrying out SWC works, often refusing to carry out necessary maintenance unless they are paid to do so.²⁷

77. **Indirect incentives:** At a more practical level, indirect incentives are often used in watershed management projects in many forms, including food, employment, provision of inputs, access to credit and rights to use other resources. Sanders et al. (1999) reviewed a variety of approaches to create indirect incentives for farmers to invest in soil conservation. These included direct subsidies but also other types of indirect incentives. They found that indirect incentives are far more important than direct subsidies if they create conditions that encourage investment. This is particularly the case for investments that yield private as well as public benefits. Examples include fiscal and legislative measures such as tax incentives, guaranteed inputs and input prices, and improved land tenure arrangements. Services such as extension, technical assistance, and education and training are also important in raising the capacity for people to conserve resources. Investments in social services, community organization and the decentralization of decision making all had a positive impact.

78. Where conservation provides primarily off-site benefits, indirect incentives have been less effective. Faced with the widespread failure of regulatory approaches to protect natural areas, in the late 1980s and early 1990s a number of programs emerged in which various development benefits were offered to local people in exchange for protecting nearby natural areas. The intention was to develop other forms of livelihood and make exploitation of natural resources less attractive. This approach has not enjoyed widespread success, mainly because of a lack of connection between compensation and cessation of the harmful activity. In particular, short term project employment and various non-land based development measures such as skills training and credit provision have no conceptual link to beneficiaries' incentives to refrain from utilizing natural resources. Local communities receive development benefits whether or not they actually stop exploiting the natural resources.

79. Ferraro and Kramer (1995) addressed this issue in the context of Integrated Conservation and Development Projects (ICDPs), which offered people living on forest fringes various development benefits in exchange for refraining from deforestation. The authors pointed out five ways to affect household behavior to conserve biodiversity in these contexts:

- Compete for labor currently allocated to destructive activities by offering other employment opportunities that are more remunerative and less destructive.
- Compete for capital such that investing capital in alternative activities is preferable to investing in destructive activities.
- Compete for threatened biodiversity, i.e. introduce alternative uses of biological resources such that conserving it is more profitable than depleting it.
- Offer new information to people to demonstrate how they can benefit from biodiversity conservation
- Promote household preferences and local knowledge for conserving biodiversity

80. The same study also suggests that attaining any single one of these objectives may not be sufficient to achieve the overall goal of preserving biodiversity. For example, a successful program to make labor more profitable in alternative non-destructive uses may simply provide the participant with cash to hire additional labor or capital to carry out destructive activities on his/her behalf.

²⁷ Since Indian watershed projects double as employment programs and local contributions are deducted 'at source', i.e., before payments are made by the project to the group of laborers engaged to carry out works, poor laborers often end up paying for this 'mandatory contribution', either through a cash payment or agreement to work at wages below posted levels. This is particularly inequitable given that landowners, not laborers, may enjoy the longer-term benefits of the conservation investments.

Creating employment opportunities in a forest fringe area may lead to higher wages, which can attract migrants from other areas who will use the forest. Competing for biodiversity, making conservation more profitable than exploitation, is theoretically the *best* approach since conservation and destruction are mutually exclusive, but it raises various problems related to collective action and free-riding: even if conservation is more profitable for a community as a whole, any given individual may have an incentive to quietly engage in destruction, especially where access rights are poorly defined. Ferraro and Kramer concluded that ICDPs often fail because they are unable to achieve enough of the five mechanisms for making resource conservation preferable to destruction (box 11). Brandon et al. (1998) concurred with this observation and identified other problems as well, such as lack of cooperation among local people, the difficulty of defining different sets of incentives and disincentives that work for a diverse range of stakeholders, and the shortage of local management capacity, among other things.

81. Indian watershed projects are known to rely on a number of indirect approaches for compensating people for refraining from activities that cause negative externalities. Most prominent among these is providing project employment to those who are asked to refrain from using uncultivated upper watershed lands for grazing and fuel collection. It is readily apparent, however, that this approach does not address any of the five conditions suggested by Ferraro and Kramer (1995). It fails to compete for labor because other family members can still exploit the upper watershed, or people can go to

Box 11. Why indirect incentives are not the right incentives

It's easy to see why the indirect incentives provided by an ICDP might not help protect an adjacent forest. Imagine if an ICDP provides funds and training to a group of local people to buy sewing machines and set up a tailoring business. If things go well and they start making money, several things might happen. First, with their earnings they might be looking for new investment opportunities. One possibility would be to buy a chain saw and hire others to clear the forest on their behalf. Rising demand for labor for any form of economic activity might lead to an influx of migrants looking for work; some of them might find that their best option is to clear land in the forest. With a rising population, pressure on the forest might be greater than ever. One might conclude that the best approach to combine development and forest conservation would have been to create new employment opportunities as

restricted areas after hours, or animals can graze under someone else's supervision. The watershed plus approach popularized under DFID-sponsored projects faces similar shortcomings in the incentives it creates to reduce pressure on upper watershed areas. In particular, the watershed plus approach was developed in recognition that watershed development, as an area-based land improvement program, risked skewing benefits primarily to landowners. In principle, the non-land based activities (NLBAs) under watershed plus are to be introduced in conjunction with efforts to encourage villagers to share the benefits of improved natural resource management, but these two things are separate and the latter is difficult to negotiate. Turton acknowledges concerns that 'watershed plus' risks being just a way to offer side-benefits to poor people while the benefits of watershed development bypass them. Caution must be exercised to prevent non-land based activities from being used as placatory devices for the poor while powerful local interests appropriate the real benefits from watershed development. The widespread optimism amongst government officials and policy makers therefore that the poor would benefit 'later' because the common property resources on which they rely on will eventually become more productive, is largely misplaced. In this context, where equitable access to common areas and fair share of usufruct rights offer more sustainable

solutions in the interests of the poor, non land based activities may be a smokescreen to cover up the negative, anti-poor effects of land-based activities.²⁸

82. An additional concern about NLBAs is when they are provided to newly-constituted groups of the poorest of the poor, as is the case of the World Bank's District Poverty Initiative Projects (DPIP) in Andhra Pradesh, Rajasthan and Madhya Pradesh. Given that these people are the poorest, often illiterate, and without much exposure to business practices, for example production and marketing from poultry rearing, basket making or leaf pressing, the chances of the group surviving the vagaries of the local market and competition are not always high, especially if there is no sustained technical and business advisory support beyond the project. The possibility of failure increases when the activity itself is new to the area, since there are often good reasons why existing rural capital, in the hands of experienced business interests, has not been invested in that activity (James, 2004). And the cost of learning this lesson may in fact drive potential beneficiaries not only out of business but also into debt.

83. ***Strengthened property rights and liability systems:*** The creation and enforcement of efficient property rights can contribute toward internalizing externalities, if coupled with an effective legal system where damage from off-site third parties can be addressed through the courts. This system certainly works to some degree in most developed countries. However, in many developing countries, property rights in rural areas are not efficient. The case of common lands is even more problematic. Further, the legal system may not be robust, objective or above corruption. In the Indian context, while efficient property rights exist for private farm owners, it would be pointless for one group of land users within a watershed to seek legal redress against others whose land use system imposes negative externalities. Establishing and strengthening laws covering the rights and responsibilities of users of land and other natural resources could reduce conflicts and lead to internalizing externalities. Laws to discourage private exploitation of groundwater at the expense of others could make it easier to organize mechanisms such as the one in Sukhomajri.

84. ***Creating markets for negative externalities (cap and trade systems):*** In this approach, the responsible authority (Government) would initially identify a target level of allowable emissions based on an ambient environmental quality standard in a given geographic area. Discharge rights equivalent to the total allowable emissions are allotted to individuals or firms through permits that allow the owner to discharge a specified amount of pollution. Anyone producing emissions below their permit allocation through improved environmental management or reduced production, can then sell their excess pollution rights to others who wish to produce emissions above their allocation. In this approach, unlike taxes and subsidies, authorities do not need to estimate private marginal abatement costs and set an efficient tax or charge. With tradable permits, the market will determine the optimal price for a unit of emissions. In the United States, an SO₂ emissions program for power plants nationwide replaced a command and control program in 1995. Emissions from the largest polluters fell by 45 percent in the first year of the program with 100% compliance, with an estimated overall cost savings of 50 percent compared to a standard command and control program (Ellerman, 2002). Critical features of cap and trade approaches are that they require the ability to monitor emissions, and participants in any given program, falling under the same cap, must contribute to the same overall pollution or externality problem.

²⁸ Earlier it was mentioned that some projects organize people into self-help groups that, among other things, help them develop organizational skills for collective action to demand better land use management from others. While this approach has merit, many current "watershed plus" style projects promote self-help groups concurrently with watershed development rather than long before watershed development. In this case development of organizational skills would come too late to support negotiation of how watershed development is to be undertaken.

85. This approach has worked successfully in some developed countries, and it offers promise for the emerging global carbon emissions market to combat global warming (Daily and Ellison 2002). However, except under limited circumstances, the application to watershed management in rural areas in developing countries is doubtful. For a given watershed, the authorities would have to identify an acceptable level of environmental impacts, for example aggregate soil erosion. It is extremely difficult to measure each land user's contribution to an overall negative externality, and land users would have a strong incentive to avoid restrictions if at all possible. Individual farmers would need to know their level of soil erosion and be able to measure change over time, for example if farm production dropped one year, or new technology was introduced that reduced soil loss. Enforcement costs could be very high.

86. The special case under which this kind of approach works in watershed development concerns situations where watershed inhabitants divide up scarce resources among themselves. In many projects, at the end of the rainy season protected pastures are opened up for each household to harvest a share of the pasture grass, with restrictions against overharvesting. Households can sell their share to others if they don't need it. A similar arrangement operated in Sukhomajri, where each household had the right to a share of water; some opted to pay for additional shares while others gave up their share for additional cash. These systems are not exactly the same as cap and trade but they are analogous.

87. **Payments for environmental services:** Natural ecosystems provide a wealth of direct and indirect benefits including valuable environmental services such as hydrological stability, reduced sedimentation, biodiversity conservation and carbon sequestration. People who use natural resources, particularly those in rural areas in developing countries, often have little incentive to conserve natural ecosystems based on downstream impacts. A number of innovative approaches have been developed in recent years to provide payments to people living near valuable natural ecosystems in return for

their assistance and cooperation in conserving these assets (Landell-Mills and Porras 2002, Pagiola et al. 2002). In the watershed context, there is sound logic for people in lower reaches of the watershed to pay people in upper reaches to change destructive land-use practices. Globally, there are a number of examples of successful initiatives for payment for environmental service systems (PES)²⁹, including water conservation in New York City, watershed conservation in Mexico, Ecuador, Columbia, and Honduras, and biodiversity conservation in Costa Rica among others (box 12). In Mexico, the Payment for Hydrological Environmental Services program was founded in 2003 to pay for upstream forest conservation that would protect water services using revenue from downstream water charges

(Bulas, 2004). In Costa Rica, a government agency called the National Fund for Forest Financing (FONAFIFO) was established to act as a broker to pay land users for various environmental services, including watershed services, biodiversity conservation, and carbon sequestration. Sources of funds

Box 12. Payment for Environmental Services in Ecuador

In Ecuador in 2000, the city of Quito established a water fund called FONAG, supported financially by the water utility and the electric power company, to pay for conservation in protected areas where the city obtains its water (Echevarria et al.2004). The programs pay private landowners for maintaining forest cover on their land to deliver water services. Surprisingly, PES programs are spreading in Ecuador even though national legislation states that landowners are not allowed to cut their trees, and they do not own the water that flows from their property. In fact, all water technically belongs to the state, which grants people the right to use it. PES systems for watershed management operate despite this legal contradiction; this implies the reality that laws banning tree cutting are largely unenforceable, and that approaches compatible with land users' incentives stand the best chance of changing land use behavior.

Source: Echevarria (2004).

²⁹ The World Bank has been a driving force behind many of these initiatives, particularly in Latin America.

are a petrol tax on Costa Rican consumers, hydroelectric power plants that use water services, a grant from the Global Environment Fund to pay for biodiversity conservation, and international buyers of carbon credits.

88. The Latin America cases may or may not provide guidance for watersheds in India. Ecuador's experience shows that natural resources need not be assigned specific property rights before establishing a system to reward people for conservation (box 12).³⁰ On the other hand, Latin America's programs often operate in very sparsely populated areas, perhaps making them easier to administer than they would be in India. For example, Echevarria et al. (2004) describes a program in the town of Pimampiro in which payments are made to manage a catchment area of 638 ha with only 24 member households. In such cases the chances are higher that the benefits from internalizing watershed externalities exceed the transaction costs involved in doing so. With denser population the benefits would have to be spread more thinly.

89. Emerging PES programs in Southeast Asia may also offer lessons for India that are closer to home. The Rewarding Upland Poor for Environmental Services (RUPES) program was established in 2001 to address possibilities for PES mechanisms in Asia, with particular emphasis on potential for the upland poor to benefit (RUPES 2004). RUPES is led by the World Agroforestry Center in Indonesia with major funding from the International Fund for Agricultural Development (IFAD). The RUPES project is working with international, national and local partners in building working models of best practices for environmental transfer agreements adapted to the Asian context. The RUPES program takes an inclusive view of payment, including rewards that provide upland farmers with enhanced land tenure security in exchange for following land use agreements. This approach makes sense in areas where tenure rights are poorly specified and cash payments would be difficult to operate.

