

Executive Summary

Establishment of inviolate protected areas (PAs) in a densely populated and rapidly developing country like India is a big challenge. Once established, the effectiveness of such PAs is liable to change due to rapid socio-economic developments and increasing demands of natural resources. Changes in land use practices and shifts in anthropogenic pressures may bring about changes in ecology and conservation status of several species which need critical assessment and regular monitoring. Similarly, effects of management interventions such as diversion of anthropogenic pressures and protection need to be objectively evaluated at regular intervals in order to adapt to changing resource use pattern and ensure support of local communities in conservation programmes.

The Great Himalayan National Park (GHNP), located in Kullu District of Himachal Pradesh (HP) was established in the year 1999 under the Wildlife (Protection) Act 1972 after completing the settlement of rights of the local people in the designated park area. The Park is located between 31° 38' 28" to 31° 54' 58" N latitudes and 77° 20' 11" to 77° 45' 00" E longitudes and spread along an elevation range of 2000 to 5500 m asl. It is well known for its diverse ecosystems, rich array of flora and fauna including several endangered species such as Western Tragopan. After final notification of the park biggest challenge for the management was to generate alternate livelihoods for the poorer sections of the society, living in the buffer zone of the park who were highly dependent on the natural resources of the GHNP prior to notification. Several initiatives were taken by the park management during subsequent years with the premise that successful alternative livelihood development for the communities living around GHNP will reduce pressures on biodiversity and ensure its conservation.

Present study deals with detailed analysis of park ñ people interface, patterns of rural livelihoods and impact of alternative livelihoods programmes on the effectiveness of biodiversity conservation in GHNP. Specific objectives of this study were to: (i) study impact of the livelihood generation efforts made by the park management in GHNP's ecozone, (ii) study the impact of these livelihood generation efforts on the effectiveness of biodiversity conservation of the Park, and (iii) identify the livelihood

generation inputs and innovations emerging from the GHNP experience which can be pertinent for implementing at the local, regional, and national levels.

The study was conducted during 2004-11. It involved detailed socio-economic survey and assessment of human-wildlife conflicts in the eco-zone, analysis of local peoples' perception and attitude towards park, effects of alternate livelihood options given to the needy families and impacts thereof. An extensive questionnaire survey was done in the eco-zone to assess these aspects. Assessment of changes in the conservation status of various components of biodiversity within GHNP and evaluation of livelihood generation inputs on the effectiveness of conservation required both primary as well as secondary data. The study had the advantage of an extensive baseline data on biological as well as socio-economic components collected during 1995-1998 which allowed detection of certain changes on biota as well as wildlife habitats. For the detection of changes in conservation status, vegetation parameters were chosen to reflect the general habitat characteristics in the park both in temperate and alpine zones, while pheasants were targeted as indicators for representing forest biodiversity. Information on both the variables were available in both qualitative and quantitative terms for the period 1996-1999 i.e. prior to Final Notification of the Park.

The thesis has been organized into five Chapters: (i) General Introduction, (ii) Study Area, (iii) Impacts of efforts of alternate livelihoods development in GHNP Ecozone, (iv) Impacts of livelihood generation efforts on the effectiveness of Biodiversity Conservation, (v) General Discussion and Conclusions. The five chapters are followed by References and Appendices.

The first chapter i.e., General Introduction deals with the problem analysis, detailed review of literature and mismatch between the conservation philosophy and policies related to livelihood issues in the mountain PAs. The chapter introduces the history of forest management in the state and role of government institutions, especially Forest Department in the management of natural resources. The importance of buffer zone in absorbing the pressure on GHNP has been discussed. This zone has been the focal point for development of alternative livelihoods to conserve biodiversity in the Park.

Chapter 2 describes the physical, biological and socio-economic attributes of the Study Area. Detailed biogeographic location, range of ecosystems and habitats covered by GHNP has been described along with description of the topography, geology, soil, flora and fauna. The vegetation of the Park shows distinct altitudinal zonation, and the plant communities are representative of temperate and alpine regions. The conifer species (e.g. Chil Pine, Blue Pine, Cedar, Spruce and Fir) are widely distributed at various altitudes (in the successive low to high altitudinal zones. The high value medicinal and aromatic plants which have been listed as per the IUCN threat categories have been given. The park supports a very diverse animal populations, notably serow (*Capricornis sumatraensis*), Himalayan tahr (*Hemitragus jemlahicus*), goral (*Nemorhaedus goral*), blue sheep (*Pseudois nayaur*), Asiatic black bear (*Selenarctos thibetanus*), Himalayan brown bear (*Ursus arctos*), and red fox (*Vulpes vulpes*). Musk deer (*Moschus moschiferus*) and snow leopard (*Uncia uncia*) found in the Park are listed in Red Data Book. The Park falls within one of the globally important Endemic Bird Areas (D02: Western Himalaya). Galliforms in GHNP constitute a very important and spectacular component of biodiversity. The GHNP is one of only two National Parks in the world having the population of the endangered Western Tragopan (*Tragopan melanocephalus*) which is a Red Data Listed bird along with Chir (*Catreus wallichii*). Monal (*Lophophorus impegenus*), and Koklas (*Pucrasia macrolopha*), are frequent while Kaleej (*Lophura leucomelana*) occurs in small numbers in the temperate forest zone.

Chapter 3 analyses the impacts of 'socially inclusive conservation programmes' in the post final notification period by involving the women of such households (HHs) whose livelihoods were affected due to ban on collection of medicinal plants from GHNP. To examine the effects of alternative livelihoods in the ecozone of GHNP, methods of questionnaires, detailed interviews, group discussions were used. A total of 375 households (HHs) were used as 'treatment set' where the Women Saving and Credit Groups (WSCGs) had been formed for the income generation activities. Data were compared with 273 HHs where such inputs were not given (controlled set). Care was taken for selection of HHs with similar or not very varied background *w.r.t.* their age, education, economic status. The research work is based on assumptions that the control site conditions reflect actual study site conditions; incomes of WSCGs through IGAs are taken as incomes of the HHs; targeting women facilitated inclusion of half of population in livelihood development which so far remained confined to HH jobs;

women more amiable to conservation related activities such as savings or conservation education.

These 375 HHs under the treatment set of WSCGs were organized to participate in micro-financing which led to income generation activities (IGAs) such as vermicomposting, development of medicinal plants propagation areas, sale of apricot oil, community based ecotourism, street theatre, souvenir making and wage labour through National Rural Employment Guarantee Scheme (NREGS). The research findings show that the income generated through various schemes were quite substantial as compared to the incomes that the male members brought in the HH by selling herbs.

Chapter 4 looked at the impact of development of alternative livelihoods on the conservation status and biodiversity of the Park. Select vegetation parameters were chosen to reflect the general habitat characteristics in the Park both in temperate and alpine zones, while pheasants were targeted as indicators of forest biodiversity. Information on both the variables were available in both qualitative and quantitative terms for the pre-notification period (before 1999). Such a research work is unconventional as it follows interdisciplinary approach to examine a socio-ecological experiment of achieving biodiversity conservation through development of alternative livelihoods in a mountain PA.

The programs of alternative development of livelihoods were targeted at providing income generation activities for the HHs who were historically dependent on natural resources of the Park. The study reveals that there has been a significant change in the overall vegetation cover in the alpine meadows which were used for collection of medicinal herbs, camping by herb collectors as well as seasonal livestock grazing. At all the study sites i.e., Rolla, Shilt, Gumtrao, Patal and Dhela Thach, there has been a significant increase in the % cover of ground vegetation. Likewise, except at the temperate forest opening i.e., Rolla (2500m), all the high altitude meadows exhibited significant increase in the richness of vascular plants (paired t-test $p < 0.05$). Most significant changes in terms of ground cover as well as species richness were seen around Shilt, Gumtrao and Patal *Thaches*.

One of the major factors affecting the structure of woody vegetation prior to 1999 in many parts of GHNP was excessive dependence of herb collectors on fuel wood. The common species used for fuel wood in the alpine and sub-alpine areas were *Quercus semecarpifolia*, *Thamanocalamus spathiflorus*, *Abies spectabilis*, *Rhododendron campanulatum*, *R. lepidotum*, *R. anthopogon*, *Betula utilis*, *Juniperus communis* and *J. pseudosabina* (= *J. indica*). During the post-final notification of GHNP, there has been a visible impact on the fuel wood species to show a recovery. Implications of increased vegetation cover and abundance of bamboos have been discussed.

In the years immediately prior to the final notification (1997-1999) the pheasant populations in GHNP showed decline in response to reduced human activities in their habitats. The recent reduction in human disturbance appears to have caused the populations to rapidly recover, indicating high species sensitivity to disturbance. This finding is consistent with the conclusions of previous studies on species responses to reduced human disturbance. As indicator species, the Himalayan Monal, Koklass Pheasant and Western Tragopan may reflect the improvement of conservation status of temperate forest ecosystems of the Western Himalaya.

Chapter 5, the concluding part of present research examines a few interesting issues. The examples of recovery of vegetation and response of wild ungulates show that there has been a positive impact of alternative income generation development on the habitat that is now protected within GHNP. The WSCGs is an attempt to reduce poverty through organizing poor, rural women for sustaining and diversifying their livelihood options in the Ecozone of the Great Himalayan National Park. The empowerment of poor, rural women in historically differentiated social groups is a long process. It will take several more years to clearly establish sustainability of the approach and its replicability. Meantime, there are indications that when poor women are incorporated and involved in poverty reducing interventions, the outcome can be very significant in just a few years

The present research underlines the fact that the biodiversity conservation would be possible through socially inclusive programmes such as development of alternative livelihoods only when the Park Management is convinced to do so. Secondly, presence of a buffer zone under the Park management would facilitate socially inclusive

programmes. To make development of alternative livelihoods a sustainable and replicable programme, institutional and financial support for WSCGs, ecozone NGO, Himachal Pradesh Forest Department would be required for longer durations. Importantly, groups of poor women have caused gender biases and political outlook in the area to change. More so is the fact that the poor women and their families are becoming part of the conservation agenda of the Great Himalayan National Park.

Chapter 1

General Introduction

1.0 Background

The establishing of a Protected Area (PA) network was widely believed to be the best method of biodiversity conservation (McNeely and Miller 1984; McNeely et al. 1990). While the current impetus for the creation of such areas is very strong, past experiences have led to increasing resistance from both local communities and governments to expand the existing PA network (Kothari et al. 1989; Reid and Miller 1989; McNeely 1992; Miller 1999). People living in and around PAs have been regarded as a management problem, and historically, little effort has been made to involve them in the design and management of the PAs (McNeely 1988; West & Brechin 1991; Western et al. 1994). Over the last two decades, there have been significant commitments but little action to include the local communities in PA policies and activities. The concept of Protected Areas (PAs) at the moment is at crossroads (Brandon and Wells 1992). The present work with the example of the Great Himalayan National Park investigates whether more socially inclusive policies could lead to better conservation.

The biodiversity is concentrated in the areas located away from main habitations where poverty tends to be pervasive, and where the reach of government development programs is often limited (Pandey and Wells 1997). This is more evident in the remote and inaccessible areas of the Himalaya where the isolated indigenous communities have developed distinctive traditions and customs, as well as farming practices, and systems of forest use. The remoteness of the Jiwa, Sainj, Parvati and Tirthan valleys is reflected in the distinct traditions and customs of the local communities (Harcourt 1882). However, there is a very little documentation of the local names of plants and animals, and conservation practices that developed because of isolation of the area. Scanty evidences of such knowledge are found in the edicts (an order sent out by the local rulers), copper plate inscriptions, and reports on land and forest settlement (Gazetteer 1994; Harcourt 1882; Anderson 1886).

Despite isolated valleys, there is one common factor which indicates social mobility among the seemingly 'separated' communities, i.e. their reverence for the nature which is often reflected in their Sacred Groves (Vasan 2002), existing in the Himalayas from time immemorial. In contrast to this community effort in conservation, the state effort of setting up Protected Area for biodiversity conservation is a recent endeavour. A National Park or a Wildlife Sanctuary is usually a bigger area (as compared to a Sacred Grove) which aims to protect/conservate an area with distinct biological, geological, geomorphological features Wildlife (Protection) Act, 1972. Often there are conflicting situations as the local communities who have been using the area for many generations are suddenly eliminated from doing so due to creation of a PA. In modern times, there are many growing differences and conflicts between the local communities and delineation of a Protected Area in their neighbourhood.

Until the 1960s human pressure on the Sainj-Tirthan area (which now is GHNP) grew very slowly. People in the area were primarily living at a subsistence level with very limited export of natural resources. However, the state government's recent efforts for rapid economic and social development (roads, hydel, tourism, etc.) of the area have put great pressures on the environment. The major pressure on GHNP's species diversity was from the collection of medicinal herbs, as well as other forest products, including the commercially valuable morel mushroom. Until 30 to 40 years ago, there was no significant commercial market for the major herbs, and it was not anticipated that this would become a critical conservation issue for the Park. However, in recent decades the commercial market has expanded enormously, giving local people a major new source of income (Tucker 1999).

Establishment of strict PAs in a densely populated and rapidly developing country like India is an enormous challenge. Once established, the effectiveness of such PAs is liable to change due to rapid socio-economic developments and increasing demands of forest resources. Changes in land use practices and shifts in anthropogenic pressures may bring about changes in ecology and conservation status of several species which need critical assessment and regular monitoring. GHNP, which was formally declared as a national Park in 1999, provides an opportunity to study such changes.

Actual field experiences of initiatives attempting to bring about harmonious relationship between local communities and PA management or between conservation and development are not abundant (Salafsky et al. 1999; Little and Horowitz 1987). It is even rarer to find examples of state-led initiatives of this kind. Thus, an in-depth study of sites where an integrated conservation and development approach has been attempted by a state agency is likely to throw up vital insights that can feed into improved field implementation as well as policy level reform. It further strengthens need to study the inter-relationships among patterns of natural resource use, community resource management systems and their livelihood requirements to establish linkages between biodiversity conservation and sustainable rural development. The Great Himalayan National Park (GHNP), located in Kullu district of Himachal Pradesh is a unique example of a protected area in the Western Himalaya where an integrated approach to conservation and development has been underway for almost a decade now (Pandey 2008). It offers an excellent opportunity for assessing the impacts of this approach as an effective strategy for biodiversity conservation.

1.1 Current Forest Management Structure

The institutions that have been involved in the conservation of natural resources in Himachal Pradesh are quite varied and diverse. The Forest Departments are in the forefront of such institutions which include colonial forest settlements and gazetteers, reserved forests, national Parks and sanctuaries, sacred groves, forest cooperatives, Joint Forest Management committees, externally aided projects and many more. In addition, there are Non Government Organizations (NGOs) and organizations at Panchayat/village levels such as Mahila Mandals, Yuvak Mandals, and Youth Clubs which also play a part in the natural resource conservation. The implementation/success of forest management efforts depends on the resilience of institutional diversity which contributes to providing a forest policy framework (Vasan 2006).

There is a wide range of altitudes and climatic conditions, with a rich and diversified flora. Major forest types include moist tropical, dry tropical, montane sub-tropical, montane temperate, sub -alpine and alpine scrub. The following are some of the important facts about the Himachal Forests (HPFSRP Report 2000).

- 66.43% (36,986sq km of the total geographical area of HP 55,673sq km), is legally defined as forest land.

- However, revenue records show only 10,561sq km of forest land; thus 71% of the legally classified forest area remains to be measured and entered into the revenue record.
- It should be noted that as much as 20,511sq km of HPös land is both uncultivable and cannot sustain forests, comprising barren land, alpine pastures, snow covered peaks and areas above tree line ñ although such areas fall within the legally classified forest land.
- However, the HPFDös estimate of forest area includes those uncultivable lands above the tree line, considering them to be an integral part of a larger forest ecosystem.

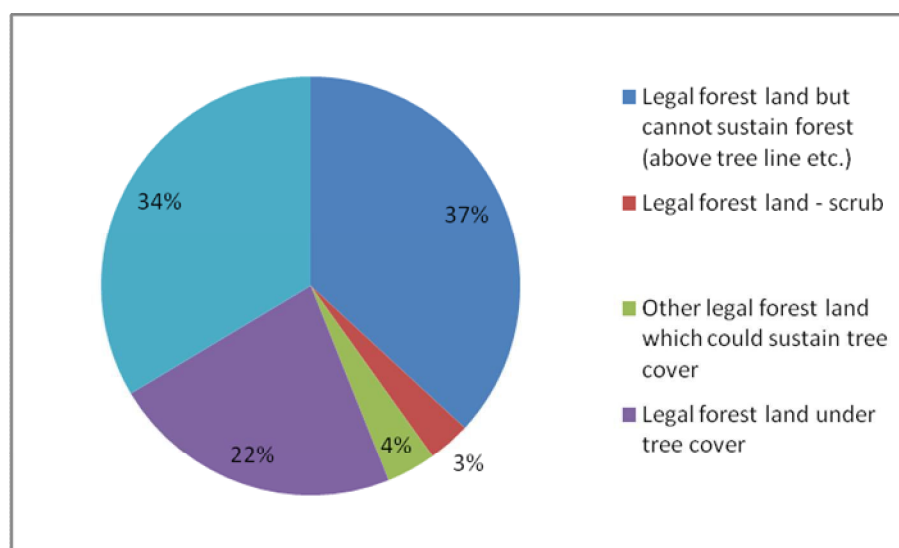


Fig 1.0 Areas of Legal Forest Land and Tree Cover

According to the existing records (HPFD 1997), legally-defined forest land is divided into:

- Reserved Forests ñ 1,896km² (5.12% of forest land)
- Demarcated Protected Forests - 11,401km² (30.82% of forest land)
- Undemarcated Protected Forests - 21,593km² (58.38% of forest land)
- Unclassified Forests - 930km² (2.51%)
- Other Forests - 1,166km² (3.15%).

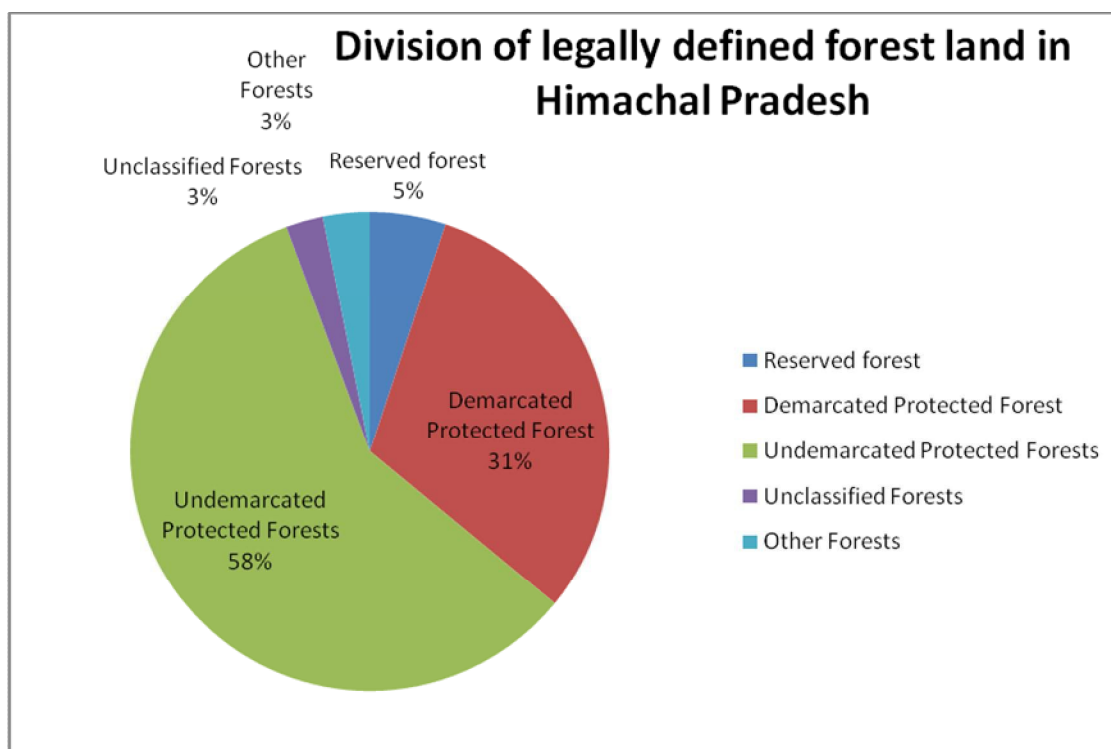


Fig 1.1 Division of legally defined forest land in Himachal Pradesh

Reserved and protected forests are under the management of the HP Forest Department. In reserved forests, few activities are allowed unless specifically permitted, whereas in protected forests, much is allowed unless specifically prohibited.

The State's effort of wildlife conservation is through a Protected Area Network (PAN). Till recently, Himachal Pradesh had a PAN comprising 33 wildlife sanctuaries and 2 national Parks spread over four Bio-geographic zones in the state. This was about 12.8 % of the state's geographical area. Of the 33 wildlife sanctuaries there were habitations within 24. These inhabited villages were 793 in number with a human population of 116658 (2001 Census) and a livestock of 183891.

1.2 Policies and Legal Provisions

The protected areas regime broadly falls under the subjects of forest and wildlife which have been dealt with in the Constitution as concurrent subjects (Bakshi 2002). It is important to note that forests and wildlife subjects were brought to the concurrent list only in 1976 through a Constitutional amendment owing to their national importance and attention of the then Government. Prior to this these subjects were

within the exclusive domain of state's respective legislative competence. The Constitution of India enjoins that the State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country, and further proclaims it to be the fundamental duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures. Thus by raising environmental concerns to the constitutional level, India has provided its citizens with a powerful legal tool to protect wildlife and their habitat.

The Wild Life (Protection) Act 1972 is the single most significant statute on Protected Area conservation in India. The term 'protected area' was only introduced in 2002 when the Act was comprehensively amended to enlarge the category of protected. The WLPA provides for four categories of protected areas i.e. National Parks, sanctuaries, community reserves and conservation reserves. Two more legal categories termed as 'game reserves' and 'closed areas' existed prior to 1991 and 2002 respectively which were designated as areas for hunting and the second one closed for hunting. They are not part of the PA regime anymore.

The Joint Forest Management circular issued by the Govt of India in 1990 was an official effort to involve local communities for the regeneration of degraded forests (Khare et al. 2000). This effort was in consonance with the Indian Forest Policy 1988. The Government of Himachal Pradesh (GoHP) issued its Government Order on joint forest management (JFM) in 1993, and new Participatory Forest management (PFM) regulations were notified in August 2001.

One effective legislation that provided framework for institutional structures is the Constitution (73rd Amendment) Act 1992. It mandates decentralization through the three tier system of local government known as Panchayati Raj institutions (PRIs), with *panchayats* at village, block and district levels, and gives a renewed emphasis on decentralized government. GoHP gave effect to this initiative through the HP Panchayati Raj Act, 1994. The GoHP has developed a Forest Policy, known as Forest Sector Policy and Strategy 2005 through a multi-stakeholder consultation process by the Policy Analysis and Planning Unit (PAPU) which was set up under the HP Forest Sector Reforms Project (HPFSRP) under the Department for International

Development (DFID), UK supported project in HP. It seeks to address the aspirations of the people by making forestry a vibrant sector contributing towards livelihood enhancement of forest dependent communities through the department's working on natural resource management (Forest Sector Policy and Strategy 2005). The Forest Policy has been drafted in context of the Panchayati Raj system which has given a renewed emphasis to decentralized government. The H.P. Forest Sector Policy and Strategy 2005 is in line with the Indian Forest Policy 1988 with provisions of environmental conservation and the meeting of subsistence needs for forest-dependent communities.

In 1998, the HP Forest Department introduced a Joint Forest Management programme, known as *Sanjhi Van Yojna* (SVY). In the background of HPFD's SVY, was DFID project's experience of participatory approaches being implemented as pilot in two districts of Mandi and Kullu (Blunt et al. 1999). *Apne Van Apne Dhan* ('Our Forest Our Wealth') is another forestry scheme of HPFD with participatory mechanisms.

1.3 State Initiatives for Wildlife Management: A Review

Since the inception of forestry by the British, silvicultural practices made prescriptions for high yields, and the forest settlements reports provided for rights and concessions of timber, medicinal herbs, etc., to the local people at very nominal rates. These practices still continue with the exception that the commercial tree felling has now been stopped. The Himachal Pradesh government imposed a moratorium on the felling of timber in all the Protected Areas in 1984. A similar ban on hunting had been imposed earlier in 1982, which is still continuing. This has shown favourable results for wildlife in the State. However, in modern times, the expansion of horticulture (mainly apple orchards), growth of the packing cases industry, over-exploitation of medicinal herbs, and even the traditional grazing by Gaddis, in addition to the timber rights enjoyed by the villagers exert a great pressure on the resources of the forests. Compared to silvicultural practices, the concept of wildlife management is relatively new to the Himalayan situation. The forest bureaucracy is very nascent in developing a synthesis of scientific understanding for the management of forests for multiple objectives, with wildlife interest as a major objective.

1.3.1 Protected Area Network and its Rationalization in Himachal Pradesh

Many of the best forests and wild lands of Himachal Pradesh happen to be within the Protected Area Network (PAN). So also are many areas, forested or otherwise, which are of little conservation value and are quite unnecessary (and inimical) had been included in the PAN. What is more important is that both the good and the not so good national Parks and wildlife sanctuaries had not only several thousand people living within their boundaries but had tens of thousands (mostly tribals and rural poor) dependent on them for their livelihood needs. Over the years the villagers in the neighborhood of a Protected Area have witnessed (and borne the brunt of) increasing restrictions on their livelihood related activities as also on getting development works approved and implemented.

Rationalization of the PAN offered a way out of this impasse. It meant re-drawing the boundaries of wildlife sanctuaries and national Parks to exclude villages / hamlets along with those forests that are heavily encumbered with people's rights. By doing this a multitude of unnecessary problems around what is allowed or not allowed within PAs gets circumvented. Development departments like public works, irrigation and rural development and through them local villagers and politicians are expected to stop looking at Forest / Wildlife departments as their number one enemy and should over time become more amenable to the idea of conservation. This may also give serious wildlife management a chance that may actually result in biodiversity conservation. After formal approval of Rationalization process, there will be 24 Wildlife sanctuaries, 5 National Parks, 3 Conservation Reserve in HP covering 8,409 sq km which is more than 15% of the total geographical area of the state.

Table 1.0 Rationalization of Boundaries of the Protected Areas in Himachal Pradesh

At Present			After Rationalization		
No of PAs	Area of PAs	Percentage of the total geographical area of the state	No of Pas	Area of PAs	Percentage of the total geographical area of the state
31 WLSs and 2 National Parks	7199 Sq km	12.8 %	24 Wildlife sanctuaries, 5 National Parks, 3 Conservation Reserve	8,409 Sq km	15.2 %

All the new National Parks and areas which are added to the Wildlife Sanctuaries in H.P. have been notified by the state government in July 2010. The Supreme Court of India is now expected to allow for the subtraction of populated areas from the existing wildlife sanctuaries. The state of Himachal Pradesh is the first one in the country to undertake such an exercise.

1.4 People Friendly Conservation Initiatives around Protected Areas: A Review

There are two broad categories which signify efforts of maintaining integrity of the protected areas, the world over: (1) Conservation by exclusion, and (2) Community based conservation. One set of authors have been inclined towards strict enforcement measures for biodiversity conservation through emphasis on nature protection and viewing critically the role of local communities as saviors of ecology (Terborgh 1999; Oates 1999). Such exclusionary approach may have succeeded in several places but at a significant social cost and conflict, especially in developing countries (Lele et al. 2010). Yet another set of researchers look at the socio-political aspects of nature conservation and elaborate upon the mechanisms which can be evolved through concerted negotiations with the local communities (Brandon and Wells 1992; Martino D 2001; Neumann R 1997; Ferraro and Kramer 1997; West and Brechin 1991; Brandon 1996; Wells et al. 1999; Brechin et al. 2002).

The Integrated Conservation and Development Projects (ICDPs) are major examples where the people-friendly approaches have been tried to conserve biodiversity (Machlis and Tichnell 1985; McNeely and Pitt 1985; Larson et al. 1997; Wells et al. 1992; Brandon and Wells 1992). Published work on ICDPs has critically assessed their role in biodiversity conservation and has made recommendations how best such projects can be implemented (Kellert et al. 2000; Wells and Brandon 1993; Wells 1994; Wells et al. 1999).

In developing countries, the conservationists recognize limited future for many protected areas without the cooperation of local people. Since the 1980s, ICDPs have attempted to reconcile park management with local needs and aspirations, usually with disappointing results (Wells and McShane 2004). In some cases, incentive-based

programs (IBPs) have been favored to protected area management, by delivering benefits tied to conservation to local people (Spiteri and Nepal 2008). Achieving local cooperation and support without jeopardizing conservation goals remains a top priority for parks. Trials have been made to work with a modeling approach for anthropogenic interactions on ecosystem associated with the complex human and ecosystem interactions for sustainable landscape development (Nautiyal and Kaechele 2009). Fortunately, the lessons from these experiences provide an important opportunity to inform the next generation of biodiversity conservation programs, including those concerned with poverty alleviation as well as those working at ecosystem and landscape scales.

All over the world, with the growing awareness about the role of biodiversity conservation in maintaining the ecological balance, the governments, courts, non-governmental organizations, conservationists, and human right activists have started raising their voice for Protected Areas to save land and water resources, stop deforestation and prevent species extinction (Brooks *et al* 2009). Efforts in India in last two decades are characterized by ecodevelopment or livelihood based approaches which focused on involvement of local people in the Protected Area conservation. The management of more than 100 National Parks and 510 Wildlife Sanctuaries comprising about 4.9% of the total land mass of the country (Wildlife Institute of India database) is done by applying the provisions of the Indian Wildlife Protection Act 1972 by the Forest bureaucracy. However, the involvement of community in biodiversity conservation did not figure on the agenda of forest bureaucracy until the beginning of ecodevelopment programmes under the Project Tiger. With reference to the Project Tiger, it was noted “Most communities in the neighbourhood of reserves sustain themselves by eroding marginal land and depleting forest pastures. In their precarious existence, enforcement of restrictions in wildlife reserves triggers antagonism. That discipline is essential to revive essential life support systems that these areas provide is not appreciated for the same reason.” (Indian Board for Wildlife, 1983).

In the Indian context, ecodevelopment has been widely used term that describes efforts to link Protected Area management with local social and economic development programs (Panwar 1992). Project Tiger, in particular, is often cited in the literature as an application

of the concept of ecodevelopment. Various definitions of ecodevelopment have been proposed, including: (1) "a site-specific package of measures, developed through people's participation, with the objective of promoting sustainable use of land and other resources, as well as farm and off-farm income generating activities which are not deleterious to Protected Area values" (ibid); and (2) "limited rural development, designed with the participation of local people, for the purpose of reconciling genuine human needs with the specific aims of Protected Area management" (Pabla et al. 1995).

The strategy of integrating conservation and development through evolution of sustainable non-forest dependent livelihood of local communities living in and around PAs has been recently debated (Saberwal et al. 2000; Saberwal and Rangarajan 2003). Scientists have been defending nature protection for its utilitarian importance or as a moral imperative (Kramer and Schaik 1997). Yet another set of scholars look at the socio-political aspects of nature conservation and elaborate upon the mechanisms which can be evolved through concerted negotiations with the local communities (West and Brechin 1991; Brandon 1996; Wells et al. 1999). A rather convincing argument given by scholars pertains to the ethical part of displacement of the local populations to set up a Protected Area. Such an action is deemed unfair and more so for such groups of people which is already at a disadvantageous position (Brechin et al. 2002; Campese et al. 2009; Lele et al. 2010). There are examples of conservation through participation of local communities (Alcorn 1993) and sharing of revenues from PAs (Archabald and Naughton-Treves 2001).

Since the creation of world's first National Park at Yellowstone, USA in 1835 (Jacoby 2001), keeping lands aside for conservation have been at the center of the conserving biodiversity in many countries. The establishment and management of wildlife Protected Areas is an essential part of effective conservation efforts (Munro 1995; Miller 1996). Protected Areas are connected to their surroundings through ecological, economic, and cultural relationships (Zube 1995). In case of most of the Protected Areas, the biotic pressures have increased manifold as they are islands of flora and fauna surrounded by human habitations. The challenge is how to make a Protected Area viable for the conservation of flora and fauna found therein (Miller 1996). Conversely, there is a new perspective of looking at the 'conservation through Protected Areas' e.g. the conservation policy that caused loss of pastoralists access to

the pastures in Mkomazi Game Reserve, Tanzania, has been challenged. Although both (conservation and development) desire enhanced well-being, both intimately reorder peoples' lives, environments and futures, and have been characterized by authoritarian planning and execution (Brockington 2002). The broad vision of ecology, society, and history, as well as the understanding of a keen observer bring together a better and undistorted understanding of issues.

In modern India, the appreciation for conservation of valued natural resources and environment was established with the creation of the first national Park, Corbett National Park, in the 1930s (in the state Uttar Pradesh). This was beginning of setting of a Protected Area network in the country (Gee 1964). However, the next big event in the country's conservation scene occurred with the India's participation in the United Nations Conference on the Human Environment (also known as the Stockholm Conference) in 1970, followed by making of wildlife legislation, Indian Wildlife (Protection) Act 1972. This marked the beginning of a systematic conservation effort in India. As a result each state has set aside a network of national Parks and sanctuaries under the Indian Wildlife (Protection) Act 1972. In Himachal Pradesh, it wasn't until the 1980s (Mehta et al. 1993) that initial efforts were made to create its first National Park which twenty years later was finalized as the Great Himalayan National Park.

In Himachal Pradesh, the vertical and horizontal complexity of the mountainous regions has led to a high degree of spatial heterogeneity. The varied landforms, particularly in relation to altitude, slope, aspect, land use and past management practices have created several land mosaics or featured landscapes. The altitude has been a decisive factor for resultant diversity and well defined seasonal as well as highly spatial distributed resource use strategy adopted by wild animals, livestock and people. Moreover, the knowledge of local people about the biophysical, socio-economic and cultural-historical elements of their immediate environment plays a significant role in determining the long term sustainability of those resources (Duffield et al. 1998). In such a scenario, the biodiversity concerns can be better dealt holistically, rather than traditional and fragmentary species oriented management approach. The GHNP along with adjoining two National Parks, and four Wildlife

Sanctuaries provide for a larger conservation unit for migration of species, and gene flow.

The Protected Areas in India or outside are of varying sizes, scattered all over the landscape. Managing smaller PAs is often a problem especially in a developing country where people are more concerned about their livelihoods rather than conservation of an endangered species. In order to survive, a PA which is competing with other land uses has to have support of the local people (Balasubramanian 2007; Bharadwaj 2007; Johari 2007; Lusigi 1995; Sankar et al. 2009). Harmonizing the livelihood needs of poverty-stricken local community with the requirements of habitat for the survival of viable populations of flora and fauna appears to be the fundamental basis of conservation (Lee 2001). There are very few examples representing this brand of conservation.

In India, the modern time socio-political conflicts over natural resources are exemplified by two major instances, Chipko Movement and Narmada Bachao Aandolan (Gadgil and Guha 1995). The Chipko (Hug the Trees) movement of 1973 in Garwal area of Western Himalayas reflects resentment of peasants against the state favouring outside commercials at the expense of local peasants' subsistence needs for fuel, fodder and small timber (Guha 1989). The Narmada movement manifests sentiments of the people displaced by a hydro-electric dam by highlighting issues of inequity in accessing waters of river Narmada. Another dimension of conflict over natural resources is based on the premise incorporating contemporary issues of environmental politics that is crucially entwined with the ongoing development in India (Rangarajan 2007). The scholars have been discussing conflicts around the Protected Areas in India, how they seem endemic and widespread, and the challenge of defusing them in a manner that keeps conservation values intact while bringing the local actors aboard. One of the important discourses has been revolving around a decline in conservationist access to political power (after the times of Indira Gandhi) as well as exclusion of the local communities from the area of conservation interests (Chhatre and Saberwal 2006).

1.4.1 Buffer Zones in support of the Protected Areas

Establishment of a buffer zone close to a Protected Area is seen as a solution to the problems of existing populations in the vicinity of a National Park or a Wildlife Sanctuary. The ICDPs in 1980s and 1990s used this approach towards conservation (Brandon and Wells 1992; Martino 2001). The Project Tiger areas are the first to have a buffer zone so that it is able to absorb most of the biotic pressures on a PA that come from outside a PA (Pandey and Wells 1997; Uniyal et al. 1993; Pandey 2005a, 2008). In the long run these pressures need to be mitigated and contained in the buffer zones so that the wildlife/ biodiversity within the PA can flourish. Many species of wild animals spill over from the PAs into the adjoining forest or wildlife corridors (Pandey 2005b) from time to time. The conservation education, alternative income generation activities, and training programmes facilitate people in these adjoining areas to co-exist with the wildlife concerns. Moreover, many livelihood needs of people like grazing areas, firewood, medicinal herbs, fodder and grass that compel people to enter PAs are efficiently and expeditiously met within the buffer zone (Pandey and Tandon 2002).

In several cases buffer zone of Protected Areas can be suitable to develop high value income generation activities like with NTFPs and Eco-Tourism, both of which provide several livelihood options to the local people while helping to conserve the habitat. Under the Centrally Sponsored Schemes for National Parks and wildlife sanctuaries (of the Government of India), there is a scheme for Eco-development in and around PAs. The funds from such scheme are available to set up buffer zones around PAs. This is to consolidate the area's conservation value. The Eco-development zone of the Great Himalayan National Park popularly known as Ecozone is a case in point (Pandey 2005a, 2008). There are several examples from Himachal Pradesh where community has come forward to protect a forest and set up their own rules and regulations for its management (Pathak 2009). Most of such areas are significant for biodiversity values and represent local community's cultural and conservation interests.

1.5 Community-based forest management practices in Himachal Pradesh: A Review

In response to the increasing needs and decreasing gains of the community from the forests, there have been a number of community initiated forestry programmes in the state. A summary of such initiatives is given in the Appendix 1.

All the examples of community based forest management practices in Himachal Pradesh present a diversity of responses towards the growing needs of local people from the natural resources. At the same time the lukewarm response of the State in checking the depleting grasslands and forests has compelled local level organizations to take the initiative. The lack of effective action on the ground and inadequate governmental policy response have made it necessary for the villagers to take up the task of protecting and managing their water sources, grasslands and forests for fuelwood and fodder. Considering the vast expanse of the Himalayan landscape, these responses appear to be only marginally effective. The uniform application of forest laws (such as the Participatory Forest Management Rules all over the State) often excludes the site-specific needs of local people. This mismatch of law and requirement often results in weakening institutions or causes institutional difference. The ineffectiveness of the forest development committees formed by the Forest Department in the State is a case in point. Moreover, the application of a participatory approach to natural resource conservation has to be very site-specific. It works well with the established mechanisms of a process-approach, and the micro-level planning of details. Involvement of local communities and good coordination between different developmental agencies and NGOs is lacking in the area (Pandey 2010).

In the HPFD, the efficiency of a forest official is measured more often by his/her ability to spend the allocated funds in a year, rather than by his/her effectiveness in relating conservation issues to expenditure (Personal Observation). There is also the factor of politics and special-interest group influences that has, in post-independent India, come to sway the functioning of institutions connected with forestry and wildlife management (Chatre and Saberwal 2006). This has resulted in new pressures on forest lands for non-forestry purposes. The development of hydel projects in the state is a fine example of such non-forestry projects. Consequently, emergence of environmental politics in India entwined with a certain kind of development

discourse has been observed (ibid). These new and varied developments in modern times constantly confront and challenge the efforts of the State to function with uniform systems of governance. There has thus emerged a mosaic of variations in the community-based forest management practices, thereby creating and recreating a diversity of practice within the limits of structural constraints (Vasan 2006).

1.5.1 Joint Forest Management in Himachal Pradesh

Like any other state forest department of the country, the Himachal Pradesh Forest Department (HPFD) has adopted the planting of trees as one of its main goals, because the ban on green felling in the mountain state, the priority on revenue generation through commercial forest exploitation has been reduced. Under the National Forest Policy 1988, many states including HP have introduced joint forest management (JFM) where forest management regimes stress on partnerships between state forest departments and local communities. Under JFM, the forest department and the village community enter into an agreement to jointly protect and manage forest land adjoining villages and to share responsibilities and benefits. The forest protection committee represents the village community under this decentralized institutional arrangement. In HP the rules for JFM were first formed in 1993 (JFM Update 1993). They were then revised in 2001 in a manner that gave the village community greater access to a number of non-timber forest products (NTFPs) and a share in the timber revenue, in return for an increased responsibility for its protection from fire, grazing and illicit harvesting.

An appraisal of the implementation of JFM strategy in HP reveals that its benefits for the forests as well as the village community were limited, and confined to areas where it was introduced under an externally aided project. The HPFD could not mainstream JFM into its forestry programmes. An attempt is being made to provide a thrust to JFM through the Forest Development Agency (FDA) created by the Govt of India and is being implemented through Joint Forest Management Committees (JFMCs). The Ecozone of GHNP has a FDA (introduced in 2010) with its objectives of building capabilities at the grass roots level to empower the local people to participate in the decision making process. However, JFM is still seen as a top-down scheme planned by the forest bureaucracy, and not as an initiative of the local community wherein the state forest department would act as a facilitator to introduce this people/forest-

friendly programme. As such the decentralized governance of natural resources through JFM could not be realized (Pandey 2010).

1.5.2 Sacred Groves

The Western Himalayas are home for some of the globe's most intact and colourful indigenous and traditional cultures (TPCG and Kalpavriksh 2005). In the fast changing world, the mountain people are maintaining ways of life reflecting their mountain homes, and continuously adapting to the changing world around them. Sometimes it becomes difficult to say if the traditional mountain cultures are threatened or thriving. One of the outstanding examples of the traditional lifestyle of mountain people in the Western Himalayas is of Sacred Groves (*Devban* or forests of Gods). These areas show how local villagers combine their beliefs and religion with natural resource management and their use (Gadgil 1975; Gadgil and Chandran 1992; Chandrakant and Romm 1991; Ramakrishnan et al. 1998; Malhotra et al. 2000; Vasana 2002; Vasana and Kumar 2006; Jaryan et al. 2010).

The sacred groves in Himachal Pradesh have been instrumental in biodiversity conservation. They have a religious connotation and mostly located away from each other. Each of about 350 clusters of villages in Kullu in Himachal Pradesh have their own devta (deity) mostly related to Hindu pantheon. A very distinct characteristic of these devtas are that they are treated as a corporal entity by the villagers. The Devtas own property in form of a forest which is locally known as Devban. Most of the Devbans are treated as sacred. A recent study identifies one set of Devbans as archetypical of conservation by the local communities. There is another set of Devban which has been commercially harvested with the community consent. Evidences have been put forth to suggest that communication and interventions of the state and markets in modern times are impacting the devban institutions in Kullu region (Vasana and Kumar 2006).

1.6 Externally Aided Projects in Himachal Pradesh: A Review

As mentioned above, the management activities of all wings of the HPFD remain confined to departmental plantation activities along with forest, wildlife and fire protection. This also includes the creation of paths, bridges, patrolling huts, check posts, etc. Issues related to the need for greater gender sensitivity in natural resources

management, the involvement of local people in forest management, or augmenting their livelihoods to reduce their dependence on natural resources, arise only when externally aided projects have to be discussed with funding agencies such as DFID (DFID 2002), GTZ, or the World Bank. Often at the implementation stage, these crucial issues are paid only lip service by the forest bureaucracy.

In past twenty years there have been four major externally aided projects in HP Forest Department, namely World Bank aided Watershed Development Project for Himalayan Hills (or Kandi Project), Indo-German Ecodevelopment Project, DFID ñ UK assisted Himachal Pradesh Forest Sector Reform Project (HPFSRP) and on-going Mid-Himalayan Watershed Project. All these projects were implemented in the mainstream forest department (very little to protect/manage biological diversity). In most of these cases, the post-project scenario shows that the integrated teams constituted to run the Project have been disintegrated; the watershed approach to soil and moisture conservation has been abandoned by the HP Forest Department; and the lessons learnt during the Project have not been internalized by the HPFD. In Changar Project, the Ecodevelopment Society (created to run the Project for more than ten years) is virtually non-existent; the HP Forest Department is back to its own agenda of plantation and protection activities; and the integrated working of various departments of HP govt in a watershed has ceased. The HPFSRP could accomplish a lot during its operational phase, the post-project phase is characterized by the abandoning of virtually all the pilot locations of community participation in the state; non-implementation of plethora of recommendations and reports generated during the project; and dismemberment of Policy Analysis and Planning Unit (PAPU) which was one the greatest achievement of this project (Pandey 2010).

1.6.1 Conservation of Biodiversity Project (CoB) at the Great Himalayan National Park

The CoB project (1994-9) assisted by the World Bank (about Rs 6 crores) was to implement ecodevelopment (ecologically sustained development) concepts at the GHNP. It was to bring in structural/institutional changes in the management so as to facilitate biodiversity conservation. The WB report very candidly mentions that there were little or no impact of Bank funded ecodevelopment programmes at GHNP. However, in post CoB period, the women saving and credit groups have been innovative and

successful. Setting up of Society mode was a new mechanism under the Changer and CoB projects. It provided greater autonomy for financial and management purposes (World Bank 2002). The microcredit mechanism, role of women in forestry, and processes of microplanning evolved during CoB and HPFSR projects are clear examples of the emergence of new institutions within the boundaries of State despite the status quo approach that requires a great deal of oversimplification or homogenization of otherwise diverse processes. However, the forest bureaucracy often remains untouched by these changes. Upon completion of the Externally Aided Projects, the lessons learnt are seldom internalized in the system (Pandey 2010).

