Chapter 1

INTRODUCTION

1.1 The Context

Watershed protection and development have gained tremendous importance and relevance in India over the past few years. This has been due to the increasing realization of the alarming state of India's natural resources – land, water and forest, which have witnessed rapid degradation as a result of the immense pressures that have been put on them by the country's growing human and livestock population. Dry lands, for instance, which account for almost two-thirds of India's total cultivated land, are among the most environmentally fragile lands. These supports a large number of India's poor and contribute a significant proportion of the country's agricultural output (Ninan and Lakshmikanthamma, 1994). Owing to the intensification of agriculture, extension of cultivation to marginal lands, perverse incentives that encourage the over-exploitation of natural resources, rapid degradation of forest resources, overgrazing and diminishing common lands, much of these lands are in various stages of degradation. According to an estimate made by the National Commission on Agriculture, 175 million hectares of land in India is under some form of degradation or the other (Planning Commission, 2002). This is easily visible in the form of increased soil erosion, declining groundwater tables, decrease in drinking water viability, desertification, etc. in different parts across the country (Ninan & Lakshmikanthamma, 1994).

Furthermore, frequent occurrences of either floods or droughts are evidence of improper land use in the catchments, and of the inadequate conservation of forests (MoA, 2002). Since more than two-third's of India's one billion-strong population depends heavily on the primary sector – agriculture and forestry – to meet their daily survival needs, this degradation of the natural resource base has thus seriously impacted the well being and development of the majority of the country's population, especially the poor, who depend on these resources the most. The degradation of land and forest resources in the upper watershed catchments have also negatively affected other urban downstream stakeholders such as hydropower

companies, municipal water supply corporations, fisheries, downstream states, etc. through increased siltation in reservoirs, dams, and natural water bodies, reduction of water flows, increased occurrences of floods and landslides, etc. However, the primary focus of watershed protection and development in India, till date, has mainly been on reversing the negative impact of land degradation on the rural poor at the local level rather than at a wider macro scale. As Kerr & Chung (2001) point out, in much of semi-arid India off-site concerns are typically limited to the local intra or inter-village level itself.

Historically, ever since the breakdown of traditional resource management systems took place in colonial times (Guha, 1991, Gadgil & Guha, 1992), regulation has been the main approach followed for natural resource management in India, with ownership, management and control of natural resources vested almost entirely in the hands of government. Similarly, in the case of watershed protection and development activities, it was only the line departments and government staff of the Ministries of Agriculture, Rural Development, and Environment and Forests that carried out watershed treatment work in a centralized top-down manner under a regulatory framework. There was very little community participation, with the role of communities in most cases, limited only to that of providing cheap labour. Further, watershed development was undertaken in a completely sectoral and piecemeal manner by each of the concerned departments and ministries, with each implementing programmes and guidelines separately, without any coordination among themselves. Financing of these programmes too was supported mainly by the government - either central or state - on the basis of annual budgets and allocations, with no contribution from the communities themselves, which resulted in a total lack of ownership of these programmes among the local people. The watershed treatment interventions were highly mechanistic, focusing primarily on technical engineering works such as construction of check dams, contour trenching, gully plugging, plantation works, etc. without paying much attention to community mobilization and social organization.

Given this highly regulatory, centralized and target-driven approach, and the emphasis on the quantity rather than the quality of interventions, programmes in

watershed development were unable to halt the rapid degradation of the country's natural resources. Acknowledging this failure, the Hanumantha Rao Committee, which was set up in 1994-95 to review watershed development programmes in the country, noted that these programmes had made very little impact on the ground despite having been in operation for over two decades (Planning Commission, 2002).

Realizing the limitations of the regulatory approach in reversing the degradation of natural resources, and learning from successful experiments of community-based watershed and forest protection in Sukhomajri, Ralegaon Siddhi, Arabari, etc. in the 1970s (Agarwal & Narain, 1999), the government made serious efforts to secure community participation in the management of the country's land, water and forest resources through the programmes of Joint Forest Management (JFM), Participatory Watershed Development, and Participatory Irrigation Management in the 1990s.

Watershed development in India has, since then, made three important transitions. Firstly, there has been a shift from a top-down, command-and-control regulatory approach to a more people-centred, bottom-up and participatory approach, which recognizes that watershed protection and development is impossible to undertake and sustain successfully without the active participation of local communities. Secondly, and related to the first, it has been realized that *technical* solutions that normally characterize watershed protection activities in India such as building of engineering structures, policing of forests from local people, etc. are by themselves insufficient, and that *social* solutions involving collective action by the communities, and offering them suitable incentives to participate in watershed development and natural resource management, are far more sustainable in the long run. Thirdly, it has been accepted that watershed development is far more effective when done in an integrated and planned manner, following a logical ridge-to-valley approach, rather than in isolation by each government line department separately.

1.2 Overview of Himachal Pradesh

Hibachi Pradesh is a mountainous Himalayan State, which constitutes major natural watershed for the entire North India region. All of HP forms the watersheds of four major tributaries of the river Indus (the Chenab, Ravi, Beas and Sutlej) and of the river Yamuna that feeds into the Ganges. These rivers provide water supply not only to the Indian capital city of Delhi but also to a number of key agricultural states located in the north Indian plains. Hence, the downstream impacts of land use in the upper watersheds of HP are potentially very significant.

State Income is the single most common and comprehensive economic indicator used to measure the economic health of a State economy. In Himachal Pradesh, first estimates of State Income were released in the year 1963 covering the period 1950-51 to 1960-61. Since Himachal Pradesh underwent many territorial changes after independence and emerged as a full-fledged State in the year 1971, a new series of State Domestic Product was developed for the year 1966-67 to 1969-70 with the base year 1960-61. The third series of State domestic product prepared in the Pradesh was based on 1970-71 prices, which consisted of the estimates up to 1986-87. After the release of the new series of National Accounts Statistics by Central Statistical Organization in February 1989, Himachal Pradesh also brought out a new series of estimates based on 1980-81 prices.

A new series of quick estimates were brought out during 1999-2000 based on the 1993-94 prices. The National Accounts Statistics have mostly been revised decennially changing the base to a year synchronizing with the year of decennial population census.

The quick estimates of State Income for the year 1999-2000 to 2006-07 at current and constant (1999-2000) prices and per capita income along with percentage changes over the previous year at 1999-2000 prices are given in the following table:

Table 1.1-Movement of Net State Domestic Product and Per Capita Income

Year	State Income		Per Capita Income		%age Change Over the Previous Years At 1999-2000 Prices	
	At Constant Prices (Rs. In crore)	At Current Prices (Rs.in crore)	At Constant Prices (In Rs.)	At Current Prices (In Rs.)	Net State Domestic Product	Per Capita Income
1999-2000	12467	12467	20806	20806		
2000-01	13262	13852	21824	22795	6.04	4.9
2001-02	13938	15215	22543	24608	5.1	3.3
2002-03	14617	16751	23234	26627	4.9	3.1
2003-04	15596	18127	24377	28333	6.7	4.9
2004-05 (P)	16953	20262	26053	31139	8.7	6.9
2005-06 (Q)	17990	22390	27163	33806	6.1	4.3
2006-07 (A)	19157	24798	28415	36783	6.5	4.6

According to these estimates, the State income of the Pradesh during 1999-2000 to 2005-06 period increased from Rs. 12467 crore to Rs. 17990 crore at constant prices and to Rs. 22390 crore at current prices. The compound annual growth rate of the State domestic product during this period is 5.37%. The per capita income at constant prices increased from Rs. 20806 in 1999-2000 to Rs. 27163 in 2005-06 and 28415 in 2006-07 while at current prices, it rose to Rs. 33806 and Rs. 36783, respectively, during the same period.

The growth rate of State Economy recorded during the Five Year Plan periods beginning from the 1st Five Year plan, 1951-56 onwards alongwith comparison with the National Economy is given in the following : -

Table 1.2 Comparative Growth Rate of H.P. and National Economy Recorded During Five Year Plan Periods

Plan Period	Average Annual Growth Rate of Economy At Constant Prices	
	Himachal Pradesh	All India
First Plan (1951-56)	(+) 1.6	(+) 3.6
Second Plan (1956-61)	(+) 4.4	(+) 4.1
Third Plan (1961-66)	(+) 3.0	(+) 2.4
Annual Plans (1966-67) to (1968-69)	(+) 3.0	(+) 4.1
Fourth Plan (1969-74)	(+) 3.0	(+) 3.4
Fifth Plan (1974-78)	(+) 4.6	(+) 5.2
Annual Plans (1978-79) to (1979-80)	(-) 3.6	(+) 0.2
Sixth Plan (1980-85)	(+) 3.0	(+) 5.3
Seventh Plan (1985-90)	(+) 8.8	(+) 6.0
Annual Plan (1990-91)	(+) 3.9	(+) 5.4
Annual Plan (1991-92)	(+) 0.4	(+) 0.8
Eighth Plan (1992-97)	(+) 6.3	(+) 6.2
Ninth Plan (1997-02)	(+) 6.4	(+) 5.6
Annual Plan (1997-98)	(+) 6.4	(+) 5.0
Annual Plan (1998-99)	(+) 7.2	(+) 6.6
Annual Plan (1999-2000)	(+) 6.6	(+) 6.6
Annual Plan (2000-01)	(+) 6.3	(+) 4.4
Annual Plan (2001-02)	(+) 5.2	(+) 5.8
Annual Plan (2002-03)	(+) 5.1	(+) 3.8
Annual Plan (2003-04)	(+) 8.1	(+) 8.5
Annual Plan (2004-05) **(P)**	(+) 7.6	(+) 7.4
Annual Plan (2005-06) **(Q)**	(+) 8.5	(+) 9.0
Annual Plan 2006-07 **(Advance)**	(+)9.3	(+)9.2

The growth analysis presented in the above table reveals that Himachal Pradesh achieved an annual average growth rate of 1.6% in the First Five Year Plan

period 1951-56. After Second Five-Year Plan, 1956-61 onwards and upto Fifth Five-Year Plan period 1974-78, the State achieved a growth rate of about 3 to 4.6 percent. During the two Annual Plans of 1978-79 and 1979-80 the economy revealed a negative growth rate of (-) 3.6 percent but again showed a recovery during the Sixth Plan period 1980-85. During Seventh Plan period 1985-90, State achieved all time high growth rate of 8.8%.

It will be of relevance to look into the structural changes that the economy of Himachal Pradesh has undergone over the years. The morphological and climatic conditions prevalent in Himachal Pradesh have natural advantage in taking up agriculture based livelihoods as primary means of earning bread. A wide degree of variation in the climatic conditions within the State also allows diversifying the agriculture based livelihoods. In the late 1940s when Himachal Pradesh came into existence as part 'C' State, the agricultural production was largely confined to the traditional Rabi and Kharif crops and stray cultivation of apple and some stone fruits in the name of horticultural produce. A large scale diversification, both in agriculture and horticulture, has occurred since then.

People of Himachal Pradesh have diversified into production of cash crops like ginger, potato, off-season vegetables, kiwi, cherries, hops and have ventured into fields like apiculture and mushroom production. It is observed that even today about two third of the total population of Himachal Pradesh still depends on agriculture in the pursuit of their livelihoods. Although the contribution of primary sector to the Gross State Domestic Product has declined over the years, yet the proportion of total population engaged in agriculture based activities has remained more or less unchanged. There is an imminent need to explore on a separate front if this inference can be attributed to inaccurate recording of the facts. Table exhibits how the contribution of three sectors of the economy of Himachal Pradesh to the Gross State Domestic Product has changed over the years.

Table 1.3 Sectoral contribution to Gross State Domestic Product

(%age of GSDP)

Year	Primary	Secondary	Tertiary
1950-	71.01	9.50	19.49
1960-	63.14	9.71	27.15
1970-	58.56	16.73	24.71
1980-	50.35	18.69	30.96
1990-	37.82	25.03	37.15
1992-	38.65	24.81	36.54
1996-	32.65	24.81	36.54
1996-	32.65	30.17	37.21
1997-	31.92	30.40	37.68
1998-	27.58	32.34	40.08
1999-	26.41	33.01	40.58
2000-	25.87	34.62	39.51
2001-	27.00	33.31	39.69
2002-	25.42	33.44	41.14

Source: DES, Himachal Pradesh

The decade of 1950s witnessed very large contribution from the primary sector to the Gross State Domestic Product. It contributed 71.01 per cent of the total GSDP. The services sector (the terms 'services sector' and 'tertiary sector' have been used interchangeably in the present context) contributed next to the primary sector and the presence of secondary sector in the economy of Himachal Pradesh was small during the decade of fifties. Since then the share of primary sector in the GSDP has declined gradually and came down to 25.42 per cent in the year 2002-03. This is an indication to the fact that the State's economy has diversified from the traditional agrarian society to an economy which has also started getting considerable contribution from the services and manufacturing sectors in its GSDP. The services sector has grown at a faster rate than the secondary sector. This fact needs to be assimilated into analytical framework with great care. The share of services sector has grown rapidly as compared to other aggregates on account of the fact that government spending on revenue account has been growing at a very fast rate due to increase in the number of government employees on the one hand, and increases in the salary outgo per capita, on the other. Not only has the economy itself diversified into non-farm sector activities but livelihood strategies in the primary sector have also diversified into more lucrative production activities which have ready market available with handsome returns. A recent phenomenon observed during the decade of 1990s is that a very large number of farmers have realized the potential of growing and marketing off-season vegetables, especially when they find

place in the markets of neighbouring States at a time when the stock of locally grown vegetables is extinguished. However, production of off-season vegetables is only confined to the areas where irrigation facilities are available in good measure as production of these vegetables requires large quantity of water for irrigation.

The analysis of shift in structure of economy is of little relevance if the changes in occupational pattern of working population are not taken into account and analysed simultaneously. Table 2.2 tries to capture the shift in occupational pattern of working population of Himachal Pradesh over the years. As stated earlier, limitations in terms of incomparable figures available for different census years, only a few categories have been selected for comparison. Moreover, the purpose is to see if the shift of structure of economy from being a traditional agrarian economy to a diversified economy with more weightage to service and manufacturing sector has also resulted in a corresponding movement of working population from the agricultural sector to secondary and tertiary sectors.

Table 1.4. Changes in occupational structure

(%age of total population)

Category	***1971***	***1981***	***1991***	***2001***
Total workers out of which	36.80	42.38	42.82	49.24
i) Cultivators and agricultural labour	75.82	57.46	53.48	68.65
ii) All other occupations	24.18	42.54	46.52	31.35
Non workers	63.20	57.62	57.18	50.76

Source: Census Data

It can be seen from the above table that the proportion of working population engaged in cultivation and as agriculture labour has declined from 1971 to 1991. This indicates that the workers released from the agriculture sector have been able to find jobs in the secondary and tertiary sectors. However, an increase in the proportion of workers in the agriculture sector has been observed during the decade of 1990s.

The fact that more and more people are reverting to agriculture for earning their livelihoods despite a considerable decline in the contribution of primary sector to the GSDP stresses upon the need to take necessary steps to raise productivity of workers engaged in farm sector. Depending upon the strategy involving

intensification or extensification of farm operations, necessary steps are required to be taken so that appropriate productivity raising inputs are provided where intensification of farm operations is required and to bring more land under cultivation where extensification of farm operations is feasibility. Immediate interventions as stated above are imperative lest growth of farm sector should get arrested due to low productivity per worker in farm sector.

1.3 About the Perspective Plan

Based on the experiences in Watershed Management in Himachal Pradesh and elsewhere in and outside the country, the Perspective Plan aims at the following:

i) Improving the management of land and water, and their interaction and externalities;
ii) Increasing the intensity and productivity of resource use with the objective of reducing poverty and improving livelihoods;
iii) Improving environmental services and reducing negative externalities for downstream areas; and
iv) Addressing technical, institutional, and policy issues needed to ensure equitable sharing of benefits among stakeholders and sustainable watershed management.

For achieving this, the plan treats watershed as the basic building block for land and water planning. Definition of watershed adopted in the perspective plan is, "a watershed is an area that supplies water by surface or subsurface flow to a given raining system or body of water, be it a stream, river, wetland, lake, or ocean (World Bank , 2001)". The plan adopts management approach that combines:

i) **The need for integrated land, People and water management**. Land use, vegetative cover, soils, water and people interact throughout the watershed. Therefore, the perspective watershed management programs adopt integrated resource management approaches;
ii) **The multiplicity of stakeholders**. Watersheds provide many important services to an extensive range of stakeholders, and changes in land and water management and in watershed hydrology will directly or indirectly affect

many or all of them. Many people use upper and lower reaches for multiple purposes, and a plethora of public and private agencies are typically involved: organizations dealing with agriculture, animal husbandry, forestry, water, irrigation, rural development, physical planning, land tenure; local governments; community institutions, NGOs, and so forth. This institutional density creates a management challenge and requires watershed management plan to create broad and inclusive institutional platforms; and

iii) **The issue of resource depletion and poverty nexus is also given due importance**. Mountain areas being typically more fragile with less productive environments where natural resource management and rural poverty are commonly linked. With frequently extensive land use practices and a more fragile resource base, mountains are vulnerable to over exploitation and deletion of natural resources (water/vegetation, forests, and soils). With land degradation, agricultural productivity declines, often aggravating the poverty problems. As a result, improving the management of natural resources in upland areas and influencing downstream impacts requires attention to the problems of the population of the poor upland areas, particularly poverty reduction and local institutional development. Thus, the Perspective Plan focuses on the farming systems of the poor in upland areas in order to achieve poverty reduction and conservation objectives simultaneously.

The DPRs developed for each watershed area would try to address the following:

i) At the overall watershed level, to have a plan that identifies key problems, intervention areas, and objectives and the mechanisms to achieve them. Ideally the DPR would be developed through a participatory process.

ii) At the micro-watershed level, to engage in dialogue with stakeholders to identify different or conflicting interests, to evaluate possible synergies and the minimum tradeoffs required, and to identify a set of options to achieve both broader public interest objectives and local

objectives. while doing so the convergence areas identified in chapter 6 (f) would also be kept in view;

iii) As also discussed in detail in chapter 8**,** water usage being an important component in the watershed management under the perspective plan, appropriate mechanisms of recovery of user charges would be brought in place to ensure sustainability. While doing so, possibilities of payment for watershed services would also be explored;

iv) Participatory approaches to developing and adopting new technologies;

v) A sound social analysis, such as a stakeholder analysis aimed at assessing losses to be incurred by different community groups because of conservation practices;

vi) A focus on generating positive income streams for farmers and other groups (such as herders) through intensification, diversification, downstream processing and marketing, and the creation of new income-generating activities;

vii) Giving stakeholders a secure stake in common pool resources, such as forests and pastures, and ensuring that all users and especially the poor have viable income alternatives when closure is involved;

viii) Promoting interventions that reduced risk, such a improving water sources; and

ix) Identifying conservation techniques that were profitable for farmers and offering a menu of interventions combining income and conservation objectives.

The perspective plan aims at achieving the balance between the top down and the bottom up decision-making processes.

Unlike earlier approaches where the revenue or administrative boundary was adopted as the unit for development purposes, under the participatory watershed development programmes today, the entire watershed is chosen as the appropriate unit area for development. This new approach seeks to improve and develop all types of lands - government, forest, community and private lands - that fall within a

particular watershed, and is thus a holistic approach to improve and develop the economic and natural resource base of dry and semi arid regions (Ninan & Lakshmikanthamma, 2001).

Further, it is widely accepted that watershed development has to be conceived as a broad strategy for protecting livelihoods of the people inhabiting fragile ecosystems, especially the poor, rather than just the physical resources alone (Rao, 2000). Thus the overall objective and rationale of watershed development in India is no longer limited to scientifically determined methods of soil and water conservation, but has gone far beyond that, evolving instead into a form of *'Watershed Plus'*, which seeks to ensure not only the availability of drinking water, fuel wood and fodder for the poor, but also raise their income and employment opportunities through improvements in agricultural productivity, better access to markets, extension services, etc (Shah, 2000). Hence, integrated natural resource management and watershed development has become a larger paradigm for achieving sustainable development in the country.

Chapter 2

AGRO-CLIMATIC CONDITIONS IN HIMACHAL PRADESH

The state is bordered by Uttaranchal in south, Punjab in southwest and Kashmir and Tibet in north and northeast. Generally speaking, the elevation gradually increases from the southwest towards northeast, the elevation ranging from 450 to 6500 meters. In all, the state presents remarkable heterogeneity and agro climatic diversity across and within its 12 districts.

Physiographically, Himachal Pradesh can be divided into four agro-ecological zones: the Shivaliks' low, mid and high-hills; and the cold and dry or the alpine zone.

Zone- I comprises of the area adjoining Punjab and Haryana states and lies below 650 m above the mean sea level. It accounts for 16.24% of the total geographic area of the State, 38% of the total cropped area and 39% of the irrigated area. The major sources of irrigation are wells and tube-wells. It covers the district of Una, Bilaspur and parts of Sirmour, Kangra, Solan and Chamba districts. In this zone, the size of holding of small and large farmers was 0.864 ha and 3.561 ha respectively (Sharma, 2001). The net sown area constituted 80.79% and 78.74% of the total holding for small and large farms, respectively. The area under pastures and farm forestry varied from 16.32% on small farms to 20.30% on large farms. The important trees of farm forestry in the region are khair (Acacia catechu), kikar (Acacia *arabica*), bamboo (Dendrocalamus *strictus*), biul (Grewia *optiva*), tuni (Tuna *ciliata*), shisham (Delbargia *sissoo*), khirak (Celtis *australis*) and simble (Bombax *ceiba*). Khair trees are mostly in pasture land and are sold for *katha* processing. Rain fed farming is most common accounting for more than 87% of the total operational holdings. Fruits occupy only a small percentage of area. The field crops, mainly food grains, covered more than 90% of the cultivated area. The commercial production of subtropical fruits like citrus, mango, guava, litchi and other subtropical fruits was almost negligible.

Zone-II includes the area ranging from 650m. to 1800m. above mean sea level and accounts for 21.25% of the geographical area, 41.04% of the total cropped area and 45% of the irrigated area of the State. Major sources of irrigation are Kuhls and tube-wells. The zone covers major parts of Mandi and Solan districts and parts of Hamirpur, Kangra (Palampur and Kangra tehsils), Shimla (Rampur tehsil), Kullu, Chamba and Sirmour districts. This zone is very important from farming point of view as about 41.04% of the total cropped area of the State falls in it. In this zone, the size of holdings of small and large farmers was 1.062 ha and 3.067 ha, respectively. The net sown area constituted 72.98% and 70% of the total holdings for small and large farms, respectively. The area under pastures and farm forestry varied from 24.67% on small farms to 28.86% on large farms. The major components of farm forestry in this zone were beul (*Grewia optiva*), kharak (*Celtis australis*), paja (*Prunus paddus*), mulberry (*Morus alba*), tuni (*Tuna ciliata*), robina, poplar (*Populus*), safeda (*Eucalyptus*), darek (*Azaderachta*), shisham (*Dalbergia sissoo*), fig (*Ficus palmata*), treamble (*Ficus roxborghi*), simble (*Bombax ceibia*) and a variety of other trees. Fodder trees were an important component of farm forestry. It has been observed that beul (*Grewia optiva*) constituted the most important source of tree green fodder to milch animals throughout the year. The area under field crops including cereals, pulses, oilseeds, fodder crops and sugarcane account for 90.36% and 86.58% on small and large farms, respectively and yielded 31.79% and 32.21% of gross farm income. About 11% of the total cropped area is under mixed cropping of pulses and oilseeds with cereals as main crops. Vegetables shared 9.64% and 13.42% of total cropped area and accounted for 23.10% and 23.30% of gross farm income on small and large farms respectively. The major rotations followed by dry land farming in the zone are: paddy-wheat, maize-peas and maize-toria-wheat. Under irrigated conditions paddy-wheat and paddy-berseem are the two main cropping systems followed by tomato-wheat. The other intensive vegetable cropping systems comprising 3 crops followed in this zone are: cauliflower-French bean-cauliflower, tomato-radish-peas, tomato-tomato-cauliflower, tomato-tomato-peas and brinjal-cabbage-cauliflower. Thus, tomato, cauliflower and peas formed important crops of the vegetable cropping systems.

Zone-III comprises of high hill areas of the State. The zone includes major parts of Shimla except Rampur tehsil) and Kullu districts and parts of Solan, Mandi, Chamba, Kangra and Sirmour districts with an altitude above 1800m above mean sea level. The zone accounts for 18.39% of the total cultivated area of the State. Only 7.80% of the total cropped area is irrigated. The Kuhls and storage tanks are the only sources of irrigation in the zone. The area experiences severe winter with heavy snow fall. The zone has tremendous potential for apple cultivation, seed potato, off-season vegetable and dairy industry and the commercial agriculture sector is on the rise here. This zone leads in production of seed potato which is an important cash crop. The other potential enterprises are raising sheep and goats, maintaining colonies of honeybees in orchards and production of mushrooms. This zone also has potential for dairy industry with its fodder availability from temperate and alpine pastures and forests. Size of holdings of small and large farmers was 1.241 ha. and 3.652 ha. respectively. The area under pastures and farm forestry constitute 27% and 28.34% of total holding on small and large farms respectively. The important trees of farm forestry are fodder trees namely kharak (*Celtis australis*), beul (*Grewia optiva*), paja (*Prunus paddus*), ban (*Quercus*) and other tress like kainth (*Pyrus*), kakarh (*Pistacia integrima*) and karyala (*Bauhunia variegata*). Net sown area formed 70.42% and 69.06% of the total holdings on the two farm sizes. The farming is mostly under rain fed conditions; irrigated area constitutes only 5.15% and 6.90% of the operational area on small and large farms, respectively. Cultivation of paddy is in irrigated areas on the river banks. The remaining irrigation was generally found in instances of cultivation of vegetable crops. The area under field crops including cereals, pulses, oilseeds and fodder crops accounted for 74.88% and 59.09% on small and large farms, respectively.

Zone-IV is the most mountainous part and covers the tribal areas of the State. The zone covers the districts of Kinnaur and Lahaul-Spiti and parts of Chamba district with altitude exceeding 2200m above mean sea level. The zone is covered under snow for about six months of the year and 39.34% of the total geographical area of the State lies in this zone. Most of the area is under snow-clad and rocky cold desert mountains and cropped area accounts only for 2.6% of the total cropped area of the

State. Cultivation is possible only in some valley areas and only with irrigation facilities. The Kuhls are the single source of irrigation and crops can be grown only if irrigation is available due to scanty rainfall and dry climate in this zone.

The higher hills are suited for growing apples and other temperate fruits. The midhills have vast potential for growing vegetables and stone fruits. The low hill areas are good for growing food, citrus fruits, vegetables and other field crops. Even the dry high hill zone that comprises mainly of tribal areas of the state has vast scope for raising dry fruits, quality seed potato and other crops along with sheep and goat rearing. All agro climatic zones are endowed with vast meadows, pastures and forests and thus, offer a good scope for developing livestock and dairy industry. Similarly, this zone can make significant advances in the production of off-season vegetables.

2.1 Rainfall

The average annual rainfall that Himachal Pradesh receives is 984.8mm but may vary greatly temporally and spatially (see Table and Map above). Most of the rainfall is received in monsoon, from June to September (causing flash floods and cloud bursts). The rivers of Himachal are mainly snow-fed. During the monsoons, they become raging torrents, carrying enormous quantity of water and in winter, when the water gets frozen at the higher altitudes, the streams greatly shrink in volume. The climatic conditions vary from hot and sub-humid tropical in the northern and the eastern high mountains. Lahaul and Spiti experience drier conditions as they are almost cut off by the higher mountain ranges. The alpine zone of the State remains under snow for 5 to 6 months in a year. During winters, snowfall is certain even at an altitude of 200 meters. At the elevation of 1500 meters, snow falls once in a cycle of five years. Above 4500 meters, there is almost perpetual snow. This range of agro-climatic conditions due to variations in altitude, climate and rainfall, is key in understanding both the current cropping pattern and the potential to produce grains and crops (see Table 1.4.1).

Table: 2.1 **Average Rainfall and altitudes recorded at District Headquarters in Himachal Pradesh**

Districts	Altitude (in meters)	Average Rainfall (in mm)
Lahaul-Spiti	3165	382.8
Kullu	1219	733.4
Kinnaur	2769	742.2
Solan	1463	908.9
Bilaspur	610	1049.9
Mandi	1273	1083.5
Kangra	750	1101.5
Shimla	2206	1103.2
Hamirpur	786	1104.6
Sirmaur	833	1187.9
Chamba	1006	1269.7
Una	350	1345.2
State	**–**	984.8

Source: Government of Himachal Pradesh, Statistical Outline of Himachal Pradesh, 2002, Directorate of Economics and Statistics.