90. One of the key challenges with PES is to develop an effective long-term financing mechanism. Paying a farmer living in the upper watershed to adopt a conservation measure is administratively easy. But, the payment does not ensure long-term maintenance if it is simply a one-off subsidy. If the payments end, the farmer may revert back to more destructive practices. Afforestation programs worldwide that result in dead seedlings or uprooted trees after a few years testify that this approach does not create an incentive for long-term conservation. A mechanism is required to provide for long-term financial flows from downstream beneficiaries of the conservation activities, to the land user in the upper watershed who has to modify her/his land-use practices. In general, a fund can be created with inflows from beneficiaries (usually through taxes or resource fees and based on their willingness to pay for the environmental benefits or reduced externalities). Monitoring and enforcement becomes important; payment should only be made to the land users if the environmental performance is maintained. The payment for environmental services approach turns the cap and trade system on its head, offering compensation for positive externalities rather than requiring payment for negative externalities. In a sense it is a subsidy for conservation, with the key feature that it pays on the basis of performance rather than investment. Assuming that performance can be monitored, this approach is superior because it creates incentives to comply with the program rather than avoid it. Also, while measuring each land user's precise contribution to the positive externality could raise the efficiency of a payment system, acceptable performance can be achieved by simply paying all participants for improved land use that contributes an unspecified amount toward the overall objective.

³⁰ On the other hand, Echevarria et al. (2004) also cite arguments that the legal contradictions must be reconciled for the program to expand.

91. Two important issues recently have arisen in the literature payment for environmental services. First, there are concerns that PES mechanisms could aggravate poverty problems. Although inhabitants of uplands where the payments are likely to be targeted are often poorer than downstream users of water services on the whole (Pagiola et al. 2005), several factors work against poverty alleviation:

- High transaction costs make it more viable to enter contracts with the largest landowners;
- Larger landowners may be more able financially to afford the opportunity cost of turning land over to uses eligible for payment;
- The opportunity to receive payment may also cause landlords to evict tenants and shift to conservation land uses.

All these possibilities depend on local circumstances (Smith and Scherr 2003).

92. A second important concern in the literature is that PES systems may be developed on the basis of false assumptions about the nature of environmental services. As has already been discussed in this report, upstream-downstream hydrological relationships can vary with location, sometimes in ways that are not apparent upon casual observation. In addition, recent literature discusses the fact that assumptions about the effects of trees on water supply are often incorrect. Calder (2002) points out that often watershed programs plant trees in upstream areas with the intention of augmenting water supplies below, but their actual effect is the opposite due to increased evapotranspiration. The lesson of this problem is obvious, not only for PES mechanisms but for all kinds of environmental externalities: that the nature of the problem must be clearly understood before trying to implement a solution. For Indian watershed projects, the lesson is that hydrological assessments are needed to better understand water conservation, particularly regarding distinctions between effects of mechanical structures like check dams and different kinds of vegetative cover such as grasses or trees. As these are typically introduced jointly it is difficult to separate the effects of each.

93. ***Creating markets for environmental services:*** Extending the PES concept further, markets for selected environmental services can be created. By definition, this removes the externality since externalities occur outside of the influence of market transactions. The emerging global market for carbon credits provides an excellent example of market creation for environmental services. In recent years, laws and agreements, along with the threat of impending laws, have created an incentive for certain firms and countries to reduce the net amount of CO₂ that they emit. Firms can exceed their quota or target by purchasing emissions rights from others who are below their quota or target, or by purchasing carbon credits from those who can sequester carbon (remove it from the atmosphere) through appropriate land uses such as forestry.³¹ Two decades ago such an approach would have been impossible, partly because of the missing institutional arrangements that now create demand for reduced carbon emissions, but also because of the difficulty of facilitating transactions and enforcing contracts among scattered parties all over the world. Technical changes however, have made it possible to estimate carbon sequestration associated with many land uses. Both parties can come together in a market with low transaction costs, and monitor compliance through remote sensing, and new forest certification programs.³² In the context of watershed management, because watershed

³¹ Russia recently ratified the Kyoto Protocol, making the establishment of a global carbon emissions market a possibility.

³² The roots of an approach that brings parties to an externality together in a market setting are related to the famous Coase Theorem, which showed that in the case of two parties to an externality, assigning property rights to one or the other would result in the same efficient solution, assuming no transaction costs. The two parties would negotiate, with the one harmed by the externality paying the other incrementally to reduce the activity causing harm. An equilibrium would be reached where the marginal value of the payment offered by one party was equal the marginal cost to the other of giving up the activity. Changing the property rights affected who received the payment and who paid, but it did not affect the equilibrium position. Coase showed that as the number of parties increases, the transaction costs become so high as to be unmanageable,

users are highly dispersed, market mechanisms will always require some kind of broker to make transactions manageable. In Ecuador, small scale PES programs are developing into environmental service markets. Echevarria et al. (2004) describe the case of Pimampiro and Nueva America as market-based, drawing upon the demand of municipal water users in Pimampiro and paying suppliers in the upper watershed, with the municipal water service and other intermediary organizations acting as the broker. Payments by Pimampiro to land users in Nueva America are based on negotiations and perceptions of the likely impact on water services rather than actual technical measurements. The payments are quite small, ranging from \$0.50 to \$1.00 per month per hectare; they are made quarterly subject to maintenance of agreed land use practices.

94. This section has presented a variety of approaches to internalize externalities. Some are more practical than others for the case of watershed management, and international experience demonstrates progress toward sophisticated, practical, and potentially equitable approaches to encourage the provision of positive watershed externalities. Regardless of the approach used for watershed management and addressing externalities, a number of practical implementation criteria come into play that should be highlighted (box 13). It is important to keep in mind that multiple approaches can be combined. In India, some fairly innovative approaches operate successfully on a small scale in very isolated cases; the Sukhomajri example of shared property rights over water is perhaps the ideal but it has not been replicated beyond a few villages. Also, moral suasion, access limits with fines, and user fees all have been widely implemented on a local scale. National programs call for some of these innovative approaches, but actual practice is characterized by more conservative approaches with major theoretical and practical limitations. In particular, the most widespread approaches are direct subsidies for conservation investments that do not address concerns about long term sustainability, and indirect compensation that neither addresses the incentive to refrain from negative externalities nor avoids inequitable outcomes.

Summary of Common Approaches to Internalizing Watershed Externalities in India

95. Watershed projects in India begin with investments in soil conservation and re-vegetation of uncultivated lands in upper catchments and structures to harvest water. Since the early days of watershed projects in India, it has always been assumed that over the course of several years, watershed development would transform landscapes from low productivity to high productivity, and that the benefits of this approach would be neutral

Box 13. Criteria for identifying practical approaches for addressing negative externalities:

- Be administratively feasible, so that solving the problem is not prohibitively costly; transaction costs should be less than the cost of the externality being addressed;
- Ensures that the private and social costs and benefits around an externality are brought closer together;
- Provides a real incentive for people to stop pursuing the offending activity;
- Ensures that the reduction or modification of the identified activity can be maintained in the long-term
- Is feasible to track progress without major investments in upgrading monitoring and evaluation systems.

with respect to different types of land users and levels of affluence and poverty. (WARASA 1990, early World Bank project documents). Watershed development would regenerate uncultivated lands, making fuel and fodder abundant rather than scarce, and by expanding irrigated area and raising the productivity of both irrigated and rainfed agriculture, it would stimulate demand for labor and thus

and the externality cannot be internalized. In global carbon markets, a broker buys and sells all carbon credits and oversees the monitoring of all contracts through remote sensing in order to minimize transaction costs.

raise incomes for all. As in the case of the green revolution (Leaf 1983), rising incomes would then stimulate other kinds of economic activity and entire village economies would be transformed. This scenario has in fact played out in a number of famous watershed villages including Sukhomajri in Haryana and Ralegaon Siddhi, Hivrebazar and Pimplegaon Wagha in Maharashtra (Farrington and Lobo 1997, Hazare et al. (1996), Kerr (2002).

96. This optimistic, technocratic expectation of favorable watershed development outcomes helps explain the relative lack of concern in early projects about the possibility that watershed development would impose hardships on landless people and, poor anticipation of difficulties in gaining popular support for the collective action it requires. In fact, watershed development authorities have always promoted the watershed approach for poverty alleviation; this explains the focus of most government projects in poor areas. Early projects did not even concentrate much on building mechanisms to protect uncultivated common lands during regeneration, apparently because officials assumed that the benefits of vegetative regeneration were self-evident and uncontroversial. By 1990, however, it was clear to all involved in watershed projects that the lag between investment and benefits, and the lost access to productive resources by people who depended on common lands, meant that concerted efforts were needed to promote protection of common lands during regeneration. This was the first effort to internalize watershed externalities and it continues in virtually all projects today. Realization that protection of regenerating lands was not straightforward also brought the understanding that those people who depended on uncultivated lands for their livelihoods disproportionately bore the costs of watershed development. It became clear that overcoming opposition to access restrictions to uncultivated lands in the first few years of a project was critical to eventually achieving the goal of transforming a watershed from low productivity to high productivity. The second major step to internalize watershed externalities was the stated intention to balance hardships from lost access to the commons with compensatory employment. Projects were designed to provide employment to landless people during the investment phase of watershed development, hopefully lasting through the process of regenerating vegetation on uncultivated lands.

97. Internalizing externalities through indirect incentives like employment does not directly address the fundamental causal activity that imposes the externality. In other words, people who gain employment under the project may ignore the ban on access to regenerating lands if they can get away with it. In addition, reliance on project employment avoids the immediate need to tackle watershed externalities directly and thus it may only postpone the problem of finding a lasting resolution to externalities without seriously anti-poor effects. Project employment is normally neither an enduring solution to unemployment nor a measure of poverty alleviation on a sustained basis.³³

98. Recognition of the shortcomings of project employment as a way to internalize watershed externalities led to an increased interest in non-land based income generation activities. Following DFID's focus on NLBAs as 'watershed plus' activities in its Rural Livelihood Programs in Andhra Pradesh and Orissa, the description has acquired wider currency amongst government, donor and NGO managed projects.³⁴ Like project employment, however, NLBAs constitute an indirect compensation mechanism that does nothing to address the incentive or capability to refrain from overexploit natural resources. While in theory NLBAs could successfully help people develop new livelihood patterns with higher incomes, it is important to keep in mind the lack of a direct link to watershed externalities. Caution must be exercised to prevent NLBAs from being used as placatory

³³ Despite these constraints, employment generation for the poor and landless is projected as amongst the largest benefits of WSD projects.

³⁴ MORD's watershed guidelines mention the usefulness of non-land based activities.

devices for the poor while powerful local interests appropriate the real benefits from watershed development.³⁵

Unintended Effects of Watershed Development Projects in India

99. As discussed, watershed projects can reverse the direction of externalities in watersheds simply through the interventions normally taken. Devising suitable mechanisms to share the costs and benefits of these interventions is the key to addressing such externalities, and success in doing so varies by case. In addition, watershed projects may have a number of other intended and unintended outcomes depending on a variety of factors. Many would fit the definition of externalities since they are unintended outcomes of an activity that affect third parties who can't control those outcomes; however to avoid confusion these will be referred to simply as 'unintended project outcomes' for the remainder of this report.

100. Unintended project outcomes are discussed in this document because the reasons they emerge are closely related to difficulties that projects face in addressing externalities. As introduced above, two main factors, the technocratic heritage of watershed development and the predominance of indirect approaches to compensate the losers from watershed projects, have deflected attention from measures that would generate more equitable sharing of the direct benefits of improved natural resource management and increased agricultural productivity. This in turn is the source of unintended project outcomes.

101. Pre-existing externalities may come from land use patterns prior to the watershed project (figure 5). The classic example is overgrazing that leads to a degraded pasture, possibly prompting initiation of a watershed project. When the project intervenes however, it may cause an externality of its own if it restricts access to the pasture, thereby imposing hardships on those who were using the pasture. The project then might attempt to resolve this problem, which would represent an improved watershed management approach that does not impose unexpected, un-reimbursed costs on certain groups. This approach could be successful or unsuccessful; however, even if it is successful it may result indirectly in other unintended outcomes that could have their effect within the village or perhaps on people downstream. For example, if a watershed project succeeds in recharging groundwater it may encourage more people to dig wells and start growing water intensive crops like sugarcane, which could actually lead to even greater scarcity of groundwater than before the project.

102. Additional unexpected outcomes result because rights to natural resources such as common lands and groundwater are poorly specified and/or enforced. As mentioned above, powerful interests may seize control over common property resources once they have been regenerated. Moreover, reliance on indirect incentives for the landless to support watershed development leads to a failure to address this phenomenon. Poor people may be keen to accept watershed projects for the short term employment benefits they provide, but in the long run they may be worse off if the project leads locally powerful individuals and groups to usurp land and water resources. This supports the need for more direct measures to internalize watershed externalities, so that benefits to landless people can occur because of watershed interventions rather than despite them. Measures such as strengthening their claim to a share of common property resources would facilitate arrangements to compensate them for environmental services. In addition to benefiting the poor, this would build wider support for watershed development, reduce the need for indirect incentives that dilute the focus of watershed projects.

