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FINAL REPORT

CATCHMENT AREA TREATMENT PLAN OF LUHRI H.E. PROJECT AREA, Himachal Pradesh

Prepared for :

SJVN (A Joint Venture of Government of India and Government of Himachal Pradesh), Shimla, Himachal Pradesh

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PREFACE

The report on the Catchment Area Treatment (CAT) plan of the proposed Luhri H.E. Project, Himachal Pradesh covering area between the dam site at Rampur up to the powerhouse site at Marola is presented. The plan is based on extensive field surveys of the region, discussions with the Himachal Pradesh Forest Department officials and the project proponents (SJVNL). While the main aim of the CAT plan is to prevent soil erosion in the catchment and ensure longevity of the reservoir, the project proponents were keen to make this study a more fruitful and relevant exercise to address the needs of the resident human population.

The delimitation of degraded areas to be treated has been carried out using remotely sensed data and analyses were carried out using GIS softwares. The results are presented in the form of a number of GIS outputs at sub-watershed levels covering 74 sub-watersheds in the study area. Though soil erosion was estimated in all the 74 sub-watersheds, however treatment plan has been prepared for the free draining catchment area only. The areas earmarked for treatment have been prioritized based on the intensity of soil erosion in a particular area of the sub-watershed. The treatment measures suggested include both biological and engineering methods to check soil erosion. A number of novel methods, particularly in biological measures, have been proposed in order to select the locally available material for prevention of soil loss and stabilization of the degraded areas.

The report emphasizes on the need to rejuvenate various degraded ecosystems in order to ensure sustainable yield of resources like water, fuel wood and fodder for the needs of local human population living in the catchments as well as create suitable viable habitats for the wildlife in the area. An integrated catchment area management is proposed to ensure socially relevant, economically viable and ecologically sustainable development.

It is hoped that the physical and fiscal targets outlined in the plan will be executed by the project proponents which will not only ensure the economic upliftment and better quality of life for the residents living in the catchment, but will also guarantee a reasonably long life of the proposed Luhri H.E. Project reservoir.

December, 2009
Delhi

M.K. Pandit
Professor and Director

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No. LHEP/SJVNL/AGM/-09-

Dated: 16/12/09

UNDERTAKING.

It is submitted that the CAT plan of LHEP with an outlay of Rs. 124.66 crore has been framed on the basis of total project cost (Rs. 4795 crore, December, 2006 price level) submitted to CEA (Central Electricity Authority) during November, 2008 for Techno-Economic clearance. In case the TEC cost is increased the CAT plan outlay shall be enhanced accordingly through formulation of supplementary report.

Yours faithfully,

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INTRODUCTION

1
INTRODUCTION

The life of a hydroelectric project primarily depends on the rate of soil erosion in the catchment area of the project, its transportation and deposition in the reservoir. Soil erosion occurs due to a number of abiotic and biotic factors like, topography of the catchment, soil characteristics, meteorological conditions such as precipitation and its intensity in the form of rainfall and snow fall, wind velocity and the extent of vegetation cover and its types. It is therefore imperative to control one or more of the most crucial contributor/s of the factors triggering soil erosion, which will enhance the life of a reservoir. In general, the silt loads in the rivers of mountains tend to be higher owing to steep slopes of their catchment and this is true for most of the Himalayan rivers. The silt loads of Eastern Himalayan rivers are known to be relatively higher than those of the Western Himalaya, which is mostly driven by prolonged spell of rainfall and its quantum and intensity. The proposed Luhri HE project on river Satluj in Himachal Pradesh, Western Himalaya is one such project where silt load in the river is very high. This is essentially a result of vast catchment of the river lying in the trans-Himalayan belt with scarce vegetation cover.

The dam of the proposed Luhri HE project is located at Nirath in the Shimla district of Himachal Pradesh. The total catchment area of the project up to the dam site is 45,453 sq km, out of which 14,764 sq km is India and 30,689 sq km falls in Tibet. The free draining catchment area of the project is 797.14 sq km. However, the present catchment area treatment plan covers an area of 1920.53 sq km of the Luhri HE project which falls between dam site of Rampur H.E. project near Rampur to the powerhouse site of Luhri H.E. project at Marola. The geographic location of the project area is given in Fig.1.1.

1.1 HIMACHAL PRADESH

Himachal Pradesh gained status of a full fledged state on Jan. 25, 1971. Himachal, translated as the "abode of snow" is composed of mountainous terrain and begins from the Siwaliks and goes up to trans-Himalayan heights of Zanskar range with altitudes varying from 350 m to 7000 m above

the mean sea level. There is a general increase in elevation from west to east and from south to north. The State is bound between 30°22' to 33°12' N latitude and 75°47' to 79°04' E longitude. To the east and northeast the State forms India's border with Tibet, to the north lies the State of Jammu & Kashmir, in the south-east lies Uttaranchal, Haryana lies in the south and Punjab in the west. The total geographical area of Himachal Pradesh is 55,673 Sq km. Lahul and Spiti is the largest district of the State with a total land area of 13,835 sq km (24.85% of the total geographic area of Himachal Pradesh). Total population of the State is 60,77,900 (Census, 2001) with an average population density of 109 per sq km (Census, 2001). Kangra is the most populous district (total population is 13,38,536) in the State with a population of 233 persons per sq km (Census, 2001). The district has around 22.01% of the total population of the ratio. For administrative purposes the State has been divided into 12 districts, 75 tehsils, 34 sub-tehsils. The catchment area of the proposed project lies in three districts, Shimla, Kullu and Mandi of Satluj valley (Fig.1.2).

1.2 SATLUJ RIVER BASIN

Satluj (Sanskrit is Shatardu and Satadru or Sutudri in Rigveda) is one of the largest rivers in Himachal Pradesh. Other important rivers in the State are Ravi, Chenab, Beas and Yamuna. The Satluj river rises in the Kailash-Mansarovar region in Tibet with its origin in the Rakshas Tal as Longchhen Khabab (Xianquan) (Fig.1.3). Some of the important glaciers feeding river Satluj in its initial stretches are Ganglung Gaungi glaciers and the glaciers of Riwa Phargul. Sindhu (Indus) and Brahmaputra are two other rivers which also originate from that region. Brahmaputra (Tsangpo) originates from Grat glacier also known as Chema-Yungdung, which covers the southern flank of the northernmost range of Kailash Himalaya at an elevation of about 5150 m. The two rivers, Sindhu and Brahmaputra have their origins in the same spot, but flow in the extreme west and east of the trans-Himalayan highlands. Sindhu river flows at distance of 80-90 km southeast of Satluj, which is its eastern most tributary. The river Satluj finally merges with Sindhu at Mithankot in Pakistan after covering a distance of about 1500 km from its origin. Prior to 1700 B.C. the geological evidences indicated that Satluj was an important tributary of the Saraswati river rather than Sindhu river (Valdiaya, 2002). It is believed that the tectonic activity brought about elevational changes which redirected the flow of Satluj from the southeast to the southwest. The mighty Saraswati, which is mostly referred to as a mythical river, began to dry up during 3900 year BP (Before Present),

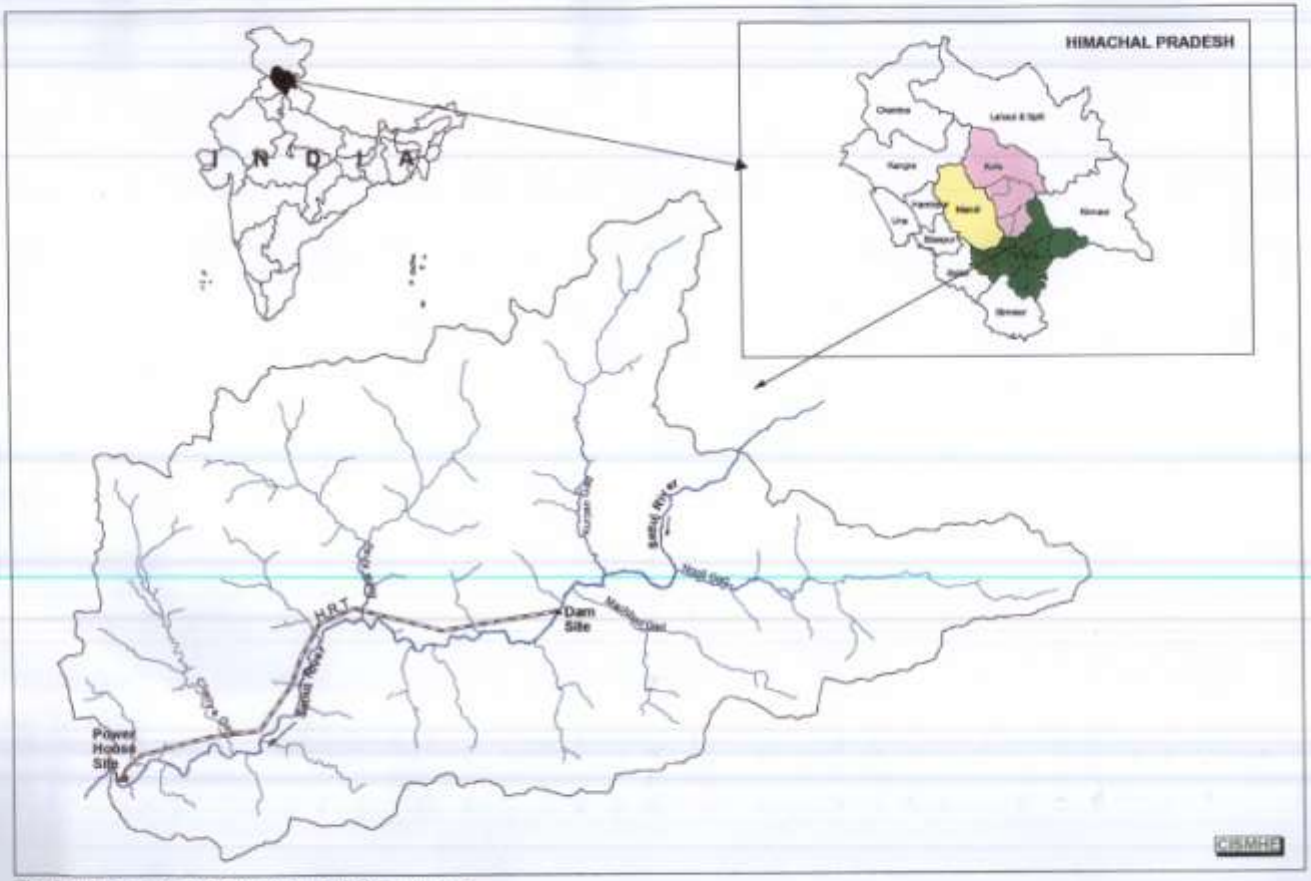


Fig.1.1 Location map of the Luhri H.E. project

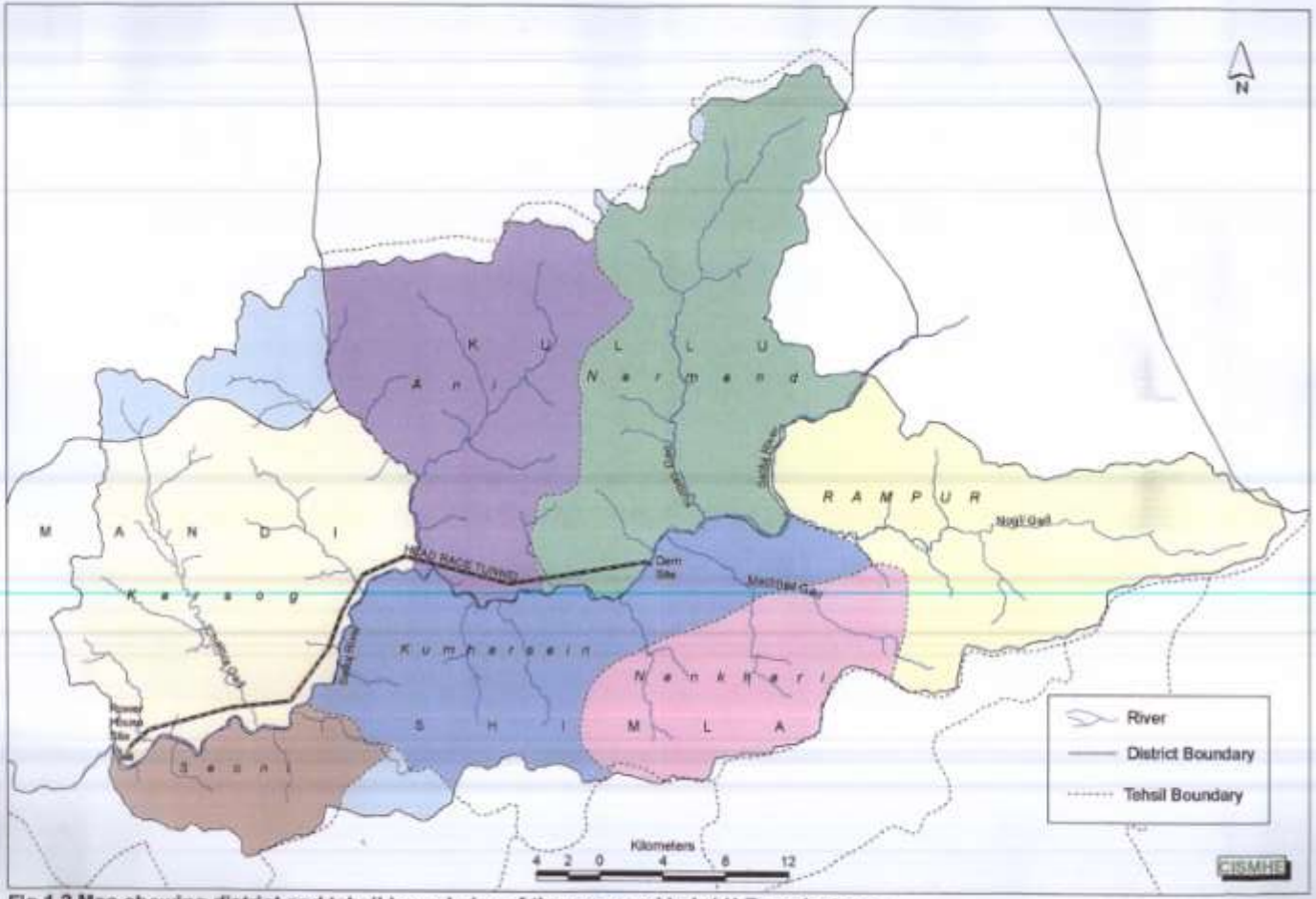


Fig.1.2 Map showing district and tehsil boundaries of the proposed Luhri H.E. project area

causing desertification of Cholistan and the eastern part of the Sindh state. The desertification resulted in the abandonment of numerous ancient human settlements along the banks of Saraswati.

The Satluj river enters India near Shipkila (2880 m) in Himachal Pradesh and leaves the State at Bhakra. The river up to this point covers a distance of about 640 km from its origin and within Himachal Pradesh it travels a distance of 320 km. In Punjab it is joined by Beas and in Pakistan Chenab meets it at Uch (Bahawalpur). The first major tributary of Satluj within Indian territory, is Spiti river which joins it at Khab. Ropa, Taiti, Kashang, Mulgaou, Yula, Wanger, Throng and Rupi are other right bank tributaries. The major left bank tributaries of Satluj are Gayathing, Baspa, Duling and Soldang. The major settlements along the Satluj river within Himachal Pradesh are Namgia, Kalpa, Rampur, Tattapani, Sunni and Bilaspur. The total catchment area of Satluj river up to its confluence with Sindhu river, while up to Bhakra the catchment area is 56875 sq km (3690 sq km in Tibet and 19975 sq km in Himachal Pradesh). The river Satluj passes through Tibetan plateau into the Himalayan ranges and the Siwalik ranges and finally flows along the plains of Punjab. It crosses Dhauladhar ranges at Rampur and Naina Devi range at Bhakra gorge.

The 75.40 km stretch of the river Satluj fall within the proposed project area of Luhri HE project catchment area from Rampur dam site to village Marola (the powerhouse site of Luhri HE project). The total catchment area is 1920 sq km and the major streams that join Satluj within the project area are Nogli Khad, Kurpan Khad and Bharo Khad. The major towns along the river within the proposed project stretch are Nogli, Sainj, Luhri and Sunni.

1.3 CATCHMENT AREA OF LUHRI HE PROJECT

The proposed project area of the Luhri HE Project lies between Rampur and Sunni towns. The proposed dam is located at Nirath and the powerhouse is at Marola village on the right bank of Satluj. Water from the river is proposed to be diverted by a 38.9 km long head race tunnel to the powerhouse. Geographical location of the catchment area is 77°12' to 77 ° 35' longitude and 31°15' to 31 °25' latitude and the total catchment area from Marola village to Rampur dam site is 1920.53 sq km. The area falls in three districts, Shimla, Mandi and Kullu (see Table 3.1). The number of villages with in the project area is 1795 (Revenue villages are 370, Census 2001). The total human population within the catchment area is 212685 (Census, 200 , with population density of 110

person per sq km. The catchment area under discussion has been divided into 74 sub-watersheds/micro-watersheds (Fig.1.4). There are more than 15 small and big streams that join Satluj on the left and right bank within the proposed project area. Neeli, Machhad, Kiara, Bhera, Sainj, Kongal Chapala, Pandola and Ogli are the important left bank streams and Devidhar, Naharu, Jharjar, Dhurmu and Chainra are the right bank tributaries of the main river. There are also a number of monsoon streams which bring lot of water and silt into the main river Satluj.

1.3.1 Climate

The climate of Himachal Pradesh State is varied and changes with the altitude. The southern lower elevation region, Siwalik zone (up to 800 m) with valleys and foothills has a hot tropical climate. The average rain fall in the region is 1500 mm. This zone comprises of around 30 per cent of the State's geographical area. The region between 800 m and 1600 m is called Mid Hill Zone, which receives maximum rain fall ranging from 1500 mm to 3000 mm annually. The region has a warm temperate climate. This zone is covered with a reasonably good forest cover. Around 10 per cent area of the State's geographic area falls in this region. Beyond the Mid Hill Zone are temperate and cold temperate areas, which come in the elevation range of 1600 m to 2700 m. In this region the climate is cool temperate type and the annual rain fall ranges from 1000 mm to 1500 mm. Beyond cold temperate zone and above 3300m lies the alpine frigid zone. A large part of this region is devoid of thick vegetation. The maximum area of Himachal Pradesh (35%) falls in this dry cold desert of Lahaul-Spiti and Kinnaur region. The region is in trans-Himalaya and receives very less rain (annual rain fall is less than 500 mm). Most of the area is covered with sand and barren rocks.

The CAT project area under discussion falls in the Mid Hill Zone where the rain fall ranges from 320 mm to 974 mm and maximum temperature goes up to 40^{0}C.

1.3.2 Silt load in Satluj Basin

Himalaya being a younger geological formation, the rivers emanating from the mountains here carry heavy silt load during snow melt and monsoon season. Satluj is one such river, known to carry the high silt load amongst the rivers flowing through Himalaya. According to an estimate the average silt load at Khab is 12MCM (6 MCM from Satluj and 6 MCM from Spitit), at Nathpa dam, which is 100 km downstream of Khab is 16 MCM and at Bhakra, 210 km downstream of Nathpa dam is 35 MCM. This indicates that maximum silt load in the river Satluj is from downstream of

Nathpa dam including present study area. One of the main reasons for disproportionately high silt loads in Satluj are ascribed to the fact that the major portion of the river's catchment lies in the trans-Himalayan region where loose soil without any vegetation cover is eroded easily and ends up in the river channel. Topography of the region is another reason for this high quantity of silt, particularly in the downstream of the Nathpa region. The river initially flows through Tibetan plateau, which is formed of successive deposits of boulders, gravel, clay and mud. Spiti is one of the major tributaries originating from Kunjan pass and contributes large quantity of silt (6 MCM) to the Satluj river. Satluj carries very large quantities of debris during the early summers when snow/glaciers start melting and the lack of vegetation, above Kinnaur, accentuates the problem. The topography and soil conditions in lower reaches during monsoon rains lead to floods and at times flash floods, which greatly contribute to the silt load (19 MCM) in the river. In the proposed project area various tributaries are not main contributors of silt in the river except the Nogli Khad.

1.4 LAND USE/LAND COVER

In Himachal Pradesh more than 35 per cent of the geographic area lies in the Trans-Himalayan Zone which is a cold desert. The vegetation in the region is scarce. The forest cover in the State is around 25 per cent of the total geographic area (FSI, 2003). Very dense forest constitutes just 0.2 per cent (1,093 sq km) area of the State, while nearly 14 per cent area is covered with moderately dense forest and 9.7 per cent area has the open forest (FSI, 2003). There are reports of significant forest loss in the State (Joshi *et al*, 2001; Pandit *et al*., 2007) and most of the forest cover is now restricted to the ridges and some valleys where human population density is low. Maximum area in the lower ranges is under cultivation and human settlement with little or no forest cover.

The total area of the CAT project is around 1920.53 sq km which falls in three districts, Shimla, Mandi and Kullu. More than 80 per cent (1588.56 sq km) of this catchment is covered with forests and nearly 8 per (154.73 sq km) cent area is under agricultural/horticultural cultivation. The human settlements and agriculture are positioned along the main Satluj valley and also along the streams like Nogli Gad, Kurpan Gad, etc. The upper reaches and ridges in the catchment are covered with dense to moderately dense forest and the predominant species are of pine. Around 933.44 sq km area of the catchment area under discussion is covered with dense forest, which is around 48 per cent of the total catchment area. The open forest is around 17 per cent of the total catchment area. Around

17 per cent area of the catchment is covered with scrubs or degrades forest. In some valleys like Machhad Khad and Sainj Nala the slopes have been cleared for horticulture. Most of the area on the right bank of Satluj is barren, particularly around Luhri region, Ogli, and Lunssu area. Barren or rocky area in the catchment is around 106.92 sq km, which is around 5 per cent of the total catchment area. The remaining area is covered with snow and glaciers, which form nearly 3.1 per cent (59.77 sq km) area of the catchment.

1.5 BIODIVERSITY

Despite the loss of forest cover there are pockets of rich biodiversity in the State of Himachal Pradesh. This biodiversity is contained mostly in the surviving forests. The State has a 25% forest cover and more than 35 per cent of the geographic area has low human population density, which makes it possible for the biodiversity to thrive in many areas in the State. The altitudinal variation from 250 m to more than 6,000 m and varied precipitation profile is also responsible for rich biodiversity in the region. A number of river valleys in the State, which induce varying microhabitat conditions and also ecological isolation, greatly contribute to the biodiversity of the State. The State is home to a large variety of plant and animal species, which have migrated from the far off regions like Mediterranean, Tibetan region of trans-Himalaya and the Eastern Himalayan region of Nepal. There is a considerably high degree of endemism in plants and animals of the State.

Himachal Pradesh is rich in various faunal elements with reports of more than 107 species of mammals, 447 species of birds, 17 species of amphibian and 104 species of fishes. There are carnivore species like tiger (*Panthera tigris*), leopard (*Panthera pardus*), leopard cat (*Prionailurus benghalensis*), jungle cat (*Felis chaus*), Asiatic black bear (*Ursus thibetanus*) and brown bear (*Ursus arctos*) in the State. Himachal Pradesh is also known for some of the unique bird species like Himalayan monal (*Lophophorus impejanus*), Kaleej pheasant (*Lophura leucomelanos*) and red jungle fowl (*Gallus gallus*). A large number of bird species were observed in the project area, therefore, the CAT plan, afforestation and ecological rejuvenation of the proposed area is highly desired and relevant. During one of the field surveys we observed the carcass of a leopard cub, which was seemingly hit by a vehicle. This is highly worrying as the continued decrease in the forest cover will endanger the animal populations which are already decreasing in the Himalaya. CAT plan

will make an endeavor to restore and preserve their habitats and make meaningful contributions to the conservation of biodiversity.

The vast variations in the altitude, edaphic conditions and precipitation in the State have offered diverse microclimatic conditions resulting in multiplicity of habitats and ecological niches for different plant species. There are reports of more than 3000 species of flowering plants from Himachal Pradesh. Asteraceae is the largest family with reports of more than 328 species, followed by Poaceae with 321 species. Many of the plant species (like more than 80 flowering plant species) like *Agropyron dentatum*, *A. repens* and *Arabidopsis, ruseelliana* are endemic to the State. The higher altitudes are known for a large variety of plant species, which have medicinal properties.

Broadly, the vegetation types of the State can be divided into tropical, sub-tropical, temperate and alpine vegetation and the vegetation of stony desert. The main forests in the State are dominated by oak, cedar and pine and in some areas the formations are of mixed type. In the Lahaul-Spiti region the scarce vegetation is represented by the scrub forest of *Ephedra*, which is an important medicinal plant. In the project area, main forest is of pine, which is particularly restricted to upper reaches and the ridges and in some area, particularly in Shimla district, cedar forest is also visible. In lower warmer areas we encountered *Eucalyptus* plantations.

1.6 SCOPE OF THE STUDY

The main objective of the present study is to plan measures for checking soil erosion thus decrease the silt load in the river channels and the reservoir of the proposed Luhri HE Project on Satluj river. Catchment area treatment (CAT) plan is an important document, which portrays the ecological health of the catchment area, suggests various soil conservation measures and watershed management programmes required to arrest soil erosion. This is crucial for improving the soil and habitat conditions of free drainage area and to rejuvenate the degraded ecosystems in the catchment. The scope of this study is not only to address all those factors which are directly responsible for soil erosion in the catchment but also to address areas of concern that are indirectly responsible for soil erosion. These issues include fuel and fodder requirements of the local people in the project area. These activities are the main drivers of deforestation and vegetation removal and exposure of soil to erosion. Additionally, there could be many natural factors like floods, flash floods, land slides, etc.

responsible for soil erosion. Our field observations suggest that the natural processes of degradation and soil erosion are not prevalent in the tributaries like Nogli Khad, Kurpan Khad and Machhad Gad. The road construction activity seems to be one of the major developmental activities in the region responsible for soil erosion in the study area. Traditionally, land conversion from forest to agriculture, horticulture and human settlements has also played significant role in increasing soil erosion in the catchment area of the Luhri HE Project.

The total catchment area of the project is 1920.53 sq km and the area under erosion is 761.79 sq km (39.67% of the total catchment area, includes severe and very severe erosion). This area under erosion has been categorized as severe and very severe type. Though erosion has been studied in 1920.53 sq km which includes downstream catchment area (up to power house site at Marola and free-draining catchment area). However, catchment area treatment plan is prepared for 82.96 sq km area which falls in free-draining and downstream catchment area of the proposed project. We have suggested a number of indirect and direct methods for the treatment of catchment to arrest soil erosion. The direct measures include engineering and biological method, while the indirect methods include gradual reduction of dependency of local people on natural resources for their daily needs.

1.7 COST OF THE PLAN

In the proposed CAT plan an area of 82.96 sq km (15.03% of the total effective catchment area) has been identified for the treatment. Entire catchment has been divided into 74 sub-watersheds and in each of these the area that needs treatment is worked out. Treatment plan is prepared for free-draining catchment which has 27 sub-watersheds. However, area for treatment has been identified in 24 sub-watersheds only. Maximum area for treatment is in St3 sub-watersheds (1903.2 ha) and minimum is in Kg4 (5.41 ha). The areas for biological and engineering treatments have been identified separately. However, in the present CAT plan more emphasis has been given to the biological treatment measures.

The total budget for the proposed CAT plan is kept at **Rs. 12466 lakh,** which includes cost for all the measures suggested to arrest soil erosion and also for the biodiversity conservation in the region. Broadly, the entire budget is divided into cost of direct methods, which includes biological and engineering methods and indirect methods. The region is rich in biodiversity and based on our

interactions with the officials of State Forest Department, a separate budget head is provided for the conservation and protection of the biodiversity of the region. However, it must be said though the proposed plan has been prepared at a sufficiently detailed level and scale, but site-specific micro-planning will be needed while executing the catchment area treatment plan by the executing agency. Accordingly, a separate budget of Rs.85.0 lakh has been kept for the purpose of Joint Forest Management (including micro-planning).

1.8 SCHEDULE OF THE CATCHMENT AREA TREATMENT PLAN

The construction schedule of the proposed Luhri HE project is around 7 years and 6 months (twin tunnel option) and implementation of CAT plan will also take 7 years and further 3 years are suggested for the maintenance of the executed work. With this entire catchment area treatment plan is prepared for 10 years, including seven years period for execution and 3 years time for maintenance. However, development of nursery will start from the zero year and end in the ninth year. A detailed fiscal and physical schedule for carrying out different biological and engineering works in the catchment is given in Table 9.8.

Chapter 2

METHODOLOGY

2 METHODOLOGY

2.1 INTRODUCTION

A large number of hydroelectric projects are coming up on the Himalayan rivers to meet the increasing demand of energy. These projects are followed by a number of related activities like deforestation, urbanization and faulty management practices, which cause degradation of the catchment. These processes directly or indirectly damage natural resources of the region like land, ecosystems, biodiversity and the water resources. Damage to some of these resources has direct bearing on the soil erosion, which affects the life of reservoir of a hydroelectric project. In order to ensure reduction of soil erosion and prolonging of the life of a reservoir, it is essential to maintain a healthy catchment area of the project. The healthy catchment is also important for avoiding a series of problems, notably depletion of flow capacity, steady loss of storage capacity consistent drop in hydro-electric power generation and frequent floods. It is known that the problem of soil erosion is more in mountainous terrain and more so in case of Satluj valley. The silt loads in the river are much higher than any other river system of Western Himalaya, both because of slope, geology and lack of vegetation cover, particularly in headwater regions of the river. Extensive soil conservation and watershed management programmes are needed to minimize the damage to the catchment and mitigation of soil erosion problems.

2.2 STUDY AREA

The total catchment of the Luhri HE project from dam site upstream is around 45606.18 sq km and the free draining catchment of the project from Rampur dam site to the dam site is 797.14 sq km. However, the present study area includes the catchment area of Luhri HE Project from Rampur dam site to its powerhouse site at Marola village, covering an area of 1920.53 sq km. The management plan is prepared for this area, which includes five tehsils of three districts, Shimla, Kullu and Mandi. Various parameters like physiography, geo-physical aspects, hydro-meteorology, land use / land cover and demography were studied before formulating a treatment plan for the catchment area of Luhri HE project.

2.3 PHYSIOGRAPHY AND BASE MAP

Spatial database on physiographic features were taken from various sources including Survey of India (SOI) topographic sheets, satellite data and analysed with Geographic Information System (GIS) tools. These data were collected, arranged and presented according to the standard methods used in the formulation of CAT plan. These data were organized and presented in the form of a general drainage map of the catchment and its sub-watersheds. In addition, a gradient profile indicating river profile was calculated from the origin of the Satluj river up to the barrage site and to the power house site. A slope model for entire catchment area was digitized from the contours of Survey of India topographical sheets at 1:50,000 scale, where available, following a 40 m contour interval. The contours were traced from the toposheets, scanned and digitized using ArcGIS 9.1. From the digital data, a digital elevation model (DEM) for the project area was generated using ArcGIS 9.1. Similarly, thematic maps for elevation-relief and aspect were also generated.

The area for each slope category was calculated for the entire catchment. Per cent area under various slope categories namely gently sloping, moderately sloping strongly sloping, moderately steep to steep, steep, very steep and escarpments were calculated for the entire catchment. The slope categories were based on per cent slope of an area, *viz.* gently sloping (up to 2%), moderately sloping (2-8%), strongly sloping (8-15%), moderately steep (15-30%), steep (30-50%), very steep (50-70%) and escarpment (> 70%). In addition an aspect map and a relief map of the total project area were also prepared. The preparation of base map of the study area is the first step in this direction. Various permanent features like roads, rivers or any other land based features were transferred to the base map. As the area has a high drainage density, only main streams were considered for this purpose. Thereafter preliminary interpretation of satellite data was carried out and a preliminary interpretation key was prepared. The preliminary interpreted maps thus prepared were taken to the field for ground checking.

2.4 LAND USE AND LAND COVER

Detailed information about the land use and land cover of the catchment area is prerequisite for formulating a management plan for soil conservation of the area. Remotely sensed data at high resolution can give the exact status of the forest and vegetation cover of the area, settlements and

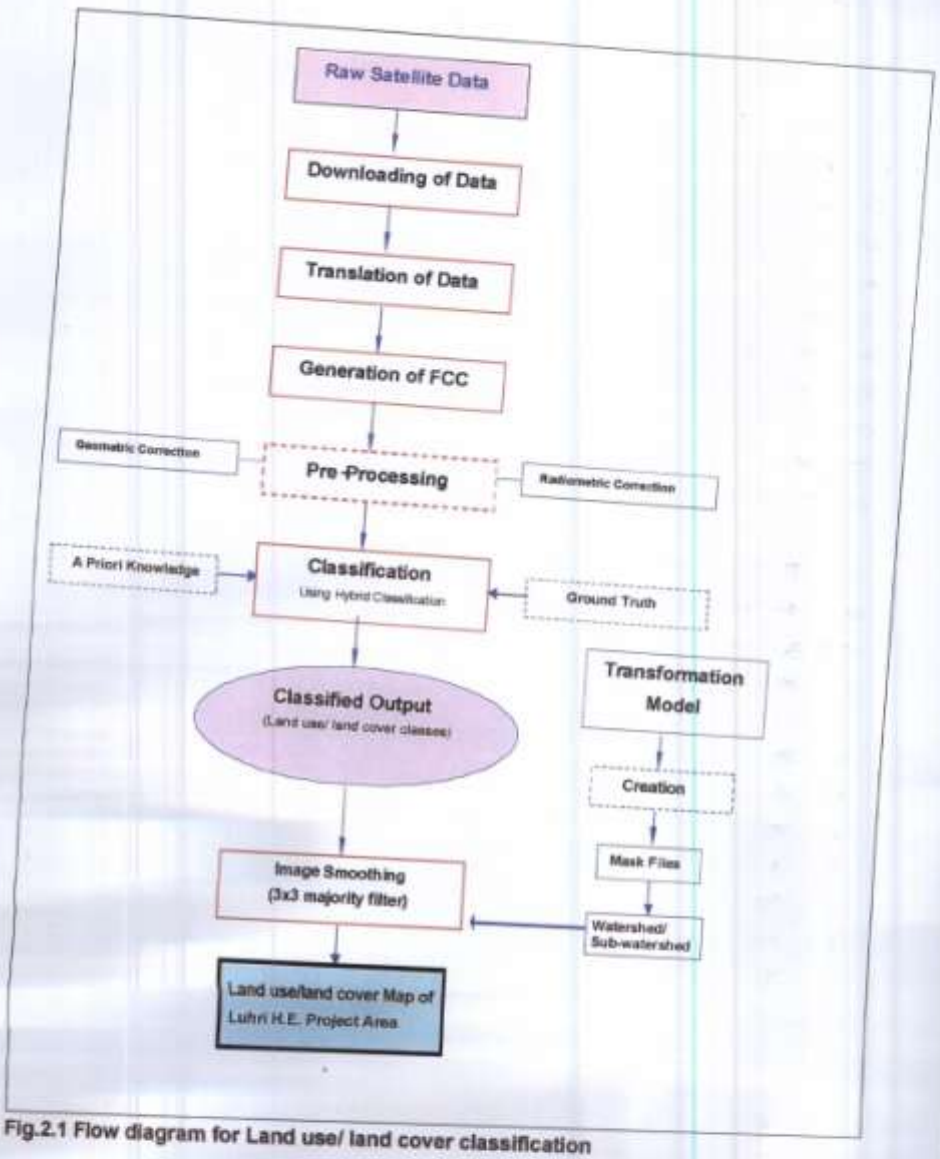


Fig.2.1 Flow diagram for Land use/ land cover classification

land under different land use like agriculture, horticulture. Satellite images are very important to know the present status of glaciers and snow cover, streams and rivers of the region to work out the hydrological status of the region. The satellite images have applicability in various areas viz. forest cover, vegetation type mapping and their changes on a regional scale. These developments have indicated that if satellite data is judiciously used along with the sufficient ground data, it is possible to carry out detailed forest inventories and monitoring of land use and vegetation cover at various scales.

Land use and land cover mapping of proposed catchment area from Rampur dam to Powerhouse site of Luhri HE project at Marola was carried out by standard methods of analysis and interpretation of remotely sensed data followed by ground truth collection, and surveys. Land use and land cover mapping was carried out by standard methods of analysis of remotely sensed data and followed by ground truth collection and interpretation of satellite data. For this purpose digital data on CDROMs was procured from NRSA, Hyderabad and Earth Science Data Interface (ESDI) at Global Land Cover Facility maintained by Department of Geography, University of Maryland, NASA and Institute for Advanced Computer Studies at Maryland, USA. Digital image processing of the satellite data and the analysis of interpreted maps were carried out using ERDAS Imagine 9.1 and ArcGIS 9.1 for GIS analysis.

For the secondary data, Survey of India topographic sheets 53-E/3, 4, 7, 8, 10-12, 14-15, on 1:50,000 scale were referred to for the preparation of base and drainage maps.

The mask of the entire area from Rampur dam to the powerhouse area was generated from two IRS-P6 LISS-3 scenes i.e. 95/49 and 96/49 generated from scenes of dates 5-10-2006 and 10-10-2006 (Table 2.1).

Before processing any image for enhancement, transformation or classification, pre-processing was done for band separation. Different bands were downloaded into the workstation using ERDAS IMAGINE 9.1. The images were checked for occasional shortcomings in the quality of radiometric and line dropouts. Band separation and windowing of the study area with the help of Survey of India (SOI) toposheets was performed. The registration of image was performed using the nearest-neighbour resampling algorithm (Jensen, 1996). The scene was geometrically corrected with

toposheets using proper identification of GCPs with a root-mean-square (RMS) error of 0.0002 to 0.003 pixels. IRS-P6 LISS-3 and LANDSAT 7 ETM+ data were radiometrically corrected using dark pixel subtraction technique. They were then co-registered with SOI toposheets using UTM Zone 43N WGS84 projection system. Geo-referencing of the composite image was done using digital vector layer of drainage, road network, water bodies and other permanent ground features extracted from SOI toposheets. Distinguishable Ground Control Points (GCPs) both on image and vector database were identified and using these GCPs the image was resampled and geo-coded. Sub-pixel image to map registration accuracy was achieved through repeated attempts. The image enhancement was performed by using different combinations for best image contrast for the full dynamic range for each band employing enhancement techniques like edge detection, filters, manipulation of contrast and brightness, histogram equalisation, etc. False Colour Composite (FCC) was prepared using enhanced data of Bands 2, 3 and 4 of IRS-P6 LISS-3 and LANDSAT 7 ETM+ (Fig. 2.1). The image was interpreted digitally using various digital image processing techniques. All operations were carried out using ERDAS IMAGINE 9.1 software.

In order to utilise the higher resolution of panchromatic band of IRS-P6 LISS-3 and LANDSAT ETM+, image fusion was done to enhance the lower multispectral ETM+ images. For this purpose a portion of high resolution PAN band that corresponds with an area of interest in the multispectral ETM+ images were extracted. Thereafter, both the images were coregistered and ETM+ images were resampled for merging with PAN image. Merging or image fusion was done by spatial enhancement module of ERDAS Imagine 9.1 (see Table 2.1).

Table 2.1 Database used for land use/ land cover mapping of Satluj river catchment

Satellite	Sensor	Path/Row	Date	Data type & Bands
IRS-6	LISS-3	95/49	05-10-2006	Digital (1,2,3,4,5,7)
IRS-6	LISS-3	96/49	10-10-2006	Digital (1,2,3,4,5,7)
LANDSAT 7	ETM+	146/38	02.06.2000	Digital (1,2,3,4,5,7)
LANDSAT 7	PAN	146/38	02.06.2000	Digital (8)
LANDSAT 7	ETM+	147/38	15.10.2000	Digital (1,2,3,4,5,7)
LANDSAT 7	PAN	147/38	15.10.2000	Digital (8)

The digital vector layers of state of Satluj river catchment up to the Luhri H.E. Project dam site as well as the administrative boundaries of different sub-watersheds of free-draining catchment were prepared from the Survey of India (SOI) toposheets at 1:50,000 scale. These vector layers were used as masks to extract the sub-watersheds from the images for further processing. A mosaic image was prepared from two different ETM+ scenes. As the scenes were of different dates for a particular year, mosaicing was done by histogram matching using band by band matching tool of ERDAS IMAGINE 9.1. It was from these mosaic images, mask of above mentioned study area was extracted. From this mosaic image, masks of different districts and watersheds were extracted.

In the preliminary analysis, image classification was done by unsupervised classification method by performing ISODATA training. It helped in assigning the classification of the image into landuse categories. Later on, the boundaries of water bodies were separately mapped using SOI toposheets and merged with classified image. The doubtful areas or wrongfully interpreted areas owing to various physical features controlling the study area were marked for ground truthing. The ground truth collected during the field surveys was used for the supervised classification for the preparation and identification of landuses resulting in accurate classification of the areas. The classified map was regrouped and merged. The classified raster map, thus prepared, was then converted to vector format for GIS analysis and the preparation of required thematic maps using ArcGIS 9.1 and GeoMedia Professional 5.2. Reconnaissance surveys of different parts of the study area were conducted to collect ground truthing.

2.4.1 Ground Truth Collection

A reconnaissance survey was carried out in the Satluj river catchment in the month of December 2007 and February 2008. These trips were undertaken basically to understand the terrain and vegetation and vegetation associations of the study area. During these visits the preliminary interpreted data was tested and necessary corrections were made. The physiographic features on satellite data appearing in different tones and textures were used to correlate image elements and ground features for accurate identification. Subsequently field visits were undertaken in different watersheds for assessing the vegetation cover. The surveys were also undertaken to collect the necessary ground truth throughout the study area. The interpretation key was finalized and the satellite images were interpreted as per the objectives of the project and all the thematic details were then transferred to base map on 1:50,000 scale. The preparation of final maps was followed by ground checks, which form the most

essential part of the mapping. The final interpreted maps were taken to field and refined after the ground checks.

2.4.2 Classification Scheme

The classification scheme adopted for the preparation of land use/land cover maps and related thematic maps on 1:50,000 scale is as follows. Density classification was done by NDVI technique. Two forest density classes were interpreted for the forest cover mapping. The forests with >40% canopy cover were delineated as dense forests and between 10% and 40% crown density as open forest. Furthermore, degraded forests and scrubs were also delineated for the purpose of erosion mapping. The cropland was also delineated. The non-forest land cover in the form of barren/ rockyland, glaciers, lakes, etc. was also delineated for the calculation of erosion intensity classification. For forest type map, queries were run using modeler and knowledge classifier modules of ERDAS Imaging 9.1. The layers used for classification were relief, slope, aspect, landslides and geological formations.

Density Class	Forest Type
Dense forest	Tropical semi-evergreen
(Crown density > 40%)	Sub-tropical wet hill forest
	Wet-temperate broadleaved forest
Open forest	Assam Sub-tropical pine forest
(Crown density 10 - 40%)	Temperate dry coniferous forest
Scrub	Secondary moist bamboo bracks
	Temperate scrub
	Alpine scrub/meadow
	Slope grassland
Non-forest	Agriculture
	Barren/ rockyland
Snow/ Glaciers	

An interpretation key was prepared based on the relationships between ground features and image elements like texture, tone, shape, location, and pattern. Image interpretation was done for the catchment area of Satluj river. Interpreted details (polygons) were then transferred to the base map.

2.5 FOREST TYPES AND VEGETATION COVER

The details of forest types and forest cover in the catchment area were based on our primary surveys in the area supplemented with the working plans and records of Kotgarh, Narkanda and Kumharsain ranges of Kotgarh Forest Division and Rampur and Sarahan Ranges of Rampur Forest Division of Himachal Pradesh. The major forest types encountered in the area were described based on the classification of Champion and Seth (1968).

2.6 FLORAL AND FAUNAL ELEMENTS

Information about the floral and faunal elements was collected during a number of primary field surveys in the catchment area in different seasons. The information on these aspects was also collected from various secondary sources. For the information on animals, we used standard methods of direct and indirect enquiry, sightings, etc. Useful information on flora was also provided by the local Forest Department.

2.7 SOIL

Soil map for the entire project area was prepared from the basic data/map of soil classification prepared by National Bureau of Soil Survey and Land Use Planning (NBSS & LUP, NBSS Publ. No. 57b, 1997), Indian Council of Agricultural Research (IARI). This basic information was transferred to a GIS based map and was later used to designate/ classify areas of varying soil erosion proneness in combination with information on slope and forest cover.

2.8 EROSION INTENSITY MAPPING

From the thematic maps of slope, drainage, soil and land use a composite erosion intensity unit (CEIU) map was prepared on 1:50,000 scale. We used hierarchical querying to extract the various erosion intensity units. The composite erosion intensity unit map was then superimposed on the drainage map with sub-watershed boundaries, so that CEIU could be obtained sub-watershedwise.

2.8.1 Areas to be Treated

The areas in the different sub-watersheds of the Luhri H.E. project from Rampur dam site to the powerhouse site at Marola that require treatment were calculated from the composite erosion intensity unit map. For this a number of simple as well as complex spatial queries were run in a step-wise manner using GIS software (combination of ArcGIS 9.1 & GeoMedia Professional 5.2). These queries included different attributes of parameters *viz.* slope, soil depth, land use, etc. For executing these queries all the thematic maps of different attributes and parameters were geo-referenced to maintain the accuracy of the resultant outputs. In case of slope, the spatial queries were undertaken for different slope categories ranging from gently sloping category to escarpments with different soil classes like shallow soils, deep soils, etc. The subsequent queries were executed with resultant outputs from the first level queries with different attributes of land use/ land cover. In all more than 150 such spatial queries were executed for the purpose for each and every sub-watershed separately. From these queries a thematic map of areas prone to erosion in the entire project area was prepared. From the thematic map of erosion intensity, areas that require treatment measures were extracted with the help of further spatial queries. Areas which were found inaccessible i.e. areas with more than 45° (50%) slope and areas above 2,600 m with natural ecosystems with little human interference and tree line were excluded to arrive at those areas where appropriate treatment measures can be undertaken. Such areas were extracted for each individual sub-watershed.

2.8.2 Treatment Measures

The treatment measures for arresting soil erosion in the catchment were basically classified into biological measures and engineering measures. These measures have been suggested as favored methods of treatment at various places/sites, depending on its location and geographic/geological condition. A new technique, named geo-textile, has also been suggested for efficient and immediate control of soil erosion, which is caused by sheet erosion. The detailed descriptions of various measures are given in Chapter 9.

Chapter 3

DEMOGRAPHIC PROFILE

3
DEMOGRAPHIC PROFILE

3.1 DEMOGRAPHY

The catchment of the proposed Luhri HE project from Rampur dam site to powerhouse site at Marola falls in three districts, Shimla, Mandi and Kullu in Satluj valley (see Fig.1.2). The dam site of the proposed project lies in Nankhari Tehsil and a portion in Kumharsain Tehsil of Shimla and Nermand Tehsil of Kullu. The powerhouse site is located in Karsog Tehsil of Mandi. The catchment area on the right bank falls in two tehsils of Kullu named Ani and Nermand and in Karsog tehsil of Mandi. On the left bank all the tehils, Rampur, Nankhari and Kumharsain are in Shimla district. The total number of villages located in the catchment under reference is 1795, which are grouped into 370 revenue villages/blocks. The demographic profile and the related information on these 370 villages have been taken from Census of India (Census, 2001). The total population within the catchment is 212685, which constitutes 10.62 per cent of the total population all three districts (Shimla, Kullu and Mandi). There are 45578 households in this catchment and the population density is around 110 persons per sq km (Table 3.1).

Table 3.1 Demographic profile of the districts under catchment area of Luhri H.E. project

Districts	Population of the district	Villages of the catchment	Household of the catchment	Population of the catchment	Work..ce of the catchment	Population of the catchment		No. of Sub-watersheds
						SC	ST	
Shimla	721,745	254	32,232	147,198	83,060	2,455	45,511	35
Kullu	379,865	36	9,725	47,016	26,548	591	17,055	24
Mandi	900,987	89	4,424	22,431	12,150	277	5,748	15

Shimla

Shimla is the third largest district of Himachal Pradesh after Kangra and Mandi in terms of population. The total population of Shimla district is 7,21,745, which is 11.88 per cent of the total population of the State (Census, 2001). The density of the population living in 17 tehsils of the district is around 141 persons per sq km. The Luhri project area is located in four tehsils viz, Rampur,

Nankhari, Kumharsain and Seoni of this district. The Nogli Gad (Ng) watershed falls under Rampur tehsil. Machhad Gad (Mg) and Bhera Khad (Brk) watersheds fall in Nankhari and Kumharsain tehsils. Seoni and Kumharsain tehsils constitute the micro-watersheds of Satluj river (St) on its left bank. There are 35 micro-watersheds falling in the Shimla district. The total population of these micro-watersheds is 1,47,198 and the number of households are 32,232. The population living in this part of the catchment area is 20.39 per cent of the total population of Shimla district (Fig.3.1). These villages have a population of 2,455 and 45,511 belonging to the Scheduled Tribes and Scheduled Casts, respectively (Table 3.2). The work force engaged in agriculture and rearing of livestock constitutes 56.42 per cent of the total population. The pastoral activities put pressure on the natural vegetation and the forests and the mountain slopes are under heavy pressure of grazing and removal of grasses and other vegetation for fodder. The grass is removed from the slopes and stored for winter feed leaving the slopes exposed to top soil erosion both by wind and rain.

Kullu

Kullu is a small district in Himachal Pradesh and is divided in four tehsils (Kullu, Manali, Sainj and Banjar) and two sub-tehsils (Ani and Nermand). The total population of the district is around 3,79,865 with a population density of 69 persons per sq km. The upper region of the catchment area of the proposed Luhri project, particularly on the right bank of the Satluj river, forms a part of Kullu district. Kurpan Gad (Kg) watershed, Beha Khad (Bk) watershed and some portion of Satluj River (St) watershed are located in Ani and Nermand sub-tehsils. Around 30 sub-watersheds are partially or fully located in the Kullu district. Out of these 30 sub-watersheds, 12 belong to Beha watershed and 9 each to Kurpan and Satluj watersheds. There are 36 revenue villages in these 30 sub-watersheds and the population of all these villages is 47,016, which is 12.37 per cent of the total population of the district Kullu (see Fig.3.1; Table 3.3). The total number of households living in these 36 villages is around 9,725. More than 56.46 per cent of this population constitutes working force (see Table 3.3).

Mandi

Mandi district is the second largest in the State in terms of population. A part of the catchment on the right bank of Satluj, near the powerhouse site, falls in Mandi district. The catchment area of the project lies in Karsog tehsil of the district. The total population of the district is 9,00,987 which is 14.82 per cent of the total population of the State. The population density of the

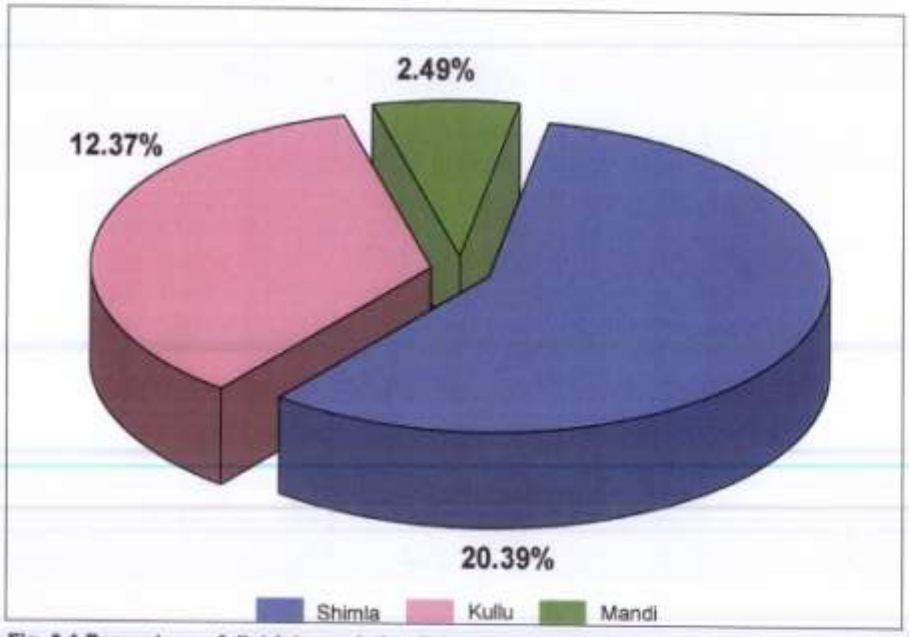


Fig. 3.1 Percentage of district population living in catchment

district (228 persons per sq km) is higher than the State average (109). The area of 15 sub-watersheds from the catchment is partially or fully falling in the district. Four sub-watersheds belong to Beha watershed, 3 sub-watersheds to Dhurmu watershed and 4 each to Chainra and Satluj watersheds. There are 89 villages in these 15 sub-watersheds and a total population 22,431 lives in 4,424 houses (Table 3.4). The population living in the catchment area is 2.49 per cent of the total population of the district Kullu (see Fig. 3.1).