2.2 Demography and Land Distribution-an overview.

Himachal Pradesh accounts for 0.59% of India's population and 1.69% of its geographical area. The state may appear to be in a better position in man to land ratio; however, in fact, the mountainous terrains and difficult agro-climatic conditions at several places do not present a hospitable environment for human settlement. More than 90% of the state's population lives in rural areas. The distribution of population among the districts is uneven and the population in the state has grown from less than 20 lakhs in 1901 to just more than 60 lakhs in 2001, an increase of three times over the period of 100 years (GoI, 2001, 2004). In the mid 1950s (1955-56), only three States and Union Territories in the country, Bihar, Orissa and Manipur had a per capita income lower than that of Himachal Pradesh

(Bose 1962). Those areas that came to join Himachal Pradesh during state-reorganization in 1966 did not improve the state's standing in agriculture and other development indices, because the new provinces were the poorest constituents of old Punjab in terms of per capita income. However, there has been a sea change in the economy of Himachal Pradesh since. This change can be appreciated by comparing per capita income with other States of India. On the basis of per capita income indices, Himachal moved to eighth rank with per capita index of 0.244 (Rana 2002). Celebrated states like Kerala (0.237) and Andhra Pradesh (0.234) come after Himachal Pradesh in terms of per capita income indices. Also, on development indices, HP ranks eighth (0.492). Again,

Box 1. Demography figures

The pattern of population growth indicates that the State is now passing through the *third* stage of demographic transition with falling death rate and the rapidly falling birth rate; these successes can be attributed to the rising female literacy and expansion of health facilities in the State. The age distribution is typically of high-fertility populations that have recently experienced some fertility decline, with relatively high proportions in the younger age groups and a slightly smaller proportion age 0-5 than age 5-9. Thirty two percent of the population is below age 15 and 7% is age 65 and above. The sex ratio is 1024 females for every 1000 males in rural areas and 912 females for every 1000 males in urban areas, suggesting that rural to urban migration in H.P. has been dominated by males. The overall sex ratio for the State is 968 females per thousand males (GoI 2001).

Himachal's education attainment index (0.577) is second only to Kerala (0.728). In the 1990s, the state's annual growth rate of 5.7% remained at par with national level (GoHP 2002). In 1950-51, food crops accounted for about 97% of the cropped area and 99.2% of total agricultural production (Sharma 1987). This was understandable in view of the near absence of modern means of transport and communications in the region coupled with low productivity in the sector, as noted above. The agrarian

economy of the region had a highly subsistence character. In the absence of markets, agriculture production was solely for home consumption and commercial agriculture was not visible anywhere. The National Council of Applied Economic Research characterized Himachal Pradesh to be "one of the poorest and backward territories in the Indian Union" in early 1960s (NCAER 1961). It is noteworthy that in 1950-51, the share of agriculture in the state's domestic product was nearly 70% and more than 90% of labour force was engaged in this sector. Currently, the agricultural sector contributes about 37% of the state income and agriculture and allied activities continue to account for a very large proportion of the working population. According to the 1991 Census, agrarian workforce accounted for 70.8% as against less than 2% employed in industry, processing and repairs, while other occupations accounted for a further 27.4% of the working population (i.e. main workers).

2.3 Land Reform Achievements

Himachal Pradesh has been one of the few pioneer states in the Country to have initiated land reforms and redistribution measures. The distribution was effective and land reform legislations were improvised upon to allow most people in the state get to possess some landholding. Since the enactment of Himachal Pradesh's Abolition of Big Landed Estates and Land Reform Act, 1953, 286 big landed estates came under the purview of this provision and out of these 281 estates were abolished and as many as 56,724 new tenants acquired proprietary rights. Also, after the reorganization of Punjab State in 1966, certain areas of erstwhile Punjab were merged in Himachal Pradesh. Immediately, after merger of such areas, the disparity in land laws of the old and merged areas became evident. There were complaints of arbitrary eviction of tenants from the merged areas. Therefore, the first step to ameliorate the lot of tenants in these areas was passing of the H.P. (Transferred Territory) Tenants (Protection of Rights) Act, 1968 by the assembly, thereby providing security against eviction of tenants in the aforesaid merged areas. Later the Tenancy and Land Reforms Act, 1972 (where all intermediaries on land were abolished), Ceiling on Land Holding Act 1972 and Village Common Land Vesting and Utilization Act 1974 (distribution of commons to landless and other needy persons) further consolidated the property rights position of poorer section in the

state. Furthermore, a pan-state survey in 1981 found 20,455 landless and 70,029 people with less than 5 *bighas* of land. Out of these two identified groups, 20,363 landless persons and 67,392 others were declared as persons eligible to receive land. In 1983, of 1,836 newly surveyed landless persons, 204 got land of 5 *bighas* each. Also, Protective laws have also helped tribal of Himachal Pradesh emerge from the cesspool of illiteracy and backwardness. The Himachal Pradesh Transfer of Land Act prevents alienation from land protection to 1.33 lakh of the tribal population (Singh 1996). Under this Act, the tribals can not sell, mortgage or lease out their land to non-tribals without prior permission of the Deputy Commissioner. As a result, practically no Himachali is landless, albeit the average size of land holding in the state is small.

2.4 Increases in Operational Land Holdings and Multiple Incomes of Households

Over the years, important structural changes have occurred in the agrarian economy of Himachal Pradesh. Most prominent of them is the significant increase in human population without corresponding increase in the area operated. This has resulted in proliferation of marginal and small farmers in the state. Other possible reasons for this situation are put as (i) breaking-up of joint families resulting in fragmentation, (ii) marginal, less than 5 *bigha* land acquired under land to landless programme (including bogus entries), and iii) putting new areas under cultivation due to availability of irrigation facilities. District-wise distribution of operational holdings shows that while the number of holdings has increased sharply in all the districts, the area operated has expanded only marginally. In case of marginal farmers, both the number and area of operational holdings have increased significantly. On the other hand, for medium and large farmers, the number and operational area have decreased sharply (see Appendix V for figures on cultivated land-man ratio in Himachal Pradesh over several decades).

2.5 Operational Landholding in Himachal Pradesh under Different Categories

More than 8 lakh farmers of Himachal Pradesh cultivate about ten lakh hectares of land with an average operational landholding of 1.2 hectares as depicted in table below. About 84% of the farmers have less than two hectares of land while 16% own between 2 and 10 hectares. Due to sub-division and fragmentation, land holdings are becoming uneconomic. Besides, due to the lack of land consolidation, the holdings are scattered and are often unmanageable and are limiting factor for crop production. Land lease and tenancy regulations do not allow farming on large areas.

Table 2.2 **: Distribution of Operational Land Holdings (1990-91)**

Category	No of Farmers (in Lakhs)	Per cent	Area (Lakh ha)	Per cent	Operational Holdings (ha)
Marginal (1 ha)	5.32	63.8	2.25	21.3	0.40
Small (1-2 ha.)	1.66	19.9	2.35	23.3	1.42
Medium (2-4 ha.)	0.94	11.3	2.58	25.5	2.74
Large (4-10 ha)	0.36	4.3	2.05	20.3	5.69
Extra Large (>10 ha.)	0.06	0.7	0.97	9.6	16.17
Total	8.34	100.00	10.10	100.00	1.21

Source: *Annual Administration Report, Department of Agriculture, H.P., 2001-02.*

Partly, as a result of this development (of most people coming under the count of marginal farmers), Himachalies have moved to other livelihoods. Also, agricultural practices are influenced by growth of other sectors in the state. For example, the 'absolute size' of State Domestic Product (SDP) from agriculture (at 1980-81 prices) in 1995-96 was Rs. 1594 crore as against Rs. 794.04 crore in 1981. However, the 'relative size' of agriculture declined during this period. This suggests that Himachal

Pradesh's economy is undergoing a structural transformation by reducing its 'relative dependence' on agriculture for its income as well as employment generation. The decline in agriculture's 'relative share' in the income as well as a workforce is much more in Himachal Pradesh as compared to that in India (See Table below). This clearly shows the incidence of multiple livelihoods and hence multiple incomes in the households in Himachal Pradesh. Indeed, the sectoral distribution of state income is observed to be shifting in favour of non-agricultural sector (see Table below). It is evident that the share of primary sector i.e. agriculture, animal husbandry, forestry and fishing that was 58.74% in 1970-71, which came down to 27.37% during 2000-01. On the other hand the share of secondary sector increased from 16.59% to 32.5% during the same period while tertiary sector's share in state's economy moved up from 24.66% to 40.13%.7 (The agriculture sectors' contribution to Net State Domestic Product (NSDP), has fallen from 43.72% in 1980-81 to 22.50% in 2000-01).

Table 2.3**: Share of Agriculture Sector in State Income/ National Income at Current Prices and Total Workforce in Himachal Pradesh and India.**

Year	Percentage Share of Agriculture in NSDP/NNPfigure		Percentage Share of Agriculture in Total Workforce	
	Himachal Pradesh	All-India	Himachal Pradesh	All-India
1970-71	49.25	44.01	74.81	69.70
1980-81	43.72	36.90	70.81	60.51
1990-91	33.58	29.90	66.55	64.81
1995-96	28.90	30.06	NA	65.20

Note: *NA = Not available*

Sources:

1. *Government of Himachal Pradesh, Reports on Agricultural Census, 1980-81, 1990-91, Directorate of Agricultural Census, Department of Revenue.*
2. *Government of India, Indian Agriculture in Brief, 25th edition, Directorate of Economics and Statistics, Ministry of Agriculture.*

3. *Government of Himachal Pradesh, Statistical Outline of Himachal Pradesh for relevant years, Directorate of Economics and Statistics.*

Table 2.4 **Sectoral Composition of Net State Domestic Product (GSDP) in Himachal Pradesh**

Years	1970-71	1980-81	1990-91	2000-01
Primary Sector	58.74	47.35	37.66	27.37
Secondary Sector	16.59	19.59	24.59	32.50
Tertiary Sector	24.66	33.00	37.82	40.13

***Source**: Economic Review of Himachal Pradesh (relevant Issues)*

An important implication of this shift is that the households have diversified from (mainly, subsistence) agriculture to practicing multiple livelihoods and deriving incomes from secondary and tertiary sector. It is notable that this emigration to other livelihoods has not been adequately noted in census; the agriculture households who now derive considerable income from nonagricultural sources are not noted.

2.6. Trend in Agriculture and food productivity in Himachal Pradesh.

Himachal Pradesh produced 268 kg food grains per person during 1990-92 in contrast to 203 kg at all India level (Karol 2000, 7). However, the increase in agricultural income per rural person in the State was lower than the national average; it went up from Rs. 373 during early seventies to Rs. 998 during late eighties against national increase from Rs. 384 to Rs. 1,302 (GoI 1994). According to the Planning Commission's estimates of 1994, about 30% of total population was below poverty line as against the all India average of 35.04%. An alarming figure that emerged from this study was that Himachal Pradesh had witnessed an increase in the persons below poverty line at the rate of 5.66% per annum during (1983-84 to 1993-94) as compared to a reduction by 2.1% at all India level (Chelliah and Sudarshan 1999, 8). In any event, the poor progress of Himachal Pradesh agriculture could be attributed to low yield of crops, chiefly because food crops grown in the state have little growth potential. Table 2.7 shows that though per hectare yield of key crops of the State have shown an increase during period II (1992-93 to 1994-95) yields of rice, wheat,

total cereals, pulses and potato are far below the national average. Maize is the only crop where the state has a limited comparative advantage.

Some of the key factors responsible for lower yield in the state are: lower farm size as compared with India, low availability of modern inputs, less area under irrigation, number of pump sets and tractors, quantum of fertilizer use, per capita consumption of electricity and the share of agricultural sector in total electricity consumption is considerably lower than the national average (*Indian Agriculture in Brief*, 1996). Suggestions to diversify agriculture through high value cash crops, mainly fruits and vegetables have been made consistently by several researchers (Singh, 1990), and have been emphasized in 7th and 8th Five-Year Plans.

Within the state, there is a great variation in food grain production and productivity in different districts of the State (see Table below).

Table 2.5 **District-wise foodgrain area, production and productivity**

S.N.	District	2004-05			2005-06		
		Area (1000 ha)	Production (1000 mt)	Productivity (Kg./ha)	Area (1000ha)	Production (1000 mt)	Productivity (Kg./ha)
1	Bilaspur	55.939	120.753	2159	53.456	54.160	1013
2	Chamba	59.944	113.920	1900	55.809	58.302	1045
3	Hamirpur	69.243	137.629	1988	67.924	82.811	1219
4	Kangra	195.807	314.566	1607	194.955	238.195	1222
5	Kinnaur	5.673	5.022	885	4.164	3.656	878
6	Kullu	51.375	94.294	1835	54.349	92.225	1697
7	Lahaul& Spiti	0.917	1.210	1320	0.795	1.031	1297
8	Mandi	142.026	287.251	2023	139.988	216.615	1547
9	Shimla	47.108	70.503	1497	43.525	65.215	1498
10	Sirmour	60.843	109.029	1792	59.198	91.153	1540
11	Solan	56.888	101.265	1780	53.856	84.043	1561
12	Una	65.274	132.203	2025	64.667	81.273	1257
	Total	811.037	1487.645	1834	792.686	1068.679	1348

Source: Department of Agriculture HP,2004-05 & 2005-06.

During 2004-05, food grain productivity was the highest in Bilaspur district; followed by the districts of Una and Mandi. It was least in Kinnaur . The district

wise crop intensity is is given Nevertheless, the variation of productivity and cropping intensity between different districts is given in Table2.6.

Table 2.6 **District-wise crop intensity.**

S.N.	District	2000-01	2001-02	2002-03	2003-04
1	Bilaspur	191.9	190.30	191.50	191.70
2	Chamba	146.50	160.60	157.00	158.00
3	Hamirpur	191.70	198.00	200.00	198.50
4	Kangra	184.00	190.50	185.10	188.30
5	Kinnaur	123.00	119.90	118.20	116.80
6	Kullu	179.70	165.60	165.00	179.10
7	Lahaul& Spiti	103.10	102.50	102.60	104.30
8	Mandi	183.90	179.20	185.00	187.20
9	Shimla	129.60	140.60	138.90	141.50
10	Sirmaur	182.30	184.70	183.40	183.20
11	Solan	163.30	167.40	157.10	164.20
12	Una	172.30	170.10	183.90	191.90

Source: Department of Agriculture Hibachi Pradesh.

Nevertheless, the variation of productivity and cropping intensity between different districts is wide (see box-2)

Box-2 Agriculture still ruling the roost :

It should be noted that, the declining share of Agriculture Sector, however, has not affected the importance of this sector in the state economy. The growth of economy still is being determined by the trend in agricultural production as it has a significant share in the total domestic product and has overall impact on other sectors via input linkages, employment and trade etc. However, due to lack of irrigation facilities, the agricultural production to a large extent still depends on timely rainfall and weather conditions. Also, cropping intensity has increased to a point at which fertility becomes the primary limited factor as depicted in table 2.6. Cropping intensity is the highest (198.50) in Hamirpur, followed by Una 191.90, Bilaspur (191.70) and Kangra (188.30). Lahaul Spiti has the lowest cropping intensity i.e. (104.30) for want of irrigation(GOHP 2002, 357)

Table 2.7**: A Comparative Statement of Average Yield of Major Crop's of Himachal Pradesh and India during Triennia 1972-73 to 1974-75 and 1992-93 to 1994-95 (in Kg–ha)**

Crop and Crop Group	Period I: 1972-73 to 1974-75		Period II: 1992-93 to 1994-95	
	Himachal Pradesh	India	Himachal Pradesh	India
Rice	1058	1089	1314	1851
Wheat	1056	1260	1275	2420
Maize	1732	1002	2066	1590
Total cereals	1260	910	1568	1706
Total pulses	492	543	275	593
Total food grains	1230	821	1490	1501
Potato	5084	8751	10854	15648

Note: *Period I refer to triennium 1972-73 to 1974-75 and period II refers to triennium 1992-93 to 1994-95.*

Source:

1. *Government of India, Indian Agriculture in Brief, various issues.*
2. *Government of Himachal Pradesh, Annual Season and Crop Report of Himachal Pradesh, various issues.*

It should be noted that, the declining share of agriculture sector, however, has not affected the importance of this sector in the State economy. The growth of economy still is being determined by the trend in agricultural production as it has a significant share in the total domestic product and has overall impact on other sectors via input linkages, employment and trade etc. However, due to lack of irrigation facilities the agricultural production to a large extent still depends on timely rainfall and weather conditions. Also, cropping intensity has increased to a point at which fertility becomes the primary limiting factor. Cropping intensity is the highest (196.7) in Hamirpur, followed by Bilaspur (192.9), Kangra (186.9) and Una (186.8). Lahaul and Spiti have the lowest cropping intensity i.e. 102.5 for want of irrigation (GoHP 2002,357).

Chapter 3

LIVELIHOOD CONCERNS IN HIMACHAL PRADESH

Climatic conditions prevailing in Himachal Pradesh are conducive for growing fruits ranging from apples and stone fruits in the Northern High Hills and Low Hills to citrus fruits which are grown in warm temperate and sub-tropical climatic conditions. As was pointed out in the preceding paragraphs, a large proportion of operational holdings is being used for growing fruits in the Northern High Hills. The proportion of total operational holdings being used for growing fruits is relatively low in Low Hills. The climatic conditions in these two regions of the State are perfectly suited for growing apple and stone fruits like plum, peach, apricot, pear and cherries. The apple produced in the relatively colder climate of High Hills is known for its crispness and relatively long shelf life. Fruit production received attention in the planning process only in the post-independence era.

The Approach Paper to the Eleventh Five Year Plan of Himachal Pradesh recognizes the vitality of increasing productivity of the farm sector in the State. It envisages increasing incomes and employment in the farm sector. Increasing farm sector productivity through technological interventions and diversification into the high value crops have been stated as the objectives for the farm sector development in the State. It mentions of putting in place a framework for opening up of the farm sector for contract farming and also for the organic farming. The Approach Paper also recognizes the existence of gap between the irrigation potential created and its utilization and accords high priority to bridge this gap through farmers' associations and extension work by the agriculture and horticulture departments.

It has generally been observed throughout the State that the women contribute in majority of the activities in farm sector livelihoods. Barring ploughing and disposing off the marketable surplus, women contribute more than the men do in all other farm related activities, Right from sowing, irrigation, using fertilizers, reaping and post harvest management of the produce has large contribution from women in all the three regions of the State. Same pattern has been observed in fruit production and livelihoods based on the livestock. The women would manage all the activities related to the livestock except for grazing and disposing off the marketable

surplus. Women would manage not only the fodder and other feeding requirements of the livestock but also all other issues related to the health of the livestock. If viewed from the participation angle, the picture seems to be pretty good in terms of women empowerment, however, sad part of the story is that none of the women from the sample households which have both men and women engaged in farm activities has reported to have known the quantum of monetary returns the household has received after selling off the marketable surplus. Same pattern regarding participation of women has been observed across all the three regions. However, over the years some of the Women Self Help Groups (WSHGs) formed through the intervention of the Government and also through NABARD have done pretty well not only by undertaking economic activities related to farm sector but also those of non-farm sector. The Government ensures credit to such groups and helps them to become financially sustainable after providing initial financial assistance on loan basis. Quite a few WSHGs, especially in the districts of Kangra, Sirmaur and Solan have been reported to have become self dependent after repayment of the loans. All the members of the WSHGs have to compulsorily save some fixed amount in the bank out of their income on monthly basis. This intervention has also inculcated the habit of saving besides engaging the female members in economic activities. The Plan will promote such women centric enterprises in the following activities.

3.1 Concerns in the Farm Sector

Land being the primary assets for adopting livelihood strategy in farm sector, people have to look for other livelihood strategies to supplement their incomes. Number of supplementing livelihood strategies being adopted largely depends on the monetary outcome of not only the primary strategy but also of the supplementary strategies. Mechanization of farm activities for most of the households in the Low Hills and in Plains and Valleys is also not economically viable because of small size of land holdings owned by a majority of households. As has been mentioned in the earlier section, that a low percentage of irrigated land out of the total cultivated land is in Low Hills and Valleys and Plains also results in a great difficulty in sustaining the livelihood strategy involving cultivation. These households in all the three regions have no other option but to diversify their livelihoods not only in farm sector but also in non farm sector.

Scope of extensification of cultivation is very limited in the Northern High Hills as a very large proportion of land in this region is already either under cultivation or has orchards or forests on it. The land classified as forest land can not be brought under cultivation because of extremely steep slopes and environmental considerations in regard to non-diversion of land use from forests to any other. Only option left in Northern High Hills to make cultivation a more successful strategy is its intensification by using technological inputs suitable for small land holdings.

Extensification of cultivation in the Low Hills and the Valleys and the Plains is the possible livelihood intervention to bring more land under cultivation. Extensification of cultivation in these regions can help in making cultivation economically more viable by bringing more area under cultivation and also by bringing in an appropriate mix of crop diversification towards making cultivation based livelihoods more sustainable in these areas. But such an option also suffers from the constraint of overall availability of the land stock which can be brought under farm operations. Among the major options are discussed as under.

(a) Vegetable and Fruits:

Production of the off–season vegetables and quality vegetable seeds besides the seasonal vegetables is one of the fields into which the diversification has been reported during the past decade in all the three regions of the State in farm sector. In those belts of the Low Hills and also of Valleys and Plains where irrigation facilities are available, growing off-season vegetable is picking up. The produce has found place in the markets of Delhi and the neighbouring States of Punjab and Haryana also. Good quality road network and availability of reasonable modes of transport further work as an incentive to take up this activity. Needless to say, the vegetables fetch attractive prices when they appear in markets during a time of non-availability of locally produced vegetables. The maximum area under vegetables, apart from potato and ginger, accounts for peas and tomatoes. Productivity of tomatoes is quite high i.e. 34,645 kg per hectare as against 24,000 kg in Punjab and 15,000 kg for all India average. Productivity of cauliflower is about the same as the all-India average while Punjab has higher productivity in case of cauliflower. Fresh peas grown in the State are of premium quality and fetch a higher price particularly in the plains where it is an off-season luxury. Vegetable seed production is a dominant feature of vegetable cultivation in the State as the climate of the Low Hills and Valleys and Plains is very conducive to seed production. Cultivation of exotic vegetables like

broccoli, asparagus, leek, parsley, Brussels sprout, and others is catching up fast as these vegetables are demanded in hotels and by foreign tourists. The advantage of topography and availability of adequate irrigation water enables cultivators of Low Hills and Valleys and Plains to grow out-of-season vegetables. Cultivators in the Northern High Hills have also diversified into the production of off-season vegetables, however, the region has not caught up with this phenomenon to an extent as the other regions have largely because of scanty irrigation facilities in this region and also because of high transportation costs involved in taking the produce to market due to long distances to the market from the place of production.

(b) Fruit growing

Climatic conditions prevailing in Himachal Pradesh are conducive for growing fruits ranging from apples and stone fruits in the Northern High Hills and Low Hills to citrus fruits which are grown in warm temperate and sub-tropical climatic conditions. As was pointed out in the preceding paragraphs, a large proportion of operational holdings is being used for growing fruits in the Northern High Hills. The proportion of total operational holdings being used for growing fruits is relatively low in Low Hills. The climatic conditions in these two regions of the State are perfectly suited for growing apple and stone fruits like plum, peach, apricot, pear and cherries. The apple produced in the relatively colder climate of High Hills is known for its crispness and relatively long shelf life. Fruit production received attention in the planning process only in the post-independence era. Prior to independence exotic varieties of apple were introduced in Himachal Pradesh by American and European missionaries early in the twentieth century.

Temperate fruits cover about 60 percent of the total area under fruit cultivation in the State out of which about 70 per cent is under apple cultivation (area under apple cultivation comprises of 46 percent of the total area under fruit cultivation). The area under fruits has more than doubled in the last two decades. The productivity of apples also doubled to about more than 5000 kg per hectare during this period, but the productivity of nuts and dry fruits, citrus and other sub-tropical fruits decreased even though the area under these crops increased. Shimla and Kullu districts of the Northern High Hills and tribal district of Kinnaur predominantly produce apple and peach is the main crop of Sirmaur district in the Low Hills. Stone fruits like plum and peach and pears are mainly grown in Kullu and Shimla districts. Citrus, mango and litchi are grown in the Valleys and Plains of Kangra and Una

districts. The area under mango is about 39 percent of the total area under sub-tropical fruits in the Low Hills and the Valleys and the Plains regions and about 6 percent of the total area under all fruits in the State as compared to 19 percent under citrus fruits.

About one seventh of the fresh fruit bearing trees are non-bearing while this proportion is about one eighth in case of dry fruits which covers about 16 per cent of the total area under fruits. Shimla and Kinnaur districts have the largest number of non-bearing trees of fresh as well as dry fruits. The average productivity of apple (kilogram per hectare) has been 5830, other temperate fruits 990, nuts and dry fruits 450, citrus 510 and other subtropical fruits 1370. The comparative figures for citrus fruits in Punjab are 10 to 15 tonnes per hectare and in Israel these figures vary from 43 to 65 tonnes per hectare. Fruits like strawberry, pomegranate, olive, kiwi, hazelnut etc. which have been identified as the potential crops of future. Some high bearing clones of these fruits have been imported and are being tested for commercial cultivation. Planting material being imported includes cultivars for apples, cherry and plum.

The Government in its annual plans makes adequate provisions for providing quality seeds, storage and testing and certification programmes. Government envisages providing Soil Health Cards to all the farmers in the State by the end of the Tenth Five Year Plan so as to enable the farmers to choose right choice. 'Rashtriya Krishi Bima Yojana' was introduced in the State in the year 1999-2000 to give a sense of security to the farmers. Crops covered are wheat, paddy, maize, barley and potato. Insurance is mandatory for all loanee farmers and optional for non-loanee farmers. The scheme provides comprehensive risk cover against drought, hailstorm, floods and pest diseases etc. Government also takes care of the design and fabrication of agricultural/horticulture tools suitable for varied climatic conditions through departments involved in extension services. In brief, the Government is making all possible efforts to make cultivation based livelihoods of the rural people of Himachal Pradesh secure and sustain in the long run.

(c) Floriculture

History of commercial floriculture in Himachal Pradesh is not very old. It started in the decades of 80s with the Government intervention through the Department of Horticulture of Himachal Pradesh. It was declared as a thrust area for economic development of the State. The District Rural Development Agencies (DRDAs) in the districts of Kangra, Mandi, Shimla and Solan are engaged in

promoting floriculture among the cultivators of these districts. The Government has set up several nurseries throughout the State for propagation of floriculture and distribution of planting material to the cultivators. Gladiolus, carnation, chrysanthemum, tulips and daffodils are the main varieties being cultivated in the State. Some of the traditional varieties like marigold are also being cultivated in certain areas like Rajgarh in Sirmaur district. Area under flower cultivation has increased from five hectares in 1991 to 467 hectares in 2006. Some of the Self Help Groups and the NGOs especially, in the districts of Chamba, Sirmaur and Bilaspur have really come up in the field of commercial cultivation of exotic and traditional varieties of flowers. The flowers being produced in Himachal Pradesh are exported to the places like Chandigarh, Amritsar, Delhi, Haridwar, Hrishikesh and other places. The floriculture in the State is still in its infancy and requires appropriate interventions to make it remunerative enterprise in order to exploit the vast potential in this field.

Handling the produce during transportation and finding immediate and appropriate market are the most crucial components in the field of floriculture. Highly delicate and fragile nature due to extremely short life of the floricultural produce makes it of critical importance that the produce reaches and is disposed off in the market immediately at a place which fetches the best price for the produce. Absence of availability of market information at the right time and lack of technical know how in post harvesting handling of the produce among cultivators are the main factors responsible for keeping the cultivators away from taking up this enterprise. An intervention under Watershed Management for imparting necessary training to cultivators and use of IT to establish a comprehensive market information system (MIS) could help in exploiting the vast potential of this produce in international markets.

(d) Mushroom Cultivation

Under the Technological Cooperation Programme of the FAO, mushroom cultivation technology was first introduced in Himachal Pradesh on trial basis in 1961. Commercial propagation of this technology was later undertaken under the FAO and UNDP assisted project at Chamba Ghat in Solan district during 1977-82. Another project with the joint assistance of the Government of India and the Dutch Government aiming at commercial mushroom production was launched at Palampur in Kangra district. These initiatives helped in encouraging cultivation of 'button mushrooms' (*Agaricus bisporus*) in the State and its productivity increased from six kilograms per square meter in 1992 to 10 to 15 kilograms currently. 4318

metric tonnes of mushroom were produced during 2005-06 and the bulk of this output was produced in the districts of Solan and Kullu of the Low Hills. During 2005-06, 421 metric tonnes of pasteurized compost for mushroom production was prepared in the two development projects located at Chamba Ghat in Solan and Palampur in Kangra and was distributed to the mushroom growers.

These units supply pasteurized compost to about 400 new production units mainly concentrated in Kangra, Kullu, Mandi, Solan and Bilaspur districts of Low Hills. Around twenty small units are operating in the private sector in Solan district which produce pasteurized compost. There are nine spawn production laboratories in the State of which six are in the private sector and three are with the research institutions. An export oriented unit has been set up at Paonta Sahib in Sirmaur district with a capacity of exporting 150 metric tonnes of mushrooms and processed products in various forms.

Mushroom production is an activity that is associated with high returns on investment if a harvest is reaped in full. However, there is a great risk of getting the whole lot spoiled if it catches infection due to inappropriate temperature and moisture combinations. Great care is required to be taken in providing appropriate climatic conditions to the mushrooms while being produced. The DPR will identity for areas with potential land and provide training to the cultivators interested in taking up mushroom production commercially.

(e) Bee-Keeping

A great diversity in agro-climatic conditions in flora in Himachal Pradesh provides enormous potential for production of honey. The British first introduced the bee-keeping in Kullu valley in 1934 and in Kangra valley in 1936. Bee flora from the Northern High Hills was brought down to lower altitudes during winter months of 1952 when migratory system of bee-keeping was introduced for the first time in the State. Himachal Pradesh took a lead in the introduction of exotic honey bee, *Apis melifera* (Italian honey bee) for the first time in 1962-63. Prior to this, the honey was produced form *Apis acerana* and production was ten metric tonnes per annum from 2500 bee colonies maintained by 150 bee-keepers. Now there are about 26,000 bee colonies maintained by 939 bee keepers producing over 650 metric tonnes of honey of diverse flora every year. The target of production of 1000 metric tonnes of honey during 2006-07 is likely to be met. The honey produced from the flora growing at the high altitudes of the Northern High Hills is said to have some unique medicinal properties and hence fetch more price in the market.