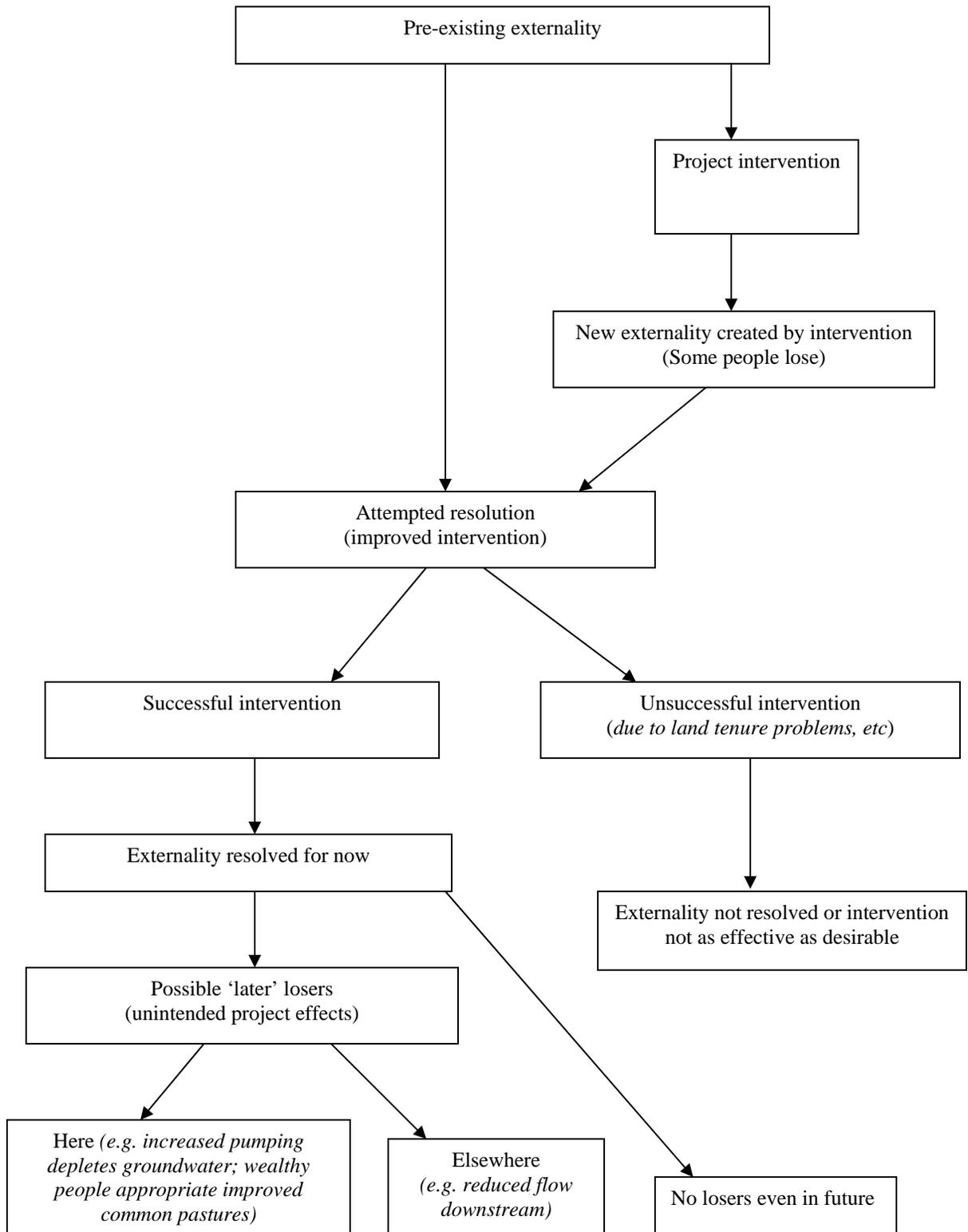
³⁵ It is important to keep in mind that self help groups are sometimes used to build organizational capacity long in advance of implementing a watershed project and this is a different matter from provision of indirect benefits.

103. A typology of the generic nature and causes of unintended impacts of watershed development projects is presented in Table 1. First and most optimistically, the project may work fine with no unintended outcomes whatsoever, or second, the intervention may fail and have no real effect whatsoever. Third, unintended outcomes may arise simply from a faulty project, either from poor implementation (the wrong technology or a bad design or simply low quality work). These are not watershed externalities per se, i.e. they may not be related to biophysical resources in the watershed, but rather generic shortcomings of a project. The fourth and fifth categories, both described in Table 1, are of particular interest in this study. The fourth is that unintended outcomes may emerge immediately as a direct side effect of a watershed intervention. The fifth is that unintended outcomes could emerge indirectly as a result of how people change their behavior or their use of natural resources due to a change in conditions brought by the project. This is an important problem that will receive attention in subsequent sections.

Table 1: Nature and causes of impacts of watershed development projects

<i>Type</i>	<i>Intervention Success and Unintended Impacts</i>
1	WSD intervention works as planned to mitigate natural resource issues and has no unintended impacts (no “losers”)
2	WSD intervention fails to mitigate natural resource issues and has no unintended impacts (just a waste of resources)
3	WSD intervention fails to mitigate natural resource issues due to poor implementation or faulty approach (wrong technology, bad design)
4	WSD intervention is successful but there are losers or gainers through unintended side effects
5	Externalities: WSD intervention works and there are later losers or gainers due to indirect feedback mechanisms

Figure 5. Intertemporal framework for identifying externalities and unintended project effects



Watershed Externalities and Project Responses: Workshop and Case Study Findings

Background

104. This section presents the findings from case studies conducted as part of the background research. It focuses on three main things: 1) the types of externalities observed in the case studies, 2) the approaches observed for internalizing them, and 3) unexpected outcomes of watershed projects that are also related to watershed externalities. The case studies come from papers commissioned for a national workshop and original field work in five states.

105. A national workshop was held in April 2004, entitled, “Gainers and Losers from Natural Resource Management in Watershed Development.” The workshop provided a forum for policy makers, academics, practitioners and the study team to discuss concepts surrounding externalities in watershed development projects, review ongoing research, and identify sites for detailed case studies. Workshop papers drew on experiences in Kerala, Orissa, Madhya Pradesh, and Rajasthan. They illustrated the complexity of externalities associated with watersheds and watershed development projects but showed that innovative solutions were possible, particularly at the community level (see Annex 1).

106. Case studies were selected in Himachal Pradesh, Gujarat, Karnataka, Madhya Pradesh and Orissa (see Annex 1). Teams of two researchers spent two weeks in a small number of watersheds in each state to identify watershed externalities and project approaches (if any) to address them. The case study teams used a rapid rural appraisal approach to identify the types of externalities present, learn people’s perceptions of them and their effects, and obtain visual evidence where applicable.

107. The workshop papers and case studies confirmed that externalities are endemic to watersheds containing multiple land owners or land users. Nearly all of the watershed projects covered by the case studies, and indeed most likely every watershed project in India with degraded common lands in the upper catchment, involves the basic externalities scenario of land uses in upper and lower watersheds being linked through hydrology. Upstream land uses are likely to impose positive, but more often negative externalities on those who use land downstream. The important question from the perspective of this study is what steps are being undertaken to internalize these externalities. The extent to which remedial measures are possible will depend in large part on the magnitude of the externalities, the overall value of the resource base, the value that could be added through the internalization of externalities and the cost of remedial measures. Section 2 highlighted the biophysical and economic benefits associated with WSD in India. Despite the lack of rigorous cost-benefit analyses, there appears to be a good case for watershed development at the macro-level. The well known cases of success discussed in much of the literature have in common: (a) a resource whose value can be greatly increased through conservation; (b) a willingness on the part of all stakeholders to consider mechanisms to internalize externalities because of this increased value; and (c) the capacity to pay for the transaction costs involved because of the magnitude of the externality and the benefits in addressing them.

108. Success stories such as Sukhomajri and Ralegaon Siddhi are characterized by bowl-shaped watersheds ideal for water harvesting. Sukhomajri had a homogeneous social structure and Ralegaon Siddhi benefited from the charismatic leadership of Anna Hazare, who organized the collective action needed for successful watershed management. Other favorable watershed programs, such as the

Indo-German Watershed Development Program, succeed in part because they are careful to operate where the odds of success are high: where conditions are favorable for water harvesting and people have a demonstrated history of collective action (Farrington and Lobo 1997). MYRADA makes a point of operating where the proportion of landless people is small in order to reduce conflict and thus transaction costs. Most other success stories have similar distinguishing features that make them unlike most of the villages where watershed projects are implemented under government programs.

109. In less exceptional villages, on the other hand, the case study evidence suggests that there are a number of reasons that externalities, and their internalization, are not addressed more effectively. First, in most cases the increased value of the resource was marginal in terms of overall livelihood benefits. Watershed development did not increase the 'size of the pie' enough to pay for the transaction costs involved in the internalization mechanisms discussed in section 3.³⁶ Second, in exceptional projects such as Sukhomajri, innovative arrangements to directly internalize externalities by sharing the benefits of watershed development were part of a quid pro quo whereby all parties stood to gain by cooperating. In many of the case studies in this study, wealthier and more powerful groups were able to protect their access to resources without having to grant access rights to poorer stakeholders in the watershed. Third, most examples of innovative, successful approaches to internalize externalities involve extensive (and costly) intervention from external agents, particularly NGOs. Given the prevailing social and economic structures, the transaction costs involved in internalizing externalities will often involve a heavy investment of resources in NGOs to support innovation. This is not always possible.

110. It is important to note that sometimes the watershed approach appears to be utilized in places where it may not be appropriate due to the lack of legitimate watershed problems. With the predominance of the watershed approach in rainfed areas, watershed projects are implemented even in relatively flat areas where the upstream-downstream hydrological connection is relatively unimportant. For example, a study by Kerr et al. (2002) surveyed 70 villages in Maharashtra, 53 of which contained watershed projects. Five of the 53 watershed projects were in villages that did not even contain a major drainage line, even though the study area was relatively hilly compared to where many other watershed projects are located. Under these circumstances it is not realistic to expect major gains from watershed development, and externalities are not likely to be an important concern.

Types of Externalities Observed

111. The case studies varied in the extent to which researchers were able to identify watershed externalities. They were most visible in steep, high rainfall areas including Orissa, Kerala, and to a certain extent Himachal Pradesh, where the hydrological connection between upstream and downstream lands was quite apparent. Elsewhere the externalities were more subtle.

112. In Orissa, the classic problem of upstream land use reducing downstream productivity was observed regularly. Farmers with land on valley bottoms frequently commented on the problems caused by shifting cultivation on hill slopes. In riparian areas they complained that removal of vegetation made stream flows less regular. *Jhola*³⁷ farmers complained that shifting cultivation led to gullies that dumped infertile soil and rocks on their lands and reduced the amount of nutrients in runoff water. In Kerala, rubber trees in upstream areas drew too much water in the dry season, reducing its availability to people further down the slope. In Himachal Pradesh, villagers rely on

³⁶ This is consistent with the findings of Kerr et al. (2002), who surveyed 86 randomly selected villages in Maharashtra and Andhra Pradesh containing various watershed project approaches, including no project at all. In many cases, natural resource management outcomes did not differ significantly between project and nonproject outcomes.

³⁷ A *jhola* is a sophisticated water management system in which terracing, leveling and channeling of perennial stream flows provide sufficient water and nutrients (leached from upper catchments) for paddy cultivation, mostly without fertilizer.

upper catchments for grazing, but the Forest Department controls most of this land and has put much of it under *Chir* pine plantations that are not conducive to grass growth. Each year, villagers start fires in the *Chir* forests to stimulate grass growth, but this in turn leads to erosion from the forested areas. In Madhya Pradesh, a similar problem arose because people upstream withdrew water from a drainage line at such a rate that none was available to people at the bottom.

113. In many of the case study areas, common lands in upper watershed areas had been encroached, creating conflicts over access and ownership. In a watershed where all land area needs to be treated it becomes very difficult to work on the common land due to its contested status. This can lead to short cuts that reduce the technical quality of the work. According to Seva Mandir, widespread illegal encroachment is also an indicator of lack of cohesion in a village, and it usually comes at the expense of the poor, who depend on the commons for their livelihoods.³⁸ Because of these problems, Seva Mandir refuses to treat common land in a village until all illegal encroachments have been vacated.

114. In addition to common land, the most prominent example of resource appropriation is groundwater, which is basically an open access resource for anyone with land and the ability to pump water from underneath it. Of course, pumping water from one location extracts groundwater from below other people's land too, so a person can pump water at the expense of others. Most case study locations reported this problem. If private appropriation of common pool resources is a problem prior to watershed projects, it is likely to become more of a problem if those projects succeed in making natural resources more productive. In other words, the distribution problems common in rural India in the first place should serve as a warning of things to come after watershed development. This problem is discussed further below.

Observed Approaches to Addressing Externalities

115. Watershed projects in the case studies vary in terrain, soil type, rainfall and irrigation potential, but in all cases the approach is to: 1) encourage perennial vegetation in upstream areas to promote infiltration and reduce erosion, and 2) harvest water through structures such as check dams. Projects in the case studies are also fairly representative in the sense that they rarely look at watersheds from an externalities perspective. There is a consciousness among project officials and policy makers that watershed development leads to uneven distribution of benefits, but most projects only address externalities indirectly, and this leads to poor connection between the approach taken and the incentives to internalize the externality as explained in Section 3. This makes watershed development more difficult and leads to unanticipated project outcomes. Table 2 summarizes how approaches observed in watershed projects relate to those introduced in Section 3. These are spelled out in more detail below.

116. ***Investment subsidies and indirect incentives:*** Indian watershed projects have long relied on subsidies for investment and restrictions against activities that impose negative externalities. In particular, they subsidize soil conservation investments and attempt to restrict grazing and harvesting of natural vegetation on uncultivated lands in the upper watersheds. Projects also rely on indirect incentives; they have long been associated with employment programs that offer jobs to those who suffer from access restrictions, and in recent years they have focused more on NLBAs. There is discussion of direct incentives that are linked to performance, but this approach remains very rare in practice. The case studies findings are very consistent with this broad pattern.

³⁸ Seva Mandir's survey found the dependence on common lands for income ranged from 11-39%; Jodha (1986) found a range of 14-23%.

Table 2. Conceptual approaches to internalizing externalities, likely effectiveness in watershed development, and status in India.

