

# Sustainable Forest Management in Himachal Pradesh

*Balancing conservation, production and use of forest goods  
and services for livelihood options and poverty alleviation*



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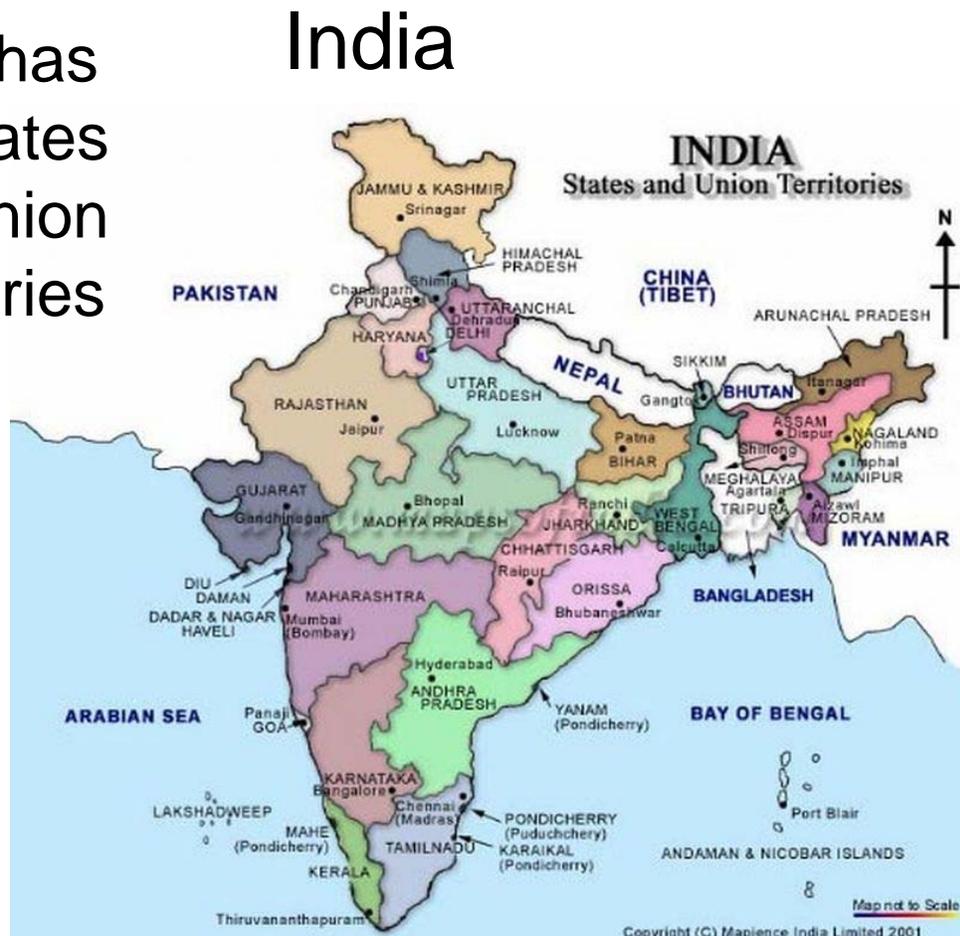
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## Chapter 1: Introduction

The Indian State of Himachal Pradesh is a mostly mountainous area neighboring Tibet and China in the East, the Indian states of Jammu and Kashmir in the north and northwest, Punjab, Haryana, Uttaranchal and Uttar Pradesh to the south (see Figure 1). It has a geographical area of 55,673 square kilometers and a population of 6.1 million people and is located at altitudes ranging from 350 to 7000 meters (1050 to 21000 feet). Nestled in the Western Himalayas, Himachal Pradesh has provided refuge and abode to the Buddhist leader, the Dalai Lama, and his Tibetan followers. This majestic, almost mythic terrain is famous for its beauty and serenity, but the harsh reality is that Himachal faces serious environmental decline.

Figure 1: Map of India (Mapience India Limited 2001)

India has  
28 States  
& 7 union  
territories



There is an ever increasing demand on the resources of Himachal's forests, due to population growth and limited, fragmented agricultural land. At the same time, the forest sector has diminished capacity—limited staffing, lack of financing, lack of expertise and

reach—to meet the forest needs and aspirations of the people. The prominent concerns in Himachal are poverty reduction and economic growth, and how to achieve both alongside conservation and development.

The forests of Himachal Pradesh (H.P.) constitute two-thirds of the state's geographic area and are crucial to the region's environmental and economic well-being. They are a storehouse of rich biodiversity and play a vital role in preserving the fragile Himalayan ecosystem while being a primary livelihood source for its rural population. The majority of the rural populace<sup>1</sup> depend on the forests for survival.

In Himachal, the forest sector now encompasses the entire biophysical and environmental components comprising lands and biological resources (i.e. forests, watersheds, wildlife, biodiversity and habitats). The sector players include the marginalized rural poor, directly dependent on the forest resources for their livelihoods; stakeholders from sectors and institutions such as wood processing, non-governmental agencies and academia; and government departments.

The forest sector strategy for the state must be sensitive to the uniqueness of Himachal's mountain environment and must prioritize the interests of its people. Since India is also a signatory to a number of international agreements and is party to other non-legal instruments that influence the forest sector, Himachal must also develop facilitating institutions and supporting policies.

Sustainability is the new mantra both at Himachal and at the national Government of India (GOI) level. The current Revised H.P. Forest Policy 2006 moves away from productive sustained yield forestry in favor of sustainable forest management, which emphasizes participation and the active involvement of local communities such as the Panchayati Raj<sup>2</sup>.

Sustainable forest management (SFM) integrates economic, social and environmental values and involves multiple stakeholders—industries, local communities and governments—in planning and decision making. Sustainable forest management must meet societal concerns and tackle conservation and land use issues—providing for multi-functional landscapes and looking to eco-regions rather than boundaries as the unit of analysis and management.

Sustainable forest management represents a new look at forests and forest management to meet two major commitments:

1. Protect and restore the forest ecosystem—improve biological diversity, enhance water supplies, make possible carbon sequestration, meet recreation needs and provide for the forest dependent communities through improved non-wood forest produce;

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<sup>1</sup> As per a census done during 2001, HP has a population of 6.1 million of which 91% live in rural areas and 90% of this rural population depend on forests for their subsistence.

<sup>2</sup> There is a 3-tiered local governance at the level of District/Block/Village. This institution was promulgated through notification in 1992.

2. Encourage profitable enterprises, attracting the investor who sees sustainability as a viable economic venture.

In Himachal, SFM is a path towards increasing emphasis on social and environmental goals. It is a movement away from the conventional, commodity production orientation, towards a holistic, people-centered ecosystem-level approach. This shift is necessary to address Himachal's depleting drinking water, global warming and biodiversity losses. Tapping environmental services—ecotourism and propagation of medicinal plants—offers a way to alleviate poverty and enhance livelihood options. Part of this shift means looking at the forest landscape in terms of functionality rather than along boundaries. Consequently, the Himachal Pradesh Forest Department reclassified the forests in Himachal in terms of watershed management units, an approach that will aid in the department's sustainability strategy. But much more remains to be done, including a new perspective on partnerships between the public, the government and industry.

In search of a fresh look at SFM, this report's author has spent 12 months in Portland, Oregon, USA to examine the breadth of ecosystem approaches in the Pacific Northwest (PNW) and the U.S. The PNW is famous for its forestlands, recreational activities, landscape beauty, commodity production and biodiversity and riparian zone protection. The region thus provides an interesting case study for evolving forest management. This exploratory report highlights the sustainable forest management practices being utilized in the PNW, and includes some case studies both in Oregon and the U.S.

The PNW experience with SFM is very different than that in Himachal. There are many lessons—both in terms of what are and are not applicable to the Himalayan State. Approaches to habitat restoration, environmental services, valuation and payments, codifying good practices and the roles of various stakeholders in the forest sector (such as government, NGOs and other partnerships) will be examined to find lessons that can be applied to Himachal. In short, what works in the PNW U.S., and can it apply to Himachal? The emphasis will not be on the specifics of a given case study so much as identifying key areas worthy of further exploration and development.

## Chapter 2: The Background

Forest Policy in Himachal Pradesh has recently undergone dramatic changes as the state attempts to involve communities in sustainable forest management after decades of ineffectual top-down management. The Pradesh faces a litany of environmental problems which are exacerbated by poverty. New management thinking and policies are needed to transition the state from its earlier extractive system to a more balanced sustainable approach that considers social, economic and environmental concerns. It is important to understand this transition within the backdrop of recent changes in national and state forestry policy.

The first State Forest Policy for Himachal Pradesh was adopted on September 3, 1980, in furtherance of the National Forest Policy Resolution of 1952<sup>3</sup>. The policy's focus was on industrial development where the primary purpose of public forests was to produce timber. The rural peoples' dependence on forests was viewed more as a destructive nuisance and the common perception was that rural people were impediments to good forest health. The National Commission on Agriculture captured this sentiment in 1976: "Free supply of forest produce to the rural population and their rights and privileges has brought destruction to the forest and so it is necessary to reverse the process. The rural people have not contributed much towards the maintenance or regeneration of the forests."

The Forest Conservation Act 1980 was significant as it laid the foundation for a change in policy that focused on conservation principles and discouraged conversion of forest land for non-forestry use. The National Forest Policy of 1988 pushed these changes further by enunciating that public forests were now to provide for the needs of the community, whether it was for fuel, fodder or other sustenance goods. The new policy emphasized poverty alleviation "to ensure environmental stability and ecological balance" through participatory forest management which involved collaboration, decentralization and democratization. The tenth five year plan (2002-2007) spelled out this approach: "A broader livelihood approach, covering productive capacity, institutional and legal structures, market access and tenure, must be adopted that puts forests into the broader context of rural development. No strategy to conserve the forest ecosystem would be successful unless the basic needs of the society are met." As a result of increased conflict between local communities and forest personnel, as well as public protest, change and reorientation were in the cards.

The new management approach to achieve these SFM goals was introduced in 1988; the Joint Forest Participatory Management (JFM) approach would move away from commercialization and towards conservation and meeting local community needs by involving village development committees. The primary objective of forest management was shifting to a participatory approach as stakeholders were demanding a broader range

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<sup>3</sup> "Forest" as a subject comes under the Union concurrent list—which means that both the centre (at the national level) and also the state can legislate. However in case of conflict, the national perspective holds.

of goods and services and also a decision making voice. To further local governance, the Constitution (73rd Amendment) Act 1992 was a path-breaker as it mandated decentralization through a 3-tiered local governance system at the District/Block/Village level called the Panchayati Raj Institutions (PRI). Further in 1996, another shift towards a more decentralized and people-oriented forestry came through another important legislation called PESA (Panchayat Extension to Scheduled Areas Act, 1996). The Government of Himachal issued an order on Joint Forest Management in 1993 and participatory forest management (PFM) regulations were notified in August 2001. To further participatory forest management across the entire state the Sanjhi Van Yojna Scheme was promoted. With regard to the PRI, the Government of Himachal instituted the Himachal Pradesh Panchayati Raj Act, 1994.

The national government has decided to implement the National Forest Policy in a timely manner. The target is to bring 33 per cent of the total geographical area of the country under tree cover (shift from forest cover) by 2012, with the percentage cover in the hills slated to be 66%. Per national estimates, 23.4% of the total land area of the country constitutes the common property land resource; another 18% is classified as wastelands. These areas are for the future afforestation program.

**Figure 2: India's Forested Areas (Forest Survey of India 2003)**

<b>Geographic Area</b>	3,287,263 Km <sup>2</sup>
<b>Tree Cover</b>	
Culturable Non-Forest Area (CNFA)	2,188,668 Km <sup>2</sup>
No. of trees per ha of CNFA	12.3
Tree Cover	99,896 Km <sup>2</sup>
Of Country's Geographic Area	0.0304
Of CNFA	0.0456
<b>Forest Cover</b>	
Very Dense forest	51,285 Km <sup>2</sup>
Moderately Dense Forest	339,279 Km <sup>2</sup>
Open Forest	287,769 Km <sup>2</sup>
Total	678,333 Km <sup>2</sup>
Of Country's Geographic Area	0.2064
Forest and Tree Cover	
Total Forest and Tree Cover	778,229 Km <sup>2</sup>
Of Country's Geographic Area	0.2368
Per capita Forest and Tree Cover	0.08 ha

It will not be possible to achieve the afforestation target in hilly states like Himachal Pradesh because there are vast stretches of unculturable (precipitous, rocky, inaccessible and also snow bound) terrain where no vegetation grows. In Himachal Pradesh, out of the total geographical area of 55,673 km<sup>2</sup>, classified forest land already accounts for 37,033

km<sup>2</sup>, which is about 67% of the total area. Of this, almost 16,000 km<sup>2</sup> are uncultivable high mountain ranges beyond the tree line, glaciers and ravines. If only the culturable area of the state (40,000 km<sup>2</sup>) were taken into account, the forest cover would reach 45%. Thus, at best green cover could be spread to only over 21,000 km<sup>2</sup>, or about 37% of the total area of the state. At present, only 14,000 km<sup>2</sup> is actually forested. This leaves about 11,500 km<sup>2</sup>, including degraded open forest area, available for afforestation. The State Forest Department has, in accordance with the decision of the national government, drawn up a plan to bring an additional 50,000 hectares under forest annually over the next eight years. The Rs. 800 crore (US \$200 million) plan will help bring about 0.4 million hectares (4,000 km<sup>2</sup>) under forest by 2012 to increase the tree cover to 32.5% of the total land area of the state. Though the GOI has given assurance that funds will not be a constraint in the implementation of the plan, the Rs. 100 crore (US \$25 million) required every year seems a tall order! At present, the department is spending only about Rs. 22 crore (US \$5.5 million) annually to raise new plantations, roughly equal to 15,000 hectares annually. In the government's overall scheme, forestry is a low priority sector and the forest department's budget has been declining over the years. Low investment and low incomes continue to plague the forest sector with its small share of employment. The forest authorities voice that donor funding has limited perspective and scope and does not address vital forest management needs. Further, national decision makers give forestry a low priority, with no accounting of natural capital and no recognition of the environmental services that the State provides for the nation.

The current trend among international donors is to fund poverty alleviation projects in Himachal. According to the Poverty Trap Theory, poverty and environmental degradation coexist and mutually foster each other in a spiraling relationship (Gore 2003). Himachal Pradesh has a subsistence economy with a high dependence on biomass. Given the inherent short time horizons and risk, poverty encourages the poor to over-exploit their physical environment which in turn further leads to their impoverishment. Environmental degradation leads to poverty which in turn leads to further degradation. It is quite credible that people inhabit degraded or unproductive environments for the same reason that makes them poor, with economic and social marginalization and powerlessness. Thus, there is a need to investigate whether the relationship between poverty and environment is functional or causal and whether other factors such as institutions and social and cultural influences have an impact. Absolute poverty is attached to those people whose income, expenditure or quality of life falls below a standard defined set. The "Little Green Data Book 2003" published by the World Bank categorizes the low income segment under various key indicators of environment, namely agriculture, forests, biodiversity, energy, emission and pollution, water and sanitation and green national accounting aggregates (Badiee and Georgieva 2003).