1.7 The Research Hypothesis

In the backdrop of above mentioned facts, the Great Himalayan National Park was set up in 1999 under the Wildlife (Protection) Act 1972 after completing the settlement of rights of local people in the designated Park area, thereby, issuing the Final Notification of the Park as needed under the said Act. With the creation of The Great Himalayan National Park, the Park management began looking to answer: How can conservation in a developing country happen when vital natural resources necessary for human survival are protected in a National Park?

Efforts were made by the Park management on alternative livelihood development in GHNP's ecozone. These efforts were made with an objective of conserving the biodiversity of Park. The present research work has been undertaken to test the hypothesis if successful alternative livelihood development for dependent communities in and around PAs will reduce/mitigate pressures on biodiversity and enhance conservation effectiveness.

1.7.1 The specific objectives of this study

- i. To study impact of the alternative livelihoods development efforts made by the Park management in GHNP's ecozone
- ii. To study the impact of livelihood generation efforts on the effectiveness of biodiversity conservation of Park.
- iii. To identify the inputs and innovations emerging from the GHNP experience which can be pertinent for implementing successfully the livelihood approach at the local, regional, and national level.

Such a research enquiry is expected to throw up vital insights that can feed into improved field implementation as well as policy level reforms.

Chapter 2

Study Area

2.0 General

The Western Himalayas are replete with numerous scenic spots where many visitors are drawn for their beauty and wildlife. The indigenous culture of the mountain villages offers unique experiences for the traveler. Isolated for centuries from the large urban centers, the remote hamlets developed a highly distinctive culture, based on the worship of local deities (*devta*) which are celebrated in numerous local, regional and national festivals. From the characteristic architecture of the houses and temples, and the folk wood carvings that decorate them, to the silver jewellery and woven wool shawls and blankets, there is a great range of local crafts. Most of the Kullu villages demonstrate the clear interdependence of people and environment that is characteristic of traditional lifestyles (Gaston & Pandey 2002). Although the high valleys of these Himalayas are remote and support a varied flora and fauna, the signs of traditional use are everywhere. They form an intimate part of the Western Himalayan ecology. An understanding of the role that traditional practices (e.g., grazing, burning, and medicinal plant collection) have had on the area's biota is important before one can fully appreciate the forces that have contributed to development of the ecosystems till now.

On a national scale, the value of the Western Himalayas lies in protecting the species characteristic of naturally occurring flora and fauna, because this area represents the best chance of survival for many of these species. The area assumes a larger conservation value as the initial framework of laws and policy (Indian Wildlife (Protection) Act 1972; National Conservation Strategy; National Wildlife Action Plan; Indian Forest Conservation Act 1980) is in place. Similarly the guidelines and orders have been issued by Government of India in 1990 for participatory forest management. The new Panchayati Raj Act under the 73rd amendment of the Indian Constitution also emphasizes people's participation with greater emphasis on the role of women.

In global context, the Western Himalayas stand out as an important area in the whole Himalayas with global conservation significance, such as conservation of bio-diversity in a "megadiversity" country (IUCN 1990; UNDP 1998; Alnutt 2002; Ghosh 1996;

Gupta 1994; Ram and Singh 1994; Wikramanayake 1998); protection of mountain ecosystem in danger of fragmentation and degradation; opportunity to prepare projects to address present and additional critical biodiversity issues; setting up demonstration areas for showing linkages between conservation and development; cycling and storage of carbon and soil nutrients with its global climatic significance. The Western Himalayas are considered an endemic bird area (EBA) by Birdlife International (Alison et al. 1998), supporting many restricted-range species, as well as a Conservation International Biodiversity Hotspot (Myers et al. 2000). The other side of the global context is economic growth, rise in consumption levels, globalisation, climate change and their impact on the various ecosystem of the world. The Millennium Ecosystem Assessment (MEA) is perhaps the most elaborate research work undertaken by the United Nations to underline these impacts (MEA 2005). MEA focuses on the ecosystem changes that have taken place on a global scale in last fifty years and predicts that the harmful consequences of the degradation that has set in on the planet earth may become worse in next fifty years. There has been degradation due to development that has taken place due to the ecosystem services, at times resulting in poverty for many. The MEA cautions that the environmental degradation may hinder the processes of checking famines and disease worldwide. It concludes by suggesting changes that may resolve many of such problems but there is a lack of effort to undertake such proposals (ibid).

2.1 Making of the Great Himalayan National Park

(Appendix 2 for GHNP Time Line)

The making of the GHNP precedes a good amount of survey work in Himachal Pradesh. A team of national and international scientists surveyed areas in Solang Nala close to Manali in Kullu District and watersheds of the Tirthan, Sainj and Jiwanal rivers in the Banjar area to recommend creation of a National Park in the Western Himalayas in 1980. The survey team of Himachal Wildlife Project- I included Dr. A.J. Gaston, Dr. P.J. Garson and Dr. M.L. Hunter along with scientists from Delhi University and officials of the Himachal Pradesh Forest Department (Gaston et al. 1981). The Second Phase of Surveys was undertaken in 1983 by the Himachal Wildlife Project-II (HWP-II) (Garson and Gaston 1984). The continued wildlife surveys subsequently recommended creation of the Great Himalayan National Park in its present location, the Banjar area of Kullu District.

Consistent with India's national Wildlife Protection Act (1972), which empowers states to initiate constitution of National Parks, the Government of Himachal Pradesh issued an initial notification on 1st March, 1984, expressing its intention to constitute the Great Himalayan National Park. This initial notification included reference to a buffer zone as an integral part of the National Park. The buffer zone (the current Ecozone) included inhabited areas to the west of the GHNP and the Sainj and Tirthan Valleys. Because there is no mention of constitution of a buffer zone associated with a National Park in the Indian Wildlife (Protection) Act 1972, the Government of Himachal Pradesh revised its 1984 notification dated. The new notification, dated 30th July, 1989, did not mention any buffer zone. In 1987, the Chief Wildlife Warden, Himachal Pradesh, wrote the first Management Plan for the Great Himalayan National Park which put a lot of emphasis on the protection of wildlife.

In 1988, under provisions of the Indian Wildlife Protection Act of 1972, the settlement proceedings for the rights of local communities in the Great Himalayan National Park began. The Government of Himachal Pradesh appointed a Settlement Officer for this purpose. Settlement proceedings were deemed a necessary step because the Settlement Officer is required to determine the existence, nature, and extent of any right of any person in or over the land that is comprised within the limits of the proposed National Park. Adequate compensation was awarded by the Settlement Officer to the persons who had any rights in the area proposed to become the National Park. This facilitated the elimination of any human interference from the area.

In 1991, the Himachal Wildlife Project-III (HPW-III) re-assessed GHNP's wildlife abundance, obtained information on livestock grazing and herb collection within the Park and reviewed the existing 1987 management plan (Gaston and Garson 1992). In 1994, the Government of HP revised the notification of intention to constitute the Sainj Wildlife Sanctuary. The Sainj Wildlife Sanctuary was created to accommodate the villages of Shakti, Marore, and Shagwar, which under the Wildlife Protection Act are not allowed to remain a part of the National Park. Yet another amendment in 1994 was Government of HP's revision of the Notification of intention to constitute the Great Himalayan National Park by including the upper Parvati River watershed, which represented a significant eastward extension of the initial Park boundaries into additional, uninhabited high mountain and alpine terrain.

For a five year period, the World Bank-aided Conservation of Biodiversity (CoB) Project was implemented at the GHNP from 1994 to 1999. During the CoB Project, the Wildlife Institute of India, Dehradun (WII), conducted a wide-ranging research project at the GHNP. Research results contributed significantly to improving understanding and management of the Park. In 1999, the Settlement Officer at GHNP completed the settlement proceedings and announced an Award and Settlement Report (May 1999) which in effect extinguished the rights of local communities in the Park. The Award included monetary compensation for those who had established their prior legitimate rights in the Settlement Report. The Govt. of Himachal Pradesh accepted the Award of GHNP's Settlement Officer and issued Final Notification (dated 28th May 1999) of the Great Himalayan National Park. The GHNP Final Notification does not include a buffer zone (there is no legal provision for buffer zone). However, for the purposes of implementation of CoB Project's ecologically sustained development (popularly called ecodevelopment), the buffer zone (or Ecozone) is under the administrative control of the Park Director.

2.1.1 Location and Significance

(see GHNP Maps)

The Great Himalayan National Park is located in the Kullu District of Himachal Pradesh, India. The GHNP is spread over an area of 754.4 sq km. The Park is located in the upper catchments of Tirthan, Sainj, Jiwa Nal and Parvati rivers. It has the advantage of *de facto* geographic protection on its northern, eastern and southern borders due to presence of extensive steep ridges and snowfields. Four major tributaries of the Beas River (Tirthan, Sainj, Jiwa Nal and Parvati) that supply water to millions of downstream users originate within the Park. As mentioned above, in 1994, two major changes were made in the land use patterns around the Park. A buffer zone of 5 km from the Park's western boundary, covering 265.6 sq km. and including 2,300 households in 160 villages, was delineated as an Ecozone under the administrative control of the Park Director. Most of the population (about 15,000 to 16,000 people) in the Ecozone is poor and dependent on natural resources for their livelihoods. The second change was the creation of the Sainj Wildlife Sanctuary (90 sq km) around the three villages of Shagwar, Shakti, and Marore (see Time Line of GHNP in Appendix 2). On the southern edge of the GHNP, another Protected Area (PA) was declared, as

Tirthan Wildlife Sanctuary. This covers 65 sq km and is without habitation, though it has rights of grazing. More recently, in 2010, both the Sainj and Tirthan Wildlife Sanctuaries were added to GHNP, but will not be formally incorporated until the process of settlement of rights has occurred (as per the Indian Wildlife Protection Act of 1972, an area is formally declared a National Park only when it is free of any habitation or rights of local people). Thus the initiated merger of Sainj and Tirthan Wildlife Sanctuaries with GHNP will be followed by a process of settlement to relocate inhabitants and make the area free of traditional pressures, which may take some time. The total area under Park administration (National Park, Wildlife Sanctuaries and Ecozone) is 1171 sq km, which is together referred to as the Great Himalayan National Park Conservation Area (GHNPCA).

It is of great importance to set up GHNP in the region which as a whole has come under enormous pressure from human activities, both from the ongoing practice of traditional livelihoods, such as seasonal grazing, hunting and the collection of medicinal plants, as well as more recent developments such as the farming of temperate cash crops, commercial forestry, tourism and hydro-electric power development. In a regional context, the GHNP is a recent addition (1999) to a network of protected areas in northern India and adjacent countries which are providing increasing protection to one of the world's 34 major Conservation International *Biodiversity Hotspots*, the Himalaya (Mittermeir et al. 2005, Myers et al. 2000). The Himalaya Hotspot, which contains not only the world's highest mountains and associated alpine ecosystems but also large expanses of temperate and subtropical forests and grasslands at lower elevations, spans some 3,000 km, east to west, and 300-500 km north to south. The World Wide Fund for Nature (WWF) has listed parts of the Himalaya in its Global 200 analysis (Abell et al. 2008) of critical ecosystems (since 2001), and GHNP is part of it.

2.2 Zonation of GHNP

Zonation is one of the means which can facilitate the sound management practices. A zone is an area of specific management category distinguishable on account of its objectives. Separate zones need to be created in the first place because some of the management objectives may not necessarily be compatible (Sawarkar 1995). At GHNP, the restrictions on access to the Park area have had some negative effect on the

livelihood of the local community. The management practices are aimed at finding ways and means to mitigate such effects. At the same time the biological processes free of biotic disturbances are expected to bring positive changes in the status of biological diversity.

2.2.1 GHNP as Core Zone

In order to facilitate the biodiversity conservation, the GHNP of GHNPCA is the core zone or the *sanctum sanctorum*. It needs to be ensured, however, that there is no stark contrast in resource use pattern immediately outside the boundary of the core. In principle, the resource use pattern should change gradually with increasing distance from the core. The resource use can vary from such as livestock grazing to tourism, both being potentially capable of impacts. In its true sense, the core is really a red flag area needing complete protection and just a minimum of restorative management intervention to secure its objectives (Sawarkar 1995).

2.2.2. Zones of GHNP

The creation of a buffer zone or Ecozone extending upto 5 km on the western boundary is an innovative land use strategy (Pandey and Wells 1997). The other two zones at GHNP are the Restoration Zone, the present location of the enclaved villages of Shakti, Marore and Shagwar which need to be relocated so that the Park can become a compact unit (the rationalization of boundaries of PAs in HP has recommended that the two wildlife sanctuaries, Sainj and Tirthan have to be merged with the Park). Here, the main management practices must aim at habitat recovery upon eviction of these villages. The third is Village Relocation Zone which is counterpart zone or the zone consisting of areas (yet to be decided) where the relocation of the villages Shakti, Marore, and Shagwar is to take place (Pandey 2005a).

2.2.3 Landscape Configuration and Linkages

The Park, the two wildlife sanctuaries which are being incorporated, and the Ecozone recognizes that a wider and well-integrated conservation area has far greater conservation value than its individual parts. The boundaries of GHNP are also contiguous with the recently established (2010) Khirganga National Park (710 sq km), the Pin Valley National Park (675 sq km) in Trans-Himalaya, Ruppi-Bhabha Wildlife Sanctuary (503 sq km) in Sutlej watershed and Kanawar Wildlife Sanctuary (61 sq

km). Together these four protected areas (PAs) add 1,949 sq km to the area around GHNP and its buffer zone, making the total contiguous protected area associated with GHNP approximately 2,854.4 sq km (see map) not including the Ecozone (See Table 2.1). This approach of conserving a bigger conservation landscape including wildlife corridors (Pandey 2005b) is in consonance with the search for a new meaning of conservation ñ a meaning that is bioregional in scope and collaborative in governance, as well as adaptive in managerial perspective. Some of the recent methodological innovations to manage the natural resources include management at landscape or bioregional levels (Holling 1978; Walters 1986; Miller 1996; Lee 2001). Such responsive approach of adaptation addresses conservation policies as experiments of continuous and dynamic learning and implementing (Lee 2001; Buck et al. 2001; Forman and Godron 1986; Naveh 1987).

Table 2.1 Summary of the relationship of buffer zone and adjacent contiguous/close by protected areas.

Area	Size sq km	Remarks
Great Himalayan NP	754.4	
Sainj/Tirthan Wildlife Sanctuaries	151	These sanctuaries are in process of incorporation into GHNP, expected in 2-3 years
Ecozone of GHNP	265.6	This is the buffer zone of GHNP (not counted in total below)
GHNP Conservation Area	1,171	This is the current <i>de facto</i> management area of GHNP and its buffer zone
Khirganga National Park	710	This National Park, contiguous with GHNP on its northern boundary, is in process of gaining full NP status
Pin Valley National Park	675	This National Park is contiguous with GHNP on its eastern boundary, also in process of gaining full NP status
Rupi Bhabha Wildlife Sanctuary	503	This sanctuary is contiguous with GHNP on its south-western boundary
Kanawar Wildlife Sanctuary	61	This sanctuary is not contiguous with GHNP but lies close to its north-west boundary
Total contiguous/close by protected area	2,854.4	This is the extent of contiguous protected areas including GHNP but not including its buffer zone

The GHNP and adjacent sanctuaries have been identified as an area where human impact on natural ecosystems has been lower than in other parts of the Western

Himalayas. For many hundreds of years, GHNP was a region where local village communities made use of adjacent forests/meadows to graze domestic cattle and sheep, to collect wild foods, especially medicinal plants, and to augment their protein intake by hunting wild game. In the latter part of the Twentieth Century these activities, especially the collection of medicinal plants, intensified as some species came to have commercial value outside the immediate region (Pandey and Wells 1997). As Indian villages turn into towns and towns transform into cities at an accelerated rate, pressures on the natural world are dramatically increasing. Aware of these stresses, there has been a concerted policy effort not only to protect the unique ecological aspects of GHNP but, through establishment of additional contiguous protected areas, ensure that there are extensive land corridors in which animals can move freely through their ranges and plant dispersal can take place (Pl see the map).

2.3 Physical

2.3.1 Hydrology

Water originating in the major rivers of the Park is a vital resource and one of the most important primary hydrologic sources for the region. The four sub-watersheds (the Tirthan, Sainj, Jiwa Nal, and Parvati) get their water from glaciers as well as runoff from the forests of the GHNP. Apparently, the glaciers at the headwaters are the main origin of rivers of the Park. However, the thick forests of three major oak types, Ban Oak *Quercus leucotrichophora*, Moru Oak *Q. floribunda*, and Kharsu Oak *Q. semecarpifolia*, contribute to the continuity of the regional hydrologic cycle and help maintain water quality for tens of millions of people living on the plains of India below. Many perennial streams and waterfalls of GHNP add water to the main rivers of the Park (Negi 1999). The cold waters of these rivers harbour a large diversity of aquatic fauna (yet to be studied) prior to their control by developmental agencies (hydro-electric power, etc.) outside the Park. Thus, in terms of contribution to and maintenance of a consistent water flow regime, the Park is vitally important for the region's downstream hydrology and healthy/natural regional water cycle.

2.3.2. Climate and Rainfall

The climate is typically the Western Himalayan temperate and alpine type. There are four distinct seasons recognized for GHNP: spring (April-June), rainy/summer (July-September), autumn (October-November) and winter (December-March). Precipitation

is moderate over most of the year and abundant during monsoon from mid-June to mid-September. During winter, the precipitation is in the form of snow even in lower elevation (1,560 m) and higher elevation areas experience heavy snowfall of over 2 m depth. Mean annual rainfall recorded at Niharni and Sainj in Sainj valley for the years 1992-1994 was 1155.7 mm and 1158.3 mm respectively. The maximum annual rainfall recorded recently was 1298 mm. The ambient temperature varied from -10° to 38° C, January and June being the coldest and hottest months of the year, respectively.

2.3.3 Biogeography

Biogeographically, the GHNP, according to the Udvardy Realm, Biome and Biogeographical Province classification, is primarily located within the Palearctic Realm of this often-referenced classification scheme, in the Biome referred to as Mixed Mountain and Highland Systems (Udvardy 1975). The GHNP and adjacent protected areas is at the junction of world's two major faunal realms, i.e. the Indomalayan to the south and Palearctic to the north. The temperate forest flora-fauna of GHNP represents the western-most extenuation of the Sino-Japanese Region. The high altitude ecosystem of Northwest Himalaya has floral affinities with the adjacent Western and Central Asiatic region (ibid, Mani 1994).

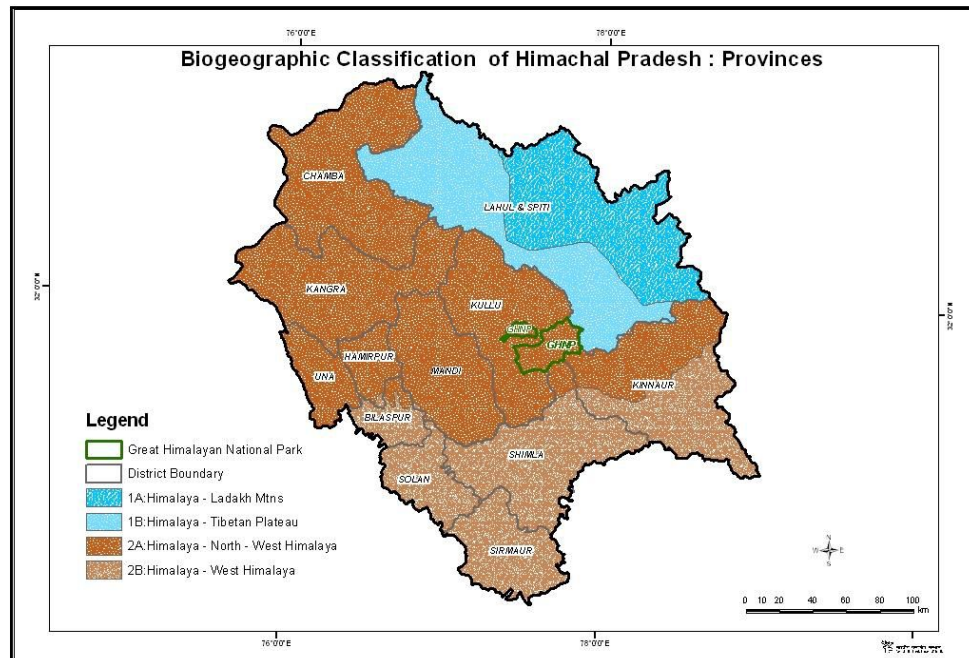


Fig 2.0 Biogeographic Map of Himachal Pradesh

Because of its range of species assemblages, and availability of a compact area for conserving the habitat and biological diversity, GHNPCA is the foremost priority for conservation in the Indian biogeographic zone 2B, i.e. North-West Himalaya (Rodgers et al. 2002). The flora of GHNPCA shows affinities with the Mediterranean and Tibetan as well as cis-Himalayan regions. For example, *Valeriana jatamansi*, *Dactylorhiza hatagireia*, *Taxus baccata*, *Leycesteria formosa* are typical taxa that extend up to Afghanistan and west China. Other affinities that are met with here are in the form of *Hippophae*, of the Palaearctic region; *Cedrus deodara*, *Viola biflora*, and *Poa alpina*, of the Mediterranean region; and *Euphorbia*, of Peninsular India. In addition, the Himalaya have evolved a high proportion of their own endemic flora and fauna taxa, for example several species of balsams *Impatiens*, *Androsace primuloides*, *Hedysarum cachemirianum*, *Draba lasiophylla*, etc. and Himalayan tahr *Hemitragus jemlahicus* which are well represented in GHNP (ibid).

2.3.4 Geology

Geologically, this Park falls under two regions, parallel to each other i.e., Lesser Himalaya along lower fringes (mostly below 3000 m) and the Great Himalaya or *Himadri*. The Park derives its name from the latter, as much of the area lies in this zone. The main range or central axis of Great Himalaya is aligned in north-west to south-east direction, indicating the northward movement of Indian Plate as it buckled under Eurasian Plate. In the north the Park is bounded by the Trans or Tethyan Himalaya (Wadia 1957). Hot-water springs found in the western part of the Park viz., Khirganga, Manikaran and Vashishtha suggest deep-seated magmatic activity. Likewise, the classic V-shaped valleys are typical of the Himalaya with powerful rivers winding their way through various rock types cutting zig-zag and s-shaped meanders, one receding behind the other. The forces of erosion combine with tectonic mountain building are continuously creating the jumbled Himalayan ranges. The rivers of Tirthan, Sainj and Jiwa Nal, and Parvati originating from GHNP have V-shaped valleys with S-shaped meanders. Various cliffs cut by these streams provide a good-cross section of rock formations. The headwaters of Tirthan, Sainj, Jiwa Nal and Parvati in GHNP are fine examples of glaciations. Mantalai, the origin of the Parvati River has a series of glacial lakes and cirques. The side rivulets near and above Mantalai represent hanging U-shaped valleys. For its snow, clean water and rugged

terrain, the area is worshiped by the residents of Kullu district as abode of Lord Shiva. Sartoo is another glacial lake located at the origin of Jiwa Nal visited by the adventure-loving trekkers. The area ahead of Sartoo has cirques. In addition to the glacial lakes, there are active moraine sites at the origin of rivers in the Park. Although, detailed geological investigations have not been carried out within GHNPCA, the following geological and geo-morphological account is based on the secondary literature:

In the Lesser Himalaya, approximately along Manikaran – Rampur alignment, the major rock formations are crystalline in nature consisting of Quartzites, Phyllites, Slates and Schists. At places Gneissic and granitic formations are exposed, majority of them occur as nappes, i.e., layers of strata that have shifted during extreme deformation and have come to rest far away from their original position. It is presumed that the Lesser Himalayan Crystalline were rooted in the Central Crystalline zone which was subsequently folded, faulted and thrust as a consequence of different tectonic episodes. The lower slopes exhibit the sedimentary structures like cross bedding, ripple marks and bedding cleavages. The major formations which inter-grade into each other towards lower parts are Rampur formation, Jutogh formation and Chail formations. Of these, the Rampur Formations are considered to be the oldest, i.e., about 2500 million years. Towards Larji and Kullu rocks exhibit low grade metamorphism and often referred as Chail group ranging in age from 1200 – 1400 million years. It has the distinction of having two Nappes – one over the other, wherein, Kullu Nappe (also referred to as Bajaura Nappe) is overlain by the Crystalline Nappe. This group is tectonically overlaid by the medium grade metamorphic Jutogh group. A persistent band of garnetiferous, Chlorite-biotite, Phyllites and Carboniferous Schist follows the thrust throughout the belt. The Karchham quartzite is sandwiched between the inter-bedded sequence of garnet-biotite schist, banded gneiss and carboniferous schist of the Jutogh group. The age is estimated around 1800-2000 million years.

The rocks of Great Himalayan range are principally metamorphic in nature that were formed under very high temperatures and pressures some 500 to 540 million years and emplaced 19 to 21 million years ago. This zone is situated between two Great thrusts, viz., the Main Central in the south and Tethyan in the north (Wadia 1957). Largest

outcrops of Central Crystalline are exposed in the Park area. Other rocks exposed exhibit reverse grade of metamorphism i.e. the regional metamorphism increases from the sole of the thrust sheet upwards to the crown. The Central Crystalline are further divisible into three groups, viz., Lower, Mid and Upper. The Lower groups consist of mica feldspar gneisses with high grade minerals such as sillimanite. The middle formation is formed of calc-silicate and quartzite. The predominant lithologic units of upper formation are biotite schist which grades into un-metamorphosed sedimentary rocks of Upper Precambrian.

2.4 Biological

Because of its complex geography, overlap of multiple zones and its great variations in altitude, the current relatively small area of the Park and buffer zone encompasses species of both plants and animals of subtropical to the alpine. The significance of mountains lie in their geographical attributes which have evolved endemism in flora and fauna, and taxonomical nomenclature/distinctions among the communities (Pandey and Wells 1997).

2.4.1 Flora

A total of 832 plant species belonging to 427 genera and 128 families of higher plants have been recorded within Park (Singh and Rawat 2000). The plant species diversity is relatively high because of the diversity of habitats (from high alpine down to the lower forests). The overall species diversity increases considering the buffer zone at lower elevations than most of GHNP. As a strategic approach to management, the inclusion of Sainj and Tirthan Wildlife Sanctuaries to the GHNP enhances the protection status of the rich flora and fauna found therein.

As mentioned in the Biogeography section, the flora of GHNP is typically West Himalayan, having some affinities with Mediterranean and Tibetan elements. The Park supports a great diversity of plant due to wide altitudinal range and relatively undisturbed habitats. The following table gives an idea about range of generic and species richness in various altitudinal zones:

Table 2.2 Number of genera and species in GHNP

Climatic Zone	Genera	Species
Lower Temperate	223	448
Temperate	311	624
Upper Temperate	220	408
Sub Alpine	135	311
Alpine	158	387

2.4.2 Biophysical features of major eco-climatic zones

The Warm Temperate Zone

The lower fringes of the Park below 2000m, adjacent to eco-development zone has a mixture of Chil pine, Ban oak and mixed forests. There are a few stretches of deep low lying riverine forests densely clothed with broadleaf species such as alder, elm, poplar, willows and horse chestnut. Understory is rich in Ringal bamboo.

Cool Temperate Zone

Between 2000 ñ 3000 m asl, the forests are largely dominated by Deodar, Moru oak, blue pine. The Great Himalayan National Park retains some areas of oak and mixed forest at altitudes below 2500m and these are some of the most rewarding places for bird watching. Grasslands in the same altitude zone can be found on south facing slopes in areas adjacent to the Park.

The Subalpine Zone

At about 3000 m to natural treeline (3500±200m), the vegetation is dominated by birch and Rhododendrons and interspersed with high altitude meadows, most of which previously were occupied in summer by migrant graziers with herds of sheep, goats and buffaloes. The subalpine zone is the richest in species, followed by the alpine and upper temperate zones.

The Alpine Zone

The altitude above which trees no longer grow varies with altitude, aspect, slope and other factors, but is generally above 3600 m in the Western Himalaya. For high altitude animals, this is one of the most important zones. The vegetation is mostly in stunted form due to the extreme cold climate and is dominated by prostrate shrubs, such as junipers, dwarf rhododendrons, bell heather and stunted willows.

Alpine pastures are found throughout the Park at elevations between 4000 ñ 5000m. They can have varying degrees of slope, be hummocky or flat. They provide the ideal habitat for typical alpine vegetation, including many species that bear attractive flowers and grasses. These in turn are part of the important food web.

Common herbaceous genera of alpine zone also include Cranesbill, Cinquifolios, Butter cups, Columbines, *Primula*, *Leontopodium*, *Corydalis*, *Pleurospermum*, *Saussurea*, and *Senecio*. *Berginia* and *Sedum* dominate the desert habitats between 3600-4200 m.; Rocky outcrops and ridges are interspersed with herbaceous meadows, used alike by domestic sheep and wild bharal. These areas are dominated by a luxuriant growth of Stoneworts, Asters, *Anemone*, *Thalictrum*, *Corydalis*, and *Arenaria*. However, in places, heavy grazing by domestic sheep has led to the spread of opportunistic and unpalatable herbs such as Knot weed, everlastings, balsams, Docks and nettles. Their presence indicates the overgrazing in the area, as most of these plants only spread where sheep and goat droppings provide a nitrogen-filled medium for their growth (Gaston and Pandey 2002).

2.4.3 Vegetation Types Recognized at Various Elevations in GHNP (Singh and Rawat 2000)

Temperate broad-leaved forests (2,000 to 3,000m),
Temperate conifer forests (2,000 to 3,000m),
Upper temperate broad-leaved and mixed conifer forests (2,500 to 3,500m),
Sub-alpine (Birch-Rhododendron) forests (3,000 to 3,500m),
Alpine scrubs (3,500m and above),
Alpine meadows (3,500m),
Riverine forests (along the rivers),
Temperate grassy slopes (2,000 to 3,000m), and
Temperate secondary scrub near village pastures and forest edges.

2.4.4 Trees

Trees largely predominate the temperate belt of GHNP. The conifer species are widely distributed at various altitudes (e.g., Chil Pine Blue Pine, Cedar, Spruce and Fir) in the successive low to high altitudinal zones. Each of the upper coniferous belts has its

characteristic oak which provides acorns for birds and rodents. The white-oak is associated with *Pinus roxburghii* and blue pine; green-oak with fir and spruce. Brown-oak mainly forms the pure community at the treeline. A number of lichens and fungi occur on the oak trees which in turn provide food material for mammals and birds. Himalayan yew is most abundant in the fir forest where they give an appearance of an old forest and provide a distinct cool microclimate. *Rhododendron arboreum* dominates between 1500-3000 m with a tendency of preference for the lower elevation on the north side. Four species of Maple occur with a wide range of altitude from 1500-3500 m. *Aesculus*, alder, poplar, birch, and willows are common near the streams. A List of trees of GHNP is enclosed as Appendix 3.

2.4.5 Shrubs and Herbs

Himalayas have been a source of many exotic shrubs and herbs transported to Europe and North America. Among these, are the genera *Berberis*, *Daphne*, *Desmodium*, *Lonicera*, *Indigofera*, *Ribes*, *Rhamnus*, *Sorbaria*, *Viburnum* and two species of hill bamboo (Polunin and Stainton 1984). These form dense clumps that are used by pheasants and other birds for feeding and breeding. Many climbers also occur, increasing the diversity of the middle levels of the forest.

2.4.6 Medicinal Plants

In the past, medicinal plants were collected in small quantities for local use, but more recently better communications and a fashion for natural medicines among the wealthy both in India and elsewhere, have made the collection of medicinal plants a lucrative trade, drawing in outsiders and giving an incentive for harvesting on an unsustainable scale.

Nardostachys grandiflora (Valerianaceae) was recorded for the first time in GHNP in 1997. This species has been given high priority for conservation by protecting its habitat from over exploitation in the Park.

As per the recent CAMP (Conservation Assessment and Management Prioritization) workshop held at Shimla (December 2010) under the latest IUCN guidelines (Version 3.1, 2001) to assess the threat status of medicinal plants in the State, the GHNP provides a home to 34 of the 47 medicinal plant taxa categorized as threatened for the

State of Himachal Pradesh (CR =5; EN = 17; VU = 12). In addition 2 species of medicinal plants i.e. *Meconopsis aculeata* and *Saussurea gossipiphora* (*) assessed as CR in Shimla Camp Workshop (May 2003) are also found in the Park. Appendix 4 is a list of these Threatened medicinal plants and trees.

2.4.7 Lichens

A total of 192 species of lichens representing 65 genera and 31 families have been identified in GHNP, which is more than 10% and 50% of the lichens recorded from India and central Himalaya, respectively. Tirthan and Jiwa valleys have relatively higher diversity of lichens represented by 101 (53%) and 100 (52%) species respectively, while the diversity of lichens in Sainj valley comprises of 67 species (35%). Saxicolous species (rock inhabiting) has higher diversity (40 species) in both Tirthan and Sainj valleys, which can probably be attributed to their large alpine meadows with exposed rocks. Interestingly, 78% (149) of the species were representatives of the corticolous category while the other groups such as saxicolous, terricolous, and foliicolous were represented by only 54, 29, and 3 species, respectively (Upreti 1999). The elevation ranges between 2,500 and 3,000 m harbours the maximum diversity of lichens. This can probably be attributed to a lower degree of pollution and higher tree density in these areas (Singh and Rawat, 1999). Kharsu oak forests appear to be supporting rich lichen diversity, particularly *Phorophytes*, in Sainj and Tirthan valleys (49 species each) as compared to Jiwa valley (30 species). Distinctly, few species are found growing on specific host trees and this has direct management implications. At lower altitude, the smooth bark of the tree species of *Ilex* and *Quercus leucotrichophora* support lichen species of *Pyrenula* and *Anthracotheclum*. *Nephroma helveticum* is found to be growing exclusively on the barks of *Prunus cornuta*. Growth of *Sulcarla sulcata* is restricted to conifer trees. *Ochrolechia rosella*, *Menegazzia terebrata* and *Hypogymnia vittata* grow abundantly only on *Quercus semecarpifolia*. Interestingly, these lichen species seem to follow a distinct vertical distribution pattern associated with the tree species that represent different climatic zones (Upreti 1999).

The Himalayan Musk Deer depends heavily on *Usnea longissima* during winter, a period of resource scarcity. Since lichens are sensitive to pollution, monitoring of diversity and abundance of lichens will indicate the level of pollution and disturbance

at different altitudinal and vegetation strata. Owing to the greater diversity of the lichens in areas such as Shilt in Tirthan valley, Dhela and Lapah in Sainj valley and Gatipat and Apgain in Jiwa, 'lichen sites' are recommended for monitoring and conservation in these places.

2.4.8 Bryophytes

Liverworts (*Hepaticae*) are represented by eight Families and 12 species, with maximum contribution from the Family *Rebouliaaceae* (3 species) followed by *Targioniaceae* (2 species) and *Marchantiaceae* (2 species). A total of 23 species of mosses (*Musci*) belonging to 14 Families have been recorded during the survey period. Of these, Family *Pottiaceae* is represented by the maximum of five species followed by *Bryaceae*, *Mniaceae*, *Amblystegiaceae*, *Brachytheciaceae*, and *Hypnaceae*, which have representation of two species each, and the rest have one species each. Of the 12 species of liverworts, 83% (10 species) are found between 2,000 and 2,500 m elevations. In the case of mosses, although the species diversity is larger in the 2,000-2,500 m elevation category with 15 species, considerable number of them occur in the 2,500-3,000 m elevation category (11 species).

2.5 Fauna

GHNP is known to host a wide variety of vertebrate fauna, including several charismatic, threatened and regionally endemic species. Mammalian fauna is represented by over 31 species belonging to six orders: Primates, Carnivora, Artiodactyla, Insectivora, Rodentia and Lagomorpha. Among these, the Himalayan Musk Deer, and Snow Leopard are endangered species (as per IUCN categorization), while the Himalayan Tahr is endemic to the Western Himalaya. Birds form a significant constituent of the biodiversity of the study area. There were 183 species of birds (both resident and migrant) reported by Gaston et al. (1994). Ramesh (2003) added 26 more species to the list, bringing the total number of species confirmed to 209.

The mammalian fauna of GHNP and its buffer zone is typical of the several ecoregions of the Western Himalaya. It is relatively diverse, reflecting the fact that there are several habitats and a variety of climatic zones in the Park and buffer zone. Mammalian diversity is significantly higher than other areas. Most of the Himalayan

fauna has been given protection under the high priority protection category of Schedule I of the Indian Wildlife (Protection) Act 1972. Prominent mammals of Schedule I are the Blue Sheep, Snow Leopard, Common Leopard, Himalayan Brown Bear, Himalayan Tahr, Musk Deer, and Serow (a goat-like antelope). The state government of Himachal Pradesh has banned hunting in the state for more than 10 years and the ban continues.

Among the large mammals, there are several species of herbivores that are characteristic of the Park: the Himalayan Goral, a small goat-antelope found in the lower forests, the Himalayan Tahr a wild goat, and the Bharal, or Blue Sheep above the tree-line. These mammals are prey for Common Leopards (in the forest zone) and Snow Leopards (above tree-line). Himalayan Black Bears inhabit the forests, while Asiatic Brown Bears are found in the alpine meadows. The high altitude habitat (3,500 m and above) is of animals such as blue sheep, snow leopard, Himalayan Brown Bear, Himalayan Tahr and Himalayan Musk Deer. The best season for sightings is autumn (September-November), as animals start their seasonal migration to lower altitudes (Gaston and Pandey 2002).

Table 2.3 Large Mammals of GHNP

No	Species
1.	Serow <i>Nemorhaedus sumtraensis</i>
2.	Himalayan Goral <i>Naemorhedus goral</i>
3.	Himalayan Tahr <i>Hemitragus jemlahicus</i>
4.	Blue Sheep <i>Pseudois nayaur</i>
5.	Himalayan Musk Deer <i>Moschus chrysogaster</i>
6.	Red Fox <i>Vulpes vulpes</i>
7.	Asiatic Black Bear <i>Ursus thibetanus</i>
8.	Himalayan Brown Bear <i>Ursus arctos</i>
9.	Common Leopard <i>Panthera pardus</i>
10.	Snow Leopard <i>Uncia uncia</i>

2.5.1 Birds

The Great Himalayan National Park is an Important Bird Area of the country (Islam and Rahmani 2004). The birds of GHNP are an important part of the Park's biological diversity. The Park is representative of Western Himalayan avian fauna (Ali and Ripley 1983), and well known as the most important locality in India for the

endangered Western Tragopan (Chauhan and Sharma 1991; Pandey 1993; Gaston et al. 1994; Pandey 1994). Monal *Lophophorus impejanus*, Kaleej *Lophura leucomelana*, Cheer *Catreus wallichii*, Koklas *Pucrasia macroplopha*, Western Tragopan *Tragopan melanocephalus*, are five pheasants of the Great Himalayan National Park. Raptors are also a prominent feature of the Park, with Lammergeiers, Himalayan Griffon Vultures and Golden Eagles being seen regularly. A great variety of other birds occurs (a total of 209 species), some of which reach their western limit in the Park (Ramesh 2003).

The GHNP falls within one of the more than 200 globally important Endemic Bird Areas (D02: Western Himalaya) identified by the International Committee for Bird Protection (ICBP) Biodiversity Project or ICBP 1992 and known as EBA 128 in more recent updates (Myers et al. 2000). The World Wide Fund for Nature (WWF) has listed, since 2001, parts of the Himalaya in its Global 200 analysis of critical ecosystems (WWF and IUCN 1994), in part due to the significance of and threats to the region's avian fauna. More recent WWF work has developed many finer-scaled terrestrial ecoregions into which GHNP clearly fits. WWF, BI (2003), IUCN and other relevant overseers of the status of Threatened bird species continually stress the importance of effective management of protected areas in the Himalayan region, including GHNP.

2.5.2 Invertebrates

The invertebrates have been recognized as providers of "ecosystem services". They play an important role in maintaining various life processes and are a vital component of GHNP food webs. Other than flying insects, most of the invertebrates have limited powers of dispersal, and are very sensitive to disturbances in their habitats. They can be used as indicators of a healthy ecosystem. Very preliminary surveys of the invertebrates have been done in the Park.

2.5.3 Insects

By virtue of their vast numbers of both species and individuals, the insects are vital determinants of terrestrial ecological processes in the Park. Their presence is determined by availability of food, suitable climatic conditions, and shelter from disturbance and natural enemies. Insects in GHNP can be broadly classified in three categories:

1. *Vegetation feeders*: mainly beetles and plant bugs (many families of these orders feed and depend on plant life).

2. *Pollinators*: flies, butterflies, moths and bees: (majority of pollinators belong to these orders).

3. *Biodiversity indicators*: Tiger beetle, ground beetle and dragonflies (also for land use change).

Only six insect orders (beetles, wasps, flies, plant bugs, dragonflies, and butterflies) have been studied in the Park. The selected six orders represented 37 families, 108 genera and 125 species among the specimens identified so far. Insect research has established ecological relationships between flowering plants of sub-alpine and alpine areas, with their corresponding insect visitors (Uniyal and Mathur 1999).

2.5.4 Butterflies

In GHNP 44 kinds of butterflies have been recorded. The common blue Apollo is resident of alpine areas at about 4,000 m elevation in the Tirthan and Sainj valleys of GHNP. Some of the translucent white endangered butterflies of the same genera also have been observed above Saketi at 14,000 feet elevation in the Tirthan valley. Yellow Swallowtail, a rare butterfly in this area, was recorded at about 4,000 m in the Tirath area of the Tirthan valley (Uniyal and Mathur 1999).

2.5.5 Earth Worms (Annelids)

A total of 11 species of earthworms, both native and exotic, were recorded in these study sites. The list also includes two new species belonging to genus *Plutellus*. Of these species recorded in GHNP, four are native and endemic to Himachal Pradesh. The other seven are exotics that have successfully established in disturbed areas and, to some extent, the wild ecosystem. Among native species, *Perionyx bainii* is very common in GHNP while native *Plutellus* sp. and exotic *Allolobophora parva* are rare in the area. There is greater diversity of earthworms in broad-leaf dominated forest and human-used lands. The low species diversity in conifer forest, on the other hand, is perhaps due to the acidic nature of the soil in such forests. Apparently, native species are known to dominate in undisturbed natural ecosystems while exotic species predominate in disturbed and human-used environments. This is evident from the fact that higher diversity and composition of exotic species is seen in human-used habitats, while native species dominate in conifer and undisturbed, mixed broad-leaved forests.

On the contrary, only one species recorded in a *óthach* (meadow) is representative of a native species (Jhulka 1999).

The earthworms act as indicators of biotic pressure and vegetation change. It is apparent from the disappearance of native species in the areas, which have undergone large-scale destruction, and these areas have completely been taken over by exotic species. The occurrence of seven exotic species (77.8%) in the Ecozone indicates a high degree of disturbance. *Perionyx bainii* is abundant in leaf litter and has high potential for vermicomposting practices since it reproduces sexually and parthenogenetically and can also be propagated in dung heaps. Introduction of this scheme will promote conservation development linkages, as this will provide scope for increasing the productivity of agricultural or horticultural areas along with decomposition of waste and conservation of the earthworm species.

During the short-term survey, only three species of leeches were recorded. *Alboglossiphonia weberi* and *Barbronia weberi* are aquatic species found mostly in small streams in the Ecozone, while *Haemadipsa zeylanica agilis* is a terrestrial blood sucker that attacks livestock and human beings.

2.5.6 Molluscs (Mollusca)

A total of 14 species of molluscs were recorded from the GHNP. The majority of the species are terrestrial (nine species of land snails and three species of slugs), constituting 85.7% of the Park's molluscan fauna. Of these, *Anadenus modestus* and *Macrochlamys Kulluensis* are endemic to Himachal Pradesh. *Macrochlamys galuca* has been identified to be a minor pest of the maize crop in the EPA. The ecological distribution of molluscs is biased towards mixed deciduous broad-leaved forests (seven species) and mixed conifer and broad leaved forests (six species). They were also seen in the *óthach* areas (four species).

The population of molluscs can also indicate disturbances in the ecosystem. With the exception of *Macrochlamys galuca*, which has wide distribution range, others are restricted to GHNP. Species richness in terrestrial molluscs directly correlates with the availability of calcium, litter for food, moisture content and shelter from desiccating wind. Low diversity of molluscs in the EPA may indicate high disturbance by the large

number of human settlements and their associated activities. These species, like other lower groups of organisms, are very sensitive to alteration of habitats and are prone to local extinction when they are forced into fragmented populations.

2.5.7 Amphibians and Reptiles

Due to cold climate, inaccessible habitat and lack of expertise, the herpetofauna of the Himalayan region is poorly studied. It has been reported that 27% of the recorded reptile species in the Himalaya Hotspot are endemic, and an enormous 40% of amphibians. This suggests that there may be some endemic reptiles and amphibians in the GHNP too (Datta 1999).

2.6 Local people and Land Use Practices

The local people have used forests and alpine pastures in featured landscapes since time immemorial for multiple uses and values. Traditionally, the transhumance and pastoralism has remained the central point of tradition, life style, activities, economy, self-sufficiency, sectoral linkages (pastures–forests–agriculture–household–market), and overall influence. Seasonal trans-humant pastorals and other people have always used upper reaches of the mountains, forests and alpine pastures for a considerable time for livestock grazing and collection of medicinal plants. The scenic, cultural, historical and pilgrimage sites often visited by local communities are located on higher peaks or valleys and to reach there, they have to traverse, camp in intermediate forests across altitudinal gradients. Thus, human-forest-wildlife interactions are unavoidable and influential to each other.