<i>Conceptual approaches</i>	<i>Likely effectiveness in watershed development</i>	<i>Applied in Indian watershed projects?</i>	<i>Specific examples</i>
Moral suasion and social conventions	May complement other approaches and become effective incrementally, but not a realistic basis for overall policy	To an extent	<i>Shramdan</i> for watershed investment and protection
Mergers (and sharing of property rights)	Important for facilitating market-type approaches for environmental services but very difficult to arrange.	Exceedingly rare	Sukhomajri involved sharing of rights over common property
Regulatory limits and economic penalties	May be an important part of local rules but not easily enforceable as a matter of overall policy	Yes	Restricted access to common lands; local fines for illegal grazing.
Taxes on negative externalities	May be an important part of local rules but not enforceable as a matter of overall policy	Rare; encouraged by several projects	User fees for access to commons
Subsidies	May not yield long term results if linked to investment because not contingent on performance	Yes	High subsidies for conservation investments
Indirect incentives	Often unreliable because compensation is not linked to incentive to reduce (increase) negative (positive) externalities	Yes	Employment and nonland based activities
Strengthened property rights and liability systems	Important prerequisite to internalizing externalities by clearly identifying rights and responsibilities.	Exceedingly rare	Indo-German project requires advance agreement not to overexploit augmented water supply
Cap and trade systems for negative externalities	Not likely to be relevant to nonpoint source water pollution.	No	Not applicable
Payments for environmental services	Favorable because payment is linked to performance; requires monitoring and permanent payment arrangement.	Exceedingly rare	Government of Orissa offers land rights in exchange for halting shifting cultivation
Markets for environmental services.	Favorable because it links affected parties without government as major partner. Payment is linked to performance; requires monitoring and permanent payment arrangement.	Exceedingly rare	Sukhomajri: landless received water rights in exchange for protecting the watershed

117. ***Moral suasion and social conventions:*** As mentioned above, social conventions and moral suasion may complement other approaches and are often found on a local level, consistent with existing social norms. In fact, this is probably the most common approach among NGOs, activists and others to try to encourage local people to change land use systems that cause negative externalities. In the case studies, for example, SAMPARK in Madhya Pradesh, Seva Mandir in Rajasthan, and the Minor Irrigation Department in Kerala devoted substantial effort to persuade community members to utilize resources in ways that benefited all. So, while this approach is not necessarily part of watershed policy or project guidelines, community members and organizations active on the ground use it as an important strategy.

118. ***Regulatory limits:*** As mentioned in section 3, early watershed projects operated on the basis of regulations prohibiting certain land uses. These approaches, in addition to being harsh, failed to bring long term land use changes, partly due to the difficulty of enforcement. While such an approach is difficult to enforce as a matter of state policy, the hierarchical nature of rural Indian society makes it a common practice on a local scale. A good example of this was found in Koraput district of Orissa, where the Danida-funded watershed project supported forest protection in Maliguda village (consisting of members of the Mali community, who are known to be good farmers). Earlier, a few Adivasi (Scheduled Tribes) families had settled in a hamlet called Gunji on the upper slopes of Maliguda. These Adivasi immigrants practiced shifting cultivation in forests on revenue land lying immediately above Maliguda. There used to be some mild conflicts, but the Maliguda villagers allowed the Adivasis to cultivate the land. With grant support from the watershed project, the Mali people got interested in forest protection to ensure availability of fuel and construction timber as well as continuous flow of water in a stream on the hillside. As a result, with persistent effort, they evicted the Adivasis from this forest and no longer allow them to cultivate these lands. The Adivasis had to shift to other slopes further up in the hills. These slopes are still within the boundary of the same revenue village, so there is a chance they may be evicted from that area also.

119. ***Taxes on negative externalities:*** The only example of tax on externalities observed in the case studies is the imposition of user fees on people who access common developed lands for fuel and fodder collection. An example in the case studies is Jabhua district of Madhya Pradesh where the NGO SAMPARK operated.

120. ***Strengthened property rights and liability systems; mergers and sharing of property rights:*** The MORD's watershed guidelines promote sharing of usufruct rights to natural resources made more productive through watershed development, but there no specific suggestions made for how to do this. In addition, poorly specified rights to groundwater and other watershed resources are often discussed, but there is little or no action taken. Some smaller projects, like the Indo-German Watershed Development Program, enforce action to share property rights through a quid pro quo whereby they agree to operate in a given location only if villagers agree in advance to specify rights and responsibilities over certain natural resources and to share project benefits. In large scale MORD and MOAC programs, however, this approach is difficult because of bureaucratic and political pressures to work in certain areas and meet area coverage targets. Accordingly, watershed project efforts to explicitly spell out rights and responsibilities of different resource users and to establish agreements regarding the sharing of usufruct rights are based almost entirely on local initiatives with little legal basis. This approach in turn enables agreements to provide compensation for environmental services, described below.

121. The Kerala Minor Irrigation Project included numerous cases of arrangements to share the rights to resources with multiple, and often incompatible uses, particularly ponds that could be used for irrigation, fishing, bathing, washing clothes and other activities. In one case, when water harvesting investments made a pond more attractive for irrigation, farmers withdrew water for

summer vegetable crops in such great quantities that the pond went dry two months before fish growing in it had reached maturity. This caused disputes that nearly erupted in violence; the project overcame the problem the next year by negotiating arrangements to share the water. Fishermen stocked the pond one month earlier in the year, and farmers agreed to maintain water in the pond for one month longer. A similar situation arose with a pond belonging to a temple. Renovation of the pond raised its water level and improved its purity, but nearby farmers drained out most of the water for irrigating their summer paddy and vegetable crops that restricted ceremonial bathing of the devotees and pilgrims. In this case the project created a Beneficiary Water Association that contained representatives of both the farmers and the temple and helped them devise mutually acceptable rules about the rights and responsibilities governing water use.

122. In Neemkhera village in western Madhya Pradesh, water in a seasonal stream that flowed through the village's *nalla* or drainage line was appropriated by a small group of relatively wealthy farmers upstream. These farmers had constructed underground channels called *naardas* from the stream to their wells, enabling them to draw water continuously. There is more water upstream, and by the time the stream reaches the lower parts of the watershed, it is reduced to a dry, gravel filled path. In this context, the actions of the upstream farmers constituted a negative externality for those with lands downstream, who had even less water to access in the stream than usual.

123. In 1995, an NGO called Samaj Pragati Sahyog (SPS) based in the region was appointed as the Project implementation agency of the Neemkhera watershed development project. Before proceeding, SPS decided that it would go ahead with the work only if farmers removed the *naardas* and initiate a collective village agreement to regulate use of water in the drainage line. The proposed agreement required all *naardas* to be blocked and all electric motors to be removed, as a first step towards the more equitable and prolonged use of water in the drainage line. SPS tried to explain to farmers here that their newly deepened or excavated wells would recharge more quickly if waters flowed in the drainage line. Farmers eventually agreed and SPS went ahead with drafting a written agreement, fending off opposition from the wealthiest farmer in the village.³⁹

124. ***Payments for environmental services:*** Formal mechanisms to compensate people for providing environmental services are rare in India. The famous Sukhomajri watershed was a highly innovative example, and in recent years a few forest-based carbon sequestration projects have been piloted. The case studies did reveal one interesting example in Orissa, where the state government has attempted to discourage shifting cultivation by offering secure, nontransferable tenure to tribal and landless people who agree to replace shifting cultivation with perennial crops such as cashew trees. Continued tenure rights are contingent on abiding by the agreement. This is part of a long effort to replace shifting cultivation with perennial vegetation. In Koraput region the main plantation crop has been cashew, though sisal, coffee and others have also been promoted. Before 1980, most of these plantations were taken up under various soil conservation programs and there were no provisions for any usufruct rights to local people. After 1980-81, a clear strategy to provide usufruct rights to the landless and poor under a program called Economic Rehabilitation for Rural Poor (ERRP) was undertaken and cashew plantations were allocated to the rural poor at the rate of two acres each. Thereafter, it has been government policy to provide usufruct or ownership rights to horticulture plantations taken up under various schemes in tribal areas. Recently a scheme for

³⁹ The resolution was signed by 139 farmers, largely from Neemkhera, as well as some other neighboring villages. The following is a literal translation of the resolution from Hindi. "It is decided by consent (*sarvasammati*) that nobody would ever draw water from the *nalla* using a *naarda*. Those farmers who have wells will also not draw water from the *nalla* using motors. Those farmers who do not have wells have agreed to draw water from the *nalla* on a limited basis according to rules. After the water in the *nalla* stops flowing, nobody would draw water from it, irrespective of whether they have wells or not. This water would be kept for cattle only. All villagers agree to this resolution."

rehabilitating shifting cultivators has also been taken up by the Government of Orissa, which also includes allocating usufruct rights to shifting cultivators over plantations. There seems to be inadequate follow-up of these policies and it is difficult to obtain data about the areas allotted to landless and their current status.

125. Some of the case study areas participated in this program; unfortunately little is known about its overall success. One NGO, Agrigamee, participated in an IFAD-sponsored program that granted secure tenure to people who ceased shifting cultivation in the village of Kudkitunda in Rayagada district. Shifting cultivation was removed and the watershed has flourished. It is important to note that this watershed has very favorable agro-climatic conditions, including excellent opportunities for water harvesting. Large increases in production have made it easier to develop mechanisms to share the gains. In Malkarbandh village, Koraput district, a case was observed in which a watershed project expanded the area of irrigated land through a diversion weir and new masonry water channel. However, villagers perceived that shifting cultivation by the immigrants immediately upstream was a threat to sustainable downstream production. A village meeting was called and these families were offered incentives in the form of lease of irrigable private lands on favorable terms. The community also allowed three of the immigrant families to irrigate a small patch of government land using water from the water channel. Thus an emergent externality when shifting cultivation upstream threatened downstream agriculture was resolved by the villagers themselves by creating new sharing mechanisms, wherein landholders themselves decided to provide alternative livelihood sources by giving high quality land to the landless.

126. In Thiruvananthapuram district in Kerala, a water harvesting program under the Kerala Minor Irrigation Project excluded landless people from obtaining any benefits and inundated the land of some others. Beneficiary Farmers' Associations (BFAs) formed by the project leased them a small piece of irrigated land to grow vegetables. The key issue here was the treatment of water as a common property resource belonging to the BFA, which could then lease out irrigated land to the landless. This model of leasing out land for cooperative vegetable cultivation and marketing has been replicated in a number of other places by the Kerala Minor Irrigation Project⁴⁰. Another case where usufructs rights from common property have been shared equitably with the poor is in Orissa's Koraput district. The project developed a watershed hillside requiring the eviction of some illegal cultivators and the loss of some other traditional uses like grazing, fuel wood collection, and stone mining. To assure widespread support for the project and ensure collective action, shares of produce from the developed hillside were allocated in such a way that those who had previously relied on the hillsides were given larger shares.

127. It is difficult to assess the overall prospects for approaches to compensate for environmental services. To date, the successful examples are limited to the Orissa government's initiative on shifting cultivation and a number of isolated local efforts. It is important to note that Agrigamee, the NGO in Orissa, attempted to undertake the same approach in nearby villages but was rebuffed by local people. Further investigation is needed to assess the success of the program to trade secure tenure for a promise to end shifting cultivation.

⁴⁰ Tiny plots of land (that were leased out) were not viable economically and people were willing to give them up for compensation. This may not be possible in other situations, where the dearth of other economic opportunities makes every bit of irrigated land attractive.

Other Local Innovations

128. **Technical solutions:** A number of project agencies observed in the field studies effectively deployed available technologies and improvised innovative methods to help the poor benefit from WSD. These efforts are particularly important to endorse not only because they represent feasible attempts that could be replicated, but also because they demonstrate how individual actors attempt to remedy larger problems in project design and implementation.

129. In Jhabua, Madhya Pradesh, as watershed works progressed, it became clear to SAMPARK (the NGO implementing the project) that benefits of recharge were much greater for residents of the lower watershed than in the upper watershed. At this stage, the NGO decided to learn from the expertise of nearby watershed projects being implemented by DANIDA and CWDP. It replaced its watershed structures of large surface areas with new 'sunken' structures, or 'dugouts', to reduce the surface area. This greatly reduced loss of available water through evaporation and increased the storage of water by percolation. For the first time in that watershed, poor people upstream were able to benefit from increased water made available through the project.

130. Residents in upstream Narangarh village in Gujarat did not benefit from the percolation tank constructed by a watershed project, as most of the water percolated downstream and was tapped by the residents of Kachadi village. It was during a participatory planning session with the implanting agency that the village residents came up with an ingenious solution to their problem. They decided to attach a 20 ft pipe from the percolation tank to the village well to ensure recharge of the well during the monsoon, and to remove this pipe as soon as the monsoon season was over. Well recharge then led to a considerable rise in the water table of this upstream village. This gave upstream villagers the incentive to protect the upper watershed to the benefit of both villages.

131. Another illustration of this approach is found in Koraput district in Orissa, where project staff under the Central Soil and Water Conservation Research and Training Institute (Koraput) responded effectively to local demand in undertaking community plantations on common lands. Most importantly, the plantation was designed to meet the needs of as many different groups as possible. Those who lost access to the commons owing to the new plantations were compensated through an innovative technical design that introduced adequate biodiversity in different areas to enable the production of fuel and fodder. On the other hand, in other cases like in Koppal district in Karnataka, attempts by the watershed agency to facilitate pro-poor project activities have been frustrated by the locals themselves. The agency tried to hand over responsibility for roadside plantations to those with bordering lands, but to no avail, as farmers were weary and disinterested for a variety of reasons, including the fear of harassment by officials later.

132. **Give poor people decision-making power and facilitate negotiation and conflict resolution:** All the examples above reveal the interface between project agencies and local people as an arena in which the poor can express discontent and seek change. The extent to which poor people can avail of this arena is another matter altogether. It is vital that the poor develop their organizational skills and confidence in order to be better involved in decision-making. This is a critical lesson if opportunities for change are to be realized and suggests that projects must direct a significant level of investment on social mobilization, group formation and capacity building.⁴¹

⁴¹ All the project implementing agencies discussed here are NGOs. Government PIAs in contrast (line department staff etc), typically pay little attention to 'social mobilisation' both due to lack of time as well as organisational resources. It is this pattern that has led to a widely shared belief in the NGO as the most popular facilitator of 'participatory' development processes. However, following much critical analysis, it is as much a mistake to generalise *all* NGOs as capable of facilitating pro-poor participatory development, as to regard all government agencies incapable of the same. It is

133. In many cases that successfully resolved externalities reviewed in the study, poor people gained decision-making power or active project agencies facilitated negotiation for resource access and use with pro-poor outcomes. The innovative system of tradable water rights in Naigaon's Pani Panchayat and the equitable agreement to share water in the main drainage line in Neemkhera were both the consequence of skillful negotiation facilitated by Vilasrao Salunkhe and Samaj Pragati Sahyog respectively. In Udaipur in Rajasthan, Seva Mandir fastidiously attempts to develop common lands in the interests of poorer communities, beginning with the insistence that local people withdraw their illegal encroachments on the commons. The NGO relies on local pressure in order to resist privatization of the commons effectively and works through village groups or *samuhas* and committees to create a broader understanding of the issues at stake. Further, compensation is offered to encroachers who are willing to withdraw, depending on their economic conditions, and the village committees play an active part in this process.