Poverty is especially hard on marginalized women, who have with no property rights, and who suffer polyandry in some regions and increased workload to meet requirements for fuel wood and water. In the biomass-based agricultural economy, the lack of markets, absence of institutional development and the continual shortage of time due to the demands of subsistence existence—foraging for fodder and fuel, fetching water, cultivation, grazing livestock, attending to offspring, cooking — increase poverty. Due to

the lack of any successful process of environmental regeneration, poverty is fostered through environmental degradation. The Himalayas remain one of the poorest regions in the world as measured by income per capita with some 150-175 million people falling below the poverty line (FAO 2005). The rural marginalized men and women in Himachal are dependent on forest resources for their livelihood and sustenance and the security of forest resources helps them socially, economically and culturally. The problem is that since their land holdings are small (<0.8 hectares) constructive management such as crop rotation, integrated pest management or erosion control are not possible.

Forest policy, tenure and ownership also affect conservation and development. Human intervention and biotic interference has changed the traditional natural forests and it is only improved land use through sustainable management that can propel communities to come together in biodiversity protection and ecosystem maintenance. The problem is also that governmental department stewardship is increasingly being viewed as suspect for their lack of transparency, changing stances and weak legal contractual agreements especially with regard to usufruct (proceeds) sharing. Lopsided subsidies, political favors and weak institutional capacity compound the problem.

Further, policy is affected by approach. In Himachal, the large scale felling of the fir/spruce forests (rotations of 150 years) for meeting the packing case demand from the apple industry was a short-sighted policy; it also demonstrated a failure in property rights. Often various agricultural subsidies intrude into vital life support ecosystems. The approach of the local people to use governmental forests to overgraze their non-productive cattle is again a failure in property rights. Much of the community lands and pastures are totally degraded and overgrazed beyond their carrying capacity because such lands are viewed as “commons” which are public lands or degraded forests which lie in between habitations and are used mostly as pasture land. The concentration of economic and political power in the region spurs lopsided development and excess timber harvests and mineral extraction, lack of integrated land use planning, insecure land tenure and absentee landowners, conversion of forests for horticulture, spreading encroachment, and the parceling out of forest land as free grants by district authorities. Large areas recorded by the Forest Department do not agree with total areas in Revenue Department records. The land hunger is leading to encroachment and increasing cultivation of illicit crops like potato and cannabis in government forests.

Conventional forestry—with over-harvesting and treating forest goods as revenue generating capital—was responsible for the degradation of the environment in Himachal. The state’s afforestation drive has increased forest area, but environmentalists criticize that the efforts have spread monocultures because the visible planting is limited to two hardy species—Chir (*Pinus roxburghii*) in the hills and Khair (*Acacia catechu*) in the plains. In the community lands and degraded forests near human habitations, the increasing demand for fodder and fuel wood (wood energy is the main source of energy for the impoverished rural populace) is hard to meet. The huge cattle population which is mostly unproductive and left to stray on government forests has overgrazed pastures. Low survival of seedling regeneration coupled with naturally slow rates of vegetative growth has impeded the regeneration of degraded forests. The menace of fire during dry

hot summers is especially real in the Chir zone—*Pinus roxburghii* has a lot of resin which actively stimulates fire. The ridiculous right holder rates (10-12 pence compared to a market rate of around US \$1000 for one Deodar tree) encourage illicit felling and smuggling. More than one right holder per household, misuse of rights and dilution of duties, over-extended<sup>4</sup> forest guards and an inadequate monitoring system confound the management and recording of the use of timber rights.

Even within the State, the promulgation of the Forest Conservation Act 1980 has met resistance from other departments like the Public Works Department which views the Forest Department as anti-development as it resists non-forest use. State finances are also being drained by an increasing vulnerability to environmental disasters, whether these are cloud bursts, severe landslides, flash floods or earthquakes. Climatic conditions, topography, high relief, thick quaternary sediments along the valley slopes, weak geological formations and high seismic activity have rendered the hill slopes in the catchments susceptible to landslides and other mass movements. Huge amounts of debris, rocks and sediment get dumped in the main streams and rivers, leading to blockades and creation of temporary water bodies which on subsequent flushing cause flash floods downstream and heavy damage to hill slopes, property and human life.

There is increasing biodiversity loss, as well as an alien/invasive species problem. The rising resource pressure from steadily growing human populations and growing livestock populations for more than 50 years has led to the depletion of tree crops from the farmlands and has contributed to additional pressure of recognized forest resources. The long rotation of conifers and poor reforestation measures, loss of fish and depletion due to unscientific exploitation<sup>5</sup> aggravates the problem. The introduction of higher yielding, higher input agricultural and horticultural crop varieties has tended to promote simpler, monoculture farming systems at the expense of more integrated, more complex systems involving many indigenous species. There is a lack of linkage of research in this field and inadequate documentation coupled with dissatisfactory dissemination with poor lab to land input.

In 2004, the Himachal Pradesh Forest Department (HPFD) produced a Vision, Mission and Value Statement: “The HPFD aims to be a committed organization of excellence in forestry, serving communities and the nation for harmony between people, environment, conservation and development. Working in partnerships, we manage and protect the unique Himalayan biodiversity for the future. Creative and dynamic, we aspire to be the best forestry service.” The HPFD realizes that only a pluralistic approach can work as there are multiple stakeholders—various governmental departments, the private sector, non-governmental organizations, the community based institutions and local bodies, the professional and research organizations—who need to be included in discussions and decision making. A new forest policy to enlarge the role of Panchayati Raj institutions and communities in preservation, expansion and collective ownership of the forest and

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<sup>4</sup> Severe shortage with a majority of field staff near retirement.

<sup>5</sup> Examples of floral depletion in species are *Taxus baccata*, *Dioscorea deltoidea*, while in the faunal arena, Musk deer (for its musk), Monal (kalgi—feathers/plume), snow leopard for its fur have been adversely diminished.

common property resources was enunciated only recently in 2005. The new H.P. Forest Policy encompasses the entire biophysical and environmental components comprising lands and biological resources (i.e. forests, watersheds, wildlife, biodiversity and habitats), and also includes the multi-stakeholders directly dependent on forest resources for their livelihoods. There is recognition that good forest management must be based on detailed local knowledge, not just of the forest and its ecology but also of the people who use the forest, i.e. their economic and social needs should drive the new policy approach from the bottom up. The Forest Department is therefore strengthening its collaborative capacity and broadening its knowledge base and the skill-mix of its staff. What is now being emphasized is the need to diversify forest governance systems to go beyond a centralized, top-down, government-dominated approach. Based on multiple stakeholders and multiple forest values, an appropriate enabling environment is being created in Himachal to enhance forest-based livelihoods and sustainable forest management.

Some of the trends and developments affecting forest policy as a result of the new emphasis on sustainability:

- Ecosystem Management is being highlighted with less emphasis on the production forestry aspects of the past (Marcot et al. 2005). The objective of the HPFD is to handle the complexity of the social, economic and environmental perspectives. A patch of forest can have global value though it may not correspond with values perceived by the local people. Thus longer temporal scales and broader spatial scales are to be addressed, and managers must think across ecosystems without specific boundaries. The simplification and conversion of the natural stands and reliance on mono-species afforestation, which seriously affects biodiversity, will not work. The landscape approach to handling degraded forest areas is gaining ground as it is dynamic, multifunctional, multi-use, productive, healthy and sustainable.
- The intrinsic value of Eco-services has come to the forefront. What is interesting is that the issues of biodiversity, ecotourism, climate change and watershed management no longer remain within the purview of the forester. Many new players are coming into the arena as ecosystem services (valuation, classification and evaluation for better integration) and prioritizing ecological processes become priorities. A holistic forest sector needs to integrate and collaborate. Management is shifting to mimic the natural processes and patterns with a multi-scale approach to integrate goals and objectives which span different land uses and ownerships. Perceptions have changed with regard to the values of forests; pluralism is being recognized and recognition is gaining ground that different forests can support different stakeholders and may require different management systems with many different systems of ownership and use of forests.
- Donor-funded projects remain important but the HPFD must find ways to sustain project momentum after donor funding ends—this entails development of products with marketable value. Donors funding projects in Himachal Pradesh include the World Bank, the German Gesellschaft für Technische

Zusammenarbeit, the Department for International Development (DFID), and the Japan Bank For International Cooperation. These donors and their projects are propagating newer innovation (organic produce versus genetic modifications), adaptation (climate change) and technology (nano, solar, wind, bioenergy) solutions (energy issues, animal husbandry, soil and water conservation, drip irrigation for agriculture, rain water harvesting).

- Legislation<sup>6</sup> too is accommodating the current trend towards ecosystem management and sustainability. Judicial activism has increased phenomenally. In 1995, the Supreme Court suspended green felling except for special work plans approved by the Government of India. The merits of the case continue to be debated as the forester continues favoring silvicultural felling and scientific management for forest health to ensure that salvaging dead, dying, diseased and moribund trees is not on the increase. The ban on felling in the state has meant further lowering of revenues from the forests.
- There is growing realization that good forest practices whether it is through incentives, market strategies or regulations should be codified. The move is towards green certification and criteria/indicators that promote healthy, sustainable forest models for improved management. Governments want to apply standards and capture revenue, the local rural people have become very aware and sensitive and want to defend rights and assets and non-governmental environmental groups want to move in and foster best practices.
- Private enterprise is becoming very important with the shift towards tree cover rather than forest cover. At the national level, it is estimated that private farmlands could yield 25 million tonnes annually against governmental forests that yield 10 million tonnes and that 40% of forest products are supplied from non-forest areas such as farmlands. Some wood-processing companies are contracting with farmers to grow timber plantations. The industrial demand is creating diversification with Eucalyptus, Poplar and Teak as favored species. Fruit trees are being heralded as having a huge potential for supplying wood.
- With the national import policy liberalization in the mid-1990s forest products markets are expanding, whether they are for plywood, panels, paper, newsprint or to meet the demands of the pharmaceutical companies. Non-woody forest products are gaining tremendous recognition especially with regard to meeting livelihood needs. Bamboo, straw products, bagasse, jute, and coconut hold great potential. In Himachal Pradesh propagation of medicinal plants in forest areas

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<sup>6</sup> A number of legislation having a bearing on biodiversity conservation in the State enacted are: The Destructive Insects and Pests Act 1914, The Indian Forest Act 1927, The Mines and Minerals (Regulation and Development) Act 1957, The Wildlife Protection Act 1972, The Water (Prevention and Control of Pollution) Act 1974, The HP Fisheries Act 1976, Himachal Pradesh Town and Country Planning Act 1977, The Himachal Pradesh Land Preservation Act 1978, The Forest (Conservation) Act 1980, The Air (Prevention and Control of Pollution) Act 1981, The Environment (Protection) Act 1986, The Himachal Pradesh Non-Bio-Degradable Garbage (Control) Act 1995.

through community participation is gaining ground. A lot of good work in this regard has been done in the Great Himalayan National Park<sup>7</sup>, at Shamshi, Kullu.

- Decentralization and devolution of authority is in the air and everyone is talking of strengthening decision making at the village-level. Many governments are decentralizing control of forests and divesting themselves of forest assets. Responsibility for forests is being placed in the hands of regional, municipal and local communities. At the local regional level there is space to integrate cultural and religious interests. In Himachal there are a lot of forests called Devta (deity) forest lands that are protected and conserved as it is felt that the area is to be revered. This concept can work as the religious ties are acutely strong in the mountain area. The trend is towards local community forest resource planning. Donor funded projects with local bottom-up planning and the current devolution to hand over decision making to rural communities are empowering the marginalized communities, who have started recognizing their rights to steer their own course. According to Forest Trends (2006), 77% of the world's forests are owned and administered by governments with a minimum 22% of all forests in developing countries being community owned. The trend for community ownership and management is on the rise. Though the government maintains its dominant position, the benefits from community ownership and management are visible—in fire control, removal of encroachment and illicit felling protection, patrolling, management or monitoring. The evolving ownership pattern has provided the community with both a challenge and an opportunity, to work towards livelihood solutions and to manage their resources productively through sustainable conservation.
- Globalization, whereby forest issues are being included and actively debated in the global arena—by new players such as multi-national corporations, banks and regulatory agencies—is impacting forest management. Conservation in one region is leading to intense forestry in another, e.g. timber imports to USA from Canada, to Japan from the other South-Asian countries, from Brazil to various developed countries. In Himachal Pradesh, the fluctuating international markets and its different products offer stiff price competition from different countries, especially China. Import tariffs, export restrictions, technical product standards, sanitary and phyto-sanitary measures and environmental and social standards such as certification and product labeling are becoming important for local producers if they want to stay competitive.
- The world is uniting over issues of the environment. There is a shift in the eco-climatic zones, new pests and disease problems are emerging, invasive weed species pose a threat, fire in one country is crossing borders and other countries are bearing the brunt of the heat and smoke, concern for fossil fuels, air, water and food pollution, link everyone with a concern that the natural resources are depleting very severely. Climate change uncertainties created by the potential

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<sup>7</sup> Himachal has 12% of its area under its 2 National parks and 32 Wildlife Sanctuaries.

impact of different climate scenarios are affecting forestry laws and institutions. Climate change adaptation is the major challenge for all forest managers in the future. In Himachal Pradesh climate change is also being felt and there are signs of global warming in the early flowering of rhododendrons, drying up of the Deodars, hotter summers, increased glaciation and a severe drinking water crunch—irregular, unpredictable and often polluted—especially in the summers.

The spark for developing a sustainable forest management approach in the Himachal Pradesh Forest Department has come primarily from adverse public reaction to inappropriate forest management policies practiced in the past, leading to a fundamental shift in its approach. The question being posed is that under these changing conditions, would the Forest Department act responsibly as a lead agency and coordinate the transition to Sustainable Forest Management? The role of the HPFD has changed from an expert-driven, enforcement-oriented (policing) one to a collaborative, consensus-building one. For this, the forest management objectives and also the forest officer/manager's skills and attitudes all need to change. Would the HPFD be able to facilitate and complement a regular, equitable, participatory system through which multiple forest stakeholders themselves can meet, debate strategic issues, consider optional solutions and form partnerships to realize the multiple forest values?

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## Chapter 3: Defining Sustainable Forest Management

The new Himachal Pradesh Forest Policy of 2006 states “sustainable forest management” as its chief goal and lists the following principles as its priorities: sustainable development, integration of natural resource management, decentralized governance, gender equity, and that forest policy should be more of a process—enabling it to be reviewed, adapted and revised as needed. In its objectives the policy lists the following:

- Conserving and improving the natural resource base (faunal, floral and biodiversity) through effective management based on watershed principles<sup>8</sup>.
- Conservation and management through sustainability and good forest practices—economically, socially and environmentally.
- Providing livelihood security to the forest dependent poor through forest goods and services.
- Participatory approach involving integration and involvement of all stakeholders.
- Meeting forest sector national obligations with regard to policies, laws, international agreements and covenants.
- Forest sector capacity building through research, training, extension, education and awareness.
- Adaptability, monitoring, review, and revision as needed.
- Appropriate land use.