2.6.1 Human Settlements in Seraj, Kullu

Because of the remoteness, and inaccessible mountain terrain, the human settlements in Seraj area of Kullu make an interesting subject of study for the scholars. Kulantpitha (the *End of the Habitable World*) is the name of Kullu in old scriptures (Chetwode 1972). A hill society offers great opportunity to understand long-term changes in the interactions between its environment, economy and society. It also highlights the fact that there are certain social and ecological elements, which actually represent continuity (Singh 1998). A study 'The Historical Development of Human Impacts on Great Himalayan National Park' by Dr. Richard Tucker explores some of the aspects on man-environment relations with reference to the Seraj area of which the GHNP is a part (Tucker 1999). The local

history of natural resource use and conservation practices have been partially documented, although limited information has been extracted from edicts (an order sent out by the local rulers), copper plate inscriptions, and reports on land and forest settlement (Anderson 1886, 1897; Diack 1898; Harcourt 1871; Gazetteer 1918).

The historians and social scientists believe that the human settlements in the Upper Beas Basin began well over 2,000 years ago, in a gradual drift northward from the lowlands up river valleys (Ohri 1980; Hutchinson and Vogel 1933). There is little documentation about agriculture, land use of the following centuries. The dominant caste of farmers and shepherds on the land were people called Kanets; by the 1800s they owned over 80% of the agricultural land in Kullu Subdivision, and referred to themselves simply as zamindars, the owners of the land. In the early 1900s they began to claim the caste name of Rajput, a status which was recognized officially in the 1930s. Since then, the term Rajput has indicated a wide range of social status (Tucker 1999).

The Rajputs, Brahmins and Untouchables have historically dominated the Kullu landscape. Perhaps as much as 1,000 years ago Rajputs of high status began penetrating the upper Beas region from the Punjab lowlands, during the early Muslim invasions. The descendents of Kullu Rajas are the most powerful Rajput families in modern centuries. They did not intermarry with Kanets in Rupi/Seraj. The Brahmins also gradually moved into the mountains from the north Indian lowlands. They served as hereditary priests in the high Hindu temples that were built by them. Unlike most of the plain Brahmins, the ones in hills held land and ploughed it. The *Shudras* or Untouchables were at lowest rung of social hierarchy. Today's Scheduled Castes were service providers such as Barehis (axemen or woodcutters in the forest), Thanis (masons and carpenters, using trees and stones from the forest), and Balras or Barras, who had the exclusive right to make baskets from ringal bamboo. The most numerous of them called Dagis in the Kullu valley and Kolis in Seraj, were not allowed to hold land, but were tenant farmers, laborers attached to Kanet families for their subsistence (Tucker 1999). It is quite apparent here that the occupations of *Shudras* directly relate to the working with the natural resources.

The villagers had an open access to the forests for their subsistence; they collected firewood and construction timber along with variety of medicinal herbs, and bamboos (the later was reserved for Balras to weave into baskets). Hunting was through snares (Anderson 1897) to catch pheasants, and mammals such as ghoral and musk deer. Pastoralism was practiced in Kullu and Saraj areas with flocks of sheep and goats, which had to migrate in a transhumant system in search of food. The contribution of livestock to soil erosion has been discussed by the foresters of British time. Dietrich Brandis, described a degree of degradation of the landscape of the lower Tirthan valley which was already as severe as today: "The lower part of the Tirath valley presents a lamentable scene of desolation, the slopes on either side ... being furrowed by torrents and scarred all over by landslips and incipient ravines, which indicate that grazing and burning are destroying rapidly the natural covering of the hill sides." (Brandis et al. 1877). Animals, plants and forests have, in the past, been revered by local communities. There are numerous examples in the Himalaya that reveal that mountains, rivers, forests and lakes have been seen as the *abode of gods*. Such traditions are best reflected in the fact that local people very often dedicate a forest area to a deity or ancestral spirit. The sacred groves or forests belonging to the local deity form a common feature in the Kullu landscape.

It is important to note here that the caste hierarchy is very much related to land tenure and the natural resource use which ultimately gets linked to the traditional environmental knowledge as well (Gadgil and Guha 1993). The penetration of people from Punjab, Tibet and Nepal into the Kullu region in the 19th and 20th century, especially after India's independence in 1947, stimulated a social transformation (Singh 1989). Improved - if still limited - communications and penetration of the market economy has led to an increase in local resource exploitation, especially timber from the forests (Pandey and Wells 1997).

Interestingly, some portions of the Ecozone of GHNP still use the old time nomenclature of revenue units that were introduced by the Britishers. The Raja of Kullu's holdings became *waziris* in the colonial times. Penetrating into the villages, the Raja's officials were a hierarchy of men who collected dues from holders of arable land. This hierarchy the British successors largely adopted in the late 1800s. Lower-level officials functioned primarily as collectors of taxes in kind from villages. Each subdivision was headed by a

wazir, under whose authority a *negi* was appointed for each *kothi* or revenue village, which was a cluster of *phatis* or hamlets. Village landholders held collective responsibility for payment of goods and labor. Tax assessments included portions of many items, including cash, grain, oil, ghi, honey, and possibly even wild items like bird plumage and deer antlers (Tucker 1999).

The central role that forests play in the social, economic and cultural life of the local people is further reflected in the existence of many diverse institutional arrangements to manage forests. Such forestry institutions prior to the British interventions were mainly community based initiatives when life was self-sufficient based on local system of subsistence. The croplands, forests and grazing lands provided an integrated agroecological system. Such a village life had its social mobility through the administrative system of Raja as well the trade in agricultural or forest based local produce. There are a few studies on the changes that were occurring in the mountain villages due to interactions with the chieftains or Rajas and the traders coming from outside markets. Such studies have their significance in understanding the pre-modern life which in turn may provide a rational to understand the dynamics of hill society in modern times (Singh 1998; Tucker 1999).

In modern times there are many prevailing practices which can be best understood by studying the literature on the history of Rajas in western Himalayas. The rights in forests, *nataur*, practice of *begar*, attitude towards the outsiders may be traced back to the times of Rajas. For their Raja, the villagers often did portage work involving carriage of goods from one place to another. This was a form of *begar* or unpaid labour which was evidently an endemic source of friction between villagers and their overlords. Living in mountains, the villager were traditionally wary of outsiders, since they experienced outsiders mostly as people who had some advantage to gain by manipulating them. The Raja granted rights of *nataur* to the villagers to plough on the forest lands. In addition, they were given forest rights to gather wood products and building materials, grazing and fodder for their livestock, and non-timber forest products for their own use, including medicinal herbs and bamboos.

The small rural populations and vastness of mountains did not have adverse effect on the environment as there was little monetization, little development of cash markets for forest

produce. One other element of the Rajas' power, the aristocratic hunt, was also very relevant to the fate of wildlife in modern times (Tucker 1999). "The hill state rajas exercised control over the forest lands and regulated hunting. The common man was prohibited by ritual, religion and means from hunting. Rajas established game reserves, enforced close season and restricted hunting on the basis of social hierarchy, to his courtiers and the military elite. Rajas themselves arranged big hunting parties in the open season to involve the general public in these highly ritualized hunt activities." They presented musk, and monal and pheasant plumes to important visitors (Sharma 1998). The Raja often presented horns of Ibex, Ghoral or even Nayan to the local temple. The finest example is temple of Hidamba in Manali which still adorn them.

The settling of people from Punjab, Tibet and Nepal in the Kullu region in the 19th and 20th century, enhanced substantially after India's independence in 1947 which provided stimulation for social transformation (Singh 1989). The events of later part of 20th century such as building of roads and better communication have brought in market economy leading to enhanced exploitation of forest resources, especially timber and medicinal herbs. In late nineteenth century, the British Colonial Administration had commissioned forest and revenue settlements to record details of the rights awarded to people in the local forests. Such records are popularly known as Forest Settlement reports which have names of local forests, local peoples' access rights and the allocation of these rights to specific individuals and households. This was the time when the Forest bureaucracy came in its being (Weil 2006). A Forest Officer would decide if the local use of the forests to be restricted to ensure the regeneration of timber/other useful species. The exercise of power by the forest officials over the forests which villagers were using for their livelihoods was not received well by the later (Tucker 1991).

In Kullu District, the Forest Settlement Report was prepared by a British officer, A. Anderson in 1886 (hereafter referred to as Anderson's Report). The Anderson's Report has names of villagers and their forest use rights and concessions. Only such individuals who owned land and paid land revenue were allowed to use rights in the forests. Most of such rights were about cutting grass and bamboos, removing medicinal roots, fruits, flowers, dry fallen wood (except deodar, walnut, box and ash), and taking splinters of deodar and kail stump. This Report was very strict for providing right of grazing in the forests.

Anderson's Report classified forests in Reserved, Demarcated, Undemarcated and Unclassed forests. While the Reserved Forests provided for very little intervention of the locals; the other classes had varying degrees of rights, more so in the undemarcated forests, as these areas were unspecified. The Report provided that those proprietors and tenants who had hitherto exercised any such rights could continue to do so. From wildlife point of view, one of the more significant rights was to net and snare wild animals. In the areas now included in GHNP (Anderson 1886), local people were formerly allowed to catch musk deer after obtaining permission from the forest officer (musk deer hunting is now illegal, although extremely lucrative; cases of musk deer poaching are reported from the Kullu district forests). The size of the net for catching Birds of Prey (such as hawks) had been specified in the Anderson's Report. The pheasants were considered as Game Birds, however, they remain, of significance in the local culture. Wearing a crest of Monal (a pheasant species) on the cap is considered a sign of chivalry, and many such crests can be seen at local festivals and fairs (Chetwode 1972).

2.7 Past management practices

The Forest Department's policies after Independence were consistent with the overall priorities of the Five Year Plans. Their priorities were accelerated timber cutting and contribution to rapid economic growth (rising market production and cash incomes). As J. C. Sharma, who revised the Kullu forests' Working Plan in 1980, put it in retrospect, "The value of the forest was recognized not only in the physical field such as conservation of soil and moisture, prevention of erosion and increase in rain fall etc. but also in the economic field such as development of agriculture, industry and communication. All the post-independence reconstruction schemes involve industrial expansion, river valley projects, electricity schemes and development of communication all of which lean heavily on forest produce" (Sharma 1980). In response to environmental criticisms, commercial timber felling was banned statewide in 1978. Thereafter, the Forest Corporation was expected to do only salvage logging, and establish more depots for local people and fruit packers. The trend of changing priorities was embodied in 1980 Himachal Pradesh Forest Policy, which instructed the Forest Department and Corporation to reorient their work toward reforestation and conservation. The Forest Sector Policy and Strategy (2005) is the latest forest policy of the H.P. Government.

The Forest Department's work of reforestation was also a potentially important element of the picture. Reforestation had begun almost at the beginning of the Forest Department's existence, over a century before, but its priorities were very different from villagers' interests. From very early on, the Forest Department had planted commercial species in Reserved and Protected Forests, at the expense of fodder trees. One vitally important feature for villagers' lives was the system of Timber Distribution (TD) rights: granting timber trees from government forests to villagers for construction, for very low fees. By the 1970s the question of TDs was becoming an increasingly contentious between forest officials and villagers. In an accelerating trend, many village families were splitting from joint households into nuclear units, so there was a steady increase in demand for housing construction.

2.7.1 Grazing Pressures

The first Himachal Wildlife Project report (Gaston et al. 1981) noted how difficult it was to census livestock; the report recommended that all flocks be removed from any future GHNP. The research team's resurvey in 1992 gave an estimate of 25,000 local sheep and goats in GHNP, plus 10,000 outsiders' sheep and goats each summer.

Early research for GHNP saw domestic grazing as largely destructive of wildlife and habitats. The first international team of wildlife biologists concluded in 1983, "Grazing has...modified the understory vegetation considerably, reducing the amount and diversity of shrubs and ground vegetation. Along grazing routes in particular, large areas of meadow consist almost entirely of dock –and other herbs that favour nitrogen-rich soils. The understory is best developed in areas subject to little or no grazing, such as the upper Sainj and Tirthan valleys. Comparisons of heavily and lightly grazed areas lead us to the conclusion that grazing by domestic animals is causing severe alteration of the natural forest flora. In most areas this reduces the suitability of the habitat for wildlife." Peter Garson expanded the analysis that year, concluding that the upward spring migration of flocks to high *thachs* (meadows) probably disrupts nesting habitats of pheasants and other species (Garson and Gaston 1984).

2.7.2 Medicinal Herbs and Other Non-Timber Forest Products

Most observers agree that the second major pressure on GHNP's diversity of species is the collection of medicinal herbs, as well as other minor forest products, especially morel mushrooms. This is a different issue from grazing rights, for administrators as well as local people, since the Forest Settlements from Anderson onward placed little restrictions on anyone's collecting the herbs. Until the 1960s there was no significant commercial market for the major herbs (Pandey and Wells 1997), and it was not anticipated that this would become a critical issue for the Park.

A recent survey (Tandon 1999) shows that 1100 Households (HHs) out of 2300 HH of Ecozone were dependent on herb collection for their livelihoods prior to the Final notification of GHNP in 1999. The Anderson's Settlement mentions names of only 349 people who were allowed to collect herbs from the area which has now become Park. The original system of rights established in Anderson's Settlement (1886) was restricted to a collecting season of only two months, 15 August to 15 October. But under the irresistible pull of the booming market, collectors expanded their work to the entire season, from April to November. In consequence several species of herbs have become rapidly depleted, including: *Picrorhiza kurroa*, *Jurinea macrocephala*, *Dactylorhiza hatagirea*, *Aconitum heterophyllum* became critically endangered (CR); *Dioscorea deltoidea*, *Nardostachys grandiflora*, *Podophyllum hexandrum*, *Texus wallichiana* were endangered (EN).

The system of trade begins with many local shopkeepers, who buy from the gatherers. By the mid-1990s there were 8 traders in the Parvati valley and 38 in Seraj Division. Many specialized in one or two items. Larger traders worked from market towns; the largest group was 18 in Kullu (Tandon 1999, Sharma 1999). The herbs were shipped from these towns to Amritsar, Delhi, Bombay and beyond. Major traders in Amritsar and other distant cities placed orders with key traders in towns like Kullu, who gave advances to local traders at trailheads in Gushaini, Manikaran, Sainj, etc., to buy specified quantity at specified prices; a collection time, generally 2-3 weeks, was given.

Nearly 60 species were collected. Restrictions were in place only for *Dioscorea*, which was seriously depleted, and *Texus wallichiana* (Himalayan Yew), which was recently being over-harvested. Records indicate about 1,200 collectors; but there were probably

many more. Herb collectors reported over-exploitation of some species, especially *Jurinea macrocephala* (*dhoop*), and a decline in quality of some others (ibid). In 1978 a Himachal Pradesh law set up a list of permit fees; in 1993 the Himachal government raised royalty rates so as to reflect market prices more reasonably. But this was not accompanied by stricter regulation or collection of dues. Several Himachal government agencies were involved in the trade, in particular the Forest Department, the Ayurveda Department and the State Council for Science, Technology and Environment.

Regarding bamboos, landless Scheduled Castes continue to harvest the type known as ringal. As other sources of cash income, such as for unskilled labor, become more available, there is a slow decline in this work. However, the market for bamboo items has increased, attracting marginal outsiders, such as migrants from Bihar and Nepal. In sum, pressure on bamboo does not seem to have changed much in recent years. It does not seem to pose a serious ecological problem in and around GHNP.

2.7.3 Hunting

Hunting, the other local system of harvesting the natural wealth of the region, underwent basic restrictions after creation of the Indian Wildlife (Protection) Act 1972. The number of gun licenses for crop protection from wild animals increased considerably in the first years after Independence. They were issued by the District Magistrate. India-wide, commercial hunting accelerated in the 1940s-60s, but it is unclear whether the Sainj-Tirthan region was affected (Tucker 1991). "Inadequate wildlife staff, a strictly commercial approach to forestry, the expanding road network and access to crop protection guns led to another phase of indiscriminate hunting in the 1960-1980 period" (Sharma 1998).

The license system was not effective in controlling poaching as there were far more hunters at work than the number of licenses issued (Tucker 1999). From Kullu, there have been reports of seven large game licenses and seven small game licenses in 1979-80. However, there were reports of poaching from Rolla during winter (Gaston et al. 1981). In the years immediately after Independence many local *shikaris* (hunters) obtained licenses for snaring Musk Deer and hawks. Of the five species of pheasant, shooting or drop-traps especially in winter takes crest feathers of Monal, Western Tragopan and Koklass for hats. Falcons were sold to Pathan traders. It is a recorded fact

that the forest guards knew poachers but seldom reported them (Kapoor 1973). Most of the hunting was done by the local men, though some outsiders also joined (Choudhury 1999). The poachers included military men and government officials. Meat from wild game was readily available in local markets in winter.

Perhaps the most important reason for the poaching of wild animals is twofold: (i) skyrocketing prices on international markets, (ii) high market prices outstripped the capacity of forest officials to control poaching. A third reason that is attributed to poaching was lack of knowledge or interest within the forest department towards wildlife protection.

2.8 Recent Management Interventions

The region in which GHNP is located has been subjected to outside influence for only four decades. As such the Park area still remains untouched by the road network, and provides a great opportunity for sound conservation efforts. Until the 1960s human pressure on the Sainj-Tirthan area grew very slowly: activities were largely subsistence, with very limited export of natural resources beyond the area. Between villagers and the state, there was increasing intervention in British times, in a more centralized and bureaucratic system. Villagers sometimes accommodated officials, sometimes evaded or even resisted them. This long tradition made it very difficult to shift to today's principle of participatory management in the area around GHNP.

The ecological processes in the Park were adversely affected by biotic disturbances such as grazing and herb collection by such persons (labour hired by the herb dealers) who did not have any legal rights in the area. Substantial damage to the pheasant breeding has been reported as the uncontrolled villagers entered the forests for *Guchhi* (morels) collection in April-May, a period which coincided with the egg laying of pheasants. Often the villagers took away the eggs or disturbed the pheasants in egg-hatching (Garson 1999). Along with pressures exerted by unsustainable grazing and herb collection, there have been many instances of the snaring of pheasants and wild ungulates such as goral (*Nemorhaedus goral*) and Himalayan musk deer (*Moschus chrysogaster*). The shepherds invariably killed red fox pups as they, on reaching maturity, represent a potential danger to the lambs. Threats were also there for other animals such as Common Leopard, Snow Leopard, Brown Bear, Martens and Civet

Cats who ventured near to the shepherd camps. Collectively, all such actions have affected the local flora and fauna in very adverse ways.

2.8.1 Settlement of Rights of Local People in the Great Himalayan National Park

The rights of the local people in the GHNP were settled in May 1999 (Pandey 2008) through an elaborate procedure, as prescribed in the Indian Wildlife (Protection) Act 1972. This has led to the issuance of Final Notification of the GHNP in 1999. The Forest Settlement Report of Anderson is in operation even after the Independence of India. However, the implementation of rights mentioned in the Report has gradually weakened, thus converting the regulatory access of villagers into the forests into an open access. This was very evident in the area that was to become the Great Himalayan National Park. Prior to the settlement of rights in GHNP, it was seen that there were more than 20,000 local sheep and goats, about 10,000 migratory shepherds, and annual seasonal collection of medicinal plants by 4,000 to 5,000 herb collectors involving hired labour by the local herb dealers (Gaston and Garson 1992). A survey showed that there were only 1100 HHs of Ecozone involved in the herb collection (Tandon 1999). As per Anderson's Report, there were no rights of grazing in the area and very few villagers (about 350) had rights of herb collection.

The Final Notification of the Great Himalayan National Park (1999) does not allow any biotic pressures in the Park area. Under the Indian Wildlife (Protection) Act 1972 the Final Notification for a National Park can be issued only when the area of the Park is free of biotic pressures. In this regard, the Anderson's Settlement Report (1886) was the only available document on the basis of which the local people had been exercising their rights in the area which was now constituted as the Great Himalayan National Park. With the passage of time a number of non right holders (such as labour hired by the local herb dealers to collect herbs for them) also gained access to the resources of the Park area. This, in turn, led to unsustainable levels of extraction which had threatened the biological diversity in the Park (Personal Observations).

The Settlement Officer in his Report (popularly known as Award), mentioned that according to the Anderson's Settlement Report, there were only 349 HHs who actually had legal rights of herb collection in the designated Park area. The Anderson's

Settlement report has names of all these HHs. A very few of them owned small pieces of land in the area that was to be finally notified as GHNP. The rights being hereditary, the Collector, GHNP provided for a compensation of about Rs. 1,55,00,000 to the descendents of those whose names are mentioned in the Anderson's Report. This amount includes cost of land, fruit trees, buildings, non-fruit trees, compensation for user rights of medicinal herb collection, grazing, etc. The Park management, hence, paid the compensation money to the ones who have been recommended in the Award.

The main objective of the settlement of the rights of the local people in GHNP was to allow natural processes to take place in the designated Park area without disturbances of the biotic factors. As the Award of 21st May 1999 suggests, there were only very limited number of people (about 350) who were being compensated for the settlement of rights in the Park. In fact, there was a vast majority of people (labour and 1100 HHs from Ecozone) who have been using the Park area as a traditional source of their livelihood. The Award has made very limited consideration for such people which annoyed the herb collectors. There has been a huge resentment of local people against the Park officials which was reflected in demonstrations and burning of Park Director effigy (Chhatre and Saberwal 2006). The Park management was virtually left alone to face the wrath of local people (Personal Observation). Later it decided to work for the livelihoods of all such people who lived in the Ecozone and had been adversely affected by the making of the National Park.

2.8.2 Post Settlement/Final Notification GHNP Management

The Ecozone is an area adjacent to the GHNP that contains 160 villages with 2300 HHs (with about 15 to 16,000 villagers) that have historically had some economic dependence on the resources of the land incorporated into the Park. The formal designation of the Park boundaries and the resulting loss of these resources have economically impacted Park-dependent HHs in the Ecozone villages. About 90% of the Ecozone area is under forests and with the Park administration. The strategy at GHNP was to bring about a change in the relationship between the natural resource base including the Ecozone and Park, and the immediate and long term livelihood needs of the local communities (Pandey 2008). The main vehicle to develop such a strategy at GHNP are the Women Saving and Credit Groups (through a micro-credit scheme) developed among women in 1100 households of GHNP's Ecozone which, before

creation of the Park, remained dependent on its natural resources such as medicinal herbs and vegetation for grazing (Tandon 1999). The alternative livelihood options among the WSCGs included vermicomposting, apricot oil production, Medicinal Plant Propagation Areas, handicraft making, and agricultural produce. Most of these alternative income generation sources were promoted by the Park management for the women members of such HHs whose members used to go into the Park to collect medicinal plants to earn a livelihood by selling them to the herb dealers. Many herb collectors (mostly males) are now on the team of Ecotourism, or act as Wildlife Watchers in the Park, or become part of the Kala Jatha, Street Theatre (Pandey 2008).

2.9 Institutional Framework

There are currently two types of institutional arrangements: (1) to manage GHNP and (2) to interact with the local community in the Ecozone.

2.9.1 Managing GHNP

The Government of Himachal Pradesh as well as the Government of India (popularly known as the Central Government) contributes to the management of the Great Himalayan National Park. The salaries of employees and funds to manage and develop the Park and Ecozone are provided by the State and Central governments. There is a new institution called Biodiversity Conservation Society (BiodCS) which is facilitating the Park's conservation efforts as following:

2.9.1.1. Biodiversity Conservation Society (BiodCS)

Public (government) funds alone cannot do justice to the Himalayan heritage that is being conserved at the Great Himalayan National Park. To appreciate and care for the biological diversity of the unique ecosystems of the Park, the State Government created a new mechanism, the Biodiversity Conservation Society (BiodCS) for the Great Himalayan National Park in 1999. The BiodCS shares responsibility for the management of the Great Himalayan National Park. It provides fund advances, empowerment, flexible administrative procedures, and governing board structure, which in combination provides continuity of Park funding across fiscal years, eliminates most bureaucratic delays, renders managerial autonomy at the Park level, and help to ensure the flexibility required for a process-oriented approach. The member-secretary (i.e. Director of GHNP) of the Governing Board of the BiodCS is

responsible for the management, along with assumption of responsibility and accountability for production of outputs, achievement of the Park's objective and for the use of the Park management funds.

The Society is a fully autonomous organisation with the main aim of managing the Great Himalayan National Park by involving the neighbouring communities through the strategy of livelihood generation/ecodevelopment. The funds of the Society consist of Grants-in-Aid made by the state government for furtherance of the objectives of the Society. The member-secretary of the BiodCS, raises funds for the GHNP at national as well as international levels in two ways: (1) plan, design, develop and execute projects for the management of biodiversity of GHNP; (2) develop a corpus fund for biodiversity conservation at the GHNP. In addition, the Society gets receipts from Park entry fees; Van Vihar (forested areas for recreation in towns) fees; rental of field equipment, camping gear, camping grounds; and all Forest Rest Houses/Inspection huts/Interpretation Center at Sai Ropa/ Information Center at Larjee/stores at Aut and other places, etc. Sale proceeds from posters, booklets, books, stickers, souvenirs, and the like also add to the funds of the Society.

Table 2.4 Funds raised under the BiodCS

Amount Raised	Projects
Rs. 5000,000	óConservation & Cultivation of Medicinal Herbs in Sainj and Tirthan Ranges of GHNPô (Funding agency: the Medicinal Plants Board of India, N. Delhi); Year 2002-05.
Rs. 350,000	óConservation of the Western Tragopan through wider support of the local community and Community Based Organisationsô (Funding Agency: National Hydel Project Corporation, Bhuntar, Kullu); Year 2004-05
Rs. 500,000	National workshop on óEcotourism in Himalayas: Prospects and Challengesô - Product development and Marketing for Ecotourism in December, 2005 (Funding Agency: The Ford Foundation, New Delhi).
Rs. 3000,000	Conservation and Cultivation of Medicinal Herbs in the Ecozone of GHNP 2007-2011 (Funding Agency: National Medicinal Plants Board).
Rs. 1000,000	Establishment of Botanical Garden at Sai Ropa 2008-1011. (Funding Agency: Ministry of Environment and Forests, Govt of India, New Delhi)

At BiodCS, a system has been set up for an ongoing fund raising programme for the management of the GHNP through Park entry fee and incomes from the facilities created for Community Based Ecotourism. This sum is about Rs. 1000,000 per year since 2002. These funds are used to maintain the community related assets (such as Community Training and Tourist Center at Sai Ropa) and run training programmes for the staff and villagers.

The Society can receive grants, donation or assistance of any kind from foreign governments and other external agencies with prior approval of the central government. The BiodCs has executed three major projects on ecotourism and Medicinal Plant Propagation Areas (MPPAs) in the Ecozone (Table 2.6). Such an attempt is a move towards contribution to the efforts of the Park's biodiversity conservation (Pandey 2005a).

2.9.2 Interacting with the Local Community in the Ecozone

2.9.2.1 Women Saving and Credit Groups (WSCG) & Village Forest Development Society (VFDS)

A WSCG provides the rural poor and women an opportunity to make a *choice* in income generation activity and raise their *voice* in preparation and implementation of the micro-plans. These smaller scale initiatives in the post-World Bank Project CoB (1994-1999) have been set up by the Park management.

2.9.2.2 Friends of GHNP

Friends of GHNP was formed in 2000 as a volunteer group. Members come from all walks of life (mostly the foreign visitors/tourists who have visited the GHNP) and believe that GHNP should have international support for its efforts to protect a part of the unique environment of the Western Himalaya. These dedicated members help further spread the message of the Park to the world. The Web site www.greathimalayannationalpark.com has been created and developed by the Friends of GHNP and My Himachal. A 20-minute video documentary, *Voices and Choices in the Great Himalayan National Park*, has been made by the Friends (2005). The video *A Few Impressions of GHNP* has interviews with people closely associated with GHNP (2010). Friends of GHNP also prepared most of the educational and promotional print work for the Park including brochures, posters, flyers, etc. There have been a number of slide shows and talks on GHNP in USA and Europe. All these efforts have given the Park world wide publicity. The ecotourism group of local

villagers in the Ecozone of GHNP hosts the visitors that Friends of GHNP send to GHNP which becomes a source of income generation for the community. In 2008, the Friends of GHNP became My Himachal (see below).

2.9.2.3 Ecozone NGO, Society for Advancement of Hill and Rural Areas (SAHARA) and Biodiversity Tourism and Community Advancement (BTCA)

The Park management facilitated the WSCGs and their Group Organizers to form an NGO, Society for Advancement of Hill and Rural Areas (SAHARA) which worked from 2000 to 2005. Later it was replaced by the Biodiversity Tourism and Community Advancement (BTCA), registered in 2008. BTCA provides continuity and support to biodiversity conservation in GHNPCA. The NGO, in collaboration with the Park administration, organizes the poor and women, empowers them with asset building, rationalizes use of natural resources, helps in socio-economic development, and provides market support and raises funds, all to reduce dependency on the Park's resources.

2.9.2.4 My Himachal

My Himachal (MH) is an award-winning organization that is tax-exempt (501(c)(3)) in the USA and a registered NGO under Himachal Pradesh Societies Registration Act 2006 in India. It is a charitable, non-profit, non-governmental organization, made up of people of Himachal origin and friends of Himachal Pradesh worldwide. My Himachal's goal is to help the poorer and deprived residents of the state of Himachal Pradesh by assisting in rebuilding their material lives and/or improving their health, living and educational conditions without any distinction of race, religion, sex, or opinion. The MH mission is also to preserve Himachal culture and natural environment, and to promote, support and expand the social and economic interests of Himachal Pradesh and its people worldwide. MH incorporated Friends of GHNP into its organization. The NGO promotes the Park, updates and maintains the GHNP website, provides support and capacity building for BTCA. In 2010 it began research/surveys on examining impacts of global warming and water recharge issues in the Upper Seraj Valley where GHNP is located. My Himachal, in association with the SP Jain Institute of Management of Research (Mumbai) has carried out studies and prepared reports on various issues including the state of the traditional Kullu weaving

industry and Ecotourism opportunities and issues in Great Himalayan National Park. My Himachal makes recommendations to the local government on the basis of these studies.

2.9.3 Livelihood-based Management Plan of the Great Himalayan National Park (2005-2010)

The Management Plan of GHNP is based on the livelihood approach. It is based on the premise that the biodiversity conservation will be possible only with the active support of the local communities. The Management Plan gains support from a more informed understanding of the livelihoods of different stakeholder groups and the major influences that shape them. Such an approach is primarily based on analysis of local livelihoods with a focus on poor people who have been dependent upon the Park's resources. The Plan stresses that the process of planning and implementation should continue on a regular basis, because consensus cannot be reached on all issues and options in one term of a Management Plan. Experimental approaches and flexibility will be needed, demanding subsequent review and adaptation by stakeholders (Pandey 2005a).

Chapter 3

Impact of Efforts of Alternative Livelihood Development in the GHNP Ecozone

3.0 Background

Recognizing the fact that active support of the local community is important for the biodiversity conservation, a more informed understanding of the livelihoods of different stakeholder groups and the major influences that shape them is very essential (Tandon 2002; Roe and Elliott 2004; Berkes 2004; Pandey 2005a, CBD 2010). Such an approach is primarily based on analysis of livelihoods of the local people with a focus on such (poor) people who have been depended upon the resources of the Great Himalayan National Park (GHNP). This is also expected to bridge the gap between policies (Himachal Pradesh Participatory Forest Management Rules, 2001) and ground realities (at the village level) and *vice versa* (Sood 1996; Hobley 1996).

The livelihood approach is a way of thinking about objectives, scope and priorities for development, to enhance progress in poverty elimination. Basically, this is a way of integrating and further developing recent thinking and best practices (Lindsay 2000). The Ecozone of GHNP typically shows that the local villagers are mostly natural resource dependent. Their livelihoods comprise capabilities, assets and activities required for a means of living.

Table 3.1 Assets accessible to the poor people who depend on the open access to the natural resources for their livelihoods

Assets	Example
Human	knowledge, skills, technology, ability to labour
Physical	shelter, transport, infrastructure, tools
Social	community, membership of groups, bonds of trust
Natural	access to biomass, water
Financial	access to credit, savings, income, remittances

(Source: DFID website Sustainable Livelihoods Guidance Sheets, 1999)

3.1 GHNP Management and Local Livelihoods

The primary goal of management at GHNP is to link the village level development issues (local livelihoods) with the conservation of biodiversity (Pandey 2005a). This was done by integrating environmental, social and economic issues into a holistic

framework based on the livelihoods of the natural resource dependent community. In order to achieve this goal, it was imperative to integrate the functions at two fronts, i.e. (i) Working with the local communities to reduce their dependencies on the Park's natural resources, and (ii) Interventions to manage, monitor and protect the natural habitats and resources. Primarily, in both of these cases, it requires putting people at the center of GHNP's biodiversity conservation.

At GHNP an attempt has been made to demonstrate the Forest Department's role of being a facilitator for livelihoods and women empowerment to achieve goals of conservation. A Livelihood-based Management Plan for the GHNP (Pandey 2005a; 2008) gives priority to the people-related issues to manage and protect the ecology of the Park. The management plan is linked to 59 Panchayat-Ward based micro-plans prepared with the participation of local people living in the twelve Panchayats of the buffer zone (or Ecozone) of the Park. The theme of setting up of a harmonious relationship between conservation and development at a landscape level cuts across the regional diversity. The GHNP Conservation Area is an example of amalgamation of the distinct cultural and management aspects of local communities, and the intricacies of biodiversity conservation and rural development (Pandey 2010).

3.1.1 Effects of State Policies on Livelihoods in GHNP Conservation Area

The Final Notification of the GHNP in May 1999 is the most important policy level change to have occurred for the local communities residing in the Ecozone of this Park (Pandey 2004, Wani and Kothari 2007; Pandey 2005a, 2008;). The notification does not allow any habitat disturbances (including grazing) under the Wildlife (Protection) Act 1972. Such a drastic change is expected to affect/enhance the management of conservation of the biological diversity of the Park to a great extent. At the same time it is to impinge on the livelihoods that the villagers of Ecozone were eking out of the Park's medicinal herbs.

The 1999 Final Notification is based on the compensation given by the Settlement Officer of GHNP on the basis of the Anderson's Forest Settlement Report prepared in late nineteenth century (Anderson 1886). In absence of revision of the Forest Settlement, the rights of the local people are still governed by this Report. According to this Report, the number of families depending on the forest areas of present day

GHNP was only 349 (Settlement Report 1999). With the help of genealogical record, the present day descendents of these persons have been compensated for the settlement of rights in the Park. Contrary to this, there has been a tremendous rise in the number of people using the GHNP resources. Most of these people have been using the Park area as there was a lack of implementation of rules of usage of forest produce in the Anderson's Forest Settlement. There are villagers of Shenshar Valley, Raila, Shangarh area in Sainj Valley, and villagers of Nauhanda Panchayat in Tirthan Valley (about 1100 HHs) who have been going into the Park area for herb collection and grazing their sheep and goats. Moreover, the local herb dealers used to hire labourers (popularly known as Gorkhas from Nepal) with advance payment to them to fetch herbs from the designated Park area. It has been estimated that there were 4,000 to 5,000 herb collectors were going into the Park (Gaston and Garson 1992). Because, their names do not figure in the Settlement Report of Anderson, the Award has made no consideration for such people.

The records and data do not provide a balanced picture of the dimensions of the herb trade prior to the Final Notification of Park (Tandon 1999). The main lacunae seem to relate to the thoroughness and authenticity of the records maintained by the HPFD. These records are not maintained uniformly at all exit points and permit issuing authorities are many with no clear jurisdiction. For instance herb export permits could be issued by the Director of the GHNP as well as by the DFO of Banjar even when the herbs had been collected from areas under the administrative control of the Director. Moreover, there seems to have been neither effort made at collation of these records nor any analysis done to figure out periodic variations in trends, species, volumes, quantities etc.

Resultantly, only guesstimates of species and quantities exported / extracted can be made. Data on illegal trade / extraction is virtually non existent and not added to the annual figures given. It is very difficult to show the economically important linkage between herb collection and rural cash incomes. In the absence of any significant studies pertaining to Non Wood Forest Produce (NWFP) or to herb collection, forest policies and management continued to ignore or play down the significance of herb collection to the livelihood of the people (ibid; Sharma 1999).

Similarly, the Anderson's Settlement Report does not provide rights to migratory or local shepherd to graze their sheep and goats in the area which has now become the GHNP. The unattended issues of grazing and compensation given to a very limited number of villagers resulted into local resentment, creating problems for conducting effective Park management, and implementing ecodevelopment/livelihood generation programmes. This in turn would have diluted the provisions of the HP govt's Final Notification of the Park. The Park administration initiated a *quid pro quo* in the Park's Ecozone through the Women's Saving and Credit Groups (WSCGs), and application of H.P. Forest Department's Participatory Forest Management Rules 2001. Pressures on Park resources from neighbouring village communities varied considerably. Some of them depended on the Park heavily during collection season of mushrooms (April-June) and medicinal herbs (August-October). Others did not affect the Park at all, as the villagers subsisted on incomes from basket making, handloom weaving, horticulture, and agriculture.

3.1.2 Human Wildlife Conflict Cases and Local Livelihoods

The Park has human settlements on its western side only. Only 26.07 sq. km. (9.81%) out of the total area of 265.6 sq. kms. of the Ecozone is covered under habitation/agriculture/orchards and rest of the 239.53 sq. kms. (90.18%) is under natural vegetation (Naithani and Mathur 1999). The Tirthan range is the most populated area in the Ecozone, followed by Jiwanal and Sainj ranges. The preponderance of forest cover in the Ecozone allows for the close interactions between people and wild animals. Such a situation affects the diverse sections of the village society, differently. Those who live closer to the forest areas and away from the road-head are mostly poor and bear most of the burnt of the human-wildlife conflict. In such a situation the livelihoods of poor are adversely affected two folds: creation of the Park has taken away incomes from Park resources, and wild animals cause loss of crops, and human and livestock casualties.

The Sainj WLS and GHNP are examples of presence of crop fields just outside their boundary where mostly the poorest and most marginalized villagers live. The resource-deficient villagers need to resort to labour intensive measures of crop protection, which include burning fire at night, beating drums, or putting up scarecrows in the fields. Such actions mostly result in disproportionate cost of raising

crops by the poor and marginal villagers. The villagers often use retaliatory measures of harming/killing the wild animals of which there is hardly any record or report.

3.1.3 Compensating the Loss of Livelihoods

Providing compensation in form of alternative income generation sources with respect to the loss of livelihoods to such HHs who did not figure in the settlement proceedings of Collector GHNP was initiated by the Park management. The present research work tests the hypothesis of including local communities in Park's conservation through application of socially responsive programmes and policies. It examines and analyses the impact of development of alternative livelihoods undertaken in the Post CoB Period (1994 - 99) which coincided with the declaration of the Final Notification (1999) of the Park and resulting unrest among the local people against this govt order.

The Park management saw the biggest challenge to save/protect the Park from the aggrieved villagers and at the same time to set up a system of linking the biodiversity conservation with the development of alternative livelihoods. Such an approach in GHNP could be followed through the income generation activities introduced in the Women Saving and Credit Groups that were developed in the post CoB phase of ecodevelopment (Appendix 5 gives a comparison of ecodevelopment and livelihood approach as they were pursued in GHNP Ecozone during and after CoB project, respectively). A research methodology has been designed to understand development of alternative livelihoods; their linkages with smaller organizations at village level; and role of various institutions played in implementation of such strategy. Such a research framework is expected to provide insights into factors that have potential to act as catalyst for livelihood development which could lead to effective biodiversity conservation.

3.2 Methodology

The present research work is to assess/evaluate merits to establish a clear cause and effect relationship between the interventions undertaken by the GHNP management and their impacts on the people's livelihoods, and on conservation. In the absence of base line data and given the problem of the recall capacity of individuals being surveyed, it was difficult to study the before/after scenario of the affected households (HHs) in GHNP Ecozone. Hence, this study relies more on a comparative analysis

between a control set and a treatment set of HHs. The selection of HHs in both sets is based on the similarities of socio-economic background, and dependence on Park resources.

The participatory social research tools (Ashford and Patkar 2001) were used for data collection that allows greater flexibility and comfort levels among the respondents.

The survey tools used for data collection were:

- Household questionnaires (HHQ)
- Focus Group Discussion (FGD)
- Key Informant Interviews (KII)

Most of the data and relevant information were collected from the Ecozone using above tools. The questionnaire for the research was prepared to collect as much information as possible and aimed at establishing a clear relationship between the management interventions (primarily through WSCGs) and conservation of biological diversity of the Park. Only broad trends could be shown due to long process of intervention and social unrest among several user groups.

The data generated from this study has been examined to observe (i) impact of alternative income generation on Ecozone community (ii) relationship between livelihood development and biodiversity conservation. The survey tools of FGD and KII facilitated knowing about the changes in attitude of the target groups towards the Park.

In addition, primary data on the following aspects were collected:

- Household income from on farm/off farm
- Income from forest produce
- Others income including wage employment
- Status & source of credit & indebtedness
- Access to resources & development schemes across castes, class & gender
- Agriculture & high value crops and their yield
- Horticulture and agriculture

- Livestock & improved breed of animals through graded livestock and milk production (ltr/day from cow/buffalo, local/improved)

The sampling strategy was designed to capture the recent socio-economic changes in the Ecozone region. There are about 2300 households (HHs) in 160 villages (in 12 panchayats) of Ecozone.

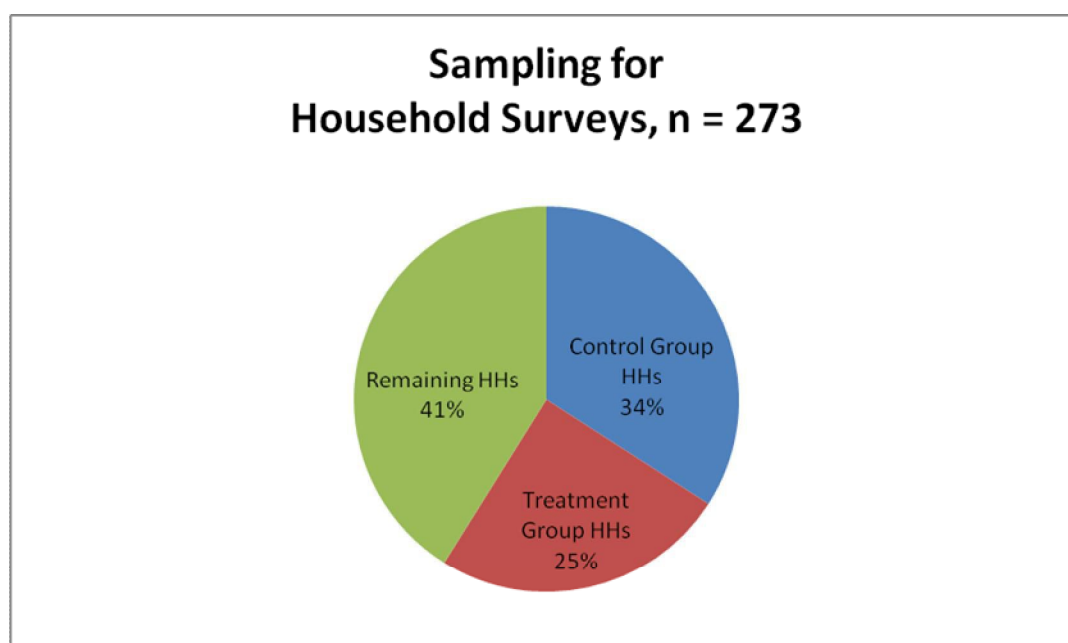


Fig 3.0 Per cent households sampled for impact of livelihood development initiatives in Ecozone of GHNP

About 1100 households were affected by the loss of livelihoods due to closure of the Park. Data was collected from 273 HHs which were part of Women Saving and Credit Groups (Treatment Set) and 375 HHs which were not part of WSCGs (Control Set). Within the sample HHs (controlled or treatment), a listing of key selected women was made for interview/detailed inquiry. It facilitated drawing up of a list of key stakeholders for generating baseline information and impact assessment (Fig 3.0).

3.2.1 Relative Similarity between Treatment and Controlled Sets of Data

The poor in WSCGs include not just members of the Scheduled Castes, but also those belonging to other groups, including high caste Brahmins and Rajputs. Villages are

caste-segregated (in one panchayat, there are usually around two to three Scheduled Caste villages) with approximately 50 to 100 out of 200 to 300 HHs composed of Scheduled Caste (SC) members. Wealthier members of the community, identified on the basis of the size of their landholdings and their business-related activities, were not selected for WSCG formation. Only a few groups were mixed WSCGs where the members agreed to have both SCs and other caste members. The selection of WSCGs from Treatment set of HHs and Controlled Set of HHs show that there was not much difference in the age profile in various age groups and education of man and women (see Fig 3.1, 3.2, 3.3, 3.4).