134. The creation of village level self-help groups (SHGs), particularly among the disempowered (such as women and landless), is emphasized by MORD's common guidelines and also in a number of donor- and NGO-managed watershed projects. While this has not been the subject of specific investigation here, it is well known that not all projects are able to galvanize SHGs with equal success. Nevertheless, the field studies reveal that wherever successful, SHGs can serve as an effective way to develop organizational skills amongst the poor, especially women, and build their confidence. In Jhabua district in Madhya Pradesh, SAMPARK (the NGO PIA) initiated SHG activities amongst 20 Bhil⁴² families, generating much enthusiasm in the village. Subsequently, a number of other SHG groups have been formed in the project village. They have participated effectively in WSD activities leading to concrete benefits not only for group members, but also poor people more generally in the village. For example, these groups undertook plantation work through voluntary contribution of labor as well as social fencing, also ensuring equitable distribution of fodder grass at a nominal price. MYRADA, an NGO that works in Karnataka discussed earlier, develops SHGs in its project villages as a conscious strategy.

135. Exercises in micro planning undertaken by the village Panchayat can also aid the inclusion of poor people's voices in the planning process, especially once they have been organized through SHGs. In fact, increased participation by SHGs in the Panchayat's activities represents the logical next step to grant institutional support to SHG activity as well as to make decentralized government more locally accountable. The Rural Technology and Development Centre (RTDC), an NGO based in Palampur, Himachal Pradesh, has worked to promote local self-governance at the Panchayat level. Over the last five years or so it has refined the Panchayat Micro Plan (PMP) approach in which Panchayats are encouraged to make their own plans, which are then brought together at the block into a block level plan.⁴³ Panchayat level planning has the potential to be a highly effective way of promoting internal consistency of ongoing projects in the village, avoiding conflicts with other development initiatives or other line department activities and also with neighboring villages that might arise from a single village project. However, the extent to which these 'people's' plans are taken into account when the district-level Line Departments prepare their annual work plans and budgets is the real constraint to effective use of bottom up planning processes.

136. ***Negotiate with the government department:*** Finally, the observed efforts also included attempts by project agencies to negotiate with the line department in question to undertake works or grant permission for works that would resolve externalities. When farmers in Gulbarga district were reluctant to invest in SWC activities in upstream areas, MYRADA discovered this was because land

nonetheless true that NGO PIAs operate in about 10% of the area treated by watershed development programs and government departments are responsible for project implementation in the rest.

⁴² Bhils are an Adivasi group.

⁴³ Panchayat micro-planning is discussed in detail in the Himachal Pradesh case study.

in the upper reaches of the watersheds belonged either to the Forest or Revenue Departments and were frequently encroached upon by private landowners (many of whom also had lands downstream). These encroachers feared that tree planting on encroached land would encourage the Forest Department to claim them back. MYRADA then successfully lobbied the Forest and Revenue Departments to treat the upper reaches. A similar situation arose in the Jhabua district of Madhya Pradesh, where the Forest Department controls the ridgeline and refused to allow SWC activities there. This was detrimental to the interests of the poor advisasis resident upstream, who were already suffering at the hands of the powerful non-advisasis. The latter controlled the drainage line waters and were denied access to traditional grazing lands upstream following the watershed intervention. The Rajiv Gandhi Mission lobbied with the Forest Department and managed to convince the latter to allow SWC works on the ridge.

137. Vulnerable upland areas in Orissa are widely managed under the authority of the Forest and Revenue departments, so the problem of watershed projects not treating this land is widespread. In a number of watersheds like Phatkijam and Murkar, the project could not treat the degraded uplands due to apprehensions that the Forest Department would raise objections. In other watersheds like Kaveribedi, where the uplands were owned by the Revenue Department, the Tehsildar (village level revenue authority) denied permission, causing changes in project design. The Forest Conservation Act of 1980 prohibits putting forest lands to any other land uses apart from 'natural forest growth' even when it may be in the interests of conservation and regeneration. Because of this, it is not always feasible for project agencies solve land use areas in upper watersheds simply through negotiation with the line department and the problem may need to be tackled at a different level altogether.

Unintended Project Outcomes with Uneven Distribution of Costs and Benefits

138. As introduced in Section 3, WSD projects often result in unintended negative effects. Many of these are related to externalities that watershed development interventions introduce, while others may arise from faulty project implementation or indirectly, over time, following feedback effects in response to the intervention. In many cases a technology or practice introduced for one purpose has unintended negative consequences for others. To the extent that watershed policy makers and managers learn over time from earlier mistakes (both their own and those of others), good practices should evolve over time so that negative outcomes from yesterday's standard practices only arise today from poor quality implementation. Several examples of such problems arose in the case studies. In Karnataka, for example, one project promoted the planting of eucalyptus on field bunds alongside food crops. When the trees matured, they competed with crops for scarce moisture, reducing crop yields. Fifteen years ago this might have qualified as a negative externality from standard practices, but today, it is well-known that crops cannot compete for water with eucalyptus and so such a practice surely can be characterized as poor project implementation.

139. Another issue concerns the turf battles between government departments. As early as 1991, many states, including Maharashtra, Orissa, Karnataka, and Rajasthan, established watershed departments that were supposed to transcend such divisions between line departments. However, case study field work suggests that bureaucratic divisions have continued to constrain more effective integrated decision-making in a number of watershed management projects.

140. Numerous distribution problems arise when work is undertaken in areas where ownership of land or other resources is under dispute, or where powerful people are poised to seize control of common pool resources at the expense of the poor. The Himachal Pradesh case study makes the case that if project implementation is rushed these kinds of problems are more likely to arise because the project staff may not be alert to them. This suggests the need for projects to work more slowly in order to become aware of problems that may arise, thus making them more avoidable.

141. Feedback effects associated with watershed development appear to be little understood yet widespread, and they can undermine some of the productivity, conservation, and poverty alleviation objectives of watershed management. Feedback effects refer here to actions that people take in response to watershed development, with a time lag. The ways in which donor and government-managed watershed projects operate helps explain why second round effects are poorly understood and largely ignored. In particular, these projects are all time bound, typically following a three-to-five year schedule. Project officials must move on to the next site after their work in any given location is completed. In addition, once a site has been treated under a watershed project it is not eligible to participate again. As a result, project officials are not in a position to notice the long term impacts of their work, let alone the indirect feedback effects.

142. When watershed management raises the productivity of previously degraded resources, they become more attractive to powerful people who previously were less interested in them. Examples from the case studies show that common pastures, irrigation tanks and groundwater are all subject to appropriation after watershed management makes them more productive. The Kerala Minor Irrigation Project, for example, undertook work to recharge village ponds that traditionally had been used by village fishermen, who stocked the fish in August and harvested them in May. After expansion of the tank, its water became more attractive for irrigating vegetables and coconut palms and in the first year of the project, the water in the tank was emptied for irrigation by the end of March. Fishermen lost substantial income because their fish could not mature. In this example the problem was solved in the second year when project officials helped fishermen and farmers negotiate a deal to keep a certain amount of water in the pond. In other cases, however, the problem may be less visible or more insidious (box 14).

Box 14. Usurping the improved commons

In Rajasthan's Udaipur district, the common pasture in one village under the World Bank's Integrated Watershed Development Project became much more productive through regeneration investments and protection. Unbeknownst to project officials, in that village the dominant caste group laid claim to the entire resource, making it off-limits to the groups from weaker sections who had previously relied on it for grazing their animals. Under the new arrangement, they had to walk an extra 2-3 km to reach pastures that were still open to them. It was only by accident, after the project had closed when visitors came upon the weaker section groups walking in the direction of the distant pasture, that this situation was understood. The new arrangement led to a better managed pasture as intended by the project, but at a cost to poor people's livelihoods.

143. Feedback effects can also lead to increased resource degradation. It was widely reported in case studies under this project that the wealthy and powerful are the immediate gainers from groundwater recharge because they are the ones who own wells and pumps. In addition, several case studies reported that the number of wells had increased greatly in the years following watershed development interventions. In one watershed in the Karnataka case study, before the watershed project there were four borewells irrigating 32 acres and the water table was about 200 feet. Following the watershed project, enhanced groundwater led to a proliferation of borewells. Today there are 55 or 60, of which 50% have gone dry and the rest of which have very low output. The total irrigated area remains at 32 acres and the water table has fallen to 800 feet. Batchelor et al. (2000, 2003) and Rao et al. (2003) document similar cases in Karnataka and Andhra Pradesh.

144. It was beyond the scope of the current study to test whether water tables actually drop faster in areas where there has been watershed management than areas that have not. This would require an experimental study documenting the change in pumping behavior and the drop in water tables in areas with and without projects, measured both before and after the project intervention. In addition, groundwater exploitation has risen steadily throughout India for over twenty years, in areas both with and without watershed projects. On the other hand, there is widespread documentation of the rapid

adoption of water intensive crops like sugarcane following successful watershed projects, and there is no reason to doubt that a substantial rise in the water table would trigger a flurry of investment in bore wells and irrigation pumps in any given Indian village. Many watershed projects report having to take steps to avoid this problem (Farrington and Lobo 1997, Hazare et al. 1996).

145. As mentioned above, externalities resulting indirectly from watershed development through feedback effects are typically related to poorly specified property rights and inefficient institutions. In all the examples listed above where powerful people took interest in newly productive resources, there were no effective legal guidelines to determine the extent of rights and restrictions on access to them. No legal rights guaranteed that everybody should have continued access to fishing ponds or common pastures or groundwater, and no effective legal restrictions dictated that no one should usurp the resources at others' expense.

146. All of these resources either have unclear or unenforceable legal status. Any landowner, for example, can pump groundwater from his or her land, subject to a few unenforceable conditions. In particular, it is against the law in two states (Andhra Pradesh and Maharashtra) to pump water for irrigation if it interferes with drinking water supplies. However, since aquifer boundaries are not mapped, it is impossible to document whether or not such interference occurs, making this law impossible to enforce. Similarly, in many places it is not permissible to obtain credit to dig a well in "black" zones with severe groundwater scarcity, but it is possible to drill without getting a loan, and there is no constraint on pumping from existing wells. Subsidized electricity in many states only contributes to this problem.

147. Where property rights may be clear on paper but not in practice, it is very difficult to introduce land management improvements because one party or another may object and undermine the effort if it feels disadvantaged. Kerr and Sanghi (1992) observed that where soil erosion problems transcended property boundaries, it often signified a boundary dispute between the two adjacent landowners who could not agree on where the boundary lay or who should be responsible for what. Similarly, the Orissa case study mentions cases where a block of land was officially assigned to community members but the important step of drawing the internal boundaries within the block was not taken, creating confusion and conflict (see box 15). Also in Orissa, inconsistencies between customary and official land tenure create conflict when the customary owner of a piece of land is not the same person as the official owner. Until such conflicts are resolved it is very difficult to encourage long term land improvement investments. Many NGOs are well aware of this problem and devote a great deal of attention to conflict resolution before trying to implement watershed development. Projects trying to adhere to preset timeframes have a more difficult time with this.

Box 15: Insecure Access to Natural Resources in Orissa

Poor specification of property rights was a major theme in the Orissa case study. The interior of Orissa is hilly, with a high proportion of land classified as forest and a large proportion of people classified as scheduled tribes. Tribal people have long earned their livelihoods through shifting cultivation, a practice officially condemned since colonial days as damaging to forests, but still widespread. Between 1938 and 1964, land rights in Orissa were formally demarcated under the Survey and Settlements program. In hilly areas of the interior, large tracts were classified as government forest or revenue land while others were declared private. People who could document that they had been cultivating the land for at least 12 years could secure private rights, but those practicing shifting cultivation could not, largely because they could not claim continued occupation. As a result, many or most of Orissa's tribals were deemed as encroachers on what they had always treated as their own land.

In the context of watershed projects, classification of these lands as forest implies that only forest tree plantations can be taken up. Also, any trees that local people might protect would belong exclusively to the government, and harvesting them would be illegal. The Forest Department's main strategy to treat these forest lands is through plantations, which tend to fail because of lack of cooperation and active resistance by people they displace. For example, in a plantation raised by the Forest Department in the late 1980s, a village forest committee was created for its protection and upkeep. The Forest Department verbally committed to give the committee a share of the return upon harvest, and thus the villagers strictly protected the forest. But when the trees were harvested in 1996-97, no such share was given. The villagers have now completely destroyed the coppice crop.

On revenue lands, cashew plantations were used for treatment of barren hillsides, because growing conditions are favorable and good markets exist. This situation creates the possibility that transforming land use on hillsides can create benefits for hillside land users that outweigh the costs they incur. To avail of this opportunity, the Government has undertaken initiatives to provide ownership rights to landless tribal and scheduled castes. In one such case, land rights were given to landless Scheduled Caste and Scheduled Tribe groups, but a conflict emerged later because the land was already claimed by other villagers through customary rights. Such rights carry substantial legitimacy among local people. In this particular case, because the concerned people belonged to the same tight-knit community, they worked out an arrangement whereby they shared the rights. In other cases where competing groups from different communities claim the same land, amicable outcomes may not be forthcoming. For example, the Orissa study documented cases in which more powerful groups evicted those who were less powerful, without compensation. The Orissa case study shows that creative approaches to internalizing externalities are possible, but that great care must be taken to fully understand local conditions.

Conclusions and Recommendations

Conclusions

148. Central and State Governments in India are committed to watershed development as a priority approach to improve the social and economic conditions of people living in resource poor, rainfed areas covering approximately two-thirds of the country's agricultural land. Watershed projects try to address a broad range of issues in India. From a hydrological perspective, watershed development is about harmonizing the use of soil and water resources in an area that drains to a common point, and designing approaches to generate the necessary collective action among affected people. This requires innovative approaches since the benefits and costs in watershed development tend to be distributed unevenly. Watershed development in India has gradually evolved into a comprehensive program for rural development that promotes rural livelihoods, especially for poor and disadvantaged groups. Projects are delivered through a complex institutional structure involving national, state and district governments, local authorities, NGOs and communities. The simultaneous pursuit of biophysical and pro-poor equity objectives through WSD has frequently been contradictory, largely because of a failure to address the problem of uneven distribution of benefits and costs.