This transition towards sustainability requires a different managerial approach, where all stakeholders should have a voice in the policy process and can participate. Can this approach alleviate poverty and provide livelihood options for forestry dependent communities, and can the forest department succeed in facilitating this transition? These and many other questions must be addressed and the attempt to move forward necessarily begins with a better understanding of exactly what sustainability means.

The subject of sustainability is tricky and there is a lot of confusion, heated debate and perceptions on its definition. A definition given by Mathis Wackernagel (Wackernagel et al. 2005) states, that “Sustainability is securing people’s quality of life within the means of nature.” This was also reiterated in United Nations Conference on Environment and Development Principle 1: “Human beings are at the centre of concern for Sustainable Development. They are entitled to a healthy and productive life in harmony with nature.” Then again “Sustainable Development” as defined by Bruntland (Bruntland 1987) is “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. In the context of forest management then sustainability would mean:

1. Maintaining healthy productive forests (both in terms of ecosystem services and goods) to meet the needs of the present generation, as a steady natural asset (capital) nurtured for perpetuity.

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<sup>8</sup> Watershed principles is a significant step forward as a “watershed” is an ideal unit in terms of bio-physical, socio-economic and cultural conditions with information of soils, production systems, land use systems, climate, water and biodiversity.

2. Encompassing a concern for the general well-being of future generations. For this it should be possible to make reasonable estimates for future needs, with knowledge of the current rates of resource use and regeneration and ability to reach consensus on appropriate levels of resource use.

Thus the elements of sustainability that need to be looked into are: maintaining the forest and its resources for longevity and perpetuity, concern for future generations and reasonable estimates of future needs, estimates of current rates of use and regeneration along with a widely accepted view of what is the appropriate rate of use.

Sustainable forestry has elements of environmental justice in that it advocates that there must be neither hoarding nor over-exploitation of forest resources. Defining forest sustainability, Noss in 1993 (Floyd et al. 2001) stated: “Since sustainable forest management is only possible within the ultimate constraints and limits imposed by the ecosystem, sustainability should be viewed as the degree of overlap between ecological possibilities and socially desired benefits of forests.” Coufal (1999) then defined Sustainable Forestry as “the act of managing forests to provide the necessities of life.” Sustainable forestry clearly manages for greater relative ecosystem complexity, maintaining high ecological productivity and functionality as compared to conventional forestry. The issues that are being raised with regard to how sustainable forestry can best be achieved are defining the incentives required, the regulations that need to be set, the research priorities to be highlighted, and the education and technologies at work. The issues of land use planning and type of ownership also comes up as to whether private or community ownership work best. The Joint Forest Participatory Management experiment shows that communities are better motivated to conserve once they realize that under new property rights changes they can have some say in managing the forests. Sustainable forestry, however, is different from sustained yield (e.g. growing trees for cellulose). The definition of the term Sustainable Forest Management as adopted by the FAO (2005) is: “the Stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.”

The emphasis on both environmental and social goals increases as one moves onwards from sustained yield forestry to sustainable forestry to sustainable forest management. As per the 2003 National Report on Sustainable Forests, USDA Forest Service discusses the concept of sustainable forestry as “Sustaining the full range of services and benefits (environmental, social, and economics) that people desire from forests will usually require a diverse mosaic of ownerships, forest conditions and capacities across the landscape, as well as a variety of management emphases” (USDA 2004). The elements of sustainable forestry are reiterated in the Montreal Process (6 of the 7 criteria subscribe to sustainable forestry). These are:

1. Socio-economic benefits—need to improve rural life through investments and recognition of environmental services and accounting for them.
2. Biodiversity—need for natural forests—“intact forests.”
3. Productive capacity, both for non-wood and wood.

4. Forest health, especially protection against fire, pests, disease etc.
5. Soil and water quality through alleviating soil erosion, compaction and nutrient depletion. Subsistence farming and grazing are particularly damaging in the developing countries and aggravate poverty.
6. Carbon sequestration—stresses due to global farming and climate change with reduced dependence on fossil fuels (USDA 2004).

The 2003 Forestry Program for Oregon (Sohn and Brown 2003) defines sustainable forest management to mean forest resources across the landscape are used, developed, and protected at a rate and in a manner that enables people to meet their current environmental, economic, and social needs, and also provides that future generations can meet their own needs (based on ORS 184.421). On a state-wide basis, sustainable forest management would provide:

- Healthy and diverse forest ecosystems that produce abundant timber and other forest products;
- Habitat to support healthy populations of native plants and animals;
- Productive soil, clean water, clean air, open space, and recreational opportunities; and
- Healthy communities that contribute to a healthy state economy (Sohn and Brown 2003).

The 2002 Johannesburg declaration slants the focus of sustainability towards poverty alleviation and thus has significance for developing countries and specifically Himachal Pradesh, which must cope with sustenance issues for its rural marginalized poor (Johannesburg Summit 2006). These are:

- Halve the number of people living in extreme poverty
- Halve the number of people lacking access to water and sanitation
- 10 year framework for sustainable consumption and production
- Reduce rate of loss of biodiversity
- Substantially increase global share of renewable energy
- Restore fish stocks
- Achieve sustainable use of chemicals

The “Ecosystem Approach” predates and shares many of the traits of “Sustainable Forest Management” but differs both in its philosophy and its origin. Its approach is a prioritization of biodiversity conservation through multiple land uses. The Ecosystem Management Approach was first developed during the 1980s, in the US Pacific Northwest and later was adopted by the US Forest Service. Later, the Convention on Biological Diversity adopted the term Ecosystem Approach as a practical managerial approach and defined it as follows: “The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. An ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompasses the essential structures, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems.”

**Table 3: Comparison of Sustainable Yield, Sustainable Forest Management, and Ecosystem Approaches (Sayer et al. 2004)**

<b>Criteria for Comparison</b>	<b>Sustained Yield Forestry</b>	<b>Sustainable Forest Management</b>	<b>Ecosystem Approaches</b>
Primary concern...	...is on sustainable commodity production	...is on balancing conservation, production and use of forest goods and services	...is on balancing—and integrating—conservation and use of biological diversity
Tangibility of goals...	...is high -commodities.	...is high-products and services	...is low-equity and sustainability
Resource management objectives...	...are based on long-standing technocratic traditions and legal mandates, focused on production	...incorporate broader range of environmental and social objectives	...are a matter of societal choice
Control of resource management decisions...	...is generally centralized under responsible forest management agency	...is still usually centralized though other management options are emerging	...is decentralized to the lowest appropriate level
Hierarchical approach...	...is one of command and control—“we manage”	...is slightly more open – “we manage, you participate”	...is replaced by the concept of social learning-“we are learning together”
Spatial scale is considered...	...at site level only (i.e. management unit)	...primarily at site level, though with some consideration of externalities	...to incorporate the wider landscape-scale linkages
Knowledge is based on...	...scientific and technological knowledge	...expert knowledge, supplemented with broader stakeholder inputs	...a more balanced use of scientific and indigenous and local knowledge, innovations and practices
Sectoral approach is...	...narrowly focused	...broadly focused	...cross-sectoral
Assumes...	...predictability and stability	...adaptive management – but within defined limits	...need for resilience, anticipation of change
Associated tools...	...are those of classic silviculture	...include codes of forestry practices, criteria and indicators, etc.	...are not yet available. ESA have no case law and need practical testing

Sustainable forest management treats the environment as a benefit, putting greater emphasis on forest practices that promote diversity, interconnectedness, feedback, adaptation, and continuous improvement. Sustainability aims to balance economic, ecological and social needs. Sustainable forest management ensures both resource protection and enhancement of the ecosystem, while also providing a spectrum of marketable forest products (wood and NWFP).

For sustainable development to work with natural ecosystems and their goods and services, a combination of regulatory constraints and market mechanisms are needed. Traditionally, an important role for government is to protect public goods such as clean air, clean water, and other natural resources from becoming over depleted or degraded by an unchecked marketplace—a way to avoid a “tragedy of the commons.” At the same time, such regulations should not suffocate private enterprise because there is a degree of efficiency in the free market’s allocation of resources. Finding this balance requires a steady government with clear policy goals, and it is imperative that local governmental institutions which deal with common-property problems must rise above weakness and petty political influence. Stephen Farber, in his paper *Local and Global Incentives for Sustainability: Failures in Economic Systems* (Costanza et al. 1997a), concludes that institutional longevity is congenial to sustainability and weak governance adversely affects the sustainability of institutions. Institution longevity is one of the prerequisites for sustainability, as are long term stability of society, incentives, taxes, value-added production, reduced logging, conversion of waste, and log export constraints. Strong state control, permanent usufruct or community tenure, or similarly long-term arrangements are fundamental for achieving sustainability.

The Millennium Ecosystem Assessment Synthesis report’s 4th main finding (Millennium Ecosystem Assessment Panel 2005) warrants that “There is an urgent need for change in policies, institutions and practices” to halt and to reverse the degradation of ecosystems. Per its recommendations, greater use of economic instruments and market-based approaches in the management of ecosystems services are required. There is thus urgency for a new approach that considers a combination of enforceable regulatory constraints on ecosystem destruction and meaningful economic incentives for ecosystem conservation. The adoption of the New H.P. Forest Policy by the State government shows an affirmation to handle forests as reserves in which integrated management (multi-product asset, i.e. for wild life, carbon sinks, recreation, clean water and other values) can be practiced. Ecosystem restoration would ensure biodiversity conservation that will help to reduce poverty and provide meaningful livelihood options for its rural poor. Federal land management in the PNW illustrates an Ecosystem Approach. The federal public lands of the Pacific Northwest, managed under the Northwest Forest Plan<sup>9</sup> entail designation, on federal public lands, of 1) various kinds of late-successional forest reserves and riparian reserves, as well as 2) adaptive management areas for silvicultural experimentation and research, and 3) matrix lands for more intensive timber production. The combination of these land allocations as intended to provide 1) conservation or recovery of salmon, spotted owls, marbled murrelets, and other species associated with old forests, and 2)

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<sup>9</sup> Instituted in 1994, after a mandate from the then U.S. President, Mr. Bill Clinton.

timber and other commodity, recreational, and cultural opportunities (Bruce Marcot, personal communication).

The current spotlight in Himachal is on “Ecosystem Services”. To understand ecosystem services the term “ecology” is important as it relates to the study of the relationships between organisms and their environment. As defined by Bettina von Hagen, “Ecosystem services are fundamental life-support services provided by natural ecosystems upon which the well-being of all societies depends.” Ecosystem services may include (Daily 1997):

- sequestration and storage of carbon
- storage and filtration of water
- maintenance of biodiversity
- purification of air
- mitigation of droughts and floods
- generation and preservation of soils and renewal of their fertility
- detoxification and decomposition of wastes
- pollination of crops and natural vegetation
- dispersal of seeds
- cycling and movement of nutrients
- control of the vast majority of potential agricultural pests
- protection of coastal shores from erosion by waves
- protection from the sun’s harmful ultraviolet rays
- partial stabilization of climate
- moderation of weather extremes and their impacts
- provision of aesthetic beauty and source of inspiration

Marcot (2004) defines “Ecosystem services are the array of natural resources and processes that are valued by humans and that sustain ecological communities and ecosystems” and has 5 categories to encompass them:

- Ecological Services (pollination, carbon sequestration etc.);
- Biophysical Services (soil and regolith services, water regulation services, air quality and atmospheric services, vegetation services),
- Ethno-biotic Services (medicinal plants used by native peoples, provision of aesthetic beauty etc.);
- Economic Services (biological controls, recreational services etc.); and
- Natural resource Services (timber, clean water, fauna etc.).

Boyd and Banzhaf (2005) define “Ecosystem services are the end products of nature that yield human well-being” and attribute three conditions to services: 1) service emerges from natural environment 2) the service must enhance human well-being 3) the service is an end product of nature directly used by people. They also go on to differentiate ecosystem services from ecosystem functions. Functions are the biological, chemical, and physical interactions associated with ecosystems. The services (clean water) depend on the functions (nutrient cycling) but are different as they are the aspects of the ecosystem valued by people (Boyd and Banzhaf 2005).

The interdependence of ecosystem services and economic systems is most important, yet there is currently little economic valuation of ecosystem services in national accounting. The ecosystem services are essential and valuable and cannot be replaced by technology. Natural capital continues to not be taken into account in national accounting. Economic growth is assessed by the rate of growth of the GNP with no account being made of the stripped resource or environmental assets. The attempt of Daly and Cobb (Costanza et al. 1997a) to adjust the Gross National Product figures, from 1945-1980, accounting for depletions in the natural capital came as a shock—it showed that the net economic growth in the US has been virtually flat over the past 25 years. This means that whatever was projected in glowing terms, was merely a delusion. Incorporate the depleted inventory of natural capital for understanding economic growth and the picture changes. This means also that for many countries in the tropical belt where deforestation has come about the economic growth would be rendered negative. Daly (1997), warns that due to the information gap and poor value understanding, human activities are impairing ecosystem services and there is fear that if this process continues natural ecosystem services would be dramatically altered. For sustainable development, natural capital must be accounted for. If an environmental impact assessment were done, this would render many development projects, unfeasible to execute. Most development as of today is unsustainable in these terms.

Clearly there is need for the valuation of ecosystem services in economic terms. The economic value of the ecological services provided by intact natural ecosystems are substantial and much higher than conventional market rates. Scientific understanding of ecological services immensely improves new financial opportunities. As an illustration, enhanced quality and quantity improvement in money terms through natural insect pollination in a coffee crop in Costa Rica<sup>10</sup> was significant. Ecological goods and services should not be taken in as being free. Valuation ensures that choices can be made and alternatives explored. Ecosystem services were valued globally through Costanza who put the ecosystem services at a value of US \$33 trillion (as against US \$18 trillion for the global GNP) (Costanza et al. 1997b). As per Costanza “the economic value of ecosystems is connected to their physical, chemical and biological role in the overall system, whether the public fully recognizes that role or not” (Costanza 2006) Valuation of ecological services needs to be done realistically in a way that there is no discrediting and tarnishing of the idea. The recent Millennium Ecosystem Assessment was the first comprehensive global survey of ecological services.