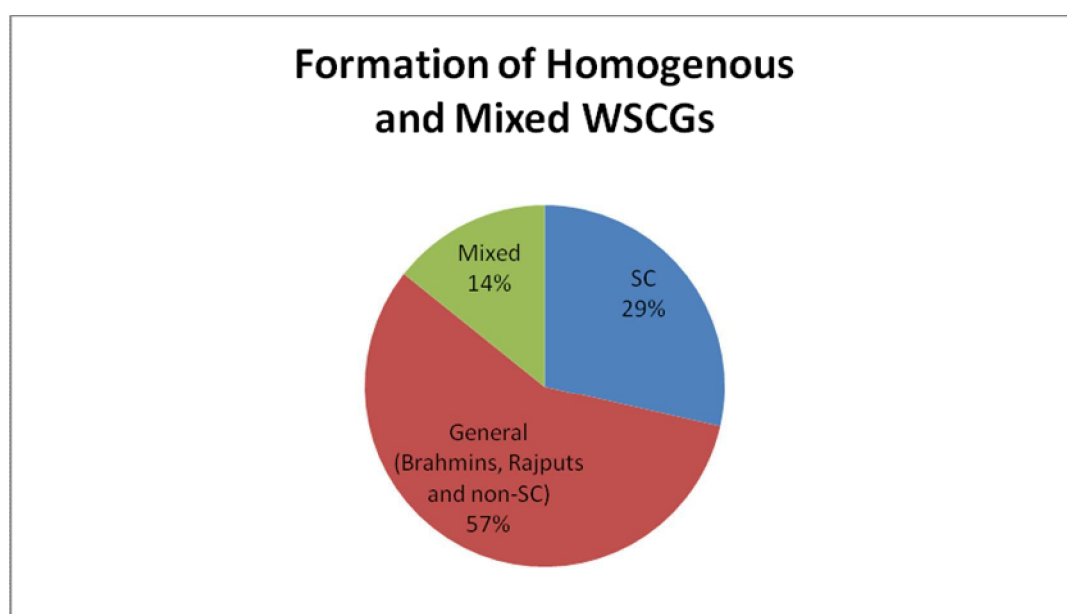


Fig 3.1 Percentage of Homogenous and Mixed WSCGs in GHNP Ecozone

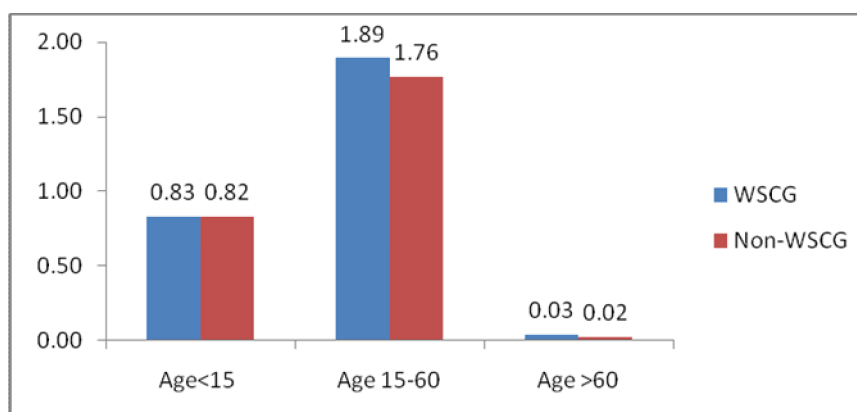


Fig 3.2 Comparison of average number of Women in different

Age Groups in WSCG and Non-WSCG

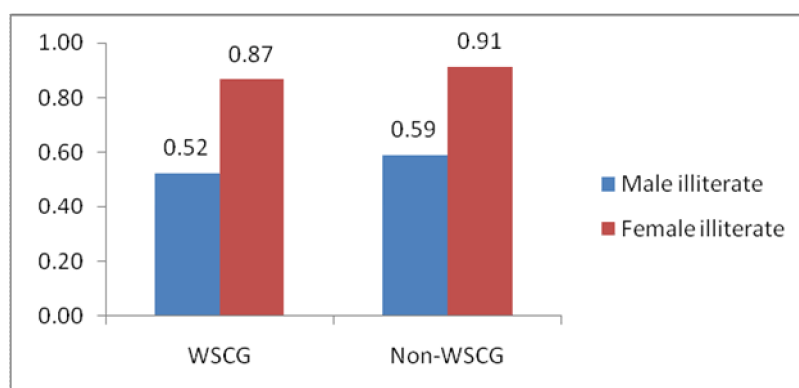


Fig 3.3 Comparison of Illiteracy level of male and female in WSCG and Non WSCG

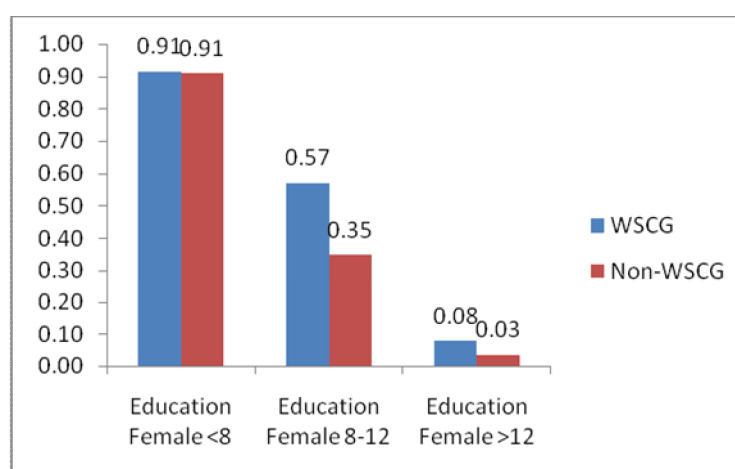


Fig 3.4: Education levels of females of WSCGs and Non-WSCGs

Starting in 2000, the Park management selected twelve Groups Organizers (a young lady from each Panchayat with high school education, and ability to walk in hilly terrain and trainable in community work) to organize women of such poor households, which were traditionally dependent upon the Park's natural resources. Each woman of the WSCG (an average of ten women per WSCG) was encouraged to save one rupee a day, which they used for income generation activity (IGA) when it becomes about Rs 3,000 in a year's time. Through this saving the poor women have done IGAs such as vermicomposting, apricot oil production, agricultural produce, ecotourism, street theatre and wage labour

(Tandon 2002, Rajshekhar 2002, Pandey 2005a, 2008). In two years time there were 75 WSCGs, with over 900 members, organized into an NGO SAHARA (BTCA after 2008).). This rural development programme in a WSCG has been supported by the environment awareness education, women and child care, and Joint Forest Management. They have been federated into Village Forest Development Society (VFDS) at Panchayat or village council level, to participate in the preparation and implementation of the village level micro-plans.

3.2.2 Assumptions

The present research work is based on assumptions that the control site conditions reflect actual study site conditions; incomes of WSCGs through IGAs are taken as incomes of the HHs; targeting women facilitated inclusion of half of population in livelihood development which so far remained confined to HH jobs; women more amiable to conservation related activities such as savings or conservation education.

3.2.3 Human – Wildlife Conflict in the GHNP Ecozone

The human-wildlife conflict was studied in the Ecozone covering all the villages in sixty Wards of 12 Panchayats of the Ecozone. Door to door surveys were conducted and findings were recorded on a data sheet (Appendix 7) that was designed and validated for the purpose. Prior to actual data collection, test -survey was done for a few days and the methodology was refined. The data on crop damage by the wild animals were collected for various categories such as poor households (HHs), scheduled castes and general category HHs. Of these some of the selected HHs were intensively interviewed to ascertain their perception about man-wildlife conflicts. The data has been analyzed to ascertain how HHs suffer differently because of loss or restriction of access to natural resources on which they have been dependent, and secondly face a threat to their lives and livestock and property due to raids by animals. Based on this analysis the ways have been suggested to ameliorate the present state of affairs.

The output from these sets of queries along with the socio-economic surveys have been drawn together to integrate the patterns of occurrence, and to extract the conclusions most relevant for the present research about impact of livelihood generation programmes and protection measures on the biological diversity of the Park. The study intends to

contribute to the on-going debate about the conditions under which various approaches work and why, and how this can be useful for the theory that underpins the approach and its application to real-world situations (Brecht et al. 2002).

3.3 Results

3.3.1 Part I: Results of Alternate Income Generation Activities

Major interventions as Income Generation Activities (IGA) include:

- Vermicomposting
- Medicinal Plant Cultivation
- Ecotourism
- Apricot Seed Oil Extraction
- Wage Employment
- Street Theatre
- Crafts/Souvenirs

IGA 1: Vermicomposting

The first and foremost activity was Vermicomposting for which the Park nurseries in Ecozone have been a ready buyer. The WSCGs took up this programme as there was quick payment by the Park, and most of the vermicompost was collected by the Park staff from the site of production. The WSCGs found it a good starter as an IGA, because it required an investment of only Rs1200, which is affordable by most of the poor members of the WSCGs (Chandar 2001, Tandon 2002, Rajshekhar 2002, Personal Observation).

Almost all the WSCGs had adopted vermicomposting. 850 sites were established by January, 2002 which had a combined production of about 6 to 8 tones per month.

After scrounging for months, they (the members of WSCGs) were being told to spend hard-earned money on 5 kg of earthworms! Some bought into the idea reluctantly. A month later, when the (Park) management paid early adopters Rs. 280 (for 40 kg of compost), the others sat up. Today, there are 870 compost pits between 72 groups. When the idea was mooted, every group had started with just one pit. In 2001, the groups produced over 6 tonnes of manure every month (Rajshekhar 2002). In 2003, the vermicompost preparation was integrated in the Park management's programme of setting up of Medicinal Plant Propagation Areas (MPPAs). In coming years, some of

the WSCGs started selling vermicompost and earthworms to the orchardists in Banjar and Manali (Personal Observation).

Economic Viability

Vermicomposting could be undertaken in the backyard of a house with initial investment of five kg of earthworms (@ Rs 250 per kg) and labour to put decomposed plant and cow dung in a pit and a sieving screen (Rs 300). Another Rs 100 for bringing earthworms to the site (transportation cost).

The output from one average size vermicomposting site (two feet wide, ten feet length, and nine inches height) is 80 to 100 kg vermicompost every 45 to 50 days with annual production of 480 ñ600 kg. Sold at Rs 7 per kg. , the annual sale may fetch Rs 3360 to Rs 4200. Since most of the WSCGs engaged in this activity have made 4-5 pits, the annual income in some cases could range between Rs 13,440 to 21,000(Chandar 2002). High multiplication rate of earthworms allows members to multiply pits without investing further. However, this IGA is only for summer as the activity of the earthworms reduces in the severe winter months. With some persuasion, the members of WSCGs started using home-made vermicompost in their fields. Vermicomposting is also considered as the first step towards the 'óorganic' farming which means farming with the help of vermicompost without using any factory made fertilizers and pesticides. Not much of headway could be made in this direction. The SAHARA records show that by 2004, the total income of 60 WSCGs was more than Rs 4,90,000 from vermicomposting.

IGA 2: Medicinal Plants Propagation Areas (MPPAs)

The Ecozone of the Great Himalayan National Park is characterised by good forest cover. More than 90% of the Ecozone has forest cover from 1,800 m to 3,600 m altitude (Naithani and Mathur 1999). As the closure of the Park is enforced, the Park administration facilitated setting up of medicinal herbs nurseries along with the Medicinal Plants Propagation Areas (MPPAs) in the Ecozone.

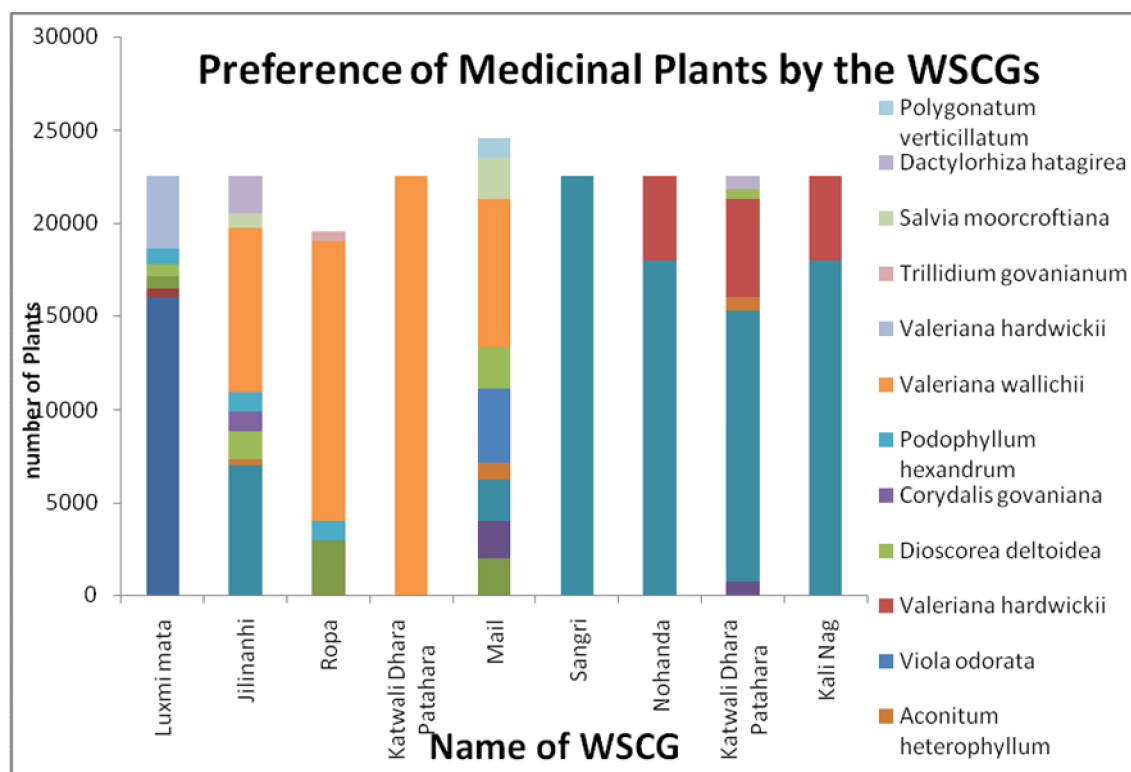


Fig 3.5: Preference of Medicinal Plans by the WSCGs in MPPAs in GHNP Ecozone

The strategy in GHNP Ecozone was to combine and make complimentary the roles of the Park management and WSCGs in order to institutionalize an approach whereby the livelihood dependence of poorer forest dependant households could be wedded to NTFP management in a sustainable way. For this purpose, the BiodCS (Biodiversity Conservation Society) developed two separate projects/schemes under the Van Vanaspati Scheme of the Govt. of India (through the National Medicinal Plant Board) for the funding of the medicinal plant propagation. These projects to some extent, involved the WSCGs, gradually to compensate for the illegal herb collection and grazing. The Projects used principles of JFM as provided under the H.P. Participatory Forest Management Regulations, 2001. At the same time, the Project was to initiate and strengthen WSCGs through involvement of outside, experienced agencies and training of Park staff. The medicinal plant propagation could be linked to Vermicompost production and wage employment for the poor members of the WSCGs.

In practice MPPAs were effectively closed lands suitable for indigenous medicinal species and located in the immediate vicinity of villages or habitations. These could also be areas that have already been closed under other forestry plantation schemes (so that the expenditure on the barbed wire fence is saved). A clearly identified community/user group or WSCG within the village was associated with each MPPA. This group was responsible for the protection, planting, and management and later sharing the benefits that accrue from the area. In the MPPA, to begin with 4 to 5 selected, high value medicinal species (Fig 3.5) that are also in good demand were short-listed. The ones suitable for the area and easily grown were then raised in nurseries and later planted out in the selected sites.

It is important that when such an area was so used and the MPPA work allocated to a particular user group then a clear written down arrangement for sharing usufructs or other monetary benefits were spelt out and understood by all the immediate stakeholders in the endeavor. The Park authorities and the WSCGs were signatories to such a written agreement. One of the strengths of the MPPA concept over conventional tree-oriented-JFM is that the returns through short rotation herbal species from the closed areas were quick enough (about three to five years) and substantial enough (high value species) to promote and sustain public/ immediate stakeholder interest in the scheme.

Some of the key findings of the field visit to four areas namely Galayad, Gilinahi, Ropa and Majhan where medicinal plant activity has been introduced, include

- The coordination between the Park staff and the WSCGs has been lacking here. The plots in most of the cases have been essentially selected by the forest department with very little consultation with the members of WSCGs. During interviews many WSCGs members felt that the benefits of the activity will be appropriated by the department. It was further argued that it's a plantation activity undertaken by the department and women's involvement was limited to planting saplings for which the group earned wages only.
- The WSCGs such as Shangari, Shang Chool, Durga Mata, Ropa, Majhan and Panchveer have managed MPPAs well (Pers observ.). In Gilinahi, the group

members were taking keen interest to maintain and protect the plot and as a result good growth of plants and high survival rate (Chander 2001).

- Since most of the identified plots were earlier used as common grazing area, even with enclosure of the area, grazing continues unabated in some of the plots. As a result, protection of plantation had become a great concern to the group members.
- There have been a few cases of theft of high value medicinal plants such as *Picrorhiza*. The group members, however, did not feel appropriate to lodge a complaint with police. Some of the species planted in the plot like, *Sathjalari* is abundantly available in the area and raising these species in the plot is seen futile attempt.

Economic Viability

Medicinal plant collection from the Park has been a contentious issue with the herb collectors in the Park Ecozone. The MPPAs in Ecozone tried to provide a chance to the families of earlier herb collectors to get involved with the medicinal herbs though at a low key intervention in the Ecozone. One MPPA usually takes three to five years to get ready for herb collection provided it is well looked after and protected from grazing and theft. In most of the cases this activity has been considered as a wage earning opportunity which is instant. There have been very few examples to show that the WSCGs could earn by the plants multiplied over years (though it has started happening during the second phase of MPPAs started in 2008-09). Making of drugs or value addition from MPPAs is still a far-fetched proposal.

By January 2004, about 60 MPPAs had been set up involving about 40 WSCGs. The members of WSCGs found the wages part of the MPPA scheme as most attractive. In two years time they could earn more than Rs 5,25,000 in wages for growing medicinal plants. In 2008-09, seven WSCGs sold medicinal plants to other Forest Divisions for their MPPAs which fetched them more than Rs 55,000 (official records).

IGA 3: Community Based Ecotourism (CBET)

The members of WSCGs in their second year (2002) started looking for opportunities for the male members of their families. By 2002, the agitation of the local villagers

against the Park was subsiding. The Park had started receiving trekkers. The Park management selected some of the male members of families of WSCGs who used to go into the Park to collect herbs. These villagers were organized in a group, popularly known as Ecotourism Group and given training to become a guide, cook or a porter as per their aptitude. The Park administration also approved rate for the jobs of a guide, cook or a porter and arranged for their training. The Friends of GHNP brought in trekkers from their countries. The WWF, BNHS and Youth Hostel sent their youth to GHNP whom the Ecotourism Groups conducted inside the Park. Ecotourism activity in year 2006 alone could fetch Rs 6,50,000 in the respective WSCGs (Fig 3.6).

The Ecozone and Sai Ropa Visitor Center provide nature experiences that are much more accessible and physically easier for the average tourist with day hikes, activities for children and student groups, birding, and adventure experiences (rock climbing, river crossing etc.). These activities and the associated Ecozone infrastructure are where most of the tourism/ecotourism has been developed including: home stays, camping and tent sites, sale of traditional crafts (masques, local mats, baskets, etc.) and local products (jams, pickles, apricot seed oils, etc.), development of food products (fresh and dried), nature guides, etc.

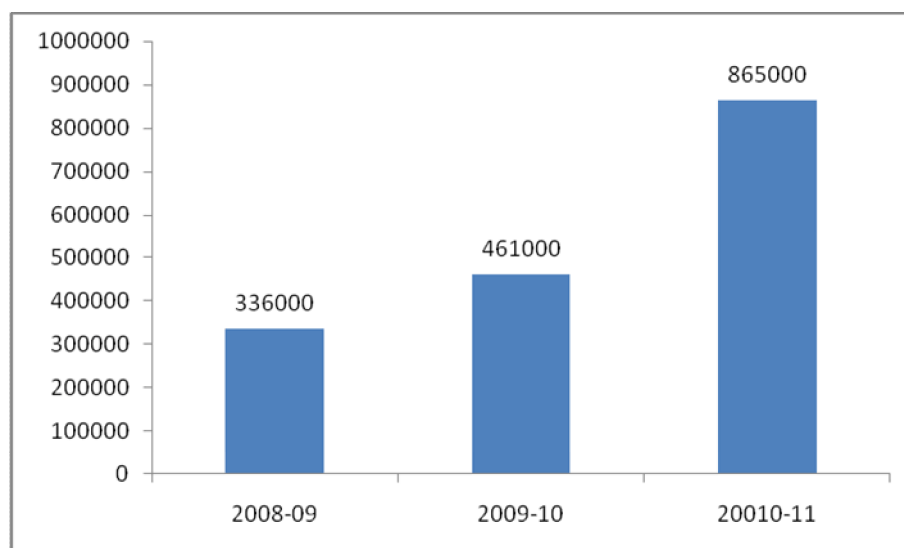


Fig 3.6 Incomes (mostly wages) of members of Ecotourism Group from CBET

Economic Viability

The Himachal Pradesh govt has notified its policy of Ecotourism (2005) which draws a few lessons from the initiatives undertaken as CBET at GHNP. The CBET involves various stakeholders (HP government departments, tour operators, local NGOs, etc.) to assess their roles and responses. The Community Based Ecotourism opens up the discussion and development of ecotourism/tourism in the GHNP region for further study and critique by those involved and affected. They are next steps in the on-going efforts to ensure that GHNP remains a protected and yet accessible environment and that the local community develops economic systems to ensure their protection as well.

The CBET has involved some of those herb collectors who used to go to the Park to collect herbs and graze their cattle. The present group of villagers involved in CBET is of about forty people belonging to the WSCGs. Their incomes are seasonal and need to be supplemented by other IGAs within a HH. The alliance of WSCGs, NGOs and tour operators to ensure that the main profits stay in the local community is a challenge as often distant tour companies are the main financial beneficiaries of the business they bring to the area.

IGA 4: Apricot Seed Oil Extraction

Traditionally, the seed fruits such as hill apricots, walnuts, almonds are grown on the private lands in the Ecozone of the GHNP. However, the local traders were buying seeds at a low cost and selling apricot oil at a premium. The WSCGs saved their money and gave credits among the group members for purchasing apricot seeds so that the exploitation by the local traders is checked.

Economic Viability

About 30 WSCGs in Nohanda, Raila, Suchain and Tung Panchayats have marketed apricot oil worth more than Rs. 2,80,000 from 2001 to 2003. On an average, the members of the groups are earning more than Rs 1,00,000 per annum from the sale of apricot seeds and oil. The viability of this particular activity is yet to be realized to its optimum. There is a market for the apricot seed and oil within and outside India which may be tapped by the WSCGs. However, the issues of quality control and timely supply of the material has to be resolved urgently.

IGA 5: Wage Employment

Wage employment is perhaps one of the major initial activities which the identified WSCGs could undertake. To organize the local people in WSCG, the wage labour could become a very nice intervention since the beginning of the WSCGs. Training inputs were given to the Park staff to employ the poor in the works such as medicinal plant nurseries, construction work, repairs, street theatre and community based ecotourism.

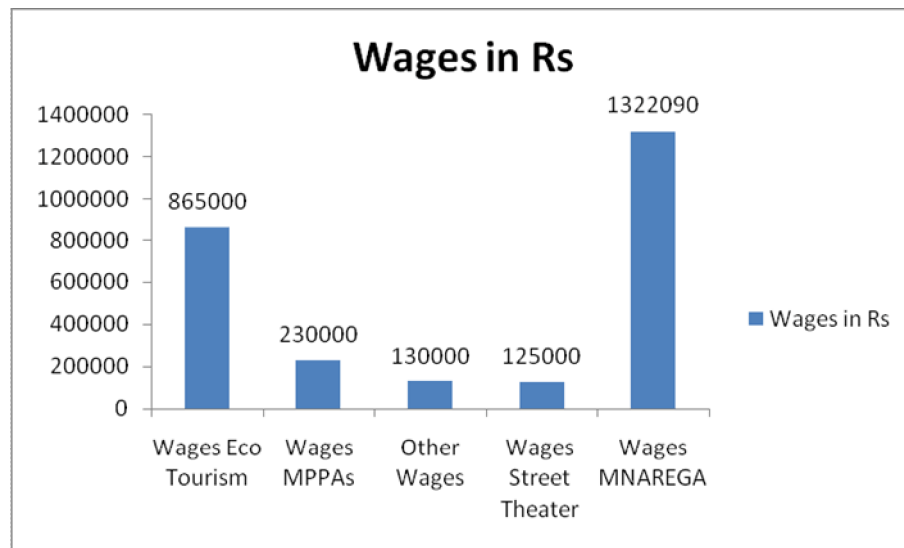


Fig 3.7 Incomes of WSCGs from various wage related activities in 2010-11

Economic Viability

The 56 WSCGs (after the replacement of SAHARA by BTCA in 2007-08) have earned more than Rs. 26,00,000 in wages in 2010-11 (Fig 3.7). The wage incomes here have a substantial contribution from the Mahatma Gandhi National Rural Employment Guarantee Scheme (MNAREGS) which aims at enhancing the livelihood security of people in rural areas by guaranteeing hundred days of wage-employment in a financial year to a rural household whose adult members volunteer to do unskilled manual work. NAREGA is a good example where the women forming a group show its usefulness. The Park administration conducted training programmes for the Group Organizers of BTCA about the legal provision of the scheme which is discussed in the meetings of WSCGs. As a result, almost all the members of the WSCGs have individual bank accounts and job cards to work under NAREGA and receive their wages. They are applying for jobs in a group in a Ward Panchayat knowing well if an

applicant is not provided employment within 15 days he/she shall be entitled to unemployment allowance.

IGA 6:Kala Jattha/Street Theatre

Indigenous knowledge about the nature reflects into the folk songs and dances of the Ecozone of the Park. A theatre group of boys and girls belonging to the WSCGs with knowledge of local folksongs could earn good incomes. The street theatre of eight boys and four girls from the WSCGs is an on-going activity of the WSCGs in the Ecozone of the Park. The Park management employed the street theatre for spreading messages of wildlife conservation and protection in the remote villages. The street theatre was especially active in sensitive times such as upon snow fall when animals come down to the villages and need protection, at festival times when the people tend to indulge in poaching. The Management Effectiveness Evaluation (MEE) Report of GHNP mentions, "Due to involvement of local people specially women and community based organizations, the cultural heritage is being valued and protected. The street theatre through SAHARA is very popular and totally based on local culture" (WII-MoEF 2007).

Economic Viability

A sum of about Rs 3,00,00 was paid to the 12-member Kala Jattha by the Park management in 2001-04 period (SAHARA record, Appendix 6). On an average, a street theatre earns Rs 1,00,000 to Rs 1,70,000 per annum. Series of campaigns have been conducted in GHNP Ecozone and also in areas where special request was made by different government departments like NABARD, Forest department. Awareness campaign consists of role-plays on various issues with strong social messages. This according to the staff has not only brought awareness among various sections of people but also helped SAHARA and My Himachal to initiate work in new areas (health issues, nutrition, alcoholism, nature conservation, etc.). For its long-term impact, it is important to reconsider the format of organizing such events. The content needs to be carefully articulated to bring out relevance of the topic and alongside propose alternatives to undesirable social practices (Chander 2002).

IGA 7: Crafts/Souvenirs/Agricultural Produce

Hemp is a local fiber being used by the villagers for their local requirements. However, use of hemp for trafficking in narcotic has brought it a bad name in the region. Introduced in the WSCGs in 2001, this activity needed a lot of training inputs in form of hemp-workshops. This activity was abandoned. However, the products of weaving, stitching by the members of WSCGs have their market among the local villagers, especially in winter months. Similarly, the agricultural produce such as Rajmash, local millets, Lal rice have been packaged and sold at the outlets provided by the Park in Manali and Aut.

3.3.2 Part II: Results of activities to provide energy and reduce drudgery among the members of WSCGs

LPG/Indene Gas Connections

In the hills, firewood has been the main source of energy for cooking. The burden of firewood collection usually falls on the woman who has to cook. Firewood collection is time consuming and entails much hard work. Besides, burning firewood in open "Chullas" often leads to severe health problems among women. All this makes for much little or no time to pursue gainful, economic livelihood options.

The collective impact of several hundreds of women engaged in firewood collection on the forest/vegetation is severe and often leads to degradation of the resource thus making firewood availability even more difficult. In order to mitigate the adverse effects of this downward spiral both on the lives of rural women and the forest, the intervention of LPG/Indene Gas connections was taken up in the affected areas of the Ecozone and Sainj and Tirthan Wildlife sanctuaries. These might be appropriately called "Drudgery Reducing Intervention", though through them a positive impact on the health of forests surrounding habitations was also envisaged.

One time support was planned for providing energy and drudgery reducing devices like LPG stoves, pressure cookers etc. in order to maximize the number of beneficiaries and reducing the impact of firewood extraction from the forests. The poor, rural women who have been members of a WSCGs and have been saving

regularly were involved in this programme. Preference was given to such women who were located in relatively remote villages close to the forests. A kit of the LPG connection with one burner, gas chullah, a gas cylinder and a pressure cooker was given to the woman member of a WSCG. In 2001 one such set was worth about Rs. 3,000. (In order to qualify for a LPG connection, a woman member was required to contribute 50% of the total cost. She was free to raise her contribution either from her own resources or a loan from her group or both). The Park administration made the remainder of the contribution out of the funds raised for this purpose thus extending the available funds to the maximum number of beneficiaries.

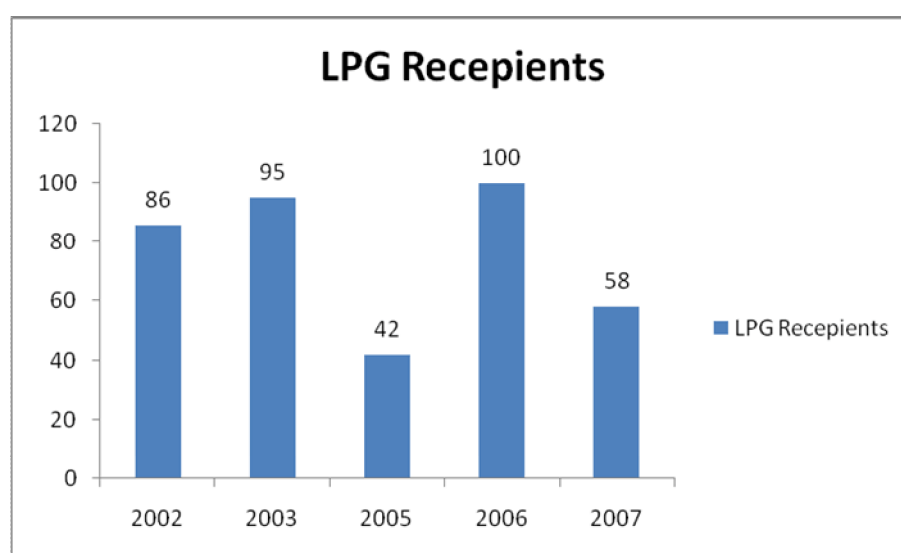


Fig 3.8 No. of WSCGs HHs who received LPG connections

Such an approach, besides being participatory in nature, was also in consonance with provisions of the recently promulgated PFM Rules (in 2001) for HP. While PFM rules stipulate (under Sanjhi Van Yojna that 15% contribution would be made by the beneficiaries), in this case over 50% contribution was provided for. More than 50% HHs of 56 WSCGs by 2010-11 have availed the LPG facility (Fig 3.8). The distribution of LPG is more of a function of the Park administration as it involves govt subsidy.

Ecological Viability

The fuelwood collection is a small-scale, traditional bio-energy use for the rural poor which may be considered as part of a sustainable energy policy. The initiative of LPG

connections is a support to the bio-energy use which often results into in-door smoke and the labor burden of gathering fuelwood. The GHNP attempt at LPG looks at extra time (mainly women's time) needed not only to gather fuelwood but also to actually use it. LPG is a start to show that it can possibly play a key role in allowing women and girls with more time for other productive activities and/or education. The interviews with members of WSCGs show that the women do not want to go for another reason which is safety concerns from wild animals most notably leopard.

3.3.3 Part III: Results of Activities Concerning “Services” in the Focused WSCGs

In this section, three programmes were identified in the selected WSCGs: Literacy Programme, Women and Child Health Care Programme, and Veterinary Programme. All the three programmes were taken up in third or fourth years of setting up of WSCGs. The initial aim was to make a WSCGs active centre for propagation of all the three programmes. The Park management could not effectively coordinate with the line departments of Education, Health and Veterinary. Even it was difficult for the Group Organizers and the members of WSCGs to understand and adopt these programmes as quickly as was the case with the Income Generation Activities with direct economic benefits. However, the Park administration worked with NGO, My Himachal (MH) to organize Health Melas which were locally appropriate, and concentrated on health care education and prevention not medical intervention. MH trained 20 selected local Health Workers from among the members of the WSCGs (2005) with skills ranging from clinical medicine to relationship building. Additionally MH, working with Jibhi CHAI NGO, trained approximately 27 women as nutritional workers to go into villages and help educate women on proper nutrition, especially for neonates and pre-school children.

Shanta Devi, a rural health worker from Bhua village (near the Great Himalayan National Park) tells her experience in being selected, trained and subsequently working on her own in and surrounding villages. Shanta is presently working on village based medical treatment, immunization, nutrition and disabled village children. She is an example of a rural woman providing a culturally appropriate link to do work on health aspects which had to happen in the villages and in people's homes. Much of what can be done for rural empowerment is not 'high -tech' but rather relative simple things that

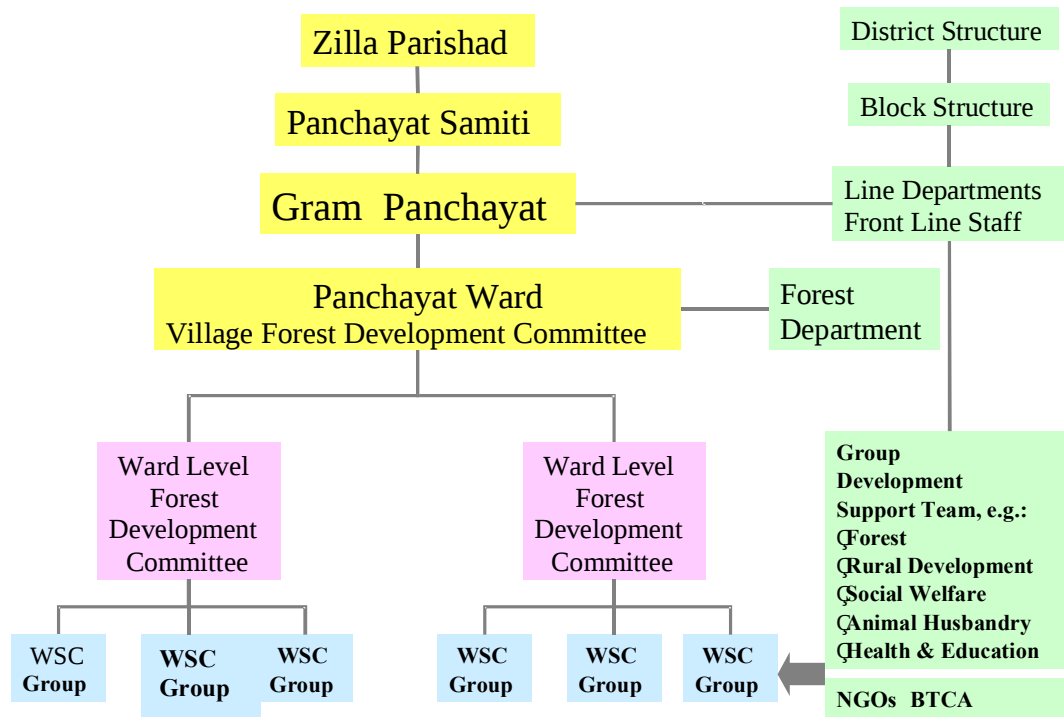
require careful thinking and committed human resource.

The Park administration facilitated the óDangar Dhaiô programme in Ecozone villages. Under this programme, a member of the WSCG was trained in the health aspects of the cattle and sheep and goats. She provided first aid before the animal is attended by the proper Vet doctor. The trained women from a WSCG earned money for each service that she provided. There were three training sessions for the selected members of WSCGs in 2004-06. This programme could not take off as it required on the spot support of a trained veterinarian.

3.3.4 Involvement of WSCGs in Microplanning

The PA management's intervention (from 1999 till now) in the formation, training, capacity building and follow up support (quality control, marketing) of the women's savings and credit groups (WSCGs) and promotion of SAHARA/BTCA was a starting point to develop a livelihood based participatory Panchayat microplan. A Palampur based NGO called Rural Technology Development Center (RTDC) helped in the microplanning at WSCG-level which was consolidated at the Panchayat ward (about five wards constitute one Panchayat). 58 microplans had been prepared in corresponding numbers of Panchayat wards of twelve Panchayats in the GHNP Ecozone.

Fig 3.9 Integration of Women Saving and Credit Groups (WSC Groups) in the Panchayati Raj System



A WSCG functions as pressure group for their livelihood based needs within a Panchayat (Pandey 2008). Support for doing so has been gained from the Participatory Forest Management Rules of H.P. Govt, 2001 which provide for the organizing of user groups at the ward level and their federation into a Village Forest Development Society (VFDS). These rules also provide that all the voters (everybody above 18 years of age in that ward) are the members of the VFDS, and the executive committee of VFDS will have 50% representation of women. On an average, there are about 200 to 250 voters in one Panchayat Ward in the GHNP ecozone (HP PFM 2001). The federation of WSCGs into VFDS at the ward level is to integrate them directly and organically with the Panchayat (Fig 3.9). The linkages of WSCGs with the Panchayati Raj system, also ensures that their micro-plans get funded through regular state schemes and are not dependent on project funds from the PA management.

The Park staff facilitated participation of members of WSCGs in the training workshops for microplanning exercise. It took about four to six months time to prepare

one microplan. It was emphasized that a microplan is an institutional contract or arrangement to bring benefits (to the local communities through development of livelihood programmes) and responsibilities (of the local communities to help protect, conserve the biological diversity of GHNP) (Pandey and Wells 1997).

3.4 Man Animal Conflict

3.4.1 Crop Depredation

Almost all the surveyed villages (n=117 out of 125 or 93.6%) suffered damage to livestock/crops by the wildlife. Most of the people living in the villages of the Ecozone own very little land : only 12% people owned upto five bighas land (1bigha = 800 sq. m; 1ha = 12.5 bighas in Himachal Pradesh); 52.9% owned five to ten bighas; and 35% more than 10 bighas land. Hence, even a small portion of the cropland subject to depredation by wild animals is of great consequence for the livelihood security of the farmer.

The villagers in Ecozone raise wheat, maize, barley, potato, rajmash, peas, and garlic. The time of growing these crops mostly depends on the altitude of the area. The wheat in higher altitude is harvested in May/June while at lower altitude it is harvested in March/April. The wild animals such as Ghoral, monkey, and paraqueets do the maximum damage to these crops. Porcupine is known to dig out the potato, while black bear raids the maize crop. The paraqueets feed mostly on fruits, while monkey and rats go for barley. There are legal provisions to annihilate the small-bodied animals such as rats and many insects; the big-bodied animals are protected under the various Schedules of the Wildlife Protection Act. In this scenario the poor farmer living on the edge of the Park is faced with the problems of the crop depredation as well as the legal action in the event of his killing a wild animal.

In all the three valleys (Tirthan, Sainj and Jiwa Nal) in Ecozone, villagers have suffered 10 to 25% damage to crops. Maximum damage by wild animals is done between 0.5 to 3 km. This is due to peculiar location of agricultural fields between human habitation and natural forests. Most of the natural forests are located towards inner valley from where the wild animals spill into agricultural fields. Beyond this limit there are more habitations, regular vigilance and lack of refuge for the crop damaging species. The croplands of a household (HH) in Ecozone have not been

consolidated (as is the case in plains). One HH may have small pieces of land in various locations, which makes farming a tedious process. The villagers from Ropa village in Tirthan village indicated that if the wild animals have damaged one piece of land, they depend on the produce of the remaining fields. However, the small land holdings are not sufficient for the subsistence of the poor HHs. They often had to do wage labour or other works such as basket weaving, weaving, etc. to supplement their livelihood requirements.

3.4.2 Livestock Depredation

A Re-Appraisal of the Great Himalayan National Park (Gaston and Garson 1992) shows that there is a definite increase in the populations of the wild animals due to the ban on hunting by the H.P. govt. Because of this increase in number of the wild animals, the incidence of the crop and livestock damage has also increased (WII Report 1999). At the same time the rhesus macaque and langurs are able to adapt themselves to the human presence. It is a well-known fact that the wild animals avoid areas with disturbances. This means that when their habitat gets further restricted as a result, they venture into the human habitations. The wild animals also intrude into agriculture fields as the crops raised are more palatable, and they are located in easy locations (Personal Observation). In addition to this the poor and marginal farmers in the villages of the Park's Ecozone keep livestock such as sheep and goats, which usually survive on grazing on the forest and pasture land. For wild animals, such domestic livestock are very easy prey. The local shepherds confirm this by narrating ages old stories and local songs about their sheep and goatherds being followed by the snow leopard or brown bear. The shepherd watch dog with a metal collar mostly accompanies these herds of sheep and goats in the forests/pastures.

The survey data shows (Table 3.2) that the common leopard is the biggest predator of sheep (36.9%), goat (24.15%), bull (7.99%), cow (6.88%), followed by Black Bear which has killed sheep (5.59%), goat (3.88%), bull (3.10%), cow (1.34%). The Brown Bear accounts for killing of sheep (2.58%), goat (1.32%), bull (3.20%) and cow (1.34%). This in fact appears to be a historical shift in the prey species of carnivores from wild ghoral, Tahr and serow to the domesticated sheep, goats and cows (Pandey 2003).

Table 3.2 Number of live stock killings/ human casualties by Leopard, Black Bear/ others in Ecozone/GHNP during the past five years (total for the Ecozone)

	Sheep	Goat	Bull	Cow	Horse	Mule	Dog	Human	Total
Leopard	1426	933	309	266	4	3	46	1 injured	2988
Bear	216	150	120	52	---	1	----	-----	539
BrownBear	100	51	124	52	-----	2	----	----	329
Jackal	7	----	----	----	-----	----	----	----	7
Total	1749	1134	553	370	4	6	46	1	3863

However, the drop in the wild prey base for big carnivores such as leopard and Black Bear is very much evident in the area. Though there are no base line data to compare the present census figure from the past, there are many evidences existing in folklore, which suggest that the wild ungulates such as Ghoral, H. Tahr, and Barking Deer occurred in large numbers in the areas not far from the human habitations.

Interestingly, there is not much mention about the sheep and goats being regularly eaten by the leopard or bears. This is also a very well known fact that the large mammals usually have large home ranges to fulfill their dietary needs animals (Saberwal and Rangarajan 2003). The cumulative impact of all these factors is that the wild animals have started straying into the human habitations in search of food. In such a situation it is very difficult to suggest that a substantial and viable carnivore population will revert back to its natural base if ever such a natural prey base is built.

3.4.3 Timing of predation by the WL

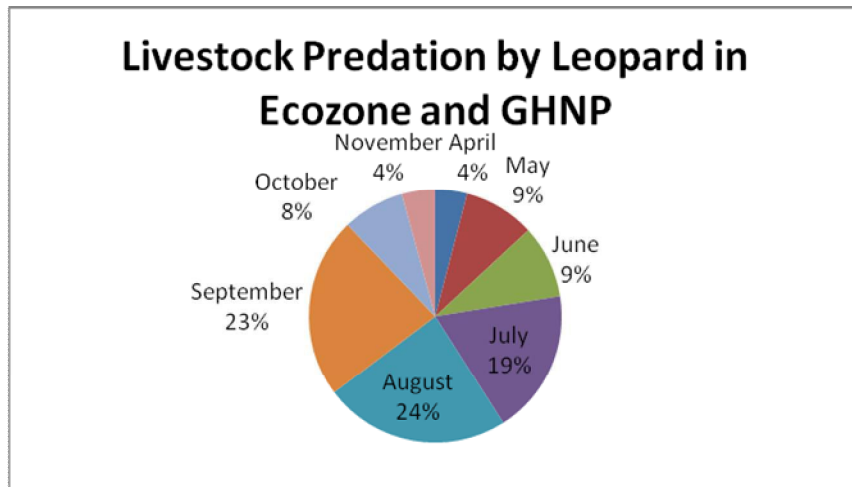


Fig 3.10 Livestock Predation by Leopard in Ecozone and GHNP

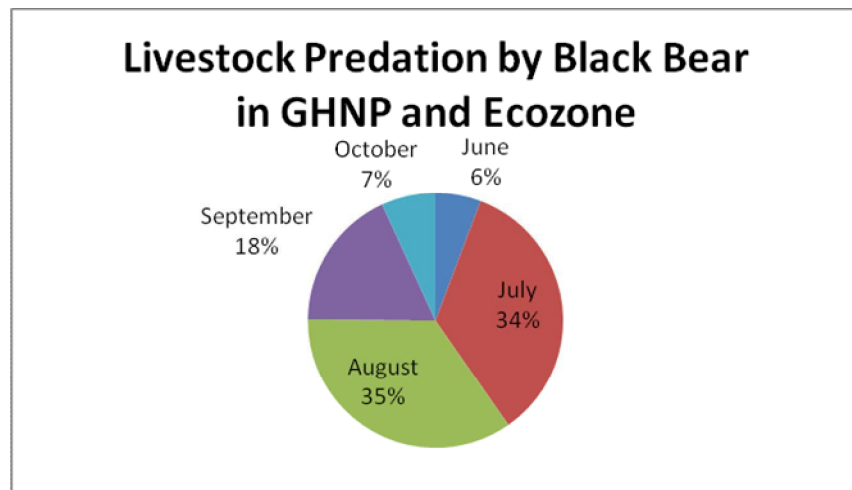


Fig 3.11 Livestock Predation by Black Bear in GHNP and Ecozone

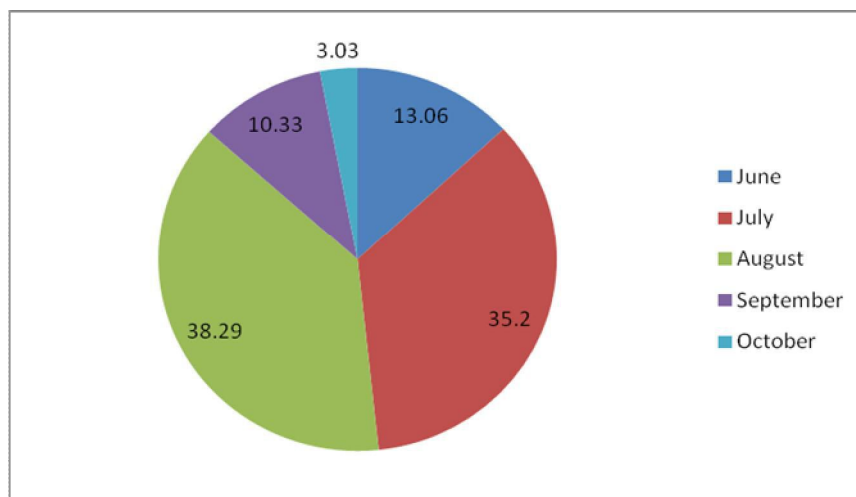


Fig 3.12 Livestock Predation by Brown Bear in GHNP

One of the important findings from the survey done for the Man-animal conflict study is the timing of the predations by the wild animals. The leopard killings (n= 2988) in past five years were 3.88% for April, 8.66% in May, 8.86% in June, 17.63% in July, 22.69% in August, 21.95% in September, 7.56% in October, 4.08% in November (Fig 3.10). The reason for seasonal variation in predation of livestock may be due to the fact that the livestock is sent for grazing in the forests/pastures of ecozone of Sainj and Tirthan WL Sanctuaries (where local people have rights to do so) during summer months. Also, migratory shepherds pass through this area to higher pastures during summer. Seasonality of predation by bears may be attributed to their hibernation in winters. Black Bear for the same period made killings in five months (n= 539) starting in June 5.75%, July 34.5%, August 34.8%, September 17.9%, and October 6.86% (Fig 3.11). The Brown Bear also remains active for the similar months as for the H. Black bear. It preyed upon the domestic livestock (n= 329) in June (13.06%), July (35.2%), August (38.29%), September (10.33%), and October (3.03%) (Fig 3.12). These figure show that the wild carnivores remain active in the months of June to October when the livestock is in the forests/pastures of the Ecozone or the Sainj or Tirthan Wildlife Sanctuaries close to the GHNP. The shepherds/villagers loose substantial number of their livestock to the wild animals such as leopard, Black Bear, Brown Bear. At the same time the villagers need to spend considerable time, energy and money to guard their livestock (Pandey 2003).