Private entrepreneurs have established breeding and multiplication centers with the assistance under various State and centrally sponsored schemes. These schemes have become very popular among the upcoming bee-keepers. Bee keeping is also resorted to by the fruit growers of all the three regions of the State on rental basis during the flowering season as it helps in pollination/cross pollination of fruit trees resulting in better fruit yields besides producing honey. The targets set by the Government in terms of distribution have always been met and some times the actual distribution well exceeds the targets. One honey processing unit with the installed capacity of 120 metric tonnes of honey processing every year has been established in the public sector at Kandrori in Kangra district and is managed by the Ago Industries Corporation Limited. The plant procures honey from the local producers as the first priority and imports it from outside the State if adequate honey is not available locally to ensure working at full capacity. The State Government has provided financial assistance during 2006-07 for improving financial health of the plant. Some of the private companies like Dabur India Ltd. also procures honey from the local producers and processes it Presence of private players in the field will bring in competition and help the public sector players to compete in the self sustaining mode.

(f) Animal Husbandry

A reasonably large proportion of people follow animal husbandry based or supported livelihood strategy. Main commodities being produced through this strategy are milk, wool, meat and hides. Most of the households owning milch animals sell milk though in small quantities within the village. Out of the total annual milk production of 784.082 thousand tonnes, MILKFED, the only large scale and functional milk cooperative in the State procures just 1.5 per cent of it. This indicates to the existence of a large unorganized and obviously highly decentralized market for milk in the State. A sizeable part of the demand for milk in the urban areas is met by the imports from Punjab and Haryana which clearly indicates the scope for expansion of this particular pursuit of livelihood strategy either in conjunction with others or as a stand alone strategy.

A large proportion of the milch animals in Northern High Hills and Low Hills are indigenous varieties with very low levels of yield when compared to those of improved and exotic varieties. The proportion of indigenous milch animals to the total milch animals is about 54 percent in the Northern High Hills and about 67 percent in Low Hills. Livestock of exotic and improved has, per force, to be reared in an entirely different manner than the indigenous stock. Indigenous stock is habitual

of open meadow/grassland/open forest area grazing whereas the exotic breeds need to be only stall fed. The milk yields drastically fall if these animals are sent out for open grazing. In this context, cultivation of high protein/nutrient fodders has to accompany the rearing of exotic/improved breeds. Fodder cultivation also offers opportunities for further refurbishing the farm based livelihoods. The plan proposes to take up these activities in all District of the State.

(g) Non Timber Forest Product

Extraction of herbs and medicines from forests is generally pursued as a supplementary livelihood strategy. Whatever extraction of herbs and medicines is being done, its marketing is being done in an unorganized manner. Lack of market for herbs and medicines within the State makes people sell these to the middlemen at throw away prices. Middlemen reap huge profits by selling these in the proper markets of Punjab, Utter Pradesh and Delhi. Existence of common properly rights to natural resources is negligible. Rather free access rights to the natural resources are being exercised by the rural people making natural resource based livelihoods vulnerable to their early extinction. Various national and international organizations have also been exploring the natural wealth of the State to exploit the potential of highly valued medicinal and aromatic herbs. The State has enormous potential of growing herbs and medicinal plants in private as well as common land. The perspective plan aims at promoting this activity and ultimately linking it with health tourism in areas of potential for generated employment. There are about 70 units/pharmacies in the State which manufacture Ayurvedic medicines. Profit being the sole motive of these private sector units, the scientific extraction of herbs and medicinal plants do not form a part of overall operations of these units. Indiscriminate exploitation by the outside agencies of these plants is likely to bring many species to extinction. Two bigger units in the Government sector are functional at Joginder Nagar and Majra and they procure raw material from the local producers, process them and supply to outside agencies as ingredients to various Ayurvedic medicines. Four herbal gardens have been set up by the Ayurveda Department of the Government of Himachal Pradesh to raise germplasm nurseries. These herbal gardens have been yearning for perfecting the conservation and other agro-techniques for the sustenance and multiplication of such plants which suit best to and are grown in the given agro-climatic conditions.

3.2 Concerns in the Non Farm Sector

With the rapidly increasing industrialization, educational infrastructural facilities and new emerging economic enterprise options in Himachal Pradesh, any

planned intervention in the rural agro economic scenario should focus on concerns in the non farm sector. This is also important from the strategic point of view as it is necessary to off load burden of dependence on the farm sector and natural resources. Over the past few years, the Government of Himachal Pradesh has given emphasis on setting up of hydro-electric projects in the State, exploring and expanding tourism activities into the rural and far flung areas and setting up of industries in different parts of the State. Special incentives are also being given for setting up micro and small enterprises in the rural areas. However, among the major limitations in expansion of employment avenues in these areas despite the condition of employing seventy percent people from Himachal Pradesh imposed by the Government are:

i) There is a gap between the kind of skills demanded by the enterprises being set up in the State in all the above sectors and the kind of skills available in the market. Often, industries opt for labour from outside the Stae as people with requisite training and experience are not available. A planned effort has therefore to be made for identifying manpower requirement of the enterprises coming up in a watershed area and tie up with the existing training facilities in the public and private sector for providing market related skills. For this, convergence with SGSY scheme of the Rural Development Department and RUDSETIs being set up in the State would also be necessary;

ii) In order to encourage local youth to set up micro and small enterprises in the State to encourage expansion in the rural areas, training on entrepreneurial skill development is required to be undertaken. Along with this, appropriate interface with the banking institutions will also be required to be developed to ensure adequate flow of credit; and

iii) With the expanding service sector infrastructure in the State in the Transport, Tourism, Communication and IT related activities and marketing; potential for employment is large especially in view of the fact that with the increased educational infrastructure, the reasonably qualified work force is already available, which can be employed with some hands on training. In the non-farm activities likely to be taken up under the watershed management, this aspect will be required to be kept in view.

Chapter-4

WATERSHED MANAGEMENT INTERVENTIONS IN HIMACHAL PRADESH

Presently the watershed development programme/projects are being implemented through Rural Development Department, Forests Department and Agriculture Department. The Department wise position of programmes /projects being implemented is as under:

4.1 RURAL DEVELOPMENT DEPARTMENT

With the objectives to ensure over all development of rural areas, harvesting of rainwater, employment generation, poverty alleviation, community empowerment and development of human and other economic resources of the rural areas, mitigating the adverse effects of extreme climatic conditions & development of natural resources, the Government of India launched Watershed Development Programme on watershed approach during 1995-96. The main activities taken up under watershed development programmes are Soil moisture conservation, Water Harvesting, Afforestation, Pasture Development & Horticultural /Agricultural Dev. etc.

As per guidelines issued by the Government of India time to time, the following three programmes are being implemented in different districts of the State:

(a) Integrated Wastelands Development Programme (IWDP)

This programme is being implemented in districts Chamba,Hamirpur, Kangra, Kullu, Mandi, Shimla, Sirmour,three blocks of district Solan (Nalagarh, Solan, Kandaghat) and two blocks of district Kinnaur (Kalpa & Nichar). Under IWDP, 67 Projects consisting of 873 micro watersheds costing of Rs.254.12 Crore have been sanctioned in phased manner from 1994-95 and funds to the tune of Rs.178,63 Crores have been released upto September, 2008 against which the expenditure is Rs.143.74 Crore. In 14 Projects all due instilments have been received and these projects almost have been completed or nearing completion.

(b) Drought Prone Area Programme (DPAP) :

This programme is being implemented in District Bilaspur, Una , and in Two blocks of district Solan (Kunihar & Dharampur). Under this programme 412 micro

watersheds costing of Rs. 116.50 Crore have been sanctioned in phased manner from 1994-95 and funds to the tune of Rs.62.92 Crores have been released upto September, 2008 against which the expenditure is Rs.51.90 Crore. In 71 Micro Watersheds all due installments have been received and these projects almost have been completed or nearing completion.

(c) Desert Development Programme (DDP):

The Desert Development Programme is being implemented in district Lahaul & Spiti and Pooh Division of district Kinnaur. Under DDP 552 micro watersheds costing of Rs.159.20 Crore have been sanctioned in phased manner from 1994-95 and funds to the tune of Rs.77.11 Crores have been released upto September, 2008 against which the expenditure is Rs.73.36 Crore. In 80 Micro Watersheds all due instalments have been received and these projects almost have been completed or nearing completion

4.1.1 Cost Norms.

The programmes are implemented as per provision of the guidelines and accordingly the funds are utilized. The cost norms according to guidelines are as under:

a) Prior to 1-4-2000

Sr. No.	Prog.	Rate per ha.	Sharing Pattern
1.	IWDP	Rs. 4000/- per ha.(Rs. 20.00) lakhs) per	100% GOI
2.	DPAP	Rs. 4000/- per ha.(Rs. 20.00) lakhs per watershed)	50:50 GOI & State Govt. w.e.f. 1.4.1999 75:25 per watershed between GOI & State Government
3.	DDP	Rs. 5000/- per ha.(Rs. 25.00)lakhs per watershed)	100% GOI . w.e.f. 1.4.1999 75:25 per watershed between GOI & State Government

b) After 1-4-2000

1.	IWDP	Rs. 6000/- per ha. (Rs. 30.00 lakhs per watershed)	Rs 5500:500 per ha. between GOI and State Government
2.	DPAP	Rs. 6000/- per ha. (Rs. 30.00 lakhs per watershed)	75:25 per watershed between GOI & State Government
3.	DDP	Rs. 6000/- per ha. (Rs. 30.00 lakhs per watershed)	75:25 per watershed between GOI & State Government

The projects sanctioned prior to 1.4.2003 are being implemented on old guidelines and the works are being executed through watershed Committees. The Projects sanctioned after 1.4.2003 are being implemented as per Hariyalli guidelines and

the works are being executed through Panchayati Raj Institutions. The main differences in old guidelines and Hariyalli guidelines are as under:

S.No.	**Old Guidelines (Pre- Hariyali)**	**Hariyali Guidelines.**
1.	Execution through Watershed Associations/Watershed Committees.	Execution through Panchayati Raj Institutions.
2.	**Allocation of funds.** 1. Administration = 10% 2. Training = 5% 3. Entry point activities. = 5% 4. Works = 80%	**Allocation of funds.** 1.Administration = 10% 2.Training & Community Mobilization. = 5% 3. Works = 85%
3.	Prescribed installments =7 (15% 1st year, 15% +15% in 2nd and 3rd year, 15% 4th year and 10% in 5th year)	Prescribed installments = 5 ((15% in 1st year, 30% each in 2nd and 3rd year, 15% 4th year and 10% in 5th year)
4	Mid term evaluation required to be conducted before release of 4th installment.	Mid term evaluation required to be conducted before release of 3rd installment.

Although, the Watershed Projects are being implemented as per provisions of the Guidelines for the programme issued by the GOI, and are to be completed within a period of 5 years. But the progress has been rated slow due to lack of awareness amongst the community of Watershed area. The organization of awareness camps, training and finalization of work plan took more time resulting delay in execution of works. The other important factor is topography of Himachal Pradesh which is tough having hill terrain and working season is limited particularly in snow bound areas.

4.2 FOREST DEPARTMENT

(a) Mid-Himalayan Watershed Development Project.

The Mid Himalayan Watershed is operative in 10 districts of the State w.e.f. 1st October 2005 with the financial assistance of World Bank. The project builds on the successful experience of Integrated Watershed Development Project Kandi which culminated on 30th September 2005. Mid Himalayan Watershed Development

project would aim at scaling up the success of Integrated Watershed Development project with two main differences. 1st it would expend upwards from the Shiwalik to the mid hills, a region which covers about of 1/3rd of the State and over half of the cultivated land. Secondly it would responsibility for most project implementation with local Governments (Gram Panchayats) rather with the village development committees. The goal of the project is to reverse the process of degradation of natural resource base and improve productive potential of natural resources incomes of the rural household in project area. Second objective is to support policy and institutional development in the State.

(i) Project Scope: The Project will cover around 272 Micro- Watersheds spread over 602 GPs,42 blocks and 10 districts(viz Bilaspur, Chamba, Hamirpur, Kangra, Kullu, Mandi, Shimla, Sirmaur, Solan and Una).

(ii) Project Area : Mid Hills and High Hill zone of the State with in the altitude of 600-1800 meters.

(iii) Project Cost : The total project cost is Rs. 365-00 Crore involving World Bank share Rs.270.00 Crore, State share Rs.67.50 Crore and beneficiary contribution (app.) Rs.7.50 Crore.

(iv) Implementation Arrangements

The Project is being implemented by the Himachal Pradesh Natural Resource Management Society (HPNRMS), a society registered under the Societies Registration Act, 1860. The nodal department is the H.P Forest Department. The head office of the Project is located at Solan and there are two Regional Watershed Development Offices located at Dharamshala and Bilaspur each headed by a Regional Project Director (RPD). There are 11 Watershed Development Divisions headed by Divisional Watershed Development Officers (DWDO), under each WDO, there are 4-5 Watershed Development Coordinators (WDC) with a multi-disciplinary "Front Line Multi Sectoral Team"

A key feature of the Project is the proactive involvement of village level institutions of self-governance i.e. the Gram Panchayats (GP). It is envisaged that substantial Project activities, and the Project funds, would be canalized directly

through the GPS. The GPs will implement the approved works under the Project through User Groups, though some works can be implemented directly by the GPS through qualified agencies. Livelihood enhancing activities will be implemented through User Groups, Self Help Groups and Common Interest Groups. These groups will ultimately ensure empowerment to the community. The GPs are being assisted by its budget and works committees in the implementation of the Project activities

(v) Project Components and Expenditure upto July, 2008: The main components of the projects are i) Institutional Strengthening ii) Watershed Development Management iii) Enhancing Livelihood Opportunities iv) Project Coordination. An amount of Rs. 97.25 Crore has been spent under the project till Jully, 2008.

(b) Swan River Integrated Watershed Management Project Una.

Out of total 180 Gram Panchayats in district Una, 60 Gram Panchayats have been selected in the project as per criteria of selection. The areas already treated by Kandi Project and DFID are not the part of project area.

(i) Objectives.

- To generate the forests, to protect the agriculture land and enhance the agriculture and forestry productions in catchments area of nallahs/ rivers.
- To secure protection and optimum use of resources in the catchments area.
- To augment the resources of existing flora, fauna, vegetable, Horticulture and Agriculture produce.
- To reduce soil erosion and decrease sediment production.

(ii) Roles and Responsibilities.

The Forest Department is a nodal agency for the project and is responsible for overall project management implementation, monitoring and execution of project activities through Watershed Development committees/Line department after approval of micro plan.

(iii) Project Cost/ Project Period and Expenditure: Total Project cost is 4,045 Mil. Yen including GBIC portion 3385 Mil. Yen and others 660 Mil. Yen. The date

of agreement is 31.3.2006 and Project period is 8 years.(upto July 2014). An amount of Rs.9.55 Crore has been spent under the project till July, 2008

4.3 AGRICULTURE DEPARTMENT

The Department of Agriculture is taking up watershed development activities under Centrally Sponsored Scheme NWDPRA for Rainfed Areas which has now been merged into Micro Management Scheme of Ministry of Agriculture Department of Agriculture and Cooperation, Govt. of India. Under this scheme, no staffing support has been provided by the GOI as per guidelines. The watershed covering an area of 500 ha. to 1000 ha. are taken up in the 1st year of Five Year Plan which are saturated by the end of Five Year Plan period. In these watersheds, besides Agriculture, other activities of Horticulture, Animal Husbandry are also taken up with the assistance of line departments. The department of Agriculture is the Nodal Department and for 11th Five Year Plan, the Department has taken up 40 watersheds in different parts of the state covering area of 24692 ha. with a total outlay of Rs. 14.81 Cr.

Besides above, the department is also taking up water harvesting activities under RIDF programme supported by NABARD and under Rastriya Krishi Vikas Yojna and State Plan. Annually Rs 2 to 3 Cr. are being spent for water harvesting activities under these schemes. The works are executed through the Water User Associations registered under Societies Registration Act.

4.4 Experience

With the implementation of watershed development programme in rural areas by the different departments, the experience gained reveals that in some projects good water harvesting activities have been taken up and positive results/impacts have been seen in the project areas. As per information gathered from various quarters approximately 1300 traditional water sources have been revived by creating the rain water harvesting structures under watershed development programme. In District Hamirpur, Kangra , Solan, Sirmour etc. the traditional cropping system have been changed by adopting the off searson vegetable and

other cash crops by the inhabitants of the project areas. During interaction with villagers of Gram Panchayat Khart Khas and Rajyana Khas in District Kangra it was apprised, that after execution of water harvesting structures in their areas and by introducing improved variety of grasses, the drinking water and fodder problems have been solved. Now the services of tankers during summer for drinking water and arrangements of fodders from outside the State are not required due to availability of sufficient water and fodder in their area.

"Gaon Ka pani gaon mein" Construction of Check Dam.

Protecting Soil & Conserving Water Check Dam

Recharging Ground Water by Harvesting Rain Water

Pasture Development

Water Management (construction of Tank)

Vegetable cultivation after Water Management

Watershed Bhadyara (Buhla) District Mandi (C/O Check Dam and Kuhal)

Micro Watershed Kharshali (Chirgaon) DRDA, Shimla (After Water Management Plantation of Fruit Plants)

However the experience also reveals that the soil conservation activities such as gully plugging, crate work etc are not linked to the livelihood enhancement as such the impact is not visible in project areas in majority of cases. The activities defined in the old guidelines for watershed development projects mostly confine to the land development and due to low land holdings of the people

in the State the direct benefits of the programme could not be provided to the watershed communities. Moreover the hilly ranges of the State remained covered under snow approximately 5 to 6 months in a year and the people earned their income from other sources like bee keeping, wool, poultry farm and non timber products etc. The convergence issue was missing in the previous guidelines and coordination between line departments in the implementation of watershed development programme remained paralyzed. Ridge to valley approach also could not be followed due to lack of coordination, convergence and certain conditions about the identification of areas like forest areas, private land etc. The small structures have been constructed in view of the limited financial resources and the impact of the activities is invisible in most of the cases. The inhabitants of watershed area have inadequate knowledge of the programme as such active participation of village community particularly deprived section of the society could not be ensured in the implementation of watershed development programme. Similarly separate provisions for livelihood enhancement for vulnerable groups were lacking in the previous guidelines resulting less impact on poverty eradication have been observed in the project area even after taking up the activities for watershed development.

Chapter-5

DRAINAGE AND WATERSHED

5.1 Introduction

The concept of watershed as planning unit for development of land and water resources has gained importance since 1974 when the Ministry of Agriculture, Government of India initiated various developmental programmes like Drought Prone Area Programme (DPAP), Desert Development Programme (DDP), Hill Area Development Programme (HADP), etc. Therefore, it is necessary to delineate watershed boundaries at various levels of hierarchy to identify development activities under various schemes in each watershed. Drainage network helps in delineation of watersheds and for suggesting various water harvesting structures and soil conservation measures. In Himachal watersheds have been delineated within the catchments boundary nearest to the ridgelines.

5.2 Drainages

Himachal Pradesh fall partially under three major Water Resources Region. They are the Indus, Ganga and the Ephemeral Water Resources Region. The river basin that falls under Himachal Pradesh under the Indus Region comprises of Chenab, Ravi, Beas and Satluj. Those basin falling within Himachal under the Ganga Region is only the Yamuna and those are falling within Himachal under the Ephemeral Water Resources Region are Kaushaliya and Markanda river basin.

The area falling within the drainage area of Chenab River forms part of the Chandra and Bhaga watersheds. The area can be broadly divided into three zones on the basis of drainage systems, viz. i) the Upper zone, 2) middle zone and 3) lower zone. All the rivers flow in the North-East to South-West direction. The drainage of Bhaga River in the northern zone originates from the Bara La Cha La Pass range and flows over the slopes in the south west direction and finally drains in the Bhaga river at Tandi which finally drains to the main course of Chenab River, a tributary of Indus River. Prominent streams exhibits a dendritic river pattern. The Chandra River also originates from the Bara La cha la Pass and initially flows in the east direction then to the south along the Kunzum La pass. This change in its course

from east to south direction indicates the change in the underlying litho logy. Downstream it takes a sharp turn to the where it meets the Bara Sigri River west before meeting the Bhaga River at Tandi. After flowing through these dissected mountains the drainage maintains its regular course in the Southern direction.

The area falling within the drainage area of Ravi River comprises part of the Budhil, Tundahan, Beljedi, Saho and Chirchind rivers. The upper drainage of Ravi river in the east originates from the Bara Bangal and flows over the slopes in the west direction and finally drains in the Chamba valley till it meets Siul river at Chamera which finally drains to the main course of Ravi river downstream that falls finally in the Indus river. The streams exhibit a dendritic river pattern all along its course.

The drainages falling within the Beas river comprises part of the Parvati, Hurla, Patlikuhl, Sainj, and Tirthan river in district Kullu, Uhl, Bakhli and Suketi river in district Mandi. Awa, Banner, Banganga, Neogal, Luni, Gaj, Bhed, Dehar, Chakki in Kangra, Bakkar and Man in Hamirpur district. All the major rivers mentioned above finally drain into the Pong Reservoir that further drains into the Indus River. All the streams represent a dendritic drainage pattern all along its course.

The drainages falling in the Satluj river comprises of Spiti river in the north followed by Baspa river, Nogli river downstream, by Gambar river in Bilaspur are and by Sir and Sukkar river in Hamirpur and Bilaspur. These entire rivers finally drain in the Govind Sagar reservoir. Downstream of Govind Sagar reservoir Satluj River is joined by the Swan River from Una valley. Satluj finally joins the Indus further downstream. The overall drainage pattern is dendritic.

The drainages falling within Himachal Pradesh in the Yamuna region comprises of Pabbar, tons, Giri and the Bata River in district Shimla and Sirmour. The river flows through the outer Himalayas and forms a dendritic drainage pattern.

The drainages falling in the Ephemeral region of Himachal is the Kaushalya River around Dharmpur in district Solan and Markanda River and its tributaries in the Kala Amb area of district Sirmour. The overall drainage pattern is dendritic in nature.

5.3 Demarcation of Watersheds

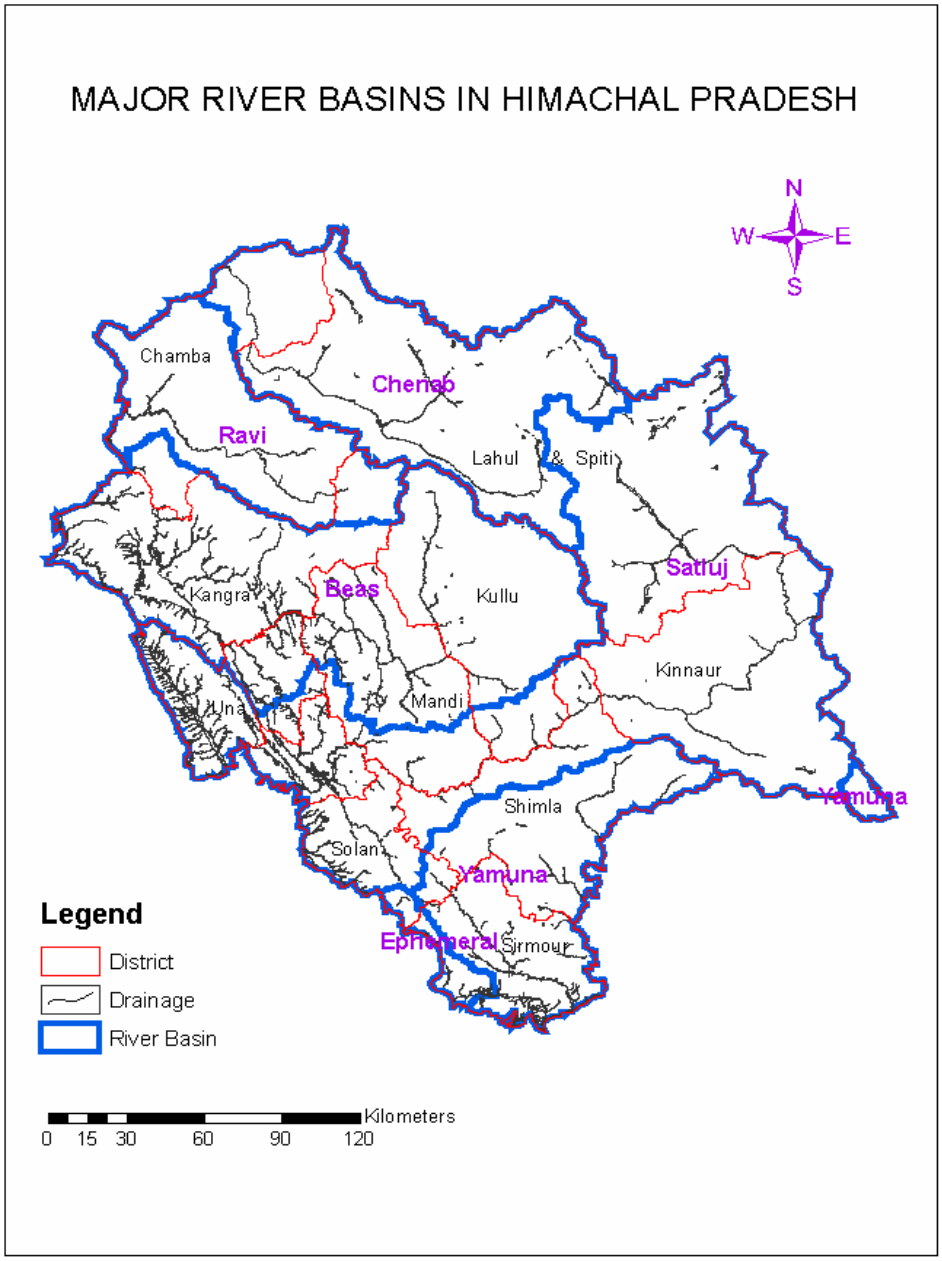
Watersheds are natural hydrologic entities that cover a specific aerial extent of land form, from which rainwater flows to a defined gully, stream or river at any particular point. The size of the watershed is governed by the order of the stream or river and the point of interception of the stream or river.

The All India Soil and Land Use Surveys of the Ministry of Agriculture have developed a hierarchical system of watershed delineation like Water Resources Region, Basin, Catchment, Sub-Catchment, Watershed, Sub-watershed. However, for land use planning at Block level the following eight levels of watershed delineation has been adopted. These are as follows:

1	Water Resources Region (as defined by the watershed Atlas of India)	
2.	Basin	(----------do----------)
3.	Catchment	(----------do----------)
4.	Sub-Catchment	(----------do----------)
5.	Watershed	(----------do----------)
6.	Sub-watershed	(30 to 50 Sq. Km.)
7.	Mini-watershed	(10 to 30 Sq. Km.)
8.	Micro-watershed	(5 to 10 Sq. Km.)

Survey of India topographical maps on 1:50,000 scales have been used for extracting surface water body spread, drainage network and water divides. Latest Geo-coded satellite images have been used to update the drainage information for any addition or modification wherever required.

Figure : 5.1 Major river basin map of Himachal Pradesh



5.3.1 Indus Water Resources Region:

The Indus River rises from the Tibetan plateau and enters the Himalaya. The drainage basin of the Indus river system extends from Jammu &

Kashmir to Himachal Pradesh. It includes the whole of Jammu and Kashmir and most of Himachal Pradesh. In Himachal Pradesh the tributaries of Indus basin like Chenab comprises of Chandra and Bhaga River that includes the cold desert of Lahaul valley. Ravi River also forms a tributary to the Indus Region that includes the Bharmour, Chamba and Tissa valley. Other tributary includes the Beas River that comprises of the Kullu valley and the Kangra valley and the largest tributary of Indus in Himachal is the Satluj River and its sub-tributaries that includes the Spiti valley, Kinnaur, Sangla valley upstreams and the Rampur, Karsog and Bilaspur area in the lower reaches in Himachal. Climatic conditions in the Indus river system vary from arctic to sub-tropical. The cold desert area remains devoid of rainfall and experiences heavy snowfall.

5.3.1.1 Satluj River:-

Satluj rises from beyond Indian borders in the Southern slopes of the Kailash mountain near Mansarover lake from Rakas lake, as Longcchen Khabab river (in Tibet). It is the largest among the five rivers of Himachal Pradesh. It enters Himachal at Shipki (altitude of 6,608 metres) and flows in the South-Westerly direction through Kinnaur, Shimla, Kullu, Solan, Mandi and Bilaspur districts. Its course in Himachal Pradesh is 320 km. from Rakastal, with the Spiti, the Ropa, the Taiti, the Kashang, the Mulgaon, the Yula, the Wanger, the Throng and the Rupi as right bank tributaries, and the Tirung, the Gayathing, the Baspa, the Duling and the Solding as left bank tributaries. It leaves Himachal Pradesh to enter the plains of Punjab at Bhakhra, where the world's highest gravity dam has been constructed on this river. Its total catchment area in Himachal Pradesh is 20,000 sq. km. The Satluj finally drains into the Indus in Pakistan. The catchments area of about 50,140 sq. km. of Satluj river is located above the permanent snow-line at an altitude of 4,500 metres. The upper tracts of the Satluj valley are under a permanent snow cover. The prominent human settlements that have come on the banks of the Satluj River are Namgia, Kalpa, Rampur, Tattapani, Suni and Bilaspur. Its total length is 1,448 km.

a) Baspa River:- Baspa is an important tributary of the river Satluj in its upper courses. The Baspa is joined by many smaller channels draining snow melt waters. The Baspa River has cut across the main Himalayan range. Thereafter it empties

itself into the river Satluj in district Kinnaur and leaves Kinnaur district in the West near Chauhra and enters Shimla district.

b) Spiti River: - The Spiti river originates from Kunzum range. Tegpo and Kabzian streams are its tributaries. Its position across the main Himalayan range deprives it from the benefit of the South-West monsoons that causes widespread rain in most parts of India. The river gets a major contribution of discharge in late summers due to glacier melting. After flowing through Spiti valley, the Spiti river meets Satluj at Namgia in Kinnaur district traversing a length of about 150 km. from the North-West beyond that it flows in South-West direction. Huge mountains rise to very high elevations on either sides of the Spiti River and its numerous tributaries. The mountains are barren and largely devoid of a vegetative cover. The main settlements along the Spiti river and its tributaries are Hansi and Dhankar Gompa.

c) The Nogli Khad:- It joins Satluj just below Rampur Bushahar. The confluence is opposite the Kullu district in Nirmand tehsil opposite to Rampur tehsil of Shimla district. The river Satluj enters Mandi district near Firnu village in the Chawasigarh and passes through the areas of Mahunm, Bagra, Batwara, Derahat and Dehar. The main tributaries of the Satluj in district Mandi are Siun, Bahlu, Kotlu, Behna, Siman, Bantrehr, Khadel and Bhagmati.

d) Soan River:- The Soan river rises from the Southern slopes of the Shivalik range also known as Solasinghi range in the tract to the East of the Beas gap across the Southern periphery of the Kangra valley. It joins the boundary of Himachal Pradesh and Punjab. Its gradient is not very steep and the slopes of the Soan catchments vary from gentle to steep. In the summer the discharge drops drastically, while during monsoon it is in spate.