Table 3.2 Demographic Profile of Luhri Catchment Area Villages (Shimla)

S.No.	Sub-Watershed	District	Tehsil	Village	No. of Households	Total Population	Total SC	Total ST	Total Workforce
1	Brk1	Shimla	Nankhari		153	731	99	0	376
2	Brk2	Shimla	Nankhari	Kotla	37	151	25	0	123
			Kumharsain	Jusi	87	396	50	0	235
				Khamoti	30	146	0	3	76
				Dharori	9	48	9	0	17
				Kati	66	339	159	0	128
				Khalet	30	148	32	0	87
				Khosi Pandi	144	620	2	0	373
				Taprog	52	277	0	0	146
3	Brk3	Shimla	Nankhari	Bargaon	127	493	257	3	347
			Kumharsain	Sarega	26	96	43	0	65
4	Brk4		Shimla	Dharori	9	48	9	0	17
			Nankhari	Barara	113	397	63	1	201
				Nagali	3	29	0	0	19
				Shola	58	311	7	0	218
5	Brk5	Shimla	Rampur	Chauju	34	240	16	0	126
			Nankhari	Narula	22	88	17	0	54
			Kumharsain	Tutu	135	595	277	0	352
				Panel	117	579	113	0	324
				Naula	26	117	51	0	75
				Tikri	33	179	42	0	135
				Kalmug	64	273	45	0	150
				Bhatti	184	835	484	0	581
				Karangla	71	372	241	0	222
				Bargaon	127	493	257	3	347
6	Mg1	Shimla	Rampur	Karshali	29	167	20	0	99
7	Mg2	Shimla	Rampur	Dalag	60	350	33	0	252
				Mandhag	86	457	103	0	390
				Sangri	7	32	0	0	19

				Ghat	28	131	131	0	74
				Jurasi	44	174	23	0	140
8	Mg3	Shimla	Narkhari	**Khamnana**	29	138	35	0	87
				Dagri	13	81	0	0	41
				Bai	90	404	259	0	239
				Karoli	62	303	41	0	189
9	Mg4	Shimla	Narkhari	**Loti**	36	205	0	0	114
				Mundar	42	197	65	0	108
				Kengal	90	433	145	0	341
10	Mg5	Shimla	Narkhari						
11	Mg6	Shimla	Rampur Narkhari	**Bahli**	104	420	9	0	334
				Shobli	43	229	46	0	153
				Nahri	41	192	135	0	114
12	Mg7	Shimla	Rampur Narkhari	**Bhadrash**	51	227	52	0	123
				Doi	90	437	159	0	265
				Nirth	176	748	296	0	397
				Barkeli	86	410	203	0	218
				Barach	26	113	1	0	62
				Lelan	119	642	93	0	348
				Kati	53	294	67	0	217
				Thana	240	1126	327	0	519
				Khaneri	240	1038	296	107	398
13	Ng1	Shimla	Rampur						
14	Ng2	Shimla	Rampur	**Pat**	103	590	411	0	330
				Kandi	27	120	0	0	69
				Kadra	117	626	250	0	347
				Radoli Sharauli	54	245	157	6	135
15	Ng3	Shimla	Rampur	**Kukhi**	50	195	63	0	108
				Durkali	88	423	32	8	252
16	Ng4	Shimla	Rampur	**Khanotu**	10	39	0	4	27
				Bhata Newal	27	125	18	0	77
				Theda Chikheri	59	274	99	0	178
				Damrali	23	93	84	7	68
				Syarla Barshol	191	710	252	19	359
				Seri Majholi	73	341	111	0	187
17	Ng5	Shimla	Rampur	**Chikoo**	38	184	100	0	91
				Majholi	67	333	102	0	136
				Kim	123	628	226	0	554
				Kareri	4	19	10	0	10
				Thala	54	294	43	0	140
				Kahl Patrea	146	840	330	0	403
				Bahli	104	420	9	0	334

18	Ng6	Shimla	Rampur	Chodali	90	435	287	1	242
				Rajpur	28	114	52	0	68
				Masarau Kareri	59	337	134	0	224
				Bohli	104	420	0	0	334
				Batheda	13	80	42	0	47
				Dershal	52	287	119	13	182
				Rawan	12	64	22	0	36
19	St2	Shimla	Rampur	Rampur	16173	72026	23361	1492	39579
				Kandi	27	120	0	0	69
				Kheneri	240	1038	296	107	398
				Racholi	229	913	351	89	330
				Dershal	52	287	119	13	182
				Sanathli	30	155	19	0	82
				Pathada	37	173	5	0	93
20	St3	Shimla	Rampur	Brua	425	2056	313	242	1080
		Kullu	Banjara	Badgrau	361	1631	433	217	1081
				Rampur	133	711	266	0	404
				Shaneri	129	713	314	0	311
				Uru	45	220	39	0	125
				Kalsa	73	382	179	0	166
				Kerali	80	379	212	0	205
				Thana	12	68	0	0	29
				Dhar	59	306	244	0	152
				Jagnai	137	706	289	0	362
				Dunsa	129	595	163	0	526
				Khokhrela	109	571	352	3	289
21	St4	Shimla	Rampur	Banl	114	636	299	5	318
		Kullu	Nermand						
22	St8	Shimla	Kumharsain	Kepu	54	237	85	0	173
				Sainj Parsau	41	175	47	0	91
				Kirti	78	330	211	0	107
				Dulas	113	448	199	0	291
				Kandah	76	307	86	0	197
				Shathla	143	635	76	0	403
				Thonadhar	18	89	10	0	51
				Halyana	23	109	20	0	70
				Nahna	4	22	14	0	14
				Barabagh	51	191	89	0	93
				Chohan	6	20	0	0	14
				Nagrasu	14	55	48	0	41
				Barbasu	74	303	111	0	207
23	St10	Shimla	Kumharsain	Thinu	91	444	79	0	279
				Jarai	196	850	166	0	513
				Batari	144	727	333	0	490
				Duja	62	324	124	0	187
				Dhala	33	152	46	0	74

				Nehri	43	189	27	0	120
				Narkanda	199	713	26	27	362
				Jarol	196	850	166	0	533
24	St11	Shimla	Kumharsain	Rabo	14	162	9	0	93
				Madhwan	3	10	0	0	7
				Shela	46	209	77	0	141
				Kareot	40	216	105	0	134
				Ghareawat	60	259	35	0	110
				Pharnal	21	119	19	5	69
25	St12	Shimla	Kumharsain	Khekhar	29	115	19	2	59
				Sainj Parana	41	175	47	0	91
				Dethal	66	302	130	0	70
				Mandholi	91	651	116	44	426
				Kumhar Sain	255	1347	320	2	343
				Kafri	24	127	0	0	73
				Barara	113	397	63	1	201
				Shanad	35	156	81	0	102
				Kacheri	133	579	14	0	354
				Bareg	80	140	29	0	192
				Keri	12	46	9	0	29
				Manan	0	54	42	0	24
				Sakandi Chimla	40	193	59	0	119
				Melan	188	915	369	14	439
				Chorath	34	130	24	0	94
				Maegon	171	714	333	0	412
				Pamlabi	276	1034	162	0	497
				Kotgarh	180	686	266	4	294
				Bhareri	61	299	128	0	158
				Jahal	75	424	197	0	224
26	St13	Shimla	Kumharsain	Kowahra	36	203	90	0	132
				Mann	20	106	25	0	57
				Khekhar	29	113	19	2	59
				Kolla	37	131	25	0	123
				Kui	107	574	74	4	318
				Panchi	53	264	19	0	198
				Shalota	82	410	107	0	332
				Degri	13	83	0	0	41
				Khaner	33	153	23	0	113
				Degri	13	83	0	0	41
				Kalmo	39	199	199	0	179
				Dhanal	91	429	178	0	255
				Malendi	69	293	132	2	189
				Naula	26	113	51	0	75
				Luso	14	50	24	0	31
				Chalan	67	227	104	0	121
				Baiara	23	130	40	0	58
				Lathi	46	228	8	0	132
				Mateog	21	96	0	0	35
				Mahoo	14	61	28	0	34

27	St14	Shimla	Kumharsain	Bargal	54	323	55	0	197
				Bara Gaon	190	920	205	0	483
				Sapela	26	127	0	0	63
				Jhamol	38	183	38	0	87
				Teshan	40	195	47	0	148
				Parashan	36	153	100	0	114
				Bagthal	22	86	0	0	36
				Gonthla	31	155	69	0	76
				Bhareri	61	299	128	0	158
				Bareada	11	54	0	0	27
				Kathain	37	197	4	0	124
				Manan	9	54	42	0	24
				Dugri	13	83	0	0	41
28	St15	Shimla	Kumharsain	Barwhagh	51	191	89	0	93
				Chamar	11	64	0	0	41
				Banehar	90	494	91	0	283
				Thachi	6	22	0	0	21
				Taleh	24	107	31	0	79
				Bhath	15	102	11	0	64
				Barog	80	340	79	0	192
				Goneog	20	102	61	0	58
				Batara	23	130	10	0	58
				Deoridhar	33	158	12	0	115
29	St17	Shimla	Kumharsain	Kanda	36	212	11	0	132
				Kowahra	36	203	90	0	132
				Chekar	12	71	0	0	42
				Bhawana	33	200	87	0	94
				Bagthal	22	86	0	0	36
				Chamala	27	156	86	0	90
				Kholwi	37	213	0	0	132
				Jajeli	53	219	169	0	138
				Magra	98	453	37	0	259
				Kholwi	37	215	0	0	132
				Jajeli	53	219	169	0	138
				Ropa	19	77	64	0	26
				Bhasa	52	235	39	0	157
				Chajal	28	140	17	0	91
				Kangal	76	329	189	0	199
				Shaidri	29	128	9	0	88
				Tha	20	132	6	0	73
				Bagain	13	65	55	0	39
30	St18	Shimla	Kumharsain Theog	Ghogsi	10	59	0	0	47
				Kanda	36	212	11	0	132
				Thana	22	140	0	0	81
				Shanehan	41	169	3	0	44
				Bagain	13	65	55	0	39
				Ana	67	359	187	0	210
				Nagali	3	29	0	0	19

				Dekali	19	100	23	0	67
				Karali	9	52	12	0	37
				Dakoin	33	170	94	0	125
				Kiyara	38	172	144	0	104
				Dhar	67	323	86	0	202
				Thathal	42	216	65	0	128
				Jangal Kalta	2	10	0	0	7
				Karali	51	242	34	0	183
31	St19	Shimla	Kandaraun	Bagain	56	273	117	0	188
			Theog	Pandoo	30	129	24	0	82
			Seoni	Shali	44	226	70	0	183
				Makleg	5	34	12	0	20
				Kayalu	32	159	85	0	99
				Bagain	7	37	5	0	22
				Khawal	10	79	0	0	39
				Chauki	51	228	20	0	131
32	St20	Shimla	Seoni	Malgi	52	184	55	0	124
				Bathora	53	274	26	0	169
				Newal	8	38	17	0	23
				Rewag	47	283	19	0	216
				Dharogra	94	471	86	0	298
				Dhano	14	69	0	0	25
				Banona	42	203	24	3	119
				Bharara	16	100	0	0	61
				Gadheri	136	628	224	0	343
				Sandoa	101	468	106	0	274
				Golon	19	91	41	0	47
33	St21	Shimla	Seoni	Ogli	54	249	18	0	167
				Manad	22	102	6	0	69
				Kothi	30	133	59	0	83
				Sal	35	168	103	0	99
				Taleh	24	107	31	0	79
				Thara	70	299	248	0	173
				Bagri	37	175	1	0	81
				Himri	41	222	37	0	134
34	St25	Shimla	Seoni	Lanoo	45	240	33	0	124
				Chehri	75	337	30	0	213
				Chauki	51	228	20	0	131
				Kloh	28	150	10	0	113
35	St26	Shimla	Seoni	Bharara	64	339	62	0	233
				Grano	18	81	2	0	48
				Sal	35	168	103	0	99
				Matog	21	96	0	0	35
				Narar	20	92	8	0	37
				Mandap	27	133	90	0	62
					32232	147198	45511	2455	83065

Table 3.3 Demographic Profile of Luhri Catchment Area Villages (Kullu)

S.No.	Sub-Watershed	No. of Villages	District	Tehsil	Village	No. of Households	Total Population	Total SC	Total ST	Total Work Force
1	Bk1	1	Kullu	Ani	Bachher	469	2327	694	1	1085
2	Bk2	Nil	Kullu							
3	Bk3	Nil	Kullu							
4	Bk4	1	Kullu		Kangash	495	2484	1029	0	1508
5	Bk5	Nil	Kullu							
6	Bk6	Nil	Kullu							
7	Bk7	3	Kullu	Ani	Bohal	13	49	0	0	22
			Mandi	Thunag	Khair	9	35	0	0	21
					Khair	9	35	0	0	21
8	Bk11	1	Kullu	Ani	Karad	464	2438	729	0	1420
9	Bk12	1	Kullu	Ani	Karuna	497	2510	623	0	1264
10	Bk13	1	Kullu	Ani	Dalash-Sui-Dhar	474	2092	600	0	1408
11	Bk14	6	Mandi	Karsog	D.P.F.Shashan	36	175	0	0	148
					Shashan	17	108	0	0	80
					Shaong	23	146	0	0	118
					Balot Sarahudi	62	336	26	0	193
					Koti	12	86	0	0	50
					Fercon	65	294	105	26	165
12	Kg1	Nil	Kullu	Nermand						
13	Kg2	Nil	Kullu	Nermand						
14	Kg3	Nil	Kullu	Nermand						
15	Kg4	1	Kullu	Nermand	Shili Kote	398	1918	628	0	1110
16	Kg5	1	Kullu	Nermand Banjar	Sarahan	153	651	107	0	389
17	Kg6	5	Kullu	Nermand	Arsu	249	1436	712	1	869
					Bari	244	1160	426	0	786
					Sahach	284	1475	773	0	837

					Keti	215	1085	409	0	599
					Dethua	292	1533	940	1	684
18	Kg7	1	Kullu	Nermand Ani	Nare	280	1333	730	0	797
19	Kg8	Nil	Kullu	Nermand						
20	Kg9	1	Kullu	Nermand	Nermand	1380	6200	2933	32	3436
21	St1	3	Kullu	Nermand	Pashana	773	3522	1368	63	1564
22	St3	12	Shimla	Rampur	Brau	425	2036	313	242	1080
					Badgran	361	1631	433	217	1081
					Rampur	133	711	266	0	404
					Shanori	129	713	314	0	311
					Uru	45	220	39	0	125
					Kalea	73	382	179	0	166
					Karali	80	379	212	0	205
					Thana	12	68	0	0	29
					Dhar	59	306	244	0	152
					Jagani	137	706	289	0	362
					Dansa	129	595	161	0	526
					Khakhrola	109	571	332	3	289
23	St4	1	Shimla	Rampur	Basi	114	636	299	5	318
24	St5	Nil	Kullu	Nermand						
25	St6	1	Kullu	Nermand Ani	Tandi	241	1351	250	0	759
26	St7	2	Kullu	Ani	Dulash-Sui-Dhar	474	2092	600	0	1408
					Tandi	241	1351	250	0	759
27	St9	Nil	Kullu	Ani						
						9725	47016	17055	591	26548

Table 3.4 Demographic Profile of Luhri Catchment Area Villages (Mandi)

S.No.	Sub-Watershed	No. of Villages	District	Tehsil	Village	No. of Households	Total Population	Total SC	Total ST	Total Work Force
1	Bk7	3	Kullu	Ani	Bohal	13	49	0	0	22
			Mandi	Thunag	Khair	9	35	0	0	21
					Khair	9	35	0	0	21
2	Bk8	Nil	Mandi	Thunag						
3	Bk9	Nil	Mandi	Karsog Thunag Karsog						
4	Bk10	3	Mandi	Karsog	Bagend	90	470	44	0	259
					Khanerg	49	242	22	0	132
					Tharnai	37	224	0	0	172
5	Drg1	9	Mandi	Karsog	Bagshad	129	682	338	0	364
					Behl	148	668	229	0	341
					Ropri	33	152	94	0	82
					Mathiana	66	436	1	0	227
					Saror	8	50	31	0	31
					Thakar Thana	114	602	266	0	331
					Kangru	83	479	194	80	230
					Naloh	55	233	6	0	127
					Dareli	35	169	117	0	87
6	Drg2	8	Mandi	Karsog	Saror	8	50	31	0	31
					Richhai	40	206	55	0	127
					Boki	79	384	194	0	217
					Bagail	52	309	98	0	168
					Bhurthi	24	126	58	0	67
					Batoa	9	50	0	0	42
					Seri	40	200	16	0	111
					Jawa	49	256	15	0	212
7	Drg3	15	Mandi	Karsog	Pokhi	59	310	58	0	152
					Rashog Abbal	39	200	0	0	151
					Rashog Dayan	86	367	133	0	192
					Purla	43	314	25	0	244
					Bhanol	29	157	33	0	84
					Chehar	32	172	118	0	88

					Shalag	3	17	0	0	7
					Tehan	117	569	147	0	328
					Kothi	17	71	1	10	39
					Nichli Begli	1	9	0	0	5
					Bhora	17	85	0	0	42
					Maheg	48	239	8	0	123
					Batoo	9	50	0	0	42
					Mahwan	93	548	3	0	427
					Kher	51	237	92	0	159
8	Cg1	2	Mandi	Karsog Nihri	**Sanohal**	25	140	55	0	62
					Tikkar	3	8	0	0	3
9	Cg2	1	Mandi	Karsog Thunag	**Basthal**	168	756	313	0	422
10	Cg3	17	Mandi	Karsog	**Sarkol**	22	100	12	0	31
					Bakhrout	93	480	43	4	131
					Karsog	396	2280	500	30	826
					Chanoli	2	12	0	0	7
					Chameg	37	188	67	0	65
					Sauna	77	408	143	0	228
					Chalaru	23	133	89	0	37
					Bagalo	69	403	314	0	116
					Dabrot	95	562	9	0	280
					Bhanera	99	549	286	0	289
					Shaong	34	225	0	0	112
					Dabrot	95	562	9	0	280
					Chalauni	14	76	0	0	32
					Kanthari	22	133	9	0	42
					Kandah	42	181	31	0	100
					Rashog Akbal	39	200	0	0	151
					Rashog Deyam	86	367	133	0	192
11	Cg4	4	Mandi	Karsog	**Shansh**	42	257	55	0	188
					Shansh	42	257	55	0	188
					D.P.F. Tikar Karsog	24	147	0	0	68
					Sawa Mahun	47	266	11	0	145
12	8456	10	Mandi	Karsog	**Nanj**	97	510	166	59	312
					Sainj	69	395	137	0	213
					Gahr	10	68	0	0	54
					Mandi	8	29	0	0	35

					D.P.F.Gharlot	12	98	0	83	81
					Bagra	33	194	80	0	120
					Baldhar	74	365	1	0	185
					Sainji	15	72	0	0	39
					Khandeyal	6	29	0	0	15
					Koti	12	86	9	0	50
13	St22	5	Mandi	Karsog	Kashwal	12	55	0	0	35
					Phaphas	15	79	0	0	40
					Parkg	27	151	47	0	84
					Rupari	1	6	0	0	3
					Seuns	77	408	143	0	226
14	St23	6	Mandi	Karsog	Mehras	144	766	271	0	642
					Bahal	26	165	58	0	81
					Degri	99	468	192	11	226
					Lohardi	2	9	0	0	7
					Thalta	8	67	44	0	35
					D.P.F.Kahsta (B)	11	54	0	0	28
15	St24	5	Mandi	Karsog	Kund	14	79	0	0	46
					Dadhali-II	5	17	0	0	6
					Dadhali-I	1	9	0	0	5
					Gama-II	9	25	0	0	11
					Merola	12	75	13	0	34
						4424	22431	5748	277	12158

Chapter 4

PHYSIOGRAPHY AND CLIMATE

4
PHYSIOGRAPHY AND CLIMATE

4.1 INTRODUCTION

The physiography of a river basin refers to the topographic features like hills, mountains, peaks, slopes and their geographical disposition as well as drainage network, glacier cover, recent depositional and erosional landforms. Physiography has a strong control on the water cycle in basin-scale. Coupled with the climatic variables, the physiography of a region is responsible for the sediment load that ultimately gets into the high order streams of a region. Therefore, in the preparation of a Catchment Area Treatment Plan, the primary requisite is to understand the physiography of the area and the climatic factors prevalent in the basin. These aspects of the Luhri HE project region have been discussed in this chapter.

4.2 SATLUJ RIVER SYSTEM

The river Satluj originates from Rakshastal in Kailash-Mansarovar as Longchhen Khabab. After flowing for 1500 km from its headwater region the river Satluj merges with Indus river at Mithankot in Pakisthan. The river flows for 300 kms in Tibet and enters India at an elevation of 2800 m near Shipkila in Himachal Pradesh. Some of the important tributaries of Satluj are Spiti, Beas and Chenab. An estimate based on long-term data (25 years) suggests that the annual average suspended silt load at Khab is 12MCM (6 MCM from Satluj and 6MCM from Spiti), at Nathpa Dam, which is 100 km downstream of Khab, it is 16 MCM and at Bhakra, 210 km downstream of Nathpa dam, it is 35 MCM (Chopra, 2006). It is, therefore, apparent that substantial volume of silt load (19 MCM) into the Sutlej is also generated and contributed from the catchment along the 210 km stretch downstream of Nathpa dam.

In the proposed Luhri HEP region, Satluj flows from Rampur in the east to Marola village in the west (Fig.4.1). The total river stretch in the catchment is around 74 kms (from Rampur dam site to Luhri H.E. power house site, Marola) The major tributaries which join the Satluj river in the proposed CAT plan area are Nogli Gad, Kurpan Gad, Machhad Gad, Bhera Khad, Bena Khad, Dhurmu Gad and Chainra Gad. Of these, the Nogli Gad, Kurpan Gad and Machhad Gad feed water and sediments into the

proposed reservoir area of the Luhri HE project. The Behra Khad, Behna Khad, Dhumu Khad and Chainra Gad feed the Satluj river channel in the downstream stretch of the proposed dam site at Nirath.

4.3 RELIEF

The relief in the catchment varies from 620 to 5240 m. This elevational range of 4620 m was divided into twenty-two elevational bands of 200 m as shown in Fig.4.2. We observe that the elevational band 1600-1800 m has maximum land coverage area around 15.23% (23,164 ha) in the catchment. Because the lowest point in the catchment is 620 m at the Satluj riverbed and the highest point is 5240 m peak in the Nogli Gad watershed, the bottommost band is 180 m high and the topmost band is 240 m high. The former covers 8,552 ha (5.62% of the total catchment) while a minimum area of 20 ha (0.013%) is covered by the band above 5,000 m which is mostly covered with snow. Starting from the bottommost band the coverage area for elevational bands increases gradually up to 1400-1600 m band and above this an exponentially decreasing trend prevails. Since the region in the neighbourhood of 1600 m elevation in the catchment covers maximum area, this area would receive maximum rainfall.

4.4 ASPECT

The flat areas in the catchment mostly occur alongside the Sutlej river channel where large terraces have developed as well as at the mountain tops, particularly in the Guma Khad catchment (Fig.4.3). These flat areas in the catchment cover only 4.59% of the total land area in the catchment. The slopes with SW-W-NW aspect have minimal coverage in the catchment covering 3.35% of the catchment area. The slopes with NE-E-SE aspect are predominant in the catchment, which cover 32.40% of the catchment area. The NW-N-NE and SE-S-SW slopes cover 28.65% and 31.01% of the catchment area, respectively (see Fig. 4.3).

4.5 CLIMATE AND RAINFALL

In Himalaya, four main seasons can be categorized to visualize the seasonal distribution of precipitation. These are i) Snow accumulation season (Dec-Feb), ii) Snowmelt season (Mar-May/

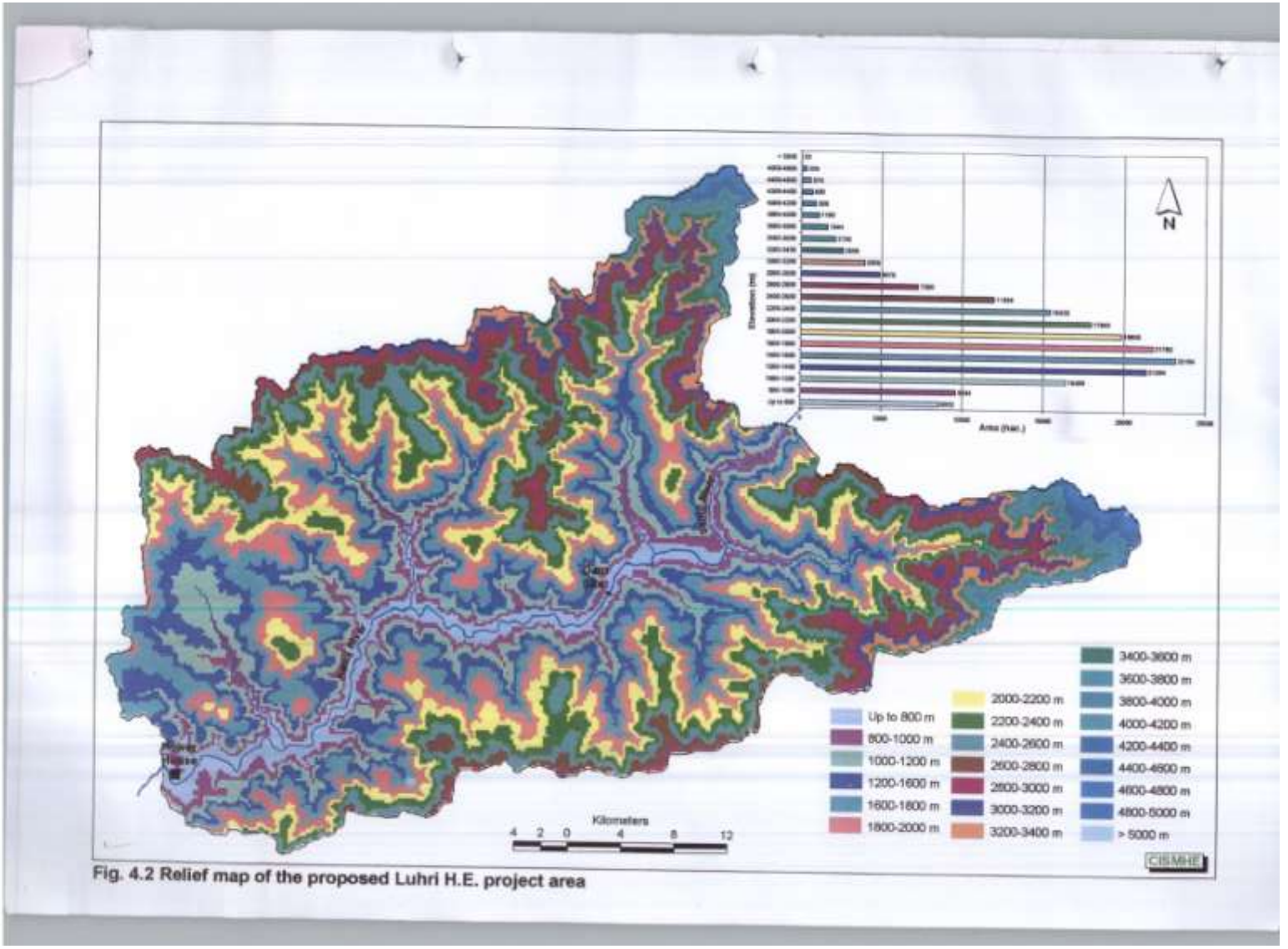


Fig. 4.2 Relief map of the proposed Luhri H.E. project area

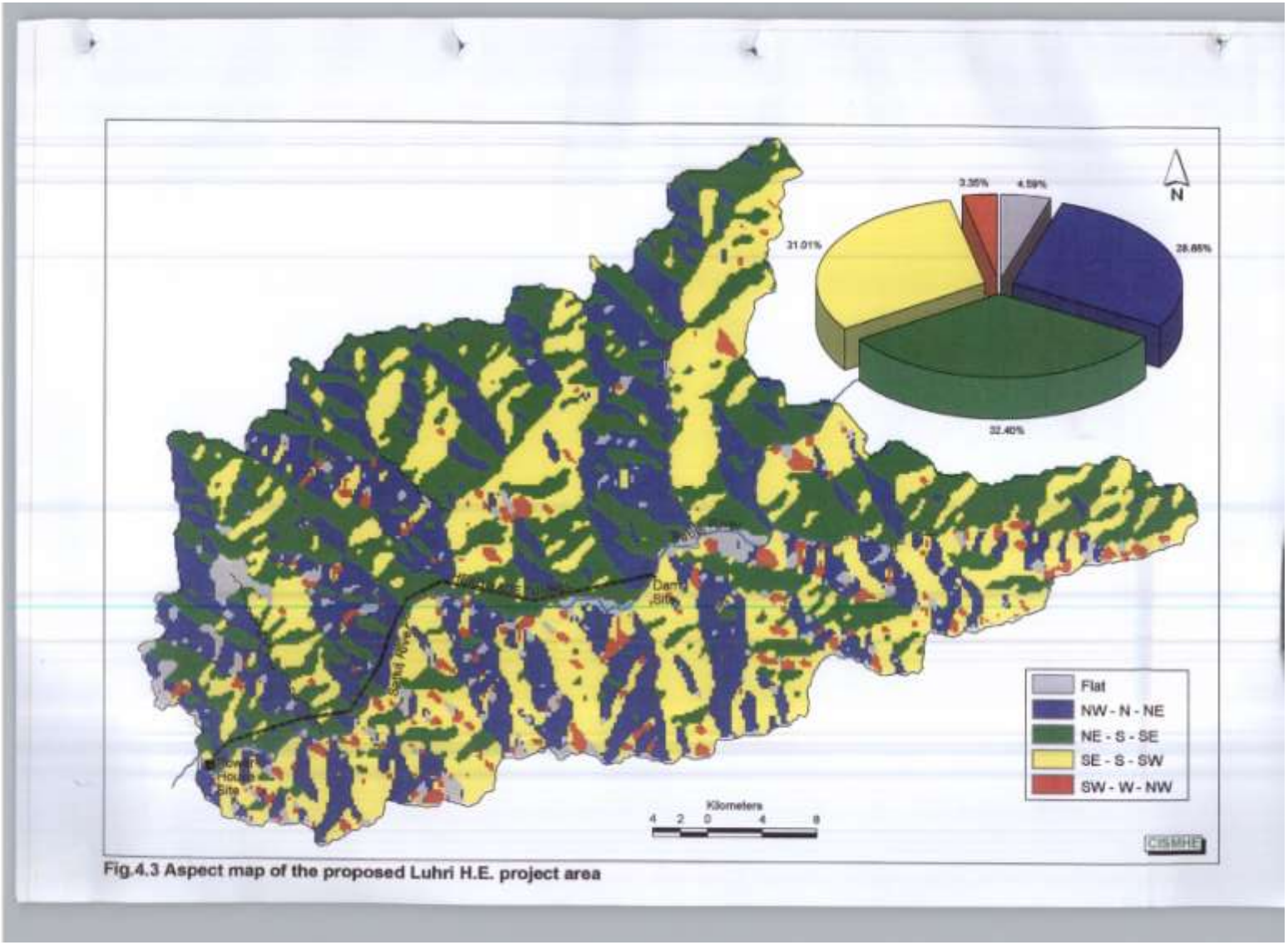


Fig.4.3 Aspect map of the proposed Luhri H.E. project area

June), iii) Monsoon season (June/July-Sept) and iv) Post-Monsoon season (Oct-Nov). The general hydrometeorological characters of these seasons are described below.

i) Snow accumulation season (Dec-Feb)

A series of western disturbances crossing into North India result in precipitation, particularly snow, during this season. These disturbances usually remain in the high latitudes and, therefore, do not influence the Himalaya. With the advancement of this season such disturbances reach 24°N latitude around January, thereby resulting in precipitation in the Himalaya. After February they normally go back to their original position beyond the Himalayan ranges. Precipitation caused intermittently by the westerlies is small as the tracks of disturbances are far away from the sea. The Himalayan ranges receive most of the annual snowfall during this season. The stream flow during this season is due to the contribution of groundwater supplemented by runoff from rain and snow melt from lower hill ranges.

ii) Snowmelt season (Mar-May/ June)

In March, the temperatures over the Himalaya start rising leading to melting of snow. By April most part of the winter snow-cover is melted away during this season. Precipitation is generally in the form of rain and snow in the higher altitudinal zones which contributes to the stream flow in addition to the groundwater. By end of April and mid May most of the Himalayan rivers start swelling with higher water discharge.

iii) Monsoon season (June-July/ Sept)

During this season immensely moist air currents from the Bay of Bengal get deflected westwards by the Eastern Himalayan ranges. While travelling along the Himalaya, this moist air results in intense rainfall in the region. The magnitude of rainfall decreases from east to west. During this season, most of the Himalayan rivers are in spate. Snow and glaciers at high altitudes continue to melt but their contribution is insignificantly low compared to the total river flows. Rainfall accentuates snow/ glacial melt, therefore, increasing water flow in the rivers manifold.

iv) Post-Monsoon season (Oct-Nov)

Clear weather prevails in this season with little or no precipitation. The river flows are entirely dependant on the inflow of groundwater into the river.

The Satluj basin in the stretch between Bilaspur in the west to Purbani in the east receives good amount of rain. The total annual precipitation for this stretch measured at different rain gauge stations is given in Table 4.1. The data indicates that highest rainfall (2291 mm) in the catchment is received at Fancha (2071 m). Upstream of Fancha the rainfall gradually decreases. In the downstream of Fancha, the precipitation is high (813 to 1974 mm) between Rampur and Theog. Further downstream, in the stretch between Shimla and Sunni, the region at higher elevation receives less precipitation and at lower elevations receives higher precipitation. The region downstream of Sunni receives high (1104 to 1228 mm) precipitation.

Table 4.1 Annual Rainfall in Satluj Basin in the stretch between Bilaspur to Purbani

Places	Rainfall (mm)	Elevation (m)
Bilaspur (Sadar)	1104	580
Bilaspur (Obs)	1226	587
Ghumarwin	1215	637
Arki	1228	1219
Suni	978	510
Shimla	320	2065
Karsog	978	1890
Theog	1040	2286
Shillaru	1280	2590
Kothgarh	963	1828
Kumarsain	813	1388
Khadrala	1974	2957
Rampur	924	1067
Fancha	2291	2071
Nichar	997	2195
Kilba	823	1707
Baspa	760	2550
Sangla	820	1986
Kalpa	673	2771
Purbani	580	2195

Source: DPR Luhri HEP (2007)

The month-wise rainfall data available at Rampur for the period 1999 to 2004 are given in Table 4.2 and plotted in Fig.4.4. This figure shows that the precipitation in the region is high during the Monsoon months (June to September) with the peak during July. The maximum monthly rainfall goes up to 350 mm in July and the variation in precipitation is large for the monsoon months.

Table 4.2 Month-wise rainfall at Rampur for the period 1999 to 2004

Months	1999	2000	2001	2002	2003	2004
Jan	78.9	0	20	61.5	55	67
Feb	19.9	0	40	142	110	4
Mar	5.4	0	105	93	60	0
Apr	0	0	34	104	61	69
May	31.4	0	103	13	11	57
Jun	19.6	244.9	113.9	45	41.5	114
Jul	185	337.9	60	10	264	93
Aug	60.9	21.3	123.1	152	132	244.5
Sep	18.5	12.1	60	104	107	24
Oct	0	0	0	0	0	81
Nov	0	0	16	0	4	2
Dec	5.2	0	41	1	41	6

Source: CAT Plan, Rampur HEP (2005)

4.6 SLOPE

The slope map for the catchment was generated from the DEM prepared from the SRTM data (Fig. 4.5). The mountain slopes in the proposed catchment were divided into six slope categories viz. Gently sloping (0-2% slope), Moderately Sloping (2-8 % slope), Strongly Sloping (8-15 % Slope), Moderately Steep (15-30 % slope), Steep (30-50 % slope), and Very steep (>70% slope). The mountain slopes in half of the catchment area (50.23%) are moderately steep. Steep slopes cover 30.4% of the catchment. Strongly sloping and Gently sloping areas cover 7.45% and 7.10% of the catchment area, respectively. Moderately sloping areas cover 4.54% of the catchment, while very steep slopes cover only 0.28% of the catchment (see inset in Fig. 4.5). The spatial coverage of these slope types in different sub-watersheds is discussed in the following paragraphs.

4.6.1 Satluj Watershed

Twenty-six sub-watersheds alongside the Satluj river between Rampur in the east to Marola in the west have been grouped under Satluj river watershed because slopes of these watersheds directly contribute sediments into the trunk channel of Satluj. The coverage area of different slope

categories in the sub-watersheds is shown in Fig. 4.6a. Moderately steep slopes are prevalent in most of these sub-watersheds. All but St22 and St24 sub-watersheds have more than 500 ha land under moderately steep slopes. More than 200 ha area in all but St10, St11, St12, St14 and St23 sub-watersheds has steep slopes, whereas more than 100 ha lands in all but St2, St6 and St22 sub-watersheds are in strongly sloping areas. Areas with very steep slopes have lesser coverage, the maximum coverage of 54 ha being in St1. Such areas have lower coverage (<15 ha) in the sub-watersheds St2, St3, St16, St17, St19, St20 and St21, and are absent from the remaining sub-watersheds. More than 100 ha lands in all but St1, St2, St14, St15 sub-watersheds have gentle slopes. Amongst all the sub-watersheds, the St23 has the maximum coverage area for different slope categories viz. gently sloping (759.59 ha), strongly sloping (317.75 ha) and moderately sloping (923.58 ha). Maximum coverage of steep and very steep area is met within St1.

The sub-watershed St13 and St18 have higher coverage of strongly sloping, moderately sloping and moderately steep areas. Amongst all the sub-watersheds, maximum land of moderately sloping areas lies in St23. The sub-watershed St4 has large areas with gentle slopes in contrast to St3, which contains large strongly sloping and moderately steep areas.

4.6.2 Nogli Gad Watershed

This watershed is divided into six sub-watersheds, viz. Ng1, Ng2, Ng3, Ng4, Ng5 and Ng6. The coverage area of different slope categories in these sub-watersheds is shown in Fig. 4.6b. In sub-watersheds Ng4 and Ng5 more than 100 ha land are gently sloping. There are more than 150 ha of land in each of Ng1, Ng2, Ng3 and Ng5 sub-watersheds under strongly sloping category. In Ng1, Ng2 and Ng5 sub-watersheds more than 80 ha land are under moderately sloping category. More than 1000 ha land in all but Ng4 (847.69 ha) sub-watershed has moderately steep slopes. While more than 100 ha land in all the sub-watersheds are under steep slopes, in Ng1 and Ng2 more than 120 ha are under steep slopes.

Amongst all the sub-watersheds, Ng5 has largest land coverage for gently sloping (139.45 ha), strongly sloping (293.52 ha), moderately sloping (146.07 ha) and moderately steep (2441.08 ha) areas. On the other hand, the sub-watershed Ng1 has the largest coverage for steep (3123.56 ha) and very steep (128 ha) areas. Major part of Ng2 is under strongly sloping, moderately sloping, steep and very steep areas. The sub-watershed Ng4 also has large areas under gentle slopes.

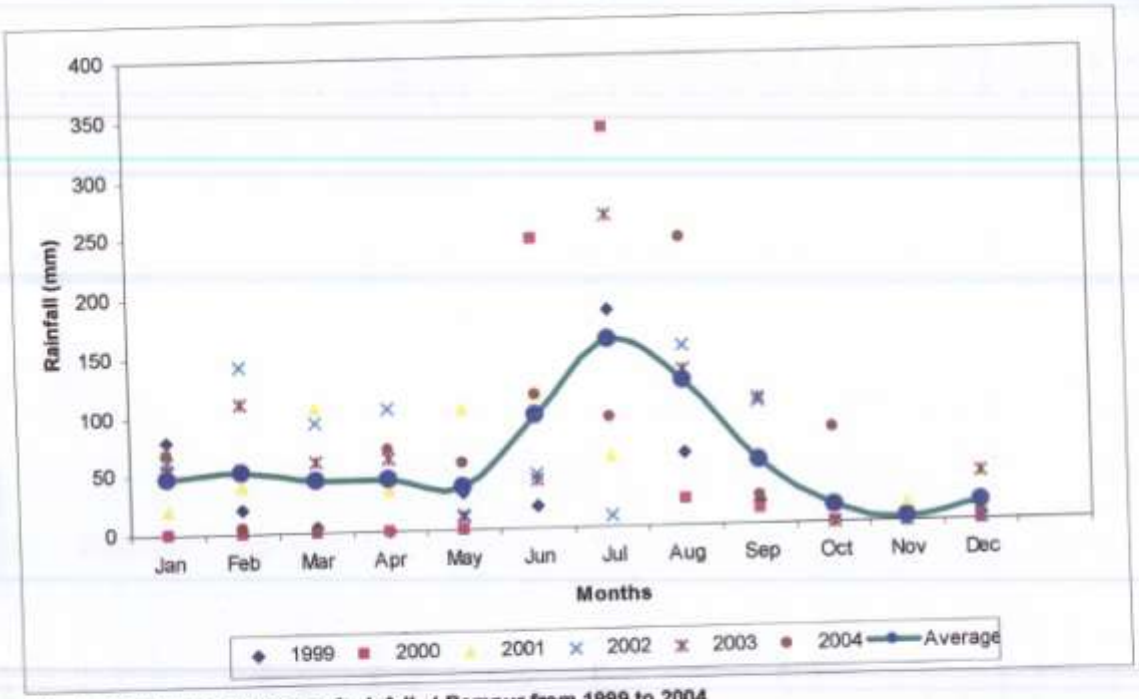


Fig. 4.4 Month-wise variation of rainfall at Rampur from 1999 to 2004

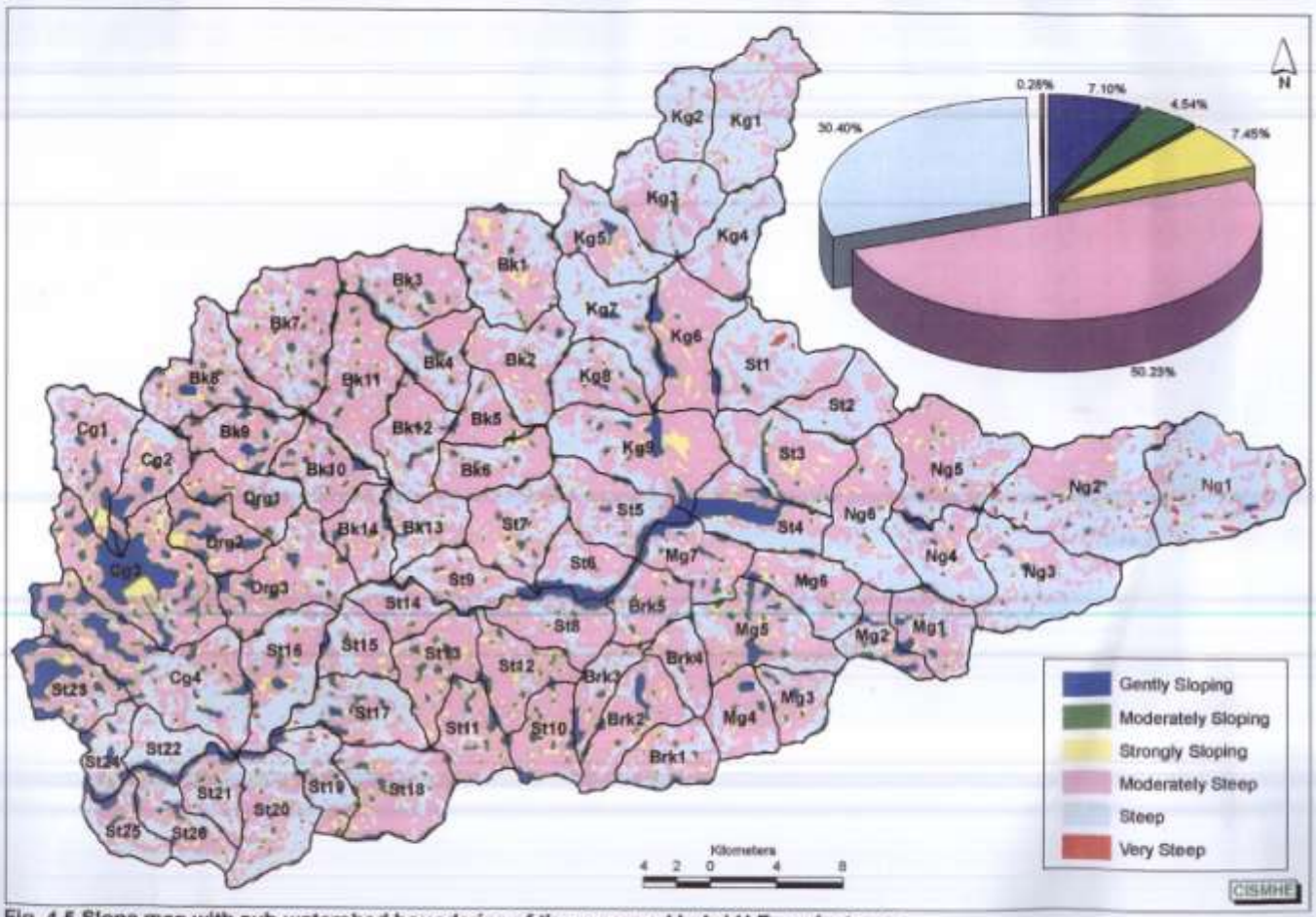


Fig. 4.5 Slope map with sub-watershed boundaries of the proposed Luhri H.E. project area

4.6.3 Kurpan Gad Watershed

This watershed has been subdivided into eight sub-watersheds, viz. Kg1, Kg2, Kg3, Kg4, Kg5, Kg6, Kg7 and Kg8. The coverage area of different slope categories for these sub-watersheds is shown in Fig.4.6c. Major part of Kurpan Gad catchment has moderately steep and steep slopes. Large areas are under gentle slopes in Kg6 and Kg7, are strongly sloping in Kg1, Kg5 and Kg6 and moderately sloping in Kg1, Kg3, Kg5, Kg6, Kg7 and Kg8 sub-watersheds. Large areas in Kg1, Kg3 and Kg6 are under moderately steep slopes. Large areas under steep slopes are in sub-watersheds Kg1, Kg3 and in Kg7. The sub-watersheds Kg5 and Kg7 have substantial areas under very steep slopes. The sub-watershed Kg3 has only 3 ha area in this category and others do not contain steep slopes.

Among these sub-watersheds, major area under steep slopes lies in Kg1 while under very steep slopes in Kg5. The sub-watershed Kg6 has maximum coverage in moderately steep category. This sub-watershed also has the highest coverage under gently sloping, moderately sloping, strongly sloping and moderately sloping areas.

4.6.4 Machhad Gad Watershed

This watershed has been divided into seven sub-watersheds named as Mg1, Mg2, Mg3, Mg4, Mg5, Mg6 and Mg7. The coverage area in different slope categories for these sub-watersheds is shown in Fig.4.6d. Large area of this watershed has moderately steep and steep slopes. More than 100 ha land in sub-watersheds Mg1, Mg2, Mg5 and Mg7 are gently sloping. In each of the sub-watersheds Mg1, Mg5, Mg6 and Mg7 more than 150 ha land is strongly sloping. More than 100 ha land in Mg1, Mg2, Mg5 and Mg7 are moderately sloping. Major portion in each of the sub-watersheds Mg1, Mg4, Mg5, Mg6 and Mg7, covering more than 1000 ha, has moderately steep slopes. More than 300 ha land in each sub-watershed is under steep slopes. Such areas exceed 600 ha in Mg5 and Mg6 sub-watersheds.

Among all the sub-watersheds, Mg5 has the largest coverage under strongly sloping (339.15 ha), moderately sloping (227.73 ha), moderately steep (1946.28 ha), steep (695.62 ha) areas. In this sub-watershed, 249.39 ha land is gently sloping. The sub-watershed Mg7 has largest gently sloping area, which covers 275.52 ha. More than 600 ha land in Mg6 is under steep slope.

4.6.5 Bhera Khad Watershed

In this watershed there are five sub-watersheds, namely Brk1, Brk2, Brk3, Brk4 and Brk5. The coverage area in different slope categories for these sub-watersheds is shown in Fig.4.6e. Major portion of these sub-watersheds is under moderately steep and steep slopes. Large areas in Brk2, Brk3 and Brk5 are gently sloping. Moderately sloping areas predominate in Brk1, Brk2 and Brk3. Strongly sloping areas are substantial in sub-watersheds Brk1, Brk2 and Brk5 while good coverage of gently areas are in Brk2, Brk3 and Brk5.

Among these sub-watersheds, Brk2 has largest for gently sloping, moderately sloping, strongly sloping and moderately steep areas. The steep slopes predominate in Brk1 with coverage of 584 ha and has also good coverage (396.01 ha) in Brk3.

4.6.6 Beha Khad Watershed

There are 14 sub-watersheds in the Beha Khad watershed namely Bk1, Bk2, Bk3, Bk4, Bk5, Bk6, Bk7, Bk8, Bk9, Bk10, Bk11, Bk12, Bk13 and Bk14. The coverage area in different slope categories for these sub-watersheds is shown in Fig.4.6f. Large coverage in Bk1, Bk3, Bk7, Bk8 and Bk11 sub-watersheds are under moderately sloping and moderately steep areas. The sub-watershed Bk7 has largest coverage for these areas. In Bk1, area with moderately steep slopes is very large (2333.80 ha). Area under very steep slopes covers only 6 ha in Bk7. The sub-watershed Bk11 has largest coverage for gently sloping, strongly sloping, moderately sloping, moderately steep and very steep areas while Bk8 has largest coverage for gently sloping areas. Large areas in these sub-watersheds are under steep and moderately steep slopes.

4.6.7 Dhurmu Gad Watershed

Dhurmu Gad watershed has been subdivided into three sub-watersheds Drg1, Drg2 and Drg3. The coverage area in different slope categories for these sub-watersheds is shown in Fig.4.6g. In these sub-wartersheds, area under moderately steep slope is maximal (2093.81 ha) in Drg3. Large areas in Drg2 and Drg3 are gently sloping, strongly sloping and moderately sloping. The sub-watersheds Drg1 and Drg3 have large areas under moderately steep and steep slopes.

Large portion of Drg3 is under strongly sloping (376.10 ha), moderately sloping (215.76 ha), and steep (449.91 ha) areas. The sub-watershed Drg1 has 384.78 ha area under steep slopes while Drg2 has 317.64 ha under gentle slopes.

4.6.8 Chainra Gad Watershed

There are four sub-watersheds in Chainra Gad watershed namely Cg1, Cg2, Cg3 and Cg4. The coverage area in different slope categories for these sub-watersheds is shown in Fig.4.6h. In these sub-watersheds there is large coverage under all but moderately sloping areas. The gently sloping areas predominate in Cg3 and Cg4, whereas, the strongly sloping areas dominate in Cg1, Cg3 and also in Cg4. The areas with moderate slopes is maximal (917.78 ha) in the sub-watershed Cg4. The moderately steep areas dominate in all the sub-watersheds. Steep areas dominate in Cg1 and Cg4. Maximum coverage under gently sloping (1379.82 ha), strongly sloping (818.38 ha), moderately sloping (818.38 ha) areas is in the sub-watershed Cg3, which also has substantial areas measuring 2485.68 ha under moderately steep slopes.