3.5 Discussions

As the work of Women Saving and Credit Groups progressed, three major stakeholders emerged in the Ecozone of GHNP. They are:

- | | | |
|---------------|----------|-------------------------|
| (A) Community | (B) NGOs | (C) Park Administration |
|---------------|----------|-------------------------|

3.5.1 (A) Community

Impact of Livelihood Options

The biggest challenge in the period followed by the Final Notification was to incorporate the livelihood concerns of local people into the conservation agenda at GHNP. Attempts were made by fostering women's savings and credit groups as an instrument for income-generating activities, with focus on women from poor and forest-dependent households. This approach is supported by the working through small groups, preferably of women for community mobilization (Hirschland 2005; Mishra

1996; Rutherford 2004). Given the scattered nature of dwellings in the hills, working through a large unit like the VEDC (as proposed during the CoB project) was problematic (Tandon 2002; Pandey 2004).

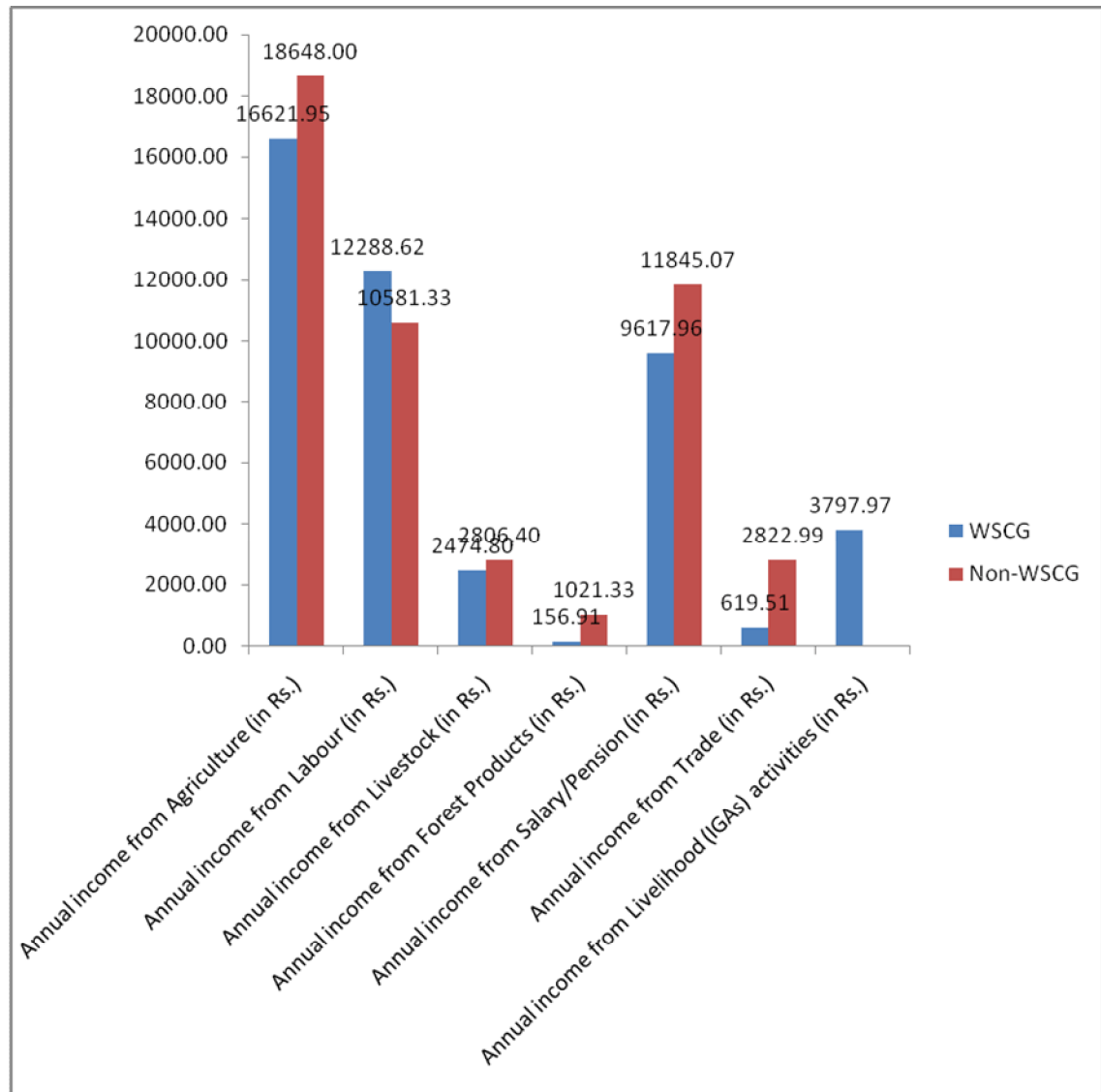


Fig 3.13 Comparison of Incomes from various sources of one HH among WSCGs and Non-WSCGs

A comparison of Treatment Set (WSCGs) and Controlled Set suggests that the main source of annual income of Household (HH) is agriculture and wage work (labour) followed by incomes from employment in government jobs/from pensions, and livelihoods generated through the facilitation of the Pak management (Fig 3.13). By 2004, about one thousand women of poor households had been organized in WSCGs, which had an accumulated savings of Rs.5,50,000. With these savings, they had done

business worth Rs.25,00,000 (SAHARA Records). The members of WSCGs show a remarkable discipline in recovery of loans from within the group members (WSCG Record). However, they need a continuous training/exposure input in matters such as new methods of asset building, marketing of their produce, distribution of benefits within the group, etc.

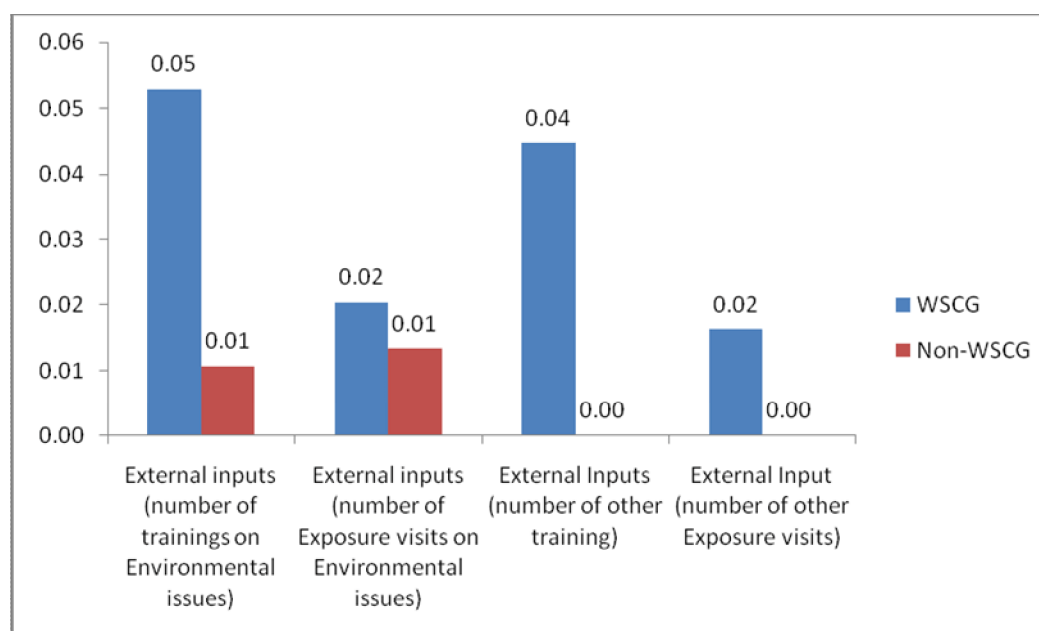


Fig 3.14 Comparison of Training Inputs on Environmental and other aspects among WSCG and Non-WSCG

Fig 3.14 shows average training inputs given to a WSCG as compared to such HHs which were not organized in a formal user group. The external inputs in terms of trainings and exposure visits on environmental issues in a WSCG were quite high. The PA management intervened actively in the formation, training, capacity building and follow up support (quality control, marketing) of the women's savings and credit groups (WSCGs), and also played a major role in promoting a support organization called SAHARA (which in 2008 changed into BTCA) to help the fledgling WSCGs in aspects of their functioning. Such a handholding support from the Park Management was quite critical for the firming up of the women groups and their marketing support. The effort was further supplemented by street theatre which had performers from the WSCGs. The theatre group further supported building of an atmosphere for the participatory conservation in GHNP Ecozone involving women of Park dependent

HHs. The Park administration could develop an outreach to the WSCGs through the Group Organizers G.Os. These G.Os were given training twice a month in the matters which could enhance their levels of awareness (social, political, economic and information related to government schemes). The G.Os, in turn held regular WSCG meetings twice every month to discuss these issues in detail (Pandey 2004).

A very significant change that reflects in the members of WSCGs is their decision-making (Fig 3.15). It gets reflected in the choice of income generation activities that are undertaken in a group. With the help of the Group Organizer, most of the WSCG members decided to go for production and sale of vermicomposting and apricot oil. This was for the reasons that the Park nurseries became a buyer of vermicompost and there was a market tie-up for the apricot kernel and oil. When asked to give their views on rabbit-rearing, none of the WSCG came forward with their saving to buy rabbits for the reasons of predation on rabbits by the Leopard Cat or Leopard. Conversely, the govt scheme of rabbit rearing (which provides rabbits at subsidized rates /free) is easily accepted by the villagers as it does not involve their own money/savings (pers observ.). Hence, the investment of own saving brings in responsibility and encourages decision-making.

The efforts of the Park administration to provide alternative income generation sources through vermicomposting, Medicinal Plants Propagation Areas, Apricot Oil, Street Theatre, and Ecotourism are shown in the Table below:

Table 3.3 IGAs in WSCGs

Income Generation Activity (IGA)	WSCGs Involved	No. of Women Involved	Total Income/ Years	Per Year Income /Group	Average Income per women /year	Remarks
Vermicomposting	60	570	4,90,000/3	1,63,333	286.5	Labour intensive activity
MPPA	40	380	5,25,000/2	2,62,500	690.7	-do-
Ecotourism	15	125	16,62,000/3	5,54,000	4432.0	Skill based activity
Apricot Oil	30	270	2,80,000/2	1,40,000	518.5	Labour ntensive activity
MNREGS	56	510	26,00,000/1	26,00,000	5098	-do-
Street Theatre	5		1,30,000/1	1,30,000		Skill based activity

The per capita income from herb collection in Ecozone village of Nahi (which had its most of the inhabitants going into the Park for herb collection) has been evaluated as

Rs 7,000 in a season (Nandi 1999). The incomes from IGAs were quite segregated in the WSCGs which is reflected in the combination of IGAs being undertaken by diverse groups. The above incomes earned by the WSCGs represent that the labour based activities such as vermicomposting, Medicinal Plants Propagation Areas, Apricot Oil sales, and MNREGS had wider appeal among the poor HHs, while skill based activities such as Ecotourism (involving males of HHs) and Street Theatre were specific to a few HHs.

Table 3.4 Showing Income Generation Activities in twelve WSCGs in 2001-04

Nº	Group Name	Village Name	Agri Prod	Vermi compost	EcoT	Wages	MPPA	Kala Jattha	Apricot Seed	Total
1	HansPuri	Manhar	7492	19963			6000		35000	68455
2	Kali Nag	Dingcha	2967	3540	49675	39740	11500			67682
3	Laxmi Mata	Ghaliyar	5028	15966	15670	12536	5000		31500	73164
4	HansPuri	D.Shlinga	8000		56480	45196	13720			78200
5	Laxmi Narayan	Dhar	4256	9670	15450	12360	13720		17500	60596
6	Laxmi	Tung	4768	14754	52400	41920	8500	16000		96422
7	Lomesh Rishi	Gahidhar	3938	32345	1470	1176	6500	12000		56253
8	Deuri	Deuri	6105	98586	15600	12480				120291
9	Dudhi	Nanout	5406	4850	42500	34000	6500			59256
10	Majhan-1	Majhan	8776	16752	28450	22760	20720		35000	109698
11	Rihadu	Jiyalu	9568	16780				22000	49000	97348
12	Darmeda	Darmeda	9143	43294	26850	21480	5000			84287

Although data were collected from 273 Households (27 WSCGs) but for the sake of representativeness and clarity only 12 WSCGs have been presented. These clusters adequately represent various socio-economic groups, spread over >270 households whose livelihoods depend on wage labour, collection of medicinal herbs, tourism and other vocations. Criteria for selection of these WSCGs were (i) Their dependence on resources of the park prior to final notification, (ii) Income level, (iii) Willingness to adopt alternate income generating activities.

For the poor members of WSCGs, in the absence of other employment opportunities, the government daily wages were important which they could get through MPPAs in HP Forest Department, and MNREGS from Rural Development Department. Women were largely engaged for nursery work while the bulk of other daily waged work went to men. After the present initiative was taken up, it was agreed as a policy that in the Ecozone area the first preference in daily waged work would be given to members of

the WSCGs. Over several years (2001-06) this decision has helped provide several hundred womandays of work to group members in many of the panchayats. Some groups have agreed to save one third of their daily wage and doing so thereby greatly increasing their collective and individual savings.

The Community Based Ecotourism for the male members of WSCGs could contain the initial anger against the Final Notification of Park to some extent. By 2001, national and international trekkers started coming to GHNP. Introduction of Medicinal Plants Propagation Areas (MPPAs) through JFM was taken up to involve women of such families whose men-folk used to go into the Park to eke out a living through herb collection. A system of support was put up by the Park management involving external experts in areas like production techniques, methods of collection and processing, and strengthening of marketing opportunities.

Cooking gas (LPG units) was introduced as a drudgery-reducing measure in a WSCG. The group/individual interviews revealed that the women used the time saved at fuel wood collection to go in for weaving and knitting to augment the household income. Adoption of LPG has reduced pressure on fuel wood collection partially and its impact on regeneration of woody species will have to be quantified in due course. According to PEACE (2004) the women in the Ecozone put aside voluntarily the money required for refilling gas cylinders, since the cost is defrayed by benefits in terms of ease of cleaning utensils, cleaner kitchen environment and reduced cooking time.

The costing and periodic follow up for the replacement has been discussed under sections 3.3.2 (Results of activities to provide energy and reduce drudgery among the members of WSCGs). The sustainability of this scheme depends on the continuity of the interactions between the Park management and community members so that the former is able to facilitate initiatives of nature conservation with the active participation of the later in perpetuity.

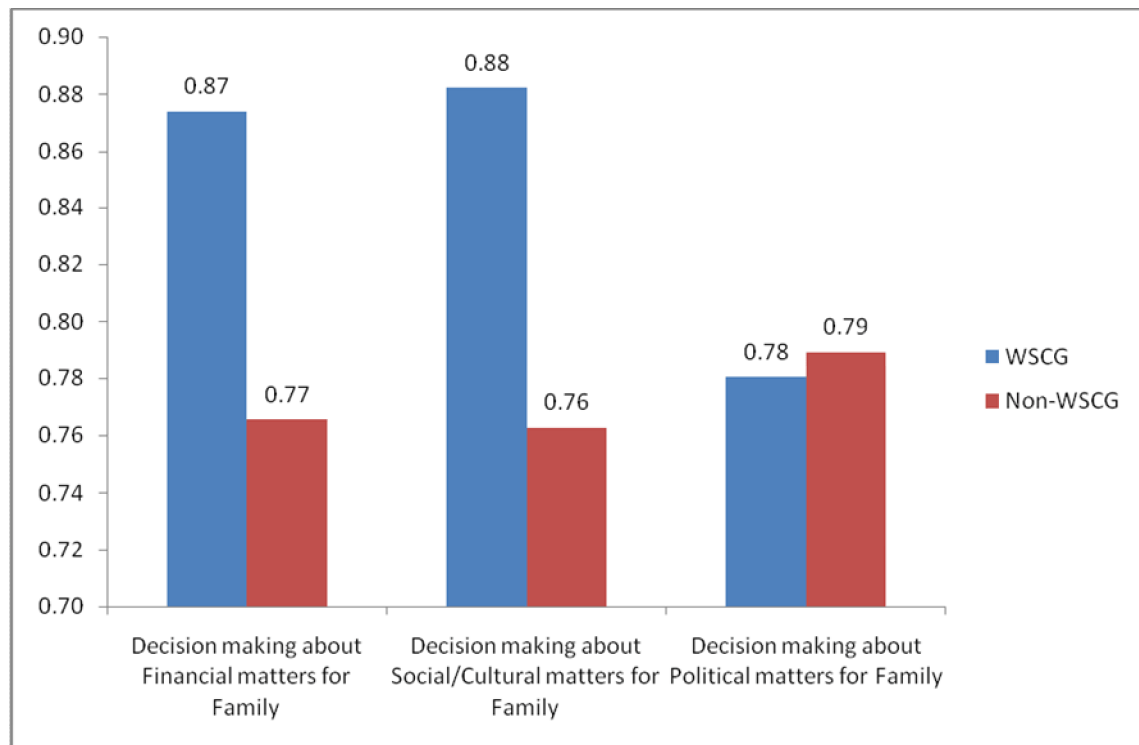


Fig 3.15 Comparison in trends of Decision Making for Family on matters such as Financial, Social/Cultural or Political among the WSCGs and non-WSCGs

The existence of an organized group of women in the Panchayat ward seems to relate better with the Panchayat structure and dynamics (In 1995, the Indian Constitution was amended to provide for one-third of the total number of Panchayat seats reserved for women. One-third of the offices of chairpersons of Panchayats at all levels have also been reserved for women). The economic empowerment of WSCG members has had its impact on social and political aspects of their lives. Four Pradhans (chiefs) of Panchayat, and 22 Panches (a Panch is head of a Panchayat Ward) have been elected in the Panchayat elections in December, 2005 (SAHARA records). It is also significant that this is the first time that a sustainable village/ hamlet level organizations in the hills of Kullu have emerged (Tandon 2002).

By far the weakest link in the WSCG model as promoted in GHNP is the internal dynamics within these groups. The selection of women within a group has been made more on the basis of expediency (the poorest women, the women whose family members eked out living from the herb collection or grazing cattle in the Park) than factors like affinity and mutual trust, and the most serious consequence of this is that

even groups that have managed to save large amounts of money are wary about lending this money within the group (PEACE 2004). This shows a mutual lack of trust and confidence among the group members, as a result of which most groups do not have members taking loans for starting income-generating activities. Thus, the link between savings and ultimate livelihood security is still tenuous in GHNP (Pandey 2004). Perhaps what should be of more concern, here, is not the amount of incomes through the IGAs, but recognition of women being brought to forefront in the official efforts of the Park management as a critical constituency affecting conservation. The associated outcome of such efforts has been the ability of women of WSCGs to make economic decisions reflecting their specific problems and requirements (Fig 3.15).

3.5.2 (B) NGO/Community Based Organization

The Park management made an attempt to bring together all the WSCGs in one organization called SAHARA (registered as an NGO in 2000). Such an organization was to be managed and regulated by the members of the WSCGs. It worked well till 2005 (SAHARA records). However, monitoring of SAHARA leadership revealed transparency issues which resulted in growing complaints of members of certain WSCGs against SAHARA. The WSCGs preferred to disassociate from SAHARA and formed a new NGO Biodiversity Tourism Community Advancement (BTCA) which was registered in 2009. BTCA at the moment has 56 WSCGs with 527 women members. Meanwhile, another NGO My Himachal (pl see chapter 2) came up with issues of child health care and environmental education in villages of GHNP Ecozone and Banjar area, with emphasis of their work in the WSCGs. This effort was supported by Envi-Savoirs NGO formed in Upper Seraj Valley with focus on environmental protection.

The critical learning from SAHARA experience is that such an organization as compared to the well established environmental NGOs from outside depends on the Park support for its structural as well as functional aspects. The issues of leadership, transparency over finances, maintaining records, and developing reproducible and constant procedures at all levels (SAHARA, Group Organizers, Marketing/Sales, etc) need to be addressed on a continuous basis through an effective monitoring and evaluation system (Pandey 2008).

The WSCGs and supporting NGOs needed support to develop strategic partners and find markets for its income generation programmes such as vermicomposting, apricot oil production, ecotourism and street theatre. Similarly, without continuous support, the programmes related to social empowerment such as literacy, health and veterinary care could not be successfully introduced in WSCGs though they have great relevance and potential. It is important to note that the efforts of WSCGs, supporting NGOs, and Park administration have to be complementary and supplementary to each other in the pursuit of nature conservation. As such, the volunteer organization (NGOs, local groups such as Mahila Mandal, Youth Mandal, Self Help Groups, etc) in Himachal Pradesh have a tendency of dependency of government departments for their financial support and need to have norms of good governance and public disclosure (Personal Observation).

3.5.3 (C) Park Administration

Since the Final Notification, the Front Line Staff (FLS), the most important constituent of Park management, working in the field has been witnessing hostilities between the community and the PA management. The CoB Project initiatives of formation of Village Ecodevelopment Societies without much impact on the local villagers were also not very encouraging (a comparison of eco development and livelihood approach as pursued in GHNP Ecozone during and after CoB Project, respectively is given at Appendix 5). The Park was under biotic pressure from thousands of illegal sheep and goats and herb collectors. Hence, the legal requirement of the Final Notification imposing restrictions on any disturbance to Park habitats was a big challenge for the Park staff. Moreover, interventions in the area of environment awareness and research and monitoring were not very imaginative during FREEP as documented revealingly in the assessment of FREEP (World Bank 2002). In such a scenario, redrawing mental maps of the Park officials from enforcement to participatory management was an underlined assumption.

Whenever a government official (from Park Management or Rural Department) visits a village, the villagers perceive the visit in only two ways, either the official has come to book the villager for some offence or the official is there to give out doles or subsidies under some new govt scheme or Project. Upon Final Notification, the third perception was tried at GHNP, i.e. let the villagers (only those who are very poor and

depended on the Park resources; such villagers usually do not figure high on the local politicians priority list; only middle income groups are the ones who have connectivity with the politicians) feel at home when "someone" visits them for their involvement in participatory natural resource management or in Asset Building activities. This "someone" in case of GHNP experiment has been a local lady (from the same Panchayat) and not a Forest Guard or any other official. There being twelve Panchayats in the GHNP buffer zone, hence, twelve local ladies or Group Organizers (G.O.s) were selected and trained by the Park management. The G.O.s. are the mediators between the Park management and the community. The Park Director arranged for the training of the G.O.s. sometimes twice a month in various aspects so that these ladies can appreciate linkages between poverty and conservation, the gender sensitivity, and the issues of girl child education and conservation (Pandey 2008).

At the same time, there were training sessions for the FLS to make them understand about community involvement, gender issues, importance of working with small groups, alternative income generation sources to achieve the bigger goal of biodiversity conservation. The mixed groups of FLS and local villagers were sent on exposure visits. Over five years, they could observe small user groups at Kalakad Mundanthurai Tiger Reserve (Bharadwaj 2007), protection work at Corbett National Park, soil and water conservation at Ralegaon Shiddi, and learn wildlife management at the Wildlife Institute of India (official records). As such, these trainings had a limited role to play. There were only about one-third of the FLS which appeared to be convinced that working with user (women) groups would result in Park protection or biodiversity conservation (Personal Observation).

Initially as the income generation activities started in the WSCGs, the FLS was not very sure of the matters of quick or on-the spot payment to the members of WSCGs for the purchase of vermicompost. The office procedures and unwillingness to adopt changes were the main obstacles. As the work advanced, the field level functionaries such as Forest Guards, Range Officers have started recognizing the fact that they need to participate actively in the livelihood support to the WSCGs. They also recognized the need to provide the wage jobs to the members of WSCGs to reduce the dependencies of the poor villagers on the Park's natural resources. These daily wage jobs include working in the medicinal plant nurseries, planting the plants in Medicinal

Plants Propagation Areas (MPPAs), and the protection of MPPAs. Later MNREGS became a major wage earner for the members of WSCGs.

The front line staff of the Park administration often gets caught in between the diagonally opposite approaches of participatory management and enforcement. The formation of Kala Jatha or street theatre from the members of WSCGs and their regular performances in the Ecozone villages helped a lot in spreading the message of benefits of working in a WSCG, relevance of Park's conservation efforts, along with the provisions of the law of the land. For next four years, the villagers were persuaded not to enter the Park through street theatre shows, and consistent and continuous dialogue. The villagers while complaining about the restrictions imposed by the Park, also accept the need for some restrictions on resource uses, and Park authorities while taking strong action on making GHNP 'inviolate', accept the human need to resolve the life and livelihood problems of the people (Wani and Kothari 2007). Since 2004-05 the violators of the provisions of Indian Wildlife Protection Act are being punished. In this year only seven groups of offenders were convicted and punished by the court.

A system of team patrolling was introduced in the finally notified National Park. These teams of FLS also involved selected male members of WSCGs which proved effective. They brought snares, loops put up stealthily by the poachers in the Park. The street theatre used these concepts and props in the Ecozone villages to convey message about Park protection.

3.5.4 Resolving Human-Wildlife Conflict for Livelihood Development

The Himachal Pradesh Forest Department has a provision of providing compensation to the person whose sheep, goats or cattle have been killed by the wild animals. A close look at the Department's rules reveals their inadequacy with reference to the damage done by the wild animals in the field. The rules provide for postmortem report, and verification by the high authority in the villages such as Pradhan/up-Pradhan of Gram Panchayat/ and a forest official, not less than the rank of a Forest Ranger. For a poor person, it is difficult to approach these high authorities, as a result we find that very few cases of damage by the wild animals are reported for the claim

of compensation. Moreover, the rules have been framed for the damage of domestic animals done by the big-bodied animals, mostly the carnivores. This also reflects the inadequacy as most of the damage done relates to the crops and horticulture trees for which there is no provision of compensation. The nearest HQ of a wildlife official is often far away from the remote location of the villages where most of the incidences of damage by the wild animals take place. In such conditions, the vulnerability of the poor and backward people to the malpractices of the local Park staff is quite high (Pandey 2003).

The following interesting facts emerged during the interviews of the villagers:

- a) The Panchayats of Nohanda, Shangarh, Shenshar and Mushiyar are quite close to the Park area and have a lot of forest areas next to them. The damage done to the livestock here is quite sizeable. However, the amount of compensation received by the villagers (those who were interviewed) is very meagre.
- b) As such, there is no provision for the payment of compensation for the crop damage by the wild animals. This hurts the poor villagers more as they do not have many livelihood options to fall back upon.
- c) In the Ecozone of the Park, there is not much knowledge about the existence of the compensation scheme for the damage done by the wild animals. Nor is any NGO active in facilitation for completing the formalities by unaware and illiterate villagers to help them get compensation. In such a situation the villagers often feel it very cumbersome to approach the HPFD for the meager compensation payment.
- d) Accessing or following up the compensation cases is a very tedious job for the villagers, particularly when the literacy rate in the Park's Ecozone is quite low. The situation becomes worse for an illiterate woman who is a widow/lone woman. There is no provision whatsoever to pay compensation directly to a poor women/widow.
- e) Very seldom the poor villagers approach the Park officials for compensation. It is difficult for a poor person to trudge long distances to the Park office. It involves paper work which most of the illiterate or semi-literate villagers are afraid of. The inspection of remote site by the veterinary doctor and other officials is a tedious process. If the whole process of reporting a damage by the

wild animal is followed completely, the poor villager needs to spend at least two days and much money.

- f) The villagers did mention the apathy of the Park officials. The women mentioned very categorically that only such persons who are very well acquainted with the forest officials get the compensation for their livestock. They also said that they find it very difficult to fill up the application forms to get compensation.
- g) The members of the Women Saving and Credit Groups told that they often have to go to the forest areas for fuelwood, grass and water. They do not feel safe to go to the forest areas in evenings for the fear of the wild animals. The situation becomes particularly difficult for a woman or physically or mentally challenged person.
- h) If not now, the situation in near future may become alarming. Making of the GHNP and consequent restrictions on the use of natural resources of the Park may compel the villagers to rise against the damage done to their livestock and crops.

3.6 Conclusion

The data collected during the research shows that the Park management tried to incorporate the livelihood concerns of local people into the conservation agenda at GHNP in the period followed by the Final Notification. This was done through women's savings and credit groups by focusing on the women from poor and forest-dependent households. They were organized to undertake income-generating activities as alternative livelihood options. The livelihood approach of working with community was different from ecodevelopment that was pursued in GHNP ecozone during the World Bank aided CoB Project in the pre-1999 period (pl see Appendix 5 for a comparison between the two approaches).

The research work is based on a comparison of Treatment Set (WSCGs) and Controlled Set to assess the changes in the incomes of affected HHs due to 1999 notification. The results suggest that agriculture and wage work (labour) followed by incomes from employment in government jobs/from pensions, and livelihoods generated through the facilitation of the Park management have been the main sources of annual income in the Treatment Set which was about 25% (n=273) of the one

thousand women of poor households. The WSCG members were quick to recover loans as they were dealing with their own savings though they needed training/exposure input in new methods of asset building, marketing of their produce, distribution of benefits within the group, etc.

The Treatment Set shows that the WSCGs members have been gaining ability of decision-making which got reflected in their choice of IGA such as vermicomposting or apricot oil production. This is in consonance with the fact that the investment of own saving brings in responsibility and encourages decision-making. Moreover, the incomes from IGAs were matching the per capita incomes from herb collection in the affected HHs. The government daily wage jobs through MPPAs in HP Forest Department, and MNREGS from Rural Development Department fetched good incomes to WSCGs generating several hundred womendays of work. The male members could become part of community based ecotourism and MNREGS.

There was a positive impact of introduction of LPG units as a drudgery-reducing measure in a WSCG. This was to reduce the WSCGs burden of fuelwood collection from ecozone forests. Moreover, a user group like WSCG could better relate to the Panchayat structure as has been shown in Fig 3.9. The election of members of WSCG to Panchayat Pradhan and Panch shows that the economic empowerment of women is leading to their social and political empowerment. However, the WSCGs show a limitation of internal dynamics as they were organized due to the expediency of Park for compensating the loss of incomes due to its Final Notification. Often there are accumulated savings in a WSCG that the members find difficult to invest in new IGAs as for lack of mutual trust.

The man-animal conflict in the Park ecozone was another issue that was to be addressed by the Park FLS. The WSCG members often complained about the wild animal attacks on them when they went to fetch water or fuelwood. Very seldom the poor villagers approach the Park officials for compensation as the process of reporting damage by the wild animal is quite tedious. The MEE Report remarks, 'With the rights of people having been settled through payment of compensation and formation of WSCGs on a large scale and involvement of local NGO such as SAHARA the conflict can now be better addressed' (WII-MoEF 2007).

This was at the behest of the Park management to bring together all the WSCGs in one organization called SAHARA (registered as an NGO in 2000) to manage and regulate members of the WSCGs. Initially it worked well but soon it started showing transparency issues leading to complaints of members of certain WSCGs against SAHARA. By 2006 the SAHARA ceased to function. It took two years for the WSCGs to come together in a new NGO Biodiversity Tourism Community Advancement (BTCA) which was registered in 2009. Such happening stress the point that the Park support in organizing and monitoring of such organizations has to be continuous over a longer period of time.

Though the Park Director provided leadership to the Ecozone NGO, and WSCGs to undertake community based conservation efforts, there have been issues of hostilities between the community and the Front Line Staff (FLS) of the PA management. The FLS during CoB Project had to work for formation of Village Ecodevelopment Societies in pre 1999 period without much impact on the local villagers (a comparison of ecodevelopment and livelihood approach as pursued in GHNP Ecozone during and after CoB Project, respectively is given at Appendix 5). The change over to a livelihood approach through WSCG was not so easy to follow by the FLS. In fact an attitudinal change in the FLS from enforcement to participatory management was an underlined assumption. It took time to happen with the examples of stoppage of herb collectors and graziers of WSCGs as the incomes of alternative livelihoods started to come in the affected HHs.

The fact that the the perception of the local people towards Park has positively changed is supported by the Management Effectiveness Evaluation (MEE) report which says that, "With the continued efforts in ..involvement of women and community base organization, the neighbouring communities are by and large supportive. The scenario before 5-6 years was quite opposite" Threat have been reduced to a considerable extent after public participation and education and purchase of rights in NP. It will take sometime for the threats to be abated provided efforts at present level are continued with the same zeal. (WII-MoEF 2007).

Chapter 4

Impact of the Development of Alternative Livelihoods on Effectiveness of Biodiversity Conservation

4.1 Background

The monsoon-affected forests and alpine meadows of GHNP support many distinct altitude-sensitive ecosystems and are home to many plants and animals. The Western Himalayas, of which GHNP is a part, are considered an endemic bird area (EBA) by Birdlife International (Alison et al. 1998, Birdlife International 2003). This region as a whole has come under enormous pressure from human activities, both from the ongoing practice of traditional livelihoods such as seasonal livestock grazing, poaching and the collection of medicinal plants (Gaston and Garson 1984, 1992). In addition, more recent developments such as the farming of temperate cash crops, commercial forestry, tourism and hydro-electric power development have taken the toll of natural forests. Nevertheless, the survey teams of HPW I and HPW II considered the GHNP and adjacent sanctuaries as an area where human impact on natural ecosystems has been lower than in other parts of the Western Himalaya (Gaston et al. 1981; Garson and Gaston 1984; Gaston and Garson 1992). The area provides near-intact examples of temperate, sub-alpine and alpine ecosystems, and contains a range of species characteristic of this part of the Western Himalayas. Since 1999, when the Park was created, the Park administration has been implementing an approach of participatory wildlife management through alternative income generation sources in small user groups designated as the Women Saving and Credit Groups (WSCG) (Pandey 2005a, 2008).

The Park is amongst the few conservation areas in the country wherein different taxonomic groups *viz.*, vertebrates (mammals, birds, reptiles and amphibians), invertebrates (insects, annelids and molluscs), plants (Angiosperms, Gymnosperms, Pteridophytes, Bryophytes and Lichens) have been inventoried (Gaston et al. 1994; WII Research Report 1999). These inventories were made under a multidisciplinary project during 1995-99 by the Wildlife Institute of India (WII). In addition, this project also documented land use practices during the study period,

historical development, socio-economic conditions, and people's attitudes and perceptions (WII Project Report 1999). The study revealed that GHNP harbours 74 species of mammals including four Threatened species (Vulnerable-2, Endangered-2) and six species as Near Threatened. Among the birds, there are three Threatened species (Vulnerable-2, Critically Endangered-1) and one Near Threatened. Similarly, the IUCN's CAMP process for medicinal plant species indicated that the GHNP has 36 of the 47 medicinal plant taxa, categorised as Threatened for the state of Himachal Pradesh (Chapter 2).

Following the Final Notification of the Park in 1999, two major management interventions were made: (i) ban on anthropogenic activities such as livestock grazing, extraction of medicinal plants, mushroom and other non-wood timber produce, and (ii) development of alternative livelihoods especially for the families which were highly dependent on the resources of the Park. Law enforcement and patrolling the remote and rugged mountain PA such as GHNP by a handful of Park staff have been major challenges given that almost entire lower boundary of the Park is porous and villagers in the buffer zone have easier access to the Park as compared to the staff. Therefore, engaging the poorer section of the society in alternate income generation activities so as to win their confidence was thought to be the best solution in the long term. While legal backing as applicable in a National Park was necessary to create a psychological pressure on common public, it is the people-centered intervention which would make the difference in real sense. This chapter deals with the changes in the status of flora and fauna within GHNP after the Final Notification and attempts to objectively evaluate the impacts of development of alternative livelihoods on the effectiveness of biodiversity conservation.

4.2 Methodology

Assessment of changes in the conservation status of various components of biodiversity within GHNP and evaluation of inputs of development of alternative livelihoods on the effectiveness of conservation required both primary as well as secondary data. The study had advantage of an extensive baseline data on biological as well as socio-economic components collected during 1995-1998 (WII Research Report 1999) which allowed detection of certain changes on biota and wildlife habitats. Broad methods to meet the study objectives are outlined below:

4.2.1 Evaluation of Effectiveness of Biodiversity Conservation

The broad strategy was to look into each of the activities implemented as a part of livelihood generation program and evaluate the effectiveness in terms of income generation activity (IGA) and the broad reflection of this activity on the components of biodiversity. In order to be efficient with the assessment, vegetation parameters were chosen to reflect the general habitat characteristics in the Park both in temperate and alpine zones, while pheasants were targeted as indicators for representing forest biodiversity. Information on both the variables was available in qualitative and quantitative terms. However, it is to be noted that the key indicator group (pheasants and plants) were sampled during spring and monsoon seasons respectively. Because, the pheasants that are usually shy and evasive were vocal during this season, since they use the specific repertoire to attract mates and defend territories during this season. Monsoon is the season when the plants attained climax phase for the year and most of the species were represented.

4.2.2 Repeat observations on vegetation parameters

The GHNP has four main entry points in four valleys on its western boundary. The trail starting from the road-head goes along the valley-bottom touching the Park's boundary after covering about 7 kms in the Tirthan valley, 18 kms in the Sainj valley, 10 kms in the Jiwa Nal valley, and 40 km in Parvati Valley. After crossing the boundary, these paths either follow the valley-bottom or lead to the hilltops covering various altitudinal gradients (Gaston and Pandey 2002). Thus, walking along these trails, earlier used by the pastoral communities and herb collectors can provide a good sense of the vegetation, and animals across altitudinal and anthropogenic pressure gradients. During 1998 several plots along the trails and sites, especially the Thaches (sheep and goat camps) had been marked for Long Term Ecological Monitoring (LTEM) (WII Research Report 1999). During the course of present research, several sample plots and sites especially closer to the Ecozone were revisited. The areas and plots selected for repeat observations and to detect the changes in the status of biodiversity conservation are located along T1 and S1 i.e., Kharongcha to Patal via Gumtrao in Tirthan Valley and from Sakti to Supdhar in Sainj Valley, respectively. The major sites for comparison include Rolla (2080m), Shilt (2900m), Rakhundi (3750m), Gumtrao (3460m), Patal (3500m), Supdhar (3820m), Dhela (3500m) and forested tract between Shakti and Dhela. Along the T1 and S1, LTEM plots

are located on either side of the trail at an interval of 250m. The plots for tree layer encompass an area of 500m^2 (12.65m radius plots). A nested plot of 5.65 m radius (100m^2) area was marked within the larger plot for shrubs. For the ground layer *i.e.* grasses and forbs, four 1m^2 quadrats were laid outside the smaller circular plot one each in four cardinal directions. However, for estimation of species abundance and cover in *Thaches* random quadrats of 1m^2 were used (6- 10 in number) at select localities where major changes were expected (Pandey 1999). Though, a large number of parameters have been collected prior to notification of the Park at the time of establishment of LTEM (including environmental and physical factors), during repeat observation (for the purpose of this study) only following parameters were recorded:

- i. Over all cover and Richness of plant species
- ii. Cover of palatable species in *Thaches*
- iii. Abundance of unpalatable / weedy species
- iv. % ground cover and exposed soil
- v. Cover and regeneration status of bamboo

Species richness, Frequency, Density and Cover of various groups of plants as estimated during the baseline surveys following the standard phyto-sociological methods (Mishra 1968, Kershaw 1973, Mueller-Dombois and Ellenberg 1974) were compared during the present study to detect the changes.

4.2.3 Observations on Animal Abundance / Habitat Use by Pheasants and Mammals

Baseline information on faunal components include encounter rates, direct and indirect evidences of habitat use by mammals and pheasants in the areas adjacent to Ecozone *i.e.*, lower parts of Tirthan and Sainj Valleys along T1 and S1 mentioned in section 4.2.2 above. Specific methods of monitoring pheasants and mammals followed before and after the notification of the Park are described below:

Encounter Rate (ER) is expressed as number of individuals seen per unit effort (Caughley, 1975) *i.e.* $ER = n / L$, where as n = number of sightings of pheasants or mammals and L = distance traveled. This method involves walking on trail and counting birds or mammals encountered on both sides of the trail. This technique for estimating and monitoring population trends of Galliformes has been commonly used

(Islam 1982, Gaston and Garson 1992, Kaul and Ahmed 1992 and Sathyakumar et al., 1993). The method is also reliable to compare the abundance of mammals as used in other mountain PAs. Data on species, number, sex, sighting distance and sighting angle were recorded for further analysis.

Scanning technique: This is a very effective method involving scanning from vantage points using spotting scope/ binoculars for a specified period of time. Goral and Himalayan Tahr were scanned vantage points namely Kharongcha, Rolla, Chodwar and Gumtrao. The number of animals seen, their age, sex and activity patterns were recorded for every sighting. The various habitat parameters were also recorded around 10m radius of the animal sighted whenever possible. Recording the time of animal sightings, multiple count of the same animal was avoided. Green (1978) used this technique in Langtang National Park, Nepal and Sathyakumar (1994) in Kedarnath Wildlife Sanctuary.

Pellet group count: Bennett et al. (1940) formalized this technique. Rodgers (1991) and Sathyakumar (1994) have used this technique in recent studies. In GHNP, three transects laid for estimating encounter rates and densities were also used for estimating the pellet group encounter rates. Pellet groups were counted twice a month within a 1m belt along the transect.

Silent Drive Count Technique for Himalayan Musk Deer: This technique is a modified form of block count, which involves drive in a small patch of habitat, using 10 to 12 people who walk along a line abreast and record the animals sighted. Also two or more observers were positioned strategically above the forest level to spot the animals which otherwise might have flushed undetected from the area. Green (1985) used this method for Himalayan musk deer, first in Kedarnath Wildlife Sanctuary followed by Kattel (1992) in Sagarmatha National Park and Sathyakumar (1994) in Kedarnath Wildlife Sanctuary. In GHNP, this technique was used in Gumtharao (Tirthan Valley) and Dhel (Sainj Valley) areas. This technique could be used only in spring and autumn, as these areas were inaccessible during winter. This method was not applicable in other musk deer areas of GHNP due to, inaccessibility and a major limiting factor could be the absence of logistics in planning and conducting counts.

Call Count: Through call counts, the bird communities were studied in relation to vegetation structure. Elusive birds such as Western Tragopan and Koklass which are seen less and heard more can be estimated during their breeding season when they call loudly. Counting the calls will give useful index of the population in a given area (Severinghaus 1979, Gaston 1980, Duke 1990, McGowan 1990 and Garson 1983). Estimate of call counts are expressed as $ER = n / P$, where n = Number of calling stations (from where the birds were calling) and P = Unit effort, i.e. sampling plots.

Opportunistic Sampling: Besides the systematic data collection using trails and call counts, data on abundance and distribution were also collected while on movement from one area to other and also during surveys. The data collected by opportunistic sampling was mainly performed to explain seasonal distribution of the pheasants.

In addition to it the Human Interference has been recorded by the signs of grazing, grass collection, lopping, wood collection, bamboo collection, cultivation, habitation.

4.3 Results

4.3.1 Effectiveness of Eco-development Activities

All the programs were targeted at providing alternate income generation activities for the people who were dependent on natural resources of the Park. These people were essentially dependent on herb and mushroom collection, and in the process, were instrumental in negative effects on the biodiversity. Table 4.1 provides details of the effectiveness and changes caused by the development of alternative livelihoods on the biodiversity. It is worth mentioning that these activities were executed through use groups (WSCGs), including skill based activities.