5.3.1.2 Beas River:-

The Rohtang pass at 4,350 meters, 51 km. North of Manali is the source of the river Beas. This river provides the water to the fields of Punjab and Pakistan before flowing into the Arabian Sea. The river emerges from a cavern at the Rohtang pass and assumes different identities as the seasons go by. From a clear blue easy flowing mountain river in the non-monsoon period it turns into an awesome torrent river during the monsoon.

On the South of the Rohtang pass lay the civilized state of Kullant (Kullu), while to the North lay the more desolate and barren areas of Lahaul and Spiti. There are two mountain streams that meet at Palachan village, 10 km. North of Manali to form the river Beas. The tourist resort of Manali is situated on the right banks of the river Beas. From Manali, this holly river after passing through dense evergreen forests reaches the town of Kullu. After covering hundreds of Kilometers through the hills, the river at Hari Ka Patan in Ferozpore district of Punjab embraces the river Satluj before flowing into Pakistan.

Its main tributaries are the Parbati, the Spin and Malana nala in the East; and the Solang, the Manalsu, the Sujoin, the Phojal and the Sarvati Streams in the West. In Kangra, it is joined by Binwa, Neugal, Banganga, Gaj, Dehr and Chakki from North, and Kunah, Maseh, Khairan and Man from the South. The Beas enters district Kangra at Sandhol and leaves it near Mirthal. At Bajaura, it enters Mandi district situated on its left bank. In Mandi district, its own Northern feeders are Hansa, Tirthan, Bakhli, Jiuni, Suketi, Panddi, Son and Bather.The northern and Eastern tributaries of the Beas are perennial and snow fed, while Southern are seasonal. Its flow is maximum during monsoon months. At Pandoh, in Mandi district, the waters of the Beas have been diverted through a big tunnel to join the Satluj. It flows for 256 km. in Himachal Pradesh.The important settlement on the bank of Beas river are Kullu, Mandi, Bajaura, Pandoh, Sujanpur Tihra, Nadaun and Dehra-Gopipur. The total lenght of this river is 460 km.

a) Awa River: Rises from the Dhauladhar range in the Kangra valley of Himachal Pradesh. It flows in a South-Westerly direction before joining the river Beas. It receives both snowmelts as well as rainfall water from smaller channels.

b) Banner River:- It is also known as Baner Khad. It is a tributary of the Beas river and drains the central part of the Kangra valley. The Baner Khad rises as a small snow fed channel on the Southern slopes of the Dhauladhar range near Palampur. The general direction of flow of the Banner River is towards South-West.

c) Banganga River:- It joins the Beas River in the Kangra valley. It rises from the Southern slopes of the Dhauladhar range. The river is fed by snow melt and channels

emanating from springs. Large fertile sediments have been formed all along the river near its mouth.

b) Chakki River:- It drains the South-Western part of Himachal Pradesh. The Chakki River rises as a small snow-fed and rain-fed stream from the Southern slopes of the Dhauladhar range. The river enters Punjab near Pathankot and joins the Beas River.

e) Gaj Khad: - It rises as a small stream from the snows on the Southern slopes of the Dhauladhar range in Kangra district. A number of small streams form the Gaj Khad. The Gaj River joins the Beas River a little upstream of the Pong dam lake (now known as Maharana Pratap Sagar).

f) Manuni River: - It rises from the Southern slopes of the Dhauladhar range and joins the river Beas. Steep slopes form the upper catchment of the Manuni River. There is a sharp fall in its gradient. Huge river terraces occur on the both sides of the river bed, which are used for cultivation extensively.

g) Luni River: - Luni rises from the South slopes of Dhauladhar in the Kangra valley. It merges with the river Beas in the central part of Kangra valley.

h) Parbati River:- It rises in the snowy areas upstream of Manikaran on the foothills of the main Himalayan range in Kullu district. The glacier which feeds this river descends down from the steep Southern slopes of the main Himalayas. It joins the river Beas at Shamshi in Kullu valley.

i) Patlikuhal River:-This River is a tributary of the Beas River in the Mandi area of Kullu district. It rises from the snow on the Southern slopes of the Pir Panjal range and thereafter it flows into the Beas River upstream of Kullu.

j) Sainj River:- It rises from the water divide of the Beas and Satluj rivers in the lower ranges of the main Himalayas to the East of Kullu. Thereafter it flows towards South-West to join the Beas River just before it cuts across the Dhauladhar range near Larji.

k) Hurla River:- Hurla river rises as a small channel from the snows in the depression of the North-Western plank of Kullu valley. It joins the river Beas near Bhuntar. Numerous snow-fed streams join the river Hurla.

l) Suketi River:- This river is a tributary of the Beas river in the Kangra valley. It rises from the South facing slopes of Dhauladhar range. A number of small channels join the Suketi River in its upper reaches. The river has formed huge terraces, most of which are under cultivation. The upper catchments of the river consists of steep slopes.

l) Tirthan River:- It is a tributary of the Beas river. It rises from the base of an offshoot of the main Himalayan range to the South-East of Kullu. Thereafter it follows a South-Westerly course and flows into the Beas at Larji just before it cuts across the Dhauladhar range.

n) Uhl River: - It is another tributary of the Beas river which rises as two feeder channels in the area to the North of the Dhauladhar range in Himachal Pradesh. Thereafter the two channels cross this gigantic mountain barrier and merge at the base of the Southern slopes to form the main channel of the Uhl River in Kangra area. It flows for a considerable distance along the base of the Dhauladhar range. Then turns towards the South-East to merge with the Beas near the town of Mandi.

5.3.1.3 Ravi River:-Ravi river rises from the Bara Banghal (a branch of Dhauladhar) as a joint stream formed by the glacier-fed Badal and Tant Gari. The right bank tributaries of the Ravi are the Budhil, Tundahan Beljedi, Saho and Siul, and its left bank tributary worth mentioning is Chirchind Nala. Town Chamba is situated on the right bank of the river Ravi. The Ravi River flows by the foot of Dalhousie hill, through the famous Chamba valley. The river with its length of about 158 km. in Himachal has a catchments area of about 5,451 sq. km. As the Ravi River flows down from the heights, it passes hill sides with terraced fields. The river looks devastating in its fury. It carries away even sturdy trees. The Ravi river first flows Westward through a trough separating the Pir Panjal from Dhauladhar range and then turns southward, cutting the deep gorge through the Dhauladhar range. It flows nearly 130 km. in Chamba region, before leaving it finally at Kheri..

The Ravi river forms the biggest sub-micro region of Chamba district. From Bara Bangal of Kangra district, it flows through Bara Bansu, Tretha, Chanota and Ulhansa. The Ravi River merges with the Chenab in Pakistan. The well known human settlements along the river are Barmaur, Madhopur and Chamba town. Its total length is 720 km.

a) Bhadal River: - It rises from the snowy range of the area lying between the Pir Panjal and Dhauladhar ranges in the Bara Banghal area of the Central Himachal Pradesh. It flows in a Westerly direction before merging with the Tant Gari River to form the mainstream of the Ravi.

b) Siul River: - It is the tributary of the Ravi River. It rises from the tract between the Dhauladhar and Pir Panjal ranges near Jammu and Kashmir and Himachal Pradesh border. Thereafter this river flows towards East, takes a U turn and attains a South-Westerly course before flowing into the Ravi River downstream of Chamba. River Baira is the prominent tributary of the Siul River. This river is fed by both snow melt and spring waters.

c) Baira River:-It rises from the snows on Southern slopes of the Pir Panjal range in Himachal Pradesh. Numerous tributaries of the Baira River are also fed by the snow and so make it a Perennial river before it joins the Siul River, which is a tributary of the Ravi River. Its catchments consist of steep slopes, deep valleys and terraces that have been laid down by the river since a long time.

d)Tant Gari:- It is a tributary of the Ravi river. This river rises as a small stream from the slopes of an off-shoot of the Pir Panjal range in the area East of Bharmaur in Chamba district. The Tant Gari valey is U shaped. Its bottom is strewn with boulders and moronic deposits laid down by the glaciers in the past.

5.3.1.4 Chenab River:-Two streams namely Chandra and Bhaga rise on the opposite sides of the Baralacha pass at an elevation of 4,891 metres and meet at Tandi at an elevation of 2,286 meters to form the river Chenab. The Chenab rises from the South-East and Bhaga from the North-West of the Baralacha pass. It enters Pangi valley of Chamba district near Bhujind and leaves the district at Sansari Nala to enter Podar valley of Kashmir. It flows in Himachal for 122 km. With its total length of 1,200 km., it has a catchments area of 61,000 sq. km., out of which 7,500 sq. km. lie

in Himachal Pradesh. It is the largest river of Himachal Pradesh in terms of volume of waters. The Chenab valley is a structural trough formed by the great Himalayan and Pir Panjal ranges.

a) The Miyar Nullah: - It joins Chenab in Lahaul, while Saicher Nullah joins it in Pangi valley. It meets the Indus River at Mithankot in Pakistan and ultimately joins Arabian Sea. The important human settlements that have come up along this river are Udaipur, Killar, Doda and Ramban.

b) Bhaga River: - This river originates from the Lahaul valley. A number of Snowfed Rivers join it during its course, before it joins the Chandra stream at Tandi. From its origin it flows in South-South-Westerly direction as a raging torrent before joining the river Chandra. U shaped valleys, waterfalls, glaciers and moraines characterizes the upper catchments of the BhagaRriver. The entire tract is devoid of a vegetative cover. The discharge of this river increases during the summer months, when the snow on the high mountains starts melting.

c) Chandra River: - It rises in the snows lying at the base of the main Himalayan range in Lahaul-Spiti district. Thereafter it flows for a considerable distance along the base of thin range in the South-East direction, before making a 180° turn and taking a South-West course in Spiti valley. The entire area is a vast cold desert that receives little or no rain as it lies in the rain shadow of the Pir Panjal range lying towards South. The important human settlement along the river is Koksar.

5.3.2 Ganga Water Resources Region: - In Himachal Pradesh the tributaries of Ganga Region comprises of Yamuna Catchments and falls in the south eastern part of Himachal. This catchment area comprises the Pabbar in Rohru, Tons and Giri in Shimla and the Bata River in Sirmour area.

a) Yamuna River:-

Only a small part of Yamuna river system which is a tributary of Ganga river system flows through the state of Himachal Pradesh. Yamuna enters Himachal Pradesh at Khadar Majri in Sirmour district. Yamuna River is the largest tributary of the Ganga. It rises from Yamunotri in Gharwal hills and forms the Eastern boundary with Uttar Pradesh. The Yamuna is the Eastern-most river of Himachal Pradesh. Its famous

tributaries are Tons, Pabbar and Giri.The Giri rises from near Kupar peak just above Jubbal town in Shimla district, Tons from Yamunotri and Pabbar from Chandra Nahan Lake near the Chansal peak in Rohru tehsil of Shimla district. Its total catchment area in Himachal Pradesh is 2,320 sq. km. It leaves the state near Tajewala and enters into the Haryana state.

The main geomorphic features of the Yamuna valley are interlocking spurs, gorges, steep rock benches and terraces. The latter have been formed by the river over the past thousands of years. The area drained by the Yamuna system includes Giri-Satluj water divide in Himachal Pradesh to the Yamuna Bhilagana water divide in Gharwal. To be more precise the South-Eastern slopes at the Shimla ridge are drained by the Yamuna system. The utilization of water of the river system is being done by the way of transportation of timber logs, irrigation and hydel power generation. After Himachal Pradesh, the river flows through the state of Haryana, Delhi and Uttar Pradesh where it merges with the Ganga River at Allahabad. The Yamuna is 2,525 km. long.

b) Jalal River:-Jalal River is the small tributary of the Giri River in Himachal Pradesh. It rises from Dharti ranges adjoining Pachhad and joins Yamuna at Dadahu from the right side. It also joins the river Giri at Dadahu. The origin and entire course of this river lies in the lower Himalayas. This is the Rainfed River and has abrupt flow during the rainy season. A number of human settlements have come up along the Jalal River. These include Bagthan and Dadhau.

c) Markanda River: - Markanda is a small river of Nahan area of the Sirmaur district. It rises from the Southern face of the lower Himalayas on the Western extremity of the Kiarda dun (Paonta) valley. The lower Himalayan hills of Nahan occur on the right flank of the Markanda valley while the low rolling Shivalik hills are on its left flank. It is a rainfed river and has very low flow in the winter and summer months but rises abruptly in the monsoon.

d) Andhra River: - This is a tributary of the Pabbar River which in turn drains into the Tons River. This river rises from a small glacier in the lower hills of the main Himalayas in the area to the North-West of Chirgaon in Shimla district. Thereafter it

flows in a general direction towards South-East and merges with the Pabbar River at Chigaon.

e) Giri River: - The River Giri is an important tributary of the Yamuna river. It drains a part of South-Eastern Himachal Pradesh. The Giri or Giriganga (as it is famous in the Jubbal, Rohru hills) rises from Kupar peak just above Jubbal town and flows down in the South-Eastern direction and divides the Sirmaur district into equal parts that are known as Cis-Giri and Trans-Giri region and joins Yamuna upstream of Paonta below Mokkampur. The river Ashni joins Giri near Sadhupul (Chail) while river Jalal which originates from Dharthi ranges adjoining Pachhad joins it at Dadahu from the right side. The water from the Giri River is led through a tunnel to the power house of Girinagar and after that it is led into the Bata River.

f) Asni River: - The Ashni River is a tributary of the Giri River. This river flows along a deep V shaped valley whose side slopes vary from steep to precipitous. It has carved a steep gorge across the off-shoots of the Nag Tibba ridge. Numerous small spring fed tributaries join the Ashni River at various places along its course.

g) Bata River: - This River originates in the boulders below the Nahan ridge in the South-Western corner of Himachal Pradesh. It is mainly fed by the rain water that is cycled as underground water before finally coming up on the surface as a spring. The river flows below the surface for a part of its length in its upper reaches, thereafter the water flows on the surface. Large and wide terraces have been formed by it. The small tributaries which join the Bata River in the Paonta valley are Khara-Ka-Khala flowing in a Southerly direction from the Nahan ridge, and Kanser-Khala originating from the Southern slopes of the Nahan.

h) Pabbar River: - The Pabbar River is a tributary of the Tons River, which in turn drains into the river Yamuna. This rises from the Dhauladhar range (South facing slopes) near the border of Uttar Pradesh and Himachal Pradesh. The main stream is fed by the Chandra Nahan glacier and springs originating from underground waters. It joins the Tons River at the base of the Chakrata massif near the border of Uttar Pradesh and Himachal Pradesh.

i) Patsari River:-It is a small spring fed tributary of the Pabbar River. This river rises from the lower Himalayan hills near Kharapathar in Shimla district of Himachal

Pradesh. This river joins the Pabbar River near the mountain hamlet of Patsari about 10 km. upstream of Rohru. Its bed is strewn with boulders of various sizes. Small villages and hamlets have come up along this river.

j) Tons River: - This River is an important tributary of the Yamuna River and joins it at Kalsi in the North-Western part of Dehradun valley. It has two feeder streams - the Supin River which rises from in the Northern part of the Tons catchments near the Himachal Pradesh and Uttar Pradesh border and the Rupin River that rises from a glacier at the head of the famous Har-Ki-Dun valley in the North-North Eastern part of the Tons catchments. These two feeder streams merge near the mountain hamlet of Naitwar and the channel downstream of Naitwar is known as Tons river. The river flows along a V shaped valley. A number of settlements have come up along the Tons River such as Tuni, Naitwar and Menus.

5.3.3 Ephemeral Water Resources Region:

A very small but covering a significant area of the state is drained by the Ephemeral Water Resources Region in the south. This basin extends from the ridges around Dharmpur area in Himachal and forms a part of the Solan district. Further east it forms a part of the Markanda river catchments south of Nahan and the Kala Amb area.

a) **Kaushalya River:**-It is a small spring fed tributary of the Ghaghar river. The river rises from the southern part of Dharmpur and eastern part of the Kasauli area of Solan district.

b) Markanda River:-The River Markanda originates from village Utamwala south east of Nahan town and flows westward along the Shiwalik ranges to Kala Amb in district Sirmour. At Kala Amb it leaves the hills and entres into the Indo-Gangatic plains downstream it meets river Ghaghar in the Panjab plains.

Chapter-6

LAND AVAILABLE FOR WATERSHED INTERVENTIONS

As per information of wastelands given in the Atlas Of India for the year 2003 by National Remote Sensing Agency, Department of Space, Government of India Balangar Hyderabad Andhra Pradesh out of total 55,67,300 hectare geographical area of the State, 28,33,680 hectare area is wastelands which is 50.90 % of total geographical area of the State. Similarly in Annual Seasons and Crop Report (2003-04) issued by Director of land Record Himachal Pradesh, the total geographical area of the State according to Surveyor General of India is 55,67,300 Hectares. In comparison of this geographical area, the total cadestrally surveyed area by village papers in the State comes to 45, 44,156 hectares revealing thereby that 10, 23,144 hectares of area is un-surveyed and is not appearing in revenue record. According to the information given in the above crop Report, out of total Geographical area i.e.5567300 hectare (by professional survey) an area 10,99,055 hectares is forest lands, 6,72,512 Hectare is barren and unculturable land, 4,53,498 Hectare is Land put to non agriculture use and 15,15,011 Hectare is pasture land.

The quantum of rainfall and proper distribution are the most crucial variables for the State like Himachal Pradesh where the development of irrigation infrastructures is restricted by its topography. The extent of assured irrigation is limited and net irrigated area as per above report is 1, 05,081 Hectares which is 19.40% of net sown area. The 81% of area is still rainfed and the production of crops depends upon the quantum of timely rainfall and its proper distribution during the crop seasons. Thus the land must be preserved and utilized carefully to fulfill multifarious requirements. The status of agriculture land utilization is given in table below:

Table 6 - **Agriculture land** (‘000 Hectares)

SN	Item	2002-03	2003-04	2004-05
1.	(a) Total geographical area by professional survey	5567.3	5567.3	5567.3
	(b) Total geographical area by village papers	4543.1	4544.1	4544.9
2.	Forests	1099.6	1099.1	1101.1
3.	Area not available for cultivation	1125.5	1126.0	1130.0
4.	Other uncultivated land excluding current fallows	1698.2	1705.9	1695.3
5.	Fallow land	75.4	72.6	74.5
6.	Net area sown	544.5	540.5	542.7
7.	Total cropped area	945.2	955.6	953.6
8.	Area sown more than once	400.7	415.1	410.9
9.	Net irrigated area	123.9	105.1	104.5
10	Percentage of gross irrigated area to gross cropped area	19.7	19.0	--
11	Percentage of net irrigated area to net area sown.	22.8	19.4	19.3
12	Percentage of area sown more than once to net areasown.	73.6	76.8	75.7

Source:– Annual season and Crop Reports, Directorate of Land Records, H. P.

6.1 Irrigated area in H.P.

Whatever proportion of the operational holdings is put to cultivation, only 19.40 per cent of it is irrigated and the remaining land under cultivation has to be dependent on the rain for irrigation (sample data). Data published by the Department of Land Records of Himachal Pradesh shows net irrigated area as 19.40 per cent of the net sown area which comes about 1.05 lakh hectares. The information about source of irrigation is given in table below:

Table :6.1. (i) **Agriculture Irrigated area (Haectare)**

SI. No	Source	2002-03	2003-04	2004-05
1.	Canals	3,510	3,520	3,379
2.	Tanks	267	3	28
3.	Wells and Tube Wells	11,764	13,569	15,512
4.	Other Sources	1,08,377	87,989	85,571
	Total ..	1,23,918	1,05,081	1,04,490

Source- Annual Season and crop Reports, Directorate of Land Records, H.P.

The State Government has been implementing various major and medium irrigation projects and efforts to add more and more culturable command area (CCA) are on. However, actual utilization of the created CCA is a matter of concern. The Economic Survey of Himachal Pradesh (2006-07) says that against the total irrigation potential of 3.35 lakh hectares available in the State, 2.09 lakh hectares of the CCA has already been created by the end of December, 2006. Thus, there is a vast gap between the created CCA and area under effective irrigation and there is an urgent need to bridge the gap between the two so that the massive investment already made in CCA creation is put to use and also lead to imparting resilience to the issue of sustainability of farm based livelihoods. An important comment on this data is that as the topography eases up and the altitude reduces, the proportion of operational holdings being cultivated also increases. It implies a higher intensity of land use in Valleys and Plains as compared to that in the Lower hills and the Northern High Hills.

Table: 6.1. (ii) Irrigated land by source. (%age of total irrigated land)

Regions	Canals/ Kuhls (Flow Irrigation)	Nallah	Community ownership	Private ownership
Northern High Hills	98.46	1.54	Nil	Nil
Low Hills	88.95	0.11	10.94	Nil
Valleys and Plains	93.16	Nil	6.73	0.11
Total	**92.46**	**0.21**	**7.27**	**0.06**

Source: Based on the sample data

As is evident from the table 6.1.(ii) almost all the irrigation in Northern High Hills is done through flow irrigation as the costs of lifting water from the nearby gorge or valley are exorbitant and does not meet the economic criteria of evaluation of lift irrigation projects. A major proportion of the uncultivated land in Northern High Hills is being used as orchards mainly for growing apple and stone fruits. The proportion of cultivated land in Low Hills is large as compared to that in Northern High Hills and is still larger in valleys and plains. A very large proportion of the operational holdings in the Low Hills and Plains and Valleys of the State are classified as the barren lands or *Ghasni* (land used for grazing or abundant in grass).

The climatic conditions of the valleys and the plains are conducive for growing citrus fruits yet proportion of land as orchards is very less both in Low Hills and in Valleys and Plains. A very large proportion of irrigation is done either through irrigation canals or Kuhls. Most of the irrigation is done through these two sources of flow irrigation. Community owned and private irrigation is almost missing from Northern High Hills and the Low Hills and their presence in Valleys and Plains is negligibly small. A huge investment is required to bring un-irrigated land under irrigation. It, however, needs to be underlined that with the high O&M costs of future expansion of irrigation and low cost recovery even from the earlier irrigation assets will remain formidable constraints for a rapid expansion of irrigation facilities. This will certainly impact the farm sector based livelihood options and strategizing such options vis-à-vis others.

6.2 Forest Land

The information in respect of legal classification of forest has been taken from website of forest department. The legally defined forest area is 37,03,30 Hectare, and further breakup of classified forest lands is given in the Table below:

Table 6.2. (i)- Legal classification of forest area

S.N.	Class of Forest	Area in Kn/2	Area in Hect.
1	Reserve Forests	1,896	1,89,600
2	Demarcated protected forests	11,830	11,83,000
3	Un-demarcated protected forests	21,213	21,21,000
4	Un-classed forest	977	97,700
5	Other forest (managed by forest Deptt.)	369	36,900
6	Other forests (Not managed by forest Deptt).	748	74,8000
	Total	37,033	37,03,300

Out of total legally classified forests are 37,03,300 Hectares, the district-wise forest cover as per forest survey of India report 2005, the tree cover area is 14,36,900

Hectare, out of which the area under dense forest is 8,92,800 Hectare and open forest area is 5,41,100 Hectare. The District wise break up is given in the Table below.

Table: 6.2. (ii)- District wise forest cover in Himachal Pradesh.

District	Geographical Area	Legally Classified Forest area	Tree Covered				% of Geo.Area
			Very Dence	Moderate Dense Forest	Open Forest	Total	
Bilaspur	116700	42800	1100	9300	25800	36200	31.02
Chamba	652500	503000	43600	113100	84600	241300	37.00
Hamirpur	111800	21900	300	10600	13300	24200	21.65
Kangra	573900	284200	13400	125000	49500	187900	32.74
Kinnaur	640100	509300	1600	32400	25700	59700	9.33
Kullu	550300	495200	11700	129700	52700	194100	35.27
Lahl& Spiti	1384100	1013300	700	2800	15000	18500	1.34
Mandi	395100	186000	7800	92900	64400	165100	41.80
Shimla	513100	341800	19200	157600	61100	237900	46.37
Sirmour	282500	184300	5900	62800	69200	137900	48.81
Solan	193600	72800	3900	31100	47300	82300	42.51
Una	154000	48700	500	15800	35500	51800	33.64
Total	**5567300**	**3703300**	**109700**	**783100**	**544100**	**1436900**	**25.81**

As mentioned in above table the dense forest area is 8,92,800 Hectare (1,09,700 + 7,83,100 = 8,92,800 Hectare) and open forest area is 5,44,100 Hectare which is proposed to be treated under watershed development projects.

6.3 Left out area for treatment

After excluding Net Irrigated, Dense Forest, Land put to non-Agriculture uses. Lands treated under ongoing WD Programme and snow covered areas, the total left out area is 3112472 hectare for treatment under Watershed Management

programme in all the districts of the State. The district wise information about left out area is given in table below:

Table- 6.3: District-wise leftout area.

District	Total Geographical area	Net Irrigated area	Snow covered area	Area under dense forest	Area treated under watershed development Prog. by Rural Dev. Deptt.	Total area which will not be covered in Perspective Plan (3+4+5+ 6)	Left-out area for treatment.
1	2	3	4	5	6	7	8
Bilaspur	116700	3164	0	10400	35200	63176	53524
Chamba	652200	5712	5504	156700	38222	217860	434340
Hamirpur	111800	1731	0	10900	47552	78208	33592
Kangra	573900	35598	0	138400	38343	289743	284157
Kinnaur	640100	4487	130859	34000	40322	334270	305830
Kullu	550300	2878	0	141400	21719	172050	378250
Lahl& Spiti	1384100	3043	415831	3500	64674	622778	761322
Mandi	395000	13774	0	100700	13588	128062	266938
Shimla	513100	2493	0	176800	25213	219463	293637
Sirmour	282500	13883	0	68700	32064	125305	157195
Solan	193600	9762	0	35000	54808	110401	83199
Una	154000	8556	0	16300	39550	93512	60488
Total	5567300	105081	552198	892800	451255	2454828	3112472

6.4 Proposed Area.

As is evident from the above table, total 3112472 hectare area is left out which is proposed for treatment under Watershed Management programme in all the districts of the State. The district wise information about category wise proposed area is given in table below:

Table:6.4 District wise & categorywise proposed area

S.N.	District	Open Forest Area proposed for treatment.	Other Rainfed / Waste lands area proposed for treatment (includes Agri.Land, Pastures, Forest, community and private areas.)	Total proposed area for treatment. (Colmn. 3+4)
1	2	3	4	5
1	Bilaspur	25800	27724	53524
2	Chamba	84600	349740	434340
3	Hamirpur	13300	20292	33592
4	Kangra	49500	234657	284157
5	Kinnaur	25700	280130	305830
6	Kullu	52700	325550	378250
7	Lahl& Spiti	15000	746322	761322
8	Mandi	64400	202538	266938
9	Shimla	61100	232537	293637
10	Sirmour	69200	87995	157195
11	Solan	47300	35899	83199
12	Una	35500	24988	60488
	Total	544100	2568372	3112472

6.5 River Basin Approach:

The first step of watershed planning process is to develop water management goals and objectives. It is, therefore, essential that water management planning be prepared on watershed basis following river valley approach. The

logical sequence of actions of river valley approach would be preparing the watershed plan, sub- watershed plan and then site specific plan

Integrated water management planning will involve the multi resource thematic information on resources availability at micro watershed level will be prepared through the process of participatory mechanism. Based on this information, base prioritization of the watershed will be attempted and guided by the following principles:-

i) Degradation status of micro watershed.
ii) Livelihood and socio-economic status of the inhabitants of the micro watershed.
iii) Sc/ST population.
iv) Water scarcity and drought proneness areas of watershed.
v) Contiguity with the already treated watershed areas etc.

6.6 Delineation of micro watershed:

As already mentioned in Chapter -5,the Sate of Himachal Pradesh has six major river systems draining its territories which are **mainly Satluj System, Yamuna System, Ephermeral System, Beas Stystem, Ravi System and Chenab System**. Using the Watershed Approach as stipulated in Watershed Atlas of India on 1:1 Million Scale with stream names on 1:250, 0000 scale by the All India Soil and Landuse Survey, Department of Agriculture, GOI , the micro watersheds have been attempted . Five stages starting with Water resources region, basin catchments, sub-catchments watershed, sub-watershed and micro-watershed. Codifications of each micro watershed have been done as per the approach suggested by All India Soil and Land use Survey. Coding of micro watershed has been carried out starting from downstream upstream. The Basin wise Maps in respect of all the Basins in Himachal Pradesh are enclosed as **Annexure- A to F**.