149. Externalities appear to be a major underlying cause of distributional gains and losses in watershed development. An externality occurs when the activities of one person or group affect economic costs or benefits of others who have no direct influence on those activities, either through the law or through compensation mechanisms. Externalities can be positive or negative; for negative externalities the person or group affected is not compensated for the reduction in their welfare, and for positive externalities the person or group does not pay for the improvement in their welfare. Their 'internalization' may frequently require the management of unequal power relations. A better understanding of the scope and distributional aspects of externalities in watershed development in India is clouded by a lack of robust, empirical economic analysis. A contributing factor to this situation is a gap in required site-level data, due largely to weaknesses in project monitoring systems.

150. A wide range of options exist in the literature for addressing externalities in the context of natural resource management and protected areas management. Examples are found from other jurisdictions where the challenge of addressing watershed externalities has moved beyond literature to practice, particularly in Latin America. In India, only a limited number of examples were identified where WSD projects were applying simple options in project design and implementation, but in most cases without a specific focus on externalities. The issue of externalities is important in WSD, and given the level of past, present and future project investments at risk in India, it must be raised to a higher profile at all levels, from the national government to communities.

151. Successful examples reviewed in the literature, workshop papers, and case studies identify several common themes within the observed efforts to tackle externalities in India. **First**, watershed projects work best with clear upstream-downstream hydrological linkages, particularly opportunities for water harvesting whose realization requires internalizing externalities. Too often, watershed projects have become a catch-all repository for various rural development objectives rather than watershed management, thus diluting the focus and operating in locations where watershed problems are not found. There is a need to strengthen the link between watershed programs and water based livelihoods including agriculture, horticulture and livestock. **Second**, internalizing watershed externalities requires a proactive agency that is aware of externalities and committed to address them during project design and implementation. **Third**, tackling watershed externalities has been most successful where there are innovative pro-poor resource use arrangements among different groups in

communities, based on a quid pro quo whereby project implementation is contingent on advance agreement to share the benefits of enhanced natural resource productivity. This increases the likelihood of the collective action that is necessary for successful watershed development and leads to more equitable distribution of benefits. **Fourth**, building local organizational skill and facilitating negotiations among groups can support innovative local institutional arrangements for collective action. This takes on even more importance in light of the trend to shifting program delivery through local authorities. **Fifth**, while there have been a number of isolated examples of successful internalization of externalities, many of them have succeeded despite the existing policy and institutional environment rather than because of it. More supportive government policies, for example in more clearly specifying common property rights to water, could create a more supportive environment and encourage innovative local programs. **Sixth**, success is more likely when technical specialists have a broader range of knowledge and skills related to social and institutional development. **Seventh**, programs to address externalities need to be supported by robust monitoring and evaluation systems that can provide quantitative technical and socio-economic information for program and policy analyses. **Finally**, more advanced institutional approaches to internalizing externalities should be tested. For example, although performance-based payment systems like payment for environmental services are largely unknown of as a matter of policy or program guidelines in India, they has been applied in other countries and there appears to be good potential to at least explore applications in India on a pilot scale.

Recommendations

Recommended National Level Actions to Address Externality Issues

A) Short-term actions

152. **Commission independent research assist central and state governments in quantifying major economic impacts and formulating specific policy recommendations for watershed development projects to address externality issues.** As a first step, a Delphi survey of practitioners, policy makers, and researchers could be implemented through a national level research institute to identify key research questions and data requirements to better understand watershed externalities at the field level and guide project design. The survey could be informed by the present report, and would likely cover how externalities are affected by watershed scale and specific site factor such as slope and soil, what people are most affected and to what extent in terms of economic costs and benefits. It could also evaluate trends in watershed treatment preferences by farmers, equity issues such as distribution of project investments across different income groups, etc. The survey would form part of a rapid national assessment to determine what biophysical and socio-economic data are presently available or being collected, by whom and from where. A short-term program of socioeconomic and biophysical (including hydrological) data collection could then be initiated from ongoing government monitoring programs at the national and state levels, specific projects implemented by donors, and various project reports. Gaps can be filled through intensive field surveys, supported through remote sensing information and other biophysical data where necessary. Finally, applied research and analysis could be completed to address specific policy and project design questions around externalities. The research can then inform brainstorming to identify specific policy and program initiatives that can address externalities in WSD, especially the sensitive issue of compensation (box 16). It is suggested that this work be led by MORD, under the auspices of the National Watershed Committee, in partnership with a national research institute.

153. **Independent research should be commissioned to examine the application of remote sensing to help prioritize selection of watershed sites based on specific criteria relating to potential externalities.**

A number of donor and Bank-funded watershed projects are already using remote sensing technology from a number of Indian institutes. India is at the cutting edge of technology development and application of remote sensing, primarily based on high resolution satellite imagery. This technology may have great potential to help locate watershed projects in areas where there is better chance of success in terms of specific biophysical and hydrological characteristics, and where the potential for externalities might

be higher. Overlay maps from satellite imagery can also be used for watershed management planning at the field level to raise awareness of potential externality issues. Remote sensing is particularly powerful for monitoring, through measurement of the extent of vegetative growth into the dry season. A national research/technology institute such as ISRO or Antrix could be contracted by MORD to undertake a survey of state and donor-funded projects, synthesize experiences to date and lessons learned, and develop draft guidelines for applying remote sensing in project site selection that would account for potential externalities.

Box 16. Brainstorm to develop better compensation mechanisms

For project sites where watershed externalities are potentially serious, creative mechanisms are needed to compensate the 'losers' who are required to alter their livelihood systems. The current approach of offering project employment to landless people does not necessarily reach the right people or last long enough to compensate them while upper watersheds are still off-limits. Even when upper watersheds are fully developed, there is no guarantee that these people will regain access to them. The solution is not simply to ensure project employment or other financial compensation in the long term, since that would create a permanent entitlement program and reduce the pressure to develop ways to ensure that everyone benefits from watershed development and has an incentive to support it. For example, a compensation mechanism could be developed that more effectively covers costs during watershed rehabilitation while also securing direct benefits from the improved natural resource base in the long term. Reforming property rights to ensure that everyone gains may be the best approach in theory but it may not be feasible politically or administratively. Good ideas are needed and those in the field are well-situated to brainstorm to come up with the best approaches.

154. **Develop an externalities or 'Impacts Tree' as a decision support tool, and mandate its application in new WSD projects.** It would help identify positive and negative externalities, communities (and community groups) affected over time by the main project interventions being planned. A list of possible approaches to address externalities should be identified and how these can be built into project design. An independent research organization, possibly working with external consultants, and collaborating with state watershed agencies and donors, should examine models applied in other jurisdictions to guide an appropriate local design. After completion of an Impacts Tree, it could be important tool for training of PIA staff and partner NGOs on externalities and practical solutions based on a matrix of approaches.

155. **Develop a policy paper for the Government of India on the challenge of matching national goals of devolution and watershed program delivery through Panchayat Raj Institutions, and the ground realities of weak institutional capacities in many local authorities.** The policy paper should build on recent work by the World Bank on decentralization capacity and lay out a framework for a gradual transition from registered watershed committees and user groups to local authorities for fund flows. The paper should also aim to identify criteria that could be used to assess the financial management and human resource capacity of local authorities to effectively deliver watershed development projects, and ameliorative actions to address weakness through awareness raising, capacity building, pilot programs, etc.

B) Medium-term actions

156. **Review and reform the national Hariyali policy guidelines for watershed development projects to reduce the impact of externalities.** The common guidelines for watershed development as well as the individual guidelines governing watershed projects by MORD, MOEF and MOAC, are currently being discussed by MORD, however a more formal review may be needed that takes greater account of externalities. Based on the current report and proposed data collection and research above, it is suggested that MORD lead this initiative with close collaboration from state WSD agencies and NGOs/private sector agencies involved with monitoring and evaluation. The review could be linked to a recent initiative of GOI where a core group of MORD, MOAC, ICRISAT, and ICAR has been established to draft a comprehensive approach paper on watershed development issues. A formal review of the Hariyali policy guidelines should consider focusing on the following in relation to externalities:

- a. A first suggested reform is to develop guideline goals that include broader water management and specific project interventions addressing both water supply and demand. Current projects are oriented more towards increasing supply through groundwater and surface water treatments, which is a positive feature. However, focusing equally as much on water demand management (efficient allocation and distribution) in participative planning with communities would help address many of the watershed externality issues. Specific project interventions could include developing approaches for community ground and surface water resource allocation (such as in the Sukhomajri project), and more efficient distribution such as small-scale drip irrigation, kitchen gardens with drip irrigation, harvesting rainwater from roof catchment systems, etc.
- b. A second suggested reform is to develop more specific site selection criteria that would help target soil and water conservation investments on areas where water harvesting opportunities are greatest, and where externalities may tend to be more problematic. More indicators are needed that link watershed management to water based livelihoods, such as land use, crop patterns, livestock, etc. Despite the large current WSD program in India, investment funds for soil and water conservation are limited compared to the area generally recognized as needing project interventions. Conventional wisdom would suggest priority sites are located where slopes are steeper and soils less stable, and with land-use activities in upper watershed areas creating significant downstream environmental impacts. In flatter areas without identifiable watersheds and fewer watershed management problems, other development interventions such as the District Poverty Initiative Project (DPIP)⁴⁴ model, may be more appropriate. The policy goal

Box 17. Selecting villages for watershed development

A good approach for selection of villages on likelihood of successful watershed development is that of the Indo-German Watershed Development Program, which works where water harvesting opportunities are the greatest and local people have a demonstrated capacity for collective action. Criteria include, among other things, dry and drought-prone villages; areas with serious erosion; villages in upper watersheds; scale between 500 and 1,000 ha; village boundaries correspond with watershed boundaries;. The IGWDP also uses socio-economic criteria including a willingness of the community to commit to stopping environmentally harmful activities (which could also generate externalities); contributing labor for project implementation; promising not to grow water demanding crops such as sugarcane, and starting a maintenance fund for longer-term operation and maintenance.

Source: Farrington and Lobo (1997)

⁴⁴ The goal of DPIP is to alleviate the poverty of rural poor by improving their capacity to act collectively and to effectively use social and economic infrastructure and services. It does this by: fostering strong self-managed

would not be an “either/or” situation. On sites where soil and water conservation is a priority, rural development initiatives may still be needed and could complement the more technical watershed management works being implemented; however, limited funds for civil works would not be dissipated across other project sites where impacts may not be as great. The Indo-German Watershed Program offers some potentially useful criteria (box 17).

- c. A third suggested reform is to add more detail to the site election criteria to promote watershed development and rural development in blocks of contiguous villages so that both inter- and intra-village externalities can be better addressed. Village-specific watershed development plans would still be needed to concentrate investments where they are most relevant and village-level collective action can be promoted through locally sensible approaches. Within any given block actual watershed problems may be more important in some areas than others. Development funds need to be utilized flexibly so that some areas receive more investment on watershed interventions while others receive more investment on other rural development activities such as improving infrastructure. Selection of larger blocks could be decided annually at state-level, with Zilla Panchayat CEOs & District Collectors presenting feasibility plans of how they plan to spend the (pooled) watershed development and rural development funds on the entire watershed (including instances requiring inter-district cooperation where the watershed lies in more than one districts).
- d. A fourth suggested reform is to use a flexible preparation phase for watershed projects that allows states sufficient time for a number of readiness filters to be satisfactorily met and critical actions to occur that would help ensure project implementation begins smoothly and accounts for externalities. These could include:
 - A rights regime review (possibly including a legal review) comprising a detailed investigation and documentation of common land resource tenure and usufruct rights, with concerned government department officials and village community representatives, as part of the preparatory activities and the project implementation plan.
 - Completion of an externalities review as part of watershed planning, using the decision tree described previously.
 - A compensation policy and guidelines to be developed for ‘losers’ in WSD, as part of the initial micro-plan, created by setting aside a proportion of total WSD funds allocated to each state.
 - A written agreement (such as a memorandum of understanding) concerning activities to be carried out on state land in the watershed managed by different government departments, for example between Watershed Departments, and Department of Environment and Forests.
 - Demonstration by people in project villages that they can protect common resources and devise mechanisms to compensate those who lose livelihood options as a prerequisite for project investment.

157. Commission independent research to develop national standards for project monitoring and evaluation systems for watershed programs that incorporate impacts of major externalities, in addition to more traditional monitoring and evaluation data sets. The research should build on

institutions and making finance available to those groups; building capacity of established local institutions, especially Panchayat Raj and the Government line departments, to operate in a more inclusive manner in addressing the needs of the poor; and supporting investment in sub-projects proposed by grassroots institutions of the poor to accelerate their entry and expand their involvement in social and economic activities

existing systems in place in several states and focus identifying key baseline and change indicators, and how to consolidate data at the national level. The work should also examine how communities can participate in ongoing monitoring. It is suggested that MORD lead this work, in partnership with a national institution with expertise in monitoring and evaluation systems. The research should also examine the capacity in MORD and other national agencies delivering state-level watershed programs for economic and policy analysis, both in technical and socio-economic fields. The study should identify current human resource levels assigned to these task areas, human resource gaps, and the key education and experience attributes of staff needed to fill these gaps.

158. **Establish a national level multi-stakeholder watershed network.** The network would constantly collect information on thematic issues and innovative solutions, revise national curricula, and information, education and communication (IEC) training materials; create and manage focused e-discussion groups on watershed issues with one group looking at externalities; organize at least one national workshops each year to review progress and make fresh action plans. The network could be funded by MORD allocating a small percentage of project funds earmarked for watershed development, and outsource the implementation to a lead national NGO or institute on a competitive tender basis. The lead NGO or institute would prepare information, education and communication (IEC) material on externalities, linked to state-level watershed agencies. Materials could include audio-visual and printed examples of externalities (identification and handling) both for Training of Trainers (TOT) modules, for training of multi-disciplinary teams (MDTs), watershed development teams (WDTs) and for community-level training.⁴⁵ Materials should be available on a national web site for access by state watershed agencies, NGOs, research institutes, etc.