Table 4.1 Qualitative assessment of development of alternative livelihoods on biodiversity values in Great Himalayan National Park, Himachal Pradesh

Nº	Eco-development Intervention	Target Groups	Effectiveness Index	Change in Biodiversity Value	Assessment Process	References
1.	House Hold Income Generation Activities (Vermi-composting, Apricot Oil, Agro Produce & Souvenirs)	HH of Herb Collectors (Male)	Medium	Alpine Habitats	Vegetation Sampling	<i>Tandon 2002; Pandey 2008</i>
		HH of Gucchi Collectors (Male and Female)		Temperate Forests	Pheasant Survey	<i>Miller et al. 2008</i>
2.	Wages from MPPAs and MNREGS	HH of Herb Collectors (Male)	High	Alpine Habitats	Vegetation Sampling	<i>Pandey 2008; Unpublished Data</i>
3.	Ecotourism	HH of Herb Collectors (Male)	High	Alpine Habitats	Vegetation Sampling	<i>Pandey 2008; Unpublished Data</i>
		HH of Gucchi Collectors (Male)		Temperate Forests	Pheasant Survey	<i>Miller et al. 2008</i>
4.	Awareness (through Street Theatres)	Entire Ecozone	High	Alpine Habitats	Vegetation Sampling	<i>Pandey 2008; Unpublished Data</i>
				Temperate Forests	Pheasant Survey	<i>Miller et al. 2008</i>

Index: High (% score of 80 and above); Medium (% score of 50 to 80); Low (% score of less than 50)

4.3.2 Impact on overall vegetation cover

The study reveals that there has been a significant change in the overall vegetation cover in the alpine meadows which were used for collection of medicinal herbs, camping by herb collectors as well as seasonal livestock grazing. At all the study sites i.e., Rolla, Shilt, Gumtrao, Patal and Dhela Thach, there has been a significant increase in the % cover of ground vegetation. Likewise, except at the temperate forest opening i.e., Rolla (2500m), all the high altitude meadows exhibited marginal increase in vascular plant Species Richness (Table 4.2). Most drastic changes in terms of ground cover as well as species richness were seen around Shilt, Gumtrao and Patal *Thaches*.

It was not possible to separate the changes caused due to ban on livestock grazing from that of trampling and herb collection. Hence all changes in vegetation cover and species richness around the alpine meadows are as result of cumulative effects.

Table 4.2 Changes in overall vegetation cover, Species density and Richness across various *Thaches* in Sainj and Tirthan Catchments, GHNP (n = 20 Quadrats of 1m²)

Locality	Status			
	1997-98		2010-11	
	% Ground Cover	Species Richness	% Ground Cover	Species Richness
Rolla	45.00	13.00	73.75	11.00
Shilt <i>Thach</i>	37.50	17.00	92.50	19.00
Gumtrao Ridge	47.22	44.00	70.36	46.00
Gumtrao <i>Thach</i>	72.22	19.00	85.00	26.00
Patal Meadow	67.22	46.00	80.44	53.00
Dhela <i>Thach</i>	41.88	33.00	55.63	40.00

4.3.3 Changes in species composition and Species Richness around *Thaches*

The density and percent frequency of herbaceous vegetation at six sites have been compared (4.3.2a ñf). Most significant changes in terms of ground cover as well as species richness were seen around Shilt, Gumtrao and Patal *Thaches*. Density and frequency of most of the species have changed since 1997 ñ 98, but their species composition showed only marginal response in all the study sites. At Rolla, wild buckwheat (*Fagopyrum cymosum*) has increased drastically in terms of density and frequency. Similarly, proportion of species which spread due to trampling and camping such as *Achyranthus aspera*, *Cyathula capitata* and *Rumex nepalensis* have declined around Rolla. Around Shilt *Thach*, abundance of nitrophilous species such as *Urtica dioica*, *Rumex nepalensis* and *Impatiens sulcata* have decreased at most of the *Thaches*. Most noticeable changes in the species composition were profuse growth of *Dactylis glomerata*, a highly palatable grass around Gumatrao Camp, *Barbarea intermedia* around Gumtrao and Patal *Thaches* and noticeable changes in the abundance of two medicinal and aromatic plants viz., *Jurinea dolomiaea* (= *J. macrocephala*) and *Dactlyorhiza hatagirea* (Hathpanja) around the *Thaches* monitored during this study.

It was expected that several opportunistic and weedy species in alpine meadows viz., *Polygonum amplexicaule*, *Polygonum polystachyum*, *Impatiens sulcata*, *Cirsium verutum*, *C. falconeri*, *Morina longifolia*, *Athyrium schimperi* and *Rumex nepalensis* would decline gradually with the decrease in anthropogenic pressures.

Table 4.3.2a Comparison of Mean Density (# m⁻² ±SE) and % Frequency of herbaceous plants around Rolla during 1997 ñ 98 (n = 10) and Present study (2010-11) (n = 10)

Species	1997-98		2010-2011	
	Mean Density	% Frequency	Mean Density	% Frequency
<i>Achyranthus aspera</i>	4.42	20	1.4±0.94	20
<i>Carex setigera</i>	3.22	80	6.6±2.12	90
<i>Cyathula capitata</i>	1.04	20	0.2±0.2	10
<i>Fagopyrum cymosum</i>	0.28	10	4.4±1.14	80
<i>Phacelurus speciosus</i>	2.45	10	15.0±6.54	40
<i>Strobilanthes atropurpureus</i>	1.11	30	2.5±1.35	30
<i>Rumex nepalensis</i>	6.03	50	1.0±0.80	20
<i>Urtica dioica</i>	0.23	10	-	-
<i>Viola serpens</i>	4.10	30	1.1±0.40	50
<i>Festuca gigantean</i>	-	-	5.9±1.14	10
<i>Polygonum amplexicaule</i>	-	-	3.9±2.65	20
<i>Polygonum chinense</i>	-	-	6.3±3.3	30

Table 4.3.2b A comparison of Mean Density (# m⁻² ±SE) and % Frequency of herbaceous plants around Shilt during 1997 ñ 98 and Present study (2010-11) [n = 10 for both years]

Species	1997-98		2010-2011	
	Mean Density	% Freq.	Mean Density	% Freq.
<i>Anaphalis triplinervis</i>	6.45	40	1.7±1.03	30
<i>Chaerophyllum villosum</i>	3.32	80	7.2±1.74	70
<i>Geranium wallichianum</i>	2.11	40	9.1±3.15	50
<i>Impatiens sulcata</i>	4.56	80	3.2±0.51	90
<i>Phlomis bracteosa</i>	1.02	30	4.1±1.31	60
<i>Polygonum</i>	1.89	80		90
<i>amplexicaule</i>			2.0±0.30	
<i>Polygonum</i>	0.90	40		50
<i>polystachyum</i>			3.3±1.13	
<i>Rumex nepalensis</i>	8.65	70	2.1±1.16	30
<i>Selinum vaginatum</i>	2.12	50	2.8±1.15	40
<i>Urtica dioica</i>	0.32	40	0.4±0.4	10
<i>Verbascum thapsus</i>	1.02	10	-	-
<i>Viola serpens</i>	-	-	6.5±3.12	40

Table 4.3.2c A comparison of Density (# m⁻² ± SE) and % Frequency of herbaceous plants in Gumtrao Ridge during 1997 ñ 98 (n=65) and Present study (2010-11; n = 20)

Species	1997-98		2010-2011	
	Mean Density	% Freq.	Mean Density	% Freq.
<i>Anaphalis nubigena</i>	10.19±0.39	30.60	25.8±7.25	60
<i>Anemone rupicola</i>	3.37±0.44	21.42	4.3±1.02	70
<i>Cirsium verutum</i>	1.05±0.05	18.36	3.3±3.3	10
<i>Dactylorhiza hatagirea</i>	2.12±1.22	22.95	5.6±1.96	50
<i>Danthonia cachymeriana</i> *	0.25±0.00	45.90	10.2±3.54	50
<i>Delphinium vestitum</i>	1.79±0.22	21.42	4.1±4.1	10
<i>Gentiana capitata</i>	3.18±0.80	27.54	6.3±3.29	30
<i>Geranium wallichianum</i>	0.79±0.25	15.36	3.2±1.79	30
<i>Geum elatum</i>	2.59±0.95	76.50	12.1±5.13	40
<i>Gymnadenia orchides</i>	-	-	3.5±2.36	20
<i>Hackelia uncinata</i>	0.39±0.00	21.42	6.6±1.66	70
<i>Impatiens sulcata</i>	2.78±1.22	7.65	2.1±1.09	50
<i>Jurinea dolomiaea</i>	5.38±1.00	38.25	11.4±3.15	60
<i>Kobresia nepalensis</i>	0.46±0.20	18.36	18.5±18.5	10
<i>Morina longifolia</i>	0.09±0.01	22.95	2.0±2.0	10
<i>Phleum alpinum</i>	3.19±0.14	9.00	8.0±5.33	20
<i>Phlomis bracteosa</i>	0.39±0.00	38.25	5.6±1.94	50
<i>Polygonum amplexicaule</i>	2.79±1.21	85.68	4.9±1.41	90
<i>Polygonum viviparum</i>	3.37±1.35	68.85	5.6±1.44	80
<i>Potentilla atosanguinea</i>	3.18±2.52	21.42	1.6±1.02	30
<i>Ranunculus hirtellus</i>	6.59±2.35	38.05	3.2±2.21	20
<i>Rumex nepalensis</i>	1.20±0.50	21.42	0.1±0.10	10
<i>Selinum vaginatum</i>	0.98±0.21	21.42	2.2±1.53	20
<i>Tanacetum dolichophyllum</i>	2.39±1.52	7.65	3.8±3.8	10
<i>Athyrium schimperi</i>	1.20±0.50	4.59	3.3±3.3	10

* Tussock forming grass

Table 4.3.2d A comparison of Mean Density (# m⁻² ±SE) and % Frequency of herbaceous plants in Gumtrao near camp site during 1997 ñ 98 (n = 65) and Present study (2010-11; n = 20)

Species	1997-98		2010-11	
	Mean Density ± SE	% Freq.	Mean Density	% Freq.
<i>Anemone obtusiloba</i>	1.54±0.28	21.42	3.5±3.5	5
<i>Artemisia dubia</i>	-	-	12.2±8.2	15
<i>Barbarea intermedia</i>	-	-	1.8±0.74	45
<i>Cirsium verutum</i>	0.12±0.00	85.68	2.3±0.73	60
<i>Dactylis glomerata</i>	-	-	6.8±2.17	75
<i>Delphinium vestitum</i>	-	-	0.7±0.47	20
<i>Gentiana capitata</i>	-	-	0.6±0.6	5
<i>Geranium wallichianum</i>	4.32±1.28	21.42	1.1±0.76	15
<i>Geum elatum</i>	2.56±1.22	7.65	-	-
<i>Hackelia uncinata</i>	0.60±0.03	38.25	4.9±2.65	25
<i>Impatiens sulcata</i>	1.46±0.72	18.36	3.1±2.13	20
<i>Morina longifolia</i>	1.08±0.44	22.95	0.4±0.30	20
<i>Nepeta erecta</i>	0.08±0.00	9.00	3.9±3.9	5
<i>Pedicularis hoffmeisterii</i>	1.43±0.64	7.65	-	-
<i>Phlomis bracteosa</i>	2.65±1.35	22.95	4.0±1.77	35
<i>Polygonum amplexicaule</i>	5.31±2.65	24.48	4.8±1.98	40
<i>Polygonum polystachyum</i>	4.36±2.81	73.44	7.9±2.73	50
<i>Polygonum viviparum</i>	1.26±0.45	7.65	7.8±4.09	30
<i>Potentilla atosanguinea</i>	3.38±1.24	9.00	2.0±2.0	10
<i>Potentilla argyrophylla</i>	0.26±0.00	22.95	-	-
<i>Ranunculus hirtellus</i>	1.26±0.58	38.25	4.3±1.88	40
<i>Rumex nepalensis</i>	10.26±2.81	85.68	4.4±2.12	35
<i>Selinum vaginatum</i>	3.56±1.76	9.00	12.9±12.9	10
<i>Urtica parviflora</i>	3.11±1.15	30.6	1.5±0.80	25

Table 4.3.2e A comparison of Mean Density (# m⁻²±SE) and % Frequency of herbaceous plants around Patal *Thach* during 1997 ñ 98 (n = 65) and Present study (2010-11; n = 20)

Species	1997-98		2010-11		
	Mean Density	% Freq.	Mean Density	% Freq.	
<i>Achillea millifolium</i>	-	-	0.5±0.34	20	
<i>Aconitum violaceum</i>	-	-	0.7±0.7	5	
<i>Agrostis pilosula</i>	-	-	1.1±0.48	40	
<i>Anaphalis nubigena</i>	4.00±1.94	15.36	2.4±1.28	25	
<i>Anemone obtusiloba</i>	2.67±0.19	16.50	0.5±0.50	10	
<i>Arenaria serpyllifolia</i>	-	-	1.5±1.06	20	
<i>Artemisia dubia</i>	-	-	0.6±0.22	45	
<i>Barbarea intermedia</i>	-	-	4.2±2.24	25	
<i>Cirsium verutum</i>	1.24±0.42	18.36	0.2±0.13	20	
<i>Cyananthus lobatus</i>	-	-	0.2±0.2	10	
<i>Chaerophyllum villosum</i>	2.67±1.24	9.00	0.2±0.2	10	
<i>Cicerbita microrhiza</i>	-	-	0.1±0.1	5	
<i>Dactylorhiza hatagirea</i>	1.46±0.82	9.00	4.6±4.6	10	
<i>Geranium wallichianum</i>	0.80±0.00	35.68	-	-	
<i>Geum elatum</i>	1.67±1.10	58.85	1.0±0.36	50	
<i>Hackelia uncinata</i>	0.33±0.00	21.42	1.1±0.52	40	
<i>Impatiens sulcata</i>	1.33±0.75	38.05	-	-	
<i>Jurinea dolomaea</i>	0.67±0.02	21.42	1.5±0.58	50	
<i>Morina longifolia</i>	0.33±0.01	21.42	-	-	
<i>Pedicularis hoffmeisterii</i>	0.30±0.00	7.65		10	
<i>Phleum alpinum</i>	-	-	0.5±0.5		
<i>Phlomis bracteosa</i>	3.67±2.14	45.68	1.3±1.3	5	
<i>Polygonum amplexicaule</i>	3.45±1.82	68.85	0.2±0.13	20	
<i>Polygonum polystachyum</i>				45	
<i>Polygonum viviparum</i>	3.67±1.25	21.42	0.5±0.16		
<i>Potentilla atosanguinea</i>				25	
<i>Potentilla argyrophylla</i>			0.5±0.26		
<i>Ranunculus hirtellus</i>	2.37±1.21	38.05	1.3±0.57	40	
<i>Rumex nepalensis</i>	4.33±1.25	21.42		5	
<i>Selinum vaginatum</i>			0.3±0.3		
<i>Tanacetum longifolium</i>	1.08±0.25	21.42	0.7±0.47	20	
	0.30±0.00	7.65	0.2±0.2	5	
	4.30±1.21	38.05	1.2±0.85	20	
	2.30±1.08	21.42	2.5±2.5	10	
	1.40±0.65	7.65	-	-	

Table 4.3.2f A comparison of Density (# m⁻² ±SE) and % Frequency of herbaceous plants in Dhela Thach during 1997 ñ 98 and Present study (2010-11) [n = 40 in 1997-98; n = 15 in 2011]

Species	1997-98		2010-11	
	Mean Density	% Freq.	Mean Density	% Freq.
<i>Anemone obtusiloba</i>	5.04±1.12	15	0.35±0.33	6.67
<i>Artemisia dubia</i>	-	-	1.33±1.33	6.67
<i>Athyrium schimperi</i>	3.68±2.56	17.50	2.34±1.59	13.35
<i>Barbarea intermedia</i>	0.28±0.80	15	2.44±1.10	26.65
<i>Chaerophyllum villosum</i>	3.68±2.56	45	0.78±0.50	13.35
<i>Cirsium verutum</i>	1.68±1.56	7.5	0.11±0.09	13.35
<i>Dactylorhiza hatagirea</i>	0.05±0.00	2.5	1.78±1.23	13.35
<i>Danthonia</i>	1.20±0.51	15	2.80±1.30	26.65
<i>cachymeriana*</i>				
<i>Delphinium vestitum</i>	0.37±0.00	10	-	-
<i>Gentiana capitata</i>	1.51±0.15	2.5	-	-
<i>Geranium wallichianum</i>	0.86±0.03		1.22±0.82	13.35
<i>Geum elatum</i>	2.25±1.02	75	0.65±0.66	6.67
<i>Hackelia uncinata</i>	0.28±0.00	15	1.56±1.13	13.35
<i>Impatiens sulcata</i>	3.35±2.25	7.5	3.56±3.53	6.67
<i>Jurinea dolomiaea</i>	1.05±0.30	15	2.44±0.72	53.36
<i>Kobresia nepalensis</i>	-	-	3.48±1.35	46.66
<i>Morina longifolia</i>	0.15±0.60	15	-	-
<i>Phleum alpinum</i>	2.10±0.85	17.50	0.22±0.20	6.67
<i>Phlomis bracteosa</i>	2.26±0.80	77.50	1.22±1.20	6.67
<i>Polygonatum</i>	-	-	0.22±0.14	13.35
<i>verticellatum</i>				
<i>Polygonum</i>	3.45±2.30	27.50	3.95±3.93	6.67
<i>amplexicaule</i>				
<i>Polygonum</i>	4.35±1.80	17.50	2.35±1.04	26.65
<i>polystachyum</i>				
<i>Polygonum viviparum</i>	1.25±0.85	75	1.65±0.55	46.65
<i>Potentilla</i>	2.36±0.55	7.5	0.34±0.33	6.67
<i>atrosanguinea</i>				
<i>Ranunculus hirtellus</i>	0.58±0.01	15	2.11±0.72	46.66
<i>Rumex nepalensis</i>	6.54±4.20	32.50	1.85±1.86	6.67
<i>Selinum vaginatum</i>	3.15±2.00	15	2.42±1.11	26.65
<i>Tanacetum</i>	0.82±0.00	2.5	-	-
<i>dolichophyllum</i>				
<i>Urtica dioica</i>	1.02±0.65	7.5	-	-

* in tussocks

4.3.4 Status of Shrub Layer and Hill Bamboo

One of the major factors affecting the structure of woody vegetation prior to 1999 in many parts of GHNP was excessive dependence on fuel wood by the herb collectors. The common species used for fuel wood in the alpine and sub-alpine areas were *Rhododendron campanulatum*, *Rhododendron lepidotum*, *R. anthopogon*, *Betula utilis*, *Juniperus communis* and *J. pseudosabina* (= *J. indica*). The herb collectors (as well as shepherds) used to carry logs / twigs of *Quercus semecarpifolia*, *Thamanocalamus spathiflorus* and *Abies spectabilis* to alpine zone (3600 m) for their camps. Fuel wood collection was much higher near treeline compared to temperate forests. People visiting these pastures *i.e.* graziers, medicinal plant collectors, patrolling staff and pilgrims, are also responsible for the destruction of these species. Few species such as *Juniperus communis*, *Juniperus pseudosabina* and *Betula utilis* were totally absent from camping site. Though, the changes in tree and shrub layer from the temperate and sub-alpine forests could not be compared during the present study. However, it was observed that two species of hill bamboo *viz.*, *Sinarundinaria falcata* (= *Arundinaria falcata*) and *Thamnocalamus spathiflorus* which flowered gregariously during 2000 ñ 2002 in the temperate and cool temperate ñ subalpine areas have germinated profusely and understory vegetation along the T1 and S2 had high abundance of both the species along with other natural associates. These are most valuable fodder species for a variety of wild ungulates and also provide natural cover for pheasants. Thus it could be ascertained that regeneration of these species have led to improved habitat condition along the survey route.

Though the differences in the overall ground cover and density of shrubs were statistically significant (Independent samples test, $t=0.764$; $df=18$, 95% interval), it was not possible to separate the changes caused due to ban on livestock grazing from that of trampling and herb collection. Hence all changes in vegetation cover and species richness around the alpine meadows are as result of cumulative effects. The data on two hill bamboos were also not statistically comparable due to different phenophases *i.e.*, large tussocks and fully grown clumps prior to 2000 and young seedlings profusely growing as an understorey in the same area during 2007-2008.

During the post-Final Notification of GHNP, there has been a visible impact on the fuel wood species such as *Quercus semecarpifolia*, *Thamanocalamus spathiflorus* and *Abies*

spectabilis to show a recovery. Fuelwood collection near treeline zone by the graziers, medicinal plant collectors, patrolling staff and pilgrims has been checked. The fodder species mainly the green leaves of oaks e.g. *Quercus semecarpifolia*, *Quercus floribunda* and *Quercus leucotrichophora* used to be collected from alpine and sub-alpine zones. The grasses used as an alternative to fodder species belonging to the shrub genera viz. *Indigofera*, *Desmodium*, *Sinarundinaria* and *Thamnoclamus* are showing improvement in their density in the Park. The collection of the bamboo species *Sinarundinaria falcata* and *Thamnocalamus spathiflorus* has also been checked which forms important habitat for many wild animals such as goral, and rhesus macaque. Black bear and common langur eat young shoots.

4.3.5 Status of Pheasants

Much of the results presented below on the status of pheasants were drawn from a recent work by Miller et al. 2008. According to the study, population abundances for three pheasant species (Western Tragopan, Koklass and Himalayan Monal) showed large recovery over the ten-year period. Himalayan Monal encounter rates tripled from 2.2 ± 1.1 birds/km in 1998 to 6.1 ± 3.0 birds/km in 2008 with a significant increase of 3.9 birds/km ($z = -2.86$, $p < 0.005$, $n = 24$; Fig. 4.3). Encounter rates for the Koklass Pheasant also tripled from 3.2 ± 1.2 birds/station to 10.9 ± 2.9 birds/station, a rise of 7.7 birds/ station ($t = -11.5$, $df = 35$, $p < 0.0001$; Fig. 4.3). The abundance of Western Tragopan increased from 0.2 ± 0.0 birds/station to 3.2 ± 1.4 birds/station, or 3.0 birds/station, an encounter rate 16 times greater than the 1998 value (Fig. 4.3). Although no statistical tests were conducted to confirm differences between 1998 and 2008 abundances for Western Tragopan, the distance between 95% confidence intervals strongly suggests the validity of these contrasting values.

Table 4.3 Results (1997-1999) and after (2008) the Ecozone interventions (development t of alternative livelihoods) (a) Himalayan Monal; (b)

Transect	Encounter rate in birds/km (Monal) or birds/station (Koklass and Tragopan)								
	1997-1999 ¹			2008			Change from 1997-1999 to 2008		
	Himalay an Monal	Koklass Pheasant	Western Tragopan	Himalayan Monal ⁴	Koklass Pheasant	Western Tragopan	Himalayan Monal	Koklass Pheasant	Western Tragopan
Rolla-Dulunga	0.8 ± 0.3	1.2 ± 0.3	0.0	0.8 ± 0.3	9.3 ± 0.3 ⁴	0.0 ²	0.0	8.1	0.0
Dulunga-Grahani	2.4 ± 0.5	0.2 ± 0.1	0.4 ± 0.2	3.0 ± 0.7	10.0 ± 1.2 ⁴	1.5 ± 2.1 ³	0.6	9.8	1.1
Shilt-Chorduar	3.9 ± 0.5	1.2 ± 0.3	0.0	10.6 ± 2.3	8.6 ± 0.6 ⁶	4.5 ± 0.7 ³	6.7	7.4	4.5
Shilt-Daran	2.5 ± 0.6	0.7 ± 0.2	0.4 ± 0.1	2.5 ± 0.9	9.0 ± 0.7 ⁴	0.0 ²	0.0	8.3	-0.4
Rolla-Basu	1.5 ± 0.8	0.3 ± 0.1	0.0	2.0 ± 0.7	7.6 ± 1.3 ⁶	0.8 ± 0.8 ⁵	0.5	7.3	0.8
Basu-Koilipoi	1.4 ± 0.4	0.4 ± 0.2	0.2 ± 0.1	8.5 ± 2.5	6.0 ± 1.3 ⁶	1.5 ± 0.6 ⁵	7.1	5.6	2.3

Koklass Pheasant; and (c) Western Tragopan.

¹Pooled mean between years, n=11

(Ramesh 2003)

²Arithmetic mean, n=1

³Arithmetic mean, n=2

⁴Arithmetic mean, n=4

⁵Arithmetic mean, n=6

⁶Arithmetic mean, n=8

The results of this study indicate that abundances of Himalayan Monal, Koklass Pheasant and Western Tragopan have increased significantly since livestock grazing and the collection of NFTPs were banned in the GHNP. In the years immediately prior to Final Notification (1997-1999) during the formative period of development of alternative livelihoods, the pheasant populations showed decline in response to human activities in their habitats (Ramesh et al. 2005). The recent reduction in human disturbance appears to have caused the populations to rapidly recover, indicating high species sensitivity to disturbance.

This finding is consistent with the conclusions of previous studies on species responses to reduced human disturbance (Madhusudan 2004, Harihar et al. 2008). Additionally, a previous study measuring abundances of the Satyr Tragopan (*Tragopan satyra*) and Koklass Pheasant in comparable vegetation types with less human disturbance measured encounter rates ranging from 5.0 to 7.0 birds/station and 4.2 to 5.7 birds/station, respectively (Kaul and Shakya 2001). The close resemblance to our data (Table 4.3) suggests that populations of Western Tragopan and Koklass Pheasant in the GHNP may be approaching more natural abundances than recorded in the past.

As indicator species, the Himalayan Monal, Koklass Pheasant and Western Tragopan may reflect the conservation status of temperate forest ecosystems of the Western Himalaya. The three pheasant species inhabit a variety of vegetation types between 2,000m and 4,500m ranging from upper temperate broadleaf, conifer and sub-alpine oak forests to dense undergrowth of bamboo and alpine scrub, to open grassy meadows and slopes, to barren cliff sides (Ramesh 2003). The increased abundances of these species suggest that these habitats in the GHNP may also be quickly recovering. Several mammalian species share the pheasants' habitats, including prominent species such as goral (*Nemorhaedus goral*), Himalayan tahr (*Hemitragus jemlahicus*), Asiatic black bear (*Ursus thibetanus*), Himalayan brown bear (*Ursus arctos*), Common leopard (*Panthera pardus*), red giant flying squirrel (*Petaurista petaurista*) and yellow-throated marten (*Martes flavigula*). Populations of these species are also likely to benefit from improved habitat quality as a result of lower human disturbance.

4.3.6 Ungulates

Pheasants were the main indicator species that were studied to notice changes before and after the Final notification. However, Ghoral, Musk Deer and Himalayan Tahr (Tables 4.5 a-d) were the main ungulate species for which data was collected during the CoB Project in pre-1999 period (Vinod and Sathyakumar 1999). In post 1999 period data for these species was collected based on opportunistic sampling during surveys. The data thus collected was mainly performed to explain distribution of the ungulates. Thus the inferences of this research are mainly based on changes in vegetation and pheasants.

Gorals in the study area were sighted more between 2300m and 2600m. Sightings were low in altitudes below 2200m and above 2900m. Southerly aspects (Southeast, South and Southwest) were used relatively more during all seasons.

Table 4.5a Density estimates ($\#/km^2$) for Ghoral. Results (1998) after Ecozone interventions (development of alternative livelihoods).

Transect Name	1998	2002	2003	2004	2009	2010
Kharongcha-Rolla	3.17	2.7	4.1	4.3	4.0	4.3
Rolla-Shilt	12.87	12.1	13.1	12.8	12.4	13.8
Rolla-Basu	18.76	21.2	22.7	18.3	22.9	22.4
Chalocha-Nara	17.16	16.3	18.1	18.5	19.2	18.8

Himalayan Musk Deer was studied using the silent drive counts. They were sighted in areas between 3200m and 4000m with a slight seasonal variation in use. They used slightly lower altitudes (3300 m to 3500 m) during spring compared to autumn. Himalayan musk deer mainly used areas with low tree cover (<10 %), moderate to high shrub cover (between 21-30 % to 51-60 %), low grass cover (<20 %) and moderate rock & soil cover (11-40 %) (ibid).

Table 4.5b Density estimates ($\#/km^2$) for Musk Deer using silent drive count. Results (1995-1998) and after Ecozone interventions (development of alternative livelihoods).

Thach	1995	1996	1997	1998	2003	2008	2010
Guntarao	3.33	3.33	3.33	4.44	7.1	6.8	6.7
Dhel	Not measured	2.86	Not measured	1.43	3.4	3.5	3.2
Majhoni	Not measured	Not measured	Not measured	Not measured	Not measured	4.3	Not measured

Himalayan tahr were sighted in a wide altitude range (2801-4000m) in the study area with a preference to the altitude between 3300 and 3500 m. They were mostly sighted in the southerly aspects (Southeast, South & Southwest) on steeper slopes. All the sightings of Himalayan tahr occurred in areas with less than 10% tree cover. They used areas with low shrub cover with rock and soil.

Table 4.5c Density estimates (#/km²) for Himalayan Tahr. Results (1998) and after Ecozone interventions (development of alternative livelihoods).

Meadows	1998	2003	2006	2008	2010
Guntarao	4.4	3.9	4.1	3.7	Not measured
Nara	3.3	4.8	4.7	4.6	4.6
Supakhani	4.1	4.7	5.1	5.3	5.6

Bharal or Blue Sheep have been found in GHNP at the headwaters of Tirthan, Sainj and Jiwa Nal rivers. Early spring when the snow start melting make the area approachable to observe Bharal which are mostly above 3,900 m. Mostly they have been seen in big groups of 25 to 40 animals.

Table 4.5d Density estimates (#/km²) for Bharal (Blue Sheep). Results (1998) and after Ecozone interventions (development of alternative livelihoods).

Meadows	2000	2006	2008
Tirath	28	25	31
Khandedhar	15	18	Not Measured

The Blue Sheep does not share its habitat with the pheasants. This species was not studied in the pre-Final notification period. However, they have been sighted during the transact walks with increasing number of sightings over the years.

4.4 Discussion

The research work done by the scientists and researchers of the Wildlife Institute of India during the CoB Project (1994-99) was very crucial to undertake the present research. The WII

research provided a basis to plan and manage affairs that followed the Final Notification of the Park in May 1999. The closure of the Park brought in a phase of unrest among those who were dependent on Park's herbs for their livelihoods. The WII research inputs provided data of the Park dependent people, thus facilitated planning for the transition into development of alternative livelihoods in the affected HHs. The WSCGs of targeted HHs became vehicle for this transition with an assumption that they were more amiable to follow a microcredit scheme to save their own money to undertake IGAs. The women were easy to get persuaded for alternative livelihoods as compared to man.

Present research shows that the organized WSCGs were quick to adopt such IGAs which were easy to handle and to fetch them quick returns. The discussions between Group Organizers (trained by the Park) and WSCGs in combination with the Park's awareness programmes (street theatre) were to discourage the herb collectors (male members) from going into the Park. This was done with an objective of linking the livelihood generation with the reduction/mitigation of human pressures to induce conservation of biodiversity of GHNP. The Park staff backed up the livelihood generation programme by persuading the herb collectors not to go into the Park as the law did now allow it. Villagers while complaining about the restrictions imposed by the Park, also accept the need for some restrictions on resource uses, and Park authorities while taking strong action on making GHNP 'inviolate', accept the human need to resolve the life and livelihood problems of the people (Wani and Kothari 2007).

The Kala Jatha (street theatre) has been going from village to village (more than 350 performances in Ecozone as per Park record) campaigning for the protection of wildlife and spreading the message of alternative livelihood development that was available for HHs which depended on the Park resources. In post Final Notification times, there have been a few violators of the provisions of Indian Wildlife (Protection) Act 1972. In past five years, seven groups of offenders from the villages of Sungcha, Shalinga, Daran and Nahin, close to the Park boundary were caught grazing their sheep and goats in the Park (Park records). These graziers were fined a nominal amount by the court and left with a warning. A few villagers from Ecozone were caught for illegal herb extraction. However, in most of the cases the

quantity of collection has been very little and for domestic use. The Park staff tries to trace identity of such offenders to their WSCGs so that IGAs in such groups are further strengthened to avoid such incidences in future. Upon Final Notification of Park, the measures of providing alternative livelihood options in association with compensation, implementation of law, personal contacts, and awareness-generation programmes proved very effective in reducing pressures on the Park.

In addition to the WSCGs, there were other related institutions and NGOs which contributed to the effectiveness of WSCGs and process of reducing pressures on the Park. The Biodiversity Conservation Society (BiodCS) facilitated propagation of medicinal herbs with the help of WSCGs in the Ecozone of GHNP. The BiodCS headed by the Forest Minister of Himachal Pradesh made rules for Ecozone and GHNP to enable participation of Ecozone NGO (SAHARA, later BTCA) in the IGA of ecotourism. Only male members of WSCGs were to become part of ecotourism team so that they also contribute to the incomes of the Park-affected HHs. A prominent rule that was made by BiodCS is entry of trekkers in the Park only through Ecozone NGO (BTCA). This was to facilitate local NGO to regulate trekkers in the Park in association with the Park officials. The Friends of GHNP and My Himachal are other NGOs that contributed to the popularity of GHNP biodiversity and its conservation through WSCGs in foreign countries. Moreover, the GHNP field staff (which has always been below 30 forest guards and rangers) alone cannot save/conserves Park's biodiversity spread over 760 sq km area. Its facilitation of incorporating local communities through WSCG, BiodCS, BTCA, My Himachal could help reduce pressures on the biodiversity values of the Park.

Although slack in enforcing restrictions on NFTP collection, the Forest Department appears to actively prevent livestock grazing in the Park. In a survey of select villages in the Tirthan Valley, 10% of all households said they no longer graze their livestock inside the GHNP and 22.7% of these cited Park restrictions as the primary reason for their shift (Pisharoti 2008). Some villagers reported confrontations with forest guards in which they were repetitively blocked from passing through the entry gate with livestock. One man mentioned that the Forest Department had filed a law case against several shepherds, although I could not locate

documentation to confirm legal action. Regardless, the rumor seems to have intimidated many villagers and prevented them from attempting to graze livestock in the Parkô (ibid).

The above findings are corroborated by the impacts on biodiversity values of the Park. During 2006-08 period, the meadows of Dhel, Patal and Guntarao that were studied after the Final Notification based on qualitative and quantitative analysis. The *Jurinea macrocephala* was easy to see in most of the meadows as compared to the period before the Final Notification. However, the tall forbs such as *Polygonum polystachyum* and *Polygonum amplexicaule* continue to dominate meadows of Patal, Guntarao and Nada. The Dhel meadow shows a preponderance of *Anemone tetrasepala*, *Geum elatum*, *Geranium wallichianum*, *Potentilla atosanguinea*, which have been intolerant to grazing. The moderately intolerant species of *Delphinium cachymeriana*, *Jurinea macrocephala*, *Pedicularis* spp., *Phlomis bracteosa*, and *Tanacetum longifolium* are abundant and *Impatiens sulcata*, *Plantago erosa*, *Rumex nepalensis*, *Polygonum polystachyum* and *Athyrium foliolosum* had high density near camping sites. In other meadows Nada, Tirth, Dhel where herb collection used to be extensive, the species such as *Allium humile*, *Dactylorhiza hatagirea*, *Meconopsis aculeata*, *Podophyllum hexandrum*, *Selinum tenuifolium* and *S. vaginatum* had higher density in the altitudes above 3,800 m that seemed to be favourable for their growth. In Rolla (extensive collection area) few species viz. *Angelica glauca*, *Berberis lycium*, and *Thymus linearis* were not observed.

Among animals, pheasants have emerged as the indicators of improvement of habitat in GHNP. In 1998, K. Ramesh (Ramesh et al. 1999) observed groups with as many as 50 people entering the GHNP on a single day to collect mushroom, which has considerably reduced in the post Final Notification period. Similarly there is conspicuous absence of domestic dogs in the Park from 2005 onwards whereas villagers had previously brought their dogs for protection against wild animals (Ramesh et al. 1999). This change has reduced disturbances to breeding pheasants. The increase in pheasant densities especially of Western Tragopan and Koklass suggests that their habitat, the temperate forests has been positively impacted by the livelihood development programme. Likewise, the herbivores share habitat with the pheasants and show an increase in their sightings.

4.5 Conclusion

The present research brings out a few very prominent conclusions, the most important being that a government organization could successfully perform community based conservation which is often seen a domain of non government organizations. More so, the GHNP experience refutes the contention of such opinions which look at strict enforcement measures for biodiversity conservation through emphasis on nature protection, and view critically the role of local communities as saviors of ecology (Terborgh, 1999; Oates 1999). Such exclusionary approach may have succeeded in several places but at a significant social cost and conflict, especially in developing countries (Lele et al. 2010). On the other hand, the GHNP experiment supports the viewpoint of scholars who look at the socio-political aspects of nature conservation and elaborate upon the mechanisms which can be evolved through concerted negotiations with the local communities (Brandon and Wells 1992; Martino 2001; Neumann 1997; Ferraro and Kramer 1997; West and Brechin 1991; Brandon 1996; Wells et al. 1999; Brechin et al. 2002).

Moreover, there is a growing awareness in India among the state governments, courts, non-governmental organizations, conservationists, human right activists about the role of biodiversity conservation in maintaining the ecological balance. The GHNP example of development of alternative livelihoods in support of biodiversity values highlights the fact that this is very important for the Park leadership to coordinate efforts of the partners in conservation to make a tangible impact. Perhaps the most important aspect at GHNP has been the leadership provided by the Park Director to work with socially-inclusive policies and programmes which exist in the government system.

Chapter 5

General Discussions and Conclusions

The present research work investigated whether more socially inclusive policies could lead to better conservation. To test such a hypothesis, the example of the Great Himalayan National Park was selected where the Final Notification had been issued after settling the rights of the local people in the Park. The Park administration tried to set up a programme of alternative livelihoods for the households who lost their Park dependent incomes. Various methodologies were engaged to look into impacts of livelihood options in the Ecozone and their connection to the conservation of Park's biodiversity. The lessons learnt here are expected to be useful in similar situations elsewhere in the country.

5.1 Overall Impact of Alternative Livelihood Development on Households who Lost Park-Dependent Incomes

Two major dependencies on GHNP have been of herb collection and grazing. There were about 1100 Households (HHs) in the Ecozone involved in herb collection and about 20,000 sheep and goats were coming to graze in the Park prior to 1999. Both of these activities were exclusively done by the men. In 1999, when the Final Notification of GHNP was issued, the men were very agitated by the ban on their entry into the Park. In these disturbing times, the Park administration started working on the relationships and contexts (Chapter 3) with an assumption that when poor women were incorporated and involved in poverty reducing interventions, the outcome could be very significant in just a few years.

An attempt was made at GHNP to bring forth women and gender relations in development of alternative livelihoods. Presumably, the dependencies of such HHs who depended on the Park resources for their livelihoods would be decreased if they were provided with the alternative source of incomes. The research work was based on an assessment of incomes that the WSCGs could earn due to introduction of alternative livelihoods in the HHs which were Park dependent before 1999. The methodology adopted for the research work was based on a

comparison of Treatment Set (WSCGs) and Controlled Set (which were not organized as WSCGs). The results show that the women in the Treatment Set which was about 25% (n=273) of the one thousand women of poor households, started earning from varied income generation activities such as sale of vermicompost; Apricot oil; and agricultural produce. They could earn wages from Parkös medicinal plant nurseries, and Kala Jatha (street theatre), and Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS). The male members of the WSCGs earned from Community Based Ecotourism.

As the programme of livelihood generation progressed, both women and men gained access to more income generation options. In absence of authentic data on the herb collectors incomes before 1999, it is difficult to assess if the incomes from these livelihood options match significantly with the ones from medicinal plant collection/grazing of sheep and goats in the Park. However, the fact remains that upon closure of the Park, these HHs in the Ecozone started getting additional incomes through the alternative income generation activities (Personal Observation), which was a beginning of women and men becoming part of conservation agenda of GHNP (Chapter 3).

The Treatment Set shows that the WSCGs members took responsibility to spend their own savings which helped them gain ability of decision-making in their selection of IGA such as vermicomposting or apricot oil production. The interventions of LPG units in a WSCGs could bring in drudgery-reduction as it could reduce the women burden of fuelwood collection from ecozone forests. Once organized in a group the women of a WSCG could better relate to the Panchayats as is evident from their election to the Panchayat posts of Pradhan and Panch.

The normal working of the Government Forest Department seldom includes an integrated approach to strengthen forest-dependent livelihoods; the government departments continue to undertake uncoordinated piecemeal initiatives to benefit communities. At GHNP, the stoppage of herb collection and grazing were to hurt the poorest forest users who were unable to replace the diminishing flows of forest products on which their livelihoods depended. These were the women of the poor families who faced food and livelihood insecurity which was expected to deteriorate further.

Accordingly, the conservation of biodiversity at GHNP was seen in relation with the development of a cost effective model for empowering and supporting the poorest forest-dependent women and men to strengthen their own livelihoods. This was done in ways which would increase value-added options from alternative income generation sources. Sustainable improvements in the livelihoods of poor forest-dependant people required interventions beyond the village level. It needed strengthening of non-government (Park NGO SAHARA and later BTCA, Friends of GHNP, My Himachal) and government institutions (HP Forest Department and Biodiversity Conservation Society), to enable them to develop and implement the integrated livelihood support mechanisms for the poor in the community, and working through the Panchayati Raj institutions (PRIs).

5.2 Main Strengths of Development of Alternative Livelihoods

Organizing the women of poor HHs in small identifiable, homogenous groups of about 10 to 15 individuals (such as a Women Saving and Credit Group) is helpful in mountain terrain where smaller group size is linked to the members (especially women) do not have to travel long distances in difficult terrain to attend meetings. The size of the group/organization is linked directly to its performance and its efficacy. This facilitates holding of meetings with adequate quorum. In a smaller group it is possible to listen to their voice and concerns and include in action plans. Thus a smaller group is more sustainable. What was more exciting was the noticeable change in women to collectively articulate and represent their interests, socially and politically, even when they were by and large poor (Tandon 2002).

A persistent complaint in the government sector has been that several government programmes meant for the poor do not reach them. An organized women's group(s) in GHNP Ecozone that consists of primarily the poorest households in the Panchayat ward becomes difficult to be ignored in surveys, census operations etc. and gradually acquires social and political significance. Groups also greatly facilitate collective articulation of women's interests and concerns at the village and panchayat level. The establishment of about 19 Medicinal Plant Production Areas exclusively by and for women's groups with the agreement of the concerned panchayats is a case in point (ibid).

Poor villagers participate in income generation programmes, which have very little investment, very low level of technological inputs and ready markets for the sale of produce, such as production of vermicompost in WSCGs which was readily bought by the Park management. The WSCGs showed a preference for such medicinal plants which fetch more incomes and easy to grow. The diverse income generation activities in WSCGs provided the members with more security. After SAHARA collapse, BTCA the new NGO is working hard to draw attention of WSCGs to the production loans. In long run, such WSCGs are going to be sustainable and will contribute to the conservation of the biodiversity of the Park.

There has been a change in attitude of males towards the women of the HH participating in the WSCGs who brought in money either through daily wages or as from income generating activities. The initial skepticism of males towards WSCGs is now changing into a pragmatic approach. There are reports of males sharing the household jobs to provide time to the women of HH to attend WSCG meetings (ibid). This change is also reflected in members' willingness to attend longer duration exposure visits and take up more activities that bring in income and improve livelihood opportunities.

The research findings are also corroborated by the Great Himalayan National Park assessment for its management effectiveness based on IUCN-WCPA Framework (Leverington et al. 2008). The Management Effectiveness Evaluation (MEE) Report prepared by the Wildlife Institute of India and Ministry of Environment and Forest makes a mention about the livelihood issues of resource dependent communities especially women that, this is the most positive and effective aspect of the PA management of GHNP and other areas under its umbrella. Formation of 92 WSCGs covering 980 poor HHs. Large savings by these groups in local banks undertaking alternative income generation activities thereby earning over 32 lakh rupees. Facilitating community based organizations involving user groups, local NGOs, Mahila Mandals, Yuvak Mandals, Ward Development Committees and Panchayats are some of the highlights of this activity. The GHNP has scored an overall 76.5% on its MEE Score Card (WII-MoEF 2007).

Conclusions about assessment of the livelihood generation in post 1999 period in the Ecozone of GHNP can also be drawn from the evaluation carried out by the World Bank (2002). The World Bank, under the CoB project stopped all project financing in GHNP on December 31, 1999, even though the CoB project at the KMTR and the FREE project continued for another two years (extended period). However, the World Bank conducted a review of the CoB project at GHNP in the first quarter of 2002, i.e. two years after the stoppage of World Bank financing at GHNP. The World Bank prepared an Implementation Completion Report (World Bank 2002) for the CoB project at the GHNP commented that, "In the GHNP, achievement of project objectives during the project period was unsatisfactory". However, during the post bank-financing period, some promising innovations have been established at GHNP. At GHNP, the processes in formation of local level institutions and micro planning left much to be desired. There has been little or no impact on the ground from ecodevelopment investments. The 16 village committees formed during project period are defunct. However, in the post credit closure period, women's saving and credit groups have been established covering poor families and a Biodiversity Conservation Society is in place. At GHNP, women's saving and credit groups have been successful. However, because project financed GHNP investments tended to be routine forestry works without imagination, without community involvement and without clearly targeted linkages to conservation, those ecodevelopment investments have not proved cost effective. A comparison of ecodevelopment programme of CoB Project and livelihood approach pursued in the post CoB Project is given in Appendix 5.

The development of alternative livelihoods provided strengths to a WSCG to be part of a livelihood based participatory Panchayat microplan. The micoplans based on WSCGs as the starting point (Fig 3.9) could reflect the doable steps for their livelihoods and natural resource management in a Panchayat Ward. 58 micoplans had been prepared in corresponding numbers of Panchayat wards of twelve Panchayats in the GHNP Ecozone.

5.3 Limitations of the Process of Development of Alternative Livelihoods

The Park administration could take up development of alternative livelihood programme only for the targeted HHs who were generating incomes from sale of herbs. However, the

migratory shepherds who were coming from the distant villages (away from Ecozone) could not be involved in such programme. The Park staff visited the migratory graziers to persuade them not to come to the Park. An alternate route was demarcated for their passage. Such an arrangement continued till four or five years in post Final Notification period. Some of the shepherds were taken to the court only in fifth year for illegal grazing.