6.7 Basin wise break up of proposed area:

As per basin wise position explained in chapter- 5, the proposed area falls in all the basins. Although the detailed exercise / base line survey is required to get the realistic figure of proposed area in each basin but this process involves more time and as such on the basis of information collected from the field agencies the tentative

basin wise proposed area for treatment under watershed management projects is as under:

i) Yamuna System:

The Yamuna System mainly confines to the major part of district Sirmaur, parts of Shimla and Solan districts. Out of total area 6.34 lakh hectares falls under this basin in Himachal Pradesh, an area of 3.02 lakh hectares (approximately) is proposed for treatment under watershed management projects.

ii) Ephemeral Basin:

The area coveredunder this basin in Himachal Pradesh is very small which falls in district Sirmour and Solan. Out of total area 0.57 lakh an area of 0.22 lakh hectare is proposed under watershed management projects

iii) Satluj System:

The Satluj System covers the majourity area of the State comprising of districts of Kinnaur, Bilaspur, Una and parts of Shimla, Mandi, Solan, Kullu, Hamirpur and Lahaul& Spiti. Out of total area 20.50 lakh hectares, an area of 11.72 lakh hectares (approximately) is proposed for treatment under watershed development projects.

iv) Beas System:

The Beas River Basin mainly covers the major part of districts Kullu, Kangra, Mandi and Hamirpur. Out of total 13.82 lakh hectares area falls in Himachal Pradesh, an area of 7.48 lakh hectares (approximately) is proposed for treatment under watershed management programme.

v) Ravi System:

The Ravi Basin covers mainly the large portion of district Chamba (except Killar area) and smaller part (Bara Bhangal area) of district Kangra. Total area under this basin falls in the state is 5.15 lakh hectares, out of which an area 3.61 lakh is proposed for treatment under watershed management projects.

vi) Chenab System:

The Keylang area of district Lahaul & Spiti and Killar area of Chamba district falls under Chenab Basin. Total area under this basin tin Himachal Pradesh is 9.30 lakh hectares out of which 5.08 lakh hectares (Approx.) area is proposed for treatment under watershed management projects

The proposed area is inclusive of Pasture lands, Community lands, Private & Forest Lands. Under Watershed Development Programmes implemented by the Rural Development Department, an area of 4, 51,255 hectare has been treated up to November 2008 which has not been included in the proposed plan. But due to limited financial resources it can not be ensured that the entire project areas have been treated for the fruitful purpose. Thus the possibilities of additions of left out area can not be ignored in future. In Common Guidelines for Watershed Development Projects (Para 6) it has been mentioned that "a series of evaluation studies have been conducted by Indian Council of Agriculture Research (ICAR) Institutes, State Agriculture Universities (SAUs). National Remote Sensing Agency (NRSA) etc. Besides, impact assessment studies were carried out by the Ministry of Agriculture, Ministry of Rural Development, Planning Commission and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the technical Committee constituted by the Department of Land Resources (DOLR). These studies support the observation that in several watersheds, the implementation of the programme has been effective for natural resources conservation by increasing the productivity of land, bringing additional area under agriculture, employment generation and social upliftment of beneficiaries living in rural areas. But these successes have been sporadic and intermittent. The overall impact at the state and national levels has generally inadequate. Additional demand and supply driven socio-economic and risk managing paradigms are emerging."

Moreover in the Wastelands Atlas of India the total Wastelands area of Himachal Pradesh is 2833680 Hectares which is 50.90% of total geographical area. This figure also confirm that lot of areas in the State are still required the interventions under watershed management. Some lands in the category of culturable waste have neither falls in the category of wastelands nor in cultivated lands and these lands are also needed to be treated under watershed projects. Thus as already

mentioned above the total area which has been proposed under the Perspective Plan is 3112472 hectare which is 56 % of total geographical area.

The major problems identified in the proposed areas are deterioration of land due to lack of appropriate water and soil management or on account of other natural calamities. The deforestation, unscientific agricultural practices and overgrazing continuously are the reasons of increase wastelands day by day adversely affecting the fertility of land. The growth of population and stressing needs of inhabitants, the degradation of land should be prevented and the wastelands/rainfed areas should be put in the maximum use without disturbing the ecological balance to meet out the increasing requirement of local community. Erratic behavior of rainfall, excessive deforestation and conservation of pasture in to cultivation, all such denudation has resulted in disturbance of the water regime, causing damages to the top soil and adversely affecting the productivity of land. The rain fall during rainy season is very high and due to lack of vegetative cover the rain water causing severe soil erosion and damages to the cultivated land. In the absence of proper water management, the water flowing down from the hills simply drains away as surface runoff and cause floods in the plains. When the rain fall is inadequate, the upper catchments areas experience droughts in the absence of in situ water conservation. Thus the absence of proper water management results in flood in the down lands and drought in the uplands.

6.5 Preparation of resource information:

Resource information available within each micro watershed such as present land use, land degradation category, soil and water availability. Socio-economic will be prepared using the scientific methodology as well as through participatory approach. The database available with the Remote Sensing Centre of Department of Science, Technology and Environment has database prepared on 1:50,000 scale and the same will be utilized for evolving micro watersheds wise DPRs.

6.6 Preparation of Action Plan

Based on the database compiled through various modes, site specific Action Plans will be prepared solely using the participatory approach. Prioritization of action will be carried out taken into consideration the local needs and priorities.

The proposed area is required to be treated under watershed development projects in phased manner with in a period of 10-15 years. All these lands would be developed, but the priority would be to cover the untreated areas. The duplicity and overlapping if come to the notice will be avoided at the time of preparation of Detailed Project Report for sustainable development of the proposed areas, the community action through demographic process would be ensured in all the stages of the project, right from framing Action Plans, their execution, sharing of usufructs and their long term sustainability. The local communities will be organized into Self Help Groups/User Groups. In view of the availability of funds, the consortium approach for strengthening of capacity building can be considered to motivate and trained the stakeholders in relation to watershed technologies and activities. Suitable Training Programmes, work shops, exposure visits, video shows etc. will be organized. Other Income generating activities for increase in the economic status of the watershed community will be propagated and necessary financial support will be provided from the project fund and converging the funds from ongoing other schemes.

In the project areas, the priority of activities/works would be linked directly or indirectly with livelihood enhancement. The rain water harvesting with pucca structures, irrigation, plantation of fodder, fruits plants, renovation & augmentation of water sources, de-siltation of village tanks for drinking irrigation, repair restoration & up gradation of existing common property assets etc. would be the main activities in the watershed areas which would be carried out with the active participation of the watershed community. The agro-climatic conditions of the State are best suited for Agro Forestry and Horticulture activities and these activities would be carried out in watershed areas including private lands. Pasture Development by silvipastural methods including plantation of leguminous species, nutritious grasses and other economically useful species on the village pasture will be adopted.

Chapter-7

STRATEGY FOR WATERSHED DEVELOPMENT

Watershed management's underlying principle is that people, land, and water are connected. People use land in a variety of ways, and affect ecosystems, and ultimately, their own communities for better or worse. Managing and protecting the environment while providing a high quality of life for people is a complex process that is most successful when governing bodies, community members and experts in various fields are true partners in the planning process. It shall be the endeavor of the watershed management approach to bring all these factors together to provide long-term well being for communities by integrating people, land, and water in a watershed area.

It is often seen that within any watershed, there are natural resources that have both ecological and economic value. Human activities can affect those resources, often with unintended consequences. It is therefore important to work on a watershed approach that recognizes those consequences by seeing the entire system in a holistic manner rather than considering each aspect independently as was the case with watershed programmes earlier. The perspective plan aims at developing strategies to manage resources and human activities in a coordinated way. Its focus will be on integration of the efforts of landowners, land use agencies, water management experts, and communities. Institutional arrangements will be put in place in a way that these stakeholders work together to ensure proper stewardship of our natural resources, compliance with regulation and efficient management. The underlying purpose is to strive toward efficient, sustainable and intelligent solutions to our watershed issues: land use, water supply, water quality, storm water runoff, water rights, air quality, planning and utilization. The watershed approach changes this mindset to develop recognition among members of a community of the value of their own resources, and to guide a holistic, balanced program of stewardship that achieves community goals while complying with rules. A watershed approach integrates biology, chemistry, hydrology, economics, and social considerations into decision-making. It recognizes needs for water supply, water quality, flood control,

navigation, hydropower generation, fisheries, biodiversity, habitat preservation, recreation, and development; and it recognizes that these needs can compete. It establishes local priorities, accounts for state and national goals, and coordinates public and private actions.

7.1 Philosophy

While traditional approaches are reactive, precautionary, regulatory, single-purpose, and driven by enforcement, watershed management plan aims at making it proactive, scientific, uses agreement-based approaches to achieve multiple benefits, and is driven by the self-interest of stakeholders. Watershed protection measures seek to stop or reduce pollution and prevent degradation. Measures that prevent degradation before it occurs typically cost less than restoration measures implemented after watersheds are impaired. When restoration is required, it is more challenging to establish acceptable and measurable goals. This is where stakeholder collaboration is most essential. Some will see restoration as the re-establishment of pre-disturbance aquatic functions, but others may focus more on recreation, flood protection, or water use efficiency. It is critically important that stakeholders work out a balance among competing "public goods", which no single discipline is equipped to achieve.

In a mountainous state like Himachal Pradesh where the vast majority of population has been dependent on natural resources for their livelihoods, "development" will have to be based primarily on long-term sustainable productivity enhancement and, in the drought prone regions, on increasing the dependability of production and, consequently, the security of livelihoods. The interconnectedness of the biophysical and the social is intrinsic to watershed development and draws strength from this interconnectedness. The plan sites on the principle that biophysical and social interventions are not two separate processes, but aspects of a single unified process and ecosystem processes and resources are basic economic resources as well.

A review of watershed development projects in Himachal Pradesh highlights an immediate need to re-orient the present approach to watershed development and put an enabling policy framework in place to ensure that watershed development

programmes adequately meet the requirements of the four central concerns, namely, sustainability, livelihoods, equity, and participation/self-governance. Previous studies have concluded the following drawbacks in approach and implementation:

- Problems related to lack of coordination;
- The need to help community catchments groups mature;
- Confusion between bottom up consultation and community participation and top down policy and government investment;
- The lack of integration of economic development with ecological management;
- Institutional barriers to effective integration; and
- The effectiveness of local community institutions

Thus there is a need for a reorientation of approach to watershed development based on the following: a sustainable productivity enhancement orientation; pro-active measures to deal with sustainability and equity issues; preceding resource generation with institutional arrangements to handle those resources; making adequate technology choices; and taking dependability into account in watershed planning.

There is also an urgent need for an enabling policy framework for collective regulation of groundwater use and eventually moving towards Integrated Water Resource Management. Many policies, which may not be directly related to watershed development programs *per se*, also impinge on the outcomes, e.g. tourism Hydro Power, Industry and TCP electricity tariffs, irrigation policy, agriculture research and extension policy, fertilizer and agricultural produce pricing, and forest policy. There is also a need to restructure the watershed development program by increasing the watershed development allocation and period, and conduct it in phases. The areas that need particular attention are:

(i) Hydrological: a) cross-scale and inter-scale hydrological effects (upper to valley portions, intra- and inter-watershed relations up to basin scale); b) surface water-groundwater interactions; c) aquifer behavior, in particular balance between shallow and deep aquifers, their sizes, recharge rates, locations, and so on; d) net effect of

different soil and water conservation measures as well as afforestation and agricultural practices on quantities like infiltration and erosion under different geophysical conditions.

(ii) Land-Vegetation-Water interactions: a) agro ecological relationships and impact on one another as an ecosystem; b) grazing and forest management, in particular productivity, sustainability, and offsite effects.

(iii) Socio-Economic and Institutional aspects: a) compare asset-based approaches with income based approaches, in terms of benefits, their distribution and sustainability; b) scope for biomass-based value addition — biomass, labour, energy, capital and financial requirements, and identification of possible bottlenecks; c) scope of watershed and NRM-based development in different regions, limits, and implications, especially in resource poor areas; d) indigenous knowledge, its scope, and issues in its interface with modern knowledge; e) role of CVOs and SHGs in improving participation and sustaining benefits beyond project period; f) ways of better addressing the problem of local heterogeneity by equitable and sustainable reconciliation of interests and conflict resolution; g) social and institutional mechanisms and capability building for incorporating rigorous participatory grassroots benchmarking, monitoring, and assessment in watershed based development programs.

7.2. Approach for watershed management

Based on the experiences of implementation of watershed management project in the State and elsewhere in India, the new plan proposes to use watershed development as an opportunity to combine an integrate water conservation with livelihood concerns. Enhancing sustainable livelihood options of the people shall be the key objective in Watershed Management activities. The goal of watershed development would be sustainable productivity enhancement and consequent increased livelihood option for the local community. As opposed to the traditional water conservation approach which focused on minimization of run-off as a unilinear strategy, the new approach will aim at productivity oriented hydrological planning approach that maximizes agriculture and other bio-mass production within the limits

of water availability and promotes agronomic practices with sustainability and equity as the key concerned.

The following aspects will constitute the key elements of the approach followed for watershed development in Himachal Pradesh:

(i) Interconnectedness of the bio-physical and the social aspects.
(ii) Fulfilling livelihood needs.
(iii) Sustainability.
(iv) Equity.
(v) Participation.

(i) Interconnectedness of the bio-physical and the social aspects.

The proposed watershed development plan will keep the element of interconnectedness of bio-physical and the social aspects as intrinsic to the very concept of watershed development. The underlying philosophy will be that reads watershed as a bio-physical entity in an eco system comprising of all bio-physical processes within the watershed and their interaction with larger systems. Bio-physical and Social interventions are actually not two separate processes but aspects of the same unified process. What appears as a soil erosion in the case of bio physical process would appear as inability to meet food needs in the social aspects due to reduced farm productivity. Likewise, purchase of fertilizer may be an aspect of bio physical intervention but the resultant pollution would be the social implication of the same. The strategy proposed to be adopted under the perspective plan would therefore keep this bio physical and social aspect in view in deciding technological interventions.

(ii) **Fulfilling Livelihood needs**

A Livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. The interventions would be so designed that result in fulfilling minimum livelihood needs consisting of domestic water (including drinking water and water for livestock), food, fuel, fodder, some bio mass in put to the

agricultural system to maintain soil productivity and other goods and services that may have to be obtained from the larger system, for example, health and education.

(iii) Sustainability

Maintaining and enhancing the products and assimilative (as sinks) potential of the local eco systems would be the objectives to be achieved through using water within renew ability limits, using common property resources (for example, forest and forest produces) within renew ability limits, enhancing and sustaining the productivity of crop land uncultivated land and enhancing dependability of availability of resources, for instance, water.

(iv) Equity

The fulfillment of livelihood needs depends crucially on who has access to how much and what kind of productive resources thereby bringing the element of equity to the watershed management. The equity may have several dimensions including intra generation distribution of human well being across barriers of class, ethnicity and gender. Concerns about special or locational inequality in the level of development require distributing fruits of development equally in different regions. In the context of water availability inter-sectoral equity also becomes relevant. Often, the prioritization of water availability follows the following sequence namely; drinking water: water for domestic use and for cattle: water required for eco system regeneration and for livelihood activities: and surplus/extra water that could be used for cash or commercial crops. The impact of watershed development on all the dimensions of equity will be an important evaluating criterion of success of the programme.

(v) Participation

The approach followed in watershed development will see participation as a goal of a developmental (decentralized) process in that it helps communities make informed choice and also as a mean of more equitable, sustainable and efficient outcome. The emphasis will be on creation or enhancement of

genuine participated democracy at the grass roots. Participation is seen as a means to enable the local community to make informed choices and ensuring more equitable, sustainable and efficient outcomes. However, it is important to view critically the constituents of local community that are engaged in the decision making process. General expectations are that homogenous societies would respond very differently to opportunities of participation available within the framework of watershed programmes as compared to heterogeneous societies. Since, in their current form, the Watershed Development Programmes necessarily require partnership in some form with outside agencies (governmental and non- governmental organizations, international donors, etc.), the nature of this collaboration is bound to affect the efficiency of the participatory communities within the watersheds. In this context, the increased importance of the institutions of local self government Panchayats as brought about by the Hariyali Guidelines and further refined under common guidelines is expected to change somewhat the participatory dynamics.

7.3. Strategy

(a) Integrated Watershed Management

Watershed Management has evolved and passed through several developmental stages. In the initial stages, it was confined to soil conservation mainly handled through Agriculture and Forest Departments with little or no involvement of people. During the second stage, it became land resource management related, including activities with an eye on economic benefits. At this stage, the focus was on beneficiaries. Under the proposed perspective plan, it is intended to be made participatory and integrated watershed management with involvement and contribution from local people. The emphasis will be on making watershed natural source management as a part of local socio economic developmental processes. The detailed project report will incorporate ways of integrating natural resource management with socio economic development, sustainable livelihood and poverty alleviation. Special attention will be given to strengthening the capacity of local actors to manage the three main components of

watershed management namely land management, water management and biomass management will be kept in focus.

The land management will incorporate major land characteristics like terrain, slope, formation, depth, texture, moisture, and infiltration rate and soil capability of the proposed project area. Necessary interventions of different kind like structure measures, vegetative measures, production measures and protection measures will be taken depending upon the sight requirement. Structural measures will include interventions like contours bunds, stone bunds, urban bunds, compartmental bunds, contours terrace walls, stream bank stabilizing, contour trenches, bench terracing and check dams etc. Where watershed contain natural ecosystem like grass land, wet lands, mangroves, marshes, water body, appropriate vegetative measures will be planed to provide vegetative cover, hedges, grass land management, and agro forestry etc. Linkage of watershed activities with appropriate agricultural practices is an important dimension of the watershed management. The DPR prepared for various sites will include appropriate production measures to improve farm productivity like mixed cropping, crop rotation, cultivation of shrubs and herbs, use of improved variety of seeds, cash crop cultivation and horticultural plantation. Wherever needed, protective measures like land slide control, gulli plugging, run of collection etc. will also be suggested. Adoption of all the above interventions aimed at land management will be done in accordance with the characteristics of the land taken for management.

Economic use of water and avoidance of affluence in use of water at individual and community levels will be a major concern for water management under this perspective plan. Water characteristics like inflows (specification, surface water inflow, ground water inflow) water use (evaporation, evapotranspiration, irrigation, drinking water) out flows (surface water out flow, ground water out flow) storage (surface storage, ground water storage, root zone storage) are the principle factors to be taken care of in sustainable water management. The broad intervention for water management to be planned under the detailed project reports to be prepared for each site shall be rain water harvesting, ground water recharge, maintenance of water balance, preventing water pollution and economic use of water. Rain water harvesting forms the major component of water management. The rain water

collected can be recharged into the ground. Roof top water harvesting, diversion of peremmial springs and streams into storage structures, farm ponds etc. will also be used for rain water harvesting. Along site, water harvesting, appropriate measures will be planned to ensure economic use of water. One such most effective measure is often the introduction of user charges for water usage to recover operating cost and at the same time introduce behavioral change among the water users by incorporating cost of water in their usage decision.

Under the integrated watershed management, along site land and water management, bio-mass management is an important area of concern. Under the traditional approached followed so far in Himachal Pradesh, no efforts have been made to establish clear cut linkage between land management, water management and the bio-mass management. Resultantly the water management structures have often ended up as stand alone intervention in any area without a clear linkage without a clear forward and backward linkage in terms of land management and in terms of bio-mass management. Both land management and a bio-mass management outcome in fact becomes the key indicator of the watershed management performance in any area. Appropriate biomass intervention namely eco preservation, biomass regeneration, forest management and conservation and plant protection and social forestry will be planned for each area.

(b) Participatory Watershed Development and Management

People participation and collective action are critical ingredients for watershed management. The perspective plan aims at achieving the three core elements of participatory watershed management namely sustainability, equity and participation. Watershed level interventions have the potential of enabling technological intervention to work better from both technical and social stand point, given the strong interaction between different stake holders in the watershed community. However, key challenges of ensuring appropriate and effective participation are confronted in terms of ensuring equity in such negotiated outcomes by making a move away from interest based to more equitable decision making. The watershed action plans will be prepared at the grass root level i.e. by the Gram Sabha with diverse users and with different priority and the levels of influence. Decision making at the watershed level will only be done after watershed units have elected

representatives and established a frame work for more wide spread feed back and validation. For this to be effective performance criteria for elected representatives would be established prior to the identification of individual to avoid the tendency to reflect existing power dynamics rather than robust leadership criteria. The second strategy to be followed in this case would be greater devolution of decision making and management within the watershed and moving to higher levels of negotiation only in those case where absolutely necessary.

The second consideration when seeking effective participation in watershed management is often the issue of developing a general watershed action plan versus plan around specific issues. While the former enables an integrated approach to planning, the latter is more suited to an emphasis on stake holder equity. This involves the identification of stake holders specific to each issue, followed by multi stake holder's negotiation at village or watershed level. A stake holder approach minimizes involvement to only those who have a direct stake in the issue at hand, and lends itself more easily to effective representation since for any given issue the individuals directly involved in negotiation will hold views that approximate those or their constituents. The main objective of this component is to facilitate a participatory process at the village level to establish Watershed Committees and develop proposals within a budget envelope provided to each GP and then to enable implementation of these plans through the GPs. The participatory decision-making process, including all stakeholders in the village is critical to the implementation and shall be achieved through the following sub components:

(i) Promotion of social mobilization and community driven decision making

Key activities under this sub-component would include: (i) facilitation of participatory watershed and development planning processes at the village level with the involvement of all stakeholders and, using a budget envelope as the basis (ii) identification of specific interventions for treatment of the watershed on arable and non-arable lands (iii) identification of the vulnerable sections o f the village (iv) integration of proposals into GPWDPs (v) identification of inter-GP areas and planning for treatment of such areas by the Panchayats.

(ii) Watershed treatments and village development

Communities at the village level will prioritize (with the help o f the ESMF), implement, operate and maintain village development and watershed investments as articulated in GPWDPs. However, all works will be implemented by GPs. Communities will prioritize and implement sub-projects for soil conservation on arable lands (e.g. bunds, vegetative barriers, ago-forestry, etc.); development of non-arable communal and government lands (e.g. forest regeneration, pasture development, silvi-pasture development, soil erosion bunds, vegetative barriers, etc.); and, activities other than watershed-treatment related (e.g. upgrading of link roads, bridle paths/mule tracks, potable water supply, etc.). Communities will be required to contribute toward the costs of each sub-project and undertake to operate and maintain the investments.

(c) Enhancing Livelihood Opportunities

(i) Farming systems improvement

This sub-component will draw on the lessons o f both the IWDP and the DPAP. It will focus on: (i) disseminate technologies and provide advisory services; (ii) produce and distribute quality seeds and seedlings; and (iii) establish linkages between farmers and suppliers for processing and marketing of high value crops. Farmers will be directly involved in identifying problems, establishing priorities, and on-farm testing of technologies to enhance productivity. The major emphasis will be the introduction o f off- season vegetables and high value crops. In order to cover a part of the risk, the project will support all the inputs (seed seedlings, bio-agents and bio-fertilizers) of the sub-projects, with the condition that the land, labour, irrigation and farm yard manure will be provided by farmers. In order to facilitate the production of marketable produce, the plan undertake programs that demonstrate improvements in the productivity of crops already cultivated in the area and the introduction of new high value crops (new varieties of off-season vegetables, fruit crops, medicinal and aromatic plants will be introduced based on agro-climatic factors, demand and assured market). Training will also be provided in application of new technologies; training of para vets and storage techniques etc.

(ii) Value addition and marketing support

One of the often lacking areas in all farms related developmental programs is absence of processing and marketing facilities. The experience of the State in introduction of cash crops and Horticultural produce has been that in the absence of such facilities either the farmers switch back to their traditional crops or put up a pressure on the Government to purchase their produce through market intervention mechanisms. Such an arrangement is not sustainable in the long run especially with the resource crunch faced by the Governments at all levels, the plan will support increased private sector involvement and public private partnerships in agribusiness development. The project will establish an agribusiness pilot that will be used to fund consultancies, studies and investments that would: (i) identify potential rich market opportunities; (ii) establish links with private sector entrepreneurs who could help in exploiting the market potential; (iii) disseminate appropriate information and technology to farmers to help them to enter into production; (iv) co-finance sub-projects with private sector entrepreneurs (on a one-time subsidy basis) for storage, processing and or marketing infrastructure needed to exploit the market potential. This fund would be administered in consultation with the GPs and communities and would complement the needs identified during the village level planning process.

(iii) Income generating activities for vulnerable group

This is designed to finance small income generating micro-enterprises for vulnerable groups (women and landless), which will promote the project's objective o f equity and sustainable NRM. These SHGs would be identified during the watershed planning process. Training will be provided to vulnerable groups to encourage their entrepreneurial development. The Income Generating Activity proposals will be developed after the implementation o f the Entrepreneurial Development Program (EDP) and the GPWDP will only reflect the overall envelope and the target groups. The funds will be disbursed through the GPs to the SHGs, who will manage them. Final criteria to prioritize proposals for the SHGs funding will be developed. The funds will be disbursed in two installments based on the implementation performance of the SHGs who are managing the income generating activities.

(d) Institutional Strengthening

i) Capacity building of Gram Panchayats and local community institutions:

Under this sub-component, the core administrative capacity of GPs in planning, budgeting, financial management, implementation and reporting would be strengthened. Capacity will also be built in other tiers of PRIs (block and district) as needed to ensure efficient and effective functioning o f the project. However, the initial capacity building strategy for the project will be focused on GPs and will include programs for GP elected officials, community representatives, SHGs, NGOs and the watershed staff involved in project related activities. The capacity building strategy focuses on: (i) enhancing technical skills in watershed management; (ii) improving level of information at the community level on the project and other relevant issues; (iii) training all stakeholders in applying the technologies; and, (iv) institutionalizing a performance appraisal and reward system for the GPs and WMD staff in the project. The Coordinator for Human Resource Development and Capacity Building in the Directorate of Rural Development will be responsible for implementing training and capacity building strategy in collaboration with other line departments and training institutes. An Incentive Fund administered by the Department for Rural Development and Panchayats, will be established to reward better performing GPs based on clear objective criteria and thereby encourage behavioral change.

(ii) Information, Education and Communication

This sub-component is designed to implement a strategy that identifies specific audiences and develops targeted messages to increase general awareness about the project, terms o f participation and overall transparency. The strategy would target the general public and the state's political establishment; staff who would be implementing the project, NGOs, GPs, and, communities. The media would include traditional folk theatre and dance, print media and audio-visual. The Communications coordinator at the district would be responsible for the implementation of this strategy.

(iii)Project coordination, monitoring and management*:*

This will finance organizational change management initiatives to realign the WMD to the new implementation arrangements and the increased role o f GPs. Under project monitoring, links would be developed between the MIS, GIS and impact evaluation. Participatory monitoring of the project activities by the communities would be introduced in addition to the tracking of physical and financial milestones. This sub-component will also finance construction of office and/or residential quarters for DPDs and MDTs if it is not possible to rent appropriate office and/or residential space in nearby towns. Finally, the sub-component will finance incremental operating costs of the project office.

(e) Monitoring and Evaluation

An effective monitoring and evaluation strategy needed to capture trends in benefits capture and other social impact as they emerge. Without such monitoring systems in place that make the distribution of benefits and social impacts explicit, it is likely that current intervention cause problems for certain social groups and further existing inequalities. Continuous monitoring also enables continuous (re-) planning; a pre-requisite to adaptive management in that reality encountered during implementation do not always reflect best approaches as prescribed early in the planning process and therefore, require continuous adaptation. Appropriate socio culture, economic and environmental indicators will be developed in each DPR with a definite time frame to measure performance the socio culture indicators under the following heads will be specially developed to ensure participation and equity:

- Decision making power of the community;
- Empowerment of women;
- Formation of farmer groups/self help groups;
- Change in ownership of land;
- Improvement in quality of life;
- Harmonious social life.

The economic indicators would include factors required for livelihood and economic well being of the people consisting of:

- Increase in income level;

- Availability of food and food security;
- Improvement in the standard of living;
- Off-farm income to family;
- Improvement in rural economy;
- Improvement and credit and market supports.

Environmental indicators would include tangible and non tangible factors influencing the ecology of the community, for example, increase in productive potential of source base, management of common property resources and improvement in bio-diversity.

(f) Convergence

One of the important components of integrated watershed management is main streaming the watershed planning and management by developing appropriate interface with other ongoing developmental programmes. The possibilities of identifying and deriving support from other line departments can be subdivided into the following categories:

a. Infrastructure Development;
b. Productivity Enhancement;
c. Off Farm Initiative;
d. Livelihood Support;
e. Weaker Sections Support;
f. Quality of Life.
g. Capacity Building.