The Himachal economic valuation of eco-services, such as direct non-consumptive benefits<sup>11</sup> and goods—all direct benefits like salvage timber, timber for right holders, fuel wood, fodder and minor forest produce—recognizing the multi-stakeholders, multi-

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<sup>10</sup> Conserving tropical forests could increase profits for coffee farmers in developing countries, according to research. The study shows that the closer coffee bushes are planted to patches of forest, the more and better quality beans they produce because of greater pollination by wild bees (as per Mike Shanahan, dated Aug. 4, 2004, Source: SciDev.Net)

<sup>11</sup> For example, ecotourism and indirect benefits like watershed management, microclimate, carbon sink, biodiversity, endangered species and employment generation.

sectoral contribution of forests through their multiple values was done by Ms. Madhu Verma of IIFM Bhopal. This study was conducted by IIED, London with financial support from the DFID (Verma 2000). The economic value of forest stock of H.P. (on an annual basis as per 2000 prices) came around US \$17,000 per hectare. As per her results maximum per hectare value is generated by watershed function, followed by carbon sink, biodiversity, ecotourism, etc. Accordingly the growing stock value for a volume equal to  $10.25 \times 10^7$  cubic meters came to US \$9.5 billion. The direct benefits were valued at \$1.8 billion while the indirect benefits came to US \$23 billion, projecting the total annual economic value as US \$24.8 billion.

The sustainable forest management model is becoming very important for forward thinking environmentalists. In the Pacific Northwest, Ecotrust, a non-governmental organization, is propagating the idea that financial institutions are ready to finance projects under this model as this is environmentally and economically much more secure than conventional models. Sustainability models favor FIMOs (Forest Investment Management Organizations) as alternatives to institutional investors called TIMOs (Timber Investment Management Organizations)<sup>12</sup>. The acquisition and viewing of forestland for timber as a financial asset, by the TIMOs, brought with it a risk that vast areas of forests would get converted through intensive harvest. On the other hand, the FIMOs are also investors that go in for acquisition, differing in their view of forestland assets, which are seen in its entirety for conservation and sustainability for timber and non-timber revenue sources (Best and Jenkins 1999). Ecotrust has attracted private funds to invest in an innovative model where forests are grown for financial and environmental benefits. Unlike the short rotation single species plantations of many TIMOs, the Ecotrust project has different management goals across the landscape, and offers a mix of goods and services beyond just timber. Forests are considered a productive asset, which is to be enhanced rather than depleted to provide for long term revenues rather than a short term return of capital. It allows for forests to regenerate and rebuild ecosystem complexity, vitality and biodiversity.

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<sup>12</sup> As forest industry began divesting forest ownership, groups of forest owners formed timberland investment management organizations (TIMOs) to take advantage of emerging opportunities. TIMOs in the US expanded operations to several other countries, especially in the Southern hemisphere—Argentina, Brazil, Chile, New Zealand and Uruguay. Low unit prices, long term potential for value appreciation and high productivity increased institutional investment in timberland from about US \$14.4 billion in 2002, over an area of about 7.4 million hectares (Ravenel et al. 2002). Examples are John Hancock Timber Resource Group, The Campbell Group, Prudential Timber Investments, Forest Investment Associates, Forestland Group, Wachovia and UBS Resource Investments. TIMOs are bringing about a trend towards increasing flow in timber investment funds (current figures are US \$5 billion, mostly in pension funds).

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## Chapter 4: Watershed Management and Sustainability

Himachal Pradesh is a state facing critical environmental challenges. Few issues highlight the critical need for forest policy changes in Himachal Pradesh better than the topic of water. This chapter explores Himachal's key water challenges and the strategies needed to meet them.

The New H.P. Forest Policy 2006 states its major objective as the need to conserve and improve its natural resource base (faunal, floral and biodiversity) and its ecosystems, through effective management based on watershed principles. The thinking is sound, since ecosystems maintain water flow and supplies, regulate water quality, and minimize water-related disasters (Emerton and Bos 2004). This new policy is in line with the Rio Action Plan (Chapter 13 of Agenda 21) where the key challenge of poverty eradication highlighted the importance of watersheds and ecosystems:

1. Generating and strengthening knowledge about the ecology and sustainable development of mountain ecosystems; and
2. Promoting integrated watershed development and alternative livelihood opportunities (UNDESA 1992).

The state policy shift from “tree propagation” to “water augmentation” is a major visionary change which requires a change in the forest department's mission and responsibilities. Previously, the foresters' primary focus was on policing forests to ensure protection of tree resources, especially in regards to planting and harvesting of trees. Now he must also look at water issues, not just tree resources, and the forestry department must lead a participatory process in which the forester acts in a facilitating role to involve the local community in protecting forests and water. This matches the principles of the International Conference on Water and the Environment (ICWE) whereby it is stated that water is a finite resource<sup>13</sup> having economic value, that every human has the right to access clean water and sanitation, that there should be active participation amongst all stakeholders in the management of water resources, and that women deserve a pivotal role in decision-making and need empowerment (ICWE 2006).

For Himachal, this policy shift is in keeping with an already emerging recognition at the state level of the importance of forests to water. 28% of the world's forests are in mountains, and mountains are the source of some 60-80% of the world's freshwater resources. The Himalayan state of Himachal faces a severe shortage of drinking water. Cloud bursts and floods cause severe erosion and destruction while droughts catalyze fires annually. The change to the water regime is impacting human habitations, agriculture, sensitive ecosystems and economic development. Tapping into ground water leads to depletion of the vital resource and is not a long-term solution. Degrading water stocks are being observed in many other places in India, as too much reliance on ground water is resulting in depletion, land subsidence and salt water intrusion. The present trend

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<sup>13</sup> Worldwide, only 3% of total water in the world is fresh water, with most of it standing locked in the icecaps and glaciers.

towards global warming is particularly severe for Himachal as almost all of its water is snow-melt. With the receding of glaciers, the issue of water sustainability has wider ramifications for the Himalayan State in the future. Institutional capacity building will have to accommodate climate change and the role of the hydrological cycle, noting that traditional approaches may tend to oversimplify. Since the watersheds are affected by soil type, geology, vegetation, slope and aspect and with the climate bearing upon the quality and quantity of water, the erosion in the cold desert areas has significantly increased, as areas which previously only had snow in the past, are getting precipitation in the form of rain. This is particularly severe on the muddy hills which are eroding sharply, increasing the silt content in the rivers, especially as observed in the Spiti River. There is thus urgent need for adaptation as both engineering and vegetative soil and moisture conservation is required to protect the fragile ecosystem of the cold desert. Many environmentalists question the Forest Department's move to provide employment to the people in these ecosystems, allowing planting above the tree line—with Willow and Poplar and provision for irrigation in perpetuity.

Himachal faces rising water demand and increasing pollution—especially garbage dumping in natural water sources, choking from non-biodegradable polythene material, exhaustion of groundwater sources, damaging erosion and increased run-off due to loose soil strata. Unstable climate, political disputes with regard to development issues and problems of subsidies and poor land use further complicate the matter. The fact remains that human activities have caused degradation of stream habitats, contamination of water supplies, and groundwater depletion through bad management and land use changes that use large amounts of water. The need for potable water is at an all time high and there is a pressing need for adequate sanitation. Water has become an increasingly threatened natural resource, even though it is a renewable product which calls for balanced ecology, rather than costly technological inputs. There are growing environmental concerns about hydroelectric power development in Himachal, which threatens biodiversity, soil stability and water quality. Dams can cause increased landslides, pollution and submergence of prime areas through the diversion of rivers, damage to microorganisms which help in natural purification of water, damage to fauna and flora and aquatic life, increased muck and its poor disposal, and significant negative impacts on affected people. Himachal is actively working towards a revised HP Water Policy appreciating the need for good governance, which must entail transparency, accountability and local public participation—only then can the basic interests of the poor be promoted.

Managing forests to provide clean water both in terms of quality and quantity is a complex issue. Links between forests and watersheds are complicated and vary with geography, weather patterns and management. Watershed management can be through a natural forest or other well-designed landscape mosaic such as interspersing natural forests with crops, pastures or production forests (Vandas 2002). However there is no denying the fact that forests in catchments generally result in cleaner water downstream, and this leads to massive reduction in the costs of purification. Protecting forests can help provide high quality water and these protected areas need to be integrated into the landscape. Management practices must maintain soil infiltration and water storage for

desirable stream flow. Forests do increase infiltration and have a local impact on amelioration.

There are many examples of major cities looking to their forests for a consistent supply of clean water. For Himachal, the Shimla Catchment Area is fundamentally important to its capital; 85% of San Francisco's drinking water comes from the Hetch Hetchy Watershed located in Yosemite National Park (Category II); 90% of Melbourne's water supply comes from uninhabited mountainous catchments to the North and Eastern sides of Melbourne through the Mountain Ash (*Eucalyptus regnans*) forests; and in Los Angeles, the Angeles National Forest (Category VI) is one of 18 national forests in California, that covers only 20% of the land but produces almost half the State's water. New York's experiment at quality augmentation through its upstream community compensation is exemplary (Stolton and Dudley 2003).

Oregon water also originates from forests and requires little treatment. In the PNW, care is taken not to waste water, through drip irrigation and advanced water technology. In many of the agricultural fields the run-off is zero. This means the nutrients and the chemicals—pesticides, insecticides, or fertilizers—do not run off and enter the water sources. The laws, especially for riverain protection, are also eco-friendly. In Portland Oregon and in Washington areas it has been found that every US \$1 invested in watershed protection can save anywhere from US \$7.5 to nearly US \$200 in costs for new water treatment and filtration facilities (Emerton and Bos 2004).

The issue of dams has been etched into the social consciousness in the PNW as an environmental issue as salmon migration is threatened. The construction of dams, weirs and barrages act as physical barriers to migration, preventing fish access to their usual breeding regions and feeding grounds. The denial of migration may result in permanent and irrevocable reduction of fish stocks ranging from low numbers to complete extermination. The niche so vacated may be filled up by undesirable species. Oregon's Status Report warns that many wild fish face risk of extinction within 5-10 years. Construction of power generating dams has adversely affected some of the salmon—e.g. Spring Chinook Salmon are going extinct in the upper Snake and Klamath rivers (ODFW 2005). There is loss of habitat spawning grounds and other problems. The Red-band and Bull Trout are also at risk; the Alvord Cutthroat Trout has gone extinct and the reason is being attributed to the intentional release of non-native rainbow trout into its habitat (ODFW 2005). The species loss has fuelled improvements in water management and sustainability in the PNW. In Himachal, *Tor putitora* (Mahseer), a commercially important fish species, migrates from the main rivers to the tributaries for breeding in monsoon months and descends back, before the onset of winter. The State Council for Science and Technology of Himachal Pradesh and also the Fisheries Department have also implicated dams in the decline of Mahseer fishery in the State. There are gaps in information, vision, policy and legal structure, and in institutional and human capacity. Sustainable conservation practices need to be applied after inventory and documentation of the traditional and current knowledge of aqua biodiversity. It is important that adverse impacts of development must not be allowed to ruin the valuable resource which must be

protected, diversified, maintained and propagated in the context of food security, employment generation and sustainable development.

Water resource management using the principles of sustainability is essential. The water's carrying capacity must be accounted for, considering the processes are cyclical and renewable. Feedback is important to help evolve policies, management practices, technologies and lifestyles that promote sustainability and develop statistical indicators for measurement. "Integrated Water Resources Management" (IWRM) is to water what sustainable forest management is to forests. IWRM is an integrated water resources approach that meets the human requirement for freshwater whilst maintaining the hydrological and biological processes essential for the functioning of the ecosystem. The approach must be participatory, especially for women, who need to be involved in decision making. The FAO definition of IWRM describes it as a "process that promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (FAO 2006). Watershed-management requires effective governance with transparent and consistent regulations and policies that can deliver equitable solutions to the poor and other marginalized communities. There is growing recognition of the need to question how power is exercised, whose values count, who owns and controls what, who benefits and who sets the rules of the game. Mobilizing financial resources, land use planning, local capacity building and sharing knowledge are equally important. Non governmental organizations and cooperatives are to be encouraged to share in the effort.

What does Himachal need in its watershed management? The concerns are:

- For the total economic value of ecosystems for water, including both use and non-use values<sup>14</sup>, to provide income generation, employment and health.
- Participation and empowerment through transparent decision making and decentralization, involving all stakeholders(non governmental organizations, women and other marginalized groups) working through the local Panchayati Raj System.
- Environmentally sensitive low-cost technology to handle moisture conservation measures and run-off reduction<sup>15</sup>. Various soil and water conservation measures and effective land use is required to ensure that infiltration is increased and run-off reduced—the management of the land use and changes thereof is critical.
- Evolving market strategies to help fund watershed projects and maintenance are necessary for long term sustainability.

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<sup>14</sup> Under use values come three categories, namely direct values (outputs—food, NWFP, timber etc.), indirect values (ecological services like flood control, carbon sequestration etc.), and option values (future needs). Under non-use values are the existence values like cultural, aesthetic etc.

<sup>15</sup> The "Neeru-Meeru" used in another Indian State, Andhra Pradesh, was especially successful as it used engineering physical structures (through continuous contour trenches or staggered trenches and dams or percolation tanks, sunken gully pits etc.) along with vegetative measures to improve green cover, fertility and moisture regime in non-forest private lands and rural development. The "Haryali" Scheme of the Government of India is holistic as it encompasses all soil conservation activity under one umbrella.

It is urgent that Himachal protect its drinking water sources from pollution. The problem of pollutants is severe, considering excess use of fertilizers on agricultural and grazing lands. This calls for water quality with minimum physical, chemical and biological parameters and cost effective treatment through filtration, disinfection, chlorination, and exposure to sunlight. Water quality involves many physical, chemical and biological characteristics, like clarity, sediment concentrations, temperature, dissolved oxygen content and the presence of bacteria, algae, insects, manufactured chemicals and various nutrients. Water quality is affected by erosion, fire, natural chemicals, coliform organisms, soil microorganisms, human activities and forest management such as thinning, roads, fire suppression, timber harvest and reforestation. Landscaping using natural vegetation that relies only on precipitation for moisture can conserve water. There is massive contamination of natural water sources, especially the natural brooks, springs and rivers through urban pollutants. Most of the city pollutants are being dumped in water courses, severely affecting water sustainability. Increasing populations are putting greater pressure on water resources. Microbial pathogens resistant to chlorination and the ever-increasing use of synthetic compounds are a challenge to treatment technology. Adaptive and cost effective pollution control measures like phyto-remediation should be tried, such as using Poplars, certain legumes and grasses to filter and absorb contaminated water from the soil. Preventing contaminants from reaching streams and aquifers is the most effective way to reduce water contamination. Proper handling, storage and disposal of toxic substances can prevent these substances from reaching waters. Best management practices include: line impoundments of landfills, building sediment and run-off ponds, equipment wash-off areas, capture and treatment of urban run-off and vegetated buffer strips next to stream channels and lakes. Regulatory measures in the form of source directed controls are important for waste standards. Riparian area protection in the US as seen in the PNW is significant, with buffer zones measuring 20-30 meters wide to protect vegetation.