The concepts of WSCGs microcredit scheme are very new to the villagers, especially in the remote areas. For some of them this is the first time that they are participating in market systems through production (income generation activities) or consumptive (personal/family requirements) loans. The group affinity by and large is not based on mutual trust among women. It is at the behest of the Park administration that the women in a WSCG have come together. They usually spend their savings on consumptive activities rather than loaning among the group members for production purposes. The October 2010 report of BTCA shows that out of total savings of Rs 9,73,906, the WSCGs have Rs 7,01,306 as bank deposit, Rs 25,700 as consumptive loans and Rs 62,900 as production loans (BTCA Records). In 2002-05, only one-fourth of the total savings of Rs 8,00,000 was circulated within the WSCGs as loans (SAHARA Records). It shows that saving money is easier part than giving loans within a WSCG. The group members feel skeptical towards production loans and are more inclined to take consumptive loans to meet with their family requirements.

It is very essential to ensure the absolute honesty and transparency with the Ecozone NGO responsible for protecting WSCG interests. The Park management facilitated WSCGs to federate themselves in a NGO called SAHARA (2000), later replaced by BTCA (2008). It was assumed that a locally rooted NGO like SAHARA, would be sufficiently sensitized to the issues of accountability and justice and it could easily relate to the local problems. In the formative years, SAHARA worked well, however, as the work of income generation activities progressed, it started showing cracks in its working. By 2005-06, the SAHARA leadership showed its failure to direct and manage the many aspects of the organization. The example of the SAHARA debacle when WSCG made a productive loan for apricot seed purchase and were not repaid only reinforced the consumptive loan model for the women and made them dubious/more cautious. They took a risk with SAHARA Director and got very badly burnt,

thus hurting the viability of productive loan model. There were cases of corruption at the highest level. Moreover, there was a lack of inspiring local confidence in WSCGs, expertise in computer and internet skills, proficient English writing and communication skills, dealing with foreign and Indian organizations, researching and writing grants, etc.

The Park administration, through Biodiversity Conservation Society (BiodCS), supported a change in SAHARA and decoupling from any direct support. It was replaced by BTCA (Biodiversity Tourism and Community Advancement) in 2008. BTCA in collaboration with the Park administration and Friends of GHNP is trying to resolve issues such as finding consistent markets, quality control of products produced, reliability of product producers. One remarkable intervention has been from the Friends of GHNP who took the message of conservation efforts at GHNP to the foreign lands. It resulted in groups of environmentally conscious tourists coming to GHNP, and the BTCA ecotourism group conducting them. This could bring in good incomes for the ecotourism group. Similarly, without continuous support, the programmes related to social empowerment such as literacy, health and veterinary care could not be successfully introduced in WSCGs though they have great relevance and potential. Towards that end, the Park administration facilitated WSCGs forming a relationship in 2006 with My Himachal, a non-profit organization based in the USA (www.myhimachal.org) and India. Working with local doctors, one goal was to help bring child healthcare and health care training into remote villages of GHNP Ecozone.

The research work also looked at the role of government action for biodiversity conservation as illustrated by the GHNP example. From 1999 till 2006, the Conservator of Forest was Director of the Park. However, since 2007, a Divisional Forest Officer (DFO) who is not Director GHNP is heading the Park. Being a low rank officer, this DFO has to work under a long chain of command that controls his/her thoughts, actions and money. What is to be done in the Park in any given year gets decided at various levels of the department and state government. What is actually done in that year depends on what work the MoEF releases money for, (there is virtually no state funding for conservation action here). This is decided usually by a senior officer in the Ministry who has not even seen this potential World Heritage Site.

At lower rung of administration, an Assistant Conservator of Forests (ACF) three Range Officers, are posted in GHNP very few of whom have been trained in wildlife. All these officers have uncertain tenures, usually short with the GHNP. The ones with longer tenures are the deputy rangers and the forest guards and forest workers. Few among this bulk workforce of the GHNP are adequately trained in wildlife management. The vast majority, are over 50 years old and posted in the Park for political considerations. It is critical to understand that the time needed for a habitat to bounce back (and thus give a species a chance to stage a comeback), is going to be longer than the tenure (on the job time) of any one individual in administration.

5.4 Connect Between Development of Alternative Livelihoods and Biodiversity Conservation

Prior to the settlement of rights in GHNP, ecological processes in the Park were affected by biotic disturbances such as grazing and annual seasonal collection of medicinal plants. In addition, the breeding season of pheasants coincides with the season for collecting *Guchhi* (morel mushrooms) by the locals in April-May (Garson 1999). All of these collection practices have occurred on a free-access basis as most of the graziers/herb collectors did not have any rights as per the Anderson Settlement Report of 1886, which continues to govern resource use in this area. Gorkha labour hired by local dealers to collect medicinal plants were not right-holders. Along with pressures exerted by unsustainable grazing and herb collection, there have been many instances of the snaring of pheasants, ghorals and musk deer. The shepherds invariably killed red fox pups as they represent a potential danger to the lambs on reaching maturity. Collectively, all such actions have affected the local flora and fauna in very adverse ways.

The alternative livelihood development (through IGAs) were targeted towards HHs of herb collectors who were going to alpine areas for herb collection and in temperate areas for *Guchhi*. The impact of these livelihood options can be seen in the meadows of Dhel, Patal and Guntarao that were studied after the Final Notification (Chapter 4). The preponderance of species such as *Jurinea macrocephala* in Guntarao and Dhel meadows, *Dactylorhiza*

hatagirea in Guntarao and Parkachi meadows are positive indicators of reduction/mitigation of herb collection. Similarly, the higher density of *Aconitum violaceum*, *Saussurea obvallata*, *Rhododendron anthopogon* and *R. lepidotum* in higher altitude areas is yet another indicator of reduction in the biotic interference in the post Final Notification period. Favourable growth of species such as *Allium humile*, *Dactylorhiza hatagirea*, *Meconopsis aculeata*, *Podophyllum hexandrum*, *Selinum tenuifolium* and *S. vaginatum* in the meadows of Guntarao, Patal, Dhel where herb collection used to be extensive, indicate recovery of these species. Occurrence of *Angelica glauca*, *Berberis lycium*, and *Thymus linearis* in another erstwhile extensive collection area of Rolla show signs of recovery (Chapter 4).

During post Final Notification period, the reduction in number of mushroom collectors and their dogs during the pheasant breeding period in early spring have shown improvement in the numbers of pheasants and ungulates in the temperate zone forests. Increased abundance of pheasants can be taken as indication of better protection and improved habitat conditions in GHNP as has also been observed by Miller et al. (2008). . The increase in pheasant densities especially of Western Tragopan and Koklass suggests that their habitat, the temperate forests has been positively impacted by the livelihood development programme. Likewise, the increase in sightings of herbivores in forests and alpine areas shows improvement in their habitat due to lessening of pressures from herb collectors.

During the research work, it was not possible to separate the changes caused due to ban on livestock grazing from that of trampling and herb collection. Hence all changes in vegetation cover and species richness around the alpine meadows are as result of cumulative effects. It was found that the enforcement by the Park staff in the rugged and difficult to approach terrain has been very low (Park Records). Thus, the improvement of vegetation and animal density and abundance may be attributed to the support that the Park staff could elicit from the people living in GHNP Ecozone through improvement in the alternative livelihood options.

5.5 Lessons for the Future

The Himachal Pradesh government's economic policies impact the rural livelihoods immensely. A study of issues such as change in livelihoods, diversity of livelihoods, and access of poor households to livelihood options may determine if a particular policy is working well in the field. There are many factors that influence livelihood options of a poor household. For example National Rural Employment Guarantee Scheme is (NREGS) is one such legislation which has affected the local livelihoods in the Study Area. An effective policy may alter the livelihoods in a big way. However, it is observed that when the poor people are well organized, they may approach/access livelihoods in an efficient manner. Often, the household economics determines a livelihood option. As issues connected to sustainable rural livelihoods come more into focus, there is simultaneously a growing need for better co-ordination between various government departments and their capacity to institutionally engage with such groups. Many such issues need inter-disciplinary approaches. NREGS is one such scheme which is administered by the Rural Development Department and has benefited the members of WSCGs.

As a caution, it is very important to be clear about the livelihood support which can be used along with some rural development inputs (DFID 2002) in the biodiversity rich areas. The biodiversity conservation remains all pervasive goal and livelihood as tool to achieve that cherished goal. Hence this is very important to find linkages whether livelihood and rural development inputs led to improved conservation of biodiversity or not. Simultaneously, this is to see that the people who live in and around high biodiversity value areas are enabled to lead an improved quality of life, but as defined by themselves (and not by people from consumerist metropolis). In the new paradigm, biodiversity conservation becomes a mean to help people to achieve better life quality (Salwasser 1995).

The following inputs at GHNP were pertinent for setting up alternative livelihood activities as a strategy to conserve biodiversity:

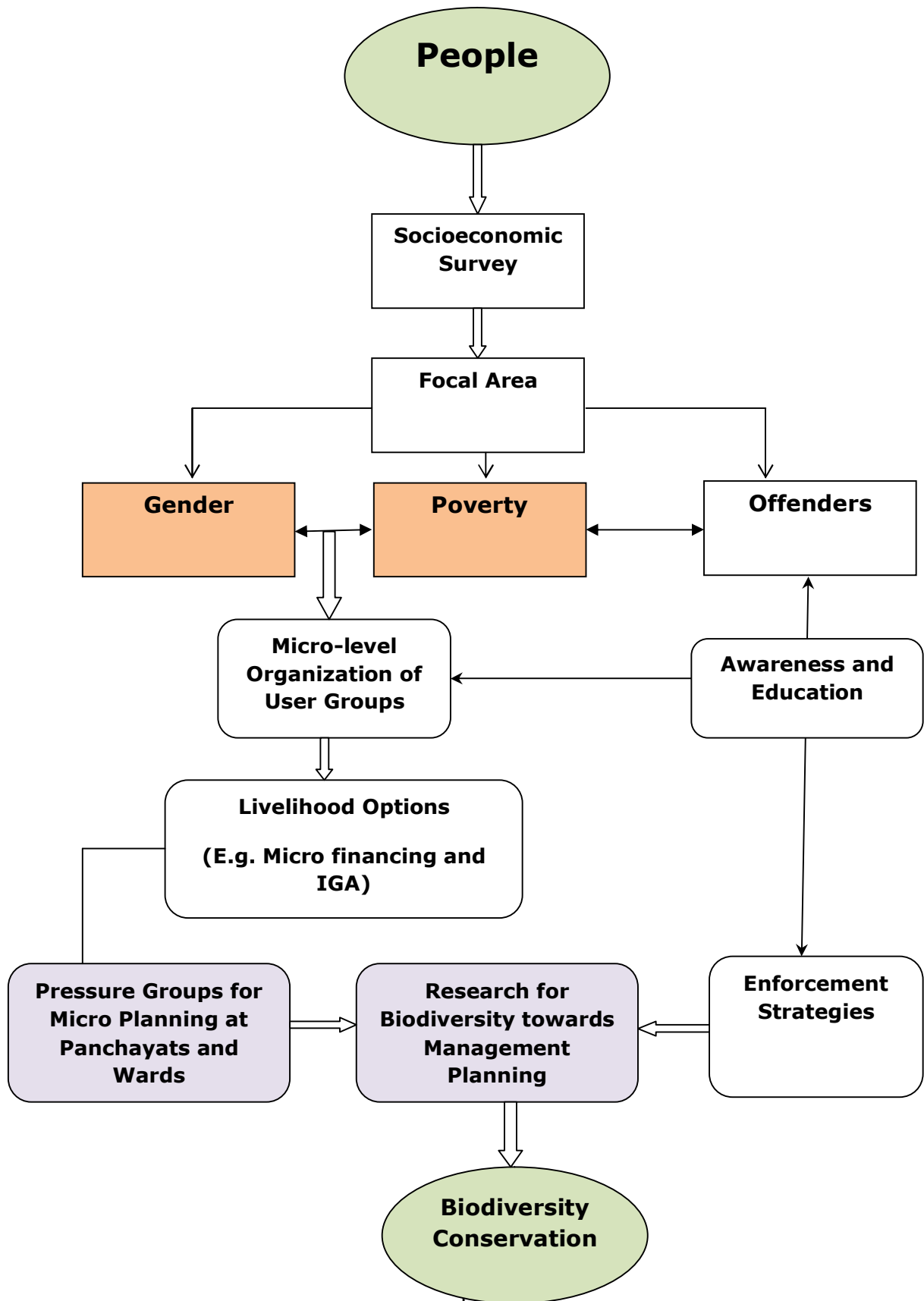
5.5.1 Buffer Zone in support of Biodiversity Conservation

As such, there is no provision of a buffer zone under the WLPA. A buffer zone ensures that there is no stark contrast in resource use pattern immediately outside the boundary of the core (Park). In principle, the resource use pattern should change gradually with increasing distance from the core. Setting of a buffer zone is for 'softening the edge effect' so that the core is provided protection with minimum of restorative management intervention to secure its objectives (Martino 2001, Neumann 1997). The Great Himalayan National Park is a good example to show that the buffer zone (Ecozone in case of GHNP) is a very effective management intervention to address issues of biodiversity conservation through the involvement of local people. The Park management could involve poor and women in its conservation programme as it had administrative control over the Ecozone. Under the Centrally Sponsored Schemes for National Parks and Wildlife Sanctuaries of the Ministry of Environment and Forests, there is a scheme for Eco-development around and within PAs. In order to purposefully utilize funds under this scheme and consolidate the area's conservation value, it is important that well identified buffer zones be established around PAs.

5.5.2 Facilitate Community to Help Conserve Wildlife

The traditional planning for Protected Areas in India emphasizes management of natural resource or wild habitats/species as basic approach towards conservation (Sawarkar 1995). This concept needs a second look. The management of natural resource, has more to do with the 'management of people' involvement of women/poor in the conservation efforts; and adoption of a livelihood approach towards conservation (Flow Chart given below).

Fig 5.0 Flow chart depicting the process of biodiversity conservation efforts in Great Himalayan National, Himachal Pradesh



The Livelihood Based Management Plan of the Great Himalayan National Park (2005-2010) is based on the fact that the biodiversity conservation is possible only through an active support of the local communities. The Management Plan gains support from a more informed understanding of the livelihoods of different stakeholder groups and the major influences that shape them. Such an approach is primarily based on analysis of local livelihoods with a focus on poor people who have been dependent upon the Park's resources.

The GHNP Management Plan revisits the planning sequence as following:

- It prioritizes working with the local communities (their livelihoods) to reduce their dependencies on the PA's natural resources, and
- The interventions to manage, monitor and protect the natural habitats/species and resources are facilitated when the local communities cooperate (Pandey 2005a, 2008)

5.5.3 Gender Responsive Conservation Efforts at GHNP

The GHNP Ecozone exemplifies that the income opportunities for the local mountain people recede with remoteness; the villagers mostly dependent on free access to forests; the women overburdened with work; their family literacy rate very low, and the mountain societies as such very stratified with government classified Scheduled Caste people living in poverty. At the same time the reach of government or Non-Government Organizations is limited, and skewed in favor of the better-off in the remote areas, the delivery of programmes among the target groups (SCs, widows, etc.) is not so efficient, and the participation of poor and women in the Panchayati Raj Institutions is not effective. These were the women of the poor families (constituting half of the local population) who faced food and livelihood insecurity which was expected to deteriorate further. Accordingly, one of the crucial findings of this research is that the women as compared with men respond quickly to such interventions as saving their own money and using it for income generation activities. Government daily waged work is very important. Suitable policy changes can direct much of this work to the poorest (as is being tried under MNREGS) and not only provide more income but also a chance to save much more as has been seen in some of the WSCGs.

Similarly, realizing the collective impact of several hundreds of women engaged in firewood collection from the forest/vegetation that often leads to degradation of the resource, the Park management responded with "Drudgery Reducing Intervention", among the WSCGs. This scheme could provide energy and drudgery-reducing devices like LPG stoves (for cooking), pressure cookers etc to the selected members of the WSCGs who could contribute at least 50% of the total cost. The HP Forest Department can make suitable policy interventions to reduce drudgery of women and dependency on forests.

5.5.4 Redrawing Mental Maps of Government Officials/Park Management

At GHNP, establishing partnerships between the local community and government agency was tried to reconcile conservation and livelihood needs through the WSCGs. It needed to redraw the mental maps of the government officials for a shift from enforcement to participatory management, mainly through training, exposure visits, monitoring, and evaluation, and interactions with the WSCGs. The front line staff of Himachal Pradesh Forest Department mostly works with the available budget on the schemes which are related to infrastructure development or a few meetings with community which do not yield much of community participation. Considering these points, the Park Director in GHNP took services of women group organizers selected from local Panchayats and trained them to organize, motivate women of such households who were dependent on the Park's resources for their livelihoods. There were fortnightly training programmes for these Group Organizers based on their experiences with the women and need of more training inputs. Gradually, some of the field staff of Park saw merit in this programme. On the spot disbursement of money to the WSCG to buy their vermicompost (for medicinal plant nurseries in the Ecozone) was a major contribution of the field staff. It enhanced confidence of WSCGs towards Park staff which responded by providing wage related jobs in the medicinal plant nurseries and other forestry works in Ecozone.

It took some time for the Park staff to understand that participatory management and enforcement have to go hand in hand. The formation of Kala Jatha or street theatre from the members of WSCGs and their regular performances in the Ecozone villages helped a lot in spreading the message of benefits of working in a WSCG, relevance of Park's conservation

efforts, along with the provisions of the law of the land. After the Final Notification of Park, the situation became very volatile in the years following May 1999 as the people were persuaded not to enter the Park through street theatre shows, and consistent and continuous dialogue. Since 2005, the provisions of Indian Wildlife Protection Act are being enforced in the area.

The Himachal Pradesh Forest Department (HPFD) so far sees the WSCGs as an isolated effort of SAHARA (now BTCA, the Ecozone NGO) and Park leadership, even though the Himachal Pradesh Participatory Forest Management notification of 2001 has included many of the learning from GHNP experience. Involvement of women/NGO is yet to be integrated as an approach of HPFD. While the HPFD is totally male dominated, there is a predominance of women in WSCGs in GHNP Ecozone. The present intervention demonstrates the experience of working with poor women, which is very new for the forest staff. However, this important experience may be a beginning of realization on behalf of the HPFD to give proper representation of women in its recruitment policy, service rules, etc.

Following are the most important learnings (Pandey 2008) at the GHNP:

- (i) The GHNP management could **facilitate** establishment of Women Saving and Credit Groups. It helped in capacity building of the WSCGs, local NGOs, Mahila Mandals, Yuvak Mandals, Ward Development Committees, and Panchayats in the matters of asset creation, livelihood generation, issues such as role of poor and women in community development, leadership, natural resource management, micro or village level planning; monitoring of livelihood activities. It is important that the HP Forest Department or the GHNP management be the "**facilitator**" of the community based efforts. The community itself is the best "**doer**" of the works.
- (ii) Let the "**Process**" be the mainstay of working at the Park management and community levels. Process hereby will mean "small-small do-able steps in a sequence". This is very essential for the involvement of community as well as the Park staff.
- (iii) **Scaling up** of the community based effort so that the model set up may be emulated by others and the total effect of a big effort (state wide) will show up the

cumulative results. For example, the effort of Medicinal Plant Propagation Areas (MPPAs) at GHNP Ecozone will be more effective if more and more buffer zones of PAs, and Forest Divisions undertake such activities to produce the medicinal herbs in bulk (which can be exported) as part of a livelihood based approach.

5.5.5 NGO/Community Based Organization

A critical learning from SAHARA experience was that such an organization as compared to the well established environmental NGOs from outside depends on the Park support for its structural as well as functional aspects. The issues of leadership, transparency over finances, maintaining records, and developing reproducible and constant procedures at all levels (SAHARA, Group Organizers, Marketing/Sales, etc) need to be addressed on a continuous basis through an effective monitoring regular/systematic financial audits, and evaluation system.

It is important to note that the efforts of BTCA and Park administration have to be complementary and supplementary to each other in the pursuit of nature conservation. This will help building credibility of the voluntary sector through creation and promotion of norms of good governance and public disclosure. Such experiences at GHNP would be very helpful so that other NGO groups and funding agencies can become aware of the details that help or hinder in the creation of successful linkages between conservation and livelihood.

5.5.6 Requirement of Limited Funds for Innovative Approaches of Conservation

Under the World Bank assisted Conservation of Biodiversity Project, a sum of Rs 5 crores was spent for the ecodevelopment project at the Great Himalayan National Park during 1994-95. Moreover, an amount of Rs 288.79 crore was spent on the India Ecodevelopment Project (IEDP) for seven sites namely Buxa Tiger Reserve, Palamau Tiger Reserve, Ranthambore Tiger Reserve, Gir National Park, Pench Tiger Reserve, Nagarhole Tiger Reserve and Periyar Tiger Reserve. Except for two or three PAs, the IEDP on its completion does not have much to show in terms of biodiversity conservation. For GHNP, the World Bank's own implementation completion report comments that the ecodevelopment programmes could not make much progress in the 16 ecodevelopment committees that were formed under the

Project in the Park's Ecozone. However, participatory processes did successfully start through the women groups after completion of the CoB project (World Bank 2002).

Working with the community for their involvement in biodiversity conservation does not hinge on the entry point activities or high expenditure ecodevelopment programmes as were envisaged in the IEDP. The most significant lesson emerging from GHNP is that good PA level leadership and prior team capacity acquired through competent training, have been instrumental in attaining optimum results. A gender sensitive approach to people's participation can help absorb tensions, and facilitate conservation and enterprise-building initiatives which are refracted in ways that have had important implications for social and environmental relations. Building of such relationships between Park and people are of supreme importance to value and conserve biodiversity. There may be many ways to do so, however, the one which seems to have succeeded at GHNP is through the Women Saving and Credit Groups and allied organizations such as Biodiversity Conservation Society (BiodCS), Friends of GHNP, My Himachal, and others.

5.6 Biodiversity Conservation, Precepts and Practices

Research can help study socio-economic conditions of the villagers and biological diversity of the Park, it cannot replace professional leadership of Park management. The research at GHNP provided a very concrete back-up to understand conservation problems, evaluate solutions and clarify conservation goals. The writing of Management Plan based on the livelihood approach to conservation could be possible due to the research inputs. The strategy of livelihood based programmes or ecodevelopment would often fail in absence of responsible collaboration between the Park management and community. Such a strategy may obtain strength from judicious use of law application.

The effort made at the Great Himalayan National Park is an example of a government agency working towards better integration of the human dimension in Ecology. This may help understand the relationship between humans and environment, such as the socio economic issues of conservation biodiversity or the place of gender/culture and local knowledge in managing natural resources. The crux lies in striking a fine balance between participatory

approaches and biodiversity conservation. The enabling frameworks of laws and policies can contribute a lot in maintaining such balance. A creative use of spaces in law and policy help achieve the goals of PA as well as the aspirations at the local, state and national level.

The Great Himalayan National Park is often cited as an example of initiatives where it has been attempted to develop alternative livelihoods as a strategy of long term conservation of biodiversity (Chandar 2001, Tandon 2002, Kothari and Pandey 2006, Wani and Kotahri 2007, Miller 2010). The study of impacts of GHNP attempts towards livelihood developments in the Ecozone and then their influence on biodiversity conservation is important as there are not many field examples to bring about harmonious relationship between conservation and development (Salafsky et al. 1999; Little and Horowitz, 1987). The GHNP may also be considered important as it is a state-led initiative that needs to be examined in depth for its important insights that can feed into improved field implementation as well as policy level reform. The linkages and inter-relationships among patterns of alternative livelihood development in a gender sensitive milieu, their resulting levels of environmental awareness, and intertwined issues of politics of conservation and resource use are some of the important points that have been explored under this research work.

The best learning at the Park is that if we genuinely want to contribute to biological diversity conservation, we need to first resolve the socio-economic issues of the local people. The habitat of wild animals and plants will be better protected if the local villagers stand by the forest guard and assist him/her in protection of natural resources.

Furthermore, there is a need to disseminate experiences and lessons through reports, process documentation and learning materials, both within state and at the National level. The livelihood development model implemented through WSCGs has been emulated by the Department for International Development (DFID) funded Himachal Pradesh Forest Sector Reform Project (HPFSRP from 2002 to 2006) in 85 pilot locations (Panchayats) in Himachal Pradesh (HPFD documents). Such an effort is expected to test the viability, sustainability and replicability of livelihood development approach for natural resource management with societal and ecological concerns on a regional basis. The conservation of biodiversity requires a coordinated strategy, effective leadership and communication, and joint participation by all concerned.

Appendix 1
Community Initiated Forestry Programmes in Himachal Pradesh

1. Maith Committee of Chitkul village in Kinnaur district
2. Gram Utthan Sabha of Kamla, Bhatiyat Panchayat
3. Gaon Committee of Padhar, Manali
4. Soil Conservation Co-operative, Panjavar village, Una
5. Gaon Samiti, Shanag, Manali
6. Mahila Mandal, Thalli village, Mandi
7. Mahila Mandal of Rajpura Panchayat, Paonta Sahib
8. Van Sangini Khajur Samuh of Bharog Banedi village, Dharati Dhar in Giri river catchment
9. Mahila Mandal of Bohal village near Palampur
10. Wildlife Protection Groups
11. Water source protection of at Sagnam village in Spiti
12. Traditional protection of Juniper trees at Poh, Spiti
13. Informal committee for Bird Protection at Haripur village, the Pong Dam Lake Bird Sanctuary

Appendix 2

Time Line: Creation of Great Himalayan National Park

- *1978-1980: Survey for Creation of a National Park in the Western Himalayas*

In 1980 the Himachal Wildlife Project-I (HPW-I), consisting of Dr. A.J. Gaston of the Canadian Wildlife Service, Dr. P.J. Garson of the University of Newcastle upon Tyne, U.K. and Dr. M.L. Hunter along with scientists from Delhi university and officials of the Himachal Pradesh Forest Department surveyed areas in Solang Nala close to Manali in Kullu District and watersheds of the Tirthan, Sainj and Jiwanal rivers in the Banjar area.

- *1983: Second Phase of Surveys*

In 1983, the Himachal Wildlife Project-II (HPW-II) continued wildlife surveys and subsequently recommended creation of the Great Himalayan National Park in its present location, the Banjar area of Kullu District.

- *1984: Notification of Intention*

Consistent with India's national Wildlife Protection Act (1972), which empowers States to initiate constitution of national Parks, the Government of Himachal Pradesh issued an initial notification on 1st March, 1984, expressing its intention to constitute the Great Himalayan National Park. This initial notification included reference to a buffer zone as an integral part of the National Park. The buffer zone (the current Ecozone) included inhabited areas to the west of the GHNP and the Sainj and Tirthan Valleys.

- *1984: First Revision of the Notification of Intention*

Because there is no mention of constitution of a buffer zone associated with a National Park in the Indian Wildlife (Protection) Act, the Government of Himachal Pradesh revised its earlier notification dated 1st March, 1984. The new notification, dated 30th July, 1999, did not mention any buffer zone.

- *1987: First Management Plan of the Great Himalayan National Park*

In 1987, the Chief Wildlife Warden, Himachal Pradesh, wrote the first Management Plan for the Great Himalayan National Park.

- *1988: Beginning of Settlement Proceedings*

In 1988, under provisions of the Indian Wildlife Protection Act of 1972, the settlement proceedings for the rights of local communities in the Great Himalayan National Park began. The Government of Himachal Pradesh appointed a Settlement Officer to determine the existence, nature, and extent of any right of any person in or over the land that is comprised within the limits of the proposed National Park. Adequate compensation was awarded by the Settlement Officer to the persons who had any rights in the area proposed to become the National Park. This facilitated the elimination of any human interference from the area.

- *1991: Continuance of wildlife surveys in GHNP*

In Sept-Nov, the Himachal Wildlife Project-III (HPW-III) re-assessed GHNP's wildlife abundance, obtained information on livestock grazing and herb collection within the Park and reviewed the existing 1987 management plan.

- *1994: Second Revision of notification of intention*

On 22nd February, the Government of HP revised the notification of intention to constitute the Sainj Wildlife Sanctuary. This is an amendment of the earlier notifications. The Sainj Wildlife Sanctuary was created to accommodate the villages of Shakti, Marore, and Shagwar, which under the Wildlife Protection Act are not allowed to remain a part of the National Park.

- *1994: Third Revision of Notification of Intention*

On 26th February the Government of HP again revised the Notification of intention to constitute the Great Himalayan National Park by including the upper Parvati River watershed, which represented a significant eastward extension of the initial Park

boundaries into additional, uninhabited High Mountain and alpine terrain. This was an amendment of the earlier notification dated 30th July 1990.

- *1994-99: Conservation of Biodiversity Project (CoB)*

For a five year period (October 1994-December 1999), the World Bank-aided Conservation of Biodiversity (CoB) Project was implemented at the Great Himalayan National Park. During the CoB Project, among other activities, 16 Village Ecodevelopment Committees were set up to facilitate the participation of local communities in biodiversity conservation in and around the Park. Under CoB, the present Ecozone of GHNP was constituted up to 5 km distance from the Park boundary. This was an administrative decision which continues till the present.

- *1994-99: Major Research Initiatives at the Great Himalayan National Park*

For the duration of CoB Project, 1994-1999, the Wildlife Institute of India, Dehradun (WII), conducted a wide-ranging research project at the Great Himalayan National Park. Research results contributed significantly to improving understanding and management of the Park.

- *1996: Registration of the Biodiversity Conservation Society (BiodCS)*

In December 1996, the Biodiversity Conservation Society (BiodCS) (an autonomous, non-profit institution) was created and registered to share responsibility with the government for the management of the Great Himalayan National Park. It provides fund advances, empowerment of certain community groups, flexible administrative procedures, and operates under a governing board structure. The Director of GHNP is member-secretary of the Governing Board of the BiodCS and is ultimately responsible for Park management.

- *1999:*

- *Declaration of Award upon Completion of Settlement Proceedings*

In 1999, the Settlement Officer at GHNP completed the settlement proceedings and announced an Award and Settlement Report (May, 1999) which in effect extinguished

the rights of local communities in the Park. The Award included monetary compensation for those who had established their prior legitimate rights in the Settlement Report.

- Final Notification of the Great Himalayan National Park

The Govt. of Himachal Pradesh accepted the Award of GHNP's Settlement Officer and issued final notification (dated 28th May 1999) of the Great Himalayan National Park. The GHNP final notification does not include a buffer zone. However, for the purposes of implementation of ecologically sustained development (popularly called ecodevelopment), the buffer zone (or Ecozone) is under the administrative control of the Park Director.

- Completion of CoB Project at GHNP

The CoB Project was completed at the GHNP on 31st December, 1999. The World Bank Implementation Completion Report mentions, "At GHNP, the process in formation of local level institutions and micro planning [in the Ecozone] left much to be desired. There has been little or no impact on the ground from ecodevelopment investments. The 16 village committees formed during project period are defunct. However, in the post Credit period (when the CoB Project funded by the World Bank was over), women's savings and credit groups have been established covering poor families and a Biodiversity Conservation Society [see above] is in place."

- Beginning of Participatory Forest Management at the GHNP

In January 1999, the GHNP management selected 12 women from the Ecozone (one from each Panchayat) to be trained as Group Organizers (GO) to work in the villages where they live. A number of training programmes have been organized for these organizers on how to recognize poor households that have been dependent on the Park's natural resources, and then organize them into small Women's Saving and Credit Groups (WSCGs).

- 1999 *Onwards: Microcredit scheme introduced in WSCGs*

Since 1999, GHNP management has been providing training input to the Group Organizers to facilitate a microcredit scheme in the WSCGs. From the very beginning, the GOs have been motivating each member of the WSCG to save one rupee daily. By participating in the microcredit system with their savings, the members have been encouraged to take up alternative income generation opportunities such as vermicomposting, apricot oil production, handicrafts, and community- based ecotourism, so that dependencies of these households on the natural resources of the Park is reduced.

In 2000 and afterward, there were many activities and achievements to further the cause of GHNP.

▪ *2000: Formation of Support Groups for GHNP and Local NGO*

- Friends of GHNP (from India, USA, Canada, Europe)
- Community Based NGO Organization, SAHARA
- Beginning of Training of Local Men for Community Based Ecotourism
- First Foreign Trekkers in GHNP (from USA) conducted by the members of Ecotourism Group and Friends of GHNP
- Beginning of Kala Jatha/Street Theatre for Environmental Awareness
- First GHNP Booth/stall at Kullu Dushera Faire selling products from Women's Saving and Credit Groups (40,000 visitors)
- WSCG start Vermicompost product creation and sales to medicinal plant nurseries of Forest Department

υ *2000-02: Development and Creation of GHNP Website by Friends of GHNP*

The new website was www.greathimalayannationalpark.com.

υ *2001: GHNP-Related Outreach*

- Kala Jatha performances in Ecozone on GHNP-related issues

- Lectures/Workshops on GHNP at Sai Ropa Community Training and Tourist Center
Lectures on GHNP, San Francisco, CA/USA
 - Planet Works Conference GHNP Presentation, San Francisco
 - Presentation on GHNP by the Park Director at the Yosemite Conference Center, San Francisco
 - National Public Radio Interview on GHNP, San Francisco
- *2002-04: GHNP Educational Outreach and Awareness Campaign by Friends of GHNP*
- Creation of GHNP's identity, slogan, and Jujurana logotype
 - Publication of four booklets on GHNP (Ecotourism, Birds, Wildlife, Vermicompost)
 - Publication of four posters on GHNP Themes (Protect Nature, Conserve Nature, Preserve Nature, Celebrate Nature)
 - Posting of GHNP directional signage in Kullu Valley
 - Opening of GHNP marketing outlets (for WSCG products) in Kullu Valley (Manali, Aut)
- υ *2002: Women's Savings and Credit Group Development*
- BiodCS secures two Major Medicinal Plant Propagation Projects in the Ecozone.
 - World Bank Implementation Completion Report released: Its findings support and commend WSCG activities.
 - WSCGs were engaging in consumptive and productive loans and continued saving.
 - Apricot seed oil developed as an income generation activity for the WSCGs.
- *2003: On-going GHNP Developments*
- WSCG medicinal plant propagation areas implemented.
 - Friends of GHNP opened a rural Kullu Valley outpost, Behta Pani.
 - NGOs visit GHNP: World Wildlife Fund for Nature, Bombay Natural History Society
- υ *2004: On-going GHNP Developments*

- Full coverage of forest-dependent households under the WSCGs
- Ecotourism skill training for unemployed youth from Ecozone GHNP
- Ecotourism collaboration with Sunshine Himalayan Adventures: marketing and logistics for GHNP treks
- Visit and trek to GHNP by Chief Scientist, NOAA/USA
- Beginning of Indian and foreign student intern program in GHNP

u2005: *On-going GHNP Developments*

- Livelihood Based Management Plan of the Great Himalayan National Park (2005-2010)
- Visit to GHNP by US Embassy Officials; invitation to GHNP Director to visit US on International Volunteer Leadership Program with GHNP Lecture Series
- Microplanning of 57 Panchayat wards in Ecozone to implement livelihood management plan
- *Voices & Choices in Great Himalayan National Park*: first documentary with overview of Park natural history and Ecozone livelihood issues (Friends of GHNP production).

u2006: *On-going GHNP Developments*

- implementation of livelihood based management plan
- Local community and Friends of GHNP join to defeat 11 planned hydro-power developments on Tirthan River in Ecozone on environmental basis (chiefly to protect trout spawning grounds and Tirthan River watershed values).

My Himachal (US NGO) commences work with GHNP:

- Friends of GHNP merged into My Himachal

- Medical first-Aid training for ecotourism men
- Nutritional and medical health worker training for women in GHNP Ecozone
- Annual Medical Health Fairs(2005-10) for child healthcare with Indian and foreign doctors in GHNP Ecozone
- Kala Jatha/Street Theatre Performances on various themes
- First Peak (16,000 ft) in GHNP climbed by US mountaineer, named Yeshe Peak in Tirthan Valley
- First Director GHNP, Sanjeeva Pandey, departs after eight years (longest posting in the Park); second director, Harsh Mitter appointed.

u2007: *On-going GHNP Developments*

- Monitoring of SAHARA leadership reveals transparency issues and ties with GHNP management broken.
- My Himachal continues child health fair and environmental education in villages
- Envi-Savoirs NGO formed in Upper Seraj Valley with focus on environmental protection.

u2008: *On-going GHNP Developments*

- Ecozone women and men begin reorganization into new community groups after SAHARA relationship termination by Park officials.
- My Himachal sponsors:
- Training on Indian Environmental Impact Assessment (EIA) at Center for Science and Environment
- Assessment of pico hydel for converting local water/flour mills to also have small scale (pico) electrical power output
- Ecotourism study by SP Jain Institute MBA students, Mumbai
- Save the Weaver Project to assess situation of traditional Kullu Valley shawl weavers including Ecozone
- US Fulbright sponsors research on Western Tragopan population in GHNP in collaboration with Wildlife Institute of India

- Third Director appointed, Ajay Srivastav

υ 2009: *On-going GHNP Developments*

- Biodiversity Tourism Community Advancement (BTCA) registered as NGO, a community based organization replacing SAHARA.
- My Himachal projects continue:
- Child healthcare and Kala Jatha into villages
- Revision of GHNP website commences for content and updating internet technology
- Women nutritional workers going into Ecozone

υ 2010: *On-going GHNP Developments*

- Proposal to declare 710 sq km Parvati watershed as Khirganga National Park in the north of GHNP gets approval of Himachal Pradesh government. Two Wildlife Sanctuaries of Sainj and Tirthan upgraded to merge into GHNP for a higher protection status.
- My Himachal projects continue:
- Child healthcare and Kala Jatha into villages
- Revision of GHNP website commences for content and updating internet technology
- Women nutritional workers going into Ecozone
- Water Recharge Pilot to assess chronic water shortages in higher villages and impacts of global warming for potential mitigation.

Appendix 3: Main Trees of GHNP

Species/ Botanical Name	Common Name	Elevation Range (m)
<i>Abies spectabilis</i> (D.Don.) Mirbel	Himalayan high altitude fir	3,000-4,000
<i>Abies pindrow</i> Royle	Silver fir/ Tosh	2,500-3,200
<i>Acer acuminatum</i> Wall. ex D.Don.	Maple	2,500-3,200
<i>Acer caesium</i> Wall. ex Brandis	Maple	2,200-3,000
<i>Aesculus indica</i> Kk. f. & Th.	Horse chestnut/ Khnor	1,800-3,000
<i>Alnus nepalensis</i> D. Don.	Alder	1,500-2,000
<i>Betula utilis</i> D. Don.	Birch/ Bhoj patra	3,000-4,000
<i>Buxus wallichiana</i> Baillon	Boxwood/ Shamshad	2,500-3,000
<i>Cedrus deodara</i> G. Don.	Deodar/ Cedar	2,000-3,000
<i>Cornus capitata</i> Wall.	Dogwood	1,800-2,800
<i>Corylus jacquemontii</i> Decne.	Hazelnut/ Bhuti badam	2,500-3,200
<i>Cupressus torulosa</i> D.Don.	Pencil cedar	1,800-3,000
<i>Ilex dipyrena</i> Wall.	Holly/ Kaluchha	2,000-2,800
<i>Machilus duthie</i> King ex Hk. f. & Th.		1,500-2,000
<i>Picea smithiana</i> (Wall.) Boiss.	Spruce/ Rai	2,500-3,500
<i>Pinus roxburghii</i> Sarg.	Chir pine/ Chil	1,500-2,200
<i>Pinus wallichiana</i> A.B. Jack.	Blue pine/ Kail	1,800-3,500
<i>Pistacia integerrima</i> Stewart	Kakkar singi	1,500-2,500
<i>Populus ciliate</i>	Poplar	2,000-3,500
<i>Prunus cerasoides</i> D. Don.	Paja	1,500-2,500
<i>Prunus cornuta</i> Steud.	Bird cherry	2,000-3,500
<i>Pyrus pashia</i> Buch.-Ham. ex D. Don.	Kainth	1,500-2,500
<i>Quercus dilatata</i>	Green oak/ Mohru	2,200-3,000
<i>Quercus glauca</i> Thum.	Bani	1,500-2,000
<i>Quercus leucotrichophora</i> A. Camus	White oak/ Ban	1,500-2,500
<i>Quercus semicarpifolia</i> Smith	Brown oak/ Kharsu	2,500-3,500
<i>Rhododendron arboretum</i> Smith	Brash	1,500-2,500

<i>Rhus succedanea</i> L.		1,500-2,500
<i>Salix tetrasperma</i> Roxb.	Willow	1,500-3,000
<i>Sapindus mukorossi</i> Goern.	Soapnut/ Ritha	1,500-2,000
<i>Symplocos paniculata</i> (Thumb.) Miq.	Lodh	1,500-2,500
<i>Taxus wallichiana</i> L.	Taxus/ Rakhal	2,200-3,500
<i>Toona serrata</i> (Royle) M. Roe	Toon	1,500-2,500
<i>Ulmus wallichiana</i> Planch	Elm	1,500-2,500

Appendix 4: List of Threatened Plants

Species	Altitude (m)	IUCN Threat Status
<i>Aconitum heterophyllum</i> Wall. ex Royle	3,300-4,200	CR
<i>Atropa acuminata</i> Royle	1,500-3,000	CR
<i>Dactylorhiza hatageria</i> (D. Don.) Soo	2,800-4,000	CR
<i>Jurinea macrocephala</i> (DC.) Benth.	3,000-4,300	CR
<i>Meconopsis aculeata</i> Royle	3000-4,300	CR*
<i>Picrorhiza kurroa</i> Royle ex Benth.	3,200-4,200	CR
<i>Saussurea gossipiphora</i> D.Don	3,800-4,500	CR*
<i>Angelica glauca</i> Edgew.	2,000-2,800	EN
<i>Arnebia benthami</i> (Wall. ex G. Don) I. M. Johnston	3,300-4,000	EN
<i>Arnebia euchroma</i> (Royle) Johnston	3,500-4,400	EN
<i>Berberis aristata</i> DC.	1,200-1,500	EN
<i>Betula utilis</i> D.Don.	3,300-4,000	EN
<i>Dioscorea deltoidea</i> Wall.	2,000-3,000	EN
<i>Fritillaria roylei</i> Hook.	2,800-4,000	EN
<i>Malaxis muscifera</i> Lind.	2,000-3,000	EN
<i>Nardostachys grandiflora</i> DC.	3,600-4,300	EN
<i>Paris polyphylla</i> Smith	2,000-3,000	EN
<i>Podophyllum hexandrum</i> Royle	2,400-4,000	EN
<i>Polygonatum cirrhifolium</i> Royle	1,500-3,000	EN
<i>Polygonatum multiflorum</i> (L.) All.	2,500-3,500	EN
<i>Polygonatum verticillatum</i> (L.) All.	1,500-3,300	EN
<i>Saussurea obvallata</i> (DC.) Edgew.	3,600-4,500	EN
<i>Taxus wallichiana</i> Zucc.	2,100-3,300	EN
<i>Zanthoxylum armatum</i> DC.	1,200-1,800	EN
<i>Aconitum violaceum</i> Jacq. ex Stapf	3,300-4,200	VU

<i>Ephedra gerardiana</i> Wall. ex Stapf.	3,300-4,500	VU
<i>Hypericum perforatum</i> L.	2,000-3,000	VU
<i>Juniperus communis</i> L.	2,800-4,000	VU
<i>Rheum australe</i> D. Don	3,000-4,200	VU
<i>Rheum webbianum</i> Royle	3,000-4,000	VU
<i>Roscoea alpine</i> Royle	2,400-3,500	VU
<i>Roscoea procera</i> Wall. ex Bak.	2,000-3,000	VU
<i>Selinum connifolium</i>	2,500-3,500	VU
<i>Selinum vaginatum</i> Clarke	2,500-3,500	VU
<i>Skimmia laureola</i> Sieb. & Zucc.	2,200-3,200	VU
<i>Symplocos paniculata</i> (Thumb.) Miq.	1,500-2,500	VU

Source: Conservation Assessment and Management Prioritization (CAMP) Workshops (Shimla, May 2003) & (Shimla, December 2010) organized for medicinal plants of Himachal Pradesh as per IUCN's guidelines on the subject (version 3.1, 2001).

Appendix 5

Contexts of Ecodevelopment (during CoB Project) and Livelihood Approach (in Post CoB Project) at the Great Himalayan National Park

	Ecodevelopment (CoB Project)	Livelihoods (Post CoB Interventions)
Definition	Limited rural development, designed with the participation of local people, for the purpose of reconciling genuine human needs with the specific aims of Protected Area management	It comprises the capabilities, assets & activities required for a means of living. It is sustainable when it can cope with & recover from stresses and shocks & maintain or enhance its capabilities & assets both now & in the future, while not undermining the resources base.
Approach	A site-specific package of measures, developed through people's participation, with the objective of promoting sustainable use of land and other resources, as well as farm and off-farm income generating activities which are not deleterious to Protected Area values	A Livelihood approach is a way of thinking about objectives, scope & priorities for development, to enhance progress in poverty elimination. A way of integrating & further developing recent thinking & best practices.
Scope	In a broader sense, an eco-development programme is aimed at all the sections of a community	People & their priorities are places at the center of decision-making not resources or sector outputs. More systematic analysis or poverty using framework as a checklist, holistic analysis, more realistic, but manageable.
Fund Requirement	Ecodevelopment is seen a fund-intensive activity such as CoB Project or India Ecodevelopment Project, both funded by the World Bank	The overall strength of an individual's asset base is important. However, weaknesses in some area can be compensated by strengths in other areas e.g. low financial capital at certain times can be compensated for by good social capital. Family or fellow group members can act as safety nets.