(i) Infrastructure Development

Among the major infrastructure activities that will be taken up within the watershed areas are Construction of Roads and Provision of Irrigation Facilities. Among the schemes that are currently handled by various departments and could be tapped for supplementing resources are:

Table-**7.3. (i) . Infrastructure convergence frame work**

Sr.No.	Activity	Name of the Scheme	Nodle Department
1.	Road	PMGSY	PWD
		CMGSY	Planning
		NREGA	RD
2.	Water Supply	AWRSP	IPH
3.	Employment generation	NREGA	RD
4.	Irrigation	Medium Irrigation, Flood Protection, Lift Irrigation Scheme	Irrigation and Public Health Department(IPH)
5.	Marketing Infrastructure	Vikas Mein Jan Sahyog	Planning
		SGSY	RD
		Local District Planning	Planning

(ii) Productivity Enhancement

Majors aimed at productivity enhancement will require interventions in the form of soil conservation, soil quality improvement, improved seeds and fertilizers, Farm technology equipments, changes in cropping pattern and multiple cropping etc. Some of the existing schemes of the various departments are:

Table-**7.3. (ii)- Schemes for productivity enhancement**

Sr. No.	Activity	Name of the Scheme	Nodal Department
1.	Distribution of improved seeds	Agriculture inputs	Agriculture
2.	Fertilizer	Agriculture inputs	Agriculture
3.	Insecticide and Pesticide	Agriculture inputs	Agriculture/Horticulture
4.	Poly Houses	Horticulture Technology Mission (HTM)	Horticulture

(iii) Non-farm Initiative

One of the major causes of natural resources degradation is excessive dependence on land and natural resources. Therefore, development of non-farm sector activities is crucial to a sound natural resource management strategy. Among the activities that could be started are:

Table-**7.3.(iii)-Schemes for non-farm initiative**

Sr. No.	Activity	Name of the Scheme	Nodal Department
1.	Micro and Small Enterprises	i)Rural Industrial Programm(RIP), Rural Artisan Programme(RAP)/ ii)Prime Minister Employment Generation Programme(PMEGP)/ iii) Self Employment Scheme, Him Swablambhan Yojana (HSY), Laghu Vikray Kendre Yojana, Interest free loan Scheme. iv) Loan to OBC people on lower interest (6%)	Industries KBIB SC/ST Corporation Backward Classes Corporation
2.	Rural Tourism and Hospitality related enterprises	Home Stay Scheme	Tourism

(g) Livelihood Support

The average size of land holding is low especially in high hills of the State. Terrace farming is widely practiced. Due to difficult terrain, road connectivity is not always good and health infrastructure is poor. Drinking water and electricity facilities are available to the majority of households. There are high dependents on forests property and water resources. The best terms in this zone come from fruits, at an average return of nearly Rs. 75000/- per ha. However marginal farmers depending on subsistence agriculture produce at least four-five months a year. The food insecure months are from January to April, September and October. The poor people supplement their income from wage labour in mining, other labour work under any scheme of the State Government /GOI, in their adjoining local areas. Some villagers are also supplementing their income by selling their livestock's and their produce such as of Goats, Sheep and wool, milk etc. Diary products consumption is less due to low productivity of milk from local breed milch cattle's.

On the whole, there is a dominance of marginal farmers who face several problems including lack of irrigation, poor quality lands, fragmentation, weather shocks and in many remote locations poor access to state and marketing infrastructure.

The separate provision of funds to cover livelihood components to generate extra income of the poor inhabitants in the rural area has been made in the common guidelines for watershed development projects. However the state government is committed to enhance the livelihoods opportunities in the rural area of the State by providing sufficient water potential and other avenues in the field of horticulture, forestry, Mushroom cultivation, sericulture, animal husbandry etc.

In the implementation of watershed development projects the priority would be the harvesting of rain water with active participation of village communities. By creating irrigation potential, the coordination between the line departments who are associated with agriculture and allied activities will be ensured to provide the latest technology and other available benefits to the watershed community. Presently some schemes for the benefit of individual farmers in the field of Agriculture, Horticulture Technology Mission, and NREGA etc are being implemented in rural areas of the State. The other benefits for forward- backward linkages to the rural families will be provided out of watershed funds for upliftment of their socio-economic conditions. The assistance for poor people would be provided not only in Agriculture and allied sectors, but due consideration would be given to village and cottage industries, and small scale business activities. The possibilities of marketing potential will be explored and the watershed community will be motivated for growing of marketing based produce to get maximum benefit.

(i) **Weaker Sections Support**

Particular attention needs to be given true address the problem of weaker sections of the society namely SC/ST, Backward Classes, Women, BPL families and land less households. The main departments catering to these categories under the existing schemes are Welfare Department, Rural Development Department, Education and Food Supplies Department. Among the schemes operated by these are:

Table-**7.3.(g).(i)- Weaker section support**

Sr. No.	Activity	Name of the Scheme	Nodal Department
1.	Construction of Houses	IAY/AAY and Housing Scheme for SC/STs for the Welfare Department	RD and Welfare Department
2.	Self Employment	SGSY	RD
3.	Education and Trainee	Free text books, scholarship scheme for different categories of students, Mid-day Meal Scheme, Computer Literacy. Moduler Employable Scheme, Training under different trades through ITI	Education Department Technical Education

(ii) Quality of Life

Improvement in Socio-economic indicator which is an important factor for performance under integrated watershed management could only be achieved if the activities contributing to improvement in quality of life could be integrated with the watershed development plan. Among the main activities under this section would be:

Table-**7.3. (g). (ii)- Schemes for improving quality of life**

Sr. No.	Activity	Name of the Scheme	Nodal Department
1.	Maternal and Child Health	ICDS	Welfare
2.	Preventive Health	NRHM	Health
3.	Sanitation	TSC	RD
4.	Education	SSA	Secondary Education

(iii) Capacity Building

Table-7.3. (g). (iii)- **Capacity building schemes**

Sr. No.	Activity	Name of the Scheme	Nodal Department
1.	skill up gradation	SGSY	RD
2.	Entrepreneurial Development Programmes	EDP Training	Industry & Tourism

Chapter -8

INSTITUTIONAL ARRANGEMENTS

The institutional model and implementation arrangements have been developed to ensure the achievement of the project objectives in efficient and effective way. In view of common guidelines for watershed development projects the institutional arrangements at State; District, PIA and Panchayat level have been designed.

8.1 State Level Nodal Agency (SLNA)

In pursuance to para 28 of the common guidelines for Watershed Development Projects-2008, a dedicated State level Nodal Agency (SLNA) has been constituted under the chairmanship of Chief Secretary to the Government of Himachal Pradesh. A copy of notification is enclosed as **Annexure-I**

(a) Responsibilities and Role of State Level Nodal Agency

- To coordinate Planning, review and facilitate the implementation and evaluate the progress of watershed development programme.
- Support policy and institution development to harmonize watershed development and natural resource management with the best practice.
- Consider and approve the Project Proposal.
- Add and to amend the rules of State level Watershed Development Cell.
- Secure effective coordination between different departments and other
- Government/Government added Institutions for the benefit of achievements of the objective to the society.
- Preparation of perspective and strategic plan under Watershed Development Programme on the basis of Plans prepared at the District level.
- Preparation of State specific process guidelines.
- Approve and finalized the list of independent Institutions for strengthen capacity building at various level.
- Approve Project Implementing Agency.
- Regular review of the on line monitoring system of the Department

- Constitute and approved a panel of Independent Institutional Evaluators for Watershed Projects in the State.
- Perform such other functions as are entrusted to it under the guidelines.
- Under the over all control of SLNA the Department is proposed to constitute State level Watershed Development Cell and State level Data Cell.

(b) State Level Monitoring/Evaluation Cell

As per para 26 & 27 of common guidelines for Watershed Development Project a team of 4 to 7 professionals from disciplines like agriculture, water management, capacity building social mobilization, economic information technology, administration , and finance and accounts will be engaged to assist the State Level Nodal Agency. Requisite number of administrative staff will support this team of experts. The numbers of officers/officials to be engaged will be decided in view of the admissibility of the funds. Apart from above a State level data centre will be created for technical support to district watershed development units all over the State and to ensure the regular and quality on line monitoring of watershed projects. The State Level Data Centre will be connected on line with National Level Data Centre.

(c) Role and Responsibility of State level Monitoring and Evaluation Cell

- Prepare a perspective and strategic plan of Watershed Development of the State and got approved in the meeting SLNA.
- Implementation of the project activities in true spirits primarily through the Watershed Development Committees in conformity with development plan and objective of the project.
- Mobilization of the community of the selected watershed /Panchayat of the catchments to participate in planning and implementation of the programmes
- To built the capacity of the staff on technical, financial, administrative and managerial aspect of the programme through meeting, workshop, training and exposure visits at various level
- Monitoring and review the programme on fortnightly basis and submission of reports to the concerned quarters.

- Ensure regular and quality on line monitoring of watershed project in the State.
- Provide guidance and support to Watershed Development Team and Executive Agencies in Planning, technical aspects, financial aspects and decision making process.
- Plan development and to implement livelihood plans at various watersheds of the catchments through watershed development team.
- Ensure proper financial managements system.
- Approve a list of independent institutions for capacity building at various levels within the State as well as outside the State.
- Constitute a panel of independent institutional Evaluator for Watershed after concurrence and approval of Central Nodal Agency.
- Consider and approve the projects as well as Annual Work Plan of the programme.
- Formation and strengthening of the existing and new community based organization.
- Other important issues such as Vidhan Sabha matters, Audit and other general correspondence with the GOI and different offices at State, District and Block Levels.

8.2 District Watershed Development Unit (DWDU) at District Level

Presently the Watershed Development Programmes at District level are being implemented through the DRDAs with the involvement of Panchayati Raj Institutions and local communities. As per common guidelines for Watershed Development Projects a dedicated District Watershed Development Unit (DWDU) are proposed to be constituted in all the districts where the area of the District to be covered under the Watershed Development Project is about 25000 Hector or above. The officers/officials in the unit will be taken up either on deputation from line departments of the State or recruited from open market on contract basis only after keeping in view the qualification and expertise in related fields. The number of officers/officials to be engaged will be decided as per admissibility of funds under the programme.

Role and Responsibility of DWDU/DRDA

- Identify Project Implementing Agencies (PRIs) in consultation with SLNA.
- Take up the overall responsibility of facilitating the preparation of strategic and annual action plan.
- Providing professional technical support to project implementing agencies in planning and execution of the watershed development projects.
- Develop action plans for capacity building with close involvement of resources organizations to execute the capacity building.
- Carry out regular monitoring evaluation and learning.
- Ensure smooth flow of funds to watershed development projects.
- Ensure timely submission of required documents to SLNA/ Nodal Agency of the department at centre level.
- Facilitate coordination with relevant programmes of agriculture, horticulture, rural development, animal husbandry etc. with watershed development project for enhancement of productivity and livelihood.
- Integrate watershed development project/ plans into district plan of the district planning committees.
- Establish and maintain the district level data cell and link it to the state level and National Level Data Centre.

8.3 Project Implementing Agency (PIA)

The implementation of watershed projects in different districts will be done through the Programme Implementing Agencies (PIAs). As per common guidelines, these PIAs may include relevant line departments, autonomous organization under State/Central Government, Panchayat Samiti, Voluntary Organizations (VOs). However, the selection of PIAs will be prefer on the basis of prior experience in watershed related aspects or management of watershed development and they should be prepare to constitute dedicated Watershed Development Team. (WDT). In view of common guidelines the PIAs would be decided by the State Level Nodal Agency on the recommendation of District Watershed Development Unit.

Role and Responsibility of PIAs

- Providing necessary technical guidance to the executing agency for development plan through participatory rural appraisal (PRA) exercise.
- Preparation of Micro planning and detailed project report.
- Conducting the participatory base line survey and Capacity building arrangement of village communities, Panchayats through meetings, workshops, training, and exposure visits etc.
- Preparation of Action Plan for Watershed Development Programme.
- Convergence and networking with respective line department.
- Responsibility for planning and designing the implementation strategy for enhancing livelihood sub component of the project.
- Guidance to the Watershed Development Committee in the formation of the Watershed Action Plan.
- Formation of user groups and Self Help Groups.
- Coordinate and monitoring the implementation of the programme.
- Maintenance of project accounts.
- Ensure the post project maintenance and sustainability of the assets created under the project.

8.4 Watershed Development Team

After sanction of projects, the Watershed Development Team (WDT) will be constituted at PIAs level from the field of Agriculture, Horticulture, Social Science, Water Management, and Animal Husbandry Forestry etc. having professional qualification and sufficient expertise. It would be ensured that at least one women be selected as WDT member as per provision of guidelines. The role of the WDT members would be to guide the Watershed Committees in the formation of Action Plan, Preparation of Detailed Project Report, to provide technical assistance in the execution of works etc. The expenses towards the salaries of the WDT members would be charged from the 10 % Administrative Cost admissible in the guidelines. The training to the WDT members will be provided by the District Watershed Development Units (DWDU) /DRDAs.

8.5 Institutional Arrangements at the Village Level and People's Participation.

It will be the efforts of the department to implement the watershed development Projects with active participation of local people. The Self Help Groups (SHG) and User Groups (UGs) of local communities dependent on area would be

formed and assisted under livelihood activities. User Groups of the beneficiaries would be constituted, those having land holding in the watershed area and will drive direct benefit from the activity/work. These User Groups will be responsible for operation and maintenance of all the assets created under the project.

(a) Watershed Committee

At the village level the Gram Sabha will constitute the watershed committee comprising of at least 10 members from SHGs, UGs, Weaker sections of the village etc. to implement the Watershed Projects with the technical supports of the WDT at the grass root level. The Watershed Committee would be registered under the Society Registration Act-1960. Where watershed projects cover more than one Gram Panchayat, separate committee will be constituted for each Gram Panchayat. The Gram Sabha will appoint any suitable persons from the village as the Chairman of Watershed Committee. The Secretary of Watershed Committee will be a independent paid functionary of the Watershed Committee and salary of the Secretary will be charged from the administrative expenses.

(b) Role and Responsibility

- Ensure quality works and implementation of the programme as per work plan.
- Ensure proper maintenance of records of project activities and Watershed Development funds.
- Convening meetings of Gram Sabha, Gram Panchayat Watershed Committee for facilitating the decision making process of the Programme.
- Taking follow up action on all decision.
- Ensuring payments and other financial transaction.
- Maintenance and sustainability of assets created after completion of the projects.

(c) Role of Gram Panchayat

The Gram Panchayat would have to perform the important role in the implementation of projects and execution of the activities. The main function of the Gram Panchayat will be to facilitate the convergence of various projects/schemes besides supervise, support and advise the watershed committee and authenticate the accounts/expenditure statement etc.

Chapter 9

PROPOSED PLAN

As per provisions of the common Guidelines for watershed Development Projects, the proposed area will be treated according to the funds provisions made by the Government of India. The administrative expenditure such as salary/ honorarium to the staff engaged in the implementation of Projects, contingencies and other expenses of stationary, IEC activities etc. would be meet out from the provisions of Administrative Head.

9.1 Monitoring and Evaluation

Monitoring is one of the most important components of the Watershed Development Programme. The Department is of the view that independent dedicated Monitoring Cell be include within its purview that will handle all aspect of monitoring project across the State. Its functions will include developing a Management Information System on the basic data of the projects, carrying out physical monitoring of the project besides financial and social audits. The Perspective Plan is based on the Watershed approach and hence the key focus of the project will be on the building capacities of the people and the project organizations to achieve a truly demand driven approach. This implies that the project has to adopt a flexible strategy to be able to be responsive to the change.

The Project will support an integrated information management, monitoring and learning system for assisting in effective implementation, facilitating inter-sectoral coordination, and mainstreaming knowledge management. The objective of monitoring , evaluation and learning system is to (i) provide regular and timely feedback to the project management and other stakeholders on the quality and pace of project implementation; (ii) regularly assess outcomes and impact of the project vis-à-vis the objective (iii) facilitate inter-sectoral coordination and mainstreaming of knowledge management ; (iv) provide effective use of learning forum at various levels to review project performance; and (v) facilitate appropriate and timely decisions.

9.1.1. Monitoring and Evaluation System.

The Monitoring and Evaluation system shall have five distinct components, namely

- **Baseline study-** for assessing the pre-project conditions.
- **Performance monitoring-** Management Information System based input system to track the progress and performance on a periodic basis.
- **Institutional Performance monitoring-** Internal and External process monitoring to track the processes (to provide leads and direction on the progress towards the achievement of the various end results of the project component) and Comprehensive group, self-monitoring system for tracking institutional development at community based organizations.

- **Internal Learning-** Internal management review and learning system (monthly) review the implementation and monthly reporting by the project staff at various level particularly at district, block and village level).
- **Evaluation-** External impact evaluation involving mid-term review and impact assessment (by independent agency). Each evaluation will include physical, financial and social audit of the work done and to assess the status of watershed related intervention as per procedure of new guidelines. The department has already started the process to constitute the panel of reputed institutes/organizations having sufficient expertise and infrastructure for National panel of evaluating agency as well as for empanelment as evaluator for watershed development programme of the State. The panel of such institutes/organization will be forwarded to the Ministry after approval and concurrence of the State Level Nodal Agency.

Similarly the evaluation and impact studies will be carried out to ensure the quality and benefit from the interventions carried out in Project areas. The Evaluation would be carried through independent agencies approved by the State Level Nodal Agency and Departmental Nodal Agency at Central Level. The Physical, Financial and Social Audit of work done would be ensured under each evaluation. The concurrent and Post Project Evaluation would be conducted to assess the Status of watershed related interventions. The expenditure under this head will be restricted as per admissibility in the guidelines.

9.2 Entry Point Activities:-

Under Entry point activities the priority would be to ensure the sufficient water availability to the local community by revival of traditional water sources. Repair, restoration and up gradation of existing common property assets like bowries, tanks, well, pullies, community buildings etc. would be taken up. The village level institutions such as watershed committees, self help groups and user groups will be strengthen under this head. All such type of activities which will help community participation in watershed development programmes will be covered under this component. But it will be ensured that the expenditure under this component may remain within the prescribed ceiling i.e. 4%.

9.3 Capacity Building

The capacity building strategy and action plan of the project aims to build the competence and capability of targeted village communities including the poor, their organizations and the GP so as to collectively enable them to achieve the project objectives.

The main objectives are as under:-

- **Strengthening knowledge base.**
- **Increasing awareness**
- **Enhancing skills.**
- **Developing ability to train further.**
- **Developing share vision**
- **Developing confidence and self esteem.**

The training, Workshop, Seminars, Exposure/Exchange visits, Demonstration, Tele-conferencing, on the job support etc will be the tools for capacity building of all the stakeholders. The capacity building needs of the various stakeholders and their capacity building requirements are in table below:

Table 9.3 Stakeholders and capacity building requirements

Project Stakeholder	Critical Capacity Gaps
Target Community	• Participatory Watershed Development and Livelihoods Planning • Livelihoods Skills • Project provisions
GPs	• Project Management (Planning and implementation) • Inclusive of the needs of the poor • Project provisions • Post Project sustainability and exist protocol.
Gram Panchayat Committees	• Project Management (Planning and implementation) • Inclusive of the needs of the poor • Project provisions • Post Project sustainability and exist protocol
SHGs	• Group Dynamics • Funds Managements • Marketing Awareness
User Groups	• Planning, Implementation, Operations, Maintenance • Project provisions • Project Process
Watershed Dev. Team Members.	• Para-skill • Project provisions • Project implementing process. • Business promotion and marketing • Watershed Development Plan. • Participatory Natural Source Management.
Project Implementing Agency	• Formations of Watershed Committees. • Institutional building • Community learning • Project provisions • Project process
Watershed Development Committees	• Community Mobilization &Community learning • Implementation Process • Project rule, Financial rules and budgeting process • Exit Protocol systems • Livelihoods enhancement • Business promotion • Marketing • Convergence

9.3.1 Strategies for Capacity Building

The various strategies that could be adopted for building the capacities of the various stakeholders are as follows-

(i) Gradual scaling up- A phased approach for implementing the project in different batches so as to provide opportunities to learn by experiences would be followed. For the subsequent batches of GPs/WCS the previous GPs/WCS will serve as learning grounds for building their capacities.

(ii)Experiential learning- The capacity building approaches will focus on all opportunities of experiential learning including interactive learning and exposure

visits .Reviewing and sharing of project learning will be an important element of CB strategy.

(iii) Internalizing capacities locally- For building the capacity of GP members/WC members, SHG and UG members so as to empower the community Organizations to manage their livelihood affairs by themselves, the funds will be provided as per provisions of guidelines

9.3.2 Capacity Building Programs

In order to accommodate the capacity building needs of all the stakeholders of the project and also to meet the demanded capacity needs during the evolving later stages of the project, the following broad capacity building programs have been identified.

Table 9.3.2- Various Capacity Building Programs

SN	Programs	Participants	Key Contents	Tools
1	Sensitization programs	Community, GP,WDC and PIAs	Innovative project approaches and Key Project Principles	Workshop /campaigns
2	Induction programs	Project Management staff and WDC team members	Project principles, community manual, participatory methodologies, Livelihood planning process, SHG formation	Training on COM, Field placement/village immersion programs
3	Orientation programs	Empanelled appraisers outsource technical service providers, resource agencies, line department	Key Project Principles, project institutional model, project processes	Workshops and Field visits.
4	Thematic Training programs	Specialist in PIAs, WDC, GP office bearers SHG/User groups office bearers, professionals.	Social mobilization, livelihood planning, marketing, micro finance, institution building, entrepreneurship, procurement, accounts, monitoring	Separate modules on each thematic areas, experiential learning, thematic workshop and discussion forums.
5	Skill building programs	Service providers, community resource persons (Livelihood) Project professionals, community groups and their leader, GP, Master trainers, external resource persons, project staff and WDC member, communication team, skills for enhancing the livelihoods of poor-poor, managerial skills for community leader.	Accounting and monitoring, planning, community monitoring, learning and reporting, conflict resolution, joint appraisal mechanisms, negotiation skills, operations and maintenance	On the job training, field based training.

Based on needs,the content and scope of the programs will be finalized at the levels of the Secretary/ Director (Rural Development) office and Deputy Commissioner-cum-Chief Executive Officer DRDAs. . Sensitization on the issues of gender, environment, tribal etc. will be part of all the programs mentioned above.

9.3.3 Institutional arrangements for Capacity Building

The following arrangements for capacity building of project stakeholders will be made.

9.3.3.1 State Level

The State level Resource Agencies will be utilized to train the State level and District/Block level key staff and will hire appropriate physical facilities to undertake state level training programs and workshops. Appropriate national level institutions will be identified to run thematic training programs as and when required which will also be followed by refresher programs. Periodic exposure visits will be undertaken to learn from experience of similar projects being implemented in other States. A National Level pool of resource persons will be identified to run workshops and short-term programs for state level specialists.

9.3.3.2 Capacity building service providers at, State, District and Block Level.

The project will hire the services of capacity building agencies to plan and implement capacity building activities at State, District, Block and Gram Panchayat level. The primary task of the capacity building agencies will be to impart required knowledge altitude and skills to the PIAs, WDT members and WDC Teams. In addition, these agencies will design and implement specialized programs for GP and Watershed Committees office bearers on a demand responsive basis. The agencies will use wide range of capacity building tools and techniques including innovative approaches. It will be the responsibility of the capacity building agencies to develop the capacity building implementation plans and training materials based on Community Operation Manual, Project Implementation Plan and other Project Manuals. It will also be the entire responsibility of the capacity building agencies to review the emerging capacity building needs evaluate the effectiveness of the capacity building activities and to make appropriate changes in the training material and capacity building action plan.

The capacity building agencies will field a team of trainers at State/District level comprising of all essential expertise required for the project. Regular monitoring of the capacity building service rendered by the agencies will be reviewed at State as well as District level. The capacity building agencies will sign performance-linked contracts and the payments will be linked to the successful achievements of milestones. The TOR for the capacity building agencies is to be developed.

9.3.3.3 GP level capacity building

The PIA will be responsible for building the capacity of the target poor, the GP, Watershed committees, User Groups, SHGs etc. including providing handholding supports. The capacity building at the GP level will primarily be on the Community Operation Manual (COM). The COM will have all the details of the project relevant to the community clearly explained and therefore, COM will be the main resource material for training at village level to the community. In addition to this, the other major focus of capacity building component at GP level will be orientation of Gram Sabha and elected representatives to the project processes and building capacity of 10-12 paraprofessionals for each GP. As a part of capacity building strategy at the GP level, the project will put special efforts on exposure visits for community members.

Apart of Livelihoods component, the provision will be made for demonstration of best practices for various livelihoods at the district/regional level. These funds can be utilized to build suitable models within the reach of the poor in their neighborhood. These sites will be used for exposure visits and influencing the poor/poorest to adopt the best practices.

9.3.4 Indicative Modules for Various Capacity Building Programs.

Based on the project requirements, the various modules required for training the project stakeholders have been categorized into 11 generic modules. The indicative contents in each of the modules have been furnished in table below.

Table 9.3.4 Indicative Modules for Various Programmes

Sr. No.	Module	Content
1	Understanding Poverty, Environment, Ecology and Development	Poverty- dimensions, coping mechanisms, poverty webs and vicious cycles Participatory Identification of the poor Development- process, dimensions, approaches Delivery- roles of state, civil society and markets, functions, evolution and growths; Government Programs- their approach, present programs Vulnerability Sensitization- Gender, Tribal, Youth Environment and Ecology Watershed and Natural Resources
2	Management Sills	Visioning- Strategic planning Financial- Costing, Budgeting, Accounts, Financial Statement and auditing Markteting- Marketing basics, Market Intelligence, Consumer Behaviour, Product, Management, commodity Marketing-Forward Linkages Project Management-Project Planning, Sequencing and activity scheduling, Responsibility matrix, monitoring and evaluation Human Resource Management-Monitoring, Team Building and Management, Performance Measurement, Review Communications and Information Technology- Documentation, Written and Oral Communication, Written Analysis, Facilitation
3	Institution Building	Community Mobilization-process Structure of the primary and federations of poor and their groups-group dynamics, group development processes Design Prnciples of the People's Institutions Promotion Process of the Institutions Institution Development- Organization Development-life cycles Systems for the Institutional Requirement- Statutory, Transparency, Institution rating-credit rating, groups and federations rating Conflict resolution and Accountability Bylaws and Business Rules
4	Watershed Development and Natural Resource Management	Watershed concept, micro-watershed, ridge-to-valley approach Natural Resource Cycles User Groups Various elements of watershed development including soil and moisture conservation Operations and Maintenance Ownership and access- individual, common and public properties Enquiry considerations

		Engineering works Rural Infrastructure Fodder Conservation and Augmentation
5	Livelihoods, Micro finance and Micro Insurance	Livelihoods basics, concept, frameworks, Sectors, local economy Livelihood mapping and analysis-tools Livelihoods-value chains, sub-sector assessment Livelihood Opportunities, New Livelihood Development Process Feasibility, Viability and Cost-effectiveness considerations Enterprises for livelihoods opportunities-management Collective Enterprises for Livelihoods Gender, Tribal, Youth, Disabled, Vulnerable and Environment-Livelihoods Marketing-Backward and Forward Linkages Fund Management-Revolving Fund, Financing Livelihoods Risk Management-Insurance, People Institution based Insurance, Insurance-life asset, health etc. futures options
6	Project Management and Values	Project Scope, Objectives, Outputs, Components, Indicators, Processes, Value Non- negotiable, key principles-Sustainability, Equity and Productivity Project Budget and Implementation Arrangements
7	Livelihood Skills	Sectoral requirements Sectoral Understanding and Inputs
8	Participatory Planning, Process and Research	Participatory Identification of Poor (PIP) Participatory Research- processes, tools, methodology, sampling framework Participatory processes- decision making, planning, monitoring, evaluation, review
9	Visioning and Strategic Planning for Institutions, Units and Individuals	Strategic Management-Basics Visioning, Development of Vision and Plans Monitoring the Plans- progress-quantitative and qualitative Learning-feedback, review, view of poor
10	Individual Development	Personality development, Career Development Counseling, Monitoring Development Worker- Characteristics, Love Leadership-skills Conflicts, Time Management
11	Specific functional Knowledge and Skills	Training Needs Assessment (TNA) and Training of Trainers (TOT) Training specific to Functional Area at cluster, district and State levels

In addition to the content of the modules, the mix of the knowledge, skills and attitude needs to be fine-tuned for each of the various levels of the programmes. Institution Development and Participatory Development Specialists and the Capacity Building Agencies can further reinforce and detail the content with extensive consultation based on the ground reality.

Project wise Detailed Project Report will be prepared by the concerned DRDAs / PIAs under the technical guidance of Watershed Development Team Members (WDTs) for integrated development of watershed area with active participation of the watershed committee on the basis of perspective and strategic plan of the State and procedure exist in the common guidelines for watershed development project after PRA exercise and comprehensive beneficiary level database separately for private and community land development with linkages to the cadastral data base under overall supervision of the department. This will facilitate spatial depiction of action plan. The DPR should include the basic information on watershed including rainfall, temperature location including geographical coordinates, topography , hydrology, hydrogeology, soils, forests, demographic features, ethnographic details of communities, land-use pattern, major crops & their productivity, irrigation, livestock, socio-economic status, institutional mechanisms, micro watershed wise land classification, detailed mapping. The details of expected User Groups and Self Help Groups , activities to be taken in the project area, expected contribution of watershed development fund, information about soil and land –use, existing assets related to water harvesting, recharging and storage etc will be provided in the DPR. The problems in the project areas, and interventions proposed to enhance the livelihoods will be specified in the report. Every detail about the activities to be undertaken, financial projection and time table along with technical details and drawing will be reflected in the DPR. Detailed mapping exercise will also be incorporated in the report. The emphasis would be on the active participation of community in decision making equity and sustainability of the benefits. All the issues prescribed in the common guidelines will be kept in view on finalization of DPR for the particular project.

9.4 Work Phase

Under this component the objectives are:-

- Economic development of community through optimum and sustainable utilization of natural resources like land, water, forest etc. to save environmental degradation and employment generation through works and development of human and other economic resources by promoting savings and income generation activities.

- Restoration of ecological balance in the villages through soil and water conservation measures leading to reduction in soil erosion, water conservation, increase in vegetative cover etc. and sustained community actions to operate and maintain created assets and further development of natural resources in the watershed.