Exploring local solutions and maintaining traditional sources would augment the quality and quantity of drinking water in the state, and would be financially viable. The protection of the hilly state's natural water sources like the kuhls and bauris require priority attention. There should be appropriate water allocation to prioritize drinking water before irrigation. Irrigation norms demand changes in irrigation processes and conversion to growing high value crops with lower water demands. Legislation should mandate necessary changes, such as rain water harvesting, which has been made mandatory by the state government. Drip irrigation has been introduced in the cold desert but needs a real spurt elsewhere. Raising water through a mechanical system called hydram is particularly popular for its mechanical efficiency while the gharat—a traditional vertical shaft water mill<sup>16</sup>—has water-use relevance today. Small dams were introduced successfully in the 70s for irrigation, but non-maintenance and disuse has led to their current state as eyesores. The hydroelectric “run of the river” projects have become popular in the state but these are generating a lot of controversy as water channels dry out during the summer, resulting in dramatic changes in the ecology of the

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<sup>16</sup> This eco-friendly water mill could easily generate enough power for a village unit. The Energy Research Institute has worked at a more structured approach in collaboration with IT Power, UK and the Alternate Hydro Energy Centre, University of Roorkee, to compute the benefits of technology refits of Gharats.

area, especially with regard to biodiversity. The fact is that water transfers affect ecosystems, and the run of the river projects is no exception. There is heated debate, with many environmentalists subscribing to the fact that natural water regimes are adversely affected through blasting and tunneling work in developing hydroelectric power. The argument is that it disturbs fragile strata (with meteorological hazards triggering landslides and floods during the monsoon season) and leads to natural water veins getting closed or disturbed which in turn is the reason for severe drinking water crunches at different locales. The problem gets aggravated further in the snow bound areas, with development work getting hampered because of a limited working season, scanty surface communication system, and avalanche threats.

The payments collected from different water users in Himachal should be differentiated in terms of how these payments will be utilized. In hydroelectric power receipts, payment is made today for the certainty of having power resources available in the future. Likewise, there are suggestions that polluters should pay for the uncertainty of future environmental impacts. In the “polluter pays principle,” the funds collected (see Table 4) have become a significant amount and there is scope to study what happens to the resources collected and whether stakeholders are involved in their expenditure. The call to pay the local people for their role in protecting, managing or restoring watersheds and to embed biodiversity conservation and livelihood benefits into forest protection holds promise (Geoghegan 2005). Multiple-use community forestry can provide local income; communities and landowners can be paid to conserve resources and monitor water quality. Under the principles of the “payment for environmental services” approach, those who provide environmental services ask to be compensated for doing so, with those receiving the services paying for their provision. For example, in Costa Rica, the hydropower companies pay land users to maintain forest cover in watersheds and Chile has a market in watershed development rights. Proper valuation provides a powerful argument to integrate ecosystem values in water management decisions (Emerton and Bos 2004).

**Table 4: The major type of payments associated with hydroelectric projects in Himachal Pradesh (US \$1 = Rs. 42 approximately)**

<b>Name of payment</b>	<b>Nature of payment</b>	<b>Payment made to</b>	<b>Reason for Payment</b>	<b>Amount of Payment</b>
Compensatory Afforestation (CA)	One time mandatory payment for all projects diverting forest land according to the Forest Conservation Act 1980.	State treasury. A new system is to come into vogue called CAMPA (Compensatory Afforestation Fund Management and Planning Authority) where the funds would have to deposited with the MOEF (Ministry of Environment and Forests) and the HPFD (HP Forest Department) would then send Annual Plan of Operation (APO) for release of funds from the GOI (Government of India).	To compensate for diversion of forest land.	Cost of undertaking plantation work on equal area of land if within forest area or double the area if outside forest area. Also all costs involved in the diversion of the agreed forestland. The local forest department officials work out the total cost.
Catchment Area Treatment (CAT)	One time mandatory payment for all HEP projects under the Environment Protection Act 1986.	Usually to State treasury though in some cases system of installments are in practice where the larger hydro projects have their own divisions for this purpose. A new system is to come into vogue called CAMPA (Compensatory Afforestation Fund Management and Planning Authority) where the funds would have to deposited with the MOEF (Ministry of Environment and Forests) and the HPFD (HP Forest Department) would then send Annual plan of operation (APO) for release of funds from the GOI (Government of India).	To protect the catchments areas of the dam / reservoir through forestation and other watershed treatment work which would include biodiversity conservation, livelihood improvement and participatory management works.	Still to be worked out— though it can be as high as 10% of the total project cost in case of private sector projects and usually ranging between 3-5% for other national and state government supported projects.
Environmental Value Tax or the Net Present Value (NPV)	One time mandatory payment for all projects diverting forest land in HP.	State treasury. A new system is to come into vogue called CAMPA (Compensatory Forestation Fund Management and Planning Authority) where the funds would have to deposited with the MOEF (Ministry of Environment and Forests) and the HPFD (HP Forest Department) would then send Annual plan of operation (APO) for release of funds from the GOI (Government of India)	To correct distortions in forest valuation and generate revenue for forest protection.	Levy fixed at Rs. 8 lakhs per hectare where forest density is above 0.1% and Rs.5 lakhs per hectare for other forest areas.

Royalty	Mandatory for all non-state projects.	State treasury through HPSEB.	Part of it is supposedly for CAT.	12.5% of total power generated.
Green Belt provisions	Provided in the EIA/EMP	Handled by the project authorities at their own level for environmental improvement	Environmental concerns	Provisions of 1500 trees to be planted per hectare-or lesser tall plants and also some soil conservation measures
Price of trees	One time payment required for diversion of forest land approval.	State Treasury. Price of trees in Governmental land to be paid to the Forest Department while compensation required with reference to the trees coming in the private lands.	Payment with regard to the price of trees coming in the project area and which are required to be taken-up by the project authorities (for felling—if nationalized then through the HP State Forest Corporation).	Worked out at standardized rates available with the HPFD/HPSFC.
Compensation with reference to rehabilitation measures	Mandatory.	Between the project authorities and the revenue department.	As part of the EIA/EMP.	As per stipulations — connect with the revenue department for price of land and prevalent rates for other compensations.
Muck/Debris disposal and dump yard rehabilitation of muck areas	Mandatory under the EPA 1986.	In State treasury. Negotiated between the project authorities and the Forest Department.	As part of the EIA/EMP for specific environmental reasons.	The debris/muck/dump rehabilitation plan is got prepared through the HPFD. Variable.
Water Cess	Mandatory payment under the Water Cess Act 1977.	HP State Environmental Protection and Pollution Control Board.	Part of it is supposedly for CAT.	Rs. 0.40 per kilolitre.

Clumsy use of payment schemes can create perverse incentives that raise hopes of payment in other areas and hence block ways of reforming management and green taxation, which is the levying of user charges for fresh pure water coming from forests protected by the state. Bayon (2004) illustrates that the 1972 passing of the Clean Water Act in the US has helped markets to implement mitigation policies. Developers are permitted (through issue of permits, valuing a preserved wetland to be around \$44,000 an acre) to “damage” a wetland on the condition that they compensate for this harm by creating, enhancing, restoring and protecting a similar wetland, with similar functions and

values, somewhere else. Several US states have markets to the right to damage endangered species (e.g. California's coastal gnatcatcher and the Alabama gopher tortoise, and the Red cockaded woodpecker) relying on government's ability to limit and allow development (Bayon 2004). Oregon's Governor, Ted Kulongoski, has made cleaning up the Willamette River his key environmental task. The money comes from a new fund created by fines paid by polluters. Kulongoski and U.S. Attorney Karin Immergut created the Oregon Governor's Fund for the Environment with a \$2.1 million fine paid in a national pollution case against a Panamanian shipping company accused of dumping sludge on U.S. coastlines. Interest earned on the money is expected to cover annual grants to protect fish and wildlife. Out of 34 applications, 9 grants (US \$346,210) have been given to the following:

- *Yamhill Soil and Water Conservation District*: \$47,423 for river-bank buffers on private land
- *Cascade Pacific RC and D Inc.*: \$34,830 for a series of workshops to inform farmers about riverbank areas
- *Oregon State University Extension Service*: \$16,737 for training landowners to improve water quality
- *Salmon-Safe Inc.*: \$37,000 to help vineyards adopt fish-friendly farming techniques
- *Eugene Water and Electric Board*: \$40,220 to clean up agricultural chemicals from farms
- *East Lane Soil and Water Conservation District*: \$20,000 to improve riverbanks on the Mohawk River
- *Willamette Partnership*: \$50,000 to promote the use of conservation credits
- *Mary's River Watershed Council*: \$50,000 to provide technical assistance to eight watershed councils to improve waterways
- *Policy Consensus Initiative*: \$50,000 to help farmers by creating the Oregon Sustainable Agriculture Resource Center (Sleeth 2006).

What would help to bridge the gap between science and policy is effective networking and improved technical (GIS) methodologies for integrating land and water resource management. Myths need to be consciously shown the light of reason through evolving scientifically established truth for decisions and strategies. Water governance must be both holistic and evidence based, especially since there is so much financial support at stake for watershed development programs in Himachal, whether it is through the World Bank or other donor agencies. The Department of International Development's Forest Research Program and low flows research in Himachal have brought significant results based on scientific grounding and technical advances for integrated land and water management. In the hilly tracts, where many upland forests get cleared for horticulture or cultivation, use of best agricultural practices helps. These could be reduction in stock densities, break-up of plough pans with a chisel plough, and ensuring good ground cover. It may be sound to consider improvements in rain-fed farming, (e.g. crop breeding, rainwater harvesting, mulching, conservation tillage, market access, capacity building) than to invest in rural small-scale irrigation. Some of the policy implications from the lessons learnt in developing countries are (Hayward 2005):

- Increasing forest planting with fast growing, deep rooting evergreen species like pine and acacias may not be a solution to the problem of water shortages.
- Recent experimentation has challenged the notion that forests regulate and even increase water flow. In the succession cycle, forests are a consequence of soil and climate conditions and not the reverse.
- Soil degradation, through compaction (heavy intensive grazing), road construction, drainage or other reasons is harmful as it causes localized flooding during rainy seasons and reduced dry season flows.
- Landslides and floods are the result of climate, rainfall, geology and topography. Porous soils are best for storing and gradually releasing water throughout the year.
- There must be scientific validation before any market mechanism or tax system linking land management to quantified stream flow is implemented. Provision of local benefits should not mean that the water resources downstream are allowed to be degraded.
- Integrated land and water resource management takes into account the ecology, economic pricing, viability and equity, integrates local solutions, defines objectives, delivers mechanisms and monitors regulations. Closer consultation and networking is thus required between the scientific community, policy makers and other stakeholders.
- Market mechanisms (credits, market support, training and education) need to be pro-poor and policy instruments must be made equitable in terms of livelihood benefits, not just water allocations, because the poor in Himachal are landless or have low land holdings. Without natural assets, no benefits accrue to the marginalized poor, especially women, whether these are the benefits from increased water flows downstream or grants for land management upstream. Low institutional infrastructure, with the poor living dispersed, and being largely unorganized, does not allow them to benefit from environmental services trading or payments for environmental services. It is important to know what the rural poor actually want through effective negotiation support system techniques.

Every watershed is unique, requiring a close working relationship between interested stakeholders to solve the complex physical, environmental and social problems associated with balancing needs within the watershed (Adams et al. 2005). Networking is required for effective management to increase knowledge, information, partnerships and participation with new technologies, traditional techniques and indigenous knowledge. Local capacity building, decentralization and empowerment, and research and development should be fostered. Careful management of natural sources of water calls for critical governance that involves working with local people as watershed stewards, recognizing rights and traditional management capacity, encouraging negotiation and

providing technical and financial support for communities to invest in land management. Techniques of watershed management including integrated fuel wood, forage and possible medicinal plants from agroforestry in former grasslands need to be developed and applied. Financial credit, technical budgets or consumer charges need to be explored. Critical sites for hydrological functions (or biodiversity conservation) can be zoned for non-productive use, or farmers and landowners compensated for easements. The excessive use of quality freshwater being used for crop irrigation is wasteful. Infrastructure leaks, with around 50% water lost in transmission, calls for remedial action though massive investment in infrastructure and maintenance costs. There is increasing interest in the opportunities for offsetting or reducing some of the costs of maintaining urban water supplies, as well as improving water quality through management of natural resources and particularly forests. The role of the international community is vitally important to address the gnawing need for funds, and collaboration with private enterprise is also essential.

Finally, the link between water and environment must be perceived beyond pollution and water quality concerns. For sustainable development and poverty alleviation goals, recognizing ecosystem values provides the pathway to increase investment and human wellbeing.

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## Chapter 5: The Way Out

*...I have promises to keep,  
And miles to go before I sleep,  
And miles to go before I sleep* (Robert Frost)

The prior sections of this report provided some background on the global understanding of sustainable forest management, and Himachal Pradesh's current environmental situation, including its depleting water resources. This chapter presents a look at how the Himachal Pradesh Forest Department, working with key stakeholders, can work towards sustainable forest management and poverty alleviation. The new Himachal Pradesh Forest Policy 2006 represents a bold new direction for the forest department, which had largely been focused on timber production. The government has charted a new course to shift forest policy in a way that recognizes the ecological and social value of environmental services as well as its economic values. The change in policy will not be easy. It involves creating opportunities for the poor and enhancing natural resource management. Management agencies will need to change their organizational cultures, create a process that is more transparent and participatory, and find ways to utilize both technological innovation and market mechanisms. Whilst no ready-made solutions are available, this chapter includes some examples from the Pacific Northwest and U.S. which may be illuminating and provide ideas for how similar projects may be undertaken in Himachal.

As H.P. and India embarks on their new forest policy, it is worth remembering that “sustainability” is an evolving definition. The perceptions of values in resources change over time and consequently what is necessary to “achieve sustainability” is always a moving target. For example, until recently in the Pacific Northwest, the standing dead trees or snags in the forest were considered inimical, but now they are regarded as elements ensuring forest health. Old growth forests are ecologically very valuable now but until recently they were sought after for conversion. The perception that fire had to be suppressed at all cost has now changed under the realization that healthy forests need fire. Establishing values and their relative importance, setting management objectives and formulating strategies that are sensitive to the perceptions of the local people will be required at every stage of the shift in forest policy.

As the definition of sustainability evolves, so too does the focus on certain groups of stakeholders. Whilst sustainability requires a balancing of priorities between various stakeholders, in developing countries, the clear emphasis must remain on the poor, who are most dependent on natural resources. The marginalized forest dependent poor, especially women, are the target group requiring poverty alleviation through natural asset improvement. David Pearce's *Environment for the MDGs* (Pearce 2005) makes the case that the poor tend to reside in areas of stress and low-quality natural resources—such as low soil productivity, contaminated water, steep slopes, and polluted grounds—making them increasingly prone to diseases, water shortages, landslides, floods and other hazards. Their low productivity asset base is usually further depleted by large herds of

livestock. The few environmental assets that the poor own are typically low quality and rapidly depreciating. The high discount rate of the asset base spurs the poor to undermine the future when it comes to managing their assets. Rather than managing for the long-term, they tend to take what they can when they can. Social capital and community cohesiveness breaks down under environmental degradation and resource scarcity.