4.7 DRAINAGE DENSITY

Most of the sub-watersheds have drainage density above 3 km/km^2 (Fig.4.7). Only four sub-watersheds – Ng5, Ng6, St2, St25 – have drainage density above 4 km/km^2. Similarly, three sub-watersheds – Ng2, Kg3, Kg5 – have drainage density below 2 km/km^2. Goodrich (1991) found a drainage density of approximately 0.65 to 1.52 km/km^2 for watersheds greater than 1 hectare was adequate for kinematic runoff modelling in semi-arid regions which usually receives annual rainfall of 500 to 2000 mm. For these reasons the high drainage density in most of the sub-watersheds of the study area indicate that these sub-watersheds would contribute huge quantities of sediments into the trunk streams, particularly during the rainy seasons.

4.8 DRAINAGE NETWORK IN MAJOR WATERSHEDS UPSTREAM OF THE DAM SITE

Three major tributary streams named Nogli Gad, Kurpan Gad and Machhad Gad drain into the Satluj river channel in the proposed reservoir area of the Luhri HEP. From CAT plan perspective these watersheds are important because they are likely to generate and contribute huge amount of sediments into the reservoir, particularly during the rainy season. The drainage network in each of these watersheds is discussed in detail in the following paragraphs. The drainage network from

headwater regions to the confluence points with Satluj, different reaches of these tributary streams have been discussed in detail considering their potential for bringing sediments into the trunk stream.

4.8.1 Nogli Gad Watershed

Nogli Khad is a snowfed and rainfed stream. In its initial course it flows from east to west between Jalsu Thorna – Buj Dhar – Pal Dhar – Tracha Dhar – Krunshi Kharag Dhar ridge in the south and Gangdapi Dhar – Jang Dhar – Dhaola Dhar ridge in the north. It originates as Sageti Gad in the east of 5236 m peak on Kumashi Kharang Dhar.

Headwater Region

In the headwater region the Nogli Khad flows southward from 4600 m as Sageti Gad in the valley between Satmal Dhar in the west and Kumshi Kharang Dhar in the east. At 3600 m it receives water from another snowfed and springfed stream flowing on the western slope of Krunshikring (5088 m) peak. Then it flows towards southeast. There is no vegetation in this stretch above 3400 m. The river takes a westward turn at 3240 m. At 3160 m the Sageti Gad receives water on its right bank from a stream originating from the southeast slope of Hansbeshan (5240 m) peak. This stream flows in the valley between Ratonal Dhar in the west and Satmal Dhar in the east. The river maintains westward course up to 2960 m elevation and then turns towards northeast up to 2600 m. At 2600 m it receives water from Dev Ka Pani on its right bank.

Devka Pani

It is a snowfed and springfed stream which has its headwater region on the southwestern slope of Gangdapi Dhar. It flows from 5148 m and drains the barren rocky land up to 3200 m. Below 3200 m, the catchment is thickly vegetated. At 2650 m it receives water from a stream flowing from Ratonal Dhar. This stream drains the barren rocky land (from 4320–3000 m). Below 3000 m it drains a thick pine forest region.

Sageti Gad Channel from 2600 m to 2155 m

Between 2600 to 2155 m Sageti Gad drains the thick pine forest regions on its either bank. The Dogrodansa forest lies in the left and the Raungcha forest lies in the right. Three perennial streams draining the western slopes of Bujdhar and Paldhar join the Sageti Gad between 2600-2155 m on its left bank. On the right bank there are three seasonal streams. The easternmost left bank stream in this

stretch flows from 4308 m peak on Paldhar and draining the Wajor Thach region confluences with Sageti Gad at 2480 m. The central Setlu Nala originates from 3930 m peak on Buj Dhar and flows towards north. Draining the slopes of Dogri Dansa forest area it confluences with Sageti Gad at 2320 m. The westernmost stream in this elevational range is small. Flowing from 3315 m peak it confluences with Sageti Gad at 2040 m.

Among the right bank seasonal streams, the one joining at 2330 m is important. This is a small seasonal stream which originates on the eastern slope of Thana Ki Dhar in the Pat forest region. It drains the cultivable terraces and barren lands around Chhelta and Koaho. This stream drains the cultivable terraces and therefore has potential to increase the sediment load during rainy season.

Katri Gad

Katri gad confluences with Sageti Gad on its right bank at 2155 m. It is a snowfed and springfed stream which flows from 3600 m. Its catchment is barren above 3320 m. It drains Raungcha forest areas on its left bank and the Pat forest areas on its right bank. In the lower reaches on its right bank there are barren rocky lands and cultivable terraces near Kashoo, Chheta and Sarnal. This stream flows between Tichake (3993 m) peak on the east and Kang Dhar on the west in its upper reaches.

Sageti Gad between 2155m and 1450m

In this stretch three perennial streams join Sageti Gad on its left and one on its right. The left bank is mostly covered with thick forest of Dogri Dansa. Thick patches of Pat and Punar forests occur in the upper reaches of the Dhaula dhar on the left bank. In the lower reaches below 3000 m it drains the barren rocky land and cultivable terraces around Kasha, Chhelta, Sharnal, Kandi, Saurakhal Dogri, Pat and Puna Dogri.

Left Bank

Chhu Witri

It is a springfed and snowfed stream and drains a bowl shaped region between Janijot Dhar in the northeast and Buj Dhar in the south and southwest. It drains the thick pine forest region of Dogri

Dansa and passing through 122 m and 91 m high falls in the lower reaches confluences with Sageti Gad at 1935 m on its left bank.

Another small springfed stream draining the Dogri Dansa forest region, flowing from 3000 m confluences with Nogri (Segati) Gad at 1930 m on its left bank about 130 m downstream of Chhu Witri confluence.

Bankadari Nala

It is a small springfed stream which flows from Sharnu pass (2860 m) and draining the Dogri Dansa forest area confluences with Nogri Gad at 1840 m.

Right Bank

In the right bank a perennial stream draining the Pat protected forest in its upper reaches and Punar forest in the lower reaches as well as barren rocky lands and cultivated terraces around Puna Dogri, confluences with Nogli Gad at 1830 m on its right bank.

In the upstream of Chhu Witri confluence another seasonal stream joins Nogli Gad at 500 m upstream of Pat village. It drains the Pat protected forest in its upper reach.

Sartu Gad

This is a large snowfed and springfed stream flowing in the north of Ranipatagan Thach – Taganbaw Thach – Biti Chappar – Jalsu Thona (Lodar Thach) range. It drains the Darkali forest in the upper reaches and Gandla forest in the lower reaches and joins Nogli Gad at 1450 m.

In the upper catchment of Sartu Gad, Rutadori Gad, flowing from 4331 m peak at Jhalso Ghato, confluences with Dhori Gad at 2195 m. Both the catchments are covered with thick pine forest. After the confluence, the stream flows as Sartu Gad. Belo. 2195m Sartu Gad flows towards northwest as a straight channel. On its right bank, are the thickly vegetated steep slopes of Davtikar Dhar ridge. The left bank slope is gentler and the tributaries flowing on this slope drain the cultivated terraces of Darkali, Palit Dogri and Marola.

At the northwestern slope of the Davtikar Dhar, a stream named Dogli Gad confluences with Sartu Gad on its left bank. Dogli Gad flows from Jaraida (3781 m) peak and Maral Kanda (3732 m peak) and drains the Dar Kali forest region. At the southeast of Daleud Dogri it passes through an arcuate valley and drains into Sartu Gad at 1910 m.

In the downstream, Sartu Gad drains the cultivated terraces of Kukhi, Chultidhar Dogri and Radoll. Below 1800 m it drains the thick oak (banj) forest region of Gandla protected forest and confluences with Nogri Gad at 1450 m on its left bank at the southwestern end of Wirni Dhar ridge.

Thar Gad

This is a northeast-southwest flowing stream with a high gradient. It originates in the southwestern slope of 3170 m peak on Dhaula Dhar range and confluences with Nogli Khad on its right bank at 1440 m. Wirni Dhar is located on its left and its left bank slope is very steep. This Wirni Dhar ridge is covered with thick mixed jungle with dominance of pine constituting the Kotla forest. In the upper reaches on its right bank it drains the pine forest region of the Munich West forest, and in the lower reaches (<1800 m) it drains the barren land and cultivable terraces around Munish, Bahli and Jongani and confluences with Nogri Gad at 1440 m. In the downstream of Thar Gad, Nogri gad flows as Nogli Gad.

Targali Khad

Targali Khad confluences on the right bank of Nogli Khad at 1370 m. This is a springfed stream which flows in its headwater region as Bati Gandri Khad. Most part of the catchment of Targali Khad is covered with settlements and agricultural fields. Only on the left bank of this stream between Dabir Kalepi Khad and Bari Khad confluence there are patches of forests composed of pine. The villages present on its left bank are Kuhl, Chalni, Patena, Dini, Shegal, Thala, Barkal, Matalina, Urmen, Bahl Bari and Pad. The villages present on its right bank are Chiksa, Majhali, Kamsari, Jughol, Deothi, Chabi, Latehid, Sum, Shaphata, Dabri, Shil, Nog, Khun, Parandli, Oli, Gohra, Jndal, Kim, Pharog, Kareri, Anua, Basa, Anu, Rakhshi. Dabir Kalupi Khad and Bari Khad drains the pine forest region and joins the Targali Khad at 2030 m and 1520 m, respectively on the left bank.

Ghataguli Gad

This is a springfed stream which drains the Darkali protected forest in its upper reaches and Taklech protected forest in the lower reaches. It flows from 3120 m and confluences with Nogli Gad on its left bank at 1255 m. Above 1800 m the catchment is thickly forested. On the left bank it is separated from Silri gad catchment by northwest-southeast trending Balti Dhar and Bhosnu Dhar. Below 1800 m there are some cultivable terraces and settlements on either bank of Ghataguli Gad. The villages located on its left bank are Damral, Theda, Chikhri, Devdhar, Bata Newal, Karobar, Salari, Sarot, Khanortu and Khamrala. The villages located on the right bank are Taklech, Ketu, Syarta, Majhal and Kalricha Dogri.

Nogli Gad between 1255 m and 1150 m

In this stretch the Nogli Gad drains the thick forest region of Khanortu protected forest and Rajpur protected forest and agriculture fields and barren lands around Khanortu, Devdhar, Karopar, Shalari, Sarot, Khamrala on the left bank. On the right bank, it drains Darahal protected forest and cultivable terraces of Maten and Darshal.

Sahreda Gad (1150 m)

It is a springfed stream which confluences with Nogli Gad on its right bank at 1150 m opposite to Chatari. It originates from Shikar (3085 m) peak. The right bank of Shareda Gad contains barren rocky land and cultivable terraces in the lower reaches. Ban hauri Nal and Darahal protected forests lie on the left bank of the stream.These are thick pine forests. On the left bank it also drains the cultivable terraces of Darshal. On the right bank are villages Shanjal, Sgikikhad, Khanalshini, Lambanol, batheda, Dwarsa, Pau and Larso.

Nogli Gad channel between 1155 m to 1070 m

In this stretch Nogli Gad drains the slopes of Khanirtu and Rajpur protected forests on the left bank and some cultivable terraces at Chalari. On the right bank it drains the barren slopes and cultivable terraces around Chhan, Rawan, Pao, Dwarsa and Larso villages.

Silri Gad

It is a springfed stream which originates from 3195 m peak at Kul Dhar and flowing towards northwest confluences with Nogli Gad on its left bank at 1070 m. Balti Dhar and Bhosnu Dhar occur

in its east. On the right bank it drains the slopes of Khanortu and Rajpur protected forests and on the left bank the slopes of Khetli reserved forest. The villages on its left bank are Rajpur, Gartor, Masarna, Rasindli, Kateri and Chakaru is located on its right bank.

The Stretch of Nogli Gad downstream of Silri Gad (1070 m) confluence

Three streams join the Nogli Gad in this stretch. The detailed description of these streams is given below.

Stream at 1040 m

It is a springfed stream which drains the Nogli Gad protected forest in the higher areas and cultivable terraces around Kamldu and Chhalaot and barren rockyland in the downstream. This stream confluences Nogli Gad at 1040 m on its left bank.

Stream at 965 m

It is a springfed stream which drains the Tirnali protected forest in the higher reaches and cultivable terraces around Kamldu and Chholaot on the left bank and Gartor Masorna on the right bank. This stream confluences with Nogli Gad at 965 m on its left bank.

Stream at 960 m

It is a springfed stream which drains the southwestern slopes of Sikari Dhar (2600 m) and flowing towards southwest confluences with Nogli Gad on the right bank at 960 m. Most part of its catchment is barren and cultivable land. Some part of the upper catchment is forested.

4.8.2 Kurpan Gad Watershed

It is a snowfed and springfed stream. In its initial stretch it originates as Umli Gad on the southern slope of 5048 m peak. Its catchment above 3200 m elevation is barren rocky land. In its upper catchment Garlandi protected forest is located on its left bank and Dwaridanda protected forest is located on the right. In the headwater region, three snowfed streams join together above 3700 m and feed Umli Gad. Between 2200 m and 3200 m the catchment is covered with thick vegetation.

Left Bank Streams

Stream at 3080 m

This is a snowfed and rainfed stream which flows westward from 4415 m peak and confluences with the Kurpan Gad at 3080 m. It drains the barren rocky land above 3400 m and dense forest below 3400 m.

Stream at 2370 m

This is a snowfed and rainfed stream which flows westward from 4047 m peak and draining the dense forest region of Shili Girchi reserve forest confluences with Umli Gad at 2370 m.

Dewar Gad

It is a large tributary of Umli Gad which originates from the Daradwar peak (3956 m) and confluences with Umli Gad at 1629 m. After its confluence with Umli Gad it is named as Krupan Gad. The right bank of Dewar Gad is thickly vegetated with Deodar and Banj between 3200-2400 m. Below 2400 m the right bank slope is barren with some cultivated terraces. In the left bank it drains the thick vegetated slopes of Kharyo protected forest. The forests are of deodar and banj in the upper reaches and pine and banj at the lower level. It also drains the settlements and cultivated lands at Nogt, Thana and Shill. It makes a 25 m fall at 1870 m.

Stream at 1470 m

It is a small springfed stream flowing westward from 2800 m which drains the thick forest and some cultivated terraces at Tharuwa, Dim and Khanidhar. This stream confluences with Kurpan Gad at 1470 m.

Stream at 1440 m

It is a small snowfed and springfed stream flowing from a 3571 m peak, which drains the slopes of Mul protected forest above 2400 m and cultivated terraces at Bhekwa, Pakara, Koti, Thoru, Balni and Kharui. This stream confluences with Kurpan Gad at a 1440 m.

Left bank of Kurpan Gad below 1440m

The only perennial stream in this stretch is the one confluencing with Kurpan Gad at Shanun. It is a small springfed stream which drains the cultivated terraces around Damohli, Arsu, Manthana

and Shanun. Downstream of this confluence the left bank of Kurpan Gad is thickly populated. Barring the small patch of Ramgarh Kandhi dense pine forest above 2200 m, the left bank slope is either barren rocky land or covered with cultivated terraces and human settlements.

Right Bank Streams

Stream at 2130 m

This is a snowfed and springfed stream which flows southward from 4000 m and drains the barren rocky slopes of Dwaridanda protected forest above 3400 m and dense Parali Girchi reserve forest. This stream confluences with Kurpan Gad at 2130 m.

Stream at 1880 m

A snowfed and springfed stream has its headwater region at 3400 m. In its upper reaches it drains the thickly vegetated slopes of Banagi and Dadhai protected forest and in the lower reaches (below 2400 m) the cultivable terraces at Bhagi, Jawla and Kalati. It confluences with the main stream near Jaun.

Stream at 1540 m

This is a snowfed and springfed stream which originates from 3644 m peak. It confluences with Kurpan Gad at 1540 m. In its upper catchment (>2400 m) it drains the slopes of Rachhokhari protected forest, Mandrao protected forest and Jajot reserve forest. These forests are dominated by fir. In the lower reaches it drains the cultivated terraces at Sarahan, Djaogi, Sharan, Jhalair, Bildrshal, Dharini, Datand and Chandt.

Stream at 1480 m

A small springfed stream flowing from 2280 m confluences with Krupan Gad at 1480 m. Most part of its catchment is barren and covered with cultivated terraces.

Ogan Gad

It is a small snowfed and springfed stream which originates from a 3400 m peak. In its headwater region two streams, named Aukan Gad and Kalai Gad drain the slopes of Bijli and Darad protected forests and join together at 1840 m below which the stream flows as Ogan Gad. In the region below 2200 m the left bank slope of Aukan Gad is barren and there are some cultivated

terraces at Daradi, Bijri, Budna, Shomani. Below 1840 m the barren slopes continue till the confluence of Ogan Gad with Kurpan Gad at 1400 m. On its right bank Ogan Gad drains the dense pine slopes of Lohar protected forest.

Kyali Gad

Two streams namely Bashad Gad and Batu Gad join togeiner at 1955 m and feed the main channel of Kyali Gad. The left bank slopes of Bashad Gad is barren and cultivated terraces are present on it at Eshwa, Nani, Deog, Ortu, Khaler and Koltha. On the right bank it drains the thick pine forest of Bachad protected forest and Margi Kalaun reserve forest at higher elevation and cultivated terraces at Ghatu, Gad, Jojhar, Nanchan, Dharli. The downstream catchment of Kyali Gad is almost barren on both the banks.

Kherd Gad

It originates from a peak at 3000 m. Its left bank slope is almost barren and in the right bank the Patal and Moarha Kod protected forests are located above 2000 m. It confluences with Kurpan Gad at 1110 m.

Bashwa Gad

It is a small springfed stream with its upper catchment covered with pine forests of Khaira Kud. In the lower reaches (<1600 m) both the banks of Bashwa Gad are barren. It confluences with the Krupan Gad at 1075 m. In the stretch below 1075 m, the Krupan Gad watershed is either barren rocky land or covered with cultivated terraces and settlements.

4.8.3 Machhad Gad Watershed

Machhad Gad originates from Maral Kanda (3732 m) peak and flows 23 km towards northwest and drains into Satluj at 870 m. It is a springfed and snowfed stream. Most parts of its catchment on its left bank are covered with forest. However, on the right bank a major portion is barren rocky land and vast areas are under cultivated terraces and settlements. In the initial stretch Machhad Gad flows as Seri Gad Khad, then as Gatera Khad after it receives water from Sungt Nali. Further downstream, in the region downstream of the confluence with Dhuni Nala, it flows as Machhada Khad and below 1250 m it flows for a 6 km stretch as Machhad Gad. There are a few

small right bank tributaries of Machhad Gad. The left bank catchment of this stream is wide with some large tributaries draining the area.

Right bank Streams

Stream at 2400 m

It is a springfed stream which originates at 3000 m and drains the mixed pine forest of Keran and cultivated terraces at Kareli. It confluences with the main channel at 2400 m near Mashaida.

Streams between 2400 to 1840 m

There are four small springfed streams which drain the cultivated terraces around Karali, Barandli, Karshol, Ghirna, Kunu, Narain, Mandhog, Jakhdara, Sadali and Palain. Among these, the stream joining at Palain also drains a part of Ghat reserve forest and that joining at Barandli drains the slopes of Kheran reserve forest.

Sungt Nali

This is a springfed stream. Most part of its catchment is barren and covered with cultivated terraces and settlements around Mashri and Dalog. On the left bank it drains the slopes of Ghat reserve forest. It confluences with Gatera Khad at 1840 m.

Baiharla Stream

It is a small springfed stream which drains the Jakor and Dhar reserve forests on its left bank and cultivated terraces and settlements at Bamrara, Nahra and Kotlu.

Bhut Nali

It is a small small springfed stream which drains the cultivated terraces at Paljhara and confluences with Machhada Khad at 1570 m.

Stream at 1560 m

It is a springfed stream which originates from 2760 m and drains the barren land and cultivated terraces. It joins Machhada Khad at 1560 m.

Dhuni Nala

It is a small springfed stream which drains the dense pine forest in its upper reaches and barren rocky land and cultivated terraces in its lower reaches. It drains into Machhada Khad at 1490 m.

Left bank Streams

The left bank catchment of Machhada Gad is large with some major tributaries flowing and denuding the region. A detail description of these streams is given below.

Dabrela Nali

This is a springfed stream which originates from 2920 m and confluences with the Seri Gad at 2255 m. It drains the slopes of Shapri reserve forest. Its catchment is covered with thick vegetation.

Gharat Khad

It is a snowfed and springfed stream the catchment of which is spread between 3640 to 2000 m. It drains the slopes of Dhola, Sungni and Shapla reserve forests and the settlements around Sharan. Its catchment is covered with dense pine forests. It originates as Gonda Gad and later receives water from Besir Khad.

Kopar Khad

It is a springfed stream which originates from 2960 m and confluences with Seri Gad at 1950 m. It drains the slopes of Sungri and Chobra reserve forest as well as cultivated terraces at Sungri, Jorati and Pelan.

Stream at 1830 m

It is a springfed stream which originates from 3000 m and drains the slopes of Palain, Daldar and Odigad reserve forests. It confluences with Seri Gad at 1830 m. The reserved forests in the region are dense pine forests. After the confluence of this stream with Machhad Gad, it flows as Gatera Khad.

Stream at 1770 m

It is a springfed stream originating from 2600 m and drains the slopes of Matra, Kotli and Odi Gad reserve forests. It confluences with Gatera Khad at 1770 m.

Dogar Gad Subsystem

A major part of the Machhad Khad catchment is drained by Dogar Gad. It flows from 2920 m and confluences with Machhad Gad at 1250 m. Its catchment is bounded by Bamtikri Dhar in the west, Tikar Dhar and Guni Dhar in the south and Arshell Dhar and Bati Dhar in the east.

Two streams joining together at 1840 m constitute the Dogar Khad. Above 1840 m these streams drain the slopes of Bhali reserve forest and cultivated terraces around Khamadi, Karali, Ghasghari, Bai, Gadrali and Chamara. Dogar Khad receives water from Tiri Gad at 1540 m. Tiri Gad is a small springferd stream which drains the slopes of Kungal Muji Dar reserve forest and cultivated terraces around Dhal, Dogri and Garoti. It drains the fairly dense pine forests. The streams joining Dogar Gad are discussed below.

Katrel Khad

It is a small springfed stream which originates from 2400 m and confluences with Dogra Khad at 1350 m. It drains the slopes of Surad reserve forest on its left bank and cultivated terraces and barren lands around Kaleda on its right bank.

Stream at Chakti

This is a seasonal stream which drains the slopes covered with pine forest region of Charen protected forest and Mastgarh reserve forest. In the lower reaches it drains the cultivated terraces around Dhadhara and Deori. Batan Nali and Shill Khad are the two major streams joining this stream. It flows from 2400 m and confluences with the main channel at 1340 m after traversing a distance of 3.43 km.

Stream at 1260 m

This stream flows through Byunthan protected forest and drains the barren rocky lands in the north of Naga Dhar and Nahal Dhar. It confluences with Dogar Khad at 1260 m and covers a distance of 3.34 km from 2160 m to 1260 m.

Punari Khad and Kungal Khad

These streams drain the slopes of Kungal Muidar and Punan reserve forests, join together at 1675 m and flow down to 1555 m and merge into Dogar Khad. There are cultivated terraces and settlements on the left bank of Punarikhad as well as on the right bank of Kungal Khad.

Belti Khad

Belti Khad is a springfed stream and its right bank is covered with cultivated terraces and settlements. On the left bank it drains the slopes of Kandreri reserve forest which have fairly dense pine forest. Belti Khad confluences with Dogar Khad at 1500 m.

Stream at 1460 m

Dogar Khad drains the slopes of Bhorja and Charen protected forests, Mastgarh reserve forest. Between 1500 m to 1340 m, a stream flowing between Sholidhar in the south and Chirni dhar in the north drains the slopes of fairly dense deodar forest. It confluences with Dogar Khad at 1460 m. It also drains the cultivated terraces at Shakla and Sholi and Shoog.

Stretch of Machhad Gad downstream of Dogar Khad Confluence

Dogar Khad confluences with Machhada Khad at 1250 m near Sharkot. Machhada Khad flows as Machhad Gad from Sharkot up to its confluence with Satluj river at 870 m. Within this 6 km stretch it drains the slopes covered with cultivated terraces, settlements and barren rocky lands. Machhad Gad confluences with Satluj river in the south of Hul Dhar at 870 m. In this 6 km stretch only scrubs cover the mountain slopes.

SATLUJ RIVER (a)

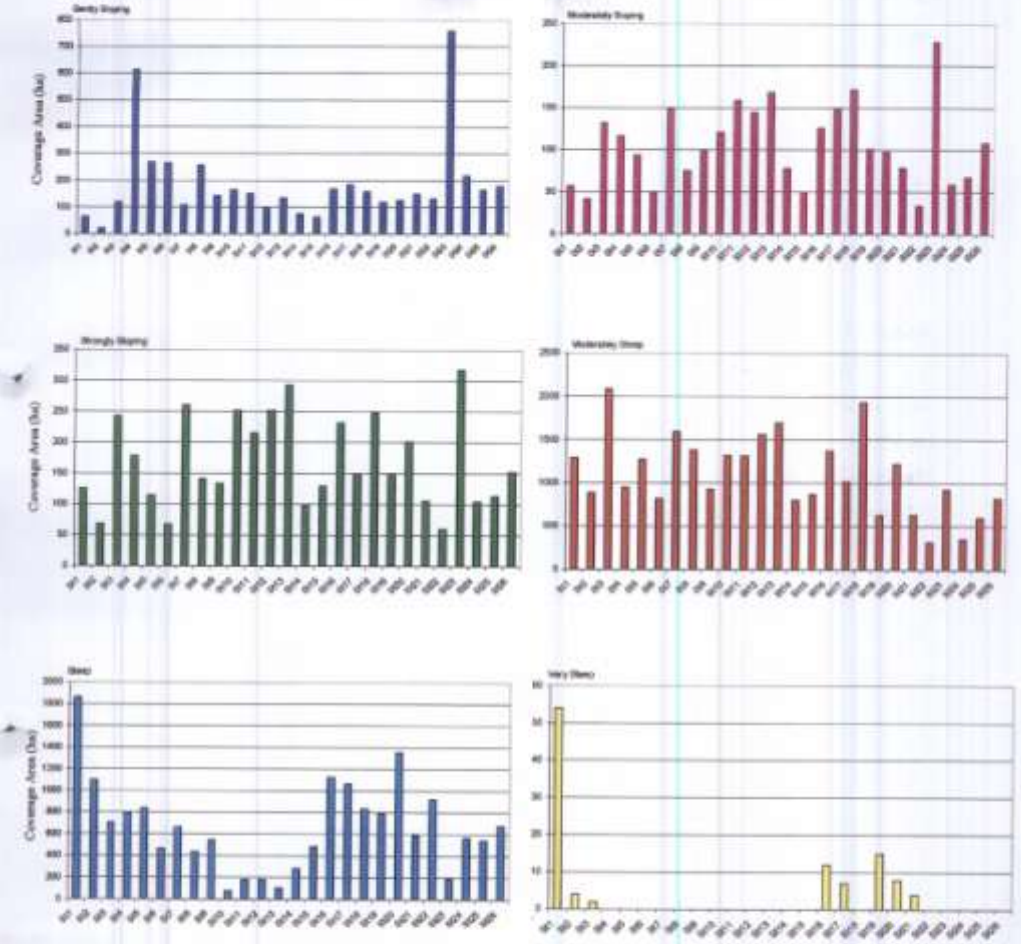
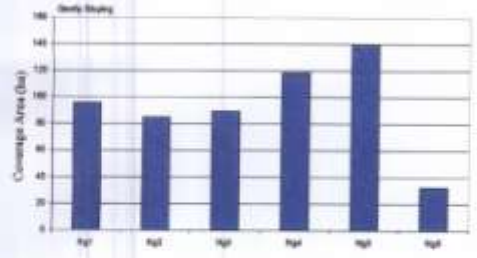
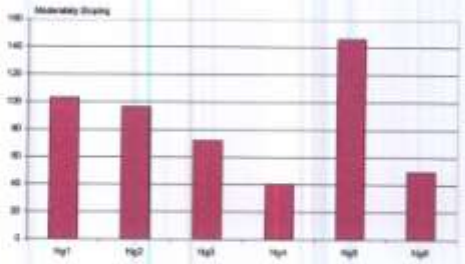
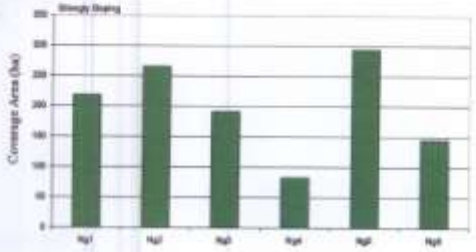


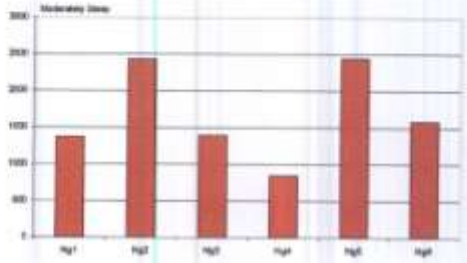
Fig.4.6 (a-h) Coverage area (ha) in different slope categories for (a) Satluj; (b) Nogli Gad; (c) Kurpan Gad; (d) Machhad Gad; (e) Bhera Khad; (f) Beha Khad; (g) Dhurmu Gad and (h) Chainra Gad

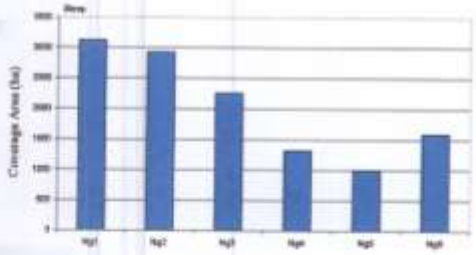
NOGLI GAD (b)

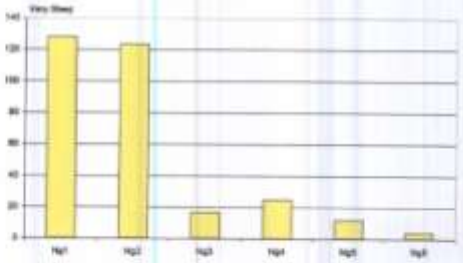




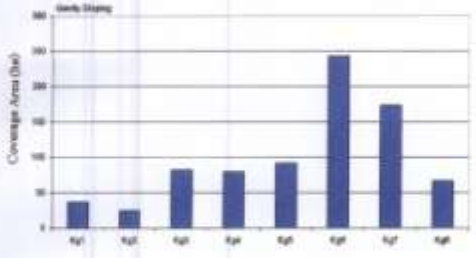


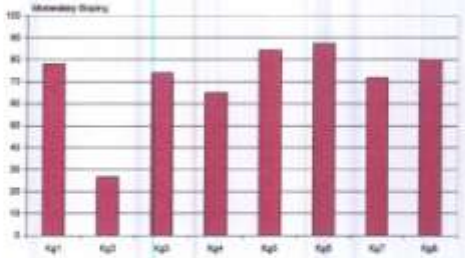


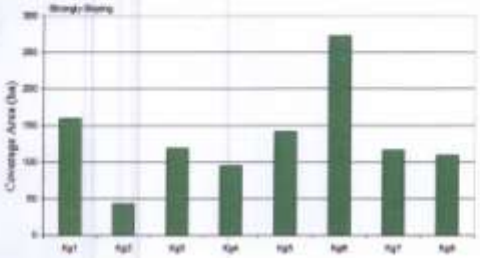


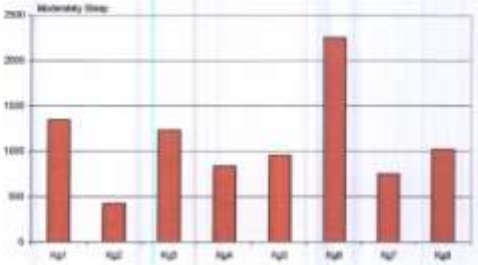


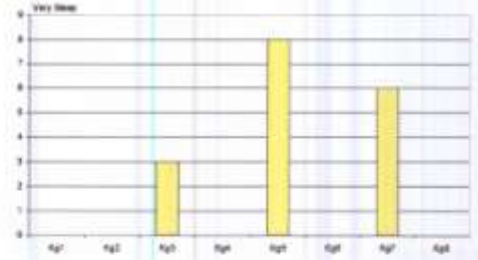
KURPAN GAD (c)



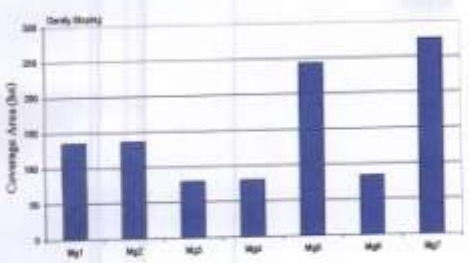


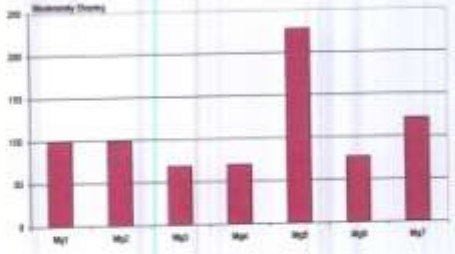


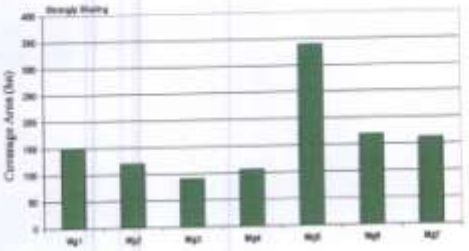


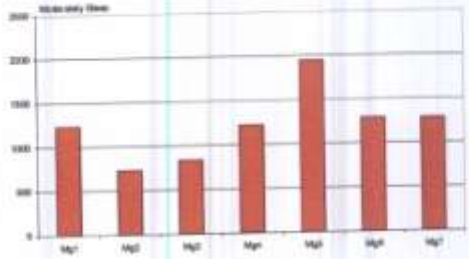


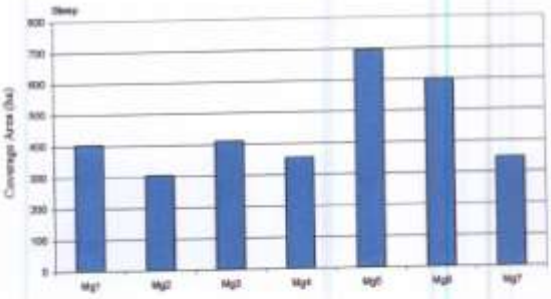
MACHHAD GAD (d)



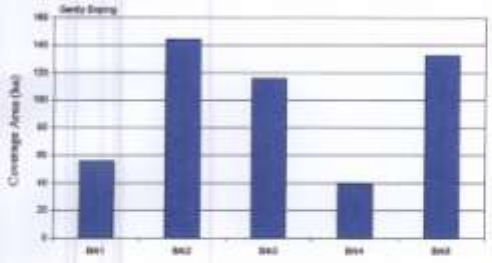


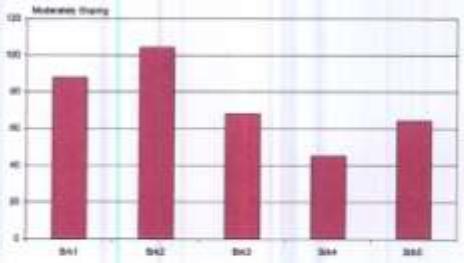


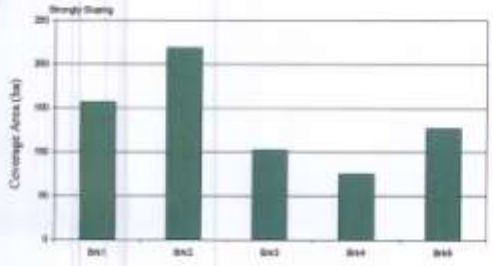


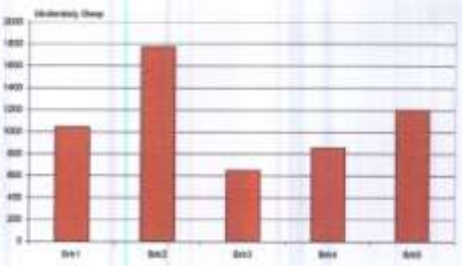


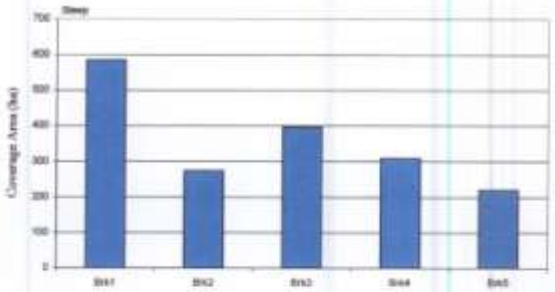
BHERA KHAD (e)


Gently Sloping
Coverage Area (ha)

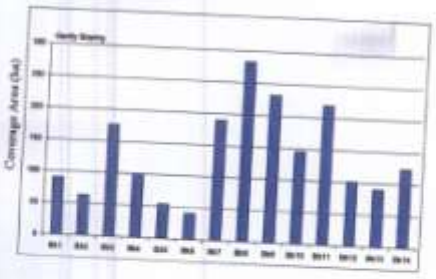

Moderately Sloping

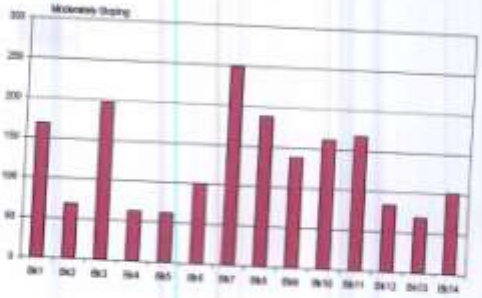

Strongly Sloping
Coverage Area (ha)

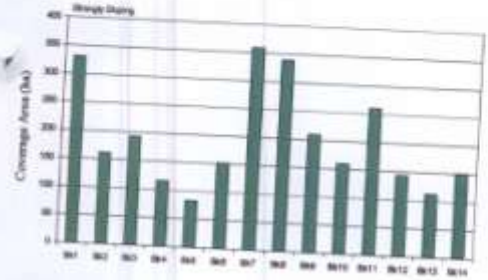

Moderately Steep

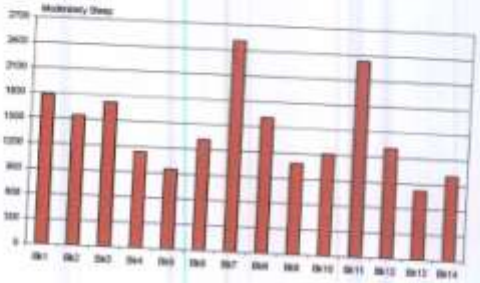

Steep
Coverage Area (ha)

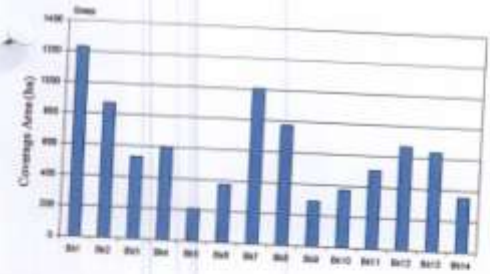
BEHA KHAD (f)

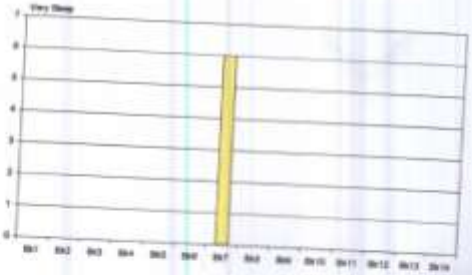




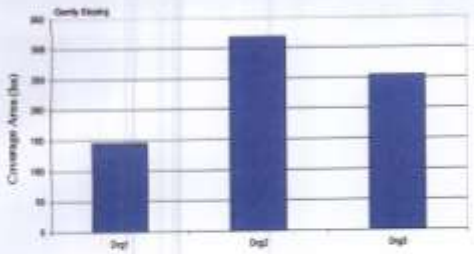


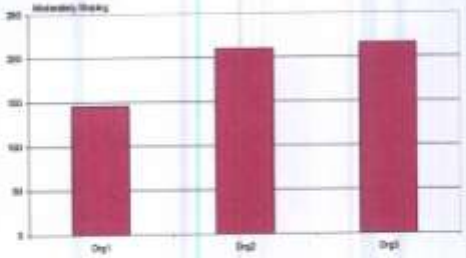


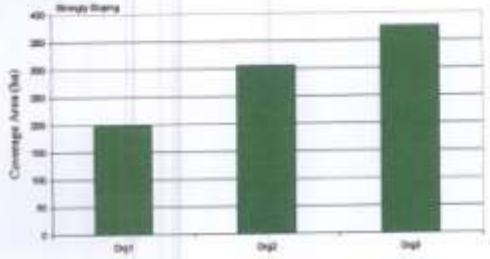


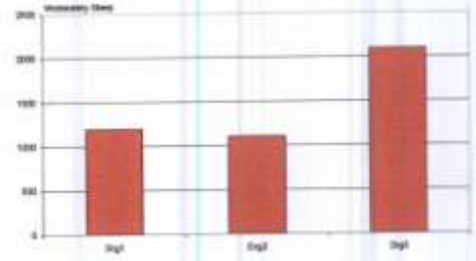


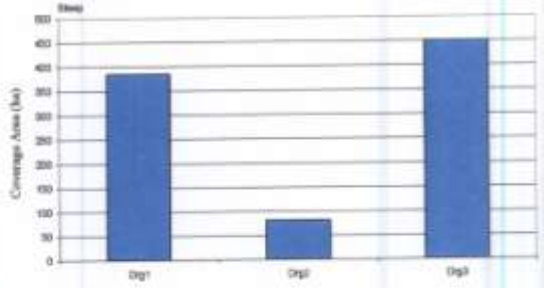
DHURMU GAD (g)



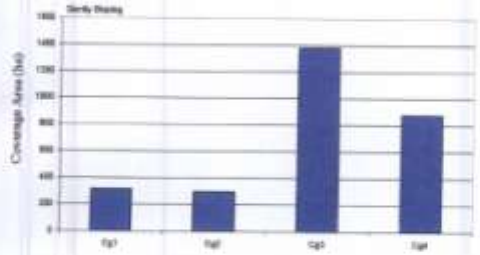


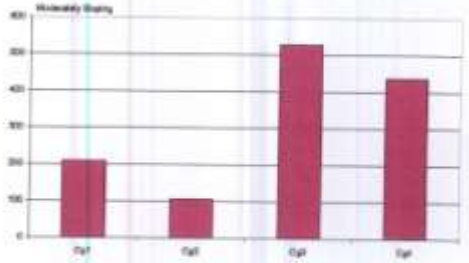


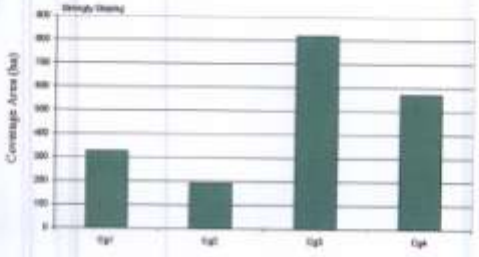


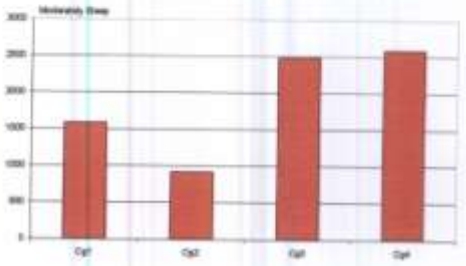


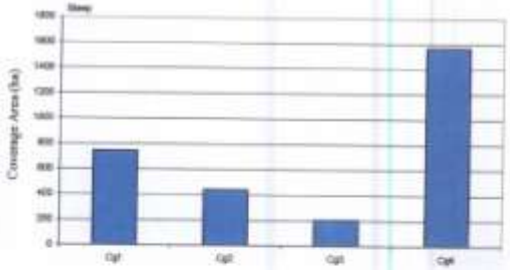
CHAINRA GAD (h)











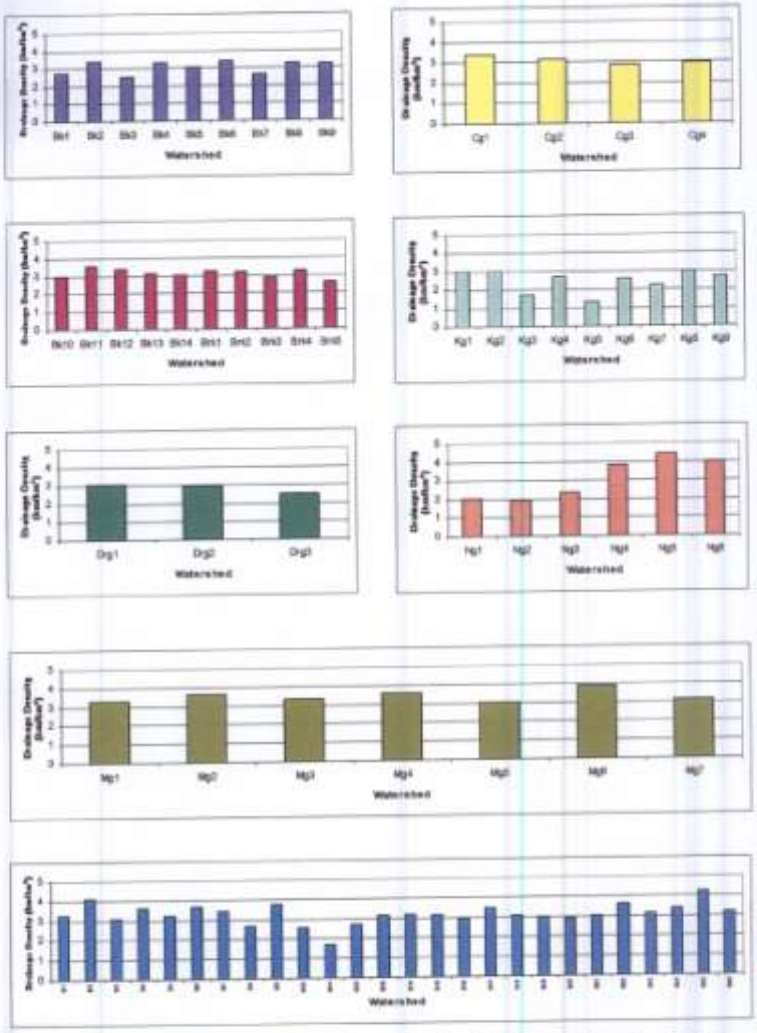


Fig. 4.7 Graph showing variation of drainage density in different sub-watersheds

Chapter 5

GEOLOGY

5
GEOLOGY

5.1 INTRODUCTION

The regional geological map of Satluj valley covering the proposed project area is shown in Fig.5.1. The dominant rock types of the area include granite gneisses, quartzites, schists, mafic volcanics, limestones, dolomites, shales, laterites and older and newer alluvium. The details of different groups of rocks are given in the following paragraphs.

5.2 LITHOSTRATIGRAPHY

The regional stratigraphic framework for the Lesser Himalaya established by GSI is given in Table 5.1. As evident from the Table 5.1 the rocks exposed along the Lesser Himalayan sector of the Satluj valley are of Archaean, Proterozoic, Palaeocene, Pleistocene and Holocene age. The Lithology of different formations and groups is discussed below.

Table 5.1 Regional stratigraphic framework of Lesser Himalayan rocks of Satluj valley

Geological age	Group	Lithology
Holocene	**Newer Alluvium**	Boulder, pebbles, coarse sands – younger terraces (T_1) and river channels
Middle to Upper Pleistocene	**Older Alluvium**	Boulder, pebbles, coarse sands- older terraces (T_2)
Palaeocene to Early Eocene	**Subathu (Kakara)**	Basal pisolitic laterite, quartz arenite, variegated shales and massive to thin bedded limestone
Mesoproterozoic to Neoproterozoic (II)	**Jutogh (Kulu)**	Carbonaceous – graphitic schist and phyllite with lenticular limestone and

		quartzite; quartzite, quartz schist; garnetiferous schist and quartzite with bands of marble and locally porphyroblasts, gneiss, amphibolites
	Simla	Quartzite-shale-limestone interbeds; shale and siltstone alternations with limestone interbeds; shale and siltstone alternations with orthoquartzite and greywacke; greywacke sandstone, siltstone, shale alternation, orthoquartzite; conglomerate, arkosic sandstone, protoquartzite, grey and purple shale at top
	Rampur	Quartzite with penecontemporaneous mafic meta-volcanics intruded by Bandal Granitoid gneiss
Palaeoproterozoic	**Shali/Largi**	Orthoquartzite-carbonate sequence
	Sundernagar	Quartzite with penecontemporaneous mafic volcanics (Mandi-Darla volcanic)
Archaean	**Zeori-Wangtu Granitoid Gneiss**	Augen gneisses, mylonitic gneiss, porphyroblastic biotite gneiss with intercalated biotite, garnet, kyanite, sillimanite bearing schist bands intruded by prorpyritic and tourmaline granite, pegmatite and aplite.

Source: Srikantia & Sharma, 1976; Sharma, 1977 and Rupke & Sharma, 1974)

5.2.1 Jeori-Wangtu Granitoid Gneiss

The Jeori-Wangtu Granitoid Gneiss is composed of high grade metamorphic rocks. These rocks are exposed between Karcham in the west to the east of Rampur and define an east–west trending anticlinal structure. The contact of Jeori-Wangtu Granitoid Gneiss with the Rampur Group is tectonic; this contact is defined as the Main Central Thrust (Kumar, 1999). Strongly foliated augen

gneiss, mylonitic gneiss, porphyroblastic gneiss with intercalated schist bands bearing biotite, garnet, kyanite and sillimanite characterise this thrusted contact. However, in the central part, non-foliated porphyritic and tourmaline granite containing pegmatite and aplite intrusions characterize the granitoid.

5.2.2 Sundernagar Group

The Sundernagar Group comprises grey slates and phyllites, white and purple quartzite with red shale partings, and green slates and phyllite with purple interbeds and occasional limestone bands. Associated with it are penecontemporaneous basaltic to andesitic mafic volcanics referred to as the Mandi-Darla Volcanics. There are three typical varieties, i.e. massive non-vesicular volcanics, amygdaloidal volcanics and units which are metamorphosed to chloritic phyllite and schist. In thin section, the mineral content typically shows the presence of albite, pyroxene, ilmenite, sphene, epidote, quartz, calcite, palagonite and chlorite with pigeonite in some sections. The groundmass typically consists of glass vitrified into an opaque amorphous mass of viridite (ferruginous chlorite) and leucoxene but in some cases is cryptocrystalline. The base of the succession is not exposed. This formation is overlain unconformably by the Shali/ Larji Group which primarily comprises quartzite which can be purple, pink and white in colour, ripple-marked and current bedded.

5.2.3 Shali/Larji Group

The Shali/Larji Group comprises a quartzarenite-carbonate sequence which is divided into eight formations, viz. Ropri (400 m), Khaira (380m), Khatpul (300 m), Sorghwari (460 m), Tatapani (610 m), Makri (180 m), Parnali (700 m) and Bandla (250 m). The sequence overlies the Sundernagar Group and is intruded by dolerite dykes. In the basal part of the sequence occurs the evaporite deposit (salt beds). There is profuse development of stromatolites in the carbonate rocks and occasionally there is some karst development. Sedimentary structures such as mud cracks, ripple marks and cross bedding are extensively seen in arenites of the Khaira Formation. The Shali Group is intruded by epidiorite/dolerite dykes and sills.

5.2.4 Rampur Group

It comprises quartzite with penecontemporaneous mafic metavolcanics. It is divisible into three formations viz: i) Bhallan Fm: Slates, greenish phyllite/schist with interbands of white flaggy quartzite and subordinate metavolcanics; ii) Banjar Volcanics: Dark green metavolcanics

(metabasalt), dark green chlorite phyllite with interbands of quartzite and grey phyllite; iii) Manikaran Fm: Grey and white massive quartzarenite, locally with penecontemporaneous metavolcanics (metabasalt).