- Improvement of socio economic conditions of the village community particularly the resource poor and the disadvantaged sections of the community such as asset less, SC/ST and the women through ensuring their effective participation in the programme, more equitable distribution of the benefits of land and watershed resources development and biomass production and greater access to income generating opportunities.

9.4.1 Activities

9.4.1.1Water Management Activities:

To improve the water availability in the project area by evolving various water harvesting technologies and promoting optimal use of available water for the purpose to improve the rural livelihood & economy of the farmers of the project area and to reduce the chances of floods and soil erosion in the areas down below, the following activities are proposed:

a) Rain Water harvesting. It is common that in the State like Himachal Pradesh, the rain water flows top to down which generally run away from surface into deep drain in Nallas and waste away. As such to conserve the rainwater for domestic as well as for irrigation purpose the following rain water harvesting activities are proposed:-

i) **Construction of Ponds/Tanks:** The ponds are constructed by excavating earth and forming embankments with stone lining to harvest rainwater. An approach path with stone

pitching is provided in these ponds. Size of these ponds depends upon catchments area and space available. The ponds are main source of rain water harvesting in rural areas because the water stored in the ponds are used by the villagers not only for irrigation purposes but also for their domestic and cattle use. These ponds are also helpful in recharging of ground water table. The irrigation tanks to provide the irrigation potential in watershed areas will be constructed keeping in view the suitable sites, availability of water and provisions of funds in the guidelines. No doubt with the construction of ponds and tanks the harvesting of rain water will be ensured and with the recharging of traditional water sources the problem of drinking water in project areas will be reduced.

ii) Rooftop rainwater harvesting structures: The Government is very keen to construct maximum roof rainwater harvesting structure to meet out the drinking as well as domestic needs . These are underground stone masonry tanks in which roof run off are lowered down through pipes for kitchen gardening and domestic use etc. is having capacity of 9 to 10 cum. Such type of activities will also be given due consideration in the implementation of watershed development projects in rural areas of the State.

iii) Dams: The soil conservation and rain water harvesting are the major component for treatment of area under watershed development projects. The construction of dams will be in the priority areas to harvest the rainwater and to check the soil erosions of the area concerned. Keeping in view the geographical conditions and position of sites the following type of dams will be constructed in the watershed areas.

(a) Earthen Dams: These are constructed with rammed earth and a central core wall of some impervious material across the nallah having slope less than 5% and have sufficient pondage on the u /s side. Suitable spillway is provided to dispose of the surplus run off. Harvested water is used for providing irrigation, development of fish; cattle's drinking etc. height of dam depends upon water demand, storage, catchments areas etc. But generally average height proposed is 6.00 meters.

(b) R.C.C. Dam: These types of dams are constructed of mass concrete where foundation is rocky & cross section of nallah is small and stone aggregate is cheaply available. In these types of dams spill way is provided within the dam body.

(c) Masonry Dams: These dams are constructed of stone masonry at places where stones are cheaply available as compared to stone aggregate. The purpose and size of the masonry dam are same as that of RCC Dam.

b) Water use

9.4.1.1.2 Minor Irrigation Activities

The irrigation is the major component that play pivotal role to improve the agriculture horticulture production and attractive income generation to the watershed communities. The proposed activities under this component are:

i) Lift/Gravity irrigation scheme: In take structures are constructed at the available water sources from where it is taken to the fields either by lifting or by gravity through irrigation channels and accordingly the scheme is called lift or gravity irrigation scheme. In case the discharge at the source is not sufficient to meet the requirement, storage tanks are constructed from where the stored water is recycled to the command areas.

ii) Makowal type structure: At locations where river beds are generally sandy and an impervious layer lies at a small depth, harvesting of sub-surface flow is done by construction of a head wall across the nallah up to the impervious layer, a water collection chamber with filters and wing walls. Water from the water chamber goes to the storage tank constructed on d/s side banks from where it is delivered to the fields through pipes/irrigation channels.

iii) Irrigation channels (kuhls): Under this activity, lining of existing water channels is done with cement concrete or stone masonry in cement mortar so as to reduce the water loss due to seepage and more area is brought under irrigation. Size of channels depends upon the availability and requirement of water.

9.4.1.1.3 Snow Harvesting Activities:

From climatic to geographic to human-induced challenges, the hardship for livelihood and habitation in cold deserts of the State are one of the most acquit and part of the solutions lays harvesting snow in sensible way. Harvesting snow in this region is a way to rehabilitate the land for crop growth. It can bring live to cold desert and renewal traditional heritage as an example of sustainability that all of us can learn from globally.

Snow harvesting requires the construction of pit, generally ranging in size from about 6 to 8 meters in dia-meters and 10 meters in depth. This pit is heavily compacted and the collected snow is dumped into the pit to a depth of 2 to 3 meters. The compacted snow is covered with the earth, which acts as an insulator and a bamboo tube is placed about 50 CM about the base of the pit to serve as an outlet. As the snow melt around the bamboo pipe

water tickles along with bamboo and into a pot beneath the outlet. This technology can be effectively implemented at small community levels.

All the works/activities under Non-arable Land Treatment will be identified in micro watershed basis as a part of watershed planning and will be implemented through Watershed Development Committee(in the jurisdiction area of Watershed Committee with technical support from the Project staff) and by the Project staff.

Since the objective of the Project is to reverse the process of degradation of the natural resource base, soil and water conservation measures will receive priority. The basic principle of ridge-to valley approach in watershed management will be followed. As such, treatment of the catchments area before or along with the development of water resources will be the essential process for Project implementation. The soil and water conservation measures will be areas specific, need based and will be decided for specific catchments area. Maximum importance will be given to vegetative and engineering measures for enhancement of livelihood of local communities.

9.4.1.2.1 Afforestration

Since the rural population of the state depends mostly on forest to meet their fuel and fodder needs, due to which there has been gradual depletion of forest wealth in the Himalayan. Afforestation is thus essential for the sustainability of Himalayan ecosystem. The forest blank are potential area for carrying out afforestation under which mix spices are suggested in various patches mainly to produced multi purpose forests products to improve the economic status of the watershed community.

The catchments area treatment will receive priority over general improvement of forest area. The treatments will be site specific and will include not only tree plantation but also improve the grass production which is more attractive to the community due to quick and visible benefits. Concept of Ridge-to-Valley treatment is to be followed strictly.

The plan of work and selection of tree and vegetative species will be the choice of the community/GPs and execution will be done by the GPs/WC.The watch and ward of plantation, to ensure the effective use and maintenance would be the responsibility of GPs/WCs. The need-based training to the Project staff and local community will be provided under this component. The treatments in inter-GP areas (i.e. those areas outside the jurisdiction of GPs) will be executed by the Project Implementing Agency.

i) Rehabilitation plantation (Normal and lantana):

The objective is to improve, restore and maintain the stocking of desired species in the degraded forest areas where natural regeneration is deficient or absent. Temporarily un-stocked-forests, away from habitations and inter G.P areas will be taken up for treatment. Indigenous species or specie growing under similar habitat condition elsewhere will be preferred.

ii) Conservation plantations:

The objective is to raise productive plantation in the form of three tire combination of grasses, shrubs and trees to check, soil erosion by both falling and flowing water, promote in situ moisture conservation and improve soil fertility, productivity and biodiversity.

Ravines, erosion prone areas, large slips and catchments of reservoirs and dams, water harvesting structures will be taken up for treatment with species of soil conservation base of thick foliage. Efforts to control lantana will be made by special treatment of cutting twice a year till there is enough vegetative cover to suppress it.

iii) Community Plantation:

The productive plantation of grasses and trees with people's participation for augmentation of availability of fodder, fuel and small timber in the rural areas will be raised. Reducing the pressure on forestlands, Fringe areas between forests and habitation, common lands and wastelands will be taken up for treatment with species preferred by the local community.

iv) Development of Non Timber Forest Produce:

Keeping in view the geographical conditions and marketing potential, the medicinal grass, shrubs and tree species of economical importance to augment the rural house hold income will be introduced. Choice of species will be according to locally factors, choice of villagers and marketing possibilities.

v) Nursery raising:

Under this component a centralized nurseries are raised at-least on 2 hac of land each in order to ensure adequate and low cost supply of desired spices for plantation purpose. It is also proposed to setup decentralized nurseries particularly in distance located watershed where the cost of transporting the plants become uneconomical so that the area proposed to cover under a forestation sector can be treated more effectively

With the active participation of watershed communities, the nurseries will be established with modern techniques to ensure the quality planting material for plantation in watershed areas.

The capacity building measures will be initiated under the project to enhance the capacity of User Groups to collect and market the NTFPs, and sub-projects/activities will be implemented to encourage the plantation of medicinal and other high value crops- especially short duration species- to make the forestry plantation as an attractive income-generating component for the community.

9.4.1.2.2 Pasture Development:

With increase in cropping area under vegetable production (300% increase) alternative sources of fodder are shrinking and thus pressure on natural pastures is increasing. Natural grasslands and pastures are the major sources of fodder for wild animals/ cattle and play critical role in livelihoods of transhumants and locals alike. The production of dry grass ranges from 10-15 quintal/ha, which can be raised upto 150 q/ha with better management. Grasslands are facing major threats from invasion of weeds rendering them unproductive and women do not prefer cutting grass in such areas. The problem of grazing is further increased due to stopping of winter grazing facilities of transhumants, which were earlier available to the grazers of the state in adjoining states and the flocks of these grazers had to be accommodated in the state for winter grazing. Natural pastures are reported to be overgrazed to the extent of three times their carrying capacity. As already mentioned in Chapter VII, an area of 1515011 hectare is permanent Pasture and other grazing lands in the State which is roughly 27 % of total geographical area. Such huge portion of land ment for permanent pasture can not be overlooked for development under watershed development programme. Thus the Pasture lands will be developed by silvipasture methods including plantation of leguminous species, nutritious grasses and other economically useful species with active participation of village people to ensure the sufficient availability of fodder through out the year. By sufficient quantity of fodder the Animal Husbandry Sector will definitely be strengthened and quantity and quality of milk production, wool production, will also be increased substantially in rural areas of the state. The developed pasture land will be protected by barbed wire fencing and social fencing as suitable for the area and undesired bushes and weeds and other grasses with less nutrients particularly lantana bushes besides being harmful for the grazing animals will also be removed and area will be covered with improved quality grasses and fodder tree plantation.

9.4.2.3 Soil Conservation Activities:

i) Drainage Line Treatment:

To facilitate the establishment of vegetation or to provide protection at points cannot be adequately protected in any other way. The erosive velocities of run off are reduced

manifold by flattening out the steep uniform gradient of the gully by constructing a series of checks dams (commonly known as check dams) with locally available material from top to bottom. Activities proposed under this component are:

ii) Brush Wood check dams: In gullies having side slopes less than 45 degrees, poles of about 7.5 cm diameters are driven into the ground in a single or double row across the nalla at right angle to the flow. The brushwood is packed against the u/s face of the poles.

iii) Contour Trenching -Contour Trenches is excavated along the uniform level across the slope. Bunds are formed down hill along the trench with material taken out of them. The main idea is to create more favorable moisture conditions and, thus accelerate the growth of the plated trees. Plants are put on the trench side of the bunds along the berms. The excess runoff is conveyed through a vertical disposal drain.

9.5. Livelihood Component

In Himachal Pradesh 90% population in rural areas dependent on Agriculture, Horticulture, Animal Husbandry and other traditional activities like weaving, wood craft work, etc. Hence, the focus under watershed development will be to improve the socio-economics conditions of the community of rural areas**.** In the common Guidelines for watershed development Projects, specific provisions of outlay have been kept for livelihood component.

In certain pockets of Himachal Pradesh, it is feared that the crafts like Metalcraft, Ornaments, Wood Carvings, Wood Turnings, Kinnauri Shawl Weaving, Traditional Foot-wears, Embroidery, Paintings etc. have either gone extinct or are on the decay. Besides their employment potential these crafts depict the aesthetic genius and technical competence of the craftsmen of the Pradesh.

Livelihood is a key component of the household economy in Himachal Pradesh. It is source of additional income to farming households, especially the poorest of them. About 73% total rural household in India keep and own livestock of one kind or another to drive an average 20% of their income from this source. Women provide nearly 90% of all labour for livestock management. The entire rural economy of the State Centers on Agriculture, Horticulture, Animal Husbandry, Sheep and Wool Development, Forests, Fishery, Poultry, Bee Keeping, Floriculture, Mushroom cultivation, Sericulture, Mining etc. Livelihoods dependent upon Forest goods and services are very high in many areas. Total rain-fed conditions and lack of access to markets alone (despite their large landholdings and greater livestock

numbers) can make the people of such areas much poorer than those who have small holdings but live in the valley.

Under Watershed Development the productivity, enhancement and livelihood will be given priority alongwith conservation measures. The systematic approach would be adopted for resource development in order to promote farming and allied activities, by resource conservation and regeneration. Suitable water sources are to be created to ensure irrigation for the agriculture and horticulture crops round the year for creating community tank, assistance will be provided to the community/Group of farmers as per provision of the guidelines, besides providing assistance for maintenance and construction of ponds, wells. Apart from developing water sources to ensure round the year irrigation. The use of plastics for on farm management of water has gained significant importance in recent years. The plasticulture applications include water distribution network through plastic pipes, plastic sprinklers, micro irrigation, micro sprinkler, nursery bags, green house, net structures, walk in and low tunnels, plastic mulching etc. Drip irrigation is useful from the point of view of judicious utilization of scarce surface and ground water resources.

In the rainfed areas the animal resources are major source of income and will be integrated with Watershed Development Projects so that a comprehensive animal husbandry component would contribute significantly to ensuring a better and sustainable livelihood for the people of the watershed / rainfed areas. Watershed approach is gaining importance is planning and implementation of natural resources management programmes. Such approach will be used to check soil erosion and denudation of catchments areas of important river systems for mitigating floods, landslides and for reducing siltation. Synergies between concerned Government Agencies, PRIs and NGOs will be developed for supporting watershed approaches for natural resources management. This will be coordinated through nodal agency. The state will explore the potential of market-based infrastructures for facilitating protection and development. The Government will also liaison with other mountain state in the country to explore market or ensuring payment for watershed services to the State and village community for protecting, managing and developing watershed.

(a) Livelihood Frame Work:

- Choosing the right livelihood activities for intervention through techno-marketfeasibility.
- Choosing an appropriate form of household level groups to mobilize.

- Choosing an appropriate structure at the cluster level to federate village level organizations and identify what they should do collectively.
- Identifying a suitable market to sell the products.
- Ensuring adequate finance to operate the whole chain from farm to market.

(b) Institutional Building

- Promoting/strengthening Community Groups/institutions/ User Groups, Self-Help Groups (SGHs), particularly of the poor/ women.
- Promote and support the federations (of SHGs, CGs, User Groups).
- Capacity building of PRIs and other local village level institutions to Plan, Implement and maintain the assets created under watershed Development Programmes.
- Building the skills and capacities of the poor and their service providers.
- Sensitizing line departments and banks to extend their moral support and responsive behavior according to the needs of inhabitants of the watershed area.
- Organize Exposure visits for community leaders and representatives of the federations, GP representatives and the project staff.

(c) Livelihoods Gaps/Opportunities

Since the project's livelihoods interventions would target the poor sections, it become critical to define who will be those poor since many of the criteria for defining and understanding poverty at the village level may not be uniformly applicable. For instance, at high altitude, remote village or Panchayat land holdings may be comparatively larger than the valleys or livestock numbers may be greater, but total rain- fed conditions and lack of access to markets alone can make the people of such areas much poorer than those who hold less land but live in the valley. For the marginalized groups who are generally the poorest, traditional occupations like grazing the village livestock, fuel wood and fodder collection, tree cutting and timber conversion, NTFP collection, etc. still form major livelihood.

The Gram Panchayat with the help of SHGs, Professionals and WDC, will initiate participatory process for preparation of Watershed Development Plan for the GP/Micro Watershed. This plan will be a result of livelihoods analysis that include resource mapping/assessment, analyzing existing livelihoods and new livelihoods opportunities against items like availability of raw materials, Skills available, existing livelihoods, existing Market demand, Marketing facilities within and outside the village, transportation networks etc. Potential livelihood opportunities for CGs will also be identified during this process.

Natural resources form the livelihood basis for most people of the state. There is a high degree of dependence on these resources and as a result often conflicts are observed between resources managers and other stakeholders. With the active involvement of PRI, SHG and USGs all the conflicts will be resolved by introducing equitable distribution system.

9.5.1. Livelihood Activities

i) Agricultural / Farm Sector activities: Out of total 55.67 lakh hectare area of the state, 5.82 lakh ha (12%) is net sown area out of which 82.3% is rain-fed area. Ninety percent of the population (mainly women) is engaged in agriculture. The climate of the State is suitable for growing non –seasonal vegetables and there is sufficient scope for increase in production of off-season vegetables under watershed development projects. Similarly, the production of cereals and pulses can be increased with the interventions under of watershed management.

Production of cereals and pulses has increased from 923 thousands tones to 1446 thousand tones over last 30 years but during the same time period, total cropped area declined marginally from 874 thousand hectare to 822 thousand hectare. Area under vegetables has registered an increase of 300% during the last three decades. For traditional crops, fertilizers use is generally 40 kg/ha, whereas for both HVC and fruits, this is up to 60 kg/ha. Agricultural practices are contributing to soil erosion and people are facing marketing related challenges. These gaps will be bridged through implementation of watershed development projects.

This subcomponent will improve cropping systems through promoting adoption of new agronomic practices, crop diversification into high-value crops, reducing post-harvest losses, and increasing value-addition. It will also improve water availability in the Project area using evolving water harvesting technologies and promoting optional use of available sources. The activities such as Land Development and to introduce improved cropping system, Introduction of High-Value Crops/varieties, Improve Cropping Systems (Horticulture**),** Homestead Horticulture and High Yielding Cultivars will be introduced in the watershed areas. The Agriculture will continue to remain the main source of income for the community in the Project area, support will be provided for the traditional crops as well as the High-Value Crops (HVCs).

While preparing the DPR the main focus will be given for the land development activities particularly for the development of lands of weaker section with the active participation of the beneficiaries. The activities such as protection of soil erosion and introduction of vermin-culture will be given priority under watershed development within

the prescribed limit of outlays as per common guidelines for watershed development. The convergence of other on going schemes relating to area development and poverty alleviation will also be taken into account on formation of action plan. Major emphasis will be given on the production of HVCs especially for those areas where new irrigation resources will be developed. This will include off-season vegetables, spices, floriculture, medicinal and aromatic plants. For vegetables and spices where the local market is available or can be stored before sale, demonstrations will be laid out in an area of maximum 0.2 ha for one family. Besides the seed planting material, training/exposure visit, demonstration will be provided to build the confidence and know-how about the latest technology.

For HVCs such as medicinal and aromatic plants which have no local market and the produce has to be partially or fully processed, a strategy will be developed to identify a new potential crops which: (a) can be successfully cultivated in the Project area; (b) perfect production technologies are available; (c) quality seed and planting material can be made available in time; (d) facilities exist for processing or can be made available if essential before the produce can be marketed; and (e) assured markets are available (specific trader with commitment and an important stakeholder). Following will be the approach to facilitate introduction of such crops:

To assure minimum marketable produce, cluster approach will be followed and if required clusters will be federated on commodity basis. Emphasis will be on value addition, organic farming and IPM besides field demonstrations with necessary inputs including seed and planting material support for efficient use of water through sprinkler and drip irrigation, poly houses and processing will be provided following the basic principle of subsidy for individuals and the group. This will be complemented with the existing practice in the State by making suitable amendments;

Farmer's nurseries will be encouraged through training and providing support on cost sharing basis for greenhouse, plastic tunnels etc. The benefits of green houses for high breed vegetables, floriculture and for nursery rising will be admissible to the farmers from project funds as per provisions exist under Horticulture Technology Mission**.**

The support will be provided for the introduction of fruit crops in terms of quality seedlings for a family with the condition that all other practices will be implemented by the beneficiary as per agreed technology.

ii) Animal Husbandry and Diary Development: Rising up of livestock is an integral component of rural economy in Himachal there is a dynamic relationship between common property resources such as forest, water and grazing land, livestock and crops. Livestock depend to a certain extent on fodder and grass grown on common property resources as well

as on crops. At the same time the animals returns, fodder, grass and crop, residues to the common property resources and fields in the form of manure and provide much needed draught power. The contribution of major livestock production during the year 2006-2007 was 8.72 lacks ton of Milk, 1605 tones of wool, 77.00 Million eggs and 31110 ton of meat which will like to be of the order of 8.73 lacks tones of milk, 1615 ton of wool, 80.00 Million eggs and 3115 ton meat during 2007-2008.

Comparison between various livestock censuses in H.P is given in Table below.

Table 9.5.1.(ii) Livestock population in Himachal Pradesh

Name of livestock	**Livestock census**				
	1987	1992	1997	2003	2007 (inlakh)
Cattle (Cows&Bulls)	2,24 4,815	2,165,034	2,001,826	2,196,538	22.78
Buffaloes	794991	703549	652373	773229	7.62
Sheep	1112768	1078940	908831	906027	9.01
Goats	1120139	1118089	946529	1115587	12.41
Total	5272713	5065617	4509559	4991381	51.82

The perspective plan laid emphasis on the livestock sector and established Cows semen processing lab for breed improvement, emphasized mineral-mixture feed supplements, provided chaff cutters, and promoted stall-feeding and other facilities to the farmers in project areas as per admissibility in the guidelines and in other on going schemes.

The main activities which will be considered under Watershed Development Project to enhance livelihood are as under:

Himachal Pradesh has no recognized breed of cattle and buffaloes and the livestock population mostly comprise of non-descript type with relatively low milk production potential. The productivity of animals maintained under village conditions is comparatively low. Cattle and buffaloes rearing for milk production is the prominent animal husbandry occupation of the rural people and 90% of these rural households are engaged in keeping the livestock for supplementing their source of income and nutrition.

In predominately agrarian economy of the State, agriculture and animal husbandry is the main stay for more than 80% of the rural people. The agriculture in general is restricted due to hilly-terrain, full of climatic hazards and small and scattered land holding with limited irrigation. Besides, agriculture, the farming families are having livestock as a primary or secondary source of earning from the sale of livestock and their produce such as milk, milk products, wool mutton etc. As a result of the ongoing cattle breeding programmes, the average milk production of cross breed cow is very low per day. The department has planed to increase the population of crossbreed cows from the present level in order to enhance the milk production substantially per day. The milk production shall be achieved by supplementing the present infrastructure by providing 100% breeding facility through the artificial insemination. Milk production shall be simultaneously sustained by boosting fodder production by cultivation in the field during both the Rabi and Kharif fodder production season for which a timetable for green fodder production round the year shall be evolved. Improved fodder seeds shall be distributed to the identified farmers as per provision of the guidelines so that the farmer grow maximum green fodder as a cash crop to exploit milk production potential of a cross breed progeny. Factors like cattle breed, feeds and fodders, age variation, water supply, clean and hygienic sheds, disease free status, macro and micro nutrient level, stage of milking and frequency of milking are responsible for variation and production of milk, which needs to be taken into consideration of improvement under one or the other components for ensuring maximum level of production of milk. To promote these activities Self Help Group/Society Mode approach can be given emphasis so as to make them self –reliant and help them grow and progress on sustainable basis. However, majority of the beneficiaries will be from BPL families giving at-least 60% representation to women and SC/ST families but the non BPL families can be considered for benefits as admissible under the common guideline for watershed management.

The main objective of this venture is to develop the milk production and to generate self-employment potential. To ensure the availability of fodder during dry season and to facilitate the weaker section of the society, the provision of fodder stores and cattle sheds can be considered The milk so produced shall be marketed directly by the self-help groups or through the already existing net work of Milk Society / Milk Federation

(iii) Sheep and Goat Husbandry:

Sheep and Goat farming is a traditional occupation of economically weaker segment of the society having twin purpose i.e. wool development and meat production particularly in Tribal belts and remote areas of the State. Comparatively, lower body sizes of the two species and their adoptability to vide range of agro-climatic conditions have rendered them suitable for poor farmers. These animals are

predominantly maintained under extensive range management on community range land, cropped land after harvesting of standing crops and forest under mixed grazing conditions. The management of small ruminants does not required specialized skills; the surplus labour is gainfully employed for management and upkeeps of the animals. In the State of Himachal Pradesh, the organized breeding programmes, feeding management, husbandry practices, health coverage and marketing linkages are not adequate.

The National Institute of Nutrition has recommended that a balance human diet should comprise of 11 KG of meat per annum. The available figures show that the current availability of meat is only 2.26 KG. Therefore the rapid increase in meat production is the necessity. But the lack of technical know how, improved breed and lack of marketing awareness are the main hurdles which are also effecting the economic health of particularly those families which entirely depend upon this activity. In order to boost and make this venture successful and more economic generating factor the following activities are proposed under this component:-

- To supply the veterinary facilities and equipments.
- To improve breed through cross breeding with improved quality breed.
- To impart training and technical know how to the breeders in order to improve their skill in sharing and breeding etc.
- To establish wool research and quality control laboratories for research and extension work in wool.
- To established wool procurement and grading centers.
- To initiate welfare measures for sheep breeders.
- To facilitating marketing of wool within a State and outside the State.
- To promote production shearing, procurement and processing of the wool.

(iv) Rabbit Rearing:

In Himachal Pradesh because of ideal agro-climatic conditions, Rabbit Farming has proliferated in hilly areas, which has opened opportunities of self employment to the educated youths in particular and to others in general. Although Rebbitary is of recent orgin as an industry yet has gradually acquired the status of full-fledged, self sufficient industry equipment with many fold sophistication including breading, production feed manufacturing, pharmaceutical and equipments. The majority of people In the State have under taken the Rabbit Rearing for wool production rather to have Rabbit meat.

With import of German Angora strain by HP Government in 1986 the advanced scientific proven techniques also flowed in Rabbit Rearing. It is obvious to mention that Rabbit Farming is gaining popularity in cooler and temperate part of the State. The profitability of Angora farming generally depends upon quality and quantity of wool produce. To ensure optimum production of quality wool planning and implementation of breeding, general management, veterinary health cover extension and marketing are of utmost importance. The Angora Wool marketing reveals that the prices of Angora wool fluctuate a lot, as such proper planning and policies required to be formulated that wool production in country encouraged and import duties should be imposed on import of Angora wool and its products.

In feasible areas of the State the Rabbit Rearing would be boosted by educating the people to adopt this activity for additional income generation resources. The provision of funds for purchase of improved breeds of Angora Rabbit, sheds/ cages etc. beside other inputs will be kept in the DPR as per provision of guidelines. But the quantum of subsidy will be fixed as admissible under other similar ongoing schemes in the State. These activities will also be linked to the loan facilities from the commercial / cooperative banks if needed. The best marketing facilities will also be ensured to provide maximum benefits to the beneficiaries under this activity.

(v) Poultry Farming: In the State of Himachal Pradesh, Poultry Farming has shown vast potential of self employment opportunity and augmenting the nutritional status of the rural population by enhancing the availability of proteins in the diet at a reasonable cost in view of decreasing trend of per capita availability of pulses.

The Poultry Farming in Himachal Pradesh play an important role in improving the socio economic status of rural population particularly the landless because Poultry Farming requires minimum capital and ensures quick returns. The sale of eggs on day to day basis helps in increasing crop production through purchase of essential inputs such as seeds and insecticides etc., while the broiler faming provide handsome return for major investments at the farmers level. Therefore, need to start a chicken scheme in rural area under Watershed Development Programme especially of dual purpose variety, efficient for both egg as well as meat production in the State of Himachal Pradesh has been felt to make the rural inhabitants especially poor families self dependent. The people of Himachal Pradesh prefer quality units of small size i.e 50 to 100 birds each rather then big units. The State Department of Animal Husbandry has also developed poultry faming in the State through their net work. The topography and the climatic conditions of the State are such that small size Poultry Farms are more successful. As such need to start small faming under subsidy especially for the beneficiary belonging to scheduled caste families and landless in the entire State is felt so that the poorest families are provided an incentive for starting poultry farming as an

occupation. Under the proposed scheme one time assistance on sharing basis as per provision of guidelines in the form of Poultry Farm sheds, chicks, equipments, medicines, Training and marketing facilities will be provided.

(vi) Fishery Development: The scope of Pond fish Culture existed in the State but due to hilly terrain valley and complex topography the better results under this component are yet to be achieved. In cold areas the State has good scope for Trout culture and other cold water fishes. As such a scheme of fresh water fish culture in the State can be boosted successfully in private sector. The Trout, which is international known fish is being cultured in the Government Farm. To take up this activity in project mode, some infrastructure will be required to setup, awareness activities amongst the people to be taken up on campaign and sustained basis, beside, raw material, seed and feed and marketing network need to be strengthen. The objective of the component is to generate more employment opportunity in fishery sector, to make fish farming a common man livelihood activity and to utilize the wasteland trout farms.

One unit of trout farming require construction of at-least two cemented raceway with a provision of RCC wall (15mx2mx1.5m) which involve approximately Rs. 1.20 lacs, with each raceway costing Rs.0.60 lac.

Basic principle of Trout Culture is "Running water fish culture", which lies in intensive stocking and fish rearing in barricaded longitudinal stretch well guarded by inlet and outlet properly flow of water required to each unit varies form 200-400 L/sec. Besides this facilitation of transportation for inputs and products, since fishery is a perish able commodity it needs to be transported in cool chain to the market. For this purpose special funds provision required.

(vii) Horticulture: The Horticulture section, which includes fruits has ample potential for development as compare to other crop in the Northern Eastern States, Himachal Pradesh, Jammu & Kashmir, Uttranchal in view of diverse agro-climate conditions, varies soil types and abundance of rain fall which has remained unexploited

The development of NE region examined by various commissions and committees recommended Integrated Development of Horticulture based on the recommendations a centrally sponsored scheme on technology mission for integrated development of horticulture.