## **Changing Perspectives on Environmental Services**

With the new Forest Policy of Himachal Pradesh, 2006, the government is switching from an extractive-based focus to one that values the many environmental services which forests can provide. If the H.P. Forest Department is to effectively make this shift, it must take three important steps: 1) recognize the value of ecosystems and environmental services to halt any further decline in the natural capital stock, especially where it concerns life support systems such as water; 2) develop market mechanisms and incentives that promote future development of eco-services; 3) create a more collaborative decision-making process that recognizes the rights of a variety of stakeholders to participate in decision-making, whether it is NGOs, villages, academia, other public agencies or the private sector.

### **1. Valuing Ecosystem Services**

The international community recognizes that the natural ecosystem and the environmental services they supply are intrinsic to achieving sustainability. The U.N.-led Millennium Ecosystem Assessment analysis (Millennium Ecosystem Assessment Panel 2005) provides a benchmark for assessing the benefits people obtain from ecosystems, and it concludes that the total economic value from managing an ecosystem sustainably is far superior to the value associated with mere conversion of the ecosystem. The “wild” state is more beneficial than an extraction-based human-dominated model, with the benefit/cost ratio as much as 100:1 (Costanza 2006). To convert natural forests to agriculture, horticulture or other development uses in the name of human well-being comes at tremendous cost, since it means losing out on many important environmental services. The arena of eco-services has provided (a) a platform for a facilitating dialogue among all forest stakeholders for effective adaptive management; (b) establishment and maintenance of multiple-resource forest databases to accommodate new stimuli in trends, threats and issues; (c) problem solving research capacity; (d) provision for new experimentation like the environmental service payments, along with good forestry practices and (e) healthy regulations to activate the path towards sustainability and development (Sayer et al. 2004).

Environmental losses translate into economic losses. A World Bank study has shown that natural environmental capital is a critical component of the asset base in most developing economies (Hamilton et al. 2005). Each year in Himachal, substantial state development funds have to be diverted for disaster management, to handle increasing cloud bursts,

landslides, droughts and floods. The Millennium Ecosystem Assessment has estimated that floods are increasing annually, reaching a peak high in 2000, and that other weather catastrophes have also grown over the last half century (Millennium Ecosystem Assessment Panel 2005). Millennium Development Goal 7 targets poverty eradication and points to the need to focus on environmental resources such as soil and water resources on marginal lands, to promote agricultural productivity, thereby benefiting the poor. A shift in policy from an income-based to an asset-based approach is clearly warranted.

In contrast to past theory, environmental improvement is consistent with economic development. Indeed, it is arguable that economic growth cannot be sustained without environmental sustainability. The Environmental Kuznets Curve (EKC) is a classic contention that environmental investments secure a lower rate of return than investments in other forms of capital. Such theories are now being challenged and their premises questioned (Pearce 2005). China provides ample illustration that economic growth at the expense of the environment will eventually limit further development. In 2006, the Chinese government announced a range of new consumption taxes on several products, including cars, fuel, oil, wooden chopsticks and wooden floor panels, to control consumption and reduce negative environmental impacts from over-logging, pollution and natural resource depletion (Reuters 2006). The adjustments are in keeping with the spirit of the ruling Communist Party's 2006-2010 Five-Year plan which aims to move the nation to a more sustainable growth model with less environmental degradation and greater social equity. In its country analysis brief on China: The Environment, the Energy Information Agency of the U.S. states "environmental pollution [in China] is damaging human health, air and water quality, agriculture and ultimately the economy" (EIA 2003). The heavy floods of 1998 from over harvesting caused US \$24.1 billion in damage, destroying homes and commercial businesses (WFI 1998). Some states are going beyond mitigating natural resource degradation. In Oregon, the non-profit, Ecotrust, is betting that environmental investments are not only good for the environment but also can be profitable. Ecotrust has created a pilot fund that invests in forests which will be managed under a mixed species, longer rotation regime, to prove to shareholders that they can earn a good profit while supporting a more sustainable forestry model (Von Hagen 2005).

Some financially viable investments (Pearce 2005) that could be explored in Himachal are:

- *Improved water supply, safe drinking water and improved irrigation (e.g. drip irrigation) can increase productivity and improve sanitation, which would reduce water-borne diseases.* These investments usually save labor and offer a favorable cost-benefit ratio.
- *Soil conservation and land tenure policies can affect productivity and biodiversity and provide incentives to farmers.* Soil conservation brings higher rates of return, increases productivity, slows land degradation, improves food security and demands less labor. Providing secure land titles through good tenure and user

right policies helps farmers obtain credit and motivates them to manage for the long-term.

- *Increased access to sustainable energy services also offers higher returns on investments.* There is an urgent need to replace traditional biomass fuels, such as wood (considerations of carbon emission), dung (an effective organic fertilizer), charcoal (polluting) for time savings, improved health, improved soil quality and reduced environmental damage.
- *Protection (from conversion of forests to cropland) and restoration of natural ecosystems is also a good investment,* whether it is agroforestry, wildlife conservation for tourism or fisheries.

Any successful strategies for optimizing an ecosystems approach must necessarily:

- Formulate an integrated land use policy, especially since fragmented land holdings are unproductive;
- revise land capability classifications and land utilization according to assessments;
- encourage multi-tier/multiple use natural resources management (NRM) practices, avoiding use of productive arable land for development purposes;
- provide adequate financial and technological resources for wasteland and fallow reclamation, regenerating degraded areas, compensating adequately for diverted land and its treatment, and providing technology to achieve best-use practices;
- regulate water use for optimum productivity of land through catchments, regulate watersheds and ground water resources and improve methods of irrigation;
- educate the public on supporting and promoting sustainability;
- cultivate economic livelihood options such as medicinal/aromatic plants, fodder production/pasture improvement, economic use of weeds, production of raw material for other village-based industries, and value added processing; and
- create cross-sectoral coordination and linkages, especially between the various departments that actively feature in the forest sector, e.g. forest, agriculture, rural, animal husbandry, horticulture, irrigation and public health or the tourism departments. Duplication of work would be avoided and transparency would increase.

A key difficulty in valuing eco-services is in calculating the monetary value of what are typically intangible assets. Tangible assets such as timber and some non-timber forest products may be as simple as asking the market price. On the other hand, eco-services

such as carbon sequestration, temperature control, soil stability and clean water are very difficult to quantify. Research in this area is growing but remains largely in its infancy. The statistical or theoretical methods have been criticized as opaque and “pie in the sky” values. Clearly the value of nature is inherently complex. Environmental benefit indicators<sup>17</sup> need to be explored and defined before values can be assigned (Boyd and Banzhaf 2005). The markets for eco-services are not yet mature, and are characterized by unsophisticated payment mechanisms, low levels of price discovery, high transaction costs and thin trading (Bass 2001).

Proper valuation of natural assets is required in order for market mechanisms to work. To generate cash, most landowners in H.P. resort to traditional land development—either agriculture or horticulture—and have no economic incentive to preserve or enhance the natural functions of their land. If natural assets were properly valued, so that the market compensates people for the public and private ecological services that their land provides, there would be greater incentive for conservation of natural capital. Under an eco-services model, beneficiaries must pay for services they currently take for free, and when there is a conversion of an ecosystem service (e.g. harvesting which reduces water), there should be compensation to the state for lost benefits.

The organizational culture at HPFD has slowly been changing to embrace the shift in policy to sustainable management and eco-services development. The journey has not been easy, involving local and international expertise, and judicial intervention. It began with the 1995 Supreme Court ban on green felling in Himachal, which triggered an interest in eco-services as a solution worth exploring, to offset the declining budget for forestry works. In the following years a dynamic and consultative process involving all stakeholders began, with the comprehensive HP Forest Sector Review (FSR) in 1999-2000 (IIED 2000). The economic valuation of forest products and services was led by Ms. Madhu Verma of IIFM Bhopal, in 2000, with technical assistance from international donor agencies. WINROCK International India (<http://www.winrockindia.org>), partnering with International Institute for Environment and Development (IIED) has explored the potential for markets for watershed protection services and improved livelihoods. Many reform-minded projects followed, with various donor funded participatory experiments in joint forest management, and the establishment of the Himalayan Development Authority—a mountain forum for redress and compensation for conservation costs. There is a conviction that valuing eco-services and developing green solutions will play an integral role in moving the mountain state towards poverty alleviation.

## **2. Developing Market-Based Incentives for Eco-services**

Building a healthy partnership between the public and private sector is critical to developing eco-services programs which are financially viable and sustainable in the long-term. This would help reduce the pressure on primary forests, especially the reserve

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<sup>17</sup> Ecological Benefit Indicators (EBIs) are quantitative and transparent measures of ecological and social conditions which are derived from geospatial information and other public data sets.

and demarcated protected forests, which can be qualitatively improved to meet their eco-services role. Alternative sources of raw material should be explored for industries, e.g. bamboo (for papermaking, corrugated roofing, construction and scaffolding, flooring, reconstituted panel and board products), utilization of weeds like lantana (charcoal briquettes), and use of agricultural residues (wheat and rice straw is the non-wood fiber used in the pulp and paper manufacturing). Increased trade in non-woody forest produce (NWFP)<sup>18</sup> is particularly beneficial to local communities.

According to Powell, White and Landell-Mills in *Developing Markets for the Ecosystem Services of Forests*, there are three categories of payments for eco-services: self-organized deals, open trading schemes and public payment schemes. In the self-organized deals or the voluntary contractual agreements, the buyers and sellers establish direct contracts, with property rights and enforceable contracts as clear key elements. These deals tend to emerge when transaction costs hinder private initiatives, for example, involving numerous small landholders or when the private parties lack the authority to implement plans. The open trading schemes are created by the government when it establishes caps or targets on forest services and pollutants. Although the caps are regulatory in nature, they actually create a market mechanism. The imposed caps create a new market for trading allocated quotas, whereby an entity which exceeds the quota may purchase additional quota rights from an entity which has a surplus quota. The public payment arrangements involve direct payments by governments to either encourage or discourage certain activity. For example, farmers in buffer zones may receive annual payments to conserve their forest (Powell et al. 2002). For a cash-strapped mountain state such as Himachal Pradesh, it would be worth exploring these types of eco-service payment categories to find ways of generating forest revenue. One market area already under exploration by the state government of Himachal is the commercialization of NWFP in poverty alleviation programs, especially medicinal plants. The Indo-German Changar Eco-Development Project initiated a successful experimental NWFP project which provided investment capital and technology to a women's group for pickle making. The project sought to empower the people living in the project area to manage their natural resources by themselves, supported by governmental and prominent non-governmental institutions. Other examples of NWFP projects include collaboration with the International Network for Bamboo and Rattan to produce value-added bamboo products and increasing the skills and capacity of local artisans (UNDP 2002).

There are various barriers to, and shortcomings in, promoting a market-based strategy for developing eco-services:

- government regulatory personnel may lack the expertise to make valuations, and thus be reluctant or slow in responding;
- some environmental groups may feel that market-based instruments would lower the overall level of environmental protection because of the belief that market-

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<sup>18</sup> NWFP as defined by FAO, consist of goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests, especially medicinal plants, resin, bamboo, lac, mushrooms, mosses, lichens, tans, honey, musk, gum, cane products etc.

based instruments condone the right to pollute or cause damage to natural resources;

- private businesses typically do not push for market-based instruments for various reasons, especially the fear that it will not be cost effective and also because most companies lack internal incentive systems to take advantage of market-based instruments;
- benefits from market-based instruments are often invisible to consumers while costs in the form of fees, penalties and taxes are tangible and transparent;
- privatization of public goods may be questioned by the public; and
- a command and control system of environmental regulation offers politicians greater opportunities for symbolic politics.

Despite its shortcomings, market-based approaches to sustainability can help to achieve environmental goals. Governments can use markets to help them effectively manage public goods such as environmental protection. However, market mechanisms work best when the government apparatus works in partnership with the invisible hand of free-market economics (Scherr et al. 2002). The government must set limits on the use of an environmental good or service. Markets look to governments for consistent policy regulations, a robust system to protect property rights, equity, involvement of relevant stakeholders, trust among market participants, easy access to market information, and understanding of possible market externalities (Bayon 2004). Other factors that are necessary for markets to work equitably are fair competition and consideration of the effects of markets on third parties, such as the poor (Bayon 2004). Free markets allow for ongoing price setting, are continuous and replicable, affect large amounts of people and businesses and can move effectively, internalizing environmental costs into the economic system. Well designed markets can complement governmental regulation. For example, in 1999, Texas set a renewable energy target for 2009 and issued renewable energy credits with trading rights, which started in 2002 - this experiment proved highly successful and Texas has taken giant strides in wind energy since then. Even when governmental backing is absent, markets can step in to push eco-services. The Chicago Climate Exchange, a voluntary trading scheme created by a private company called Environmental Financial Products Ltd., established trade in carbon credits in late 2003, even though the US has still to ratify the Kyoto Protocol!

### **Box 1: Sulpher Dioxide Markets (Bayon 2004)**

Creation of a market in SO<sub>2</sub> in the US showed that market mechanisms can create environmental policies, which can help maintain, provide and distribute environmental goods and services provided government has a will and exercises its power and established legal institutions to do so effectively. The US Acid Rain Market came up, with the enactment of the Clean Air Act in 1990, when the government used a market mechanism of “cap and trade” program to handle the acid rain environmental problem on a national scale.

There were 2 important provisions in it:

- By 2010, the US would reduce SO<sub>2</sub> emission to 10 million tons below 1980 levels.
- The country’s largest emitters of SO<sub>2</sub> would require permits for each ton of SO<sub>2</sub> they put into the atmosphere.

Through the issue of the tradable permits, their creation and distribution, a highly successful market resulted. The government thereby regulated public good, set limits on its use, and generated public property rights that enabled the market to work. The market allocated the scarce resource efficiently and helped determine the lowest price at which the desired emissions could be achieved. Government did not allocate the emission permits and did not set a price on each SO<sub>2</sub> emission through taxation or otherwise. The market was left to arrive at the most appropriate price for an environmental property right, continually. The government, through the 1990 Clean Air Act, did not establish how companies could achieve the reductions or even where it would work. Great success was forthcoming, as a sharp reduction in SO<sub>2</sub> came about, especially with reference to power plants, resulting in technology input and the finding of the cheapest way to reduce emissions. The law provided regulatory certainty and thereby encouraged long term investment. This was a movement away from “command and control” and to “regulate, monitor and punish”. It showed that the arrangement in which the government sets limits on the use of a public good, letting the markets to determine how to apply these limits, can work.