159. **Create a WSD incentives applied research fund:** Explore the feasibility of setting aside a small portion of WSD investment funds at the national level into a National Watershed Incentive Fund, which would finance innovative solutions to equity problems/externalities. Awards could be given to individuals and organizations at the national, state, district and local authority level that put forward proposals to develop simple and practical ways of addressing externalities in watershed development projects. Consideration could also be given to extending the incentive program to NGOs and research institutions.

160. **Within the framework of Payment for Environmental Services (PES), examine financing mechanisms to reward people for maintaining environmental services in upper watershed areas as part of resolving externalities in specific WSD projects.** For project sites

where downstream externalities are a potentially serious issue in soil and water conservation, longer-term approaches may be needed to encourage people in upper reaches of the watershed to continue environmentally friendly land-use practices. Creative financing would compensate people upstream for not creating negative externalities to downstream land owners. These people should be compensated at least for the opportunity cost of any reduced income, based on the value of the environmental services provided. Compensation needs to

Box 18. Innovative approaches could have unexpected problems.

Testing new approaches on a small scale is critically important. Payment for environmental services is currently in vogue but it needs to be tested in India to identify possible problems. For example, it is easy to imagine powerful community groups undertaking protection of an upper watershed to secure a performance-based payment, with little regard for the costs imposed on weaker groups who depended on those lands for their livelihoods. Other problems may be difficult to anticipate so piloting different approaches – and learning from the pilots – is essential.

⁴⁵ Current Bank-funded and other donor supported watershed projects can provide good examples of using audio-visual media for capacity building.

be sustained and linked to continued adherence to modified land use practices. To address this issue, Indian policy makers should be exposed to research on the topic and detailed examples of actual project interventions from other jurisdictions. If the potential for a PES approach appears strong in the Indian context, small pilot field projects should be implemented and monitored, but with caution for unexpected problems (box 18).

161. **Consider creation of a cadre for watershed management among the civil services.** The training should be at the university degree level. It should encompass not only the traditional civil engineering for soil and water conservation, but also social sciences that touch on economics, institutional analysis, social mobilization and group formation. As an alternative, a national training program could be established at an existing institution where government staff could take a series of short-term courses around the same subjects, perhaps at mid-career level to broaden technical and social knowledge and skills.

C) Longer-term actions

162. **Property rights reform:** From the preceding sections, property and use rights issues arise at all levels and are both contributors to watershed externalities and a solution. At the national level, it is strongly recommended that GOI, through the Ministry of Water Resources, consider specification of property rights for water resources in watershed contexts. Water is a state subject according to the Constitution of India, but beyond the Groundwater Act of Maharashtra and the Andhra Pradesh Water, Land and Trees Act, little has been done to legislate the use of water by rural consumers (Jaitly, 2004). Examples do exist in India (box 19). In this context, the South African legislation divorcing land rights from groundwater rights and also removing riparian rights are examples that India may wish to examine (James, 2004). Consideration should be given to providing Panchayats with legal powers to regulate local water use as part of their constitutional mandate to deliver watershed programs. Revision of fragmented legislation governing land rights is similarly long overdue (Saxena, 2001). Although a complex, political and emotional issue, land and resource user rights, for example with respect to forests, need to be reviewed and reforms identified that can be addressed in the immediate and longer term. The recent dialogue on national land policy is a step in the right direction, which should be continued and when appropriate, expanded to examine policy measures that address rights issues and externalities in a WSD context.

Box 19. Innovative ideas to reform groundwater rights

Groundwater is difficult to manage everywhere. Assigning property rights to it is extremely difficult, partly because of the difficulty of mapping groundwater resources and estimating recharge capacity. When a person pumps water from under their land, it is difficult to know how that action affects the supply available to others. Creative approaches could be tried that would not be optimal but might be an improvement over the current situation. For example, recall that the key technical innovation in Sukhomajri was to separate water rights from land rights; any farmer who withdrew water from the irrigation pond had to pay into a common fund, with the proceeds distributed equally to all people in the village. Perhaps a similar arrangement could be tried with groundwater: anyone pumping it for irrigation would pay to a common village fund, based on either the number of hours of pumping (which would be difficult to monitor) or the area irrigated for a certain crop (which would be less precise but very easy to monitor). Such an approach would not address the fact that aquifer boundaries cross village boundaries as well as individual property ownership boundaries, but it would certainly improve over the current situation. Additional innovative ideas could be considered for between-village allocation.

Recommended State and District Level Actions to Address Externality Issues

163. **Revise operational planning guidelines for WSD and where necessary, adjust state policy and regulatory frameworks to account for revised national guidelines as proposed above.** Making them a ground reality will be a challenge, but the following actions should be considered by state watershed agencies, in cooperation with NGOs and local research institutes, as part of initial project preparation, design and capacity building:

- a. PIAs must identify and address inter-village, inter-generational and intra-village equity issues (e.g., the identification of ‘losers’) by a working group consisting of PIA field representatives, village community-based organizations (CBOs), and community representatives, using the proposed “Impacts Tree” tool. The discussions should consider practical approaches for addressing major externalities and build these into project design; and
- b. Apply a comprehensive resource inventory to support WSD planning and identification of externality issues in conjunction with the Impacts Tree. The system should use a combination of participatory methods, GIS and satellite mapping, to identify areas within watersheds where interventions are feasible (e.g., for siting check dams) and where there are risks of causing or worsening externalities. When it is the latter, these should be checked in the M&E system, including the compensation system worked out in the action plan, and followed up during mid-term appraisals and final project evaluations.⁴⁶ A monitoring system should have provisions for screening completed watershed projects, say three to five years after completion, to determine the need for supplementary activities to counter persistent and/or new externalities.

Recommended Local Institutional Actions to Address Externality Issues

164. **Assist local authorities (Gram Panchayats) to build capacity and gain confidence in helping implement watershed development projects with communities.** Local Authorities are identified as a key implementing agency in the national Hariyali Guidelines, but where weak capacities exist, this will require a longer transition from the current system of implementation through community watershed user groups and NGOs. It is suggested that intensive awareness raising and capacity building be initiated around WSD implementation. When local authorities reach a minimum capacity of staffing, and financial management, and gained a better understanding of WSD technical and institutional characteristics, they will be in a better position to assume greater financial and program delivery responsibilities for watershed development projects. The linkages with technical line agencies at both the state and district level may need to be clarified. As local authorities gain experience, the function of the technical agencies may be more focused on provision of advisory services, monitoring, and mapping.

⁴⁶ The Karnataka Watershed Development Project has created an innovative system for watershed mapping based on remote sensing, GIS and field surveys that is used to support micro-planning, and monitoring and evaluation.

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Annex 1. Background on Workshop and Case Studies

Stakeholders Workshop

A workshop was organized in April 2004 to bring together policy makers, practitioners, NGOs and academics around the topic of externalities in watershed development. A call for papers asked contributors to focus on the following:

- How your watershed management project affects different groups of natural resource users (negatively or positively). In other words, who benefits from them, in what way, and how much? Whose interests are harmed, in what way, and how much?
- What institutional arrangements have been made to share costs and benefits (if any),
- What are your experiences with conflict and cooperation in devising institutional arrangements to share costs and benefits,
- Is there any change in the distribution of ownership and access to natural resources after the watershed development project,
- How social, economic, institutional, and political arrangements supported or constrained initiatives to manage natural resources for local benefit.
- How the approach used could be scaled up and replicated. Under what circumstances can it not be replicated?

This call for papers yielded about ten abstracts, which in turn resulted in eight submitted papers, of which five were of acceptable quality and a sixth also contained information suitable for presentation at the workshop.

About 40 people attended the workshop, which was held in Manesar, Haryana, just outside of New Delhi. Participants included senior representatives of the Ministry of Agriculture and Ministry of Rural Development, which are the major government players in watershed management, along with representatives of bilateral donor agencies, NGOs, and research institutes. The five original papers prepared for the workshop included the following:

SAMPARK, Jhabua District, Madhya Pradesh	This paper describes the situation in a tribal belt of western Madhya Pradesh, where adivasi (tribal) groups are very poorly off socio-economically due to a variety of reasons including tiny parcels of land, lack of education and health, indebtedness to moneylenders, and failure to resolve disputes and work collectively. Prior to embarking on physical watershed investments, SAMPARK, a local NGO, organized people into self-help groups with a focus on dispute resolution and labor pooling. This in turn led to collective action to reclaim the common pastures from encroachment. Later, it scaled up its efforts into a large number of villages, again focusing initially on social issues such as fixing a (low) price for marriage dowries, organizing wholesale purchase of agricultural inputs, organizing local credit groups, and advocating for local management of natural resources.
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Kerala Minor Irrigation Project	This paper discussed the Kerala Minor Irrigation Project and a number of situations in which individual actions or project interventions yielded uneven distribution of benefits, mostly related to appropriation of land and water resources. The paper describes how the project staff worked with local communities to resolve each of the problems that arose.
Central Soil and Water Conservation Research and Training Institute, Koraput, Orissa	This paper describes the rehabilitation of a patch of common pasture land in a tribal village in southern Orissa. A combination of innovative technical and socio-economic interventions helped to ensure the widest possible distribution of benefits. This included steps to plant vegetation that was useful for a range of livelihood strategies and undertakes special investments on behalf of those who suffered from loss of access to the land while it was regenerating.
Seva Mandir watershed projects, Udaipur, Rajasthan	Seva Mandir, an NGO in Udaipur, Rajasthan, works on a number of socioeconomic issues including watershed management. It has a strong commitment to building collective action at the village level, and it aims to avoid private encroachment on common lands as this eliminates an important asset in support of poor people's livelihoods.
Western India Rainfed Farming Project, Indian Farm Forestry Development Cooperative Limited (IFFDC)	This paper illustrates a participatory monitoring tool called Livelihood Asset Status Tracking System (LAST) for assessing the distribution of benefits and costs of watershed management, drawing on a case from Ratlam, MP and Chittorgarh, Rajasthan. It shows that when interventions were limited to water harvesting and other technical works, the benefits were heavily skewed to wealthier people in the village. When, in addition, non-land based activities were added through self-help groups, the proportion of people whose livelihoods improved rose greatly.

Following the workshop, a set of original case studies was undertaken to complement the lessons learned from the workshop.

Case Study Selection

The case studies were intended to explore various institutional and agro-ecological contexts in which externalities have arisen through project interventions and been successfully internalized. The findings from these case studies were then intended to suggest lessons that could be piloted in order to assess their potential for being scaled up and incorporated, in one way or another, into the policy and practice of watershed management. The initial expectation of the study group was therefore that the main task at hand was identifying suitably diverse yet representative sites in which to conduct the case studies.

Karnataka, Himachal Pradesh, Madhya Pradesh, Orissa and Gujarat were selected as the states in which the case studies would be conducted. These five states were thought to represent the major watershed types in India (hilly, B2V watershed types and watersheds with a high proportion of state owned forest land), as well as to have sufficient institutional variation in watershed management programs from which to draw lessons.

The identification and selection of case study sites turned out to be a much more complicated task than had been envisaged. The main reason for this was that we could not find examples of externalities that had been successfully internalized to study despite drawing on the combined experience of the study group, placing a call for information on the popular DNRM e-based discussion forum and conducting a national level workshop. The search for suitable case studies was in itself a revealing insight into the incidence and relevance of externalities as a concept to understand

watershed development outcomes. Indeed, it was partly this process that led to the development of the typology of costs, benefits, gainers and losers (of which only two were externalities), presented in section 3. Many of the cases that initially were thought to be suitable study sites turned out, on closer investigation, to be examples of poor project implementation or bad technological decisions rather than externalities. Most cases seemed to fall into category VI of the typology: the watershed intervention did not work but there were no clear losers or gainers, just a waste of public resources.

Another problem in identifying the case studies was finding comparable cases in terms of their scale and scope. Some potential cases appeared to be within one small village whereas others were located between large villages and watersheds. Often it was not possible to identify whether a potential case was in fact an externality without doing a site visit. In addition to these difficulties, it was very difficult to identify cases in which externalities had been internalized that were either unknown or had not been mediated by well known NGOs. Whilst one such case was acceptable, the intention had been to consider a variety of institutional arrangements and to include in particular instances where the government had been the project implementation agency.

In any event, it was even difficult to locate cases in which externalities had been generated and not internalized. Part of the problem, it seems, was that no agency wants to admit to distributional problems and failure. Finally, the term 'externalities' turned out to be a stumbling block because it is not widely used in the watershed policy context. Several factors influenced the final selection of cases for the study; these are best explained in turn:

- Himachal Pradesh, Chamba: The study group had visited Himachal Pradesh in order to field test some of the research questions. Although few clear externalities had been discovered at the time, the site was chosen because of the importance of upstream-downstream dynamics in the hills context and the institutional complexity of the resource management system.
- Madhya Pradesh, Dewas District: This site was chosen because of the familiarity of the researcher with the case study and the existence of externalities that had been internalized.
- Orissa, Koraput: This site was chosen because complex land tenure systems and large amounts of state owned Forests within the watershed provided an interesting context in which to consider how externalities arise and are negotiated. In addition, the researchers were familiar with the area and already aware of existing externalities.
- Karnataka, Koppal District and Kolar District: Karnataka had been selected at the request of the World Bank because their current involvement in watershed projects in the state. The study sites were identified following a consultative process with local PIAs, NGOs and researchers. The two sites chosen have government and NGO PIAs, as well as, in the case of Koppal District, large and stratified communities that had experienced differentiated benefits from WSD.
- Gujarat, Amreli District: Researchers were familiar with watershed programs in this area and confident that they could find a case where externalities had been successfully negotiated.