5.2.5 Shimla Group

The Shimla Group of rocks unconformably overlies the Shali Group. It is a sequence of quartzite, siltstone-shale and limestone, and is well exposed around Tatapani along the Satluj River. In the project area it has been divided into four formations described below.

a) Basantpur Formation

This formation is composed of four members, viz. i) a 19 m thick greyish white quartzite and conglomerate, ii) a 600 m thick sequence composed of sporadically carbonaceous shale with impersistent bands of quartzite and dolomite, iii) a 250 m thick sequence of massive to bedded limestone-dolomite and iv) a 180 m thick bedded to platty grayish blue limestone with interbedded shale.

b) Kunihar Formation

It is a 450 m thick sequence of shale siltstone alternation with limestone interbeds (Kakarhatti limestone)

c) Chhaosa Formation

It is a 1300 m of alternating shale and siltstone, greywacke siltstone and orthoquartzite.

d) Sanjauli Formation

It is a 1600 m sequence composed of two members, viz. i) Upper member: Composed of conglomerate, arkosic sandstone, protoquartzite, grey and purple shale, ii) Lower member: Composed of greywacke, sandstone, medium to coarse grained, greywacke siltstone- shale-siltstone alternation, orthoquartzite

5.2.6 Jutogh/Kullu Group

The Jutogh/Kulu Group progressively overlaps the Jeori-Wangtu Gneiss, Sundernagar, Shali, Rampur and Simla Groups. The contact has been considered to be tectonic and is referred to as the

Jutogh Thrust by some workers. The Jutogh is essentially an alternating sequence of carbonaceous phyllite with or without limestone and quartzite intruded by granite gneiss, which in the type area has been divided into eleven formations. In Chour Mountain area, gneissic granitoid is intrusive mainly in the Naura Formation. It comprises coarse streaky gneiss, porphyroblastic gneiss, granitic augen gneiss and porphyritic granite. The Jutogh Group is also intruded by dolerite dykes and sills.

In the Satluj Valley, the Jutogh group of rocks are referred to as the Kulu Group by Srikantia and Bhargava (1998). It is intruded by granite-gneiss and has been divided into three formations viz. i) Kharmada Fm., ii) Garh-Manjrot Fm, iii) Khokan Fmm. The details of which are given below.

a) Khamrada Formation

The Khamrada Formation is characterised by carbonaceous and graphitic phyllite-schist with lenticular bands of grey limestone. The carbonaceous phyllite is at places bleached to ash grey phyllite and encrusted with white, yellow deposits. It is sometimes interbedded with bands of greenish chlorite phyllite. The limestone is thin bedded, platy, highly contorted and deformed and varies in thickness from less than a metre to 20 m.

b) Garh-Manjrot Formation

The Garh-Manjrot Formation is an intrusive body into the Kulu Group. It is a quartzose, banded and streaky gneiss, pale greyish green in colour with alternate beds of schist, quartzite and carbonaceous phyllite. It is strongly foliated and mylonitised with elongated augens of feldspars and coarse grains of bluish quartz standing out prominently.

c) Khokan Formation

The Khokan Formation is composed of quartzite/quartz schist and associated quartz biotite schist, slate, phyllite and garnetiferous schist.

5.2.7 Subathu (Khakra) Group

The Subathu (Khakra) Group occurs in the form of numerous isolated outliers over the Shali and Simla Groups. It has yielded Palaeocene-Early Eocene fossils.

5.2.8 Older and Newer Alluvium

The Older and Newer Alluvium occur in isolated detached patches along the course of the river, principally in the form of partially eroded terraces and tributary fans.

5.3 STRUCTURES

The area is characterised by highly deformed metamorphosed sedimentary and igneous rocks. Much of the deformation is in the form of major folds belonging to four different phases. Thrusting is a particular feature of Himalayan geology and two important thrusts are present in the region. The major structures observed in the region are described below.

Four different folding episodes have been observed in the area (see Fig.5.1). The earliest phase exhibited by fold axes N10°E–S10°W and N–S were later affected by NW-SE trending plunging folds. These NW–SE folds are overturned towards the southwest; the axial plane dips towards NE with a SE plunge. The NE–SW trending folds attest to the latest folding phase and have affected the earlier structural elements. The main regional folded structures present in the region are:

Shali Anticline: This is a NW–SE trending, SE plunging anticline in the core of which Shali group of rocks are well exposed between Tatapani and Baragaon in the Satluj Valley. Several synformal and antiformal structures of the same trend are present in the southern limb of the anticline for which the Khaira Member is repeated in the core of antiforms.

Chamba Syncline: The Jutogh Group exposed between Baragaon and Dutnagar is exposed in the trough of a NW-SW trending syncline. This is the southeastern continuation of the Chamba Syncline. The northeastern limb of the syncline near Nagri is faulted resulting in the juxtaposition of the Rampur Group with the Jutogh Group.

Rampur Anticline: This is a NW–SE trending doubly plunging anticline where undifferentiated Bhallan and Banjar Formation rocks of the Rampur Group are exposed.

An anticlinal plunging fold trending NE-SW in the west of Baragaon, a syncline east of Baragon and an anticline along the NE-SW course of the Satluj river at Nirath proposed dam site, have refolded the earlier structures including the Jutogh (Suketi) Thrust.

The important tectonic features present in the region between Basantpur in the west to the east of Rampur are:

Main Central Thrust: The M.C.T. demarcates the tectonic boundary between the Rampur Group and the Jeori-Wangtu Granitoid Gneiss (see Fig.5.1). It is NW-SE trending and dips steeply towards northeast.

Jutogh (Suketi) Thrust: The contact of the Jutogh (Kulu) Group with the underlying Basantpur Formation of the Simla Group and or the Shali Group west of Baragaon in the Satluj Valley has been considered to be tectonic and is locally referred to as the Suketi Thrust by Srikantia and Sharma (1976) (see Fig.5.1). This is considered to be trace of the Jutogh Thrust (Srikantia and Bhargava, 1998). The absence of the Basantpur Formation in the northern limb of the Shali Anticline and the direct contact of Jutogh Group with the Shali Group is considered to be due to this thrust plane in the area west of Tundal.

5.4 VULNERABILITY TO EROSION

Shali, Rampur, Simla and the Jutogh (Kulu) Groups of rocks are exposed in the Project area (see Fig.5.1). Besides, there are extensive fluvial terraces and fan deposits alongside the Satluj river channel where settlements have developed. These rocks have been folded and the prominent structures are NW–SE trending Shali Anticline, the Chamba Syncline and the Rampur Anticline. These structures have been refolded into NE-SW northeast plunging anticlines and synclines. The major faults present in the proposed area are Behna Khad Thrust and Jutogh Thrust. The Main Central thrust, a pervasive tectonic plane between Lesser Himalaya and Higher Himalaya is present in the upstream of the proposed project area. The regions with high erosional potential in the proposed project area are i) the Rampur Window region in the upstream, ii) the thrust passing through Bhadras and marked as the contact between the Garh-Manjrot and Khamrada Formation, iii) the axis of the Chamba Syncline in the vicinity of Neerath, iv) the anticlinal axis paralleling the Kiongal Khad near Luhri, v) the region surrounding the Behna Khad thrust, vi) the region surrounding the Jutogh thrust, vii) the anticlinal axis near Ogli, and viii) the Shali Anticlinal region surrounding Marola and Lunsu.

The geological factors responsible for erosion in different watersheds in the proposed project area are discussed in the following paragraphs.

1. **Nogli Gad :** The rocks of Bhalan and Banjar Formation (Slate and phyllie with white grey quartzite), Manikaran Formation (White grey cherty quartzite with chlorite partings), and Khamrada Formation (Carbonaceous and ash grey slates, phyllite schist, at places garnetiferous with limestone) are present in the catchment of Nogli Gad. These rocks are folded and highly jointed at places. The carbonaceous phyllites and schists are susceptible to chemical weathering. The regions where the left bank tributary of the Nogli Gad intersects the fault plane which passes through Bhadras are locales of severe erosion where there is sparse vegetation cover.
2. **Kurpan Gad:** The rocks of Bhalan and Banjar Formation (Slate and phyllie with white grey quartzite), Manikaran Formation (White grey cherty quartzite with chlorite partings), and Khamrada Formation (Carbonaceous and ash grey slates, phyllite schist, at places garnetiferous with limestone) and Khokan Formation (Phyllites, Quartz biotite schist, garnetiferous quartz biotite schist with bands of augen gneiss) are present in the catchment of Nogli Khad. Carbonaceous phyllite and biotite schists are susceptible to chemical weathering.
3. **Machhad Gad:** The rocks of Garh-Manjrot Formation (Quartzite, banded and streaky gneiss, augen gneiss), and Khokan Formation (Phyllites, Quartz biotite schist, garnetiferous quartz biotite schist with bands of augen gneiss) are present in the catchment of Behra Khad. In the upstream the right bank slope is more susceptible to failure because the foliation is dipping towards the valley. The phyllites and schists are more susceptible to chemical weathering and landslips have developed where they are exposed.
4. **Bhera Khad:** The rocks of Garh-Manjrot Formation (Quartzite, banded and streaky gneiss, augen gneiss), and Khokan Formation (Phyllites, Quartz biotite schist, garnetiferous quartz biotite schist with bands of augen gneiss) are present in the catchment of Machhad Khad. The phyllites are carbonaceous near its confluence with the Satluj river. The phyllites and schists are more susceptible to chemical weathering. The carbonaceous phyllites also collapse into the stream and increase the sediment load.
5. **Sainj and Kiongal Ki Khad:** The unclassified Jutogh Group of rocks (composed of Phyllites, Quartz biotite schist, garnetiferous quartz biotite schist with bands of augen gneiss, quartzite banded and streaky gneiss, augen gneiss, carbonaceous and ash grey slates, phyllites and grey limestone) are present in the catchment of Sainj and Kiongal Ki Gad. These rocks are covered with slopewash material but in the valleys and along the roads are

exposed at places. These phyllites, schists and marbles are susceptible to chemical weathering. The barren slopewash materials also supply sediments into the stream.

6. **Behna Khad:** Its catchment mostly contains the rocks of Khokan Formation (Phyllites, Quartz biotite schist, garnetiferous quartz biotite schist with bands of augen gneiss). The phyllites and biotite rich schists are susceptible to weathering. The landslips mostly occur in its lower reach where there are manifestations of Behna Khad Thrust.
7. **Dhurmu Khad:** The unclassified Jutogh Group of rocks (composed of Phyllites, Quartz biotite schist, garnetiferous quartz biotite schist with bands of augen gneiss, quartzite banded and streaky gneiss, augen gneiss, carbonaceous and ash grey slates, phyllites and grey limestone) are present in its catchment. Carbonaceous phyllites and limestones are susceptible to chemical weathering. Landslips occur in one of its tributaries flowing eastward where the foliation dips towards north.
8. **Kunda Nal:** The unclassified Jutogh Group of rocks (composed of Phyllites, Quartz biotite schist, garnetiferous quartz biotite schist with bands of augen gneiss, quartzite banded and streaky gneiss, augen gneiss, carbonaceous and ash grey slates, phyllites and grey limestone) are mostly present in its catchment. In the lower reach it flows across the rocks of Basantpur Formation. The Basantpur Formation is composed of four units viz. a) Thick-bedded to platy grey blue limestone with shale, b) massive to bedded limestone/dolomite, c) shale, siltstone with lenticular bands of sporadic carbonaceous shale and d) grayish white quartzite and conglomerate. These Basantpur Formation rocks are vulnerable to erosion.
9. **Chapla Khad:** The unclassified Jutogh Group of rocks (composed of Phyllites, Quartz biotite schist, garnetiferous quartz biotite schist with bands of augen gneiss, quartzite banded and streaky gneiss, augen gneiss, carbonaceous and ash grey slates, phyllites and grey limestone) are mostly present in its upper catchment. In the middle catchment occur the Basantpur Formation and Makri Formation rocks (Grey, green, black purple shale/slate, thin bedded limestone). In the lower catchment Khatpul Formation, Songhwari Formation and Tatapani Formation rocks composed of Massive grayish blue dolomite, Pink and Grey Limestone and shale and Cherty grey dolomite with grey. There are blocks of conglomerate at the mouth of Chapla Khad. The limestones are cavernous. The shales, dolomite and limestones undergo heavy erosion, particularly, the region where the Chapala Khad cuts across the Jutogh Thrust is the locale supplying huge sediments into the stream.

10. **Pandoa Khad :** Like Chapala Khad the Pandoa Khad cuts across the unclassified Jutogh Group of rocks and the rocks of Basantpur, Makri and Khatpul Formations. Besides these rocks, the cherty dolomite, grey limestone and white quartzite constituting the Pamali Formation are also present in its catchment. The erosion of these rocks can supply large amount of sediments into the trunk stream.
11. **Chainra Khad :** The rocks of Jutogh Group as well as that of Tatapani, Songhwari and Khatpul formations are present in its catchment. Landslips are present on its either bank just upstream of its confluence with Satluj.
12. **Guma Khad :** The rocks of Jutogh Group, Tatapani Formation, Songhwari Formation, Khattpul Formation are present in its catchment. The pink and purple white quartzites of Khaira Formation are also present in its catchment. The limestones being susceptible to chemical erosion are cavernous.
13. **Satluj river Stretch in the proposed project area :** There are fluvial terraces and tributary fan deposits alongside the Satluj river. During heavy discharge these unconsolidated material collapse into the Satluj channel due to toe cutting. The road building and sand mining activities also lead to collapse of material into the tributary streams which are later on carried into the trunk stream during heavy rain in monsoon season. The regulated stream discharge due to upstream Nathpa Jhakri dam also changes the river geomorphology.

Chapter 6

SOIL

6
SOIL

6.1 INTRODUCTION

Soil is one of the most important natural resources that sustain life on earth. The economic development of a region and its biotic resources like flora and fauna depend on it. Soil regulates water discharge, land cover, vegetation, and also supports diverse underground micro- and macro-organism. The chemical, physical and biological properties of the soil determine the sustainability of a soil as a medium for growth of primary producers. Soil formation is a natural process, influenced by the geology, climate, organisms, weathering of rocks and minerals, relief, parent materials and time. Study of soil is very important for growing crops, for planning afforestation programmes and to avoid soil erosion. In the Himalayan region, soil erosion is a major problem, which results in loss of fertility of land on the one hand and increased sediment load in the river on the other. Increase in sediment load has direct bearing on the life of a hydroelectric project, besides other negative impacts on terrestrial above and below ground biota as well as the aquatic life in the rivers and streams. In order to ensure proper maintenance of soil functions and its health the project proponents propose a number of management interventions in the relevant watersheds.

In the proposed Luhri HE project, a catchment area treatment plan is being prepared, which considers data inputs related to soil, such as soil depth, texture, drainage, pH of the soil, etc. This information is important to deduce the erosion intensity in a particular region and accordingly to plan various treatment measures and protect it from soil erosion. In the present study the NBSS Soil Bulletin 57 (Sidhu *et al.*, 1997) on Himachal Pradesh was used to prepare soil-based thematic maps and also to collect inputs about soil type and soil depth of the region (catchment area).

The State of Himachal Pradesh is endowed with a wide range in climate, geology, landforms and vegetation which has resulted in the development of variety of soils. The soil of the State belongs to 4 Orders, 6 Sub-orders, 12 Great groups, 17 Sub-groups and 43 Families. The Entisols are the dominant soils and are distributed over 51 per cent land area in the State, followed by

Inceptisols, Molisols, and Alfisols, which cover 20.0, 0.8 and 0.4 per cent of the total geographic area of the State, respectively.

Total catchment of the proposed Luhri HE project is around 192052.51 ha and the area drains 7 tributaries of Satluj, namely Beha Khad (Bk), Kurpan Gad (Kg), Nogli Gad (Ng), Machhad Gad (Mg), Bhera Khad (Brk), Chainra Gad (Cg) and Dhurmu gad (Drg). The entire catchment under discussion was divided into eight watersheds and 74 sub-watersheds for proper planning, management and implementation of the catchment area treatment plan. Soil types in the catchment were delineated from the soil map of Himachal Pradesh. This source has identified eleven soil types in the catchment area. The details of these soil types and definitions are given in Table 6.1 (see NBSS Publ. 57, 1997).

6.2 SOIL TYPES

The catchment area between the proposed dam site and powerhouse site of Luhri HE project was delineated and extracted from the soil map of Himachal Pradesh and 11 soil types were identified in the region. The maximum area of the catchment has Dystric Eutrochrepts (8) type soils, which cover more than 27.0 per of the total catchment area, followed by Dystric Eutrochrepts (9) and Typic Udorthents, which cover 24.91 and 22.10 per cent area, respectively (Table 6.1; Fig.6.1). Around 9 per cent area of the catchment has Dystric Eutrochrepts (10) type of soils. The details of different areas of the catchment covered by various soil types varies from 0.39 per cent to 8.21 per cent (Table 6.1; Fig. 6.1).

6.2.1 Lithic Cryorthents

Lithic Cryorthents are the soils of Greater Himalaya, mainly near summits and ridge tops and is defined as shallow, sandy-skeletal soil. It is shallow, excessively drained and prone to severe erosion. This soil type has moderate stoniness and is generally associated with rock outcrops. These soil types cover a small portion of the catchment (0.39 per cent area) and are mainly found in Ng1 and Ng2 sub-watershed of Nogli watershed (Table 6.1; Fig. 6.1).

6.2.2 Typic Udorthents

This soil type is observed on the reposed slopes of the catchment. The soils are mostly shallow to medium deep, excessively drained, loamy-skeletal and coarse-loamy. They are slightly

alkaline, calcareous, severely eroded with moderate to strong stoniness. These soil types have been classified as Typic Udorthents (S.No 2), Typic Udorthents (S. No 3). Typic Udorthents (S. No 4), typic Udorthents (S. No 5) and Typic Udorthents (S. No 6). Around 15.52 per cent (298064.4 ha) of the total geographic area of the catchment has this soil type. These soil types are seen in Kg2, Kg5, Mg1, Mg2, Mg3, Mg4, Ng1, Ng2, Brk1 to Brk5, St3, St4, St5, St8, St10, St11, St12, St 13 and St17 to St20 sub-watersheds (Table 6.1; Fig. 6.1).

6.2.3 Typic Eutrochrepts

This soil type is fine loamy calcareous and is found on steep slopes. The soil depth is medium deep and is prone to severe erosion. Around 3.46 per cent area of the catchment is covered with this type of soil. It is mainly found in Kg6, Kg8, St1, St2, St3, St4, St5 and St20 sub-watersheds (Table 6.1; Fig. 6.1).

6.2.4 Dystric Eutrochrpts

This type of soil is found on moderately steep slopes with loamy surface. The soil depth varies from medium deep to shallow. The soil is well drained, thermic and fine loamy. The soil erosion in this case is moderate. There are three different types designated in Dystric Eutrochrept soil. These have been identified as S. No. 8, S. No. 9 and 10. Around 60 per cent of the catchment has Dystric Eutrochrept type of soil (S. No8, S. No. 9 and S. No. 10). Sub-watersheds along the Satluj valley on moderate slopes have this type of soil (Table 6.1; Fig. 6.1).

6.2.5 Soils of Fluvial Valleys (Typic Udifluvents)

The soils along the streams and flood plains are coarse loamy with medium depths. These soils have moderate erosion. Around 0.76 per cent area of the catchment is covered with this type of soil. The soil is mainly Typic udorthents-Typic Udifluvents type (Table 6.1; Fig. 6.1). The sub-watersheds where this type soil is found are Kg9, Mg7 and St5 of Kurpan, Machhad and Satluj watershed.

6.3 SOIL DEPTH

Soils of the catchment belong to 5 depth categories. Deep – Medium soil is predominant in the sub watersheds of Kurpan Gad. About 25% of the catchment has Deep – Medium category of soils. Medium – Deep soils form very small part of the catchment (5.3%). Category of Medium Deep – Shallow is the most dominant soil type in the catchment accounting for 37.8% of the

catchment area. This group is predominant in the sub-watersheds of right bank of Satluj river, Chhainra Gad watershed, Dhurnu Gad and Bhera Gad. Soils in the major part of the left bank of Satluj river are shallow in nature (Fig. 6.2). These soil comprise about 30.6% of the catchment area. Shallow – Medium Deep soils are found only in 1.1% of the catchment.

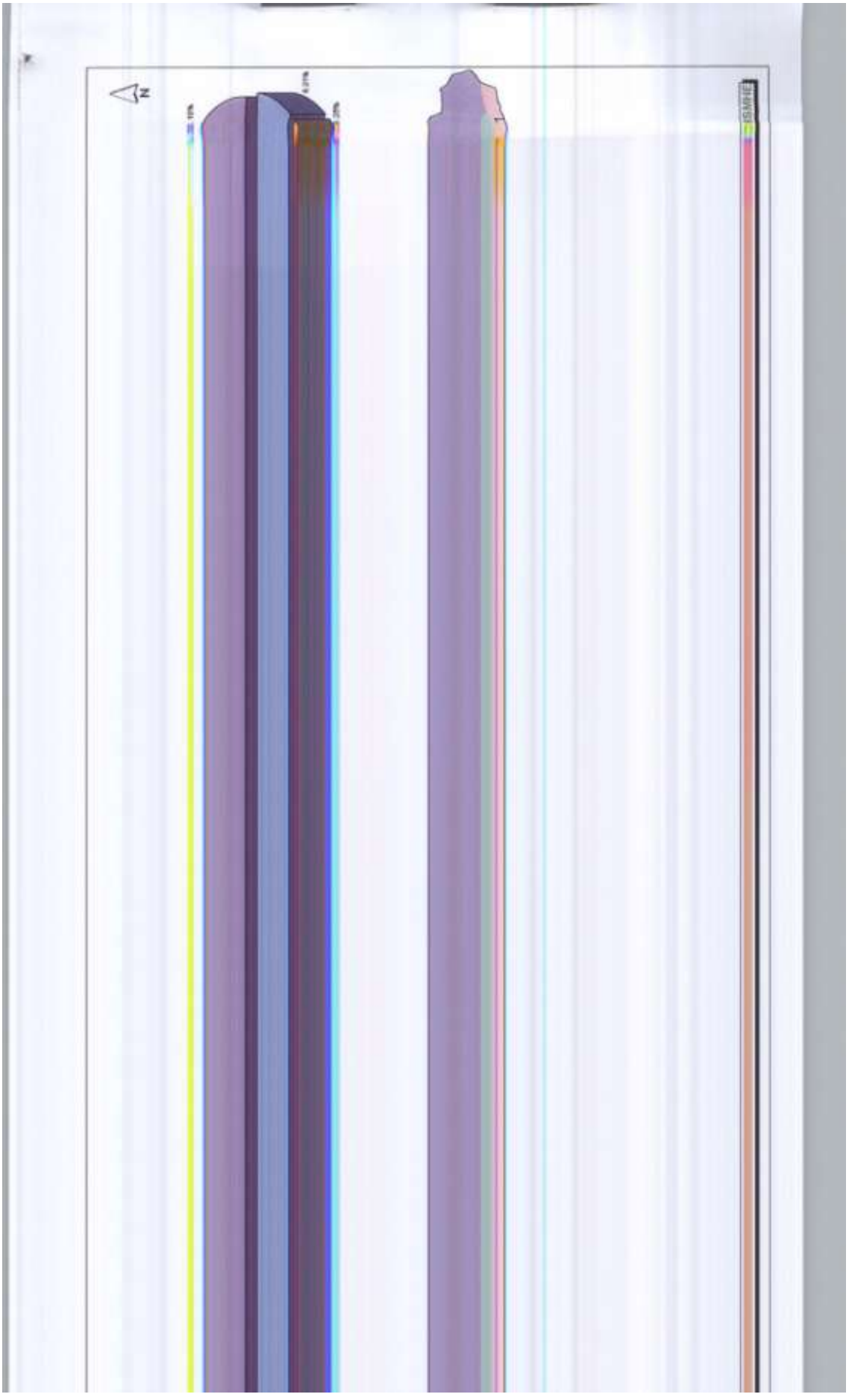
Table 6.1 Soil series and their descriptions in the Satluj CAT H.E. project

Soil No.	Soil Series	Description
1.	Lithic Cryorthents	Shallow, excessively drained, sandy-skeletal soils on very steep slopes with sandy surface, severe erosion and moderate stoniness; associated with: Rock outcrops.
2.	Typic Udorthents	Shallow, somewhat excessively drained, mesic, coarse-loamy soils on moderate slopes with loamy surface and severe erosion; associated with:
	Dystric Eutrochrepts	Medium deep, somewhat excessively drained, fine-loamy soils with loamy surface and severe erosion.
3.	Typic Udorthents	Rock outcrops; associated with: Medium deep, somewhat excessively drained, mesic, sandy soils on steep slopes with sandy surface and severe erosion.
4.	Typic Udorthents	Rock outcrops; associated with : Medium deep, somewhat excessively drained, mesic, sandy soils on steep slopes with sandy surface and severe erosion.
5.	Typic Udorthents	Shallow, excessively drained, thermic, sandy-skeletal soils on steep slopes with loamy surface, very severe erosion and strong stoniness; associated with: Rock outcrops.
6.	Typic Udorthents	Shallow, well drained, thermic, loamy-skeletal soils on moderate slopes with loamy surface, moderate erosion and moderate stoniness; associated with:
	Typic Udorthents	Shallow, somewhat excessively drained, coarse-loamy soils with loamy surface, severe erosion and slight stoniness.

7.	Typic Eutrochrepts	Medium deep, well drained, thermic, fine-loamy calcareous soils on moderately steep slopes with loamy surface and severe erosion; associated with:
	Typic Udorthents	Medium deep, well drained, fine-loamy soils with loamy surface and moderate erosion.
8.	Dystric Eutrohrepts	Medium deep, well drained, thermic, fine-loamy soils on moderately steep slopes with loamy surface, severe erosion and slight stoniness; associated with:
	Typic Udorthents	Shallow, well drained, fine-loamy soils with loamy surface and moderate erosion.
9.	Dystric Eutrochrepts	Deep, well drained, thermic, fine-loamy soils on moderate slopes with loamy surface and moderate erosion; associated with:
	Typic Udorthents	Medium deep, well drained, loamy-skeletal soils with loamy surface and severe erosion.
10.	Dystric Eutrochrepts	Medium deep, well drained, thermic, fine-loamy soils on moderate slopes with loamy surface and severe erosion; associated with:
	Typic Udorthents	Shallow, well drained, coarse-loamy soils with loamy surface, severe erosion and slight stoniness.
11.	Typic Udorthents	Medium deep, well drained, thermic, coarse-loamy soils on moderate slopes with loamy surface and moderate erosion; associated with:
	Typic Udifluvents	Shallow, excessively drained, coarse-loamy, calcareous soils with loamy surface and moderate erosion.

6.4 CONCLUSION

Soils of the catchment under discussion are generally coarse and fine loamy. The soils of almost all the sub-watersheds (65 sub-watersheds) are prone to erosion of different intensities. Soils of 17 sub-watershed are predominantly characterized by 'very severe erosion', which are located along the left bank of river Sutlej. Thus, left bank can be categorized broadly as 'very severe erosion' zone. However, ridges in this zone are covered with dense forest. Most of the settlements, cultivation and degraded forest lie in the immediate vicinity of the river Sutlej. In general, the soils in the vicinity are shallow, coarse loamy, with slight stoniness and experience severe to very severe erosion.



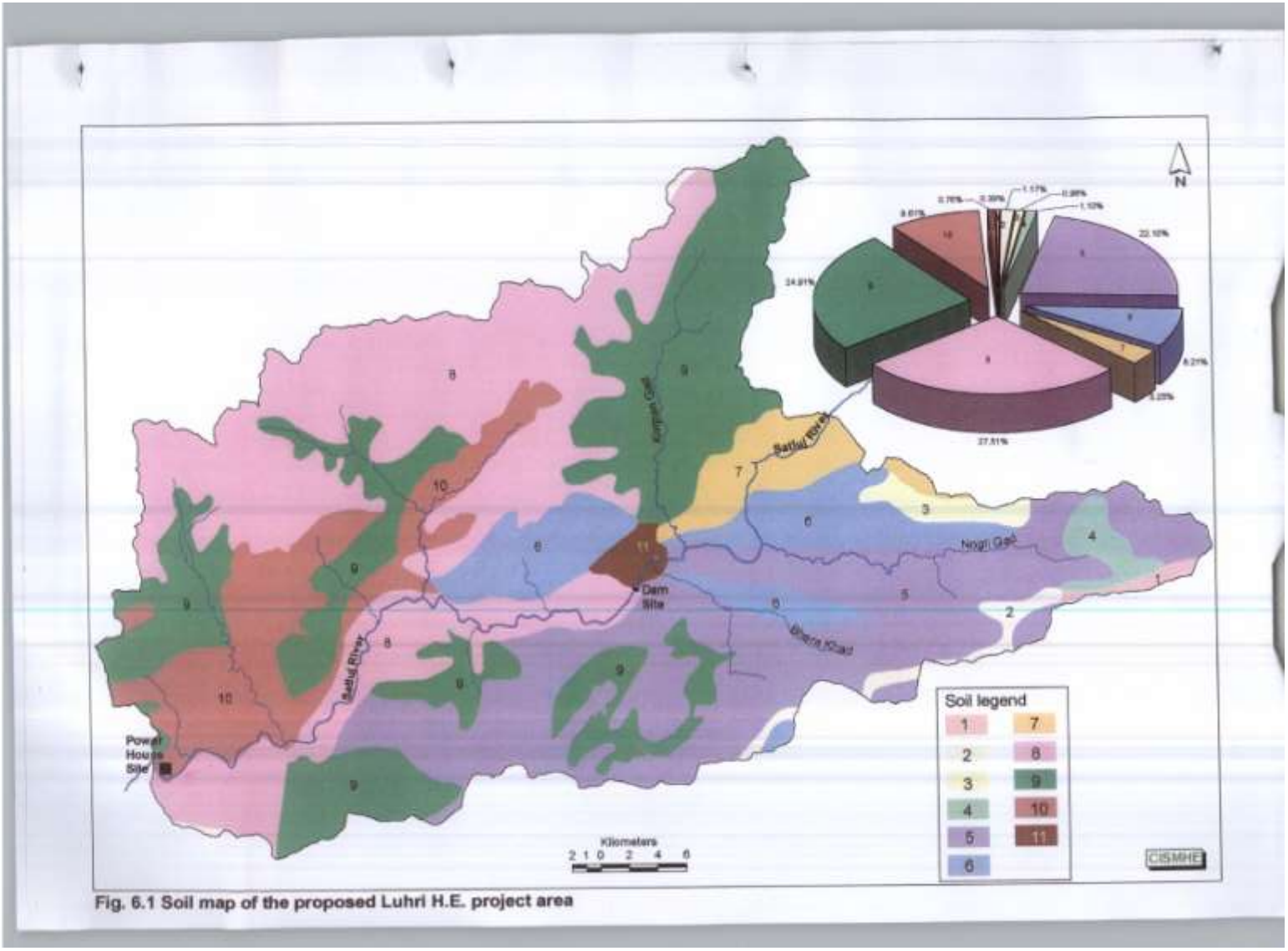


Fig. 6.1 Soil map of the proposed Luhri H.E. project area

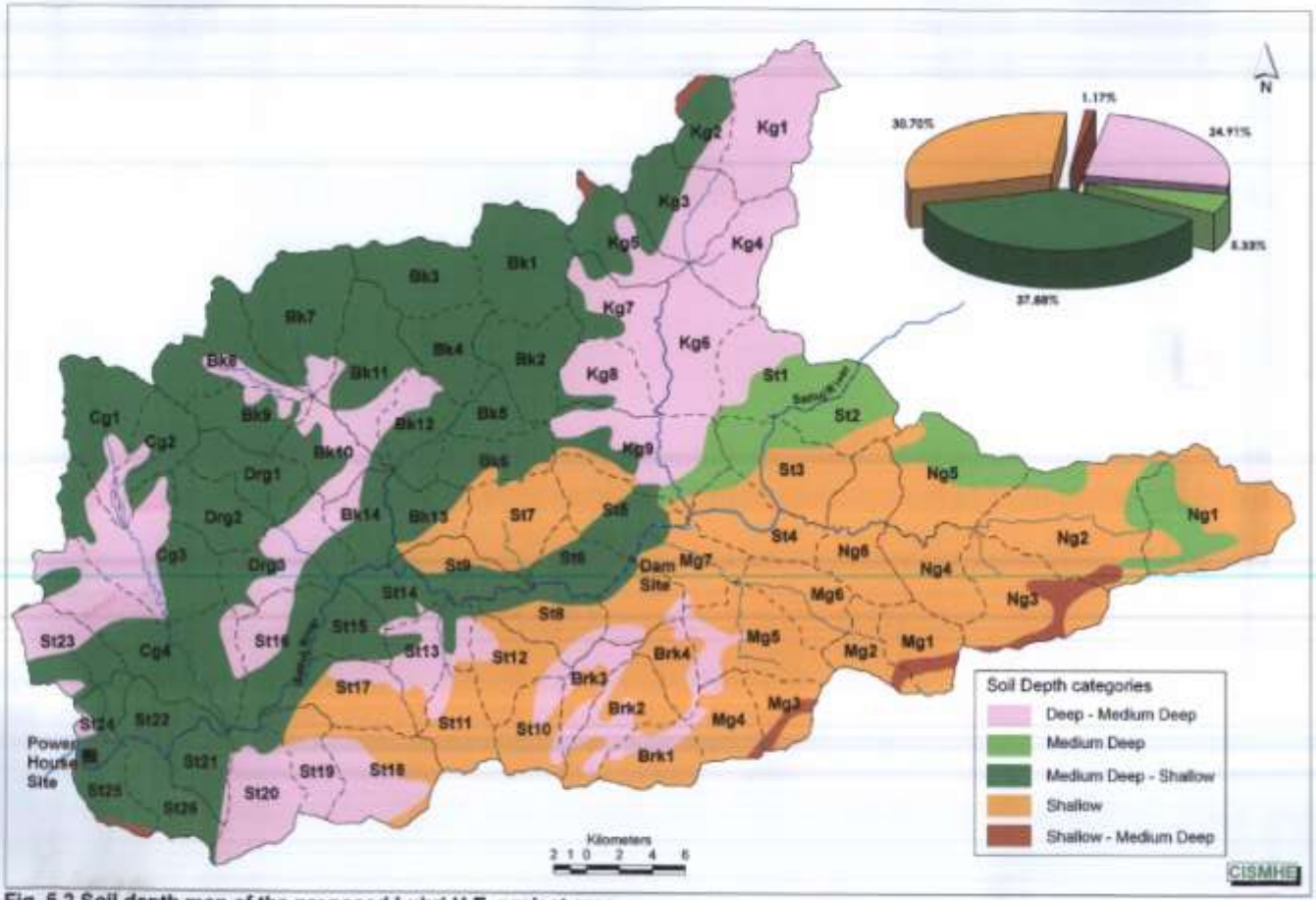


Fig. 6.2 Soil depth map of the proposed Luhri H.E. project area

Chapter 7

LAND USE/ LAND COVER

7
LAND USE/ LAND COVER

7.1 INTRODUCTION

Himachal Pradesh with a total geographic area of 55,673 sq km has nearly 25% of the area under dense forest (crown density - > 40%) and 10% of the area is covered by open forest. An area equal to 15% of the State is covered by arable land and human settlements. Scrub, degraded forest and non-forest land (barren, waterbody and snow/ glacier area) is under around 59% of the area. The catchment area of the proposed HE project falls in three districts, Shimla, Kullu and Mandi of Himachal Pradesh. All the three districts have good forest cover. In Shimla, nearly half of its total geographic area (2,383 sq km) is covered with forest amounting to 46 per cent forest cover. The other two districts have more than 35 per cent of their total geographic area under forest (Table 7.1, FSI 2003).

Table 7.1 Area (sq km) under forest cover in Himachal Pradesh and its three districts

	The State	Shimla	Kullu	Mandi
Geographic area	55,673	5,131	5,503	3,950
Very dense forest	1,093	194	117	78
Moderately dense forest	7,883	1,587	1,295	933
Open forest	5,377	602	521	637
Total forest cover	14,352	2,383	1,933	1,648

The project area designated for the catchment area treatment plan covers 1920.53 sq km (192052.51 ha). The recent land use/ land cover of this area was interpreted from the satellite images and confirmed by the field surveys. A false colour composite (FCC) was generated for the entire catchment as well as for all the 74 sub-watersheds (Fig.7.1). The land use /land cover of the said catchment area as well as of all the 74 sub-watersheds was classified under dense forest, open forest, scrub, degraded forest, cultivation/ settlements, barren/ rocky land, snow and rivers.

7.2 LAND USE/ LAND COVER

The total area of the proposed catchment of Luhri HE project from Rampur dam site to the powerhouse site at Marola village is around 1,920.53 sq km (192052.53 ha) and falls in three districts, Shimla, Mandi and Kullu of Himachal Pradesh. In Kullu district the project falls in Ani and Nermand tehsils, in Shimla it falls in four tehsils, viz. Seoni, Kumharsain, Nankhari and Rampur, and in Mandi district some villages of Karsog tehsil fall in the project area. Nogli, Macchad, Bhera, Khaneti, Kingal, Chainra, Behna and Kurpan, are major perennial streams in the Satluj catchment. Additionally, there are numerous monsoonal streams in the catchment.

The maximum area of the catchment under discussion is covered with forest (65.0 per cent), which includes dense and open forests. The dense forests are found on the higher reaches and ridges, while the low lying areas along the valleys are under cultivation and settlements. Around 8.06 per cent area (15473.73 ha) of the said catchment is occupied by human settlements and agricultural land. Nearly 5.57 per cent of the total catchment area is covered by barren and rocky land. About 4.0 per cent area is covered with snow and water bodies. In some regions like Machhad Gad, the slopes are extensively covered with orchards (Fig. 7.2 and Table 7.2).

Table 7.2 Area (ha) under under different land use/ land cover categories in the catchment of Luhri H.E. project area (Rampur dam to powerhouse site at Marola)

Sl.No.	Land use/ land cover categories	Area	Per cent
1.	Dense Forest	93,343.40	48.60
2.	Open Forest	33,015.44	17.19
3.	Scrub	13,216.70	6.88
4.	Degraded Forest	19,276.17	10.04
5.	Cultivation/ Settlements	15,473.73	8.06
6.	Barren/ Rockyland	10,692.47	5.57
7.	Snow/ Glacier	5,977.89	3.11
8.	River/ Waterbody	1,056.80	0.55

The entire catchment has been divided into eight watersheds, which are further divided into 74 sub-watersheds (see Fig.1.4). All the eight watersheds have reasonably good forest cover. The

sub-watershedwise land use/ land cover is given in the Table 7.2. The area of sub-watersheds under forest, cultivation, settlements, barren, etc. has also be categorised.

7.2.1 Beha Khad (Bk)

Beha Khad watershed is located on the right bank of Satluj river having an area of 35, 27.15 ha. Around 72 per cent of the total area of the watershed is under dense and open forests (Table 7.3). Scrub and degraded forests are spread over 16% area of the catchment. The human settlements/ agriculture cover 6.57% of the area in the lower part of the valley. Most of the area under Barren/ rockyland has been covered on the higher elevation (Fig. 7.3).

7.2.2 Bhera Khad (Brk)

This watershed covers an area of 8,853.72 ha of the catchment from Rampur dam to powerhouse site at Marola. Bhera Khad is located on the left bank of Satluj river. About 76.60% of this watershed is covered with forests (dense forest – 59.76% and open forest – 16.84%), while 5.11% of the area is under degraded forest. The human settlements and arable land cover about 11.66 per cent of the area (Fig. 7.4; see Table 7.3).

7.2.3 Chainra Gad (Cg)

Chainra Gad sub-watershed is located on the right bank of Satluj river near the proposed powerhouse site and meet with river Satluj at Marola. This watershed has a geographic area of 16,604.73 ha, of which 68.59% is under dense and open forests. There are a number of human settlements covering an area of 0.98% in the low lying areas. The degraded forest and scrubs cover 14.26% of the area (Fig.7.5; see Table 7.3).

7.2.4 Dhurmu Gad (Drg)

This is the smallest watershed in the catchment located on right bank of Satluj and has a geographic area of 7,483.38 ha. It is located on the confluence of Dhurmu Gad and Satluj river. Major part of the watershed is covered with dense and open forests (72.39%) on the higher slopes (see Table 7.3). Nearly 10% of the area is under human settlements/ agriculture, while 13.33% is covered with degraded forest and scrub (Fig.7.6).

7.2.5 Kurpan Gad (Kg)

Kurpan Gad is the major tributary of the Satluj river in this area and the watershed is located at the right bank of Satluj (Plate 7.1). This watershed has an area of 26,249.28 ha and nearly 42 per cent of its area is under dense forest, while open forest covers 21.04% of its geographic area and around 14.32% of the area lies under degraded forest (see Table 7.3). There are small patches of the human settlement areas covering nearly 4% geographic area of the watershed (Fig. 7.7). In this region, bounded by Sakranda Dhar, the upper reaches are covered with snow (6.53%).

7.2.6 Machhad Gad (Mg)

The Machhad Gad watershed constitutes about 14,543.39 ha in this project catchment (Plate 7.1). This watershed is mainly covered with dense and open forests (71.42%). Scrub and degraded forest cover 14.91% area of this watershed. A smaller area (7.57%) is under human settlements and cultivation (see Table 7.3). About 5.49% of the area is under barren/ rocky land (Fig. 7.8).

7.2.7 Nogli Gad (Ng)

Nogli Gad is the main tributary of the Luhri project area, originating at about 5240 m elevation. This watershed is located on the left bank of Satluj river and the higher elevations are bounded by Gangdhari and Trecha dhars. The watershed has a geographic area of 24,855.74 ha. This watershed has a good forest with dense and open forests (63.33%) (Plate 7.1). In this region, there are small patches of settlements with an area of 0.86% (see Table 7.3). The low lying areas are covered with degraded forest (5.52%) and scrub (4.63%). At the higher elevations, the major part of the watershed is covered with snow (17.06%) (Fig.7.9).

7.2.8 Satluj River (St)

This is the biggest watershed of the project catchment under discussion with an area of 58,151.4 ha. This watershed has 26 sub-watersheds located on both the banks. The watershed has a good forest cover, particularly at the higher elevations, where dense forests cover nearly 44.17% and open forests cover 15.41% of its geographic area (see Table 7.3 & Plate 7.2). The major part of the catchment area in the valley at the lower elevations is covered by human settlements and agriculture land. About 13.49% of the area is covered with degraded forest, while scrub covers only 7.56% of the watershed. Barren/ rockyland covers about 5.58% of its geographic area, particularly on the higher slopes (Fig.7.10 & Plate 7.2).

Table 7.3 Area (ha) under under different land use/ land cover categories in the catchment of Luhri H.E. project area (Rampur dam to powerhouse site at Marola)

Sl. No.	Land use/ land cover categories	Beha Khad	Behra Khad	Chainra Gad	Dhurmu Gad	Kurpan Gad	Machhad Gad	Nogli Gad	Sathuj River
1.	Dense Forest	18292.57	5291.07	8463.78	4215.82	11040.33	8288.46	12065.31	25686.06
2.	Open Forest	7117.28	1490.88	2926.39	1200.94	5522.51	2122.18	3676.33	8959.13
3.	Scrub	2756.38	438.50	942.17	543.64	1932.26	1056.35	1151.10	4396.30
4.	Degraded Forest	2848.47	452.48	1426.82	454.44	3759.59	1116.80	1371.61	7845.96
5.	Cultivation/ Settlements	2317.11	1032.10	1822.87	763.21	1052.31	1103.60	212.98	7169.55
6.	Barren/ Rockyland	1914.93	88.75	1020.65	303.89	1225.28	800.53	2096.32	3242.12
7.	Snow/ Glacier	–	–	–	–	1714.14	18.73	4239.93	5.09
8.	River/ Waterbody	30.18	59.98	2.04	1.49	2.90	70.65	42.26	847.20
	Total	**35276.92**	**8853.76**	**16604.72**	**7483.43**	**26249.32**	**14577.30**	**24855.94**	**58151.41**

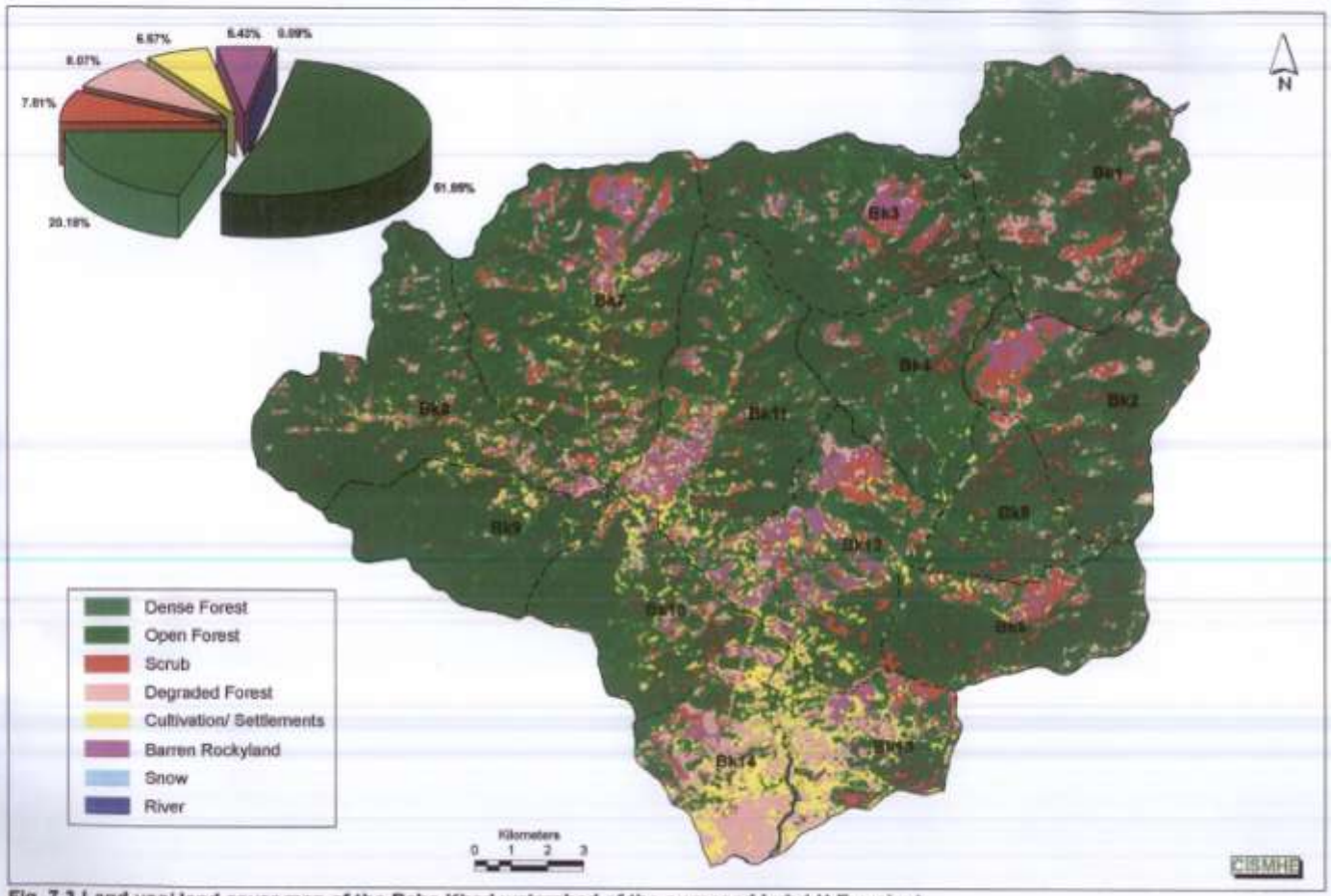


Fig. 7.3 Land use/ land cover map of the Beha Khad watershed of the purposed Luhri H.E project

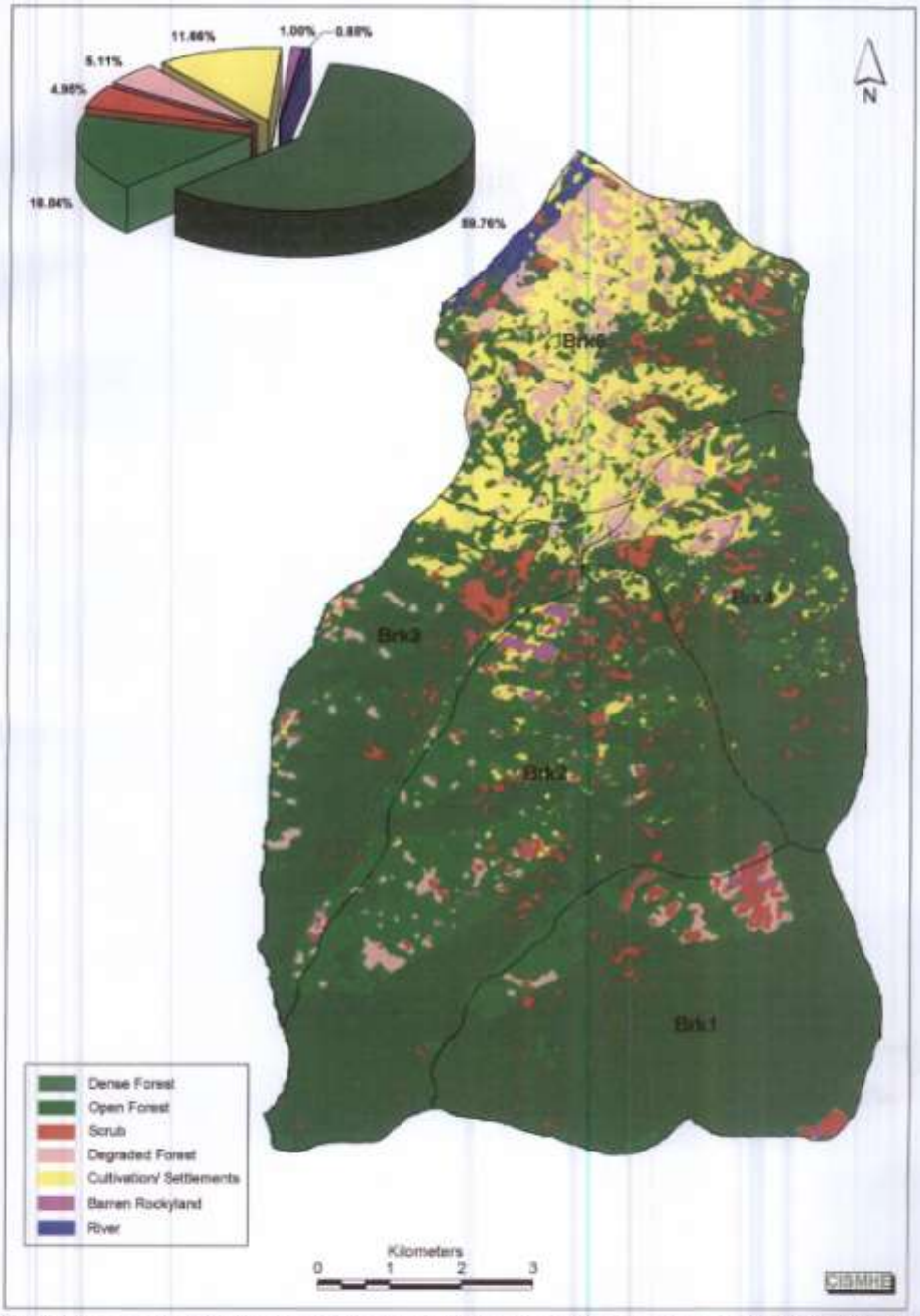


Fig. 7.4 Land use/ land cover map of the Bhera Khad watershed of the purposed Luhri H.E Project