There are various market strategies that are worth considering and are aptly summed up under The Report on Sustainable Forestry for The Wallace Global Fund (Innovative Environmental Technologies 1999):

- *Certification and green labeling*: "Eco-labeling" is a voluntary system of environmental performance certification. A variety of eco-labels exist, from government, industry associations, and third-party auditors. Generally, third-party auditors carry greater credibility, although the actual standards and criteria used by these various systems may be quite similar. Forest certification certifies that a

given forest area is managed in a way that meets a set of environmental, social and economic criteria. Forest product certification is an extension of that, whereby the manufacturer can prove that the given product contains a certain percentage of raw material from certified forests. To do so, the producer must follow a strict chain-of-custody flow from the forest where the raw material was extracted to the final product. Although the mass market in developed countries has yet to prove with their wallets that they are willing to pay more for certified wood products, big-box retailers such as Home Depot—the largest single wood buyer in the North American market—have purchasing policies which require wood products to be certified. This has effectively forced wood manufacturers to certify their products. Additionally, many state and local governments in the US have implemented green policies such as requiring new public buildings to meet LEED certification (a green building standard), and purchasing departments to buy certified wood. Currently, the majority of green building projects are government construction projects, thus illustrating the critical role which governments can play in leading green policies. Growing consumer popularity, state tax incentives and a robust construction sector are expected to push the green building trend to double-digit growth rates (Rob Fallow, Fortis Construction, personal communication). Green certification systems are an intriguing tool to encourage consumers and producers to value sustainable products, but their application to developing countries may be more limited. For certification to be effective in Himachal, it must address the needs of the marginalized forest dependent communities, accounting for their views and participation, regarding their resource pool. In a developing economy, the benefits and role of certification may be less in terms of economic benefit and more in terms of involving, informing and encouraging open dialogue with the local communities to improve their livelihood and their traditional legal and customary rights (and responsibilities).

- *Carbon credit trading:* In 1992, the United Nations Framework Convention on Climate Change recognized the need to reduce green house gas emissions and urged the development of carbon credit trading as an important economic incentive to reduce emissions. In such trading schemes, government or some other agency sets limits or "caps" on the amount of carbon pollutants, recognizing that clean air is a public good. Businesses that exceed their designated carbon emissions limit could buy emissions credits from other groups that are able to stay below their designated limits. Although the U.S. federal government failed to ratify the Kyoto Protocol, a number of public and private credit systems have emerged in the U.S., thereby demonstrating that where there is money to be made, the private sector will develop a market, even if the government is not an equal partner. Natsource Asset Management Corp., a private transaction services company, established the first private-sector carbon credit trading system allowing companies in Europe, Japan, and North America to trade credits to meet the Kyoto Protocol commitments. The trading system, called the Greenhouse Gas Credit Aggregation Pool, earned a total commitment of US \$550 million worth of CO<sub>2</sub> from 26 participants. The buyers and sellers are mostly energy companies,

utilities, oil and gas producers (Natsource 2006). The Chicago Climate Exchange is a voluntary greenhouse gas market whereby its 130 members agree to voluntarily reduce direct carbon emissions by 4% below a baseline period of 1998-2001 (Chicago Climate Exchange 2006). In 1993, two senators proposed the McCain Lieberman Climate Stewardship Bill, which called for the establishment of a carbon market in the US, to set caps on the green house gas emissions from electricity generation, transportation, industrial, and commercial economic sectors. Unfortunately, the bill failed, by a vote of 55-43 (Pew Center 2006).

- *Government incentives:* Government programs that provide financial incentives for businesses and local governments to improve environmental performance can be as effective as regulatory measures. Examples include Panama's 1994 reforestation law which gives 100% tax breaks for investments in reforestation projects; conservation easements in the U.S.; ecological VAT<sup>19</sup> tax in some states in Brazil; tree-planting subsidies in Chile. The challenge is in determining whether a carrot or stick approach works best for any given situation. Negative behaviors, such as polluting, are usually discouraged through taxes and fees, whereas positive behaviors such as replanting can be encouraged through incentives.
- *Penalties-Charges, taxes and fees:* Negative behavior can be discouraged through government penalties levied on the offending party. Taxes or user fees are normally charged for activities with external costs i.e. trade-offs not accounted for in the market. These can be price-based (taxes, fees or fines) which set a direct price on behavior, or quantity-based which set direct restrictions on inputs, emissions, harvest, or technologies. Examples include non-compliance pollution charges levied for excess particulate sulphate emissions from coal-fired power plants in the U.S.; the Oregon green convention taxes levied for pesticide use, with the proceeds going to fund a state-wide reporting system and grants program; royalties/financial payments stumpage fees in Canada; taxes to encourage recycling of tires or car batteries; taxes on excessive application of fertilizers; recreational user fees; pollution charges based on emissions, such as the taxes on chlorofluorocarbons in the U.S.
- *Liability legislation:* A strong legislative framework that enables those who have been affected by a polluter/resource user, to have legal right to bring a claim, is critical to ensuring accountability from resources users. Environmental legislation is based on the "polluter pays" principle, i.e. polluters—not taxpayers—should bear the cost of recovering or compensating for the damage they cause to the environment. The European Union recently adopted an Environmental Liability Directive for all member countries, which makes those causing damage to the water, land and nature legally and financially responsible for that damage (Directive 2004/35/CE, Official Journal of the European Union, L143/56,

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<sup>19</sup> Value added tax (VAT) is an indirect tax, similar to a sales tax and is levied at the time of the sale of goods and services—the tax is collected from someone other than the person who actually bears the cost of the tax (namely the seller rather than the consumer).

30.4.2004). Such a framework is mostly not operative in the developing countries, because those most affected tend to be disenfranchised from the legal system.

- *Debt or equity instruments:* With governmental oversight, capital markets can create a series of financial instruments that offer incentives to potential polluters/resource users to pursue specific environmental actions. This is illustrated in the creation of a forest bank in the Clinch Valley (SW Virginia) by the Nature Conservancy, through which small landowners give up their timber rights in perpetuity, in exchange for a bond with interest payments, with the value being that of the timber they have relinquished. These environmental performance bonds are refunded only if certain environmental standards have been met; otherwise, these are used in mitigation options for problems caused.

### **3. Creating a diverse and participatory process**

A key component of achieving sustainability is a balance of environmental, economic and social objectives. This balancing necessitates that a broad spectrum of stakeholders are involved in helping to formulate objectives, define benchmarks and identify strategies. Thus, the role of the stakeholders is very important.

#### ***a) Governmental Agencies***

Traditionally, especially in developing countries, it is the government which holds most of the control and authority over natural resource ownership, management, and utilization. Under such systems, control is usually top-down. Even where there is a strong ideological focus on alleviating poverty, policies are typically established at the centre and then implemented outward. The evidence so far has not been very supportive for having centralized control of natural resources. Lack of manpower and resources are stretched over too large an area with poor monitoring of resources resulting in illegal harvesting and overuse. The top-down management style alienates farmers and others dependent on the land, with many forest communities engaged in land disputes with the government over usufruct rights. Central control tends to mean less transparent systems, whereby it is easier for government collusion with special interest groups and businesses, resulting in unfair contractual arrangements that permit overuse of state lands with little economic or social benefits for the community. It is becoming increasingly apparent that sole state authority over natural resources is unlikely to achieve sustainability.

Whilst sole state authority is not ideal, strong state control remains important for creating legislative and policy frameworks that encourage private-public partnerships. The state is still the leading regulatory authority, and it must provide enforcement to ensure that laws are met and if not, that penalties are applied. At the same time, the state can dangle “carrots” to the private sector to encourage improved environmental performance. This approach requires that governments make significant changes in their institutional culture and their perspective on natural capital. Governments must value eco-services and they must make good faith attempts to reach out to groups which have probably been

marginalized in the past, including small-holding farmers, NGOs, women, and the poor. In Himachal, there is increasing talk of building new partnerships between consumer organizations, local government, local communities and the private sector. Further, looking to the poor financial health of the state, it would be proper to support a fiscal policy initiative to provide regulatory and fiscal incentives to encourage full-cost pricing<sup>20</sup> cuts in the subsidies and a move towards a lower resource-intense society<sup>21</sup>. A differentiation between sustainable and unsustainable trade and investment flows towards green GDP<sup>22</sup> (Gross Domestic Product) is in order. This would require provision of incentives for financial markets for long term sustainability to commercial banks, pension funds and insurance companies. Further, it would do well to invite private financial sector and multilateral agencies to support investment policies that favor sustainable innovations and green technology (Wackernagel et al. 2005).

### ***b) Private Sector***

Innovative financing strategies should be pursued with socially responsible private investors, primarily in the field of energy and natural resource management. There are strong indications emerging from investments in various developing countries that such healthy partnerships with local community producers and businesses strengthen long-term supply of food, water and energy renewals and bring lowering of the overall procurement costs involved (Scherr et al. 2002). In many cases, opportunities to maintain the livelihood of the rural poor have been destroyed by non-sustainable activities promoted by outside investors interested in extracting the area's natural resources (Shilling and Osha 2003). This calls for discouraging investments that are obstacles to sustainability. In Himachal, this was especially true for two forest products, namely *Taxus baccata* and *Dioscorea deltoides*, which were exploited ruthlessly by private entrepreneurs. The current experience with private businesses, as in the extraction of cedar oil, is still not good. The public image of the sector is associated with environmental degradation and profit mongering. As a result, government policies have leaned more towards regulating exploitative businesses than encouraging the private sector. Businesses express concern that there has been a lack of economic incentives from the government and favor easing of restrictive policies (e.g. granting permits for forest produce extraction). For the investment climate to improve, mechanisms are needed to improve communication between private enterprises, the local community, banks and the government. Capacity building through education and training, greater access to finance (credit and insurance), information networking and a good market support system are necessary to meet the aspirations of the rural populace that is looking for equity and efficiency in market strategies (Landell-Mills 2002). Obsolete technology, lack of trade patents, problems regarding trade or industrial disputes and other market bottlenecks also have to be addressed (Saigal et al. 2002).

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<sup>20</sup> Full cost pricing means removing subsidies and getting prices right. This can be an effective response to enable market forces to push enterprises to modernize or close altogether.

<sup>21</sup> A lower resource-intense society, with less wastes and consumption would be less taxing and not exceed ecological production leading to a decline of natural assets.

<sup>22</sup> GDP as of present is de-linked from environmental degradation and human welfare. Green GDP would value nature and its goods and services. The UN's Human Development Index (HDI) is a measure capturing how a given nation meets basic living standards through life expectancy, education and income.

### *c) Non-governmental Organizations (NGOs)*

The contribution of non-governmental organizations to society is now well recognized. Sarah Michael, in a report by The Kennedy School of Government, states, “No discussion of poverty, equality or development today is complete without considering the role of NGOs. Whether in the North or the South, NGOs are a visible, respected and entrenched part of many societies” (Michael 2002). NGOs can open up meaningful channels of political expression and can fill up voids created by government in the development arena. Many NGOs grow out of specific concerns for human welfare or rights or for specific concern for the environment (e.g. issues of damage to ecosystem, endangered species, gender issues, poverty alleviation).

Non-governmental organizations have many advantages, including their closeness to local populations, ability to innovate and adapt, a process oriented approach to development, participatory methodologies, emphasis on sustainability and cost-effectiveness (The Stanley Foundation 1999). The special qualities, roles and barriers attributable to the NGOs are listed in the pamphlet on Nonprofits and Development: The Challenge and the Opportunity, produced by the Institute for Policy Studies at John Hopkins University. The pamphlet describes NGO assets as:

- their flexibility and adaptation to new circumstances is easier;
- they are relatively independent and are free from constraints and impediments and have ability to address neglected subjects;
- they are trustworthy and have a reputation to work for public cause and have accessibility and responsiveness.

Clearly the most important feature is that the non-profit organizations exist outside the contours of the state and are therefore not limited in their scope. This means that NGOs are freer to challenge the status quo.

Long-term financial security is a major limitation for many NGOs. Although NGO programs may be effective locally, expanding them beyond small projects or continuing the programs beyond donor-funded terms is a common NGO barrier. In Himachal, few NGOs have the capacity and track record to last for a long time or have the managerial expertise required. For NGOs to flourish and be effective, it is necessary for them to use their limited resources in a targeted way. NGOs should focus on their specific concern, promoting excellence and lobbying for their cause, remaining visible, increasing required support by changing people’s attitudes and values, and ensuring a good source of funds. It would be erroneous to view the NGOs as merely motivated for societal good. Their political leanings (most NGOs are connected with a big environmental agency or conservation body) and perspectives are important for their survival and help them maintain their identity and separateness. Reliance on NGOs increases especially when governmental agencies find it too time consuming or cumbersome to reach out to the local people to increase program outreach, carry out participatory extension work or initiate capacity building. Such use of NGOs to cover the limitations of various

departmental institutions undermines the NGO's qualities and capabilities to perform special roles such as:

- empowerment, where mobilization and promotion is required,
- identifying problems and bringing them to public attention,
- resource mobilization,
- mediation to reduce social, professional, bureaucratic and geographic divisions,
- promoting change through pressure,
- monitoring implementation of public policies,
- leadership development,
- ensuring stakeholder representation,
- legitimization to secure popular support to promote implementation and to promote participation.

NGOs must overcome barriers to their growth which may be a result of 1) inadequate support from governmental and international agencies in terms of recognition, resistance, restrictions; 2) public misperceptions, passivity, lack of appreciation and reliable information; 3) lack of adequate financial resources; 4) insufficient business support; or 5) weaknesses within the non-profit sector in management and implementation, lack of shared identity, and transparency.

In India the role of NGOs in environmental concerns has gained prominence. The increasing influence of the NGO can be seen from the fact that The Centre for Science and Environment in N. Delhi, a NGO headed by Sunita Narain—the champion of the brilliant CNG drive in Delhi to curb pollution—was called upon by Indian Prime Minister Dr. Manmohan Singh to look into the disappearance of the tiger from Sariska and Ranthambore National Parks in Rajasthan. Thus an NGO was asked to investigate an issue which occurred on national lands. When new programs for forest dependent poor were needed in District Kullu in Himachal Pradesh, an NGO called the Society for Scientific Advancement of Hills and Rural Areas (SAHARA) was established in the Great Himalayan National Park at Shamshi. The social and environmental campaigning by NGOs, specifically by Ms. Medha Patkar, helped to get the World Bank Loan for Narmada Dam project cancelled in India. Despite these inroads, however, NGOs in India have not been very effective in changing projects that are already underway. They tend to be more successful at advocating future policy changes, and are most effective when they can participate in the decision-making from the beginning of the design process.

The environmental NGO community is an active participant in the push towards sustainability in the Pacific Northwest (PNW) and U.S. Various organizations are playing a critical role in highlighting environmental issues, improving legal compliance and encouraging private-public partnerships that benefit the environment and the forest sector. These NGOs are public interest groups, as opposed to special interest groups. They are influencing public awareness and changing public perceptions towards forest management and regulation. Their role in monitoring performance, gauging ecological impacts, providing required feedback, educating and advocating healthy environmental behavior is exemplary. The NGOs have also had an increasing role in the purchase of forest areas and acquisition of land through conservation easements for protection, e.g.