In addition to these primary case studies – the researchers investigated other instances of externalities in their study areas which they learnt about during the course of their study. These smaller case studies helped to bolster the picture of the generation of costs and benefits for that particular region and livelihood type system. The primary case study sites are profiled below. As the table reveals the case studies selected cover a wide variety of agro-ecological, institutional, social and economic contexts in which externalities have been generated and in some instances resolved.

Profile of Main Case Studies

Institutional Profile of Case Study	Watershed and Land Use Profile	Social and Livelihoods Profile
<p>Karnataka: Kolar District, Gollahalli Village</p> <p>Dry Land Development Board. Project carried out between 1984-85 and 1987-88.</p>	<p>Golahalli micro-watershed with average rainfall of 805 mm though drought is common. Water source is Amanikera tank situated at outset – now dry. The ridges of the watershed are owned by Forest Department; the immediate foot slopes of the hills by Revenue Department and farmers, is used mainly for grazing; the gentler slopes with class IV land is cultivated by small and marginal farmers for food crops. The valley portion with class II to III lands are cultivated with horticulture and paddy irrigated through dug wells and bore wells.</p>	<p>118 households of which 70 Vokkaliga, 10 Brahmin, 33 SC and 5 ST. Small (30) and marginal (45) farmers comprise the majority; there are 5 big farmers.</p> <p>During the 1980s farmers used to irrigate seasonal crops from dug wells. In the 1990s a change in cropping pattern from seasonal food crops to horticulture requiring year round irrigation led to the tapping of deep aquifers through bore wells.</p>
<p>Karnataka: Koppal District, Kanaknala Watershed covering 10 villages of which only 8 were visited.</p> <p>Indo-Swiss Participative Watershed Development (ISPWD) 1995-1999</p> <p>PIA: Dry Land Development Board and Samuha (NGO).</p>	<p>Watershed has steep gradient of 200 meters, with high velocity of water flow in the two main nalas during rainy season. Average rainfall is 577 mm in peak periods of August and September. Coarse drainage with moderate prospects for groundwater recharge. The total area is 15,593 ha of which 6000 ha is the rainfed crop area and 60 ha is irrigated through tanks, wells and bore wells. Well over half the watershed is therefore constituted from non-arable land, forestland, wasteland and grazing land.</p>	<p>1083 households of which approximately 41% BC, 24% OC, 16% SC and 13% ST. Of the total 941 land-owning households 15% are very small farmers; 26.67% are small farmers; 29.22% are middle farmers and 5.73% are big farmers.</p> <p>Rainfed agriculture is the main source of income with jowar, bajra, pulses and millets as main crops. Groundnut and sunflower are grown as cash crops by those with irrigation. Heavy dependence on livestock with a slow move from minor ruminants as risk management strategy to milch animals for income generation. Migration continues to be an important livelihood strategy.</p>
<p>Himachal Pradesh: Chamba District, Tundi Gram Panchayat (9 wards) of</p>	<p>Tundi micro-watershed covers 1046 ha of which large areas are covered by common grass lands in which</p>	<p>694 households in survey in 9 wards of which 159 BPL; 343 ST and 101 SC. There are pronounced</p>

Institutional Profile of Case Study	Watershed and Land Use Profile	Social and Livelihoods Profile
<p>which seven fall under the Tundi micro-watershed. All nine wards were studied.</p> <p>Integrated Wasteland Development Program of Ministry of Rural Development. Project started in 2000 and is due to end in March 2005.</p> <p>PIA: Block Development Office</p>	<p>people have traditional rights for fuel and fodder collection under the (disputed) ownership of the revenue department.</p> <p>Climate is semi-tropical and temperate (between below 0 and 35 degrees) with 195 cms average rainfall. Water availability in Bhattiyat block is from two main sources; perennial streams/rivers and perennial springs. The perennial rivers serve about 40% of the total agriculture land. The main problems in developing the water resources arise due to rainwater loss by surface run-off; lack of water bodies and lakes; few perennial streams.</p>	<p>variations in wealth, but virtually no intense poverty as all households have been provided with a small plot of land to ensure survival. Traditionally disadvantaged SCs and STs can be fairly prosperous.</p> <p>Basic livelihood strategies are agriculture (wheat, paddy and maize) and small amounts of vegetable and dairy, mainly for home consumption. Stable cash incomes are received by most families through employment in various government jobs. Increasing dependence on these jobs has led to stagnation of agricultural sector.</p>
<p>Gujarat: Amreli District, Thasa Village</p> <p>NWDPRA with funds from the DPAP; start date 1995-1996.</p> <p>PIA: Vivekananda Research and Training Institute (VRTI)</p>	<p>Thasa has 828 ha of which 601 ha is cultivable and divided into four different qualities. The average rainfall is between 550-600 mm but there are regular droughts. The village is transected by a small river. There are 150 wells and 400 bore wells in the village, but only 100 bore wells are operating, although new ones are being dug every year by Patel farmers.</p> <p>Water quality has deteriorated with a dropping water table. The watershed development program was the first attempt at collective development of land and water resources, mainly through the construction of checkdams and rainwater harvesting.</p>	<p>300 households; patels 175; harijans 40; bharwads (shepherds) 23 make up main households; rest made up from vanand, darji, kumbhar, mistry and mochi. Patel community has political and economic power and own over 80% of land in village. They have also diversified into successful non-land based activities such as trade, diamond cutting and procurement. The Patel community is however divided into factions.</p> <p>Patels cultivate most lands with cotton as a cash crop; rest is farmed with subsistence crops such as groundnut, bajra and maize, mainly by harijans and kolis. The latter also do wage labor in Patel fields. Animal husbandry confined to <i>bharvads</i> who undertake seasonal migration.</p>
<p>Madhya Pradesh; Dewas District;</p>	<p>Watershed has a negative water balance most of the</p>	<p>177 households, the majority adivasi; though three</p>

Institutional Profile of Case Study	Watershed and Land Use Profile	Social and Livelihoods Profile
<p>Village Neemkhara</p> <p>Partial watershed treatment since 1993 from Samaj Pragati Sahayog.</p> <p>Rajiv Gandhi Watershed Development Mission from 1998</p> <p>PIA: Samaj Pragati Sahayog.</p>	<p>year due to low water retentivity of soil. Shallow aquifer is tapped by 30 dug wells of which only 10 provide irrigation water; nine tube wells have been sunk but only 6 are reliable. Before watershed works only 6% of the land was being irrigated; this has increased 100% since irrigation works but is still a small number in absolute terms.</p> <p>1200 ha in the village of which 480 ha agricultural land and over 45% is common or state owned forest, pasture and wasteland.</p>	<p>non-advansi households are landowners with over 10 ha each. There are 10 landless households, 45 households with less than one ha; 50 households with between 1-2 ha; 41 with between 2-5 ha and 28 with 5-10 ha of land. Main crops are jowar, red gram, maize, pulses, cotton, soybean, wheat and gram.</p> <p>Extreme fragmentation of landholdings and low productivity of agriculture has led to surplus labor and low wages. Migration, NTFP collection and small ruminants are the main income supplements.</p>
<p>Orissa; Koraput and Rayagada Districts</p> <p>1. Malkarbandh Watershed, EAS scheme under the MORD; PIA: BDO</p> <p>2. Kokititunda Watershed, German Agro Action, PIA: Agramee, NGO.</p>	<p>Large areas of rugged hills with wide river valleys and flat plateaus from between 150-1500 meters ASL. Mean average annual rainfall is 1521 mm, giving it a potentially productive agro climate. Forest types range from semi-evergreen to dry deciduous with impressive biodiversity.</p> <p>1. Malkarbandh is a compact narrow watershed of 470 ha with high hills on three sides and 76% land controlled by government.</p> <p>2. Kokititunda is a small compact watershed of 202 ha with high hills on three sides most of which belong to the government.</p>	<p>Almost 80% of the population BPL with almost 70% belonging to STs and SCs. High livelihood dependence on natural resources from forests and subsistence agriculture. Three types of agricultural land-use: traditional <i>jhola</i> cultivation along stream beds; upland paddy and crop and shifting cultivation on high gradients. Almost all agriculture is rainfed.</p> <p>1. Malkarbandh is homogenous tribal population of 256. Main crops are paddy and uplands crops like ragi, other minor millets, pigeon pea etc.</p> <p>2. One homogenous tribal village</p>

The preceding Table charts out the wide variation in the scale and concentration of the case studies. This variation has contributed towards a broad insight into the incidence and implications of externalities in watershed management, as section 6 will explore in some detail. The next table provides a brief summary of the particular focus of each of the case studies by way of a guideline.

Externality Focus of the Case Studies

Case Study	Main Focus
Karnataka: Kolar District, Gollahalli Village	<p>Project implemented by a Government PIA in a mixed caste village provides positive economic impacts for various sections of the community. However the shift from mainly rainfed subsistence to water intensive commercial farming threatens positive impacts of watershed management through unsustainable use of groundwater. The case study focus is on losers, gainers, cause, effect and options for resolving externalities generated in this context.</p> <p>Additional case studies in Kolar District explore: (a) conflicts arising from the construction of check-dams in the catchment area of community tanks; (b) encroachment of common lands following afforestation undertaken by WSD projects; (c) unintended negative impacts of water harvesting following WSD treatment.</p>
Karnataka: Koppal District, Kanaknala Watershed	<p>Project funded by donor and implemented by Government and NGO aims to link technical know-how with traditional knowledge for integrated watershed development including soil and water conservation, dryland agriculture, afforestation, livestock development etc. The case study explores the economic and distributional benefits of these interventions and resultant losers and gainers. The focus is on the impact of WSD both between and within 8 of the 10 villages of the watershed. The case study also explores in some detail the steps the NGO has taken to create sustainable institutions that can manage resources and deal with distributional issues, including externalities.</p>
Himachal Pradesh: Chamba District, Tundi Gram Panchayat	<p>Analysis of WSD project being implemented by Block Development Office across Tundi watershed. The case study explores the institutional arrangements of the project and concludes that the lack of benefits generated (and in some cases the poor distribution of benefits for upper catchment villages) are mainly the consequence of poor planning, bad management and corruption. However there are clear upstream-downstream dynamics in resource management; degraded hills, the kuhl system and ownership of the ridges which are not being addressed by the WSD project.</p> <p>Additional case study in Chamba District: A study of Saho watershed illustrates the difference to resource management made by good leadership.</p>
Gujarat: Amreli District, Thasa Village	<p>Receding groundwater in socially stratified community leads to construction of deeper and more bore wells by dominant Patel group. A WSD project implemented by local NGO attempts collective development of land and water resources. An initial design, a check dam to recharge wells and village groundwater, is altered to divert water for vested interests creating externalities. The focus is on negotiation around these externalities and the importance of clear legal rights to safeguard rights to benefits generated by WSD.</p>
Madhya Pradesh: Dewas District; Village Neemkhara	<p>A handful of non-adviasis landholders holding political and economic power control scarce water in the nala; forest department controls ridgeline in same area. Both oppose changing status quo, or allowing adviasis to organize around watershed management, thus creating negative externalities. These are resolved through carrot and stick policies negotiated by an NGO on behalf of the adviasis. Subsequent WSD leads to same non-adviasis using increased water flow in nala to irrigate their fields thus creating externalities suffered by the adviasis. The case study shows the importance of sustained institutional support and capacity building in enabling the</p>

Case Study	Main Focus
	poor to negotiate benefits from watershed development. The case study also shows that despite the partial internalization of some of the externalities experienced, watershed development alone cannot lead to sustainable livelihoods in the village.
Orissa: Koraput and Rayagada Districts	These case studies examine watershed externalities in the context of complex property rights and tenure systems and bring out the implications of such externalities for both environmental sustainability and poverty alleviation. The focus of the study was to understand the types of externalities that arise in situations of uncertain and conflicting property rights. The further insight of these cases is the context, which is of extremely poor adivasi villages, the relative wealth in natural resources and the influence of forest department as a land manager creating externalities. Most of the externalities described in these case studies arise from a divergence between customary and formal rights systems.

Methods and Approach for Case Studies

The initial intention had been to design a research plan detailing the qualitative and quantitative methods to be used during the research. This approach was rejected as impractical for several reasons during the planning meeting of the study group in April 2004. First, several of the cases had not been identified and so it was not possible to design a methodology for them. Secondly, the cases varied greatly in size and scale and could therefore not be considered through a uniform methodology. Finally, considering this variation and the professionalism and experience of the case study researchers, it was felt that lessons on externalities could most usefully be drawn if the researchers were given the initiative to adapt methods. It was felt therefore that what was needed was a research guideline, rather than a methodology; this is presented below:

- **Baseline Data** The study group decided to collect data on basic agro-ecological, demographic, social, economic, infrastructural and institutional features of the study area from secondary sources. The objective of this baseline was to provide a context and narrative of the livelihood systems and strategies of the area. This context was important because resource constraints prevented the detailed collection of quantitative data from the study sites.
- **Livelihood types and description of natural resources within the community** Different livelihood strategies and systems were identified building on data collected in the base-line through key informant interviews and focus group discussions, in some instances through the use of PRA tools such as transects and mapping. The particular focus was on what role access to natural resources play in local livelihood strategies; what changes there have been and why; what strategies are adopted and the rationale behind these.
- **Description of natural resource related development interventions** Natural resource related development interventions were examined through project data and key informant interviews. In each case the questions for each type of intervention were: what was done, by whom, for whom and at whose request, when and with what outcome for natural resource use, access and sustainability. These questions were triangulated to include the perspectives of all stakeholders involved on the intervention. For interventions particularly relevant to the study, such as watershed related ones, transects and site visits were conducted.
- **Description of externalities** Once this background data and livelihood context was understood, detailed information was gathered in order to describe the externalities. The focus was on the

nature of the externalities from a technical, social, economic and institutional perspective. Multiple stakeholders were consulted to ensure that the perspectives were triangulated; gainers, losers, project implementers and key informants were all interviewed.

- **The institutional environment** An explicit consideration of the institutional factors causing externalities in terms of the administrative, legal and political environment was an important part of the guideline. This was explored through key informant interviews, as well as review of relevant secondary material.