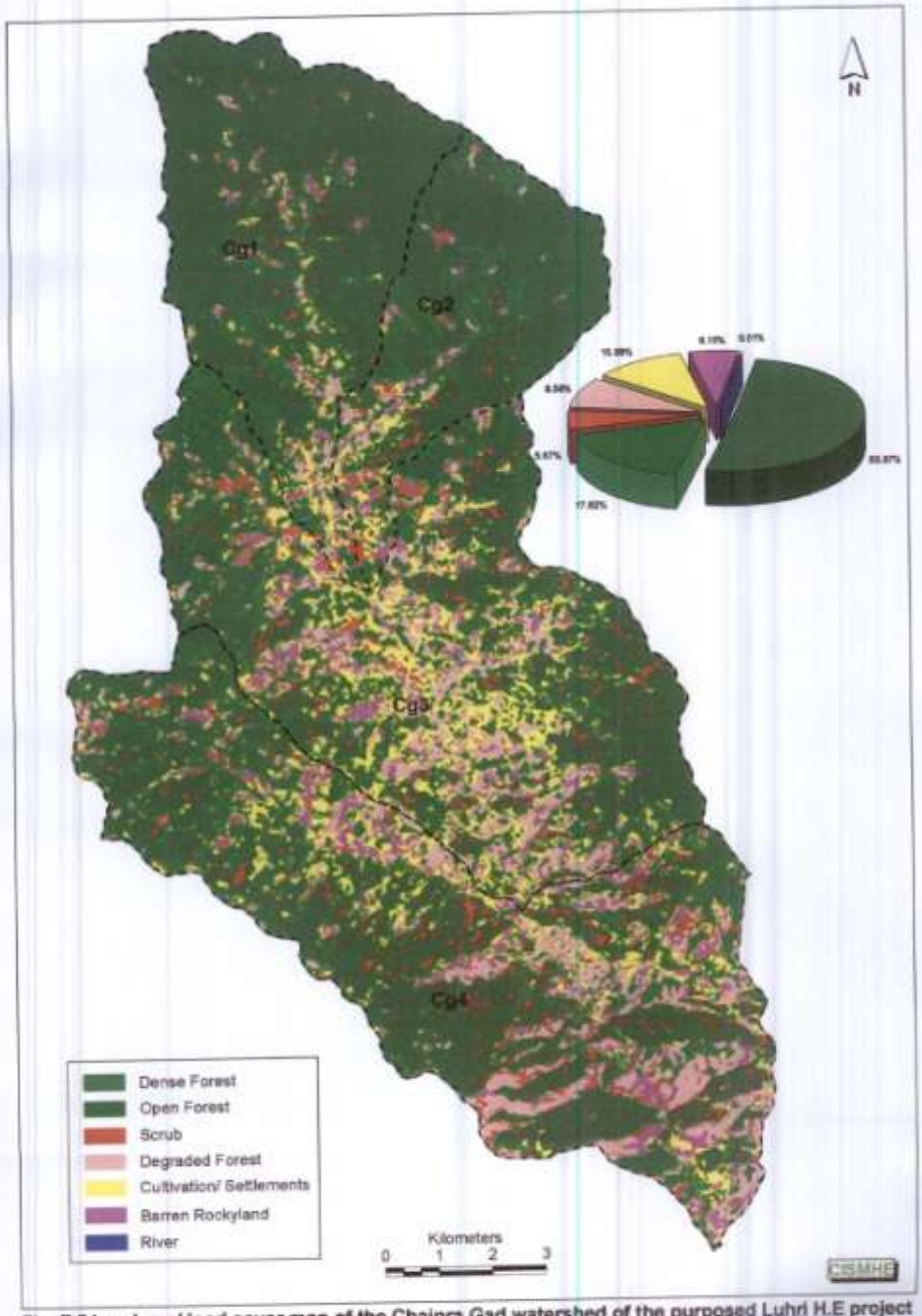


Fig. 7.5 Land use/ land cover map of the Chainra Gad watershed of the purposed Luhri H.E project

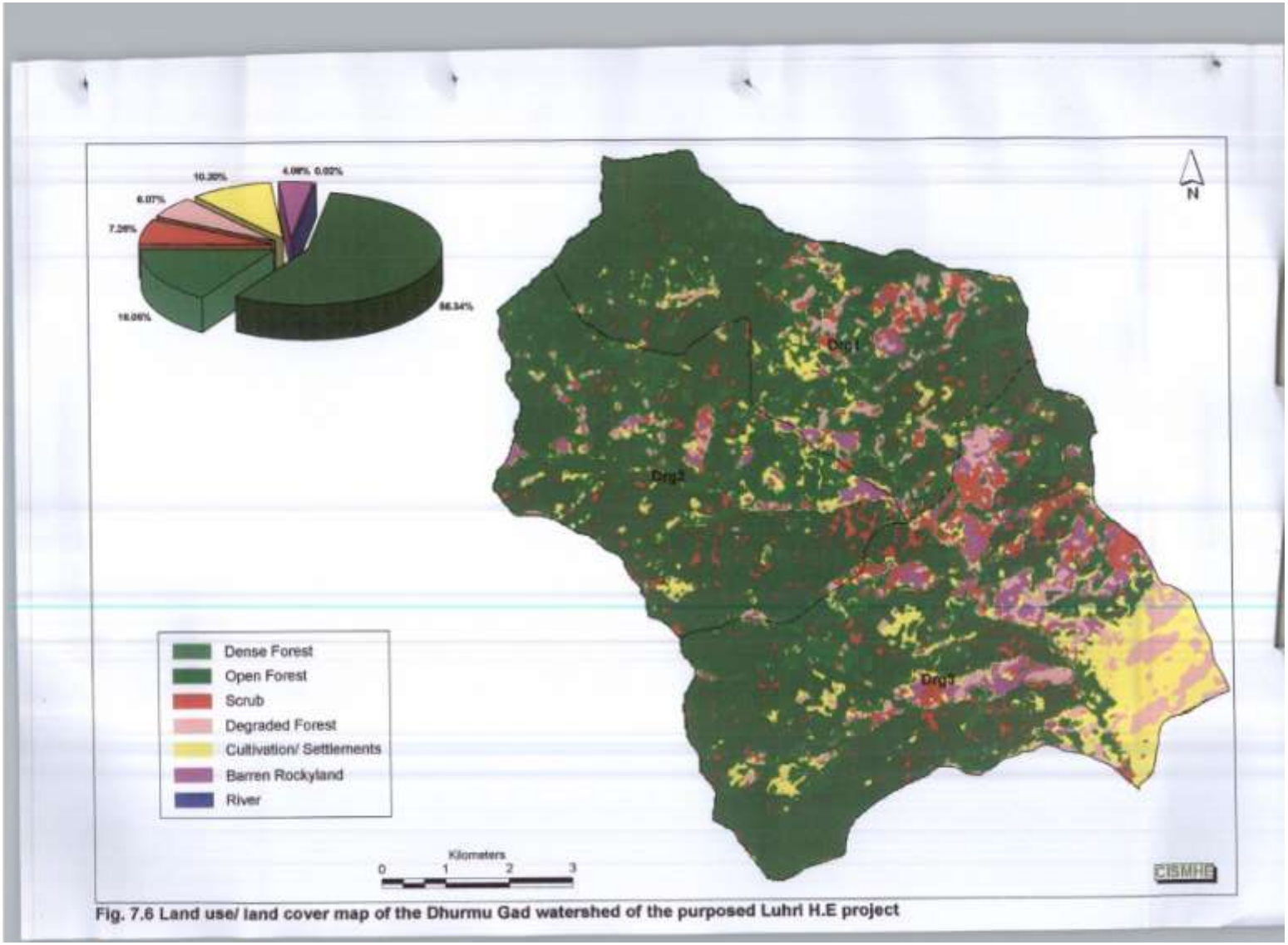


Fig. 7.6 Land use/ land cover map of the Dhurmu Gad watershed of the purposed Luhri H.E project

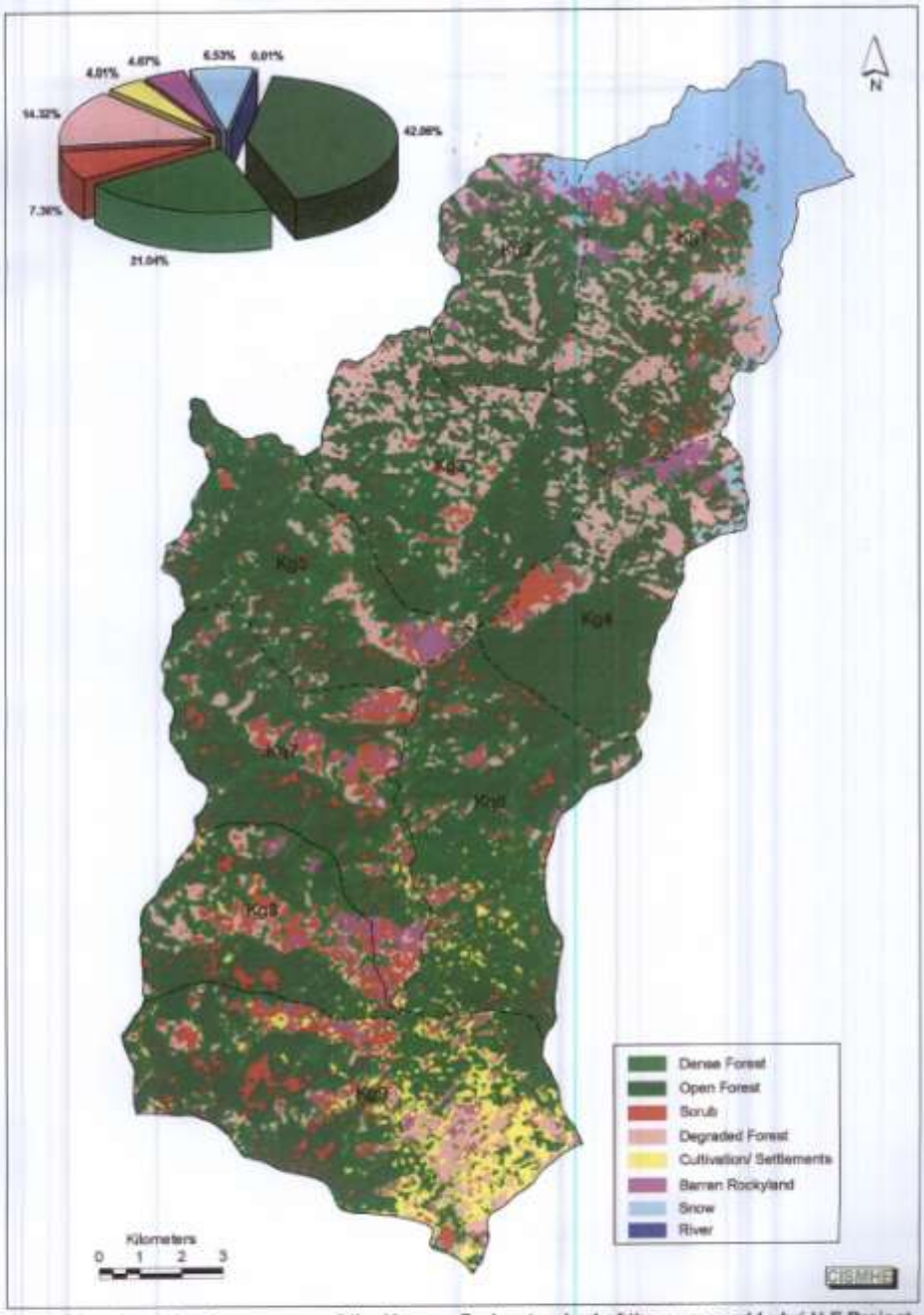


Fig. 7.7 Land use/ land cover map of the Kurpan Gad watershed of the purposed Luhri H.E Project

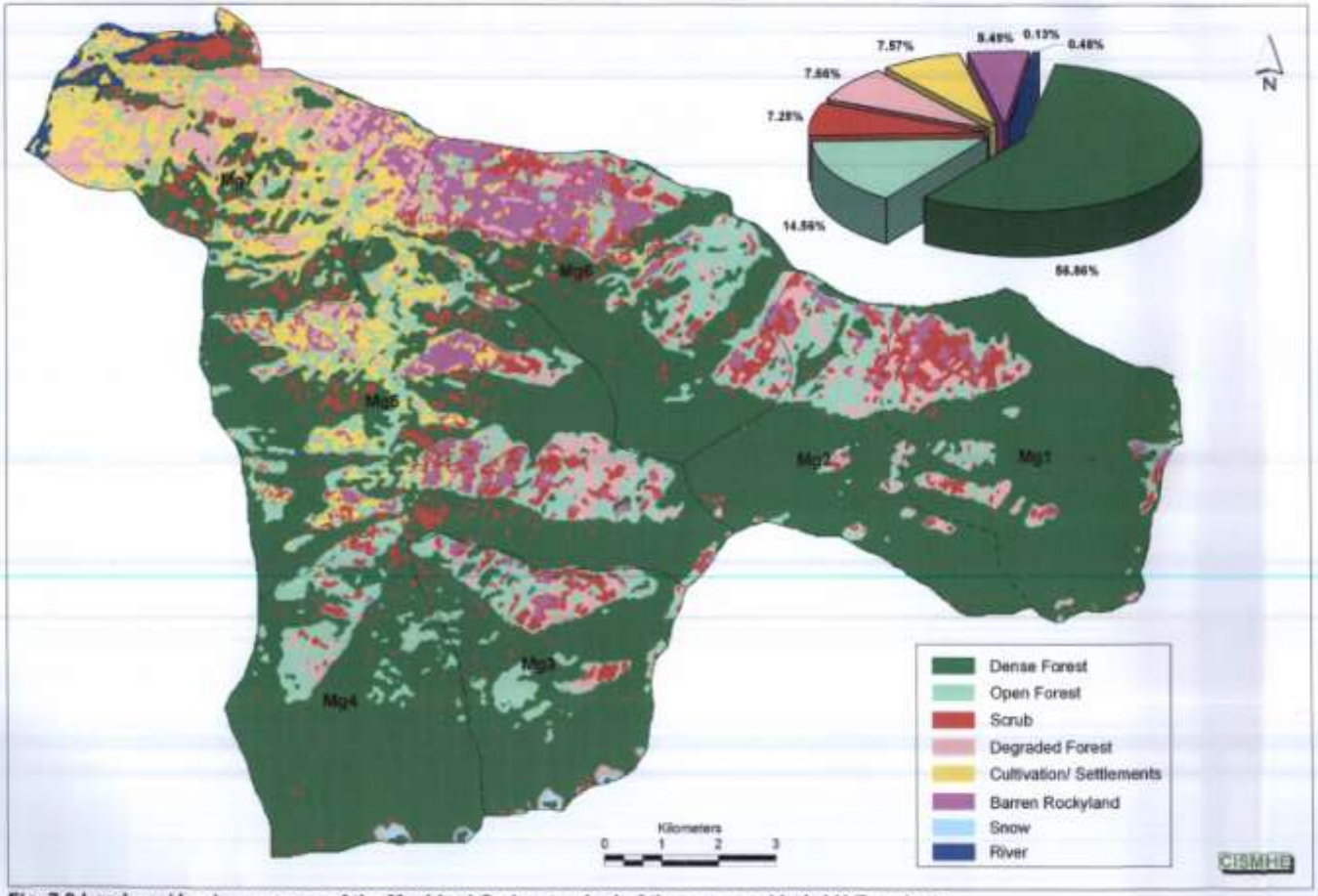


Fig. 7.8 Land use/ land cover map of the Machhad Gad watershed of the pruposed Luhri H.E project

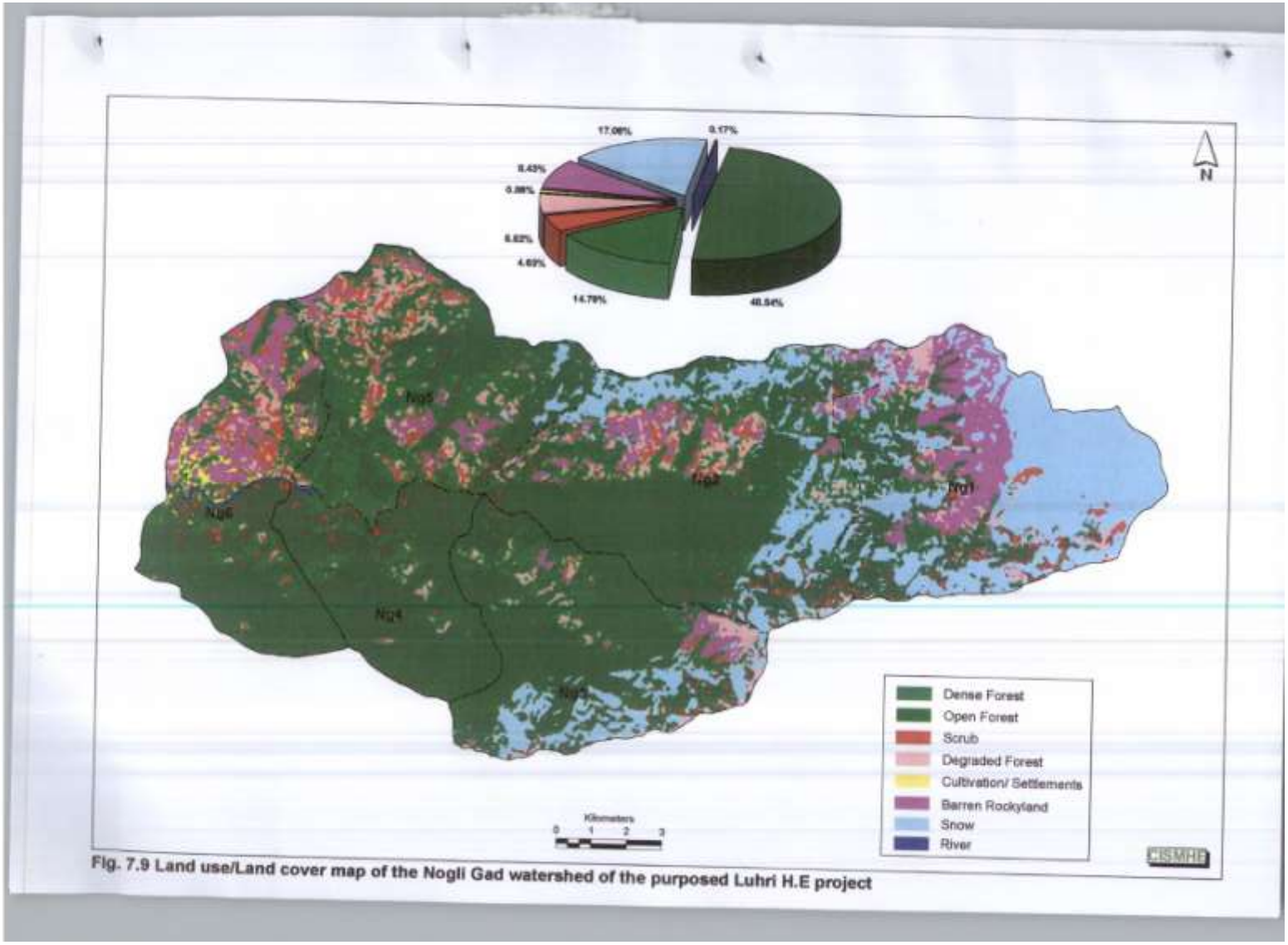


Fig. 7.9 Land use/Land cover map of the Nogli Gad watershed of the purposed Luhri H.E project

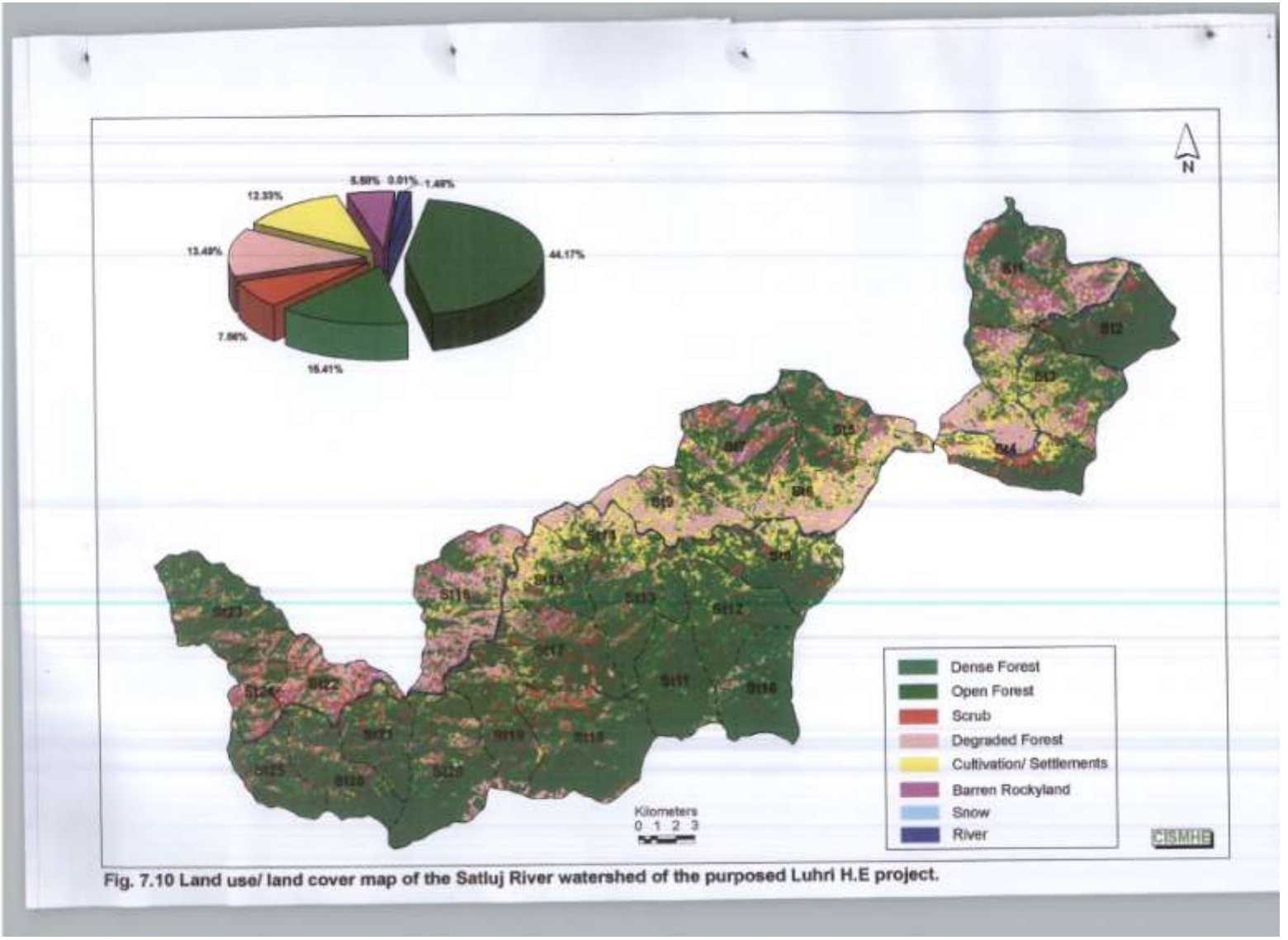
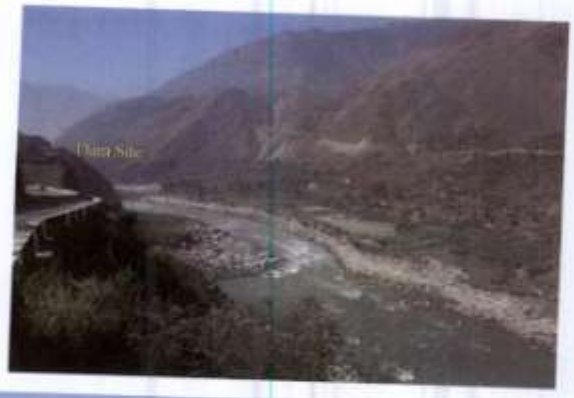


Fig. 7.10 Land use/ land cover map of the Satluj River watershed of the purposed Luhri H.E project.

Plate 7.1 A view of Nogli Gad (Above), Kurpan Valley (Middle) and Machhad Gad (Below)



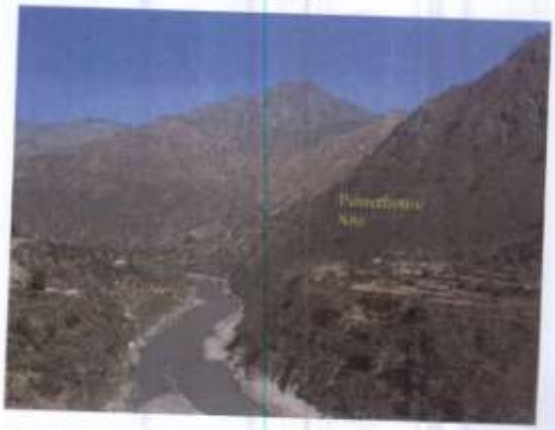


Plate 7.2 **A view of Satluj near Damsite (Above), Satluj (HRT stretch) and Satluj near Powerhouse site (Below)**

Chapter 8

SOIL EROSION

8
SOIL EROSION

Soil erosion is a natural process and is caused mainly due to moving water and the gravity. It varies from site to site and is intensified by various natural and human activities. In Himalayan river basins water is the main agent of erosion. In the higher altitudes and trans-Himalayan region wind plays a significant role in soil erosion as is the case in Lahaul–Spiti and Kinaur districts in Himachal Pradesh. Erosion by water is most complex process and takes place due to rain splash, sheet wash or rill wash, channel erosion in rivers or gullies. Glaciers also play a significant role in erosion near the origin of streams and rivers, particularly in perennial rivers, which have glacial origin.

The catchment area of the proposed Luhri HE project experiences one of the highest silt loads in the Satluj river in Himachal Pradesh. In India, this river is second only to Brahamputra and Ganga in terms of carrying silt. Studies have shown that at Bhakara the river carries nearly 35 MCM of silt annually. While the heavy loads of silt in the Himalayan rivers have been responsible for the formation of fertile plains of Assam, Uttar Pradesh, Bihar and Punjab, the headwater regions in the catchment lose the top soil leading to a series of negative consequences. In the present context, one of the significant negative impacts of soil erosion is reduction of the life of reservoir of a hydroelectric project. The increased silt in the rivers has severe adverse impacts on the micro- and macro-organisms, above and below ground as well as for the aquatic biodiversity including fishes. There are a number of factors in the Satluj basin which are responsible for extensive soil erosion and heavy silt load in the river. Some of these factors are natural, but the most are anthropogenic. The natural and man-induced factors leading to soil erosion in the Satluj basin are described below.

Glacial Erosion: Glacial erosion is a natural phenomenon, predominant in the upper region of the basin. The main river and its numerous tributaries have glacial origin, which is the source of silt. The River Satluj originates from Raksa Tal in Kailash-Mansarovar region and brings lots of rocks and debris along the glacial movement. Glacial action is characterized by furrowing, cutting, ploughing, and scouting action on landmass. The occasional flash floods due to heavy precipitation and snow melt transport the debris down the river system after damaging the area and sides of gullies. All the tributaries of Satluj and as well as the main channel bring silt due to glacial action.

Wind Erosion: This is a major cause of soil erosion in the Satluj basin, particularly in catchment area in trans-Himalayan zone. The cold desert region of Kinaur and Lahaul-Spiti districts in Himachal Pradesh is almost devoid of vegetation. The soils are exposed to natural forces of erosion like wind. The catchment area, particularly above Khab, is totally denuded and devoid of any cover, which makes it prone to wind erosion. A number of places around Rampur, Sainj, Luhri, Nogli and Marola, which are mostly under anthropogenic landuse have less vegetation cover as well. As a result, these areas under cultivation and settlements are also vulnerable to movement of soil by wind. Wind plays a significant role in removing the top soil of these regions.

Sheet Erosion: Detachment of soil particles by the impact of raindrops and their removal and transportation down the slope by water in the form of a sheet instead of well-defined channels or rills is known as sheet erosion. This process is responsible for the removal of top soil from cultivated fields as well as non-cultivated lands. A more or less uniform layer of fine particles is removed from the entire surface of an exposed land area, resulting in extensive loss of rich topsoil. Recently ploughed fields are the main areas of top soil erosion. Slopes in the lower altitudes of Machhad valley that have been converted in orchards are prone to this type of erosion. The orchards in this region are ploughed for mixing fertilizers resulting in loosening of soil and its removal by rain. During monsoon top soil is washed into the channels and Satluj river. Similarly, top soil from other watersheds like Nogli and Kurpan is also washed down into tributaries and the Satluj river during monsoon.

Rill Erosion: Rill erosion removes soil in localized small washes in well-defined channels with dimensions of few centimeters and depth not exceeding 15 to 25 cm. The intensity of downward moving water further leads to gully formation. This type of erosion is common throughout the catchment, particularly along the river Satluj, Nogli, Kurpan and Machhad watershed.

Landslide Erosion: Natural land slides, triggered by geological activities, are not so common in the project area between Rampur dam site to the powerhouse site. However, above Rampur, particularly in Karcham, Wangtu and Pooh regions the on-going road cutting induces landslides. The areas above Luhri town on the right bank of Satluj and Nogli gad on the right bank are some of the places affected by anthropogenic induced landslides. The debris from road-cutting is washed down to the river during monsoon and it is one of the major causes of soil erosion in the region.

8.1 ESTIMATION OF SOIL EROSION IN CATCHMENT

The entire catchment area has been delineated into eight watersheds, namely Nogli (Ng), Machhad (Mg), Bhera (Brk), Khaneti, Kiongal, Chainra (Cg), Beha (Bk) and Kurpan (Kg). These watersheds are further divided into 74 sub-watersheds. Detailed drainage map (Chapter 4) for the entire catchment as well as for each sub-watershed was prepared at 1:50,000 scale. All the rivers and streams have been delineated in each sub-watershed. A slope map (Chapter 4), a soil map (Chapter 6), and land use/land cover maps (Chapter 7) were prepared for the entire catchment area and for each sub-watershed. The areas under different erosion intensities were calculated using GIS software as detailed in Chapter 2. For the estimation of erosion intensity three characters, soil depth, slope and land use, each with five to seven parameters, were considered during hierarchical querying. For soil depth, deep (score 1), moderately deep (score 2), moderately shallow (score 3), shallow (score 4) and very shallow (score 5) were used. In case of slope, seven parameters, gently sloping (score 1) to escarpments (score 7) were considered and similarly five categories of land use, dense forest (score 1), open forest (score 2), scrub/alpine (score 3), barren/mountain (score 4) and cultivation (score 5) was taken into account for calculating erosion in the catchment. After running the queries, an area with the final score of 12 or above was designated as having very severe erosion, the score 10 to 12 was designated as severe, 7 to 9 was classified as moderate erosion and score up to 6 was classified as having slight erosion. Areas under different erosion intensities were estimated for each sub-watershed as well as for entire catchment and the results are presented in Tables 8.1 and 8.2. Around 40 per cent of the total catchment area is found to be under very severe and severe erosion and nearly 57 per cent area has moderate to slight erosion. Around 3.7 per cent of the total catchment is covered with snow and water bodies (Table 8.1; Fig. 8.1).

Table 8.1 Area under different intensity of erosion in the watershed of Luhri HEP catchment

Watersheds	Very Severe		Severe		Moderate		Slight	
	Area	(%)	Area	(%)	Area	(%)	Area	(%)
Beha Khad (Bk)	1163.65	3.3	11378.58	32.25	21423.44	60.73	1281.1	3.63
Bhera Khad (Brk)	858.74	9.7	2728.62	30.81	4832.17	54.57	375.19	4.23
Chainra Gad (Cg)	382.99	2.3	3523.49	21.21	10710.81	64.5	1985.4	11.95
Dhurmu Gad (Drg)	116.96	1.56	1954.79	26.12	4877.88	65.18	532.26	7.11
Kurpan Gad (Kg)	177.02	0.674	4330.26	16.49	18735.45	71.37	1292.39	4.92

Machhad Gad (Mg)	1827.37	12.53	6796.98	46.62	5777.42	39.63	86.13	0.59
Nogli Gad (Ng)	3532.01	14.21	10444.00	42.01	6541.97	26.31	55.57	0.223
Satluj (St)	3856	6.63	23106.42	39.73	28258.84	48.59	2075.53	3.57
Total	**11914.74**	**6.20**	**64263.14**	**33.46**	**101158.00**	**52.67**	**7683.57**	**4.00**

Table 8.2 Area (ha) under different erosion intensity categories in sub-watersheds of Satluj CAT H.E. project

Sub-Watersheds	Erosion Intensity Category				Snow/ Glaciers/ Lakes, etc.	Total
	Very Severe (a)	Severe (b)	Moderate (c)	Slight (d)		
Bk1	110.11	974.14	2471.18	45.79		3601.22
Bk2	124.17	962.86	1579.89	45.46		2712.38
Bk3	67.00	743.39	1902.05	98.48		2810.92
Bk4	46.26	550.50	1366.43	49.31		2012.50
Bk5	6.27	419.15	908.29	25.16		1358.87
Bk6	89.43	689.80	1199.47	11.02		1989.72
Bk7	61.58	1598.42	2546.55	116.49		4323.04
Bk8	134.68	757.10	2094.04	209.87		3195.69
Bk9	58.89	346.14	1337.79	214.31		1957.23
Bk10	18.02	401.78	1449.48	182.13		2051.41
Bk11	40.63	1076.31	2197.04	174.78		3488.76
Bk12	79.73	878.90	1283.57	65.13		2307.33
Bk13	246.75	1030.78	434.04	0.26	16.71	1728.54
Bk14	80.13	949.31	653.62	42.81	13.47	1739.34
Brk1	125.50	495.92	1244.15	64.33		1929.90
Brk2	122.97	693.43	1603.58	95.84		2515.82
Brk3	4.34	297.58	887.32	144.29		1333.53
Brk4	139.89	558.38	592.56	36.34		1327.17
Brk5	466.04	683.31	504.56	34.39	58.99	1747.29
Drg1	24.02	597.85	1358.87	89.38		2070.12
Drg2	6.17	432.21	1417.77	167.26		2023.41
Drg3	86.77	924.73	2101.24	275.62	1.49	3389.85
Cg1	112.48	446.54	2382.80	246.35		3188.17
Cg2	68.55	310.86	1407.43	166.14		1952.98

Cg3	24.12	1033.61	3485.58	877.03		5420.34
Cg4	177.84	1732.48	3435.00	695.88	2.04	6043.24
Kg1	-	216.47	2282.47	52.81	1598.35	4150.10
Kg2	55.15	632.00	967.04	6.42	74.21	1734.82
Kg3	0.08	525.05	2544.92	114.53	-	3184.58
Kg4	-	189.57	1975.91	126.35	41.58	2333.41
Kg5	25.12	664.25	1653.48	103.35	-	2446.20
Kg6	-	282.24	2552.80	326.83	-	3161.87
Kg7	7.12	393.97	2251.41	217.26	-	2869.76
Kg8	13.77	186.55	1663.32	124.79	-	1988.43
Kg9	75.78	1240.16	2844.10	220.05	-	4380.09
Mg1	278.93	849.72	889.83	-	-	2018.48
Mg2	127.28	626.76	635.17	-	0.08	1389.29
Mg3	252.40	738.13	487.41	-	9.27	1487.21
Mg4	178.80	532.44	1099.19	11.43	9.38	1831.24
Mg5	289.16	1542.76	1546.96	73.29	-	3452.17
Mg6	197.93	1373.55	641.40	-	-	2212.88
Mg7	502.87	1133.62	477.46	1.41	70.65	2186.01
Ng1	566.44	1040.26	842.04	26.52	2565.08	5040.34
Ng2	1177.24	2435.71	1331.47	29.05	956.00	5929.47
Ng3	656.28	1790.41	935.01	-	642.30	4024.00
Ng4	400.62	1234.00	790.00	-	7.78	2432.40
Ng5	145.57	1685.70	2112.42	-	76.52	4020.21
Ng6	585.86	2257.92	531.03	-	34.52	3409.33
St1	-	1117.18	2239.13	90.25	6.97	3453.53
St2	54.79	626.11	1360.39	-	76.10	2117.39
St3	494.42	1936.41	753.83	2.47	102.39	3289.52
St4	339.15	1511.49	711.76	-	87.24	2649.64
St5	233.35	1550.37	780.15	-	29.57	2593.44
St6	180.43	1062.73	374.05	1.84	45.28	1664.33
St7	514.34	1701.31	561.05	-	0.01	2776.71
St8	260.37	899.76	1023.77	28.96	79.84	2292.70
St9	305.20	1212.21	287.36	0.21	41.06	1846.04
St10	77.98	330.64	1428.52	96.66	-	1933.80
St11	110.29	421.71	1455.33	36.04	-	2023.37

St12	148.42	733.84	1328.22	24.34	5.05	2239.87
St13	5.72	476.62	1722.12	172.78	16.08	2396.32
St14	54.93	800.91	402.28	13.17	69.16	1340.45
St15	133.38	869.02	523.96	17.65	52.88	1596.89
St16	52.09	1519.46	1299.32	98.57	65.36	3034.80
St17	249.62	1130.34	1123.64	24.74	40.51	2568.85
St18	78.28	852.35	2157.48	258.72	-	3346.83
St19	108.89	501.20	1048.26	138.72	5.33	1802.40
St20	49.19	649.73	2102.04	197.40	9.28	3007.64
St21	72.80	393.63	1025.91	45.00	26.26	1563.60
St22	36.29	993.08	383.76	3.62	48.33	1465.08
St23	10.57	304.09	1399.42	701.80	-	2415.88
St24	17.37	551.21	666.04	41.81	24.85	1301.28
St25	89.62	506.99	840.09	40.63	13.28	1490.61
St26	179.14	454.03	1260.96	37.15	9.20	1940.48
Total	**11915.37**	**64263.14**	**101157.98**	**7683.57**	**7032.45**	**192052.51**

The catchment area from Rampur dam site to Marola powerhouse site has around 40 per cent of the land area under very severe and severe erosion category. This area has been earmarked for catchment area treatment. In Machhad watershed, 12.53 % and 46.62 % of its total area is under very severe and severe erosion, respectively, whereas, in Nogli watershed 14.21% and 42.01% of its total area is under very severe and severe erosion, respectively (Table 8.1; Fig. 8.1). Kurpan watershed has minimum area (17.16%) under severe and very severe erosion which has been set aside for treatment (Table 8.1). In this watershed 0.67 per area has very severe erosion and 16.49 per cent area has severe erosion (Table 8.1). In the other five watersheds, areas with very severe erosion ranged from 1.56 per cent of the total area in Dhurmu (Drg) watershed to 9.7 per cent of total area in Bhera Khad (Brk). In these five watersheds (Bk, Brk, Cg, Drg and St) area under severe erosion varied from 21.21 per cent of total area in Cg (Chainra) watershed to 39.73 per cent of total area in St (Satluj) watershed (Table 8.1).

Among the sub-watersheds Brk5 has the maximum land area of 466.04 ha (26.67% of the total area) under very severe category of erosion followed by Mg7, which has around 23.0 per cent (502.87 ha) of its area with very severe erosion. Sub-watersheds Kg3, Kg4, Kg6 and St1 do not have

any area with very severe erosion (Table 8.2; Fig. 8.1.). Similarly, maximum severe erosion was estimated in St22, with 67.78 per cent of total area under this type of erosion. Ng6, St9, St6, Mg6 and St7 are other sub-watersheds, which have 60 to 66 per cent of their total area under severe category of erosion (Table 8.2; Fig. 8.1). Kg1 sub-watershed has only 5.22 % of its area with severe erosion and Kg8, Kg6, and Kg4 are the sub-watersheds which have less than 10 per cent of their area under severe erosion (Table 8.2; Fig. 8.1).

Areas with very severe erosion

In the present study the erosion of very severe intensity is defined as having intensity score of 12 or above on the scale of 1-12. The regions under cultivation with very shallow soil and steep slopes, like escarpments are recorded to have very severe intensity of erosion. Around 6.2 per cent of the total catchment area falls in this category, which is nearly 119.15 sq km of the total catchment area (1920.53 sq km). Nogli (Ng) watershed has the maximum area (14.21%) under very severe erosion, followed by Machhad watershed (Mg) with 12.53 per cent of the total area with very severe intensity of erosion (Table 8.2; Fig. 8.1). Other watersheds, Beha (Bk), Bhera (Brk), Chainra (Cg), Durmu (Drg) Kurpan (Kg) and Satluj (St) have less than 10 per cent of this total area under very severe erosion (Table 8.2; Fig.8.1). Kurpan watershed has just 0.7 per cent of its land area under very severe erosion (Table 8.2; Fig. 8.1).

Except the four sub-watersheds, Kg1, Kg4, Kg6 and St1, all the remaining 70 sub-watersheds have recorded various areas under very severe category of erosion (Table 8.2; Fig. 8.1). Eighteen sub-watersheds have less than two per cent of their area under very severe category of erosion and 23 sub-watersheds have less than 5 per cent of their geographic area under this category (Table 8.2). Sub-watershed Brk5 has around 26.7 per cent of its total area under very severe erosion, which is the maximum among all the sub-watersheds. This sub-watershed is along the Satluj river on the left bank and has a number of settlements, like Maten, Narola, Nauld, Chunja and Balthano located in it. Mg7 sub-watershed has around 23 per cent of its area under very severe erosion category (Table 8.2). The sub-watershed is a part of Machhad watershed and the region has a number of orchards and settlements. There are 15 sub-watersheds which have 10 to 20 per cent of their geographic areas under very severe erosion intensity (Table 8.2; Fig. 8.1). Out of these 15 sub-watersheds, six are part of Satluj (St7, St9, St3, St4, St8 and St6) watershed, five are part of Nogli watershed (Ng2, Ng6, Ng4, Ng3, and Ng1), two sub-watersheds (Mg3 and Mg1) are part of Machhad watershed and one

each is part of Bhera (Brk4) and Beha (Bk13) watersheds (Table 8.2; Fig. 8.1). Most of these watersheds have agriculture and settlements on their slopes.

Areas with Sever Erosion

The erosion intensity of 10 to 12 was designated as severe erosion in this CAT plan. Around 33.5 per cent (642.63 sq km or 64263.14 ha) of the total catchment area (1920.53 sq km or 192052.51 ha) has been shown to have severe erosion (Table 8.2). Most of the severe erosion areas are along the banks of Satluj river, Nogli and Machhad gad. These areas have intensive agriculture and human settlements and a number of developmental activities are going on in these areas. Two watersheds, Machhad and Nogli have 42.0 to 47.0 per cent of their areas under severe soil erosion, followed by Satluj, Beha and Bhera watersheds which have 30 to 33.5 per cent of their areas under this category of erosion (Table 8.1; Fig. 8.1). The remaining four watersheds have less than 30.0 per cent of their areas under severe soil erosion (Table 8.1; Fig. 8.1). Kurpan watershed has only 16.47 per cent of its area with severe erosion, which is the lowest among all the watersheds (Table 8.1; Fig. 8.1).

Severe erosion was observed in all the 74 sub-watersheds, and the areas under this erosion category ranged from a minimum of 5.22 per cent in Kg1 to maximum of 67.78 per cent in St22 (Table 8.2). In the sub-water shed St22 around 993.08 ha of land has severe erosion that needs treatment (Table 8.2; Fig. 8.1). This sub-watershed is on the right bank of Satluj and includes the settlements like Parlog, Ropli and Sanhi. There are five other sub-watersheds which have more than 60 per cent of their total area under severe erosion (Table 8.2; Fig. 8.1). Three sub-watersheds (St9, St6 and St7) are in Satluj watershed and have 1212.21 ha, 1062.73 ha and 1701.31 ha area, respectively, under severe erosion (Table 8.2). Two sub-watershed, one each in Nogli (Ng6) and Machhad (Mg6) watersheds have 2257.92 ha and 1373.55 ha area, respectively under severe erosion (Table 8.2).

Around 20 sub-watersheds have more than 40 per cent of their land under severe intensity of soil erosion. Maximum sub-watersheds (8) are part of the Satluj watershed, which have 40 to 60 per cent of their land under severe category of erosion (Fig.8.1, Table 8.2). Six sub-watersheds (St5, St14, St3, St4, St15 and St16) which are all located along Satluj river have more than 50 per cent of their land area under severe erosion. The main reason is settlements and extensive agriculture in the area (Fig. 8.1; Table 8.2). Five sub-watersheds (Mg7, Mg3, Mg2, Mg5 and Mg1) in Machhad

watershed have 40 to 52 per cent of their land area under severe erosion. In this watershed slopes have been converted into apricot and apple orchards. In Nogli watershed four sub-watersheds, Ng4, Ng3, Ng5 and Ng2 have 40 to 50 per cent of their land area under severe soil erosion. Most of these sub-watersheds are along the river valley and the area is dry. Two sub-watersheds, Bk13 and Bk14, of Beha watershed, also along the Satluj river, have 54 to 60 per cent of their total area under severe erosion (Table 8.2; Fig. 8.1). There are a number of settlements in these two sub-watersheds and slopes have been converted into agriculture. Brk4 sub-watershed of Bhera watershed has 42.07 per cent of land area under severe intensity of erosion (Table 8.2; Fig. 8.1). There are 34 sub-watersheds which have severe erosion in 20 to 40 per cent of their land area. Eleven sub-watersheds, St8, St25, St12, St1, St2, St19, St18, St21, St26, St20 and St11, are in Satluj watershed which have 20.84 per cent (St11) to 39.24 per cent (St8) under severe erosion (Table 8.2; Fig. 8.1). In Beha watershed 10 sub-watersheds have severe erosion in 23.69 per cent (Bk8) to 38.09 per cent (Bk12). The other sub-watersheds, Bk7, Bk2, Bk6, Bk11, Bk5, Bk4, Bk1 and Bk3 have 20 to 40 per cent of their land area under severe erosion. Most of the area in this region is under agriculture. Dhurmu and Kurpan watersheds, have three sub-watersheds each with 20 to 40 per cent of their land area under severe erosion. In Dhurmu watershed there are only three sub-watersheds (Drg1, Drg2 and Drg3) and these have 21.36 to 28.88 per cent of their land area under severe erosion. In Kurpan watershed Kg2 and Kg5 sub-watersheds have more than 60 per cent of their land area under forest cover (dense + open) and there is no cultivation and settlements. Rest of the area (36.43 per cent and 27.15 per cent, respectively) in these two sub-watersheds is prone to severe erosion. In Kg9 sub-watershed around 18 per cent area has cultivation and settlements and severe erosion is recorded in 28.31 per cent of the land area (Table 8.2; Fig. 8.1). In Ng1 sub-watershed of Nogli gad around 50 per cent area is covered with snow and 25 per cent area has forest cover (dense + open) and the remaining 20 per cent is faced with severe soil erosion. Cultivation and settlements are absent from this sub-watershed. The sub-watershed Cg4 of Chainra watershed has 28.36 per cent land area under severe erosion. Four sub-watershed, all from Kurpan watershed, have less than10 per cent of their land area under severe erosion. These four sub-watersheds, Kg8, Kg6, Kg4 and Kg, are in the upper regions of the Kurpan valley. Two sub-watersheds, Kg1 and Kg4 do not have any areas under cultivation and settlements, while the two other sub-watersheds, Kg6 and Kg8 have 4.03 and 3.31 per cent of their land under cultivation. The areas with severe erosion in Kg1 sub-watershed ranged from 5.22 per cent to 9.38 per cent in Kg8 sub-watershed. In Kg1 sub-watershed around 38.51 per cent of its area is covered with snow (Fig.8.1; Table 8.2).

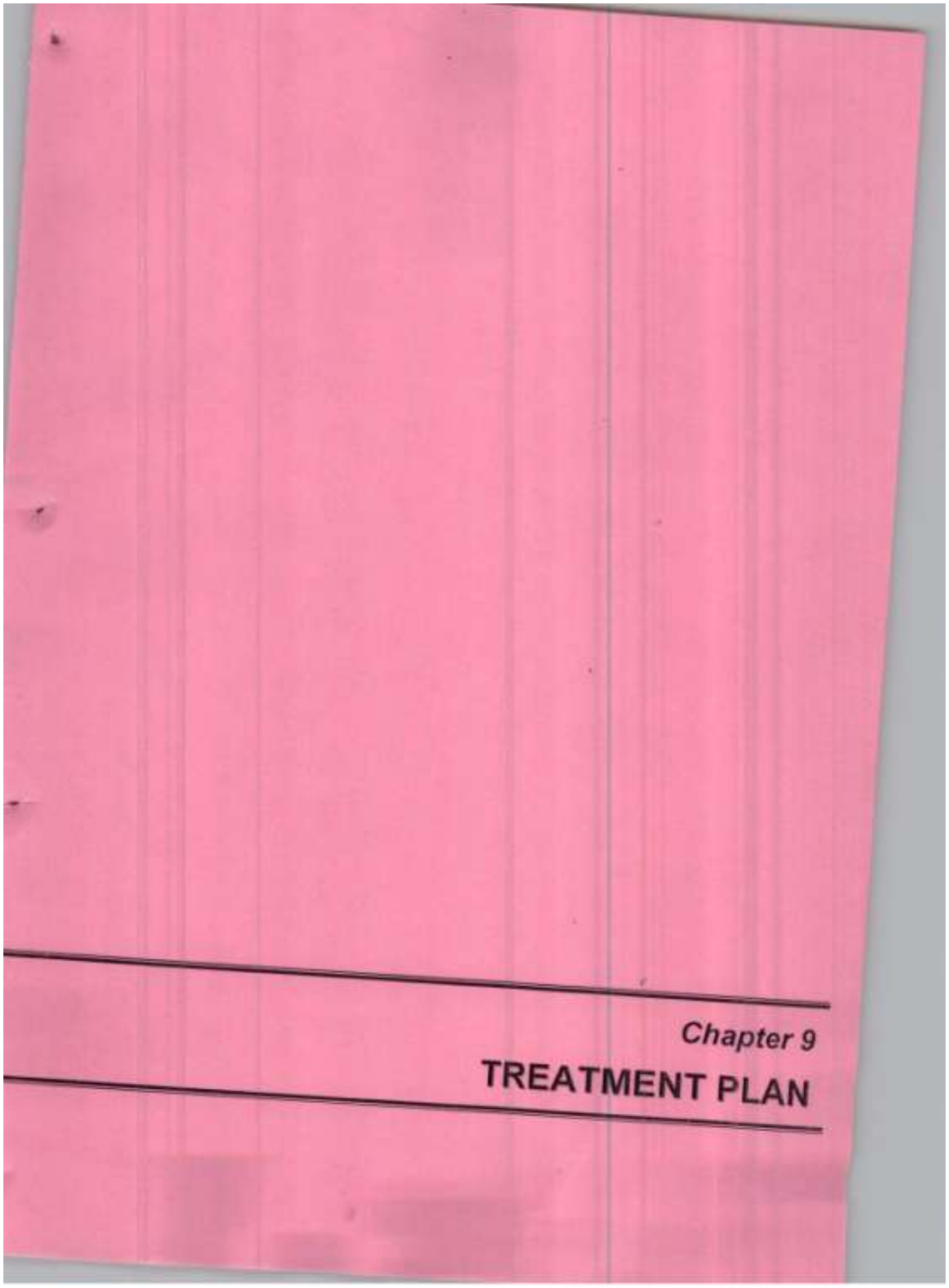
Moderate Erosion

The area with moderate erosion is defined as the area with the erosion intensity from 7 to 9. In the entire catchment around 52.67 per cent (101157.98 ha) area has moderate erosion. This area ha not been considered for treatment in the present plan. Five watersheds, Beha, Bhera, Chainra, Dhurmu and Kurpan have more than 50 per cent of their total geographic area under moderate erosion and three watersheds, Machhad, Nogli and Satluj have less than 50 per cent of their land area under moderate erosion. In Kurpan watershed more than 70 per cent (71.37%, 18735.45 ha area) area has moderate erosion followed by Dhurmu (65.18%, 4877.88 ha area), Chainra (64.50%), Beha (60.73%) and Bhera (54.57%). Nogli watershed has only 26.31 per cent (6541.97 ha area) of its total land under moderate erosion (Table 8.1).

With respect to the sub-watersheds, 35 of these have more than 60 per cent of their land area under moderate category of erosion followed by 19 sub-watersheds, which have moderate erosion in 40 to 60 per cent of their total area under this category of erosion (Table 8.2). Seventeen sub-watersheds have moderate erosion in 20 to 40 per cent of their geographic area and three sub-watersheds have moderate erosion in less than 10 per cent area. Kg4 sub-watershed in Kurpan watershed has more than 84.68 per cent (1975.91 ha) of its land area (2333.41 ha) under moderate erosion and four sub-watersheds , Kg8, Kg6, Kg3 and Kg7, in the same watershed have more than 75 per cent of their land area under moderate erosion (Table 8.2; Fig. 8.1). These sub-watersheds either do not have any or have less than 5 per cent of their land under cultivation or settlements. Minimum moderate erosion, in 15.57 per cent area (287.36 ha) was observed in St9 sub-watershed, which has around 40 per cent of its area under cultivation and settlement (Table 8.2; Fig. 8.1).