NGOs such as The Nature Conservancy, Pacific Land Trust and the Land Trust Alliance. The Nature Conservancy defines conservation easements as “a voluntary, legally binding agreement that limits certain types of uses or prevents development from taking place on a piece of property now and in the future, while protecting the property’s ecological or open-space values” (TNC 2006). The Land Trust Alliance Census of 2003 estimates that some 9.36 million acres were protected by local and regional land trusts in the U.S. through conservation easements, and an additional 25 million acres of national lands were protected by land trusts (Land Trust Alliance 2003). Ecotrust is another example of an innovative NGO which uses market-based tools to leverage funding for conservation and sustainable forestry projects. Ecotrust has initiated a forest investment project where private funding—wealthy individuals, foundations, pension funds and corporate banks—invest as shareholders in a forest tract that will be managed to demonstrate that longer rotation, multi-species mix, and reduced use of chemical pesticides/herbicides/fertilizers, can still generate trees that are profitable. The Climate Trust actively participates in state, regional, national, and international climate change policy discussions on best practices for using offsets to reduce greenhouse gas levels. Created through a state carbon credit system, The Climate Trust takes public and private dollars and invests in projects such as tree planting to offset carbon emissions. Further illustrations of work by the Trust are:

- offsets are generated through the reduction of electricity in a paper manufacturing facility through increased efficiency by upgrading equipment;
- offsets are generated through reduced electricity requirements in buildings of the Portland Building Energy Efficiency Program through use of energy efficient windows/floors and ceiling insulation and sophisticated thermostat contracts;
- the Deschutes Resource Conservancy is recruiting private landowners and has planted trees in 335 acres (carbon offsets are generated by the carbon sequestered in the planted trees) to improve the health of a riparian area impacted by logging and livestock grazing;
- re-planting 680 acres of highly degraded rainforest in NW Ecuador;
- supporting the work of the Lummi Indian tribe to acquire previously logged forest land and manage it to permanent old growth;
- a back pressure steam turbine in a lumber mill producing electricity and displacing grid electricity and thus create carbon offsets;
- cool climate concrete which uses blended cement instead of manufactured cement which has high CO<sub>2</sub> emissions;
- internet carpool matching and fuel saving—work taken-up by the Portland Department of Transportation;
- traffic signal optimization to reduce car waits at signals and thus decrease gasoline and diesel fuel use.

The Pacific Northwest boasts a plethora of leading NGOs involved in water, forests, soil, fish, wildlife, recreation and conservation issues. All work in partnership with other NGOs, local, state, and national governments, and in many cases, the private sector as well. NGOs include Conservation International, The Nature Conservancy, Water Trust, World Resources Institute, World Wildlife Fund, Natural Resources Defense Council and the California Climate Action Registry.

Other significant examples of stellar environmental groups are:

- The Coastal Rainforest Coalition used its forest monitoring information to pressure and affect the buying practices of large corporate customers like Levis Strauss and Co., Hallmarks Cards, 3 M Corp., Starbucks, IBM Corp., Hewlett-Packard Co. and others—to forgo old growth trees with a pledge to find substitutes for lumber and pulp—the dwindling store of the planet’s virgin forests (trees older than 100 years) which shelter many species of animals, birds and insects—as reported in San Francisco Examiner, December 8, 1998.
- The Forest Stewardship Council (FSC), a creation of environmental NGOs was designed to create demand for products that can pass a forest audit. Now, around 15 million hectares of forest is practicing sustainable development forestry under FSC certification, with 2.4 million hectares covered in the US (Washburn and Miller 2003).
- The American Forests and Paper Association (AF and PA) has established its SFI—Sustainable Forestry Initiative (Wallinger 2003), a certification scheme which all members must meet or face ejection.
- The Earth Systems Institute (ESI) a non-profit organization, which studies the dynamic interactions between terrestrial and riverine landscapes for applications in natural resource management, watershed restoration and conservation (see [www.earthsystems.net/](http://www.earthsystems.net/)).

## Case Studies

Two important case studies which highlight future trends in emerging market strategies for sustainable environmental management are given below.

### *Case Study 1: The Willamette River Basin Ecosystem Market Place (Vickerman et al. 2005)*

**Objective:** This is a novel market strategy which targets private and public investments for strategic ecosystem investments by first establishing a trading floor for conservation credits (Vickerman et al. 2005).

**Methodology:** Three organizing partners got together—these are 1) the Willamette Partnership, Oregon (which is made up of conservationists, business, scientific community and farmers) 2) Evergreen Funding Consultants, Washington, and 3) the Defenders of Wildlife, Oregon. The group’s intention is to find innovative market-based solutions to environmental issues and to move away from traditional, regulatory controls that are complicated, costly and contentious to implement.

**Strategy:** The carbon trading market place would evolve over time allowing complex, multiparty conservation credit trades to finance ambitious projects beyond water quality. The Oregon Department of Environmental Quality (in 2004) defined load restrictions on three pollutants, namely temperature, mercury and bacteria. These regulatory controls have meant increased expenses for businesses and sewer and water rate payers. The Willamette Partnership, a collective resource to restore basins through cost effective strategies, saw this as an opportunity and created the market-oriented approach to watershed restoration. Businesses, farmers and treatment plant operators have an incentive to participate in the market place to find more cost effective strategies to meet or exceed their regulatory obligation and to contribute to overall watershed health.

**The Picture:** The Willamette Watershed is 11,478 square miles of mostly forest land (70%) and some agriculture (22%), including vineyards, grass seed, nurseries and vegetable farms. The 190 miles of river basin affects 2 million people or 70% of Oregon's population. Both the watershed and the river basin are impacted by an expanding population with growing demand for water and sewage treatment facilities.

The Willamette Ecosystem Marketplace is a new approach that involves trading in conservation credits to mitigate environmental impacts at less cost than through traditional regulatory measures. Credits can be purchased by homebuilders, factories, transportation departments and other businesses that are required to mitigate for damage they cause to sensitive areas such as wetlands. In the initial stages of this project, water is the focus of the conservation credits. For example, effluents from factories are targeted, as these need to be treated to reduce temperatures to benefit water quality for fish, wildlife and public health. Trading is possible only with negotiable pollutants— whereas water temperature as a pollutant is negotiable, poisonous mercury as a pollutant cannot be negotiated. Traditionally, under a regulatory framework, operators at water treatment facilities and factories must reduce water temperatures often through the use of expensive discharge cooling equipment. With the new marketplace, these businesses have the option of buying conservation credits to meet their water targets. The money raised from the sale of conservation credits is then used for soil and water conservation, tree planting and wetlands restoration. In this way, the conservation marketplace moves the environmental impact from a specific locale to the broader ecosystem (Vickerman et al. 2005).

### ***Case Study 2: Carbon Offsets and the Forest Resource Trust***

**Objective:** According to figures (Cathcart 2000) Oregon has 166,000 family forest landowners that hold around 4.5 million hectares forest-land, of which 16% or 775,000 acres are unproductive. Forestry carbon offsets offer an innovative mechanism to stimulate the afforestation of degraded, unproductive forest land.

**Methodology:** To encourage land owners to turn their land into productive forests that sequester carbon, in 1993 the Oregon legislature established the Forest Resource Trust (FRT). The FRT offers to pay private landowners the full cost of afforestation and

promises to absorb all losses due to natural catastrophe, with a contract of up to 200 years. The land owners were free to use their area for any purpose, including wildlife management, water quality, or timber production but the landowner would have no claim to the carbon offsets which would pass back to the Klamath, Oregon cogeneration project, as part of its emission offset portfolio. The Oregon Department of Forestry describes the program:

In exchange for the direct payment of stand-establishment costs, participating landowners enter into contracts with the State Forestry by which they agree to share a fixed percentage of the net timber harvest revenues from forests created by the trust. Landowners choose when and if to harvest and there is no requirement to harvest at all. In the latter case, the forests become free and clear of the trust contract after 200 years. The revenue sharing component of the trust provides incentives for landowners to grow and manage healthy, vibrant forests. For the first 25 years, landowners have the option of buying out of the trust contract by repaying the funds at 6.8% interest. Payments from the revenue sharing and buyout options are reinvested into the trust to reforest even more under-producing forestland (Source: Forest Resource Trust Program (ODF 2006).

Under-producing non-industrial private forest landowners are obligated to return afforestation costs<sup>23</sup> provided they commercially harvest their timber. Lands requiring reforestation following timber harvest are not eligible. Normally 1 metric ton of carbon stored is equivalent to 3.67 metric tons of CO<sub>2</sub> emission equivalent.

**Strategy and Measurement Standards:** At its inception, 21 landowners afforested 974 acres under the FRT program, involving 22 trust projects and \$514,000; in 2000, 20 more landowners participated and another 828 acres were established. In 1995, the Oregon Legislature changed course and removed \$2.5 million from the trust to fund other spending priorities. The result was that 724 acres of non-industrial forestlands remained unfunded. There was a need to find a new source of funding which was more secure than state appropriations. PacifiCorp., a utility company in Portland Oregon, invested \$75,000 in FRT, which meant 145,000 metric tonnes of carbon emission offsets. PacifiCorp already had a history of environmental funding; in the 1990s it started the process of foresting under-producing forest lands in exchange for future CO<sub>2</sub> emission offsets. In 1999, the Forest Resource Trust received \$1.5 million from the Klamath Co-generation project, a public-private partnership between the City of Klamath Falls and PacifiCorp. The plant was a natural gas fired electricity and steam generation plant. The funds were used to afforest 2400 acres of degraded forestlands. It was estimated that this would sequester 16 million metric tons of CO<sub>2</sub> over a 100-year period. This represented the largest transfer of funds for a forestry carbon offset project in the U.S. This was only a part of the \$4.5 million in CO<sub>2</sub> emission offset portfolio required for a nuclear gas-filled 500 megawatt electrical power and steam cogeneration plant. The FRT venture was accepted as a CO<sub>2</sub> emission offset project because it met certain conditions:

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<sup>23</sup> Afforestation would cover site preparation, tree planting, seedling protection and competitive release practices.

- *Additional:* Without FRT funding, these lands would not have been afforested. The baseline for FRT is the condition of the land before afforestation (pasture, agricultural crops, brush, non-commercial cover). Since there were no other available funds to afforest, the FRT funding was key to making afforestation possible.
- *Measurable:* CO<sub>2</sub> emissions and offsets must be measurable, based on an established, internationally approved standard in order for it to be marketable. Growth and yield models (e.g. models developed by Birdsey in 1996) are available to forecast the amount of CO<sub>2</sub> stored as a result of stand development following forestation.
- *Permanent:* Accrued CO<sub>2</sub> emission offsets must adhere to required prescribed standards for long term sequestration and storage of CO<sub>2</sub> in above and below ground pools. When timber is harvested, some CO<sub>2</sub> stored is released when soil is disturbed or through slash decomposition, although most is retained when wood is used for furniture/building construction.
- *Reliability:* Oregon Department of Forestry has outreach and technical assistance to get lands enrolled and successfully forested and to monitor, measure, and report the actual amount of carbon stored over time and account for losses due to fires, insects, and diseases. The Oregon Forest Practices Act requires reforestation after every commercial timber harvest to ensure that harvest related to CO<sub>2</sub> emissions are replaced through carbon sequestration and storage in the subsequent stand.
- *Leakage:* The afforestation of under-producing lands must not trigger the conversion of established forest to non-forest use elsewhere. This would mean an inefficient allocation of land use.

**Results:** CO<sub>2</sub> emission offsets are calculated as the forest grows, but the total amount is limited by the long-term average amount of carbon stored over repeated timber harvests and regeneration cycles. The CO<sub>2</sub> emission offsets to be credited from a given project area, equals half the amount of carbon storage accrued during the first rotation, minus the quantity of carbon initially present before reforestation. Booking the offset is tricky as it needs to be a tradable paper asset for sale or trade. It is necessary to include mechanisms that ensure that the booked CO<sub>2</sub> emission offsets represent permanently stored carbon. Accordingly, 20% of total CO<sub>2</sub> emission offsets were retained and registered as insurance in the name of FRT to account for early harvest, natural catastrophe, and land use changes (Cathcart 2000).

The carbon market strategy holds promise. The planting of under-producing lands means carbon offsets, revenue for environmental projects, a financial incentive for growing trees, and managing forests for the full suite of environmental, social and economic benefits. In Oregon and Washington, there is an increasing trend towards forest management activities that increase permanent carbon storage, with longer forest rotations and thinnings, expanded streamside buffers, wildlife management areas,

increased tree retention and forest biomass accumulation through structure-based management. Businesses too are increasingly aware that the public is demanding more attention to carbon emissions management, whether in the form of emission caps, pollution taxes or fines, and that it is likely to face customer hostility towards companies that threaten the environment. The current trend is ripe for more public-private partnerships that promote environmentally friendly activity.

Developing economies, like India's, are witness to adaptive technology<sup>24</sup> with a focus on energy efficiency and market mechanisms, especially climate friendly energy<sup>25</sup> and renewables/recyclables. Emerging technologies are being considered in Himachal, including:

- Tapping of energy through solar (cookers and lighting) and wind power for the cold deserts.
- The field of bio-engineering (vermi-composting for starters) and bio-technology which offer solutions to hazardous waste generation, climate change emissions and air and water pollution. Effective and resource efficient processes (the smokeless Dhauladhar chullah of the past) with benign industrial and material flow solutions targeting pollution, especially connected with energy processes for hydro-power and cement plant design. Biotechnology has great potential in forestry, wherein priority is given to biology, diversity and propagation rather than on genetic modification. Bio-prospecting too, is advantageous, as HP has unique genetic resources and renewals, which can help reduce dependence on fossil fuels.
- The design of the built environment using local materials, chemicals, products and systems for construction (mud and straw) which work towards sustainable regional environments and healthy communities.
- Satellite imagery and detection, spatial information and decision-support systems.

Aside from technology, ecosystem services and biodiversity management require being sensitive to the perceptions of the local people in the interest of conservation i.e. it is necessary to design for specific—to actually reduce the pressures of firewood gathering there is a need to put in place acceptable and viable energy alternatives—whether non-conventional or otherwise. The right course would be to move away from using fossil fuels and to invest in new energy technologies; withdrawing investments from technologies that degrade the environment and those that are obstacles to sustainability (Wackernagel et al. 2005).

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<sup>24</sup> In technology, world wise, the future promises hybrid locomotive (“Prius” type), solid state lighting, hydrogen technologies, solid oxide fuel cells, solar technologies, “nano” technologies, biotech and bioengineering and so many other advances.

<sup>25</sup> E.g. geothermal, solar, wind power, poly-generation and methane recovery and biological projects, involving reforestation that use trees as carbon sinks to wash CO<sub>2</sub> emission from the atmosphere.

## Conclusion

The sustainability path in Himachal calls for proactive management that fuses anticipation, adaptation and preparation for future environmental challenges such as a burgeoning population, climate change, paucity of drinking water, and natural disasters. To be effective, the government needs access to funds to implement environmentally good intentions and good practices, in the name of development. Changing organizational culture in the governmental departments would have meaning only if a transparent participatory process is forged. Further, as highlighted through the case studies from the PNW, exploring market-based instruments calls for careful design, implementation and matching complementing institutions. Some of the groundwork has already been laid, with new forest policies, reorganized land management units and international donor aid helping to improve the institutional capacity of Himachal's Forest Department. All the planning and build-up must now culminate in action.

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