The Horticulture Technology Mission is working in the State with the goals to establish convergence and synergy among numerous on going governmental programmes in the field of horticulture development to achieve horizontal and vertical integration of these

programmes to ensure adequate, appropriate, timely and concurrent attention to all the links in the production, post-harvest management and consumption chain, maximize economic, ecological and social benefits from the existing investments and infrastructure created for horticulture development, promote ecologically sustainable intensification, economically desirable diversification and skilled employment to generate value addition, promote the development and dissemination of eco-technologies based on the blending of the traditional wisdom and technology with frontier knowledge such as bio-technology, information technology and space technology, and to provide the missing links in ongoing horticulture development projects. The components/activities of Horticulture Technology Mission will be adopted in the implementation of Watershed Development Programme. The small nurseries will be developed and provision will be made for the availability of plant material, equipments and Farm Tools besides facilitating the families in watershed areas with sufficient availability of water, birds' protection nets, post harvest management technology in the cluster approach. Green House approach will also be given due weigtage under this component. Since the State is having hilly terrain and in case of the areas where road connectivity is lacking the ropeways connectivity for trans-shipment of the agriculture horticulture produce will be introduced. This will not facilitate the farmers for transshipment of their produce but also the transportation charges will be less in comparison to transportation of their produce through roads.

(viii) Bee Keeping: Small farmers of the State have adopted Bee keeping with the objective to produce disease resistant types as well as best quality honey and to promote the role of honey bee as agents of pollination for increasing crop productivity. About 85% crop plants are cross-pollinated, as they need to receive pollen from other plants of the same species with the help of external agents. One of the most important such external agent are the honeybees. A few colonies of honeybees when placed in the field, when crop is in flowering stage, press into service several thousand foragers for pollination. The abundance of pollinators, help in early setting of seed, resulting in early and more uniform crop yield. Scientific studies have established that increase in yields of various crops due to the pollination by honey bees range from 20% to 100%. On the basis of published information, 12 crops of economic importance such as almond, apple, coconut, grape, guava, mango, papaya, mustard, sunflower, cotton etc. are specifically dependent upon or benefit from honeybees pollination. Honeybees also produce honey, bee wax and royal jelly thus giving additional benefit to farmers. Moreover, honeybees do not limit their pollination services to a single species rather a large number of agricultural crops are pollinated by them. To encourage the groups of BPL / small farmers at district level bee keeping equipments with

latest technology to assist the procurement, storage and marketing of honey will be patronized under watershed development projects.

(ix) Mushroom Cultivation: The cultivation of mushroom was initially started in district Solan during 1961, because of rich contents of protein its cultivation has gained momentum, and there is large scope for cultivation of mushroom in middle hill of the State and small grower have taken the mushroom cultivation on commercial scale. The Mushroom Development Project under the aegis of United National Development Programme was established at Chambaghat District Solan in 1977. Under the programme, the inputs such as compost, casing, soil & spawn etc. are supplied to the mushroom growers. Now this project has converted into National Center for Mushroom Research and Training by the Government of India. Besides, making research and imparting training this center is providing various incentives to the small-scale farmers and un-employed youths for the cultivation of mushroom. Resultantly Solan district of the State has been able to come up on the Production Map of mushroom cultivation in the country. In order to enhance the productivity of mushroom in the State, this activity will be adopted in the suitable areas by making the provision of funds for construction/renovation of mushroom sheds. Making provision of subsidy as per admissibility in the common guidelines will cover the other components of mushroom cultivation such as compost and spawn.

(x) Cultivation of Medicinal /Aromatic Plants. A number of species, mostly important herbs of mid hills and particularly high hills required special attention for conserving them. These species are threatened primarily due to habitant degradation, weed invasions and over exploitation (rampant extraction), as these are sources of livelihoods for poor. Plantations of sea buckthorn will be given high priority in cold desert areas and plantation technology for sea buckthorn will be standardized through collaborative research for wider adoption and acceptance. Better and modern nursery management practices will be adopted at block level to ensure the availability of quality planting stock.

The climate and geographical conditions of the State are suitable for growing medicinal and aromatic plants. The trade in medicinal plants from the state involves about 165 species, growing wild or cultivated in the state. An important aspect of this trade is that 24 species out of the top 100 medicinal plant species traded in the country are found in the State. An assessment in the buffer zone of Great Himalayan National Park about the contribution of medicinal plants to the economy of forest side people reveals that harvesting and trade of medicinal plants gets every household and average annual income of Rs.14000. The trade in medicinal plants is largely unregulated, secretive and exploitative and takes place in the form of raw material. People therefore, do not get benefits of possible value

addition to this raw material. Keeping in view the market requirements, cultivation of selected medicinal plants such as Kuth (Saussurea lappa) was introduced in Lahaul region in early forties making the State the largest grower of this important drug. Similarly, Poshkar (Inula racemosa) and Caraway (Carum carvi) have been successfully cultivated in the tribal region and have proved very productive for the tribal population of the State. Similar initiatives in temperate Zone with selected high value specie will be every fruitful to the farmers in augmenting their cash returns.

Among the forest products, Himachal Pradesh meet almost 70% of the total requirements of Dioscorea deltoids rhizomes of the Indian drug and pharmaceutical industry or almost fifteen years and is the largest supplier of many important crude drugs such as 'Kutaki' (Picrohiza kurrooa), 'Choorah' (Anglica glauca), 'Som'(Ephedra gerardiana), 'Kirmala' (Artemisia maritime), 'Mushkbala' (Valeriana jatamansi), Banaisha, (Viola serpens), 'Pashanbheda' (Bergenia ligulata), 'Bahera' (Terminalia belerica), 'Birmi' (Taxus buccata), Amrit Harritaki, a longer sized forest variety of Terminalia chebula much prized for its therapeutic value and commanding a very high market price, comes exclusively from Himachal.

Most of these plants are collected from the natural forests and sold to the 'local' traders and middlemen on charging a very nominal export and collection fee for exporting these herbs outside Himachal Pradesh. Regular exploitation of these important plants and increasing degradation of the forest areas has almost wiped out these important plants from their natural habitat. Production and collection as recorded by the State Forest Department is practically too less than the actual and which has also noticed a drastic decrease. Local people who were dependent on these resources for augmentation of their cash earnings are facing a lot of difficulty in meeting their day-to-day requirements. Since the agriculture is the main occupation of the rural people and collection of minor forest produce such as medicinal herbs was the easiest way of generating income for the families, which needs to be protected.

Cultivation of selected medicinal plants of known commercial value is the need of hour and can arrest the on going exploitation from natural forests. Development of cultivation practices will be useful on one hand to the local people as additional source of income and on the other hand technology will help in the conservation of these important biodiversity.

There are a number of Protected Areas in Himachal Pradesh; Access denial to resources affects livelihoods of communities in and around protected area. Besides the PA, there are some good quality patches of natural habitats falling in the State and these areas

may require special attention. Under Watershed Development Programme the cultivation of medicinal/aromatic, plants will be propagated for generation of additional income of the people of watershed areas.

(xi) Sericulture: Mulberry based sericulture is a land-based activity with good potential for generating productive employment. It has several advantages such as labour intensive nature, low capital investment, short gestation period, and good market. It has also special significance in employment of women and aged who have limitation like low resource base of less physical stamina or due to social custom against working outside the home. In the lower hills of the state majority of families are engaged in sericulture activities who are producing good quantity of cocoons and also earning good return. There is an existing network of technical service stations and mulberry plantation, which provide a technical input to the farmers and which need to be further strengthened.

However, sericulture is still being practiced in the most traditional way and in unhygienic conditions, which has restricted growth of sericulture both in quality and quantity. The need of hour is, therefore, to organize the poor families in SHG's and motivate them to adopt latest technology developed by the technical agencies, viz by adopting low cost humidity free rearing structure along with local technology inputs. Under Watershed Development Project the technical assistance and other inputs would be provided to rural poor for adopting sericulture as alternative economic activities.

The benefits to the poorest section of the society by way of organizing them into S.H.G's, will be provided from project funds and necessary technical infrastructure will be created as per requirement of DPR. The capacity building infrastructure, technology, and credit & marketing support will also be provided.

Under Watershed Project additional area shall be identified and following opportunities will be created:-

- Macro propagation of Mulberry Plantation by involving Gram Panchayats, Yuvak Mandals, Mahila Mandals etc.
- To double the numbers of existing sericulture families by introducing multiple rearing pattern.
- Forward linkage by way of introducing silk reeling and weaving.

(xii) Mining : Unscientific mining of sand, aggregates, sand stones, limestone etc., is on the rise. Based on conservative estimate, approximately 35 lakh tones of sand, gravel and boulders are extracted annually from river/streams. Apart from generating Rs.28 Million of

direct revenue it has generated direct/indirect employment to about 20000 persons in far-flung areas of the state. Although the activity of mining cannot be adopted frequently due to environmental hazards but where the resource of livelihood depends on mining, this activity can be consider under watershed development project subject to permission of competent authority. People earning their livelihood from mining are required to provide scientific training and mining techniques to ensure minimum damage to environment.

(xiii) Handicrafts and Handlooms: Handicrafts are an important cottage Industry of Himachal Pradesh and have the second largest employment potential in the rural sector being next to Agriculture. Importance of Handicrafts Industry in the economic lies in the artistic designs, low capital investment and family based skills, which passes on from generation to generation with no formal training. The revival of Indo China Trade from routs through H.P. will give further boost to the Industries in the Pradesh. The State Government has setup the H.P. State Handicraft and Handloom Corporation limited in the year 1994 with the primary objective of up-liftment of weavers/artisans of the Pradesh. The handicrafts, handlooms, and other rural artisan's activities will be given priority under watershed development programme for additional income generation by the watershed communities.

(xiv) Eco-tourism: A wide variation in the geographical and climatic conditions prevailing in Himachal Pradesh has resulted in vast potential in tourism. In fact, the policy makers have always considered tourism as an industry while formulating strategy for actualization of this potential. If guided by the right policy, this particular industry has a potential for long term sustenance as well. Clean and beautiful environment, sacred shrines, historic monuments and hospitality of the native people of the State complete the indicative list of prerequisites for sustaining tourism related activities in the long run. The potential for earning livelihood not only by the urban population but also by rural population of the State in this sector is immense. Tourism helps providing employment mainly in three ways:

i) Direct employment by rendering of hotel and catering services, as porters, transport and working as tourist guides.

ii) Employment through production of goods and services required by the tourists during their stay at the destination.

iii) Employment through the activities undertaken for development of infrastructure required for promoting tourism.

The number of tourists visiting in Himachal Pradesh has been increasing over the years. The number of tourists who visited the State in the year 2002 was 51.04 lakh and this number rose to 75.72 lakh in 2006 (upto November, 2006).[1] All the three regions of the State have vast tourism potential, a large part of which is still unexploited. The Northern High Hills are known for their clean environment and raw beauty in terms of high snow clad mountain peaks, meadows, thick forests, wide range of flora and fauna and places of historic and religious importance. This region has slight advantage in terms of natural beauty as compared to that available in the Low Hills and the Valleys and the Plains.

Promoting tourism in the lesser known areas through a suitably designed policy will surely help in providing livelihood opportunities to the people living in these areas on sustainable basis. The tourism industry in Himachal Pradesh has already ventured into the fields of recreational travel, adventure and sports tourism and cultural tourism. Under Watershed Management, the places of high attraction of tourists will be developed by adopting the activities linked with eco- tourism in identified areas. The big Check Dams/ Ponds having the scope of boating / water games etc., the assistance from watershed management programmes will be provided to the youths for purchase of boat, Dhabas and other small business activities etc. Another segment which has a vast potential for promoting tourism is health tourism in terms of herbal and medicinal plants cultivation. There is also a need to convert Himachal Pradesh from being a holiday destination to tourist destination. Under Watershed Management Programme the cultivation of medicinal/aromatic, plants will be propagated to attract more tourist and to generate additional income of the people of rural areas.

The quantum of funds for these activities would be made according to the admissibility in the guidelines.

(xv) Micro Enterprises and Skill Up gradation.

In Himchal Pradesh approximately 24% rural households are living below the poverty line. Apart from BPL families, some other households are having very small land holdings or come under the category of landless. These

households are mostly dependent for their survival on the agricultural, Animal husbandry and other labour intensive activities. But due to limited opportunities and lack or technical know how the youth of rural area are visiting other places especially in urban areas for employment. Due to meager opportunities of jobs for non technical persons in industries, these youths are either engaging themselves in uneconomical jobs or remained ideal for long period involving wasteful expenditure and wasting valuable time. If the employment opportunities to the youths in micro enterprises are ensured at their door steps or nearby areas, the valuable time and expenditure can be saved and financial status of these families will be improved. Thus the opportunities exist under Watershed Management for skill up gradation of rural youths through reputed/recognized institutions/organizations in the field of micro enterprises. In the present scenario the electronic related items are available with almost every rural household and in case of any defects in these items the solution is to get repaired these items in the market or by engaging the mechanics which is time consuming as well as the costlier affair. If the youths of the area or nearby area are trained in these activities, the wage employment to the needy person and saving in the expenditure can be ensured at village level. Similarly the Refrigerator repair, Motor repair, Welding etc. can also be considered as trade for skill up gradation of rural youth in project area. Other professions like Masson, Carpenter are also important mean of income generation in rural areas. But due to change in living standard of the perople, the modern items are being used for construction/decoration of buildings for which the latest technical skills is required to be upgraded of the persons involved in massonary and carpenter works to earn sufficient income from these professions. . The small business such as Dhabas, Tea Stalls near to common village location /bus stoppage can also be propagated to boost the income of rural poor people by providing assistance and skill up gradation training under these trades. The Animal Husbandry is most important mean for livelihood enhancement in rural area. But due to lack of proper marketing arrangements, the inhabitants use to sell their produce in through away prices to the middleman. In case the local youths are trained in the preparation of especially bio product of milk such as Cheese Khoa etc, the wage employment opportunities will be increased and producer will also get more income from their products. The other trade relating to food products like Sepu Bari, Pickles, souses ,Jams, juices and food-

cum medicinal items like Ambla Candi, Trifla, Murba, etc. can also change the economic status of rural people in case these items are prepared properly in hygenice conditions by maintaining standard. The training on these trades will be fruitful in relation to self employment opportunities and to increase the economic status of rural people. To make the rural youth self dependent the Watershed Development Programme can be the most useful tools especially to build their skills/knowledge. It is therefore proposed that the self help groups of village community in the watershed area will be constituted; and proper training for up gradation of their skills will be provided as per provisions in the Watershed Development guidelines to make them self employed by adopting income generating activities.

To upgrade the skill and to start the income generating activities, the provisions of subsidy will be kept to all the rural households comes under the category of landless, agriculture labourer, non agriculture labourer, marginal farmers and rural artisans through self help groups irrespective of their selection in BPL list. But the quantum of benefit would not be more than the prescribed limit under SGSY , in other projects and provision of the guidelines.. However, the first priority for these benefits will be the BPL families.

CHAPTER-10

FINANCIAL PROJECTIONS

To achieve the objectives of Watershed Development Projects and to enhance the livelihood opportunities total 3112472 Hectare areas has been proposed for treatment in different districts of the State. The proposed area will be treated in a phased manner within a period of 10-15 years and involvement of Panchayati Raj Institutions and local communities will be ensured at each level to achieve the objectives of the Watershed Development Projects. The financial provisions as made in the guidelines are not sufficient for treatment of whole proposed areas but the concept of convergence is important for adding additional financial resources to taken up the suitable infrastructure and livelihood related activities. The additional provisions of funds are required for implementation of watershed projects in the hilly areas like Himachal Pradesh. However with the possibilities of increase in per hectare norms for hilly areas, the per hectare cost norms have been proposed at the rate of Rs. 15000/- per Hectare instead of 12000/-.

In common guidelines para 9.3,the following budget component has been prescribed.

Table 10.1 Budget Component

S.N.	Components	Provisions(%age)
1	Administrative Cost.	10%
2.	Monitoring	1%
3.	Evaluation	1%
	Prepatory phase	
1.	Entry point activities	4%
2.	Institutional and Capacity building	5%
3.	Detailed Project Report	1%
	Watershed work phase	
1	Watershed development works	50%
2.	Livelihood activities	10%
3	Production system and micro enterprises	13%
	Consolidation phase	
1	Consolidation phase	5%
	Grand total (a+b+c+d)	**100%**

The total projected amount for treatment of 3112472 Hectare area is Rs 4668.71 .Crore and component wise breakup is as under:

10.1. (a) COMPONENT WISE PROPSED FINANCIAL OUTLAYS FOR TREATMENT OF 3112472 HECTARE LAND IN HIMACHAL PRADESH (@ Rs.15,000/ per hactare)

(Rupees in Crores)

S.N.	Components	Provisions(%age)	Amount
1	Administrative Cost.	10%	466.87
2.	Monitoring	1%	46.69
3.	Evaluation	1%	46.69
	Sub-Total (a)	**12%**	**560.25**
Prepatory phase			
1.	Entry point activities	4%	186.75
2.	Institutional and Capacity building	5%	233.44
3.	Detailed Project Report	1%	46.69
	Sub-Total (b)	**10%**	**466.87**
Watershed work phase			
1	Watershed development works	50%	2334.35
2.	Livelihood activities	10%	466.87
3	Production system and micro enterprises	13%	606.93
	Sub-Total (c)	**73%**	**3408.15**
Consolidation phase			
1	Consolidation phase	5%	233.44
	Sub-Total (d)	**5%**	**233.44**
	Grand total (a+b+c+d)	**100%**	**4668.71**

(Total Project Cost is Rs. 4668.71 Crore or Say Rs. 4669Crores)

10.1 (b) DISTRICT WISE FINANCIAL OUTLAYS FOR HIMACHAL PRADESH

i) TOTAL AREA PROPOSED FOR TREATMENT **3112472** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) –RS.**4668.71** CRORES

(RS.IN CRORES)

S.NO	DISTRICT	TOTAL AREA PROPOSED TO BE TREATED	AMOUNT
1	**2**		
1.	Bilalspur	53524	80.29
2.	Chamba	434340	651.51
3.	Hamirpur	33592	50.38
4.	Kangra	284157	426.23
5.	Kinnaur	305830	458.75
6.	Kullu	378250	567.38
7.	Lahaul & Spiti	761322	1141.98
8.	Mandi	266938	400.41
9.	Shimla	293637	440.46
10.	Sirmour	157195	235.79
11.	Solan	83199	124.80
12	Una	60488	90.73
		3112472	**4668.71**

10.1.2 DISTRICT-WISE COMPONENT WISE PROPOSED FINANCIAL OUTLAYS

10.1.2.1.. DISTRICT BILASPUR

i) TOTAL AREA PROPOSED FOR TREATMENT **53524** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) –RS.**80.29** CRORES

(RS.IN CRORES)

S.NO	PARTICULARS (BUDGET COMPONENT)	NORM	TOTAL
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	8.029
ii)	Monitoring	1%	0.803
iii)	Evaluation	1%	0.803
B.	**PREPARATORY PHASE**		0
i)	Entry Point Activities	4%	3.212
ii)	Institution and capacity building	5%	4.014
iii)	Detailed Project Report (DPR)	1%	0.803
C.	**WATER SHED WORKS PHASE**		0
i)	Water Shed Development works	50%	40.145
ii)	Livelihood activities the for asset less persons	10%	8.029
iii)	Production system and Micro Enterprise	13%	10.438
D)	**CONSOLIDATION PHASE**	5%	4.014
	TOTAL	**100%**	**80.29**

10.1.2.2 DISTRICT CHAMBA

i) TOTAL AREA PROPOSED FOR TREATMENT **434340** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) –RS.**651.51** CRORES

(RS.IN CRORES)

S.NO	PARTICULARS (BUDGET COMPONENT)	NORM	TOTAL
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	65.151
ii)	Monitoring	1%	6.515
iii)	Evaluation	1%	6.515
B.	**PREPARATORY PHASE**		
i)	Entry Point Activities	4%	26.06
ii)	Institution and capacity building	5%	32.576
iii)	Detailed Project Report (DPR)	1%	6.515
C.	**WATER SHED WORKS PHASE**		
i)	Water Shed Development works	50%	325.76
ii)	Livelihood activities the for asset less persons	10%	65.151
iii)	Production system and Micro Enterprise	13%	84.696
D)	**CONSOLIDATION PHASE**	5%	**32.571**
	TOTAL	**100%**	**651.51**

10.1.2.3 DISTRICT HAMIRPUR

i) TOTAL AREA PROPOSED FOR TREATMENT **33592** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) –**RS.50.38** CRORES

(RS.IN CRORES)

S.NO	PARTICULARS	NORM	TOTAL
A.	**ADMINISTRATION (BUDGET OMPONENT)**		
i)	Administrative cost	10%	5.038
ii)	Monitoring	1%	0.504
iii)	Evaluation	1%	0.504
B.	**PREPARATORY PHASE**		
i)	Entry Point Activities	4%	2.015
ii)	Institution and capacity building	5%	2.519
iii)	Detailed Project Report (DPR)	1%	0.504
C.	**WATER SHED WORKS PHASE**		
i)	Water Shed Development works	50%	25.19
ii)	Livelihood activities the for asset less persons	10%	5.038
iii)	Production system and Micro Enterprise	13%	6.549
D)	**CONSOLIDATION PHASE**	5%	2.519
	TOTAL	**100%**	**50.38**

10.1.2.4. DISTRICT KANGRA

i) TOTAL AREA PROPOSED FOR TREATMENT **284157** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) –RS.**426.23** CRORES

(RS.IN CRORES)

S.NO	PARTICULARS (BUDGET COMPONENT)	NORM	TOTAL
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	42.623
ii)	Monitoring	1%	4.262
iii)	Evaluation	1%	4.262
B.	**PREPARATORY PHASE**		
i)	Entry Point Activities	4%	17.049
ii)	Institution and capacity building	5%	21.312
iii)	Detailed Project Report (DPR)	1%	4.262
C.	**WATER SHED WORKS PHASE**		
i)	Water Shed Development works	50%	213.115
ii)	Livelihood activities the for asset less persons	10%	42.623
iii)	Production system and Micro Enterprise	13%	55.410
D)	**CONSOLIDATION PHASE**	5%	21.312
	TOTAL	**100%**	**426.23**

10.1.2.5 DISTRICT KINNAUR

i) TOTAL AREA PROPOSED FOR TREATMENT **305830** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) –**RS.458.75** CRORES

(RS.IN CRORES)

S.NO	**PARTICULARS (BUDGET COMPONENT)**	**NORM**	**TOTAL**
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	45.875
ii)	Monitoring	1%	4.587
iii)	Evaluation	1%	4.587
B.	**PREPARATORY PHASE**		
i)	Entry Point Activities	4%	18.35
ii)	Institution and capacity building	5%	22.938
iii)	Detailed Project Report (DPR)	1%	4.587
C.	**WATER SHED WORKS PHASE**		
i)	Water Shed Development works	50%	229.375
ii)	Livelihood activities the for asset less persons	10%	45.875
iii)	Production system and Micro Enterprise	13%	59.638
D)	**CONSOLIDATION PHASE**	5%	22.938
	TOTAL	**100%**	**458.75**

10.1.2..6 DISTRICT KULLU

i) TOTAL AREA PROPOSED FOR TREATMENT **378250** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) –RS**.567.38** CRORES

(RS.IN CRORES)

S.NO	PARTICULARS	NORM	TOTAL
A.	**ADMINISTRATION (BUDGET COMPONENT)**		
i)	Administrative cost	10%	56.738
ii)	Monitoring	1%	5.674
iii)	Evaluation	1%	5.674
B.	**PREPARATORY PHASE**		
i)	Entry Point Activities	4%	22.695
ii)	Institution and capacity building	5%	28.369
iii)	Detailed Project Report (DPR)	1%	5.674
C.	**WATER SHED WORKS PHASE**		
i)	Water Shed Development works	50%	283.69
ii)	Livelihood activities the for asset less persons	10%	56.738
iii)	Production system and Micro Enterprise	13%	73.759
D)	**CONSOLIDATION PHASE**	5%	28.369
	TOTAL	**100%**	**567.38**

10.1.2.7 DISTRICT LAHAUL & SPITI

i) TOTAL AREA PROPOSED FOR TREATMENT **761322** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) –RS.**1141.98** CRORES

(RS.IN CRORES)

S.NO	PARTICULARS (BUDGET COMPONENT)	NORM	TOTAL
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	114.198
ii)	Monitoring	1%	11.420
iii)	Evaluation	1%	11.420
B.	**PREPARATORY PHASE**		
i)	Entry Point Activities	4%	45.679
ii)	Institution and capacity building	5%	57.099
iii)	Detailed Project Report (DPR)	1%	11.420
C.	**WATER SHED WORKS PHASE**		
i)	Water Shed Development works	50%	570.99
ii)	Livelihood activities the for asset less persons	10%	114.198
iii)	Production system and Micro Enterprise	13%	148.457
D)	**CONSOLIDATION PHASE**	5%	57.099
	TOTAL	**100%**	**1141.98**

10.1.2.8 DISTRICT MANDI

i) TOTAL AREA PROPOSED FOR TREATMENT **266938** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) RS.**400.41** CRORES

RS.IN CRORES)

S.NO	PARTICULARS (BUDGET COMPONENT)	NORM	TOTAL
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	40.041
ii)	Monitoring	1%	4.004
iii)	Evaluation	1%	4.004
B.	**PREPARATORY PHASE**		0
i)	Entry Point Activities	4%	16.016
ii)	Institution and capacity building	5%	20.021
iii)	Detailed Project Report (DPR)	1%	4.004
C.	**WATER SHED WORKS PHASE**		0
i)	Water Shed Development works	50%	200.205
ii)	Livelihood activities the for asset less persons	10%	40.041
iii)	Production system and Micro Enterprise	13%	52.053
D)	**CONSOLIDATION PHASE**	5%	20.021
	TOTAL	**100%**	**400.41**

10.1.2.9 DISTRICT SHIMLA

i) TOTAL AREA PROPOSED FOR TREATMENT **293637** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) Rs.**440.46** CRORES

(RS.IN CRORES)

S.NO	PARTICULARS (BUDGET COMPONENT)	NORM	TOTAL
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	44.046
ii)	Monitoring	1%	4.405
iii)	Evaluation	1%	4.405
B.	**PREPARATORY PHASE**		
i)	Entry Point Activities	4%	17.617
ii)	Institution and capacity building	5%	22.023
iii)	Detailed Project Report (DPR)	1%	4.405
C.	**WATER SHED WORKS PHASE**		
i)	Water Shed Development works	50%	220.230
ii)	Livelihood activities the for asset less persons	10%	44.046
iii)	Production system and Micro Enterprise	13%	57.260
D)	**CONSOLIDATION PHASE**	5%	22.023
	TOTAL	**100%**	**440.460**

10.1.2.10 DISTRICT SIRMOUR

i) TOTAL AREA PROPOSED FOR TREATMENT **157195** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) –RS**. 235.79** CRORES

(RS.IN CRORES)

S.NO	**PARTICULARS (BUDGET COMPONENT)**	**NORM**	**TOTAL**
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	23.579
ii)	Monitoring	1%	2.358
iii)	Evaluation	1%	2.358
B.	**PREPARATORY PHASE**		
i)	Entry Point Activities	4%	9.432
ii)	Institution and capacity building	5%	11.789
iii)	Detailed Project Report (DPR)	1%	2.358
C.	**WATER SHED WORKS PHASE**		
i)	Water Shed Development works	50%	117.895
ii)	Livelihood activities the for asset less persons	10%	23.579
iii)	Production system and Micro Enterprise	13%	30.653
D)	**CONSOLIDATION PHASE**	5%	11.789
	TOTAL	**100%**	**235.790**

10.1.2..11 DISTRICT SOLAN

i) T OTAL AREA PROPOSED FOR TREATMENT **83199** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) RS.**124.80** CRORES

(RS.IN CRORES)

S.NO	PARTICULARS (BUDGET COMPONENT)	NORM	TOTAL
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	12.480
ii)	Monitoring	1%	1.248
iii)	Evaluation	1%	1.248
B.	**PREPARATORY PHASE**		
i)	Entry Point Activities	4%	4.992
ii)	Institution and capacity building	5%	6.240
iii)	Detailed Project Report (DPR)	1%	1.248
C.	**WATER SHED WORKS PHASE**		
i)	Water Shed Development works	50%	62.400
ii)	Livelihood activities the for asset less persons	10%	12.480
iii)	Production system and Micro Enterprise	13%	16.224
D)	**CONSOLIDATION PHASE**	5%	6.240
	TOTAL	**100%**	**124.800**

10.1.2.12 DISTRICT UNA

i) TOTAL AREA PROPOSED FOR TREATMENT **60488** HECTARES

ii) TOTAL BUDGET (@ RS.15,000/- PER HECTARE) RS. **90.73** CRORES

(RS.IN CRORES)

S.NO	PARTICULARS (BUDGET COMPONENT)	NORM	TOTAL
A.	**ADMINISTRATION**		
i)	Administrative cost	10%	9.073
ii)	Monitoring	1%	0.907
iii)	Evaluation	1%	0.907
B.	**PREPARATORY PHASE**		0
i)	Entry Point Activities	4%	3.629
ii)	Institution and capacity building	5%	4.537
iii)	Detailed Project Report (DPR)	1%	0.907
C.	**WATER SHED WORKS PHASE**		0
i)	Water Shed Development works	50%	45.365
ii)	Livelihood activities the for asset less persons	10%	9.073
iii)	Production system and Micro Enterprise	13%	11.795
D)	**CONSOLIDATION PHASE**	5%	4.537
	TOTAL	**100%**	**90.730**