Slight Erosion

The area having less than a score of 6 of erosion intensity has been designated as having slight erosion. The proposed project area has 4.0 per cent (7683.57 ha) of the total area under slight soil erosion. This area has also not been included for the treatment plan. Nogli watershed has the minimum slight erosion area, which is just 0.2 per cent, whereas, Chainra watershed has 11.95 per cent of its area under slight erosion, which is the highest for all watersheds (Table 8.1; Fig. 8.1). Slight erosion was not observed in nearly 15 sub-watersheds. These sub-watersheds are in Nogli, Machhad and Satluj watersheds (Table 8.2; Fig. 8.1).



Chapter 9

TREATMENT PLAN

9
TREATMENT PLAN

9.1 INTRODUCTION

Erosion and sediment yield in Satluj valley and sediment accumulation in the fertile flood plains of Punjab and lower regions of Himachal Pradesh represent a loss and gain phenomenon. In the upper regions of the valley at Kullu, Mandi, Shimla, Rampur and Lahaul-Spiti, active processes of slope denudation are operative and loss of fertile soil is taking place. The sediments so generated are brought down into the man-made reservoirs which get filled with silt and other channel eroded materials. In the catchment area of the proposed Luhri HE project, splash, sheet, rill and gully are the main types of erosion, besides wind erosion and glacial erosion in the upper stretches of Satluj and its other tributaries like Spiti, Baspa and Nogli. The total catchment area of the proposed Luhri project up to dam site at Nirath is around 45,453.20 sq km (13,779.71 sq km in India + 31,673.49 sq km in Tibet) and the free draining catchment area of the project from the dam site of Rampur HE project near Rampur to Luhri dam site at Nirath is around 797.14 sq km (Table 9.1). The total area considered for study is around 1920.53 sq km, which includes the free draining catchment of 797.14 sq km and also the area of 1123.39 sq km, which lies between the two components of Luhri H. E. project, dam site at Nirath and powerhouse site at Marola. In this defined region the total area under different categories of erosion intensity (very severe, severe, moderate and slight) is 185020.06 ha (1850.21 sq km), which constitutes 96.34 per cent of the total catchment area (or study area) (Table 9.2). However, the area under very severe and severe erosion is considered for treatment in free draining catchment, which is around 349.71 sq km (34971 ha) and in the downsteam area under erosion of very severe is considered for treatment which comes to around 202.08 sq km (20208 ha). Traditionally, the area with very severe and severe erosions is considered for treatment. Though area with erosion has also been estimated in the downstream with an objective to restore the degraded areas in the future. However, in the present CAT plan we have considered only 82.96 sq km (8295.98 ha) for treatment, which is around 15.03 per cent of the total effective catchment area (551.79 sq km out of 761.79 sq km because this area comes below 2600 m elevation and less than 45°). Remaining 84.97 per cent of the catchment area is not suitable for treatment either due to

higher elevation (above 2800 m) or steep slopes (slopes above 45%) or does not have the erosion of very severe or severe intensity. Entire catchment area which is taken for treatment is divided into eight watersheds which are further divided into 74 sub-watersheds (see Fig 1.4) and the treatment area is also divided into five divisions which are further divided into 13 ranges (Fig. 9.5).

We have suggested various biological and engineering measures for the treatment of these areas. However, more emphasis is given on the biological methods including bioengineering methods using locally available raw materials. Since the valleys have high human population density and the land is under heavy pressure of cultivation, grazing and settlements, the CAT plan emphasizes the use of such local materials (biological) for arresting soil erosion which have multiple uses and can augment the needs of local villagers also. There are 1795 villages in the catchment which have 45578 households with a population of 212685 (Census, 2001). The local population depends on the forests for fuel wood, fodder and timber. The suggestions in the plan have been given to decrease this dependency of local population on natural resources and allow the region to rejuvenate itself. For that various measures, like supply of cooking gas, pasture development, cultivation of various other herbs for income generation, etc have been suggested. The area receives less rainfall and is relatively dry as a result the local population faces problems of drinking water. Most of the agriculture is rain fed, except in some areas along the streams. Suggestions have been given for rain-water harvesting in the region to address the drinking water problem and also to increase soil moisture in the region. The implementation of the CAT plan will be done by the State Forest Department.

Total budget for the catchmment area treatment plan is kept **Rs. 12466 lakh** and proposed schedule for the execution of the planned work is seven years and three years time is kept for the maintenance of the work carried out in the catchment. Zero year is also considered in the schedule for the development of nursery, raising of saplings.

9.2 OBJECTIVES

The CAT plan has been prepared sub-watershed-wise. In all, 71 sub-watersheds have been considered for CAT plan. In 3 sub-watersheds, no area has been found to be convenient for treatment, even though they have potential to yield silt. The catchment area falls under five divisions

and 13 ranges (Fig. 9.1). The emphasis is given for biological treatment measures as it was observed that deforestation, conversion of land for orchards, agricultural fields and settlements and various on-going developmental projects like road, dams, etc. are the main causes of soil erosion in the region. The economy of the region is agriculture based with 70 to 80 per cent population of the region involved in agriculture. The local communities are solely dependent on natural resources for daily needs like fuel wood, fodder, timber, grazing and water for irrigation. Commercial logging of forests has continued in some areas (piles of logs were observed in the region). Rejuvenation of forest is slow and mostly *Pinus* and *Eucalyptus* are planted under afforestation programme in the region.

In the present plan thrust has been given for sustainable development of the catchment area as well as to protect and conserve the local environment with the active involvement of local people. In the CAT plan equal emphasis has been given to the economic needs of the local people, greening of the region and strengthening the local wildlife management and integrate these activities with a view to finally avoid soil erosion and decrease the silt load in Satluj and its tributaries. Various mechanical and biological measures have been suggested to treat the region to meet the following objectives.

1. Ecological rehabilitation of the region for the sustainable development of local economy.
2. Greening the region.
3. To protect the region from soil loss.
4. Enrichment/rejuvenation of water resource in the region.
5. Increase the employment opportunities for local communities to decrease their dependency on natural resources for their livelihood.
6. Management plan to protect the wildlife.
7. Initiation of research activities to use and protect natural resources in a scientific way.

WATERSHEDS AND SUBWATERSHEDS IN THE CATCHMENT

The proposed project is in Satluj valley/ catchment (1A2B as per AISLUS) on river Satluj. The total catchment of the project up to dam site at Nirath is around 45,453.20 sq km, which includes 13,779.71 sq km area in India and 31,673.49 sq km area in Tibet (Table 9.1). The study area

includes free-draining catchment of proposed Luhri HE project from Rampur damsite at Jhakri to dam site of Luhri is around 797.14 sq km (around 33 km distance) .However in the proposed catchment area treatment plan downstream area between dam site at Nirath and power house site at Marola of Luhri H.E. project is 1,123.39 sq km is also included. Thus total area considered for treatment is around 1920.53 sq km. The geographical location of the catchment area (which is considered for treatment) is 77°12' to 77°35'E longitude and 31°15' to 31°25'N latitude. The entire catchment area is divided into 8 watersheds, Beha Khad (Bk), Bhera Khad (Brk), Chainra Khad (Cg), Dhurmu Khad (Drg), Kurpan Khad (Kg), Machhad Gad (Mg), Nogli Gad (Ng) and Satluj river (St). These watersheds are further divided into 74 sub/micro-watersheds (Table 9.1, see Fig. 1.4). There are 27 sub-watersheds in the free draining catchment (from four watersheds, Nogli, Machhad, Kurpan and Satluj) 24 sub-watersheds are identified with an area for treatment and 47 sub-watersheds are in downstream area upto powerhouse site out of which 47 sub-watersheds have area for treatment (from five watersheds, Beha, Bhera, Chainra, Dhurmu and Satluj Table 9.1, Fig. 1.4).

Table 9.1 Salient features of the catchment area of Luhri H.E. project

1.	Geographical location of catchment area	Long: 77°12'-77°35'E Lat: 31°15'-31°25'N
2.	Total catchment area of Satluj river up to dam site at Nirath a) Catchment area in Indian region b) Catchment area in Tibet	45,453.20 sq.km. 13,779.71 sq.km. 31,673.49 sq.km.
3.	Total catchment area to be considered for the study area (From Rampur dam site to power house of proposed Luhri H.E. project at Marola) a) Free-draining catchment area of Luhri H.E. project (from Rampur dam site to dam site of proposed Luhri H.E. project at Nirath) b) Downstream catchment area (from Luhri dam site at Nirath to power house at Marola of Luhri H.E. project)	1,920.53 sq.km. 797.14 sq.km. 1,123.39 sq.km.
4.	Total number of watersheds in the catchment a) Number of watersheds in free-draining catchment b) Number of watersheds in downstream	8 4 4

5.	Number of sub-watersheds in the catchment	74
	a) Number of sub-watersheds in the free-draining catchment	27
	b) Number of sub-watersheds in the downstream catchment	47
6.	Number of sub-watersheds identified with area for treatment	71
	a) Number of sub-watersheds identified with area for treatment in the free-draining catchment	24
	b) Number of sub-watersheds identified with area for treatment in the downstream (biological)	20
	c) Number of sub-watersheds identified for with area For treatment in downstream(engineering)	47
7.	Catchment area with erosion (Very Severe, Severe, Moderate, Slight)	1850.21 sq km
	a) Erosion (Very Severe, Severe, Moderate, Slight) in the free-draining catchment	733.98 sq km
	b) Erosion (Very Severe, Severe, Moderate, Slight) in down-stream	1116.23 sq km
8.	Catchment area with Very Severe and Severe erosion	761.79 sq km
	a) Free-draining area with Very Severe and Severe erosion	349.71 sq km
	b) Downstream area with Very Severe and Severe erosion	412.08 sq km
9.	Total effective area in the catchment	551.79 sq km
	a) Effective area in Free-draining	349.71 sq km
	b) Downstream area	202.08 sq km
10.	Total treatable area in the catchment	82.96 sq km
	a) Treatable area in Free-draining catchment	38.03 sq km
	b) Treatable area in downstream catchment	44.93 sq km
11.	G&D stations in the catchment	8
	a) G&D stations in free-draining catchment	4
	b) G&D stations in the downstream catchment	4
12.	Treatment area identified for :	
	a) Biological measures (afforestation, regeneration/ plantation, pasture development, etc.	67.92 sq km
	b) Engineering measures (staggered contour trenches, slips/ gullies/ rill and sheet erosion and Planting grass tufts)	15.04 sq km
13.	Schedule	7 + 3 years (Execution + Maintenance)

14. Total cost of the catchment area treatment **Rs. 12466 lakhs**

The area under different intensity of erosion (Chapter) was calculated after considering latest information on land use/ land cover (EIA Chapter 7: Land use/ Land cover from satellite images), soil (NBSS Publ.57) (EIA chapter 5: Soil), drainage (from SOI toposheets at 1:50,000 scale), slope (EIA Chapter 3: Physiography), elevation aspect and geology of the region as given in EIA report. Almost entire area of the catchment (1920.53 sq km) is eroded. The area deducted under different category of erosion (very severe, severe, moderate and slight) is around 1850.19 sq km (96.34 per cent) and the area under very severe and severe category of erosion is around 761.79 sq km (39.67 % of the total catchment area considered for study; see Table 9.2). In the present management plan the area with very severe erosion (in the downstream area) and severe erosion categories in free draining catchment have been considered for treatment, which is around 44.93 sq km and 38.03 sq km in downstream and in free-draining catchment, respectively and the total treatable area is around 82.96 sq km (see Table 9.1).

Table 9.2 Area (ha) under different erosion intensity categories in sub-watersheds of Luhri H.E. project area

Sub-Watersheds	Erosion Intensity Category					
	Very Severe (a)	Severe (b)	Moderate (c)	Slight (d)	Snow/ Glaciers/ Lakes, etc.	Total
Bk1	110.11	974.14	2471.18	45.79		3601.22
Bk2	124.17	962.86	1579.89	45.46		2712.38
Bk3	67.00	743.39	1902.05	98.48		2810.92
Bk4	46.26	550.50	1366.43	49.31		2012.50
Bk5	6.27	419.15	908.29	25.16		1358.87
Bk6	89.43	689.80	1199.47	11.02		1989.72
Bk7	61.58	1598.42	2546.55	116.49		4323.04
Bk8	134.68	757.10	2094.04	209.87		3195.69
Bk9	58.89	346.14	1337.79	214.41		1957.23
Bk10	18.02	401.78	1449.48	182.13		2051.41
Bk11	40.63	1076.31	2197.04	174.78		3488.76
Bk12	79.73	878.90	1283.57	65.13		2307.33
Bk13	246.75	1030.78	434.04	0.26	16.71	1728.54
Bk14	80.13	949.31	653.62	42.81	13.47	1739.34
Total	**1163.65**	**11378.58**	**21423.44**	**1281.19**	**30.18**	**35276.95**

Brk1	125.50	495.92	1244.15	64.33		1929.90
Brk2	122.97	693.43	1603.58	95.84		2515.82
Brk3	4.34	297.58	887.32	144.29		1333.53
Brk4	139.89	558.38	592.56	36.34		1327.17
Brk5	466.04	683.31	504.56	34.39	58.99	1747.29
Total	**858.74**	**2728.62**	**4832.17**	**372.19**	**58.99**	**8853.71**
Drg1	24.02	597.85	1358.87	89.38		2070.12
Drg2	6.17	432.21	1417.77	167.26		2023.41
Drg3	86.77	924.73	2101.24	275.62	1.49	3389.85
Total	**116.96**	**1954.79**	**4877.88**	**532.26**	**1.49**	**7483.38**
Cg1	112.48	446.54	2382.80	246.35		3188.17
Cg2	68.55	310.86	1407.43	166.14		1952.98
Cg3	24.12	1033.61	3485.58	877.03		5420.34
Cg4	177.84	1732.48	3435.00	695.88	2.04	6043.24
Total	**382.99**	**3523.49**	**10710.81**	**1985.40**	**2.04**	**16604.73**
Kg1	-	216.47	2282.47	52.81	1598.35	4150.10
Kg2	55.15	632.00	967.04	6.42	74.21	1734.82
Kg3	0.08	525.05	2544.92	114.53	-	3184.58
Kg4	-	189.57	1975.91	126.35	41.58	2333.41
Kg5	25.12	664.25	1653.48	103.35	-	2446.20
Kg6	-	282.24	2552.80	326.83	-	3161.87
Kg7	7.12	393.97	2251.41	217.26	-	2869.76
Kg8	13.77	186.55	1663.32	124.79	-	1988.43
Kg9	75.78	1240.16	2844.10	220.05	-	4380.09
Total	**177.02**	**4330.26**	**18735.45**	**1292.39**	**1714.14**	**26249.26**
Mg1	278.93	849.72	889.83	-	-	2018.48
Mg2	127.28	626.76	635.17	-	0.08	1389.29
Mg3	252.40	738.13	487.41	-	9.27	1487.21
Mg4	178.80	532.44	1099.19	11.43	9.38	1831.24
Mg5	289.16	1542.76	1546.96	73.29	-	3452.17
Mg6	197.93	1373.55	641.40	-	-	2212.88
Mg7	502.87	1133.62	477.46	1.41	70.65	2186.01
Total	**1827.37**	**6796.98**	**5777.42**	**86.13**	**89.38**	**14577.28**
Ng1	566.44	1040.26	842.04	26.52	2565.08	5040.34
Ng2	1177.24	2435.71	1331.47	29.05	956.00	5929.47

Ng3	656.28	1790.41	935.01	-	642.30	4024.00
Ng4	400.62	1234.00	790.00	-	7.78	2432.40
Ng5	145.57	1685.70	2112.42	-	76.52	4020.21
Ng6	585.86	2257.92	531.03	-	34.52	3409.33
Total	**3532.01**	**10444.00**	**6541.97**	**55.57**	**4282.20**	**24855.75**
St1	-	1117.18	2239.13	90.25	6.97	3453.53
St2	54.79	626.11	1360.39	-	76.10	2117.39
St3	494.42	1936.41	753.83	2.47	102.39	3289.52
St4	339.15	1511.49	711.76	-	87.24	2649.64
St5	233.35	1550.37	780.15	-	29.57	2593.44
St6	180.43	1062.73	374.05	1.84	45.28	1664.33
St7	514.34	1701.31	561.05	-	0.01	2776.71
St8	260.37	899.76	1023.77	28.96	79.84	2292.70
St9	305.20	1212.21	287.36	0.21	41.06	1846.04
St10	77.98	330.64	1428.52	96.66	-	1933.80
St11	110.29	421.71	1455.33	36.04	-	2023.37
St12	148.42	733.84	1328.22	24.34	5.05	2239.87
St13	5.72	476.62	1722.12	175.78	16.08	2396.32
St14	54.93	800.91	402.28	13.17	69.16	1340.45
St15	133.38	869.02	523.96	17.65	52.88	1596.89
St16	52.09	1519.46	1299.32	98.57	65.36	3034.80
St17	249.62	1130.34	1123.64	24.74	40.51	2568.85
St18	78.28	852.35	2157.48	258.72	-	3346.83
St19	108.89	501.20	1048.26	138.72	5.33	1802.40
St20	49.19	649.73	2102.04	197.40	9.28	3007.64
St21	72.80	393.63	1025.91	45.00	26.26	1563.60
St22	36.29	993.08	383.76	3.62	48.33	1465.08
St23	10.57	304.09	1399.42	701.80	-	2415.88
St24	17.37	551.21	666.04	41.81	24.85	1301.28
St25	89.62	506.99	840.09	40.63	13.28	1490.61
St26	179.14	454.03	1260.96	37.15	9.20	1940.48
Total	**3856.63**	**23106.42**	**28258.84**	**2075.53**	**854.03**	**58151.45**
Grand Total	**11915.37**	**64263.14**	**101157.98**	**7683.57**	**7032.45**	**192052.51**

9.3 AREA FOR TREATMENT IN THE CATCHMENT

Around 551.79 sq km (55179.0 ha) area is considered for treatment which is 28.73 per cent of the total geographic area (1,92,052.51 ha) of the study area (free-draining and downstream area up to dam site) (Table 9.2). This includes area (34971.0 ha) with very severe and severe erosion from free draining catchment and 202.08 sq km area with very severe and severe erosion from the downstream (from dam site at Nirath to powerhouse site). However, total area considered for treatment is around 8295.98 ha (82.96 sq km) after leaving area above 2600 m elevation and area with 45° or more slope which is difficult to treat. This is around 15.03 percent of the total effective catchment area. In free draining catchment total area identified for treatment is around 38.03 sq km (3803.35 ha) which falls in 20 sub-watersheds and from downstream the area considered for treatment is around 44.93 sq km (4492.63 ha) and 15.04 sq km (1503.66 ha) for engineering measures. The distribution of the treatment area for sub-watersheds falls under different ranges in 5 different divisions is given below (Table 9.3).

Table 9.3 Distribution of treatment area for sub-watersheds under different ranges in 5 different divisions

RAMPUR DIVISION = 1250.45

S.N	NANKHARI RANGE		BAHLI RANGE		RAMPUR RANGE	
	Watershed		Watershed		Watershed	
1	Mg2	47.04	Mg1	32.23	Ng2	28.19
2	Mg3	62.42	Mg6	102.25	Ng5	48.68
3	Mg4	41.72	Ng1	0.00	St2	6.09
4	Mg5	174.18	Ng3	32.83	St3	86.77
5	Mg7	178.49	Ng4	24.85	St4	48.30
6	Brk1	15.08	Ng6	126.80		
7	Brk4	61.75				
8	Brk5	132.78				
		713.46		318.96		218.03

ANI DIVISION = 2452.90

S.N	ARSU RANGE		NITHER RANGE		CHOWAI RANGE	
	Watershed		Watershed		Watershed	
1	St1	260.45	Kg8	11.58	Bk1	40.85
2	Kg1	0.00	Kg9	62.63	Bk2	95.98

3	Kg2	0.00	St5	140.85	Bk3	60.86
4	Kg3	50.79	St6	121.01	Bk4	51.11
5	Kg4	4.60	St7	232.47	Bk5	60.06
6	Kg5	54.89	St9	148.14	Bk6	76.40
7	Kg6	188.49	Bk13	51.97	Bk7	71.73
8	Kg7	23.37			Bk11	143.61
9	Kg9	350.35			Bk12	86.84
10					Bk13	63.85
		932.94		**768.65**		**751.29**

KARSOG DIVISION = 2584.383

S.N	MAGROO RANGE		SERI RANGE		KARSOG RANGE		PANGNA RANGE	
	Watershed		Watershed		Watershed		Watershed	
1	Bk7	116.95	Bk14	137.89	Cg1	182.38	St24	264.09
2	Bk8	122.44	St16	137.59	Cg2	117.32		
3	Bk9	77.92	Drg1	69.52	Cg3	444.52		
4	Bk10	81.38	Drg2	71.78	Cg4	442.82		
5			Drg3	139.42	St22	83.74		
6					St23	94.62		
		398.69		**556.20**		**1365.40**		**264.09**

KOTGARH DIVISION = 428.108

S.N	KUMARSAIN RANGE		KOTGARH RANGE	
	Watershed		Watershed	
1	St12	94.77	St8	77.94
2	St13	56.53	St10	28.88
3	St14	81.29	St11	23.01
4			Brk2	54.18
5			Brk3	11.51
		232.58		**195.53**

SHIMLA DIVISION = 1455.137

S.N	BHAJJI RANGE	
	Watershed	
1	St15	344.46
2	St17	330.91
3	St18	157.44
4	St19	101.66
5	St20	101.31
6	St21	121.51
7	St25	137.68

8	SI26	160.17	
		1455.14	

TOTAL		8170.98	Ha
Nallah Treatment & Road side Erosion control, Pine Needle log & checkdam*	approx	125.00	ha
TOTAL AREA OF TREATMENT		8295.98	Ha

*The area for nallah treatment & road side erosion control, pine needle log and checkdam shall by decided by HP State Forest Department through field visits.

9.4 TREATMENT MEASURES

Various treatment measures, biological as well as engineering, have been proposed in the CAT Plan to manage the catchment area in an integrated manner to prevent soil erosion and maintain the ecology of the region. Sheet erosion has been observed to be the main cause of soil erosion, followed by gully and/or rill erosion, which makes it imperative that the land needs to be covered with vegetation. Accordingly, more emphasis has been given for biological methods like plantation of tree species, greening of the slopes with hardy pioneer grass and other shrub species. The factors such as over-grazing, road construction, fuel wood and fodder collection, etc. lead to soil erosion in the region. The measures, therefore, have been suggested to address these causal factors of soil erosion. Measures have also been suggested for rain water harvesting and to increase the soil moisture.

9.4.1 Engineering Methods

In the catchment area, particularly in the free draining catchment of Luhri HE project, natural landslides are not the main cause and source of soil erosion or silt in the river. Sheet erosion, as mentioned above, followed by rill and gully are the main sources of bringing silt load in the streams which finally comes to Satluj river. To address this emphasis is given to control the gully and rill erosion by adopting various engineering and bio-engineering measures, which are discussed below. Specific requirement for a particular structure should be considered at the time of micro-planning and after looking into the condition of the area where treatment measure is to be undertaken. Dry rubble stone masonry (DRSM) check dams, brushwood check dams, masonry retaining walls, and bioengineering methods like use of Treatment of slips/ gullies/ rills & sheet erosion, Staggered trenches and Planting of Grass Tufts and Pine Needle logs have been suggested. Considering the topography as well as the nature and quantum of erosion more emphasis is given for the use of biological material even in engineering measures.

9.4.1.1 Brushwood Check Dams

These small check dams are made up of locally available material. Small coppiceable species are fixed in two parallel rows across a gully or a nala and packed with rubble and stone. At places, herbs and grass species growing in nearby area can also be planted and packed between stone or rubble layers. This will help in binding the structure with roots. These types of check dams are suggested at the starting point of a gully. The purpose here is also to harvest the rain water in small pools and puddles during monsoon. The schematic diagram of a brush wood check dam is shown in Fig. 9.2. In this case the straw and brushwood are laid across the gully between two rows of country wood posts spaced at 0.9 m apart. The stakes are 10 to 13 cm in diameter and go at least 0.9 to 1.2 m into the hard bed of the gully. A brushwood apron held by galvanized iron wire is necessary to prevent scour. The double-post type is more efficient and stable and is used in the control of maximum deep gully (about 2 to 2.5 m deep) and about 6 m wide, which have a contributory watershed area of 40 ha and more.

9.4.1.2 *Dry rubble Stone Masonry Check Dams*

The dry rubble stone masonry (DRSM) dams are bigger in size than brushwood check dams. These are generally constructed using stones, rubble and cement. A schematic diagram of DRSM check dam is shown in Fig. 9.3. The site where the dam is to be erected is cleared and the sides sloped to 1:1. The bed of the gully is excavated to a uniform depth of about 0.3 m and dry stones packed from that level (Fig. 9.3). In the centre of the dam portion, sufficient water-way is allowed to discharge the maximum runoff from the catchment. The stone filling should go up to 0.3-0.6 m into the stable portion of the gully side to prevent end cutting. In the rear, sufficient length and width of apron has to be provided to prevent scour. The thickness of the apron packing should not be less than 0.45 m and the gully sides above the apron have to be protected with stone pitching to a height of at least 0.3 m above the anticipated maximum water level to prevent side scours being formed by the falling water. Care should be taken to place bigger sized stones on top to prevent the structure being dislodged or carried away by the current. The stability is secured by using stones as large as can be procured and using cement.

9.4.1.3 *Retaining Walls*

Road or foot path construction is the main activity in the region which leads to soil erosion. Due to hilly terrain, slopes are cut, the soil and rocks are removed to construct a levelled path and

extracted materials end up on the valley side, which finally comes into the river or streams as silt or sediment. For construction of houses, making terrace fields or orchards similar methods are used for leveling the land. All the extracted material is washed away into rivers and streams during rains. Retaining walls need to be constructed to avoid the washing of this extracted material to the streams/rivers. The retaining walls can be of rubble, soil bags, etc. However, in the proposed CAT plan plum concrete masonry walls have been proposed because they have the ability to provide long-term stability to slopes and are efficient against the toe-cutting when constructed alongside the river.

9.4.1.4 *Bio-Engineering Method*

Now various bioengineering methods are being developed for controlling the soil erosion. The reasons for their use are non availability of stones, steels, cement, sand etc. at the site and also, at places, these materials from the prepared structure are theft by the people. Various biological materials like grass tufts, pine needles and various agricultural waste is being used to stabilize the loose soil on slopes or in gullies. Some of the techniques are described below, which we feel will be very useful in the proposed study area.

9.4.1.4.1 *Treatment of Slips/gullies/rills & sheet erosion*

Since the region is a hilly terrain with steep slopes, the loose material is vulnerable to being washed down into streams and rivers during rains. To restore the disturbed areas due to landslides, mudflows and rock flows which lead to formation of gullies, a number preventive measures like raising grass and legumes on slopes are suggested. In this regard trees and shrubs would be planted in different habitats depending on agro-climatic conditions. Important soil binding grasses in low hills of project area are *Arundinella nepalensis, Capillipedium assimile, Chrysopogon serrulatus, Panicum antidotale, Pennisetum orientale, Sachharum spontaneum*, etc., whereas *Chrysopogon gryllus, Eleusine coracana, Eulaliopsis binata, Pennisetum purpureum, Saccharum rufipilum*, etc inhabit the mid slopes. In the up hills *Agrostis micrantha, Calamagrostis emodensis, Danthonia cumminsii, D. jacquemontii, Phleum alpinum, Stipa roylei*, etc. may be planted to check soil and water erosion. Trees like *Acacia catechu, Bombax ceiba, Dalbergia sissoo, Ougenia oujeinensis, Phyllanthus emblica, Sapium insigne, Terminalia chebula*, etc. are suggested in lower dry areas, while *Celtis australis, Grewia optiva, Pistacia khinjuk, Quercus leucotrichophora*, etc. in mid hill slopes of the catchment. *Abies pindrow, Cedrus deodara, Pinus wallichiana, Taxus buccata*, etc would be planted in high altitude areas. These locally available species may also be planted as per

the climatic suitability. A total area is 94.86 ha for the treatment of slips/gullies & sheet erosion. An amount of **Rs. 527 lakh** has been earmarked for this purpose (Annexure-III).

9.4.1.4.2 *Pine Needle Log*

In order to treat the areas prone to slips/ slides and barren slopes, 5000 pine needle logs are suggested in different watersheds. Pine needles are easily available in the area, biodegradeable, cost effective and practical to use. Total budget for pine needle logs would **Rs.25.00 lakhs**.

9.4.1.4.3 *Staggered Contour Trenches & Planting of Grass Tufts*

These trenches act as trap for the water and minimise soil erosion. The trenches do not need to be very large to be effective. A trench about 10 feet long, one foot wide and one foot deep is very effective (**Plate 9.1**). However, it should be taken care of that these fields are not being used for grazing of animals, otherwise they could be injured in holes and trenches.

Staggered trenches & planting of grass tufts would be more useful for water retention and add to the fodder production in the area. In this all disturbed and barren tracts of the watersheds would be placed under the treatment with locally available grasses. The planting of grass species in the area would be done depending on the prevailing climatic conditions. The plantation would be carried out over an area of 971.43 ha. Total financial outlay would be **Rs. 68 lakhs** (Table 9.8). The staggered contour trenches will cover the area of 312.37 and the financial outlay would be **Rs. 118.70 lakhs**.

9.4.2 Biological Methods

In the proposed Luhri HE project catchment area covering of the top soil by vegetation will be the best way of checking soil erosion. Treatment of catchment area with method/s described below will greatly help in checking the soil erosion in the area.

9.4.2.1 *Regeneration/ Plantation of oak forests*

Oak forests are characteristics of mid hills and well adapted in low rainfall areas. They are good fuel and fodder yielding plants. Three species, viz. *Quercus leucotrichophora* (ban), *Q. dilatata* (Moru) and *Q. semecarpifolia* (Kharsu) are suggested for the regeneration and plantation over an area of 396.48 ha. Total financial outlay for the purpose would be **Rs. 265.64 lakhs** (Annexure-IIb).

9.4.2.2 ***Aforestation***

It was observed that deforestation and removal of vegetation is the main cause of soil erosion. Forests/vegetated areas are cleared for timber, fuel wood and for various other purposes like agriculture, settlements and orchards. In this region or any other montane area, natural regeneration of forest may take several years. It may not be possible at all to achieve a condition of natural dense forest as is available in some areas of the catchment. Planting of native species of trees and plants in a scientific way will help in regenerating the forest which will be essential for protecting the soil from being eroded. The afforestation programmes in already existing forest areas need to achieve a density of nearly 1500 plants per ha. The trenches and pits must be preferred for planting trees and the contours of trenches and pits must be planted with hedges to protect soil erosion and retain moisture. These trenches and pits will also help in the seepage of water in lower strata of soil. The tree planting should include a mixed species associations. For instance, *Pinus* may be planted with *Artimisia* spp, which will help in nourishing the young saplings and also provide moisture. The tree saplings should be raised along with grass and other herbs (legumes should be preferred) and planted along with these plant species. Choice of species may depend on the agency who is likely to implement the CAT plan. However, first preference should be given to local species, which are fast growing and have some benefits to the plant community as well as to the local people. The total area for the afforestation in the proposed plan is 1093.40 ha and the total cost is **Rs.732.58 lakhs** (Annexure-II(a).

9.4.2.3 ***Pasture Improvement***

The entire region is under heavy pressure of grazing, particularly during winters when the herds come down to these areas from alpine pastures. The grasses growing on the slopes are harvested during summers and after rains and stored for winter feed. Additionally, during summers the slopes are put on fire by the local people in the hope of getting better growth of grasses in the monsoon months. These activities make the region more vulnerable to soil erosion. To prevent soil erosion, the ridge ditch method/ planning of grass tufts and rooted stock would be implemented. New species of pasture grass and fodder would be introduced to improve the pasturization. The proposed area for pasture development is 792.14 ha nearly 9.55 per cent of the total treatment area taken in the catchment with a financial outlay of **Rs.55.45 Lakhs** (Annexure-II(h).

9.4.2.4 *Replenishment of old plantations*

Plantation is a regular practice in the forests, conducted by Forest Department. Himachal Pradesh State Forest Department has also accomplished plantation in many watersheds in the catchment area. Sometimes, survival rate in the seedlings does not satisfactory in many sites. In order to achieve the target of old plantation a replenishment plan over an area of 1058.47 ha. For better growth and dense canopy forest, the plantation of suitable plant species are suggested in different agro-climatic conditions. The important species suggested for the plantation are locally available *Acacia catechu, Alnus nitida, Ougenia oujeinensis, Pinus wallichiana, Quercus leucotrichophora, Terminalia chebula* and *Toona ciliata* , whereas at higher elevations *Abies pindrow, Cedrus deodara, Quercus dilatata, Q. semecrpifolia* and *Taxus baccata* are proposed for plantation. The Total financial outlay for the purpose would be **Rs. 393.75 lakhs** (Annexure-II(d).

9.4.2.5 *Replenishment Afforestation (new plantation)*

In order to achieve the target of old plantation a replenishment plan over an area of 300 ha is proposed in the CAT plan. For better growth and dense canopy forest, the plantation of suitable economic plant species are suggested on non forest and forest land according to different agro-climatic conditions. The reduction in old plantation of *Eucalyptus* sp. from lower surrounding gentle slopes is urgently warranted. In the degraded areas where excessive lopping, grazing and burning have taken place, the plantation of locally available *Acacia catechu, Alnus nitida, Ougenia oujeinensis, Pinus wallichiana, Quercus leucotrichophora, Terminalia chebula* and *Toona ciliata* is required, whereas at higher elevations *Abies pindrow, Cedrus deodara, Quercus dilatata, Q. semecrpifolia* and *Taxus baccata* are proposed for plantation. The Total financial outlay for the purpose would be **Rs. 133.75 lakhs** (Table 9.8) (Annexure-II(e).

9.4.2.6 *Non-timber Forest Products (NTFP) of tall plants*

Non timber forest products (NTFP) can be important source of cash in the area if plantation of suitable trees be done properly. Fuel-wood and fodder yielding trees may also be included in the category of NTFP plants. Important fodder yielding species which also are source of one or more minor forest produce, viz. edible, medicinal and fibre are *Bauhinia variegata, Dendrocalamus strictus, Ficus auriculata, Leucaena leucocephala, Morus australis, Ougeinia oojeinensis, Quercus leucotrichophora*, etc. Fuel-wood yielding species are *Acacia nilotica, A. catechu, Ficus palmata, Mallotus philippensis, Sapium insigne, Taxus baccata, Terminalia chebula, Zizyphus jujuba*, etc.

Nearly 2500 plants per ha are suggested for the plantation in 327.27 ha area. Total budget for planting NTFP trees would be **Rs. 108.00 lakhs** (Annexure-II(g).

9.4.2.7 *Development of medicinal plants*

A large section of India's rural population depends on the forests for food, fuel, fodder, shelter and income. However due to increasing population pressure, forests are being depleted increasingly at higher rates. Annually hundred of tones of medicinal plants are harvested from nature and traded outside. These medicinal plants demanded from out side and finally collected by the unskilled labourers and dealers. In order to conserve forest resources, cultivation of medicinal plants is proposed. Further, medicinal plant garden and community garden can play vital role in conservation of forest resources. The raising of medicinal plant garden and community garden will encourage local people and schools to set up their own medicinal and herbal gardens. Further, producing a training bucket which will illustrate the cultivation, propagation, harvesting, drying and storing of medicinal plants. Survey team have to visited several village and spoken to number of traditional healers. From these visits, the beneficiaries have been able to identify the species, harvesting methods and medicinal plant uses. By working with local people to develop best practices for harvesting, drying, storage and local will be stimulated. The Total financial outlay for the purpose would be **Rs. 12.42 lakhs** (Table 9.8).

9.4.2.8 *Energy plantations of fast growing fuel wood and fodder species*

Energy plantation would be carried out to fulfill the wood and fodder requirements of the local people. The locally available fuel wood and fodder plant species in various agro-climatic conditions are *Acacia catechu, Lyonia ovalifolia, Quercus leucotrichophora, Rhus wallichiana*, etc. (fuel), *Celtis australis, Ficus* spp., *Grewia optiva*, etc. (fodder). The energy plantation would be carried out in 569.85 ha land near human settlements (@ 5000 plants/ha). Total budget for the plantation would be **Rs. 376.10 lakhs** (see Annexure-II(f).

9.4.2.9 *Enrichment Plantation*

The traditional monoculture plantations cause nutrient imbalance and nutrient loss of the soil due to low nutrient fixation in the biomass. The demand for wood for the local requirement and market is met from natural forest which leads to exploitation of high quality timber species. To overcome these problems, enrichment plantation systems can be executed as an alternative for

sustainable high quality wood production. However, tree growth depends on sufficient light, water and mineral element, therefore knowledge about site demands of native timber tree species and appropriate management of timber plantation is necessary. The enrichment plantation can be done on barren and gentle slope of Nogli gad and Machha Gad areas. Cultivation of suitable native tree species for high quality timber production in plantation will be according to agro-climatic conditions. In lower reaches *Acacia catechu, Ougenia oujeinensis, Pinus roxburghii, P. wallichiana, Quercus leucotrichophora, Terminalia chebula* and *Toona ciliata* are important for plantation. *Abies pindrow, Cedrus deodara, Quercus dilatata, Q. semecrpifolia* and *Taxus baccata* are suggested at higher reaches or ridges of catchment. The total financial outlay for this head would be **Rs. 282.00 lakhs** (Table 9.8).

9.4.2.10 *Lantana eradication with planting of bamboo*

The exotic species *Lantana* spp., *Eucalyptus globules, Grevillea robusta, Albizia* spp., *Ageratina adenophora, Parthenium hysterophorus* etc. are one of the threats for indigenous plant diversity in the catchment area; *Lantana* spp. of them are highly obnoxious. In order to recover the native species, project authorities are suggested to carry out an operation of eradication of *Lantana* spp. and planting of locally available species *Dendrocalamus strictus* and *Sinarundinaria* spp. in different agro-climatic conditions in the catchment. This plan would be implemented in 316.67 ha land of the catchment. The sites would be selected after detailed field survey, consultation with local people and after conducting the micro planning of the areas. The total financial outlay for this head would be **Rs. 95.00 lakhs** (Table 9.8).

9.4.2.11 *Raising of high value medicinal species for distribution to farmers*

The raising of medicinal plant species in the catchment is related to the income generation of local people. After raising in the nursery the seedlings would be distributed to the farmers of nearby villages. The medicinal plants include herbs, shrubs and trees. The area would be decided after field surveys. Generally, locally available medicinal plant species, viz. *Aegle marmelos, Asparagus recemosus, Gentiana kurroa, Gloriosa suparva, Plumbago zeylanica, Swertia chirita, Zanthoxylum armatum*, etc. are suggested for the plantation, however, State Forest Department would be final authority to decide the species to be planted. Total budget of **Rs. 103.00 lakhs** has been earmarked for this category.

9.5 NURSERY DEVELOPMENT

Proper development of nursery and allied services, like drip irrigation or micro-irrigation, will be crucial for successful execution of CAT plan. It will be important to prepare a stock of plant material for the supply of saplings for afforestation programme and various other activities. Main nursery may be developed near Luhri region, possibly along the road side for easy accessibility. Luhri region is well-suited for this because of its proximity to both the upstream and downstream part of the CAT plan area as it lies in the middle of catchment. Besides, the Luhri town possesses necessary infrastructure and various raw materials for nursery development can be easily made available. In addition, provision has also been made for two green-houses/chick houses for maintaining plant saplings. One chick-house may be located in Nogli area and the other one near Karsog or in Marola region. The estimated cost for the development of nursery and greenhouses will be around **Rs. 582 lakh**. Development of nursery will start from the zero year and will continue for 11 years (Table 9.8). During maintenance year nursery will supply plants wherever required for the replacement.

9.6 MODERNISATION OF NURSERIES

Modernisation of nurseries would be done by improved irrigation system using sprinkler to provide best facilities for seedling propagation. Large application of eco-friendly by fertilizer and compost would also be considered for raising field plantations.

In the modern nursery there would be facilities of chick house, poly house and drip irrigation and root trainers. A total of 13 nurseries (one nursery per forest range) would be modernized in the catchment. An outlay budget would be **Rs.186 lakhs**.

9.7 GAUGE AND DISCHARGE STATIONS

To the best of our knowledge the G&D infrastructure in the catchment is largely lacking. In this CAT plan provision of eight gauge and discharge stations have been made. These stations will be located on the main streams like Nogli, Kurpan, Macchad, Beha Khad, Chainra Khad and Satluj river in different five divisions (Table 9.4). Total budget of these stations for ten years will be around **Rs. 58.40 lakh** (see Table 9.8).

Table 9.4 The proposed locations of the Gauge & Discharge stations in the catchment

Sl.No.	Stream/river	Location	Division
1.	Satluj river	Upstream of Nogli gad confluence	Rampur
2.	Nogli gad	Just before confluence with Satluj	Rampur
3.	Kurpan Khad	Before confluence with Satluj river	Ani
4.	Machhad Gad	Before confluence with Satluj river	Rampur
5.	Behna Khad	Before confluence with Satluj river	Karsog
6.	Dhurmu Khad	Before confluence with Satluj	Karsog
7.	Chainra Khad	Before confluence with Satluj river	Karsog
8.	Satluj river	Near Marola village	Karsog

9.8 FOREST INFRASTRUCTURE DEVELOPMENT

The execution of the catchment area treatment plan will be done by the Forest Department, Government of Himachal Pradesh. Certainly this will be an added responsibility to the Forest Department and may not have adequate facilities and infrastructure to execute the work as suggested in the plan. Provision have been provided in the CAT plan to develop the infrastructure of Forest Department in the region and accordingly a budget of **Rs.548 lakhs** is proposed for this purpose (Table 9.8).

9.9 OPERATIONAL SUPPORT

The break-up of budget for operational support for implementation of CAT plan in different divisions are given in Table 9.5.

Table 9.5

Sr. No.	Name of Component	Name of Area	Rate	Financial
1	Rampur Division			
a)*	Vehicle for Division (Gypsy-1 No., Ambassador Car-1 Nos., Tata Tipper- 1No.) in kind	Rampur Division	L/S	2400000
b)	Office Expenditure	Rampur Division, Rampur , Bahli, Nankhari Range	L/S	300000
c)	Traveling allowance	Rampur Division, Rampur Range, Bahli, Nankhari Range	L/S	300000
d)	Amenities to staff & labour	Rampur Division, Rampur Range, Bahli, Nankhari Range	L/S	300000

e)	Operational Mobility	Rampur Division, Rampur Range, Bahli, Nankhari Range	L/S	500000
f)*	Office Equipments	Duel Core Desktop computer with UPS & LaserJet Printer for Division/Ranges = 5 Nos., Laptops Lenovo = 3 Nos, Office furniture including computer table, godrej almirahas, water cooler, , LCD Projector-1 No. & 8. Set in Circle/Division office & Photo Copier 2 No. Machine in kind.	L/S	900000
g)	Medical Allowances	Rampur Division, Rampur Range, Bahli, Nankhari Range	L/S	300000
			Total Operational Support	**:-5000000**
2	**Kotgarh Division**			
a)*	Vehicle for Division (Gypsy-1 No.) in kind	Kotgarh Division	L/S	550000
b)	Office Expenditure	Kotgarh Division, Kotgarh Range & Kumarsain Range	L/S	300000
c)	Traveling allowance	Kotgarh Division, Kotgarh Range & Kumarsain Range	L/S	550000
d)	Amenities to staff & labour	Kotgarh Division, Kotgarh Range & Kumarsain Range	L/S	100000
e)	Operational Mobility	Kotgarh Division, Kotgarh Range & Kumarsain Range	L/S	200000
f)*	Office Equipments	Duel Core Desktop computer with UPS & LaserJet Printer for Division/Ranges = 3 Nos., Laptops Lenovo = 3 Nos, Office furniture including computer table, godrej almiras, water cooler, LCD Projector-1 No. & Photo Copier Machine in kind.	L/S	500000
g)	Medical Allowances	Kotgarh Division, Kotgarh Range & Kumarsain Range	L/S	200000
h)	Mobile Allowances to field staff	Kotgarh Division, Kotgarh Range & Kumarsain Range	L/S	300000
			Total Operational Support	**:-2700000**
3	**Anni Division**			
a)*	Vehicle for Division (Gypsy-1 No.) in kind	Anni Division	L/S	2400000
b)	Office Expenditure	Anni Division,	L/S	1000000
c)	Traveling allowance	Anni Division,	L/S	1000000
d)	Amenities to staff & labour	Anni Division,	L/S	200000
e)*	Motor Vehicle	Anni Division,	L/S	1000000
f)*	Office Equipments	Photocopier =1, Fax Machine =1, Genset big =1, Generator small =3, computers =3 Nos, UPS = 4 nos, GPS =5, Printer =4, compas =1 Barometer =2, Abney's level =2, Digital Camera =3, Handycam =2	L/S	900000
			Total Operational Support	**:-6500000**
4	**Karsog Division**			
a)*	Car for CF Mandi		L/S	1000000
b)*	Scorpio for DFO Karsog	Karsog Division	L/S	1000000
c)*	Bolero for ACF Karsog	Karsog Division	L/S	800000

d)*	Lap Top Computers = 6 no.	Karsog Division	L/S	300000
e)*	Desk Top Computers = 4 nos.	Karsog Division	L/S	300000
f)*	LCD Projectors with accessories	Karsog Division	L/S	100000
g)*	GPS instruments = 6 nos	Karsog Division	L/S	100000
h)*	Fax including land line phone = 4 nos	Karsog Division	L/S	100000
i)*	Photo copier/ Photostat machine=1 no.	Karsog Division	L/S	300000
j)*	Godrej almirahs up to BO level=25 nos.	Karsog Division	L/S	200000
k)	Office furniture/ amenities to staff	Karsog Division	L/S	500000
l)	T.A of staff	Karsog Division	L/S	1400000
m)	M.A. of staff	Karsog Division	L/S	900000
n)	Office expenses	Karsog Division	L/S	500000
			Total Operational Support = 7500000	
5	**Shimla Division**			
a)*	Vehicle for Shimla division (Scorpio – SLE)	Shimla Division	L/S	850000
b)*	Laptop & computer for division office	Shimla Division	L/S	100000
c)*	Photostat machine for division	Shimla Division	L/S	100000
d)	Amenities to staff & labour	Shimla Division	L/S	250000
e)	Installation of fax incl. Landline ph & net connection in range office sunni		L/S	100000
f)*	Office Equipments for Bhajji range	Laptop=1, computer=1, comp table=1,godrej almirah=1, photo copier=1, water filter=1, fridge for bhajji range=1	L/S	400000
g)	Office expenses in bhajji range		L/S	200000
			Total Operational Support :-2000000	
6	**DFO(CAT Plan) Division**			
		Execution, implementation and monitoring of CAT plan	L/S	8000000
			Total Operational Support :-8000000	
			GRAND. TOTAL Operational Support :- 31700000	

* Office equipments and office vehicle shall be provided by SJVN, in kind to Forest Department

9.10 ROOF TOP HARVESTING IN HPFD BUILDING

It is ironic that mountain areas, which are the sources for huge rivers like Satluj, are faced with water problems for irrigation and drinking purposes. Besides the major river Satluj, the region under the CAT plan has a number of perennial streams like Nogli, Machhad, Kurpan. However, most part of the region away from the water bodies in the valley is dry. In this region, there is no proper water

supply for drinking and irrigation. The average annual rain in the region is around 1100 mm, which ranges from 342 to 1976 mm. Because the barren slopes predominant in the region, most of the rain is trickle down as run off water and ends up in the river channels along with huge quantities of debris and silt. Absence of proper vegetation cover does not allow water to percolate and recharge local springs and groundwater. As a result human settlements on the slopes face water problems even during monsoon time. It would be highly desirable to reverse this trend by ensuring that a major part of the catchment, wherever possible, is brought under vegetation cover. This afforestation effort needs to be supplemented with engineering measures for rain-water harvesting. There are a number of models available and the most suitable ones, according to the location, could be selected. Provision of water harvesting and roof top harvesting in HPSFD Buildings has been made in the CAT plan. Total budget allocated for these purpose are **Rs. 153.70 lakh** and **Rs. 190 lakh**, respectively (see Tables 9.8).

9.11 RIM PLANTATION

The main objective of Reservoir Rim treatment is to check erosion and arrest sedimentation in the reservoir and followed by mitigation and measures. The total river stretch in the catchment is around 74 km (from Rampur dam site to Power house at Marola of Luhri HE project). The major tributaries which join the Satluj river are Nogli Khad, Kurpan Gad, Bhera Khad, Dhurmu Gad and Chainra Gad. Of these, the Nogli Gad, Kurpan Gad and Machhad Gad feed water and sediments into the proposed reservoir area of Luhri HE project. A huge reservoir will be created due to construction of dam at Neerath. The reservoir rim area is either barren rocky slopes or has agricultural fields and plain barren land. Already a creation of a green belt has been suggested in the Environmental Management plan, however, the rim area has a few small active landslides and slips due to road construction. These vulnerable area will be treated using engineering measures. A total outlay for this purpose is **Rs.330.00 lakhs** to cover an area of 195 ha.

9.12 IMPROVEMENT AND DEVELOPMENT OF WILDLIFE

The protection of wild life can be afforded by preventive and control measures for which purpose the following objectives have been framed for effective wildlife management:

1. To maintain plant and animal bio-diversity in nature by establishing a healthy and productive population of wildlife for conserving genetic resources.

2. To ensure collection of scientific data for the maintenance and development of viable population of flora & fauna for ecological and economic purpose.

3. To identify the problems of wildlife in the tract, which in turn will help in formulating the guidelines for their development and improvement.

Forests provide a vast resource of livelihood for various communities. The communities are heavily dependant on the forest for meeting their day to day consumptions and livelihood. Hence for their sustenance it is necessary to have a balance between the ecological need and Forest. In order to achieve this following activities are required to be carried out under this CAT Plan. A total outlay of **Rs. 229 lakhs** has been kept for this purpose wherein the following activities shall be carried out:

1) **Protection of Forest and Wildlife:** A provision for formation of a street theatre of the local community may be very effective for the protection of wildlife and forests. Several bands of ten to twelve village youth each may go performing about wildlife and forest conservation (with local nature based songs and natti) from village to village. The wages for one of such performances (including traveling and boarding, lodging) will be about Rs.3000 per performance. In a day two performances may be given by one band. A dress, musical instruments and workshops for their training, etc. will also be part of this arrangement.

2) **Wildlife Research:** The wildlife research may be encouraged by engaging three to five researchers and making a provision of a Research Station. The researchers may work on surveys and natural history of endangered animals such as Musk Deer, Serow, Himalayan Tahr, Western Tragopan, Chir Pheasant and others. The wildlife research organizations located at Dehradun and Mysore may be invited to undertake such work. A sum of Rs. 90 Laks may be used for this purpose.

3) **Unique Wildlife Habitats:** The area seems to have a lot of unique wildlife habitats such as gorges and hidden valleys which are home to many such species which may be new to the science (such as amphibians like salamanders, etc.). There is a need to identify such unique habitats and protect then from blasting, degradation, etc. Same is true for nesting sites of vultures, pheasants, etc. the mapping of such critical and unique area need to be done. A sum of Rs.15 Laks may be kept for surveying and mapping.

4) **Linking community development with wildlife conservation:** The community living in the villages in the project area need to be made part of the wildlife management effort. The micocredit schemes in the area may be an effective tool to do so. Emphasis may be given on proper micro planning and suitable measures of organic farming, education of girl child, training of teachers in the schools, use of LPG in place of fuelwood, vermicompost, etc. There may be a need for capacity building of staff and community for this purpose. A sum of Rs.84 laks will be spent for this purpose.

All the territorial DFOs are also wildlife wardens for their areas. They will undertake necessary action for Wildlife Management/ Improvement on the above lines as per allocations made under table 9.8 & 9.9.