Village level Institutions	16 large VFDCs (too large) formed in GHNP Ecozone (remained unrepresentative)	Formation of homogeneous interest groups/user groups (WSCGs) at the sub-hamlet level empowered the poorest and women. WSCGs came together to form Village Forest Development Society (VFDS) under the HP JFM Rules, 2001 (HP PFM 2001).
	A Village Forest Development Committee (VFDC) an informal body formed during CoB Project at GHNP Ecozone	A Village Forest Development Society (VFDS), a formal body registered under the Himachal Pradesh Govt's Joint Forest Management Rules 2001. The villagers show more confidence and trust in a VFDS.
	Over-reliance on Park official (Forest Guard) as animator and secretary of the VFDCs	Forest Guard as one of the members of the Village Forest Development Society comprised of key front line staff from a range of departments and appropriate NGO/CBO facilitators where available. So reliance on the Forest Guard has been reduced considerably.
	VFDC as Forest based body with weak links to Panchayats or other community institutions	WSCGs is a User/Interest Group which is formed after a livelihoods-based Participatory Rural Appraisal (PRA) in the community. It facilitated processes to take account of and respond to the range of livelihoods priorities. The Gram Panchayat, here, is the key coordinating body to ensure that efforts are integrated and that funds and support flow from the most appropriate government schemes, departments or other sources.
Microplans	Too long and complex (16 microplans made with little participation of local poor and women.	Shorter, simpler, microplans prepared at the user/interest group (WSCGs) level and consolidated at the Ward level. Elements of these microplans reflected in the Gram Panchayat microplan and VFDS microplan as appropriate. User/interest (WSCG) group microplans livelihoods-focused, incorporating a wide range of activities which may or may not include a forest management based input.
	Park staff and community new to concepts of Microplanning	Special training courses were arranged for the Park staff and selected community members and members of WSCGs to understand and implement participatory processes of microplanning

	Long gap between microplan preparation and its implementation; VFDC activities dependent on CoB project funds for microplans	Attempts were made to reduce this gap. The members of User/interest (WSCGs) groups were encouraged to approach for funding through existing government schemes (such as savings and credit, livestock improvement, education and other poverty alleviation initiatives) through the Gram Panchayat microplan or directly by the department concerned.
	Microplan prepared by outside agencies with little participation of local people; No reflection of livelihood consequences for the poorest	The microplanning was a logical culmination of formation of the WSCGs in a Panchayat Ward, then integrated at the Ward and Panchayat level through the process of microplanning. User/interest group microplans reflected the needs of small homogeneous groups.
	Villagers heavily reliant on Forest Guard for expertise and cohesion. Very little sustainability of microplan.	The WSCGs initially received intense support from a "Group Development Support Team" which equipped them with key analysis, planning and management skills. At an early stage of microplanning, an "animator" was selected by the members of WSCGs at the Panchayat Ward level whose training was facilitated by the Park to assist in maintaining group processes and cohesion as well as in the appropriate technical skills for the group's priorities. This enhanced the sustainability of the microplans.

Appendix 6: Report of Income Generation Activities from 2001 to 2004

S.No	Group Name	Vill.Name	Income Generation Activities								
			Agri Prod	Vermi Compo.	EcoT	Wages	Handicraft	MPPA	Kala Jattha	Apricot Seed	Total
1	Durga Mata	Bandal	4308	15400						35000	54708
2	HansPuri	Manhar	7492	19963				6000		35000	68455
3	Bharedu	Kulthi	4506	4540			250				9296
4	LaxmiNarayan	Tindar	3708	580	24670	19718		5000			33958
5	Kali Nag	Dingcha	2967	3540	49675	39740		11500			67682
6	Panch Veer	Ghat	3800					10000			13800
7	ChaurasiSidh	Shalinga	4442	1800				6000			12242
8	KaliMata	Baity	1875	450				5000			7325
9	Bimu Nag	Janihar			7350	5880		7200			14550
10	Jamlu Rishi	Shill	7268	14680			538	13720			36205
11	Shesh Nag	Shill	6000	3480				13720			23200
12	Narayan	Garuli	8968	12560			250	11500			33278
13	Gahari	Garuli		600				6500			7100
14	Laxmi Mata	Ghaliyar	5028	15966	15670	12536	683	5000		31500	73847
15	Panchveer	Sharungar	5118	12860			291	18269			36538
16	HansPuri	D.Shlinga	8000		56480	45196		13720			78200
17	LaxmiNarayan	Dhar	4256	9670	15450	12360		13720		17500	60596
18	Laxmi	Tung	4768	14754	52400	41920		8500	16000		96422
19	Panch Veer	Barnagi	7500	540	6450	5160		13720	16000		44210
20	Choi	Bihali	3260	9450			4700	13720	22000		53130
21	Deu Ropa	Sai Ropa	5128	40680			1700	6500			54008
22	Lomesh Rishi	Gahidhar	3938	32345	1470	1176	12050	6500	12000		68303
23	Devta Choi	Timhi	2125					6500			8625
24	Deuri	Deuri	6105	98586	15600	12480					120291
25	Shangri	Desha	4208	5640				13720			23568
26	Dudhi	Nanout	5406	4850	42500	34000		6500			59256
27	Shesh Nag	Buhara	2808					6500			9308
28	LaxmiNarayan	Kalwari	1380					6500			7880
29	Sareuli	Sapneel	600		2500	2000			19000		22100
30	Shesh Nag	Sanar	2911	3250			2155		19000	24500	51816
31	Shivji	KaluRopa							32000		32000
32	Majhan-1	Majhan	8776	16752	28450	22760		20720		35000	109698
33	Rai Nag	Majhan	6576	7650				11500			25726
34	Mail	Mail	3941	3215				13720			20876
35	Athara Kardu	Thachan	10540	3550				18720			32810
36	Narayan	Banaugi						8720			8720
37	Jagthamb	Bagishiyadi	4560	4550				8720			17830
38	Manu Rishi	Jangla	9388	6285	9450	7560					25123
39	Sahu Nag	Manahara	8843	4299				5000			18142
40	Laxmi Nag	Sihan	2674								2674

41	Shivji	Khain	3534	4752							8286
42	Rihadu	Jiyalu	9568	16780					22000	49000	97348
43	Tichana	Tichana	7123	8190							15313
44	LaxmiNarayan	Raila			25650	20520	270				25920
45	Durga	Sharan	7683	11215			540		32000		51438
46	Kamla Bhwani	Gohi	7994	1500						24500	33994
47	Darmeda	Darmeda	9143	43294	26850	21480		5000			84287
48	Ropa	Ropa	5980	22295				20000			48275
49	Jilli Nahin	Jilli Nahin	6781	4240				10000			21021
50	Durga Mata	UpperNahin	3788				1920	5000		35000	45708
51	Devta Jehar	Sarahan	3875				430	5000			9305
52	Mai Gar	MaiGar	580	5540				5000	32000		43120
53	Shang Chool	Katwali	6256	4780				28720			39756
54	Durga Mata	Lapah	4365					23720			28085
55	Shangari	Dharali	2550					13720			16270
56	Shang Chool	Dhagara	2655					23720			26375
57	Shangari	Kahana	2261					28720			30981
58	Rai Nag	Sundernagar	2200					13720			15920
59	Shangari	D.Patahara	1225					23720			24945
60	Teel Mahila	Teel	4295				1755				6050
61	Mahaveer	Teel	3803							35000	38803
62	Lomesh Rishi	Kudh Dhar	800							24500	25300
63	Shuk Dev	Bachoot	1200								1200
64	Ambica Mata	Dhioun	3708							.	3708
65	Chatarkhand	Jamali	2254								2254
Total			286792	495071	380615	304486	27532	528649	285000	346500	2350158

Appendix 7

Questionnaire (in Hindi)

References

- Abell, R., M. Thieme, C. Revenga, M. Bryer, M. Kottelat, N. Bogutskaya, B. Coad, N. Mandrak, S. Contreras-Balderas, W. Bussing, M. L. J. Stiassny, P. Skelton, G. R. Allen, P. Unmack, A. Naseka, R. Ng, N. Sindorf, J. Robertson, E. Armijo, J. Higgins, T. J. Heibel, E. Wikramanayake, D. Olson, H. L. Lopez, R. E. d. Reis, J. G. Lundberg, M. H. Sabaj Perez, and P. Petry. 2008. Freshwater Ecoregions of the World: A new map of biogeographic units for freshwater biodiversity conservation. *BioScience* 58: pp 403-414.
- Alcorn JB. 1993. Indigenous Peoples and Conservation. *Conservation Biology*: Vol 7, No 2. pp 424-426.
- Ali S. and Ripley S.D. 1983. *Handbook of the Birds of India and Pakistan. Compact Edition.* Oxford University Press, New Delhi.
- Alison J. Stattersfield, Michael J. Crosby, Adrian J. Long and David C. Wege. 1998. *Endemic Bird Areas of the World: Priorities for Biodiversity Conservation*, Birdlife International
- Alnutt, T., Wikramanayake, E., Dinerstein, E., Loucks, C., Jackson, R., Hunter, D., & Carpenter, C. 2002. Composition of the alpine Himalayan protected areas network and its contribution to biodiversity conservation. In E.D. Wikramanayake, E. Dinerstein, C. Loucks, D. Olson, J. Morrison, J. Lamoreux, M. McKnight, & P. Hedao (Eds.), *Terrestrial Ecoregions of the Indo-Pacific: A Conservation Assessment*. pp 131-135. Washington, D.C.: Island Press.
- Anderson, A. 1886. *Rights and Settlements of Kullu District.* Civil and Military Gazette, Lahore.

- Anderson, A. 1897. Final Report of the Revised Settlement in Kangra Proper, Lahore: Civil and Military Gazette Press.
- Archabald K, Naughton-Treves L. 2001. Tourism revenue-sharing around National Parks in Western Uganda: Early Efforts to Identify and Reward Local Communities. *Environmental Conservation*. 28:135-149.
- Ashford G. and Patkar, S. 2001. The positive path: using appreciative inquiry in rural Indian communities, Winnipeg.
- Balasubramanian, M. 2007. Sustainability of a Forest Preservation Project in India: The case of Kalakad Mundanthurai Tiger Reserve. A thesis submitted to Oregon University, USA.
- Bakshi, P.M. 2002. The Constitution of India, Delhi: Universal Law Publishing.
- Bennet, L.J., English, P.F. and Mc Coun, R. 1940. A study of deer populations by pellet group counts. *J Wildl. Manage.* 4: 398-403.
- Berkes, Fikret. 2004. Rethinking Community-Based Conservation. *Conservation Biology*, Vol 18, No 3.
- Bharadwaj Anil. 2007. An Assessment of Ecodevelopment Initiatives in Periyar Tiger Reserve, Kerala. A Thesis for degree of Doctor of Philosophy in Forestry to the FRI (Deemed University), Dehradun.
- Birdlife International. 2003. *Saving Asia's Threatened Birds: A Guide for Government and Civil Society*. Cambridge: Birdlife International.

- Blunt, M., Jeddere-Fisher, K., Mitra, K. and Sarin, M. 1999. Forestry Project Impact Assessment Report, Government of Himachal Pradesh Forest Department, Shimla, and DFID-India, Delhi.
- Brandis, Dietrich, B. H. Baden-Powell and W. Stenhouse. 1877, Suggestions regarding the Demarcation and Management of the Forests in Kulu. Government Press, Calcutta.
- Brandon K. 1996. Traditional People, Nontraditional Times: Social Change and Implications for Biodiversity Conservation. In *Traditional Peoples and Biodiversity Conservation in Large tropical Landscapes*, ed. KH Redford. Rosslyn, VA: The Nature Conservancy.
- Brandon, K. and Wells, M. 1992. Planning for People and Parks: Design Dilemmas. *World Development* 20 (4): 557-570.
- Brechin SR, Wilshusen PR, Fortwangler CL, West PC. 2002. Beyond the square Wheel: towards a more comprehensive understanding of biodiversity conservation s social and political process. *Society and Natural Resources*, 15: 41-64.
- Brockington Dan. 2002. *Fortress Conservation: The Preservation of the Mkomazi Game Reserve, Tanzania*. Indiana: Indiana University Press. pp. xxvi + 196.
- Buck, L.E., C.C. Geisler, J. Schelhas and E. Wollenberg (eds.), 2001. *Biological Diversity: Balancing Interests Through Adaptive Collaborative Management*. CRC Press, Washington, D.C., USA. pp. 465.
- CBD Technical Series No: 55. 2010. *Linking Biodiversity Conservation and Poverty Alleviation: A State of Knowledge Review*. Secretariat of the Convention on Biological Diversity.
- Campese J, Sunderland T, Greiber T, Oviedo G. 2009. *Rights ñ Based Approaches: Exploring Issues and Opportunities for Conservation*. Bogor, Indonesia. CIFOR and IUCN.

- Caughly, G. 1975. Analysis of vertebrate population. John Wiley & Sons, New York. pp 234.
- Chandar Mamta, Aug. 2001; Report of Review of the Projects and Initiatives of SAHARA.
- Chandrakanth, M.G. and J. Romm. 1991. Sacred forests, secular forest policies and people's action. *Natural Resources Journal* 31(4):741-756.
- Chauhan B.S and Sharma V. 1991. Status of Western Tragopan in Himachal Pradesh, India. WPA News, No. 34.
- Chetwode, P. 1972. Kulu, The End of the Habitable World. Allied Publishers Pvt. Ltd. New Delhi.
- Chhatre, A. and V. Saberwal, 2006. Democratizing Nature, Politics, Conservation, and Development in India, Oxford University Press, New Delhi.
- DFID. 2002. Improving livelihoods in a changing world. A speech by Clare Short, Secretary of State for International Development, House of Commons, Department for International Development, London, pp.10
- Datta S.K. 1999. Herpatofaunal Composition of GHNP and Ecodevelopment Areas. In WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach", Forestry Research Education and Extension Project- Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.
- DeCoursey Maureen A. 1999. Community-Based Ecotourism in the Great Himalayan National Park. in WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach", Forestry Research Education and Extension

Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.

Diack, A. H. 1898. Final Report on the Revised Settlement of Kulu Sub-Division, Government Press, Lahore.

Duffield C., Gardner J.S., and Singh R.B. 1998. Local Knowledge in the Assessment of Resource Sustainability. Case Studies in Himachal Pradesh, India and British Columbia, Canada. Mountain Research and Development, Vol 18, No 1998, pp 35-49.

Duke, G. 1990. Using call counts to compare Western Tragopan populations in Pakistan's Himalaya. In Hill, D.A., Garson, P.J. and Jenkins, D. (eds.). Pheasants in Asia. World Pheasant Association, Readings, U.K. pp 116-122.

Ferraro, P.J. and R.A. Kramer. 1997. Compensation and Economic Incentives: Reducing pressures on protected areas. In Last Stand: protected areas and the defense of tropical biodiversity, R. Kramer, C. van Schaik, and J. Johnson (eds.). New York: Oxford University Press, pp. 187-211.

Forest Sector Policy and Strategy. 2005. Himachal Pradesh Forest Department, Shimla, H.P.

Forman, R.T.T. and M. Godron. 1986. Landscape Ecology. John Wiley and Sons, New York.

Gadgil, M. 1975. Sacred Groves of India. Journal of the Bombay Natural History Society, Vol. 7.

Gadgil, M. and Chandran M.D.S. 1992. Sacred Groves. In: Indigenous Vision: Peoples of India Attitudes to the Environment (ed. G. Sen). Sage Publications and India International Centre, New Delhi.

Gadgil, M. and R. Guha. 1993. *This Fissured Land: An Ecological History of India*, New Delhi: Oxford University Press.

Gadgil M. and Guha R. 1995, *Ecology and Equity: The Use and Abuse of Nature in Contemporary India*, Penguin, Delhi.

Garson, P.J. 1983. The Cheer Pheasant *Catreus wallichii* in Himachal Pradesh, Western Himalaya: An update. *Journal of World Pheasant Association*, 8: 29-39.

Garson, P.J. 1999. Conservation of Galliformes in the Great Himalayan National Park: a Review of Monitoring and Research Activity. in WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach", Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.

Gaston, A.J. 1980. Census techniques for Himalayan pheasants including notes on individual species. *Journal of the World Pheasant Association* 5: 40-53.

Gaston, A.J., and Garson, P.J. 1992. A Re-Appraisal of the Great Himalayan National Park. Report to HPDFFC, International Trust for Nature Conservation, WWF-India, Oriental Bird Club.

Gaston, A.J., Garson, P.J., and Pandey, S. 1994. Birds recorded in the Great Himalayan National Park, Himachal Pradesh, India. *Forktail* 9 : 45-57.

Gaston, A.J., Hunter, M.L. and Garson, P.J. 1981. The Wildlife of Himachal Pradesh, Western Himalayas. Report of the Himachal Wildlife Project. Technical Notes No. 82, School of Forest Resources. University of Maine, Orono.

- Gaston, A.J. and Pandey, S. 2002. Wildlife. Great Himalayan National Park Adventure Series. GHNP, Shamshi.
- Gazetteer Punjab, District Kangra, Kulu and Sainj. 1918. Vol. XXX, Government Press, Lahore.
- Gee, E.P. 1964. Wildlife in India. William Collins, Sons and Co Ltd, London.
- Ghosh, A.K. 1996. Faunal Diversity. In G.S. Gujral & V. Sharma. (eds.), Changing Perspectives of Biodiversity Status in the Himalaya. New Delhi: The British Council.
- Green, M.J.B. 1978. The ecology and feeding behaviour of the Himalayan tahr (*Hemitragus jemlahicus*) in the Langtang Valley, Nepal, M.Sc. dissertation, University of Durham.
- Green, M.B.J. 1985. Aspect of ecology of Himalayan musk deer. Ph.D thesis, University of Cambridge.
- Guha, R., 1989. The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya, New Delhi, Oxford University Press.
- Gupta, R.K. 1994. Arcto-alpine and boreal elements in the high altitude flora of the northwest Himalaya. In Y.P.S. Pangtey and R.S. Rawal (Eds.), *High Altitudes of the Himalaya. (Biogeography, Ecology and Conservation)*. pp. 12-32. Delhi. Gyanodaya Prakashan.
- Harcourt, Captain (later Colonel) A.F.P. 1871. The Himalayan Districts of Kooloo, Spiti and Lahool, Reprinted in 1982, Vivek Publishing Company, New Delhi.
- Harihar, A., Pandav, B. & Goyal, S.P. 2009. Responses of tiger (*Panthera tigris*) and their prey to removal of anthropogenic influences in Rajaji National Park, India. European Journal of Wildlife Research, 55, 97-105.

- HPFSRP Himachal Pradesh Forest Sector Review Report. 2000. IIED, Published for the Himachal Pradesh Forest Department.
- HPFD Report. 1997: Himachal Pradesh Forest Department Annual Report, Shimla.
- Hirschland M. (ed). 2005. Savings services for the poor. An Operational Guide. Kumarian Press, Bloomfield, CT.
- Hobley, M. 1996. Participatory Forestry: The Process of Change in India and Nepal, Rural Development Forestry Study Guide 3, Overseas Development Institute, London.
- Holling, C.S. (ed.). 1978. Adaptive Environmental Assessment and Management, John Wiley & Sons, New York.
- Hutchison, J. and J. P. Vogel. 1933. History of the Panjab Hill States. 2 vols. Government Press, Lahore. Reprint 1994.
- IUCN. 1990. IUCN Directory of South Asian Protected Areas. Cambridge: IUCN.
- Islam, K. 1982. Status and distribution of the Western Tragopan in Northeastern Pakistan. In Savage, C.D.W. and Ridley, M.W. (eds). Pheasants in Asia, World Pheasant Association, Reading, U. K. pp 44-50.
- Islam, M.Z. and Rahmani, A.R. 2004. Important Bird Areas in India: Priority sites for conservation. Indian Bird Conservation Network: Bombay Natural History Society and Birdlife International (U.K.). pp xviii + 1133.
- Jacoby K. 2001. Crimes Against Nature. Squatters, Poachers, Thieves and the Hidden History of American Conservation. Berkeley, University of California Press.

- Jaryan Vikrant, Uniyal Sanjay Kr, Gopichand, Singh R.D. Lal Brij, Kumar Amit and Sharma Varun. 2010. Role of traditional conservation practice: highlighting the importance of Shivbari sacred grove in biodiversity conservation. *The Environmentalist*, 30(2), pp 101-110.
- Jhulka J.K. 1999. Assessment of annelida and mollusca diversity in Great Himalayan National Park. in WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach" Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.
- Johari R. 2007. Of Paper Tigers and Invisible People, The cultural politics of nature in Sariska. In *Making Conservation Work* (eds Shahabuddin G., and Rangarajan M.). Permanent Black, Ranikhet, Uttaranchal, India.
- Kapoor, D. P. 1973. Fifth Working Plan for the Kulu and Seraj Forests. Government Press, Shimla.
- Kattel, B.J. 1992. Ecology and Conservation of the Himalayan Musk Deer in Nepal. Ph.D. Thesis, Colorado State University, Fort Collins, 76 pp.
- Kaul, R. and Ahmed, A. 1993. Pheasant surveys in Arunachal Pradesh, India, in February ñ March 1991. (in) Jenkins, D. (ed.). *Pheasants in Asia*. World Pheasant Association, Reading, U.K. pp 50-54.
- Kaul R. and Shakya S. 2001. Spring call counts of some Galliformes in the Pipar Reserve, Nepal. *Forktail*, 17, 75-80.

- Khare A, Sarin M, Saxena, N.C., Palit S., Vania F., Satyanarayana M, 2000. Joint Forest Management: Policy, Practice and Prospects: India Country Study, IIED, WWF - India
- JFM Update. 1993. Society for Promotion of Wastelands Development. New Delhi.
- Kellert SR, Mehta JN, Ebbin SA, Lichtenfeld LL. 2000. Community Natural Resource Management: Promise, Rhetoric, and Reality. *Society and Natural Resources* 13:705-715.
- Kremer RA, van Schaik CP, Johnson J, eds. 1997. *The Last Stand: Protected Areas and the Defence of Tropical Biodiversity*. New York: Oxford University Press.
- Kothari, A., Pande P., Singh S. and Variava D. 1989. *Management of National Parks and Sanctuaries in India. A Status Report*. Indian Institute of Public Administration, New Delhi. pp. 298.
- Kothari, A. and Pandey S. 2006. Case Study 20.11. A tiger reserve and a Himalayan park: Towards participatory management. In *Managing Protected Areas, a Global Guide* Ed. Lockwood M., Worboys G.L., Kothari A. IUCN, Earthscan, UK.
- Larson P, Freudenberger M, Wyckoff-Baird B. 1997. *Lessons from the Field: A Review of World Wildlife Fund's Experience with Integrated Conservation and Development Projects 1985-1996.*, World Wildlife Fund, Washington D.C.
- Lee, K.N., 2001. Appraising Adaptive Management.. In: (eds. Buck L.E. et al.). *Biological Diversity: Balancing Interests Throuh Adaptive Collaborative Management*. CRC Press, Washington, D.C., USA. pp.3-26.

- Lele Sharachchandra, Wilshusen Peter, Brockington Dan, Seidler Reinmar and Bawa Kamaljit. 2010. Beyond Exclusion: Alternative Approaches to Biodiversity Conservation in the Developing Tropics. *Current Opinion in Environmental Sustainability*, 2:1-7.
- Leverington F., Hockings M., Pavese H., Costa K.L., and Courrau J. 2008. Management evaluation in protected areas ñ A global study. Supplementary report No. 1: Overview of approaches and methodologies. The University of Queensland, Gatton, TNC, WWF, IUCN-WCPA, Australia.
- Lindsay, J. 2000. Improving the Legal Framework for Sustainable Forest Management in Himachal Pradesh: Issues and Options in Light of International Experience, Paper prepared for Forest Sector Review, IIED, London
- Little, P.D., Horowitz, M.M., (eds). 1987. *Lands at Risk in the Third World*. Westview Press, Boulder. xiii + 416 pp.
- Lusigi, W.J. 1995. How to Build Local Support for Protected Areas. In: (ed. McNeely, J.A.). *Expanding Partnerships in Conservation*. IUCN ñ The World Conservation Union, Island Press, Washington, D.C. pp 19-24.
- MEA. 2005. *Millennium Ecosystem Assessment*. Island Press.
- Machlis, G.E., Tichnell, D. L. 1985. *The State of the World's Parks*. Westview Press, Boulder, USA. xiv+131pp.
- Madhusudan, M. D. 2003. Living amidst large wildlife: livestock and crop depredation by large mammals in the interior villages of Bhadra Tiger Reserve, South India. *Environmental Management*, 31(4), 466-475.

- Malhotra, K.C., Y. Gokhale, S. Chatterjee and S. Srivastava. 2000. Sacred Groves in India : An Overview. Indira Gandhi Rashtriya Manav Sangrahalaya, Bhopal.
- Mani, M.S. 1994. The Himalaya, its ecology and biogeography: A review. In Y.P.S. Pangtey & R.S. Rawal. (Eds.), *High Altitudes of the Himalaya. (Biogeography, Ecology and Conservation)*. pp. 1-10. Delhi: Gyanodaya Prakashan.
- Martino D. 2001. Buffer Zones around Protected Areas: a brief literature Review. *Electronic Green Journal*, 15: 1076 ñ 7075.
- McGowan, P.J.K. 1990. Calling as a means to survey the Malaysian Peacock Pheasant: a preliminary assessment. In Hill, D.A., Garson, P.J. and Jenkins, D. (eds.). *Pheasants in Asia*. World Pheasant Association, Readings, U.K. pp 110-115.
- McNeely, J. A. 1988. Economics and Biological Diversity: Developing and Using Economic Incentive to Conserve Biological Resources. IUCN, Gland, Switzerland.
- McNeely, J.A. 1992. Protected areas for the twenty-first century: Working to provide benefits to society. *Unasylva* 176, Vol. 45: 3-7.
- McNeely, J.A., Pitt, D., (eds). 1985. *Culture and Conservation: The Human Dimension in Environmental Planning*. Croom Helm, London. xi+308pp
- McNeely, J.A., and Miller K.R. (eds.). 1984. *National Park Conservation and Development: The Role of Protected Area in Sustaining Society*. Smithsonian Institution Press, Washington D.C.
- McNeely, J.A., Mller, K.R , Reid W.V., Mittermeier R.A and Werner T.B. 1990. *Conserving the World's Biological Diversity*. IUCN, Gland, Switzerland; WRI, CI, WWF-US, and the World Bank, Washington D.C.

- Mehta, A., Mehta R., Palhan S., Sankaran V., Singh S., Uppal V., Vania F. 1993. Biodiversity Conservation through Ecodevelopment. A Preliminary, Indicative Plan for Great Himalayan National Park, Himachal Pradesh and Kalakad Mundanthurai. Tiger Reserve, Tamil Nadu. Indian Institute of Public Administration, New Delhi, India.
- Miller, K.R. 1996. Balancing the Scales: Guidelines for Increasing Biodiversity Chances Through Bioregional Management. World Resource Institute. pp73.
- Miller, K.R. 1999. Bioregional Planning and Biodiversity Conservation. In: (eds. S. Stolton and N. Dudley), Partnership for Protection, New Strategies for Planning and Management of Protected Areas. WWF-International and IUCN; Earthscan Publications Ltd., London: 41-49.
- Mishra, R. 1968. Ecology Work Book. Oxford and IBH Publ., New Delhi.
- Mishra, S.P. 1996. Factors Affecting Women Entrepreneurship in Small Cottage Industries in India. A report to International Labour Organization, Geneva, Switzerland.
- Mittermeier, R.A., Gil P.R. and Mittermeier, C.G. 1997. Megadiversity: Earth's Biologically Wealthiest Nations. Conservation International, Cemex.
- Mittermeier, Russell A. and others. 2005. Hotspots Revisited: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions. University of Chicago Press.
- Muller-Dombois, D. and Ellenberg. 1974. Aims and Methods of Vegetation Ecology. John Walley and Sons. New York, London, Sydney, Toronto, 547.
- Munro, D.A. 1995. New Partners in Conservation: How to Expand Public Support for Protected Areas. In: (ed. McNeely, J.A.). Expanding Partnerships in Conservation. IUCN ñ The World Conservation Union, Island Press, Washington, D.C. pp 13-18.

Myers, N. 1979. The Sinking Ark. Oxford: Pergamon.

Myers Norman, Mittermeier Russell A., Mittermeier Cristina, G, Gustavo A.B. da Fonseca, and Kent Jennifer. 2000. Biodiversity Hotspots for Conservation Priorities (2000). Nature, Vol 403, 24 February 2000.

Naithani S. & Mathur V.B. 1999. WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach", Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.

Nandi Rajib. 1999. Herbal Medicinal Plants in Himachal Pradesh, An Analysis of Income and Employment Potential. Institute of Social Studies Trust, New Delhi. Sponsored by National Council of Applied Economic Research / Ford Foundation

Nautiyal S., Kaechele H. 2009. Natural resource management in a protected area of the Indian Himalayas: a modeling approach for anthropogenic interactions on ecosystem. Environ Monit Assess; 2009 Jun;153(1-4):253-71

Naveh, Z. 1987. Biocybernetic and Thermodynamic Perspectives of Landscape Functions and Land Use Patterns. Landscape Ecology 1(2):75.

Negi A.S. 1999. Assessment of Issues Related to Soil Erosion, Landslides and to Provide Technical Support to the Park Management in WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach", Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.

- Neumann R. 1997. Primitive ideas: protected area buffer zones and the politics of land in Africa. *Development and Change*. 28:559-582.
- Oates JF. 1999. Myth and Reality in the Rain Forest: How Conservation Strategies are Failing in West Africa. Berkley, CA: University of California Press.
- Ohri, V. C. 1980. Pre-history of Himachal Pradesh; Some Latest Findings, Simla.
- PEACE ñ ELDF ñ Samrakshan, 2004. Lessons Leant from Eco-Development Experiences in India. Unpublished.
- Pandey S. 1993. Pheasant Surveys and the Conservation of Protected Areas in the Upper Beas Valley, Himachal Pradesh, India in *Pheasants in Asia 1992*. World Pheasant Association, Reading, UK edited by Jenkins, D.
- Pandey S. 1994. A Preliminary Estimate of Numbers of Western Tragopans in Daranghati Sanctuary, Himachal Pradesh. *WPA Review*, U.K.
- Pandey S. 1999. Setting-up of Experimental Plots in GHNP. in *WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach"* Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.
- Pandey S. 2003. Environmental Justice Study on Human-Animal Conflict in and around the Great Himalayan National Park, Himachal Pradesh, submitted to the Winrock International India, N. Delhi.
- Pandey S. 2004. Great Himalayan National Park (Chapter 9) in *Lessons Learnt from Eco-development Experiences in India: A Study by PEACE*, N. Delhi, submitted to the MoEF, N. Delhi.

- Pandey S. 2005 (a). Livelihood based Management Plan for Biodiversity Conservation of the Great Himalayan National Park Conservation Area (GHNPCA), submitted to the Wildlife Wing of the Himachal Pradesh Forest Department.
- Pandey S. (2005b). Corridor Planning: Wildlife Perspective. Paper presented to the fourth international workshop on Conserving Hill Mountain Ecology in Shimla (Himachal Pradesh) from 24th to 26th August, 2005 organized by the United States Educational Foundation in India, Fulbright House, 12, Hailey Road, New Delhi - 110001.
- Pandey S. 2008. Linking Ecodevelopment and Biodiversity Conservation at the Great Himalayan National Park, India: Lessons Learnt. Biodiversity and Conservation 17:1543-1571.
- Pandey S. 2010. Chapter on Diversity of Nature Conservation Practices in Himachal Pradesh in book Recognizing Diversity, Society and Culture in the Himalayas. Ed by Chetan Singh. OUP, N. Delhi.
- Pandey S. and Tandon V. 2002. Linking Conservation and Development of Medicinal Plants with Local Livelihoods in Great Himalayan National Park, Kullu, India. Submitted to a Regional Workshop on "Wise practices and experiential learning in the conservation and management of Himalayan medicinal plants" held in Kathmandu during 15-20 December 2002.
- Pandey S. and Wells M. 1997. Ecodevelopment Planning at India's Great Himalayan National Park for Biodiversity Conservation and Participatory Rural Development. Biodiversity and Conservation Vol 6 (9) pp 1277-1292.
- Pabla, H.S., Pandey, S. and Badola R. 1995. Guidelines for Ecodevelopment Planning. Wildlife Institute of India, Dehra Dun. India.

- Panwar, H.S. 1992. Ecodevelopment: An Integrated Approach to Sustainable Development for People and Protected Areas in India. Paper presented in the IV World Congress on National Parks and Protected Areas. Caracas, Venezuela. 10-21 February 1992.
- Pathak Neema (ed). 2010. Community Conserved Areas in India A Directory. Kalpavriksh. Pune/Delhi
- Pisharoti, P.M. 2008. Livelihood changes in response to restrictions on resource extraction from the Great Himalayan National Park. M.Sc. Dissertation in Wildlife Biology and Conservation. WCS and NCBS Course. Manipal University.
- Polunin, O. and Stainton, A. 1984. Flowers of Himalaya. Oxford University Press New Delhi. pp 580.
- Rajshekhkar M. 2002. Forest Trump "Business World" published in India--Dec.26; pp 48-50
- Ram, J. & Singh, S.P. 1994. Ecology and conservation of alpine meadows in central Himalaya, India. In Y.P.S. Pangtey & R.S. Rawal. (Eds.), High Altitudes of the Himalaya. (Biogeography, Ecology and Conservation). pp. 33-35. Delhi: Gyanodaya Prakashan.
- Ramakrishnan, P.S., K.G. Saxena and U.M. Chandrashekara. (eds.). 1998. Conserving the Sacred for Biodiversity Management. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. Robinson, E.C. 1998. Greening at the Grassroots: Alternative Forestry Strategies in India. Thousand Oaks, New Delhi.
- Ramesh K. 2003. An ecological study on the pheasants of Great Himalayan National Park, Western Himalaya. Ph.D. thesis, Forest Research Institute, Dehradun, India.
- Ramesh, K., Sathyakumar, S. and Rawat, G.S. 1999. Recent trends in the pheasant populations of Great Himalayan National Park, India: Conservation implications. In

press, Proceedings of the National Symposium on Wildlife research, conservation and management, Wildlife Institute of India, Dehradun.

Ramesh, K., Sathyakumar S. and Rawat G.S., 2005. Recent trends in the pheasant population in Great Himalayan National Park, Western Himalaya: conservation implications. In: Jhala Y.V., Chellam R. and Qureshi Q. 2005 (eds). Wildlife conservation, research and management. A technical publication of the Wildlife Institute of India, Dehradun. RR-05/001, 40 ñ 43.

Rangarajan M. (ed) 2007. Environmental Issues in India, A Reader. Pearson Longman, Delhi.

Reid, W.V., and K.R. Miller. 1989. Keeping options alive, the scientific basis for conserving biodiversity. World Resource Institute, Washington, D.C.

Rodgers, W.A. 1991. A field manual of techniques for wildlife census in India. TM-2. Dehradun, Wildlife Institute of India.

Rodgers, W. A., Panwar H.S. and Mathur V.B. 2002. Wildlife Protected Area Network in India: A Review (Executive Summary). Wildlife Institute of India, Dehradun.

Roe D. and Elliott J. 2004. Poverty reduction and biodiversity conservation: rebuilding the bridges Oryx Vol 38 No 2. April.

Rutherford S. 2004. The Microfinance Market: Huge, Diverse, and Waiting for You, in Livelihood and Microfinance, ed Hotze Lont and Otto Hospes, Eburon, Delft.

Saberwal, V.K., and Rangarajan M. 2003. "Introduction" in Vasant Saberwal and Mahesh Rangarajan (eds.) Battles over Nature: Science and the Politics of Conservation, pp. 1-28. New Delhi: Permanent Black.

- Saberwal, V.K., Rangarajan M., and Kothari A. 2000. People, Parks and Wildlife: Towards Co-existence, Delhi: Orient Longman.
- Salafsky N., Cordes B., Parks J, Hochman C. 1999. Evaluating Linkages between Business, the Environment and Local Communities: Final Analytical Results from the Biodiversity Conservation Network, Biodiversity Support Program, WWF-USA, Washington DC.
- Salwasser, H. 1995. Ecosystem Management: Broadening Perspectives on Relationships among People, Land, and Resources. In B. Shelby and S. Arbogast (comp.) 1995 Starker Lectures, Oregon State University, College of Forestry, Corvallis, OR pp 45-68.
- Sankar K., Qamar Quereshi, Krishnendu Mondal, T. D. Worah, Srivastava, S. Gupta and S. Basu. 2009. Ecological Studies in Sariska Tiger Reserve, Rajasthan. Final Report. Wildlife Institute of India, Dehra Dun. 145pp.
- Sathyakumar, S. 1994. Habitat ecology of major ungulates in Kedarnath Musk Deer Sanctuary, Western Himalaya. Ph.D.thesis, Saurashtra University, Rajkhot. 242 pp.
- Sathyakumar, S., Prasad, S.N., Rawat, G.S. and Johnsingh, A.J.T. 1993. Ecology of Kalij and Monal Pheasant in Kedarnath Wildlife Sanctuary, Western Himalaya. (In) Jenkins, D. (Ed.) 1993. Pheasants in Asia 1992. World Pheasant Association, Reading. U.K. pp 83-90.
- Sawarkar, V.B. 1995. A Manual for Planning Wildlife Management in Protected Areas and Managed Forests. Wildlife Institute of India, Dehra Dun
- Settlement Report, 1999. Great Himalayan National Park Settlement by Collector, GHNP, Kullu.

- Severinghaus, S.R. 1979. Observations on the ecology and behaviour of the Koklass Pheasant in Pakistan. *Journal of the World Pheasant Association*. 4: 52-71.
- Sharma J.C. 1980. Working Plan of Kullu Forest Division. Himachal Pradesh Forest Department.
- Sharma, Virinder. 1998, "History of Legislation Relating to Wildlife and Hunting in Himachal Pradesh," in Virinder Sharma, ed., *Conservation of Natural Ecosystems in Himachal Pradesh, Western Himalayas*. State Council for Science, Technology and Environment, Simla.
- Sharma, Virinder. 1999. Assessment of Herb and Mushroom Collection in Great Himalayan National Park Conservation Area, Kullu District, H.P. in WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach", Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol.1-6.
- Singh C. 1998. *Natural Premises, Ecology and Peasant Life in the Western Himalaya 1800-1950*. Indian Institute of Advanced Study, Shimla. Oxford University Press, Delhi.
- Singh S.K and Rawat G.S. 1999. Floral Diversity and Vegetation Structure in Great Himalayan National Park, Western Himalaya. in WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach", Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.
- Singh S.K. and Rawat G.S. 2000. *Flora of Great Himalayan National Park, Himachal Pradesh*. Bishen Singh Mahendra Pal Singh, Dehradun.

- Singh, T.V. 1989. The Kulu Valley, Impact of Tourism Development in the Mountain Areas. Himalayan Book, New Delhi.
- Sood, M.P. 1996. New Forestry Initiatives in Himachal Pradesh, Forest Participation Series no. 3. IIED, London
- Spiteri A, and Nepal SK. 2008. Evaluating local benefits from conservation in Nepal's Annapurna Conservation Area. *Environ Manage*; Sep;42(3):391-401.
- TPCG and Kalpavriksh. 2005. Securing India's Future: Final Technical Report of the National Biodiversity Strategy and Action Plan. Prepared by the NBSAP Technical and Policy Core Group. Kalpavriksh, Delhi/Pune.
- Tandon, V. 1999. Report on the Status of Collection, Conservation, Trade and Potential for Growth in Sustainable Use of Major Plant Species found in the Great Himalayan National Park and its Environs in Kullu District of Himachal Pradesh. in WII Project Report. An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area ñ An Ecodevelopment Approach. Forestry Research Education and Extension Project ñ Great Himalayan National Park (FREEP ñ GHNP). Final Project Report, WII, Dehra Dun. Vol. 1-6.
- Tandon, V. 2002. Getting Women to Choose. Case study on "Sustainable Livelihoods and Poverty Alleviation", Mountain Forum E-consultation for the UNEP / Bishkek Global Mountain Summit.
- Terborgh J. 1999. Requiem for Nature. Washington, D.C.: Island Press/Shearwater Books.
- Tucker, R., 1991. Resident Peoples and Wildlife Reserves in India: The Prehistory of a Strategy in P. West and S. Brechin (eds.) Resident Peoples and National Parks Tucson: University of Arizona Press.

- Tucker R. 1999. The Historical Development of Human Impacts on Great Himalayan National Park. in WII Report An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area ñ An Ecodevelopment Approach. Forestry Research Education and Extension Project ñ Great Himalayan National Park (FREEP ñ GHNP). Final Project Report, WII, Dehra Dun. Vol. 1-6.
- UNDP. 1998. Ecoregional Co-Operation for Biodiversity Conservation in the Himalayas. Proceedings of a regional meeting organized by UNDP in co-operation with WWF and ICIMOD.
- Udvardy, M. D. F. 1975. A classification of the biogeographical provinces of the world. IUCN Occasional Paper no. 18. Morges, Switzerland: IUCN.
- Uniyal V.K., Pandey S. and Sawarkar V.B. 1993. Buffer Zones - Key to the Success of Protected Areas. Paper presented at the Training on Conservation and Management of Biological Resources in the Himalaya, UNESCO-GBPIHED, Srinagar (Garhwal), India.
- Uniyal, V. P. and Mathur, P. K. 1999. A study on the species diversity among selected insects groups. in WII Research Report, ñAn Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approachö Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.
- .
- Upreti D.K. 1999. Lichen Flora of Great Himalayan National Park in WII Research Report, ñAn Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approachö Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6

- Vasan, Sudha. 2002. Devban Institutions in Kullu: Transformation, Adaptation and Potential, *Studies in Humanities and Social Sciences*, IX (1), Summer, pp. 50-76.
- Vasan, Sudha. 2006. *Living With Diversity: Forestry Institutions in the Western Himalaya*, Shimla: Indian Institute of Advanced Study.
- Vasan, Sudha and Sanjay Kumar. 2006. Situating Conserving Communities in their Place: Political Economy of Kullu Devban. *Conservation and Society*, 4 (2), 2006, pp325-346.
- Vinod T.R. and Sathyakumar S.1999. Ecology and Conservation of Mountain Ungulates in Great Himalayan National Park, Western Himalaya in WII Research Report, "An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach" Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun:Wildlife Institute of India, Vol.1-6.
- WII Research Report. 1999. An Ecological Study of the Conservation of Biodiversity and Biotic Pressures in the Great Himalayan National Park Conservation Area: An Ecodevelopment Approach, Forestry Research Education and Extension Project-Great Himalayan National Park (FREEP-GHNP), Final Report, Dehradun: Wildlife Institute of India, Vol. 1-6.
- WII-MoEF. 2007. Management Effectiveness Evaluation (MEE) of National Parks and Wildlife Sanctuaries. Draft report submitted by Wildlife Institute of India to Ministry of Environment and Forests, Govt of India.
- WWF and IUCN. Worldwide Fund for Nature and World Conservation Union. 1994, *Centres of Plant Diversity: A Guide and Strategy for their Conservation*. 3 volumes. Cambridge, UK: IUCN Publications Unit.

- Wadia, D. N. 1957. *Geology of India*, London.
- Walters, C. 1986. *Adaptive Management of Renewable Resources*, MacMillan, New York.
- Wani, M. and Kothari A. 2007. *Conservation and People's Livelihood Rights in India, Final Report of a Research Project Conducted Under the UNESCO Small Grants Programme (with inputs from Vasundhara and Foundation for Ecological Security)* Kalpavriksh, Pune/Delhi. January.
- Weil, Benjamin. 2006. Conservation, Exploitation, and Cultural Change in the Indian Forest Service, 1875-1927, *Environmental History* 11(April):319-343
- Wells, M. 1994. Biodiversity Conservation and Local People's Development Aspirations: New Priorities for the 1990s. In *Biodiversity Conservation: Problems and Policies*. Perrings, C., Maler, K.G., Folke, C., Holling, C.S., & Jansson B.O. (eds.), Kluwer Academic Press. Dordrecht, the Netherlands.
- Wells, M. and Brandon, K. 1993. The Principles and Practice of Buffer Zones and Local Participation in Biodiversity Conservation. *Ambio* 22 (2-3): 157-162.
- Wells, M. and Brandon, K., with Hannah, L. 1992. *People and Parks: Linking Protected Area Management with Local Communities*. World Bank, Washington D.C.
- Wells M, Guggenheim S, Khan A, Wardoyo W, Jepson P. 1999. *Investing in Biodiversity: A Review of Indonesia's Integrated Conservation and Development Projects*. Washington DC: The World Bank.
- Wells MP, McShane TO. 2004. Integrating protected area management with local needs and aspirations. *Ambio*; Dec;33(8):513-9

- West, P.C. and Brechin, R.S. 1991. Resident People and National Parks: Social Dilemmas and Strategies in International Conservation. University of Arizona Press, Tucson.
- Western, D., Wright, M. and Strum S. (eds.) 1994. Natural Connections: Perspectives in Community-based Conservation. Island Press, Washington D.C.
- Wikramanayake, E.D., Dinerstein, E., Allnut, T., Loucks, C. & Wettengel, W. 1998. A Biodiversity Assessment and Gap Analysis of the Himalayas. World Wildlife Fund-U.S., Conservation Science Program/UNDP Rept.
- World Bank 2002. Implementation Completion Report for the Forestry Research Education and Extension Project. Washington DC: The World Bank.
- Wildlife (Protection) Act, 1972, Natraj Publishers, Dehradun.
- Zube, E.H., 1995. No Park Is an Island. In: (ed. McNeely, J.A.). Expanding Partnerships in Conservation. IUCN ñ The World Conservation Union, Island Press, Washington, D.C. pp. 169-177.