9.13 JOINT FOREST MANAGEMENT INCLUDING MICRO PLANNING

Joint Forest Management as a collaboration between the State Forest Department and the local village bodies has been running successfully in many hill states of India. Similar efforts may be made in the villages of the catchment area of Luhri H.E. project. This task will be undertaken with the help and active involvement of the local Forest Department who have the expertise and experience in such matters. This would involve constituting of committees in villages and providing the necessary infrastructural facilities, finances and equipment, needed for the protection, watch and ward and information about the forest areas. Forest Department may like to organize training programmes for the purpose to create awareness about need for conservation of forest resources, biodiversity and about the negative impacts of poaching, hunting, forest fires, tree felling, etc.

JFM is slowly emerging into a form of sustainable forestry, which augments the forestry regime with processes for rapid adaptation to changes in what people need, want, and can do. As an adaptive social process it is striving to create sufficient future forest production opportunity to satisfy potentially competitive/ conflicting interests that would diminish the forest if left unresolved. The challenge with JFM has thus been to develop social processes that recognize, accommodate and respond more effectively to diverse and dynamic perspectives of what the forest is about and should be.

In the proposed CAT plan management plan is given at watershed (8) and sub-watershed (74) level. Further detailing will be required at the time of execution of the CAT plan. This will help in designing a suitable treatment type, biological or engineering measure, required for a particular location. Moreover, if a certain new techniques/ innovation occur in due course of time these can be taken up as pilot projects under this head.

Total funds for the Joint Forest Management and Micro-planning, generated by the project authorities would be **Rs. 85.00 lakhs** (Table 9.9).

9.14 GOSADAN

Provision has been made to establish two gosadans for the stray domestic cattles like cows left alone by the local people. These gosadan may be established at Nogli and Kurpan khad region, where these stray animals are frequently seen. Total budget of **Rs. 205 lakh** is proposed for the maintenance of these gosadan for 10 years and after that these will be handed over to the local administration. There is dual purpose of this scheme. One is to plant fodder plantations around the gosadan in 50 ha area for each and second is to get manure for the plant saplings. These gosadans will be maintained and run for 10 years the grant of project developer. After that these facilities will be maintained and run by state government.

9.15 RESEARCH AND STUDIES

Since a number of new techniques have been suggested in the present catchment area treatment plan, it will augur well for the project proponents to establish an Research and Study Centre, which will initiate experiment and customise production of various locally available materials for carpeting, mulching, planting, etc. The proposed Centre will monitor and help in executing the CAT plan besides contributing with protocol standardization, efficacy of particular treatment measure or the materials used in the field. Total budget of **Rs.86 lakh** is allocated for the establishment and maintenance of the Centre (Tables 9.8 & 9.9). This Centre may be established near Nirath, the proposed dam site of the Luhri HE project. Local educated youth should be encouraged to join the centre.

9.16 ENERGY CONSERVATION/ FOREST PROTECTION

In most of the villages at project area wood is the main fuel for cooking. Small towns and villages near the road heads do have the facilities of cooking gas and kerosene and rest of villages are totally dependent on forest for fuel wood.

There is ecological degradation in Satluj valley due to felling of trees and shrubs for fuel and other purposes. The proposed Luhri H.E project would further lead to increase in demand for fuel wood and fodder and would therefore exert tremendous pressure on forest areas in the vicinity of the

project. More than 5000 workers will come from out side during the project construction period of at least 7 years. Most of the work force will come from outside the project area, may be from other states, along with their families. The total migrant population will be around 15000. They will require fuel for cooking and for various other purposes.

In order to meet their fuel requirements, it is proposed to provide the kerosene and LPG (Liquid Petroleum Gas) to these workers by the project authorities. This would discourage them from illicit tree felling and removal of fuel wood and timber from the adjoining forests. The project authority will open LPG and kerosene depots at different projects sites given below.

Establishment of new LPG / Kerosene depots and community kitchens in the project area

S. No.	LPG/Kerosene/ Community Kitchen	Village (Tehsil)	Number
1.	**LPG Depots**	Sunni (Shimla)	1
		Gharana (Shimla)	1
		Nirath (Rampur)	1
		Dhingidhar (Nirmand)	1
2.	**Kerosene Depots**	Lanau (Seoni)	1
		Khaira (Seoni)	2
		Marola (Karsog)	1
		Chawari (Seoni)	1
		Ogli (Seoni)	1
		Soidhar (Anni)	1
		Narola	1
		Nirath (Rampur)	1
		Fathibal (Nirmand)	1
		Kepa (Kumarsain)	1
		Kot (Karsog)	1
3.	**Community Kitchen**	Singapur (Rampur)	1
		Chaunti (Rampur)	1
		Khegsu	1
		Nirath (Rampur)	1
		Parlog (Karsog)	1
		Khaira (Seoni)	1

Kerosene and cooking gas shall be arranged from the concerned authorities. These facilities can also be utilized by local people living in the nearby villages. Project authority will also provide the facility of community kitchen to the labourers.

In addition to above mentioned measures efforts would be made towards energy conservation and installation of non-conventional sources of energy as energy conservation measures are of paramount importance for conserving the environment. Under this program following facilities have been provided.

(i) **LPG Depots**: Four LPG depots have been proposed one each at Sunni, Gharana, Nirath and Dhingidhar. These places are selected due to colony development for the workers in the nearby area.

(ii) **Kerosene Depots**: The kerosene depots will be opened by the project authority. Since project area is spread over a large area, 12 kerosene depots are proposed for distribution of kerosene to the project workers and local people.

(iii) **Community Kitchen**: Six community kitchens have been proposed at six places, namely Singapur, Chauntli, Khegsu, Nirath, Parlog and Khaira, as these are the areas where colonies for labours have been proposed or where maximum project work will be carried out. These facilities may be shifted at other places according to the need during construction phase. Major construction activity will be near Nirath, the proposed dam site. The community kitchen will increase the work efficiency of the workers at the project site.

Various measures like supply of pressure cookers, solar cookers and installation of smokeless chullahs have been proposed for efficient cooking, conservation of energy and clean cooking. Domestic cooking is one of the major causes of air pollution in the villages. Various measures have been suggested for efficient and environment friendly cooking. A total outlay for energy conservation/ forest project is **Rs.272.41 lakhs** and **Rs.271 lakhs** for fuel saving devices (see Tables 9.8 & 9.9).

9.17 ECO-TOURISM

The project area is rich in cultural diversity as well as bio-diversity. Culturally as well as biodiversity is equally rich in the free draining catchment with semi evergreen forests found along the major rivers. The State of Himachal Pradesh for the visitors is famous. This may be seen as acting as a deterrent for the tourist industry. However, in Himachal Pradesh eco-tourism has a vast potential and so in this area which can attract domestic as well as foreign tourists. Eco-tourism

activities such as hiking and trekking along the existing traditional trails can be promoted at state, national as well as at international levels. The involvement of local communities in eco-tourism activities would greatly help them in generating new income sources. This peoples' involvement will go a long way in the maintenance of the local culture as well the biodiversity of the region. The natural landscapes such as higher ridges along the sub-watersheds, lower ridges with dense forest and along the riparian woodlands in the sub-watershed are suitable areas for such recreational activities. An amount of **Rs. 95.17 lakhs** @ 1% of the cost of biological and engineering works is proposed for Eco-tourism purpose (Tables 9.8 & 9.9).

9.18 ECO-SERVICES

The provision in CAT plan for payment of eco services have been worked @ 10% of the CAT plan. This effort shall not only repay the value of protection of ecology to the local people but will also create their permanent stake in protection and conservation of natural resources in catchment of the project. A total outlay for the eco-services is **Rs.951.67 lakhs** (see Table 9.9).

9.19 ECO-BATALLION

The implementation of the CAT plan will be done by the State Forest Department. However, the task of afforestation and other work should be preferably given to the Eco-battalion of the State, which is raised for the ex-service men. The local NGOs (non-government organizations) and unemployed youth should also be engaged in the work of catchment area treatment as mentioned in the plan. Rs.475.83 lakhs @ 5% of the cost of biological and engineering works is proposed. (see Table 9.9).

9.20 MONITORING AND EVALUATION

Monitoring and evaluation is very essential for the various types of activities in CAT plan on daily, monthly and annual basis for proper execution of planned works. A total budget of around **Rs.475.83 lakh** is proposed for monitoring and evaluation of the work (see Table 9.8). This will also include the recording of silt data at eight gauge and discharge stations proposed in different sub-watersheds.

9.21 SCHEDULE OF TREATMENT PLAN

The total time schedule for the execution of the planned CAT works has been kept at 7 years. Accordingly, areas from each watershed and sub-watershed have been prioritized for treatment and a year-wise plan has been assigned (Fig. 9.4). Zero year is also kept for the development of nursery and raising sapling for plantation. Maximum area for treatment taken in first year and minimum is taken in seventh year. In the first and second year the area taken for treatment is 2019.06 ha and 807.62 ha respectively and in seventh year the area to be taken for treatment is 807.62 ha. In the remaining years the area for treatment ranges from 807.62 ha (3rd year) to 807.62 ha in the sixth year (Fig. 9.4). Three years time is given for the maintenance of the executed work in the catchment. However, the maintenance of plantations would continue for five years. A division-wise treatment area is given in the Fig. 9.5 and Table 9.9.

9.22 COST ESTIMATE FOR TREATMENT PLAN

Cost estimate for each component is given in Tables 9.8 & 9.9. The main components of the management plan include biological and engineering treatment measures. The total budget for Catchment Area Treatment Plan has been proposed at **12466 lakhs** including 10% of the total budget for Escalation is **Rs. 951.67 lakhs** (see Tables 9.8 & 9.9). In this plan various new techniques like bio-carpeting have been suggested to be implemented in the region. However, if there is any requirement for change in allocation of money, type of species selected, treatment measure etc due to site location/ conditions, these may be done by the implementation agency after due approval of the same has been taken from competent authority.

The cost estimate break-up for all the components division-wise and range-wise are given in Tables 9.6 & 9.7 (see Annexures IV to VIII).

The budget provision for nursery development, rain water and roof-top harvesting, joint forest management and micro-planning, monitoring and evaluation has been made. Budget has also been provided for the energy conservation and improvement and development of wildlife in the catchment. The schedule rates to carry out different types of works are also given, which are based on the rates of Forest Department, Government of Himachal Pradesh.

Table 9.6 Year wise and Division wise cost distribution

Year	Division							Grand Total
	Rampur	Anni	Karsog	Kotgarh	Shimla	WILDLIFE DIVISION (SARAHAN)	DFO (CAT Plan)	
0 Year	9170000	17816000	42182000	2751000	4323000	0	524000	76766000
1 Year	80024302	91586685	80661940	18034590	21218070	3275000	2096000	296896587
2 Year	31616590	36333374	31020276	6881097	8592028	1310000	1048000	116801365
3 Year	31616590	36333374	44775276	6881097	8592028	1310000	1048000	130556365
4 Year	16791122	17609937	18293888	3617395	4558014	655000	524000	62049357
5 Year	31397820	34368374	35932776	6881097	8592028	1310000	1048000	119530095
6 Year	31397820	34813774	29382776	6881097	8330028	1310000	1048000	113163495
7 Year	31399130	34368374	29382776	6881097	8330028	1310000	1048000	112719405
8 Year	30306590	34368374	28400276	6881097	8330028	1310000	1048000	110644365
9 Year	14825467	16758437	13708888	3263702	4034014	655000	524000	53769508
10 Year	14825467	16758437	13708888	3263702	4034014	655000	524000	53769508
TOTAL	**323370899.7**	**371115140**	**367449760**	**72216972.6**	**88933280**	**13100000**	**10480000**	**1246666052**

Table 9.7 Division wise and Range wise percentage at a glance

S.No.	Division/Range	Grand Total	Percentage
1	**Rampur Division**	**3234.00**	**25.94**
a)	Rampur Division	219.29	6.78
b)	Nankhari Range	1592.09	49.23
c)	Bahli Range	683.29	21.13
d)	Rampur Range	739.02	22.85
2	**Anni Division**	**3711.16**	**29.77**
a)	Anni Division	117.90	3.18
b)	Arsu Range	1013.61	27.31
c)	Nither Range	1308.93	35.27
d)	Chowai Range	1270.72	34.24
3	**Karsog Division**	**3674.55**	**29.47**
a)	Karsog Division	897.35	24.42
b)	Magroo Range	534.96	14.56
c)	Seri Range	693.06	18.86
d)	Karsog Range	1155.32	31.44
e)	Pangna Range	393.81	10.72
4	**Kotgarh Division**	**722.20**	**5.79**
a)	Kotgarh Division	139.76	19.35
b)	Kumarsain Range	273.38	37.85
c)	Kotgarh Range	309.02	42.79
5	**Shimla Division**	**889.33**	**7.13**
a)	Shimla Division	26.20	2.95
b)	Bhajji Range	863.13	97.05
6	WILD LIFE DIVISION (SARAHAN)	**131.00**	**1.05**
7	**DFO (CAT Plan)**	**104.80**	**0.84**
	GRAND TOTAL	**12466.85**	100.00

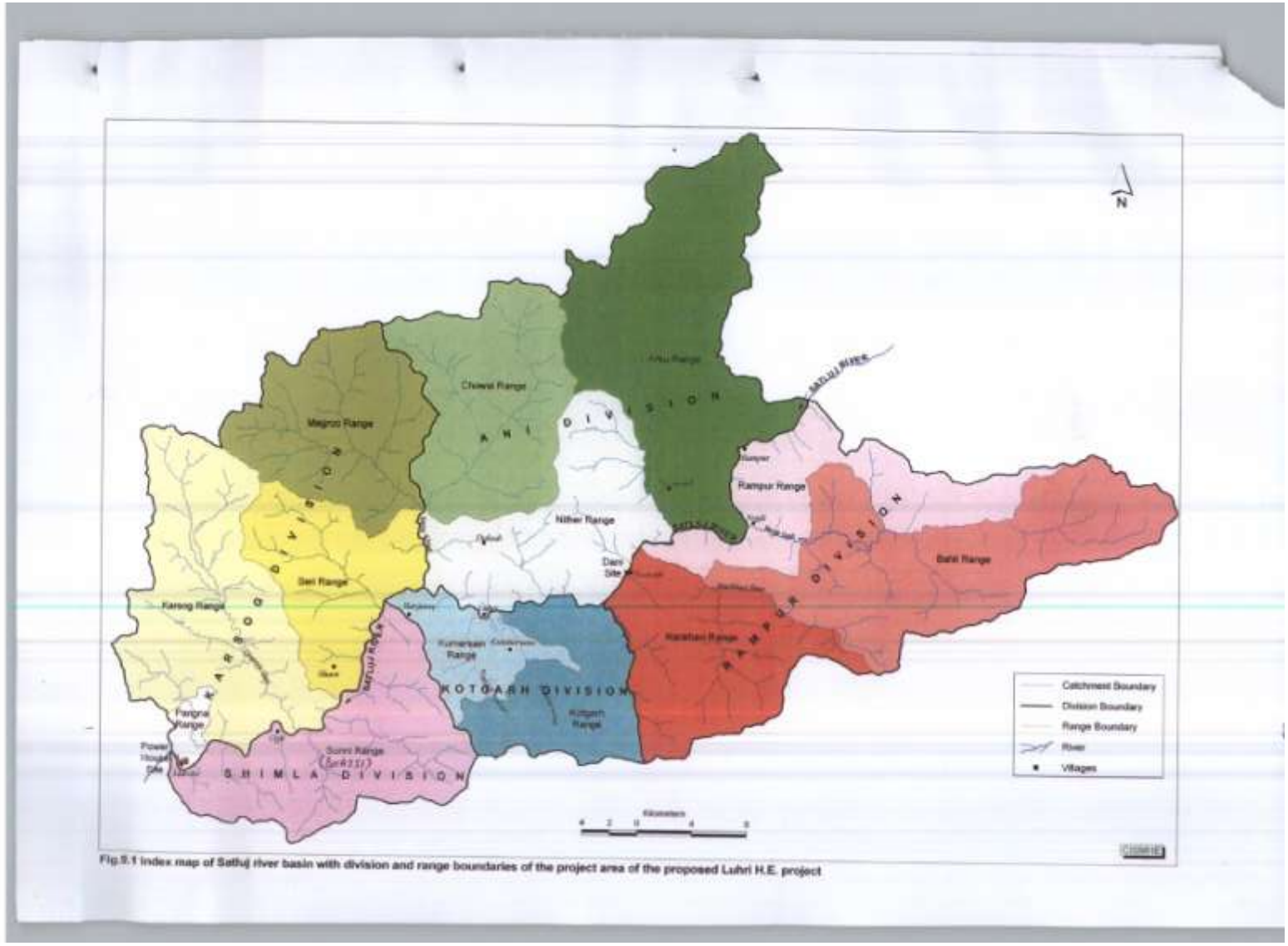
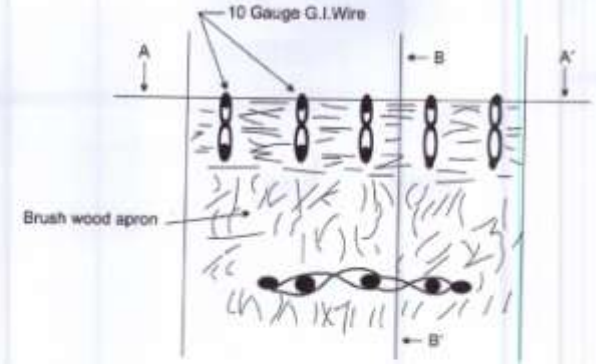
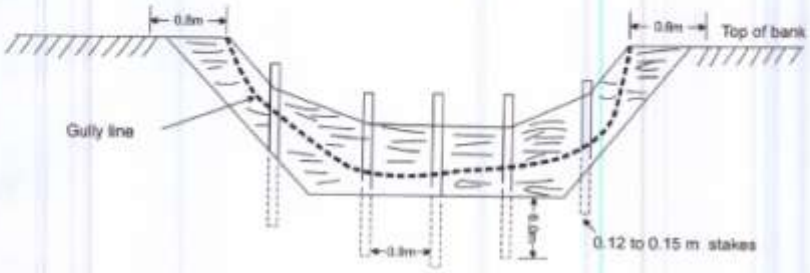


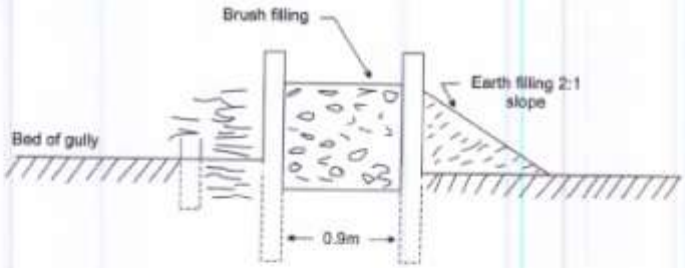
Fig.9.1 Index map of Sathuj river basin with division and range boundaries of the project area of the proposed Luhri H.E. project



a) A double-row post brush dam

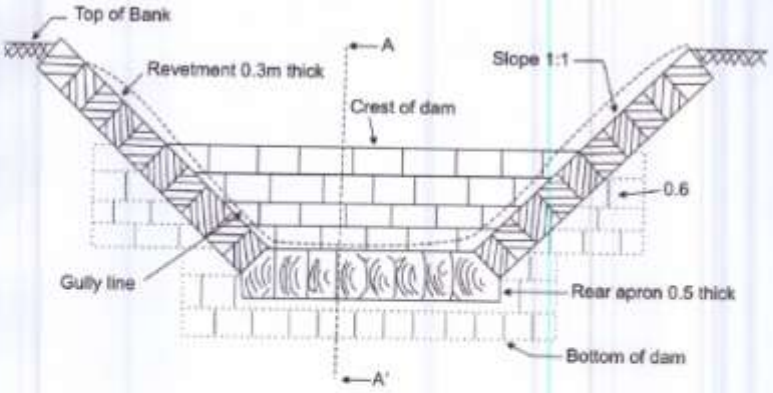


b) Section along A-A'

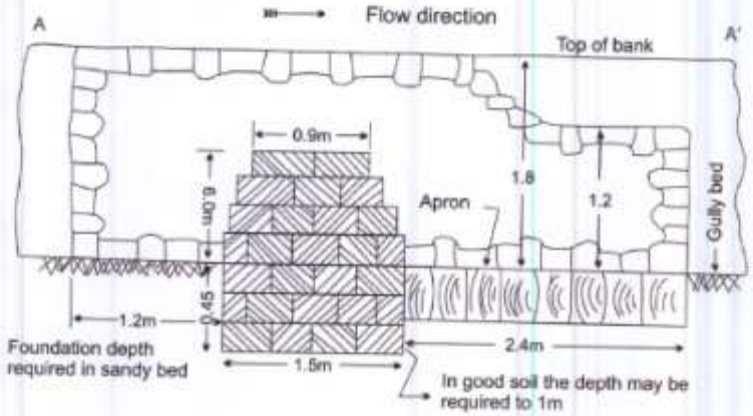


c) Section along BB'

Fig. 9.2 A Schematic diagram of a double row brush wood check (a) and its cross section along the dam A-A' (b) and across the dam (c).



a) Section of Dry rubble stone check dam along the structure



b) Section across the structure on A A'

Fig. 9.3 A Schematic diagram of a Dry rubble stone check dam showing section along the dam looking up gully (a) and section along A-A' on diagram(b).

Plate 9.1 Staggered contour trenches

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ANNEXURES

Annexure - I

Table for Computation of Silt Yield Index

Sub-watershed code	Erosion intensity	Area* (ha)	Weightage	Area x weight-age	Delivery ratio	Gross silt yield	Sediment yield index
Bk1	a	110.11	15	1651.65	0.95	1569	
	b	974.14	13	12663.82	0.90	11397	
	c	2471.18	12	29654.16	0.85	25206	
	d	45.79	11	503.69	0.85	428	
Total		**3601.22**				**38601**	**1071.88**
Bk2	a	124.17	14	1738.38	0.95	1651	
	b	962.86	13	12517.18	0.90	11265	
	c	1579.89	11	17378.79	0.90	15641	
	d	45.46	10	454.6	0.85	386	
Total		**2712.38**				**28944**	**1067.12**
Bk3	a	67	13	871	0.95	827	
	b	743.39	12	8920.68	0.90	8029	
	c	1902.05	11	20922.55	0.90	18830	
	d	98.48	10	984.8	0.85	837	
Total		**2810.92**				**28523**	**1014.74**
Bk4	a	46.26	13	601.38	0.95	571	
	b	550.5	11	6055.5	0.90	5450	
	c	1366.43	10	13664.3	0.90	12298	
	d	49.31	10	493.1	0.85	419	
Total		**2012.50**				**18738**	**931.09**
Bk5	a	6.27	13	81.51	0.95	77	
	b	419.15	12	5029.8	0.90	4527	
	c	908.29	12	10899.48	0.90	9810	
	d	25.16	11	276.76	0.85	235	
Total		**1358.87**				**14649**	**1078.03**
Bk6	a	89.43	14	1252.02	0.90	1127	
	b	689.8	12	8277.6	0.85	7036	

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	c	1199.47	11	13194.17	0.85	11215	
	d	11.02	10	110.2	0.80	88	
Total		**1989.72**				**19466**	**978.33**
Bk7	a	61.58	15	923.7	0.95	878	
	b	1598.42	14	22377.88	0.90	20140	
	c	2546.55	12	30558.6	0.90	27503	
	d	116.49	11	1281.39	0.85	1089	
Total		**4323.04**				**49610**	**1147.56**
Bk8	a	134.68	15	2020.2	0.95	1919	
	b	757.1	13	9842.3	0.90	8858	
	c	2094.04	11	23034.44	0.85	19579	
	d	209.87	10	2098.7	0.85	1784	
Total		**3195.69**				**32140**	**1005.74**
Bk9	a	58.89	14	824.46	0.95	783	
	b	346.14	13	4499.82	0.90	4050	
	c	1337.79	12	16053.48	0.90	14448	
	d	214.41	10	2144.1	0.85	1822	
Total		**1957.23**				**21104**	**1078.24**
Bk10	a	18.02	17	306.34	0.90	276	
	b	401.78	11	4419.58	0.90	3978	
	c	1449.48	11	15944.28	0.85	13553	
	d	182.13	10	1821.3	0.85	1548	
Total		**2051.41**				**19354**	**943.45**
Bk11	a	40.63	15	609.45	0.90	549	
	b	1076.31	13	13992.03	0.90	12593	
	c	2197.04	11	24167.44	0.90	21751	
	d	174.78	10	1747.8	0.85	1486	
Total		**3488.76**				**36378**	**1042.71**
Bk12	a	79.73	14	1116.22	0.95	1060	
	b	878.90	12	10546.8	0.90	9492	
	c	1283.57	11	14119.27	0.90	12707	

	d	65.13	10	651.3	0.85	554	
Total		**2307.33**				**23813**	**1032.08**
Bk13	a	246.75	15	3701.25	0.95	3516	
	b	1030.78	13	13400.14	0.90	12060	
	c	434.04	12	5208.48	0.85	4427	
	d	0.26	11	2.86	0.80	2	
Total		**1711.83**				**20006**	**1168.68**
Bk14	a	80.13	14	1121.82	0.95	1066	
	b	949.31	13	12341.03	0.90	11107	
	c	653.62	11	7189.82	0.90	6471	
	d	42.81	10	428.1	0.85	364	
Total		**1725.87**				**19007**	**1101.32**
Brk1	a	125.50	14	1757	0.95	1669	
	b	495.92	12	5951.04	0.90	5356	
	c	1244.15	11	13685.65	0.90	12317	
	d	64.33	10	643.3	0.85	547	
Total		**1929.90**				**19889**	**1030.57**
Brk2	a	122.97	15	1844.55	0.95	1752	
	b	693.43	13	9014.59	0.90	8113	
	c	1603.58	12	19242.96	0.85	16357	
	d	95.84	10	958	0.85	815	
Total		**2515.82**				**27037**	**1074.66**
Brk3	a	4.34	14	60.76	0.90	55	
	b	297.58	13	3868.54	0.90	3482	
	c	887.32	12	10647.84	0.90	9583	
	d	144.29	11	1587.19	0.85	1349	
Total		**1333.53**				**14469**	**1084.98**
Brk4	a	139.89	15	2098.35	0.95	1993	
	b	558.38	13	7258.94	0.85	6170	
	c	592.56	12	7110.72	0.85	6044	
	d	36.34	11	399.74	0.80	320	
Total		**1327.17**				**14527**	**1094.62**
Brk5	a	466.04	14	6524.56	0.90	5872	
	b	683.31	13	8883.03	0.90	7995	
	c	504.56	13	6559.28	0.85	5575	
	d	34.39	11	378.29	0.80	303	
Total		**1688.30**				**19745**	**1169.51**
Drg1	a	24.02	15	360.3	0.90	324	
	b	597.85	13	7772.05	0.85	6606	
	c	1358.87	12	16306.44	0.85	13860	
	d	89.38	11	983.18	0.8	787	
Total		**2078.12**				**21578**	**1042.33**

Drg2	a	6.17	14	86.38	0.90	78	
	b	432.21	13	5618.73	0.85	4776	
	c	1417.77	12	17013.24	0.85	14461	
	d	167.26	11	1839.86	0.80	1472	
Total		**2023.41**				**20787**	**1027.32**
Drg3	a	86.77	17	1475.09	0.90	1328	
	b	924.73	15	13870.95	0.85	11790	
	c	2102.73	12	25232.76	0.85	21448	
	d	275.62	10	2756.2	0.80	2205	
Total		**3389.85**				**36771**	**1084.73**
Cg1	a	112.48	15	1687.20	0.95	1603	
	b	446.54	13	5805.02	0.85	4934	
	c	2382.80	12	28593.60	0.8	22875	
	d	246.35	11	2709.85	0.80	2168	
Total		**3188.17**				**31580**	**990.53**
Cg2	a	68.55	17	1165.35	0.90	1049	
	b	310.86	15	4662.9	0.85	3963	
	c	1407.43	12	16889.16	0.85	14356	
	d	166.14	11	1827.54	0.80	1462	
Total		**1952.98**				**20830**	**1066.58**
Cg3	a	24.12	15	361.8	0.95	344	
	b	1033.61	14	14470.54	0.85	12300	
	c	3485.58	13	45312.54	0.80	36250	
	d	877.03	11	9647.33	0.75	7235	
Total		**5420.34**				**56129**	**1035.53**
Cg4	a	177.84	16	2845.44	0.90	2561	
	b	1732.48	15	25987.2	0.85	22089	
	c	3435.00	12	41220	0.85	35037	
	d	695.88	11	7654.68	0.80	6124	
Total		**6041.20**				**65811**	**1089.37**
Kg1	a	-	-	-	-	-	
	b	216.47	15	3247.05	0.85	2760	
	c	2282.47	12	27389.64	0.85	23281	
	d	52.81	11	580.91	0.8	465	
Total		**2551.75**				**26506**	**1038.73**
Kg2	a	55.15	17	937.55	0.90	844	
	b	632.00	15	9480	0.85	8058	
	c	967.04	12	11604.48	0.85	9864	
	d	6.42	10	64.2	0.8	51	
Total		**1660.61**				**18817**	**1133.14**
Kg3	a	0.08	17	1.36	0.90	1	
	b	525.05	15	7875.75	0.85	6694	
	c	2544.92	12	30539.04	0.85	25958	

	d	114.53	11	1259.83	0.8	1008	
Total		**3184.58**				**33662**	**1057.82**
Kg4	a	-	-	-	-	-	
	b	189.57	15	2843.55	0.85	2417	
	c	1975.91	12	23710.92	0.85	20154	
	d	126.35	11	1389.85	0.8	1112	
Total		**2291.83**				**23683**	**1033.37**
Kg5	a	25.12	17	427.04	0.90	384	
	b	664.25	15	9963.75	0.85	8469	
	c	1653.48	12	19841.76	0.85	16865	
	d	103.35	10	1033.5	0.8	827	
Total		**2446.20**				**26546**	**1085.19**
Kg6	a	-	-	-	-	-	
	b	282.24	15	4233.6	0.85	3599	
	c	2552.80	12	30633.6	0.85	26039	
	d	326.83	11	3595.13	0.8	2876	
Total		**3161.87**				**32513**	**1028.29**
Kg7	a	7.12	17	121.04	0.90	109	
	b	393.97	15	5909.55	0.85	5023	
	c	2251.41	12	27016.92	0.85	22964	
	d	217.26	11	2389.86	0.8	1912	
Total		**2869.76**				**30008**	**1045.67**
Kg8	a	13.77	16	220.32	0.90	198	
	b	186.55	15	2798.25	0.85	2379	
	c	1663.32	12	19959.84	0.85	16966	
	d	124.79	11	1372.69	0.80	1098	
Total		**1988.43**				**20641**	**1038.05**
Kg9	a	75.78	17	1288.26	0.90	1159	
	b	1240.16	15	18602.4	0.85	15812	
	c	2844.10	12	34129.2	0.85	29010	
	d	220.05	10	2200.5	0.8	1760	
Total		**4380.09**				**47742**	**1089.97**
Mg1	a	278.93	17.00	4741.81	0.90	4268	
	b	849.72	15	12745.8	0.85	10834	
	c	889.83	12	10677.96	0.85	9076	
	d	-	-	-	-	-	
Total		**2018.48**				**24178**	**1197.82**
Mg2	a	127.28	17	2163.76	0.90	1947	
	b	626.76	15	9401.4	0.85	7991	
	c	635.25	12	7623	0.85	6480	
	d	-	-	-	-	-	
Total		**1389.29**				**16418**	**1181.76**
Mg3	a	252.40	17	4290.8	0.90	3862	

	b	738.13	15	11071.95	0.85	9411	
	c	487.41	12	5848.92	0.85	4972	
	d	-	-	-	-	-	
Total		1477.94				18244	1234.45
Mg4	a	178.80	16	2860.8	0.90	2575	
	b	532.44	15	7986.6	0.85	6789	
	c	1099.19	12	13190.28	0.85	11212	
	d	11.43	11	125.73	0.8	101	
Total		1821.86				20676	1134.87
Mg5	a	289.16	17	4915.72	0.90	4424	
	b	1542.76	15	23141.4	0.85	19670	
	c	1546.96	12	18563.52	0.85	15779	
	d	73.29	11	806.19	0.8	645	
Total		3452.17				40518	1173.70
Mg6	a	197.93	15	2968.95	0.90	2672	
	b	1373.55	13	17856.15	0.85	15178	
	c	641.40	12	7696.8	0.85	6542	
	d	-	-	-	-	-	
Total		2212.88				24392	1102.28
Mg7	a	502.87	17	8548.79	0.90	7694	
	b	1133.62	15	17004.3	0.85	14454	
	c	477.46	12	5729.52	0.85	4870	
	d	1.41	11	15.51	0.8	12	
Total		2115.36				27030	1277.80
Ng1	a	566.44	17	9629.48	0.90	8667	
	b	1040.26	15	15603.9	0.85	13263	
	c	842.04	12	10104.48	0.85	8589	
	d	26.52	10	265.2	0.8	212	
Total		2475.26				30731	1241.52
Ng2	a	1177.24	14	16481.36	0.90	14833	
	b	2435.71	13	31664.23	0.85	26915	
	c	1331.47	12	15977.64	0.85	13581	
	d	29.05	11	319.55	0.8	256	
Total		4973.47				55584	1117.62
Ng3	a	656.28	17	11156.76	0.90	10041	
	b	1790.41	15	26856.15	0.85	22828	
	c	935.01	12	11220.12	0.85	9537	
	d	-	-	-	-	-	
Total		3381.70				42406	1253.98
Ng4	a	400.62	17	6810.54	0.90	6129	
	b	1234.00	15	18510	0.85	15734	
	c	790.00	12	9480	0.85	8058	
	d	-	-	-	-	-	
Total		2424.62				29921	1234.05

Ng5	a	145.57	14	2037.98	0.95	1936	
	b	1685.70	13	21914.1	0.9	19723	
	c	2112.42	12	25349.04	0.85	21547	
	d	-	-	-	-	-	
Total		**3943.69**				**43205**	**1095.56**
Ng6	a	585.86	17	9959.62	0.90	8964	
	b	2257.92	15	33868.8	0.85	28788	
	c	531.03	12	6372.36	0.85	5417	
	d	-	-	-	-	-	
Total		**3374.81**				**43169**	**1279.14**
St1	a	-	-	-	-	-	
	b	1117.18	15	16757.7	0.85	14244	
	c	2239.13	12	26869.56	0.85	22839	
	d	90.25	11	992.75	0.8	794	
Total		**3446.56**				**37877**	**1098.99**
St2	a	54.79	17	931.43	0.90	838	
	b	626.11	15	9391.65	0.85	7983	
	c	1360.39	12	16324.68	0.85	13876	
	d	-	-	-	-	-	
Total		**2041.29**				**22697**	**1111.90**
St3	a	494.42	14	6921.88	0.90	6230	
	b	1936.41	13	25173.33	0.85	21397	
	c	753.83	12	9045.96	0.85	7689	
	d	2.47	11	27.17	0.8	22	
Total		**3187.13**				**35338**	**1108.77**
St4	a	339.15	17	5765.55	0.90	5189	
	b	1511.49	15	22672.35	0.85	19271	
	c	711.76	12	8541.12	0.85	7260	
	d	-	-	-	-	-	
Total		**2562.40**				**31720**	**1237.92**
St5	a	233.35	17	3966.95	0.90	3570	
	b	1550.37	15	23255.55	0.85	19767	
	c	780.15	12	9361.8	0.85	7958	
	d	-	-	-	-	-	
Total		**2563.87**				**31295**	**1220.62**
St6	a	180.43	17	3067.31	0.90	2761	
	b	1062.73	15	15940.95	0.85	13550	
	c	374.05	12	4488.6	0.85	3815	
	d	1.84	10	18.4	0.8	15	
Total		**1619.05**				**20140**	**1243.97**
St7	a	514.34	15	7715.1	0.90	6944	
	b	1701.31	14	23818.34	0.85	20246	
	c	561.05	12	6732.6	0.85	5723	

	d	-	-	-	-	-	
Total		**2776.70**				**32912**	**1185.29**
St8	a	260.37	17	4426.29	0.90	3984	
	b	899.76	15	13496.4	0.85	11472	
	c	1023.77	12	12285.24	0.85	10442	
	d	28.96	11	318.56	0.8	255	
Total		**2212.86**				**26153**	**1181.86**
St9	a	305.20	17	5188.4	0.90	4670	
	b	1212.21	15	18183.15	0.85	15456	
	c	287.36	12	3448.32	0.85	2931	
	d	0.21	11	2.31	0.8	2	
Total		**1804.98**				**23058**	**1277.47**
St10	a	77.98	17	1325.66	0.90	1193	
	b	330.64	15	4959.6	0.85	4216	
	c	1428.52	12	17142.24	0.85	14571	
	d	96.66	11	1063.26	0.8	851	
Total		**1933.80**				**20830**	**1077.17**
St11	a	110.29	16	1764.64	0.90	1588	
	b	421.71	15	6325.65	0.85	5377	
	c	1455.33	12	17463.96	0.85	14844	
	d	36.04	10	360.4	0.8	288	
Total		**2023.37**				**22098**	**1092.12**
St12	a	148.42	16	2374.72	0.95	2256	
	b	733.84	15	11007.6	0.9	9907	
	c	1328.22	12	15938.64	0.85	13548	
	d	24.34	11	267.74	0.8	214	
Total		**2234.82**				**25925**	**1160.04**
St13	a	5.72	17	97.24	0.90	88	
	b	476.62	15	7149.3	0.85	6077	
	c	1722.12	12	20665.44	0.85	17566	
	d	175.78	11	1933.58	0.8	1547	
Total		**2380.24**				**25277**	**1061.95**
St14	a	54.93	13	714.09	0.95	678	
	b	800.91	12	9610.92	0.9	8650	
	c	402.28	12	4827.36	0.8	3862	
	d	13.17	11	144.87	0.8	116	
Total		**1271.29**				**13306**	**1046.65**
St15	a	133.38	17	2267.46	0.90	2041	
	b	869.02	15	13035.3	0.85	11080	
	c	523.96	12	6287.52	0.85	5344	
	d	17.65	11	194.15	0.8	155	
Total		**1544.01**				**18620**	**1205.98**
St16	a	52.09	17	885.53	0.90	797	

	b	1519.46	15	22791.9	0.85	19373	
	c	1299.32	12	15591.84	0.85	13253	
	d	98.57	11	1084.27	0.8	867	
Total		**2969.44**				**34291**	**1154.78**
St17	a	249.62	17	4243.54	0.90	3819	
	b	1130.34	15	16955.1	0.85	14412	
	c	1123.64	12	13483.68	0.85	11461	
	d	24.74	11	272.14	0.8	218	
Total		**2528.34**				**29910**	**1182.98**
St18	a	78.28	17	1330.76	0.90	1198	
	b	852.35	15	12783.25	0.85	10867	
	c	2157.48	12	25889.76	0.85	22006	
	d	258.72	10	2587.2	0.8	2070	
Total		**3346.83**				**36141**	**1079.86**
St19	a	108.89	17	1851.13	0.95	1759	
	b	501.20	15	7518	0.85	6390	
	c	1048.26	12	12579.12	0.85	10692	
	d	138.72	11	1525.92	0.8	1221	
Total		**1797.07**				**20062**	**1116.37**
St20	a	49.19	17	836.23	0.90	753	
	b	649.73	15	9745.95	0.85	8284	
	c	2102.04	12	25224.48	0.85	21441	
	d	197.40	11	2171.4	0.8	1737	
Total		**2998.36**				**32215**	**1074.41**
St21	a	72.80	17	1237.6	0.90	1114	
	b	393.63	15	5904.45	0.85	5019	
	c	1025.91	12	12310.92	0.85	10464	
	d	45.00	11	495	0.8	396	
Total		**1537.34**				**16993**	**1105.34**
St22	a	36.29	17	616.93	0.90	555	
	b	993.08	15	14896.2	0.85	12662	
	c	383.76	12	4605.12	0.85	3914	
	d	3.62	10	36.2	0.8	29	
Total		**1416.75**				**17160**	**1211.25**
St23	a	10.57	16	169.12	0.90	152	
	b	304.09	15	4561.35	0.9	4105	
	c	1399.42	12	16793.04	0.85	14274	
	d	701.80	11	7719.8	0.8	6176	
Total		**2415.88**				**24707**	**1022.71**
St24	a	17.37	17	295.29	0.90	266	
	b	551.21	15	8268.15	0.85	7028	
	c	666.04	12	7992.48	0.85	6794	
	d	41.81	11	459.91	0.8	368	
Total		**1276.43**				**14455**	**1132.47**

St25	a	89.62	15	1344.3	0.90	1210	
	b	506.99	13	6590.87	0.85	5602	
	c	840.09	12	10081.08	0.85	8569	
	d	40.63	11	446.93	0.8	358	
Total		**1477.33**				**15739**	**1065.34**
St26	a	179.14	17	3045.38	0.90	2741	
	b	454.03	15	6810.45	0.85	5789	
	c	1260.96	12	15131.52	0.85	12862	
	d	37.15	11	408.65	0.8	327	
Total		**1931.28**				**21718**	**1124.56**

Annexure-II(A)

Afforestation cost/ ha of plantation (incl. maintenance)

S. No.	Description			Cost
1	Survey and demarcation of plantation and area I/C marking of seditions, path preparation of map.	1 hac	67.33	67.33
2	Cutting and preparation of wooden posts 1.8 mtr and 8 to 10 CM dia I/C debarking and fashioning the top 15 cm in conical shape	60 Nos	863.35	518.01
3	Carriage of fence posts upto 2 mtr long and 8 to 10 cm dia over distance 2 KM	60 Nos	453.67 per % per KM	272.20
4	Charring and coal tarring of the ends of fence posts	60 Nos	186.33%	111.80
5	Preparation and digging of holes 20-30 cm dia & 45 cm deep	60 Nos	604.51 per %	362.71
6	Fixing of wooden posts I/C strutting	60 Nos	477.34 per %	286.40
7	Carriage of barbed wire bundles up hill over an overage distance of 2 km	0.90 qtls.	54.50 per qtl/Km.	98.10
8	Streching and fixing of barbed wire with U-stapple in 4 strand	720 Rmt.	3.16 per Rmt.	2275.20
9	Interlacing of thorny bushes with barbed wire obtained from planting side	180 Rmt.	2.74 per Rmt	493.20
10	Preparation of inspection path 60 cm wide	250 Rmt.	7.24 per Rmt	1810.00
11	Prepration of water retention mounds/treanches	L/S	L/S	2000.00
12	Digging of pits (30x30x30) cm	900 No.	318.22 per %	2863.98
13	Digging of pits (45x45x45) cm	600 No.	636.28 per %	3817.68
14	Filling of pits (30x30x30) cm	900 No.	127.22 per %	1144.98
15	Filling of pits (45x45x45) cm	600 No.	182.31 per %	1093.86
16	Carriage of Plants Naked roots from Nursery site over an average distance of 2 Km. up hill	600 No.	23.49	281.88
17	Carriage of Plants in P/bags from Nursery site over an average distance of 2 Km. uphill	900 No.	145.39 per % per Km.	2617.02

18	Planting of naked root Plants I/C ramming raised in P/bages	600 No.	122.66	735.96
19	Planting of grass tufts/prepration of strips I/C sowing in strips 100x30x5 cm for grass sowing	500 strips	613.33%	3066.65
20	Cost of B/Wire/U-nail	0.90 qtls.	7000	6300.00
21	Nursery Cost of Naked root Plants	600 No.	6 per plant	3600.00
22	Nursery Cost of P/bags raised Plants	900 No.	8 per plant	8100
			G.Total	**41916.96**
			Or Say	**42000.00**

1st Year Maintenance (30%) mortality		9100
2nd year Maintenance (20%) mortality		5700
3rd Year Maintenance (10%) mortality		3600
4th Year Maintenance (10%) mortality		3400
5th Year Maintenance (10%) mortality		3200
	G. Total =	**25000**

GRAND TOTAL(New & Maintainence)	**67000.00**

Annexure-II(B)

Regeneration/Plantation of Oak & Deodar Forest (incl. maintenance)

S. No.	Description			Cost
1	Survey and demarcation of plantation and area I/C marking of seditions, path preparation of map.	1 hac	67.33	67.33
2	Cutting and preparation of wooden posts 1.8 mtr and 8 to 10 CM dia I/C debarking and fashioning the top 15 cm in conical shape	60 Nos	863.35	518.01
3	Carriage of fence posts upto 2 mtr long and 8 to 10 cm dia over distance 2 KM	60 Nos	453.67 per % per KM	272.20
4	Charring and coal tarring of the ends of fence posts	60 Nos	186.33%	111.80
5	Preparation and digging of holes 20-30 cm dia & 45 cm deep	60 Nos	604.51 per %	362.71
6	Fixing of wooden posts I/C strutting	60 Nos	477.34 per %	286.40
7	Carriage of barbed wire bundles up hill over an overage distance of 2 km	0.90 qtls.	54.50 per qtl/Km.	98.10
8	Streching and fixing of barbed wire with U-stapple in 4 strand	720 Rmt.	3.16 per Rmt.	2275.20
9	Interlacing of thorny bushes with barbed wire obtained from planting side	180 Rmt.	2.74 per Rmt	493.20
10	Preparation of inspection path 60 cm wide	250 Rmt.	7.24 per Rmt	1810.00
11	Prepration of water retention mounds/treanches	L/S	L/S	2000.00
12	Digging of pits (30x30x30) cm	900 No.	318.22 per %	2863.98
13	Digging of pits (45x45x45) cm	600 No.	636.28 per %	3817.68
14	Filling of pits (30x30x30) cm	900 No.	127.22 per %	1144.98
15	Filling of pits (45x45x45) cm	600 No.	182.31 per %	1093.86
16	Carriage of Plants Naked roots from Nursery site over an average distance of 2 Km. up hill	600 No.	23.49	281.88
17	Carriage of Plants in P/bags from Nursery site over an average distance of 2 Km. uphill	900 No.	145.39 per % per Km.	2617.02

18	Planting of naked root Plants I/C ramming raised in P/bages	600 No.	122.66	735.96
19	Planting of grass tufts/prepration of strips I/C sowing in strips 100x30x5 cm for grass sowing	500 strips	613.33%	3066.65
20	Cost of B/Wire/U-nail	0.90 qtls.	7000	6300.00
21	Nursery Cost of Naked root Plants	600 No.	6 per plant	3600.00
22	Nursery Cost of P/bags raised Plants	900 No.	8 per plant	8100
			G.Total	**41916.96**
			Or Say	**42000.00**

1st Year Maintenance (30%) mortality		9100
2nd year Maintenance (20%) mortality		5700
3rd Year Maintenance (10%) mortality		3600
4th Year Maintenance (10%) mortality		3400
5th Year Maintenance (10%) mortality		3200
	G. Total =	**25000**
GRAND TOTAL(New & Maintainence)		**67000.00**

Annexure-II(C)

Assisted Natural Regeneration Plantation (including maintenance)

S. No.	Description			Cost
1	Survey and demarcation of plantation and area I/C marking of seditions, path preparation of map.	1 hac	67.33	67.33
2	Cutting and preparation of wooden posts 1.8 mtr and 8 to 10 CM dia I/C debarking and fashioning the top 15 cm in conical shape	60 Nos	863.35	518.01
3	Carriage of fence posts upto 2 mtr long and 8 to 10 cm dia over distance 2 KM	60 Nos	453.67 per % per KM	272.20
4	Charring and coal tarring of the ends of fence posts	60 Nos	186.33%	111.80
5	Preparation and digging of holes 20-30 cm dia & 45 cm deep	60 Nos	604.51 per %	362.71
6	Fixing of wooden posts I/C strutting	60 Nos	477.34 per %	286.40
7	Carriage of barbed wire bundles up hill over an overage distance of 2 km	0.90 qtls.	54.50 per qtl/Km.	98.10
8	Streching and fixing of barbed wire with U-stapple in 4 strand	720 Rmt.	3.16 per Rmt.	2275.20
9	Interlacing of thorny bushes with barbed wire obtained from planting side	180 Rmt.	2.74 per Rmt	493.20
10	Preparation of inspection path 60 cm wide	250 Rmt.	7.24 per Rmt	1810.00
11	Prepration of water retention mounds/treanches	L/S	L/S	2000.00
12	Digging of pits (30x30x30) cm	400 No.	318.22 per %	1272.88
13	Filling of pits (30x30x30) cm	400 No.	127.22 per %	508.88
14	Carriage of Plants in P/bags from Nursery site over an average distance of 2 Km. uphill	400 No.	145.39 per % per Km.	1163.12
15	Planting of naked root Plants I/C ramming raised in P/bages	400 No.	122.66	490.64
16	Prepration of strips I/C sowing in strips 100x30x5 cm for sowing	500 strips	613.33%	3066.65
17	Cost of B/Wire/U-nail	0.90 qtls.	7000	6300.00

18	Nursery Cost of P/bags raised Plants	400 No.	8 per plant	3600
			G.Total	**24697.12**
			Or Say	**24700.00**

1st Year Maintenance (30%) mortality		4787.60
2nd year Maintenance (20%) mortality		3200
3rd Year Maintenance (10%) mortality		1600
4th Year Maintenance (10%) mortality		1500
5th Year Maintenance (10%) mortality		1400
	G. Total =	**12487.6**
GRAND TOTAL(New & Maintainence)		**37187.60**
	Or Say	**37200**

Annexure-II(D)

Replenishment of Old Plantation (Planting/Sowing)

S. No.	Description			Cost
1	Survey and demarcation of plantation and area I/C marking of seditions, path preparation of map.	1 hac	7.33	67.33
2	Cutting and preparation of wooden posts 1.8 mtr and 8 to 10 CM dia I/C debarking and fashioning the top 15 cm in conical shape	60 Nos	863.35	518.01
3	Carriage of fence posts upto 2 mtr long and 8 to 10 cm dia over distance 2 KM	60 Nos	453.67 per % per KM	272.20
4	Charring and coal tarring of the ends of fence posts	60 Nos	186.33%	111.80
5	Preparation and digging of holes 20-30 cm dia & 45 cm deep	60 Nos	604.51 per %	362.71
6	Fixing of wooden posts I/C strutting	60 Nos	477.34 per %	286.40
7	Carriage of barbed wire bundles up hill over an overage distance of 2 km	0.90 qtls.	54.50 per qtl/Km.	98.10
8	Streching and fixing of barbed wire with U-stapple in 4 strand	720 Rmt.	3.16 per Rmt.	2275.20
9	Interlacing of thorny bushes with barbed wire obtained from planting side	180 Rmt.	2.74 per Rmt	493.20
10	Preparation of inspection path 60 cm wide	250 Rmt.	7.24 per Rmt	1810.00
11	Prepration of water retention mounds/treanches	L/S	L/S	2000.00
12	Digging of pits (30x30x30) cm	400 No.	318.22 per %	1272.88
13	Filling of pits (30x30x30) cm	400 No.	127.22 per %	508.88
14	Carriage of Plants in P/bags from Nursery site over an average distance of 2 Km. uphill	400 No.	145.39 per % per Km.	1163.12
15	Planting of naked root Plants I/C ramming raised in P/bages	400 No.	122.66	490.64
16	Prepration of strips I/C sowing in strips 100x30x5 cm for sowing	500 strips	613.33%	3066.65
17	Cost of B/Wire/U-nail	0.90 qtls.	7000	6300.00

18	Nursery Cost of P/bags raised Plants	400 No.	8 per plant	3600
			G.Total	**24697.12**
			Or Say	**24700.00**

1st Year Maintenance (30%) mortality		4787.60
2nd year Maintenance (20%) mortality		3200
3rd Year Maintenance (10%) mortality		1600
4th Year Maintenance (10%) mortality		1500
5th Year Maintenance (10%) mortality		1400
	G. Total =	**12487.6**
GRAND TOTAL(New & Maintainence)		**37187.60**
	Or Say	**37200**

Annexure-II(E)

Replenishment Afforestation(New Planting)

S. No.	Description			Cost
1	Survey and demarcation of plantation and area I/C marking of seditions, path preparation of map.	1 hac	67.33	67.33
2	Cutting and preparation of wooden posts 1.8 mtr and 8 to 10 CM dia I/C debarking and fashioning the top 15 cm in conical shape	60 Nos	863.35	518.01
3	Carriage of fence posts upto 2 mtr long and 8 to 10 cm dia over distance 2 KM	60 Nos	453.67 per % per KM	272.20
4	Charring and coal tarring of the ends of fence posts	60 Nos	186.33%	111.80
5	Preparation and digging of holes 20-30 cm dia & 45 cm deep	60 Nos	604.51 per %	362.71
6	Fixing of wooden posts I/C strutting	60 Nos	477.34 per %	286.40
7	Carriage of barbed wire bundles up hill over an overage distance of 2 km	0.90 qtls.	54.50 per qtl/Km.	98.10
8	Streching and fixing of barbed wire with U-stapple in 4 strand	720 Rmt.	3.16 per Rmt.	2275.20
9	Interlacing of thorny bushes with barbed wire obtained from planting side	180 Rmt.	2.74 per Rmt	493.20
10	Preparation of inspection path 60 cm wide	250 Rmt.	7.24 per Rmt	1810.00
11	Prepration of water retention mounds/treanches	L/S	L/S	2000.00
12	Digging of pits (30x30x30) cm	500 No.	318.22 per %	1591.10
13	Digging of pits (45x45x45) cm	300 No.	636.28 per %	1908.84
14	Filling of pits (30x30x30) cm	500 No.	127.22 per %	636.10
15	Filling of pits (45x45x45) cm	300 No.	182.31 per %	546.93
16	Carriage of Plants Naked roots from Nursery site over an average distance of 2 Km. up hill	300 No.	23.49	140.94
17	Carriage of Plants in P/bags from Nursery site over an average distance of 2 Km. uphill	500 No.	145.39 per % per Km.	1453.90
18	Planting of naked root Plants I/C ramming raised in P/bages	300 No.	122.66	367.98
19	Planting of grass tufts/prepration of strips I/C sowing in strips 100x30x5 cm for grass sowing	500 strips	613.33%	3066.65

20	Cost of B/Wire/U-nail	0.90 qtls.	7000	6300.00
21	Nursery Cost of Naked root Plants	300 No.	6 per plant	1800.00
22	Nursery Cost of P/bags raised Plants	500 No.	8 per plant	4500
			G.Total	**30607.39**
			Or Say	**30600.00**

1st Year Maintenance (30%) mortality		5100
2nd year Maintenance (20%) mortality		3600
3rd Year Maintenance (10%) mortality		2000
4th Year Maintenance (10%) mortality		1800
5th Year Maintenance (10%) mortality		1600
	G. Total =	**14100**
GRAND TOTAL(New & Maintainence)		**44700.00**
	Or Say	**44700**

Annexure-II-(F)

Energy plantation of fast growing fuel good and fodder species

S.No.	Description		Cost
1.	Survey & demarcation of Plantation area and preparation of maps per hectare	@ Rs. 68.21/ha	68.21
2.	Fencing of area of barbed wire 4 strands horizontal and 2 strands diagonal (mp-5cm 400m/ha)	@ Rs. 38/running metres	5117.18
3.	Layout of Pits/Patches per hectare	@ Rs. 68.15/ha	68.15
4.	Digging of pits 30 cm^3	5000 nos @ Rs. 318.20/100	15910.00
5.	Filling of pits 30 cm^3	5000 nos @ Rs. 127.21/100	6360.50
6.	Carriage of Plants for 3km	5000 nos @ Rs. 67.50/100/km	10125.00
7.	Plantation of plants in pits for 30 cm^3	5000 nos @ Rs. 133.85/100	6692.50
8.	Cost of plants	5000@ Rs.3.25/ plant	16250.00
9.	Other material cost	Lump sum	1100.00
10.	Material cost (M.S single wire with bars)	Lump sum	4200.00
		Total	**65891.00**
		Or Say	**Rs.66000**

Annexure-II-(G)

NTFP plantation of tall plants

S.No.	Description		Cost
1.	Survey & demarcation of Plantation area and preparation of maps per hectare	@ Rs. 68.21/ha	68.21
2.	Fencing of area of barbed wire 4 strands horizontal and 2 strands diagonal (mp-5cm 400m/ha)	@ Rs. 38/running metres	5117.18
3.	Layout of Pits/Patches per hectare	@ Rs. 68.15/ha	68.15
4.	Digging of pits 30 cm^3	2500 nos @ Rs. 318.20/100	7955.00
5.	Filling of pits 30 cm^3	2500 nos @ Rs. 127.21/100	3180.25
6.	Carriage of Plants for 3km	2500 nos @ Rs. 67.50/100/km	5062.25
7.	Plantation of plants in pits for 30 cm^3	2500 nos @ Rs. 133.85/100	3346.25
8.	Cost of plants	2500 @ Rs.3.25/ plant	8125.00
		Total	**32922.29**
		Or Say	**Rs. 33000**

Annexure-II-(H)

PASTURE IMPROVEMENT

S. No.	Description		Cost
A.	**Execution**		
I.	**Wage Component**		
1.	Climber cutting/bush cutting in	Plantation area ½ ha@ Rs. 68.21	146.00
2.	Survey of Plantation area and preparation of maps	@ Rs. 68.21/ha	68.21
3.	Digging of pits 45 cm^3	400 nos @ Rs. 636.25/100	2545.00
4.	Filling of pits 45cm^3	400 nos @ Rs. 182.28/100	729.12
5.	Planting of Plants in pits for 45cm^3	400 nos @ Rs.133.85/100	535.40
6.	Carriage of Plants	400 nos @ Rs. 67.5/100/km	270.00
7.	Preparation of patches for	250 nos @ Rs. 166.85/100	417.12
8.	Sowing of patches for grass sowing	250 nos @ Rs. 48.70/100	121.75
9.	Cost of protection	Lump sum	400.00
10.	Collection of grass seed		97.00
		Total	**5329.60**
II.	**Cost of Material**		
	Other material cost	Lump sum	400.00
	Cost of compost		1200.00
		Total	**1600.00**
	Grand Total (I + II)		**6929.60**
		Or Say	**Rs.7000**

Annexure-III

Cost per Engineering Measures^

A. DRSM Checkdams

Average Dimension = 8m x 1.49m x2m = 23.925 m^3
Cost @ Rs. 1070/ m^3= 23.925 x Rs. 1070 = Rs.25600.39
Add 30% for hill area = Rs. 7680.117
Total = Rs.33280.507

Say Rs. 33281/-

B. Brushwood Checkdam

Includes wooden post, GI wire, fiber and straw as well construction cost = Rs.1500/ dam
Total = Rs.1500/ dam

Say Rs.1500/-

C. Retention wall of average 10m height

Item	Quantity (m^3)	Rate (Rs.)/m^3	Amount (Rs)
Excavation	5.08	64.00	325.00
Cement Concrete (1:6:12)	1:56	982.10	1532.00
R/R Masonry (1:6)	6.41	1077.20	6905.00
Plum Concrete (1:5:10)	20.66	1048.70	21666.00
Boulders filling	3.08	391.70	1206.00
Total cost per running mtrs in Rs.			31634.00
Miscellaneous			1699.33
			33333.33
			Say Rs. 33333.00

D. Water Harvesting System

1-Staggered Water Harvesting Trenches :
Lumpsum Rs.38000/ ha

2-Roof top harvesting (in HPFD buildings):
Lumpsum Rs. 200000/ no.

E. G&D Station

* G&D Discharge Equipments (lumpsum) /per station = Rs. 40,000/ station
* Staff salary and Maintenance /per unit = Rs.3,00,000/ station
Total cost per unit = **Rs.3,40,000/ station**

F. Treatment of slips/gullies/rills & sheet erosion	Rate (Rs.) Rs. 555560/ ha **Rs. 555560.00/ ha**
Total	
G. Planting Grass Tufts	Rate (Rs.) Rs. 7000/ ha **Rs. 7000.00/ ha**
Total	
H. Pine needle Logs	Rate (Rs.) Rs. 500/ ha **Rs. 500.00/ ha**
Total	

COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

Annexure-IV

S.No.	ITEMS	Unit	RAMPUR DIVISION		NAWHANI RANGE		BAHJ RANGE		RAMPUR RANGE		RAMPUR DIVISION TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY.	FIN.
1	ENGINEERING MEASURES											
a)	CRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(MV.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	391.00	0.00	187.00	0.00	165.50	0.00	743.50
	Total		0.00	0.00	0.00	391.00	0.00	187.00	0.00	165.50	0.00	743.50
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	2.00	10.00	2.00	10.00	2.00	10.00	6.00	30.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	2.00	10.00	2.00	10.00	2.00	10.00	6.00	30.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	1.00	6.33	1.00	6.33	1.00	6.34	3.00	25.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slope gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	14.76	82.00	12.60	70.00	10.09	56.00	37.44	208.00
b)	Roadside erosion control	L.S	0.00	0.00	0.00	110.00	0.00	55.00	0.00	26.00	0.00	191.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Lags (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	14.76	192.00	12.60	125.00	10.09	82.00	37.44	399.00
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	125.67	80.21	15.81	10.09	33.67	21.49	175.34	119.40
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	237.64	68.40	114.62	42.64	58.71	21.84	410.97	132.88
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	196.55	86.75	55.83	25.00	44.74	20.00	299.22	133.75
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	70.00	49.20	55.00	36.30	15.00	9.90	140.00	92.40
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	31.00	2.45	45.00	7.15	10.00	0.70	90.00	6.30
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Aon Plantation	Ha	0.00	0.00	8.84	15.00	0.00	0.00	20.64	35.06	29.48	50.06
m	Development of medicinal plants	Ha	0.00	0.00	20.00	3.62	20.00	3.62	20.00	4.79	60.00	12.42
	Total		0.00	0.00	699.70	336.63	306.26	131.80	207.86	114.81	1213.81	667.24
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0.00
b)	Nursery development (not infrastructure development)	L.S	0	0	0	0	0	0	0	10.00	0	10.00
c)	Establishment of Kharau Oak/ Rai Fir Nrs	L.S	0	0	0	0	0	0	0	0	0	0.00
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	46.00	0	0	0	0.00	0	60.00
	Total		0	0	0	46.00	0	0	0	10.00	0	70.00
7	Establishment of Goradaara	No.	0	0	1.00	15.00	0.00	0.00	1.00	15.00	2.00	30.00
8	Energy Conservation/Forest Protection	L.S	0	7.00	0	32.40	0	14.70	0	25.71	0	80.81
9	Fuel saving devices	L.S	0	0	0	63.00	0	29.50	0	48.50	0	171.00
10	Forest Infrastructure Development	L.S	0	0	0	82.23	0	15.02	0	50.63	0	157.88
11	Operational support	L.S	0	36.40	0	4.59	0	4.59	0	4.33	0	50.26
12	Animal Husbandry support	L.S	0	20.00	0	0	0	0	0	0	0	20.00
13	Agriculture support	L.S	0	10.00	0	0	0	0	0	0	0	10.00
14	Horticulture support	L.S	0	20.00	0	0	0	0	0	0	0	20.00
15	Wild Life Management/improvement	L.S	0	25.00	0	0	0	0	0	0	0	25.00
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	9.00	0	0	0	0	0	0	0	9.00
17	Research & Studies	L.S	0	20.00	0	0	0	0	0	0	0	20.00
18	Training Awareness & Publicity	L.S	0	20.00	0	0	0	0	0	0	0	20.00
	Total(7 to 18)		0.00	187.40	0.00	1210.34	0.00	321.80	0.00	354.14	0.00	2468
19	Eco-Tourism 1%	L.S	0.00	1.87	0.00	12.10	0.00	3.22	0.00	3.54	0.00	25
20	Eco-Sensitive 5%	L.S	0.00	9.37	0.00	60.77	0.00	26.09	0.00	29.21	0.00	125
21	Eco-services 10%	L.S	0.00	18.74	0.00	121.53	0.00	52.19	0.00	56.41	0.00	247
22	Monitoring and Evaluation 5%	L.S	0.00	9.37	0.00	60.77	0.00	26.09	0.00	29.21	0.00	125
23	Escalation 10%	L.S	0.00	18.74	0.00	121.53	0.00	52.19	0.00	56.41	0.00	247
	G. Total		0.00	219.29	0.00	1582.04	0.00	681.29	0.00	729.03	0.00	3234

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0 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.No.	ITEMS	Unit	RAMPUR DIVISION		MAHAKARI RANGE		BAILI RANGE		RAMPUR RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY	FIN.
1	ENGINEERING MEASURES											
a)	PRISM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside erosion control	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tuffs (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i	Pasture improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
j	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	10.00	0	10.00
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	46.00	0	6.00	0	8.00	0	60.00
	Total		0	0	0	46.00	0	6.00	0	18.00	0	70.00
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0	0	0	0	0	0	0	0	0
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	0	0	0	0	0	0	0
11	Operational support	L.S	0	0	0	0	0	0	0	0	0	0
12	Animal Husbandry support	L.S	0	0	0	0	0	0	0	0	0	0
13	Agriculture support	L.S	0	0	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	0	0	0	0	0	0	0
15	Wild Life Management/Improvement	L.S	0	0	0	0	0	0	0	0	0	0
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	0	0	0	0	0	0	0	0	0
17	Research & Studies	L.S	0	0	0	0	0	0	0	0	0	0
18	Training,Awareness & Publicity	L.S	0	0	0	0	0	0	0	0	0	0
	Total(1 to 18)		0.00	0.00	0.00	46.00	0.00	6.00	0.00	18.00	0.00	70
19	Eco-Tourism 5%	L.S	0.00	0.00	0.00	2.48	0.00	[illegible]	0.00	5.19	0.00	9.75
20	Eco-Battalion 5%	L.S	0.00	0.00	0.00	2.30	0.00	0.30	0.00	0.90	0.00	3.50
21	Eco-services 10%	L.S	0.00	0.00	0.00	4.60	0.00	0.60	0.00	1.80	0.00	7.00
22	Monitoring and Evaluation 5%	L.S	0.00	0.00	0.00	2.30	0.00	0.30	0.00	0.90	0.00	3.50
23	Escalation 10%	L.S	0.00	0.00	0.00	4.60	0.00	0.60	0.00	1.80	0.00	7.00
	G. Total		0.00	0.00	0.00	60.28	0.00	7.88	0.00	23.88	0.00	92

1 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.No.	ITEMS	Unit	RAMPUR DIVISION		NANKHARI RANGE		BAHLI RANGE		RAMPUR RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY.	FIN.
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAMS(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	97.75	0.00	46.75	0.00	46.38	0.00	190.88
	Total		0.00	0.00	0.00	97.75	0.00	46.75	0.00	46.38	0.00	190.88
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	GAD STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	3.69	20.50	3.15	17.50	2.52	14.00	9.36	52.00
b)	Roadside erosion control	L.S	0.00	0.00	0.00	27.50	0.00	13.75	0.00	6.50	0.00	47.75
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	3.69	48.00	3.15	31.25	2.52	20.50	9.36	99.75
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	32.17	21.55	3.95	2.65	8.47	5.67	44.59	29.87
b)	Regeneration Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	59.41	22.10	28.66	10.66	14.68	5.46	102.74	38.22
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	48.64	22.18	13.98	6.23	11.18	5.00	74.86	33.44
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	17.50	11.55	13.75	9.08	3.75	2.48	35.00	23.10
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	8.75	0.61	11.25	0.79	2.50	0.18	22.50	1.58
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rini Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	2.22	3.75	0.00	0.00	3.18	8.75	7.40	12.50
			0.00	0.00	5.00	5.96	5.50	5.96	4.26	1.31	16.26	3.11
	Total		0.00	0.00	174.69	83.71	76.99	30.36	82.01	28.73	303.29	141.81
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery devlopment (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	1.00	15.00	0	0	1.00	15	2	30.00
8	Energy Conservation/Forest Protection	L.S	0	1.75	0	8.10	0	3.69	0	6.68	0	20.20
9	Fuel saving devices	L.S	0	0	0	23.25	0	7.38	0	12.13	0	42.75
10	Forest Infrastructure Development	L.S	0	0	0	23.06	0	3.75	0	12.66	0	39.47
11	Operational support	L.S	0	10.82	0	1.37	0	1.37	0	1.37	0	15.02
12	Animal Husbandry support	L.S	0	5.00	0	0	0	0	0	0	0	5.00
13	Agriculture support	L.S	0	2.50	0	0	0	0	0	0	0	2.50
14	Horticulture support	L.S	0	5.00	0	0	0	0	0	0	0	5.00
15	Wild Life Management/Improvement	L.S	0	6.25	0	0	0	0	0	0	0	6.25
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	2.25	0	0	0	0	0	0	0	2.25
17	Research & Studies	L.S	0	5.00	0	0	0	0	0	0	0	5.00
18	Training,Awareness & Publicity	L.S	0	5.00	0	0	0	0	0	0	0	5.00
	Total(1 to 18)		0.00	43.87	0.00	299.23	0.00	124.64	0.00	142.43	0.00	610.87
19	Eco-Tourism 1%	L.S	0.00	0.44	0.00	2.99	0.00	1.25	0.00	1.42	0.00	6.1
20	Eco-Battalion 5%	L.S	0.00	2.19	0.00	14.96	0.00	6.23	0.00	7.12	0.00	30.5
21	Eco-services 10%	L.S	0.00	4.37	0.00	29.92	0.00	12.46	0.00	14.24	0.00	61.1
22	Monitoring and Evaluation 5%	L.S	0.00	2.19	0.00	14.96	0.00	6.23	0.00	7.12	0.00	30.5
23	Escalation 10%	L.S	0.00	4.37	0.00	29.92	0.00	12.45	0.00	14.24	0.00	61.1
	G. Total	L.S	0.00	57.21	0.00	391.98	0.00	163.16	0.00	187.89	0.00	800.34

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2 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.No.	ITEMS	Unit	RAMPUR DIVISION Phy	RAMPUR DIVISION Fin.	NANKHARI RANGE Phy	NANKHARI RANGE Fin.	BAHLI RANGE Phy	BAHLI RANGE Fin.	RAMPUR RANGE Phy	RAMPUR RANGE Fin.	TOTAL PHY.	TOTAL FIN.
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(M3)	m3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	39.10	0.00	18.70	0.00	18.50	0.00	76.30
	Total		0.00	0.00	0.00	39.10	0.00	18.70	0.00	18.50	0.00	76.30
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	2.00	10.00	0.00	0.00	0.00	0.00	2.00	10.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
	Total		0.00	0.00	2.00	10.00	0.00	0.00	0.00	0.00	2.00	15.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	1.48	8.20	1.28	7.00	1.01	5.60	3.74	[illegible]
b)	Roadside erosion control	L.S	0.00	0.00	0.00	11.00	0.00	5.50	0.00	2.60	0.00	[illegible]
c)	Planting Grass Tuffs (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.48	19.20	1.28	12.60	1.01	8.20	3.74	[illegible]
5	BIOLOGICAL MEASURES											
a)	Afforestation (Including Maintenance)	Ha	0.00	0.00	12.87	8.62	1.59	1.09	3.39	2.27	17.85	11.98
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	23.79	8.84	11.46	4.25	5.87	2.19	41.10	15.28
d)	Replantation of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	19.85	6.88	5.58	2.50	4.47	2.00	29.92	13.38
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	7.00	4.62	5.50	3.63	1.50	0.99	14.00	9.24
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	3.60	0.25	4.80	0.32	1.00	0.27	9.50	0.85
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.65
k)	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Bio Plantation	Ha	0.00	0.00	3.88	1.82	0.00	0.00	2.07	3.50	5.95	[illegible]
m)	Development of medicinal plants	Ha	0.00	0.00	2.00	0.38	2.00	0.38	2.50	0.48	6.50	1.24
	Total		0.00	0.00	69.87	33.08	30.84	13.10	20.81	11.49	121.31	56.72
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Kai Fir Nty	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Establishment of Gasadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	3.75	0	3.24	0	1.47	0	2.67	0	8.06
9	Fuel saving devices	L.S	0	0	0	8.30	0	2.95	0	4.85	0	17.10
10	Forest Infrastructure Development	L.S	0	0	0	8.22	0	1.58	0	5.06	0	15.79
11	Operational support	L.S	0	3.64	0	2.40	0	0.46	0	0.46	0	5.01
12	Animal Husbandry support	L.S	0	2.00	0	0	0	0	0	0	0	2.00
13	Agriculture support	L.S	0	1.00	0	0	0	0	0	0	0	1.00
14	Horticulture support	L.S	0	2.00	0	0	0	0	0	0	0	2.00
15	Wild Life Management/Improvement	L.S	0	2.50	0	0	0	0	0	0	0	2.50
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	3.50	0	0	0	0	0	0	0	[illegible]
17	Research & Studies	L.S	0	3.00	0	0	0	0	0	0	0	3.00
18	Training,Awareness & Publicity	L.S	0	2.30	0	0	0	0	0	0	0	2.00
	Total(1 to 18)		0.00	16.74	0.00	133.60	0.00	49.73	0.00	61.29	0.00	241.36
19	Eco-Tourism 1%	L.S	0.00	0.17	0.00	1.34	0.00	0.50	0.00	0.61	0.00	2.41
20	Eco-Battalion 5%	L.S	0.00	0.84	0.00	6.18	0.00	2.49	0.00	3.06	0.00	12.07
21	Eco-services 10%	L.S	0.00	1.67	0.00	12.36	0.00	4.97	0.00	6.13	0.00	24.13
22	Monitoring and Evaluation 5%	L.S	0.00	0.84	0.00	6.18	0.00	2.49	0.00	3.06	0.00	12.07
23	Escalation 10%	L.S	0.00	1.67	0.00	12.36	0.00	4.97	0.00	6.13	0.00	24.13
	G. Total	L.S	0.00	21.93	0.00	161.82	0.00	65.14	0.00	87.16	0.00	316.17

3 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (In Lakhs)

S.No.	ITEMS	Unit	RAMPUR DIVISION								TOTAL	
			RAMPUR DIVISION		RAMNAGRI RANGE		BARI RANGE		RAMPUR RANGE			
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY.	FIN.
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAMS(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	79.1	0.00	18.7	0.00	16.55	0.00	79.10
	Total		0.00	0.00	0.00	79.1	0.00	18.7	0.00	16.55	0.00	79.10
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	2.00	10.00	0.00	0.00	2.00	10.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	2.00	10.00	0.00	0.00	2.00	10.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slope gullies/ rills & sheet erosion (Ha)	Ha	0.00	0.00	1.48	8.20	1.28	7.00	1.01	5.60	3.74	20.80
b)	Roadside erosion control	L.S	0.00	0.00	0.00	11.00	0.00	5.50	0.00	2.60	0.00	19.10
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.48	19.20	1.28	12.50	1.01	8.20	3.74	39.90
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	12.87	9.62	1.59	1.06	3.34	2.27	17.83	11.95
b)	Regeneration Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	23.79	8.84	11.46	4.29	5.87	2.16	41.16	15.29
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	19.85	8.98	5.54	2.52	4.47	2.00	29.82	13.50
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	7.00	4.52	3.50	3.43	1.50	0.99	14.00	9.24
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	3.50	0.25	4.50	0.32	1.20	0.07	9.00	0.63
j)	NTFP Plantations of Tail Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.99	1.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	2.00	0.39	2.00	0.39	2.07	0.40	6.07	1.18
	Total		0.00	0.00	69.87	33.68	36.64	12.16	20.81	11.49	121.91	69.72
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Khamru Deki Rai Fs Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment		0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0.70	0	3.24	0	1.47	0	2.67	0	5.38
9	Fuel saving devices	L.S	0	0	0	6.30	0	2.00	0	4.80	0	17.10
10	Forest Infrastructure Development	L.S	0	0	0	0.22	0	1.50	0	3.00	0	15.79
11	Operational support	L.S	0	3.04	0	0.46	0	0.46	0	0.46	0	5.21
12	Animal Husbandry support	L.S	0	2.30	0	0	0	0	0	0	0	2.00
13	Agriculture support	L.S	0	1.00	0	0	0	0	0	0	0	1.00
14	Horticulture support	L.S	0	2.00	0	0	0	0	0	0	0	2.00
15	Wild Life Management/Improvement	L.S	0	2.50	0	0	0	0	0	0	0	2.50
16	Joint Forest Management(Incl. Micro- Planning)	L.S	0	0.90	0	0	0	0	0	0	0	0.90
17	Research & Studies	L.S	0	2.00	0	0	0	0	0	0	0	2.00
18	Training,Awareness & Publicity		0	2.00	0	0	0	0	0	0	0	2.00
	Total(7 to 18)		0.00	16.74	0.00	114	0.00	89.72	0.00	61.34	0.00	261.36
19	Eco-Tourism 1%	L.S	0.00	0.17	0.00	1.14	0.00	0.90	0.00	0.51	0.00	2.61
20	Eco-Battalion 9%	L.S	0.00	0.84	0.00	5.69	0.00	2.99	0.00	2.56	0.00	12.07
21	Eco-services 10%	L.S	0.00	1.67	0.00	11.38	0.00	4.97	0.00	5.13	0.00	24.13
22	Monitoring and Evaluation 9%	L.S	0.00	0.84	0.00	5.69	0.00	2.99	0.00	2.56	0.00	12.07
23	Escalation 10%	L.S	0.00	1.67	0.00	11.38	0.00	4.97	0.00	5.13	0.00	24.13
	G Total		0.00	21.93	0.00	149.82	0.00	78.24	0.00	67.19	0.00	316.17

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4 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.No.	ITEMS	Unit	RAMPUR DIVISION Phy	RAMPUR DIVISION Fin.	NANKHARI RANGE Phy	NANKHARI RANGE Fin.	BAHLI RANGE Phy	BAHLI RANGE Fin.	RAMPUR RANGE Phy	RAMPUR RANGE Fin.	TOTAL Phy	TOTAL Fin.
1	**ENGINEERING MEASURES**											
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	19.55	0.00	9.35	0.00	9.28	0.00	38.18
	Total		0.00	0.00	0.00	19.55	0.00	9.35	0.00	9.28	0.00	38.18
2	**WATER HARVESTING SYSTEM**											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	2.00	10.00	2.00	10.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	2.00	10.00	2.00	10.00
3	**G&D STATIONS (No) (SOP)**	No.	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35
4	**BIO-ENGINEERING MEASURES**											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.74	4.10	0.63	3.50	0.50	2.80	1.87	10.40
b)	Roadside erosion control	L.S	0.00	0.00	0.00	5.50	0.00	2.75	0.00	1.30	0.00	9.55
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.74	9.60	0.63	6.25	0.50	4.10	1.87	19.95
5	**BIOLOGICAL MEASURES**											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	6.40	4.31	0.79	0.53	1.63	1.13	8.82	5.97
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	11.88	4.42	5.73	2.13	2.94	1.09	20.55	7.64
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	8.93	4.44	3.80	1.25	2.24	1.00	14.96	6.69
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	3.50	2.21	2.75	1.82	0.75	0.50	7.00	4.52
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	1.75	0.12	2.25	0.16	0.50	0.04	4.50	0.32
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.44	0.75	0.00	0.00	1.04	1.75	1.48	2.50
m)	Development of medicinal plants	Ha	0.00	0.00	1.00	0.19	1.00	0.19	1.25	0.24	3.25	0.62
	Total		0.00	0.00	34.94	16.44	16.32	6.08	10.40	8.79	60.84	28.28
6	**NURSERY DEVELOPMENT**											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery devlopment (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fr Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	**Establishment of Gosadans**	No.	0	0	0	0	0	0	0	0	0	0.00
8	**Energy Conservation/Forest Protection**	L.S	0	0.35	0	1.62	0	0.74	0	1.34	0	4.04
9	**Fuel saving devices**	L.S	0	0	0	4.65	0	1.49	0	2.41	0	8.55
10	**Forest Infrastructure Development**	L.S	0	0	0	4.61	0	0.77	0	2.51	0	7.89
11	**Operational support**	L.S	0	3.84	0	3.40	0	0.40	0	0.40	0	8.01
12	**Animal Husbandry support**	L.S	0	1.00	0	0	0	0	0	0	0	1.00
13	**Agriculture support**	L.S	0	0.50	0	0	0	0	0	0	0	0.50
14	**Horticulture support**	L.S	0	1.00	0	0	0	0	0	0	0	1.00
15	**Wild Life Management/Improvement**	L.S	0	1.25	0	0	0	0	0	0	0	1.25
16	**Joint Forest Management(incl. Micro- Planning)**	L.S	0	0.45	0	0	0	0	0	0	0	0.45
17	**Research & Studies**	L.S	0	1.00	0	0	0	0	0	0	0	1.00
18	**Training,Awareness & Publicity**	L.S	0	1.00	0	0	0	0	0	0	0	1.00
	Total(1 to 18)		0.00	10.19	0.00	57.01	0.00	25.09	0.00	35.87	0.00	128.18
19	**Eco-Tourism 1%**	L.S	0.00	0.10	0.00	0.57	0.00	0.25	0.00	0.36	0.00	1.28
20	**Eco-Battalion 5%**	L.S	0.00	0.51	0.00	2.85	0.00	1.25	0.00	1.79	0.00	6.41
21	**Eco-services 10%**	L.S	0.00	1.02	0.00	5.70	0.00	2.51	0.00	3.59	0.00	12.82
22	**Monitoring and Evaluation 5%**	L.S	0.00	0.51	0.00	2.85	0.00	1.25	0.00	1.79	0.00	6.41
23	**Escalation 10%**	L.S	0.00	1.02	0.00	5.70	0.00	2.51	0.00	3.59	0.00	12.82
	G. Total		0.00	13.36	0.00	74.71	0.00	32.87	0.00	46.99	0.00	167.91

5 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.No.	ITEMS	Unit	RAMPUR DIVISION		SANGHAR RANGE		BAHLI RANGE		RAMPUR RANGE		TOTAL	
			Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	PHY.	FIN.
1	ENGINEERING MEASURES											
a)	CRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	39.10	0.00	18.72	0.00	18.55	0.00	76.38
	Total		0.00	0.00	0.00	39.10	0.00	18.72	0.00	18.55	0.00	76.38
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPTD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	1.00	8.33	0.00	0.00	0.00	0.00	1.00	8.33
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ ribs & sheet erosion (ha)	Ha	0.00	0.00	1.48	8.20	1.25	7.00	1.01	5.60	3.74	20.80
b)	Roadside erosion control	L.S	0.00	0.00	0.00	11.00	0.00	5.10	0.00	2.80	0.00	18.10
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	Nos.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.48	19.20	1.25	12.10	1.01	8.40	3.74	38.90
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	12.67	6.42	1.58	1.08	3.39	2.27	17.63	11.89
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.30	0.09	0.09	0.04	0.39	0.13
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	23.76	6.84	11.46	4.29	5.87	2.16	41.10	13.29
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.30	0.09	0.09	0.00	0.39	0.09
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	19.85	4.58	5.59	2.50	4.47	2.00	29.92	13.38
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	7.00	4.82	5.50	3.63	1.50	0.99	14.00	9.24
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	3.52	0.23	4.50	0.32	1.08	0.07	9.00	0.63
j)	NTFP Plantations of Tali Plants	Ha	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.84	1.60	0.00	0.00	1.07	1.80	1.94	3.40
m)	Development of medicinal plants	Ha	0.00	0.00	2.00	0.38	2.50	0.36	2.50	0.48	6.52	1.24
	Total		0.00	0.00	69.67	33.08	30.64	12.16	20.81	11.49	121.31	64.73
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nrs	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0		0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	1.70	0	3.24	0	1.47	0	2.67	0	9.09
9	Fuel saving devices	L.S	0	0	0	9.30	0	2.99	0	4.85	0	17.13
10	Forest Infrastructure Development	L.S	0	0	0	9.22	0	1.50	0	3.06	0	13.79
11	Operational support	L.S	0	3.64	0	0.46	0	0.46	0	0.46	0	5.01
12	Animal Husbandry support	L.S	0	2.00	0	0	0	0	0	0	0	2.00
13	Agriculture support	L.S	0	1.00	0	0	0	0	0	0	0	1.00
14	Horticulture support	L.S	0	2.00	0	0	0	0	0	0	0	2.00
15	Wild Life Management/Improvement	L.S	0	2.00	0	0	0	0	0	0	0	2.00
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	0.80	0	0	0	0	0	0	0	0.80
17	Research & Studies	L.S	0	2.00	0	0	0	0	0	0	0	2.00
18	Training,Awareness & Publicity	L.S	0	2.00	0	0	0	0	0	0	0	2.00
	Total(7 to 18)		0.00	14.74	0.00	121.93	0.00	49.73	0.00	51.29	0.00	236.68
19	Eco-Tourism 1%	L.S	0.00	0.77	0.00	1.23	0.00	0.00	0.00	0.41	0.00	2.40
20	Eco-Battalion 4%	L.S	0.00	0.84	0.00	8.10	0.00	2.49	0.00	2.56	0.00	11.99
21	Eco-services 10%	L.S	0.00	1.47	0.00	13.19	0.00	4.97	0.00	8.13	0.00	23.97
22	Monitoring and Evaluation 5%	L.S	0.00	0.84	0.00	8.10	0.00	2.49	0.00	2.56	0.00	11.99
23	Escalation 10%	L.S	0.00	1.47	0.00	13.19	0.00	4.97	0.00	8.13	0.00	23.97
	G. Total	L.S	0.00	21.93	0.00	184.73	0.00	68.14	0.00	87.19	0.00	312.84

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6 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.No	ITEMS	Unit	RAMPUR DIVISION		NANKHARI RANGE		BAILI RANGE		RAMPUR RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY.	FIN.
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	28.1	0.00	18.7	0.00	18.33	0.00	76.35
	Total		0.00	0.00	0.00	28.1	0.00	18.7	0.00	18.33	0.00	76.35
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (BOP)	No.	0.00	0.00	0.00	0.00	1.00	8.33	0.00	0.00	1.00	8.33
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	1.48	8.20	1.26	7.00	1.01	5.60	3.74	20.80
b)	Roadside erosion control	L.S	0.00	0.00	0.00	11.00	0.00	5.50	0.00	2.60	0.00	19.10
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.48	19.20	1.26	12.50	1.01	8.20	3.74	39.90
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	12.87	8.02	1.58	1.96	3.39	2.27	17.83	11.95
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	22.75	8.84	11.48	4.29	5.87	2.18	41.10	15.29
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	18.85	6.58	5.59	2.50	4.47	2.30	28.92	11.38
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	7.00	4.52	5.50	3.81	1.50	0.99	14.00	9.24
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i	Pasture Improvement	Ha	0.00	0.00	3.50	0.25	4.50	0.32	1.00	0.07	9.00	0.63
j	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Ban Plantation	Ha	0.00	0.00	0.89	1.50	0.00	0.00	2.07	3.50	2.96	5.00
m)	Development of medicinal plants	Ha	0.00	0.00	2.00	0.36	2.00	0.39	2.50	0.49	6.50	1.24
	Total		0.00	0.00	65.87	33.08	30.64	13.18	20.81	11.49	121.31	58.72
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Ban Ft Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernisation of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0.700	0	3.24	0	1.47	0	2.87	0	8.08
9	Fuel saving devices	L.S	0	0	0	6.30	0	2.60	0	4.60	0	17.10
10	Forest Infrastructure Development	L.S	0	0	0	8.22	0	1.50	0	6.06	0	15.79
11	Operational support	L.S	0	3.54	0	0.40	0	0.40	0	0.48	0	5.01
12	Animal Husbandry support	L.S	0	2.00	0	0	0	0	0	0	0	2.00
13	Agriculture support	L.S	0	1.00	0	0	0	0	0	0	0	1.00
14	Horticulture support	L.S	0	2.00	0	0	0	0	0	0	0	2.00
15	Wild Life Management/Improvement	L.S	0	2.500	0	0	0	0	0	0	0	2.50
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	0.900	0	0	0	0	0	0	0	0.90
17	Research & Studies	L.S	0	2.00	0	0	0	0	0	0	0	2.00
18	Training,Awareness & Publicity	L.S	0	2.00	0	0	0	0	0	0	0	2.00
	Total(1 to 18)		0.00	16.74	0.00	113.60	0.00	58.06	0.00	51.25	0.00	239.66
19	Eco-Tourism 1%	L.S	0.00	0.17	0.00	1.14	0.00	0.58	0.00	0.51	0.00	2.40
20	Eco-Battalion 5%	L.S	0.00	0.84	0.00	5.68	0.00	2.90	0.00	2.56	0.00	11.98
21	Eco-services 10%	L.S	0.00	1.67	0.00	11.36	0.00	5.81	0.00	5.13	0.00	23.97
22	Monitoring and Evaluation 5%	L.S	0.00	0.84	0.00	5.68	0.00	2.90	0.00	2.56	0.00	11.98
23	Escalation 10%	L.S	0.00	1.67	0.00	11.36	0.00	5.81	0.00	5.13	0.00	23.97
	G. Total	L.S	0.00	21.92	0.00	148.82	0.00	76.06	0.00	67.18	0.00	313.98

7 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.N	ITEMS	Unit	RAMPUR DIVISION		NANKHARI RANGE		BAHLI RANGE		RAMPUR RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy	Fin.
1	**ENGINEERING MEASURES**											
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	39.1	0.00	18.7	0.00	18.55	0.00	76.35
	Total		0.00	0.00	0.00	39.1	0.00	18.7	0.00	18.55	0.00	76.35
2	**WATER HARVESTING SYSTEM**											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	**Q&D STATIONS (No) (SOP)**	No.	0.00	0.00	0.00	0.00	0.00	0.00	1.00	8.34	1.00	8.34
4	**BIO-ENGINEERING MEASURES**											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	1.48	8.20	1.26	7.00	1.01	5.60	3.74	20.80
b)	Roadside erosion control	L.S	0.00	0.00	0.00	11.00	0.00	5.50	0.00	2.60	0.00	19.10
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.48	19.20	1.26	12.50	1.01	8.20	3.74	39.90
5	**BIOLOGICAL MEASURES**											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	12.87	8.42	1.58	1.09	3.36	2.27	17.81	11.78
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	23.79	8.84	11.48	4.28	5.87	2.16	41.14	15.28
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	19.80	6.68	5.56	2.80	4.47	2.00	29.83	11.48
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	7.00	4.62	5.50	3.63	1.50	0.99	14.00	9.24
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	3.50	0.25	4.50	0.32	1.00	0.07	9.00	0.64
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.89	1.50	0.00	0.00	2.07	3.50	2.96	5.00
m)	Development of medicinal plants	Ha	0.00	0.00	2.00	0.38	2.00	0.38	2.50	0.48	6.50	1.24
	Total		0.00	0.00	69.87	33.58	30.64	12.16	20.81	11.49	121.31	56.72
6	**NURSERY DEVELOPMENT**											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	**Establishment of Gosadans**	No.	0	0	0	0	0	0	0	0	0	0
8	**Energy Conservation/Forest Protection**	L.S	0	0.70	0	3.24	0	1.47	0	2.67	0	8.08
9	**Fuel saving devices**	L.S	0	0	0	8.50	0	3.75	0	4.85	0	17.10
10	**Forest infrastructure Development**	L.S	0	0	0	9.22	0	1.50	0	5.06	0	15.78
11	**Operational support**	L.S	0	1.64	0	3.45	0	2.46	0	0.46	0	8.01
12	**Animal Husbandry support**	L.S	0	2.00	0	0	0	0	0	0	0	2.00
13	**Agriculture support**	L.S	0	1.00	0	0	0	0	0	0	0	1.00
14	**Horticulture support**	L.S	0	2.00	0	0	0	0	0	0	0	2.00
15	**Wild Life Management/Improvement**	L.S	0	2.50	0	0	0	0	0	0	0	2.50
16	**Joint Forest Management(incl. Micro- Planning)**	L.S	0	0.90	0	0	0	0	0	0	0	0.90
17	**Research & Studies**	L.S	0	2.00	0	0	0	0	0	0	0	2.00
18	**Training,Awareness & Publicity**	L.S	0	2.00	0	0	0	0	0	0	0	2.00
	Total(1 to 18)		0.00	14.74	0.00	113.65	0.00	49.73	0.00	59.62	0.00	238.69
19	**Eco-Tourism 1%**	L.S	0.00	0.17	0.00	1.14	0.00	0.50	0.00	0.60	0.00	2.40
20	**Eco-Battalion 5%**	L.S	0.00	0.84	0.00	5.68	0.00	2.49	0.00	2.98	0.00	11.99
21	**Eco-services 10%**	L.S	0.00	1.47	0.00	11.36	0.00	4.97	0.00	5.96	0.00	23.87
22	**Monitoring and Evaluation 5%**	L.S	0.00	0.84	0.00	5.68	0.00	2.49	0.00	2.98	0.00	11.99
23	**Escalation 10%**	L.S	0.00	1.47	0.00	11.36	0.00	4.97	0.00	5.96	0.00	23.87
	G. Total	L.S	0.00	21.50	0.00	148.83	0.00	65.14	0.00	78.10	0.00	313.99

8 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.N	ITEMS	Unit	RAMPUR DIVISION		RAMPUR DIVISION						TOTAL	
			RAMPUR DIVISION		SARKHANI RANGE		BAHLI RANGE		RAMPUR RANGE			
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY.	FIN.
	1 ENGINEERING MEASURES											
	a) GRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	b) RETENTION WALL(Mtr.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	c) DRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	d) Nala treatment	L.S	0.00	0.00	0.00	39.10	0.00	18.70	0.00	18.55	0.00	76.35
	Total		0.00	0.00		39.10	0.00	18.70	0.00	18.55	0.00	76.35
	2 WATER HARVESTING SYSTEM											
	a) Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	b) Construction of Van Sarovar	Nos.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	c) Roof top Harvesting in HPFD buildings(No)	Nos.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	Ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3 G&D STATIONS (No) (SOF)		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4 BIO-ENGINEERING MEASURES											
	a) Treatment of slope/ gullies/ rills & sheet erosion (Ha)	Ha	0.00	0.00	1.46	8.20	1.29	7.00	1.31	5.80	3.74	20.80
	b) Roadside erosion control	L.S	0.00	0.00	0.00	11.00	0.00	5.50	0.00	2.60	0.00	19.10
	c) Planting Grass Tufts (No)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	d) Fine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.46	19.20	1.29	12.50	1.31	8.39	3.74	39.90
	5 BIOLOGICAL MEASURES											
	a) Afforestation (including Maintenance)	Ha	0.00	0.00	12.87	8.62	1.58	1.06	3.38	2.27	17.83	11.95
	b) Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	c) Assisted Natural Regeneration Plantation	Ha	0.00	0.00	23.76	6.84	11.48	4.26	5.87	2.18	41.10	15.29
	d) Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	e) Replenishment Afforestation (New)	Ha	0.00	0.00	19.93	8.66	3.59	2.50	4.47	2.00	28.92	13.36
	f) Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	7.00	4.62	5.00	3.63	1.50	0.99	14.00	9.24
	g) Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	h) Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	i) Pasture improvement	Ha	0.00	0.00	3.50	0.25	4.50	0.32	1.00	0.07	9.00	0.63
	j) NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	k) Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	l) Km Plantation	Ha	0.00	0.00	0.49	1.50	0.00	0.00	2.07	3.50	2.56	5.00
	m) Development of medicinal plants	Ha	0.00	0.00	2.00	0.38	2.00	0.38	2.00	0.48	6.00	1.24
	Total		0.00	0.00	69.57	33.09	30.64	12.15	20.81	11.49	121.31	86.72
	6 NURSERY DEVELOPMENT											
	a) Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0.00	0.00
	b) Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0	0.00	0.00
	c) Establishment of Kharsu Oak/ Rai/ Fir/ Hly	L.S	0	0	0	0	0	0	0	0	0.00	0.00
	d) Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0	0.00	0.00
	Total		0	0	0	0	0	0	0	0	0.00	0.00
	7 Establishment of Beaudere	No.	0	0	0	0	0	0	0	0	0.00	0.00
	8 Energy Conservation/Forest Protection	L.S	0	2.70	0	3.24	0	1.47	0	2.07	0	9.08
	9 Fuel saving devices	L.S	0	0	0	6.30	0	2.90	0	4.50	0	17.10
	10 Forest Infrastructure Development	L.S	0	0	0	9.22	0	1.60	0	5.06	0	15.79
	11 Operational support	L.S	0	3.84	0	0.40	0	0.40	0	0.40	0	5.04
	12 Animal Husbandry support	L.S	0	2.00	0	0	0	0	0	0	0	2.00
	13 Agriculture support	L.S	0	1.00	0	0	0	0	0	0	0	1.00
	14 Horticulture support	L.S	0	2.00	0	0	0	0	0	0	0	2.00
	15 Wild Life Management/Improvement	L.S	0	2.50	0	0	0	0	0	0	0	2.50
	16 Joint Forest Management(incl. Micro- Planning)	L.S	0	0.80	0	0	0	0	0	0	0	0.80
	17 Research & Studies	L.S	0	2.00	0	0	0	0	0	0	0	2.00
	18 Training Awareness & Publicity		0	2.00	0	0	0	0	0	0	0	2.00
	Total(7 to 18)		0.00	16.74	0.00	113.85	0.00	49.73	0.00	51.28	0.00	231.34
	19 Eco-Tourism 1%	L.S	0.00	0.17	0.00	1.14	0.00	0.50	0.00	0.51	0.00	2.31
	20 Eco-Battalion 8%	L.S	0.00	0.84	0.00	5.69	0.00	2.49	0.00	2.56	0.00	11.57
	21 Eco-services 19%	L.S	0.00	1.67	0.00	11.38	0.00	4.97	0.00	5.13	0.00	23.13
	22 Monitering and Evaluation 8%	L.S	0.00	0.84	0.00	5.69	0.00	2.49	0.00	2.56	0.00	11.57
	23 Escalation 19%	L.S	0.00	1.67	0.00	11.38	0.00	4.97	0.00	5.13	0.00	23.13
	G. Total		0.00	21.93	0.00	149.12	0.00	65.14	0.00	67.19	0.00	303.37

5 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.N	ITEMS	Unit	RAMPUR DIVISION									
			RAMPUR DIVISION		NANKHARI RANGE		BAHLI RANGE		RAMPUR RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy.	Fin.
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	18.55	0.00	8.35	0.00	3.29	0.00	30.19
	Total		0.00	0.00	0.00	18.55	0.00	8.35	0.00	3.29	0.00	30.19
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	O&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.74	4.10	0.63	3.50	0.50	2.80	1.87	10.40
b)	Roadside erosion control	L.S	0.00	0.00	0.00	5.50	0.00	2.75	0.00	1.30	0.00	9.55
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.74	9.60	0.63	6.25	0.50	4.10	1.87	19.95
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	6.43	4.31	3.79	0.53	1.69	1.13	9.62	5.97
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	11.88	4.42	5.71	2.13	2.46	1.10	20.55	7.64
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	9.93	4.44	2.80	1.25	2.24	1.00	14.96	6.69
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	3.50	2.31	2.75	1.82	0.75	0.50	7.00	4.62
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	1.75	0.12	2.25	0.16	0.50	0.04	4.50	0.32
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rinn Plantation	Ha	0.00	0.00	0.44	0.75	0.00	0.00	1.04	1.75	1.48	2.50
m)	Development of medicinal plants	Ha	0.00	0.00	1.00	0.19	1.00	0.19	1.25	0.24	3.25	0.62
	Total		0.00	0.00	34.34	16.54	15.32	6.08	10.48	5.79	60.06	28.36
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery devlopment (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernisation of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0.30	0	1.62	0	0.74	0	1.34	0	4.04
9	Fuel saving devices	L.S	0	0	0	4.65	0	1.48	0	2.43	0	8.55
10	Forest Infrastructure Development	L.S	0	0	0	4.51	0	0.75	0	2.63	0	7.89
11	Operational support	L.S	0	0	0	0	0	0	0	0	0	0
12	Animal Husbandry support	L.S	0	1.00	0	0	0	0	0	0	0	1.00
13	Agriculture support	L.S	0	0.5	0	0	0	0	0	0	0	0.50
14	Horticulture support	L.S	0	1.00	0	0	0	0	0	0	0	1.00
15	Wild Life Management/Improvement	L.S	0	1.25	0	0	0	0	0	0	0	1.25
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	0.45	0	0	0	0	0	0	0	0.45
17	Research & Studies	L.S	0	1.00	0	0	0	0	0	0	0	1.00
18	Training,Awareness & Publicity	L.S	0	1.00	0	0	0	0	0	0	0	1.00
	Total(7 to 18)		0.00	6.55	0.00	56.87	0.00	24.64	0.00	25.41	0.00	113.17
19	Eco-Tourism 1%	L.S	0.00	0.07	0.00	0.57	0.00	0.25	0.00	0.25	0.00	1.13
20	Eco-Battalion 5%	L.S	0.00	0.33	0.00	2.83	0.00	1.23	0.00	1.27	0.00	5.66
21	Eco-services 10%	L.S	0.00	0.66	0.00	5.66	0.00	2.46	0.00	2.54	0.00	11.32
22	Monitoring and Evaluation 5%	L.S	0.00	0.33	0.00	2.83	0.00	1.23	0.00	1.27	0.00	5.66
23	Escalation 10%	L.S	0.00	0.66	0.00	5.66	0.00	2.46	0.00	2.54	0.00	11.32
	G. Total	L.S	0.00	8.69	0.00	74.11	0.00	32.27	0.00	33.29	0.00	148.28

10 YEAR COMPONENTWISE COST ABSTRACT OF RAMPUR DIVISION (in Lakhs)

S.No.	ITEMS	Unit	RAMPUR DIVISION									
			RAMPUR DIVISION		KASHIPUR RANGE		BAHJOI RANGE		RAMPUR RANGE		TOTAL	
			Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	cmt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	19.80	0.00	9.35	0.00	9.24	0.00	38.19
	Total		0.00	0.00	0.00	19.80	0.00	9.35	0.00	9.24	0.00	38.19
2	WATER HARVESTING SYSTEM											
a)	Staggered trench harvesting trenches	Ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Talmahr	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.74	4.10	0.93	5.50	0.00	2.80	1.67	12.40
b)	Roadside erosion control	L.S	0.00	0.00	0.00	5.50	0.00	2.75	0.00	1.30	0.00	9.55
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Fire Hazzle Lags (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.74	9.60	0.93	8.25	0.00	4.10	1.67	19.95
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	6.43	4.31	0.78	0.43	1.69	1.13	8.90	5.87
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	11.88	4.42	3.73	2.13	2.94	1.00	20.55	7.54
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replacement Afforestation (Nala)	Ha	0.00	0.00	9.93	4.44	2.80	1.25	2.24	1.00	14.96	6.69
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	3.50	2.31	2.78	1.82	0.78	0.59	7.06	4.82
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	1.76	0.12	2.21	0.16	0.50	0.04	4.46	0.32
j)	NTFP Plantations of Tali Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l	Ber Plantation	Ha	0.00	0.00	0.44	0.75	0.00	0.00	1.04	1.71	1.48	2.50
m	Development of medicinal plants	Ha	0.00	0.00	1.00	0.19	1.00	0.19	1.25	0.24	3.25	0.62
	Total		0.00	0.00	34.94	16.54	16.33	6.08	10.40	6.19	60.66	28.39
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir/ Ney	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0.35	0	1.82	0	0.74	0	1.34	0	4.04
9	Fuel saving devices	L.S	0	0	0	4.84	0	1.48	0	3.43	0	9.35
10	Forest Infrastructure Development	L.S	0	0	0	4.51	0	0.73	0	2.53	0	7.80
11	Operational support	L.S	0	0	0	0.00	0	0.00	0	0.00	0	0
12	Animal Husbandry support	L.S	0	1.00	0	0	0	0	0	0	0	1.00
13	Agriculture support	L.S	0	0.50	0	0	0	0	0	0	0	0.50
14	Horticulture support	L.S	0	1.00	0	0	0	0	0	0	0	1.00
15	Wild Life Management/Improvement	L.S	0	1.25	0	0	0	0	0	0	0	1.25
16	Joint Forest Management(Incl. Micro- Planning)	L.S	0	0.40	0	0	0	0	0	0	0	0.40
17	Research & Studies	L.S	0	1.00	0	0	0	0	0	0	0	1.00
18	Training,Awareness & Publicity		0	1.00	0	0	0	0	0	0	0	1.00
	Total(7 to 18)		0.00	6.50	0.00	35.57	0.00	24.84	0.00	25.41	0.00	113.17
19	Eco-Tourism 1%	L.S	0.00	0.07	0.00	0.57	0.00	0.25	0.00	0.25	0.00	1.13
20	Eco-Battalion 9%	L.S	0.00	0.63	0.00	2.80	0.00	1.23	0.00	1.27	0.00	5.93
21	Eco-services 10%	L.S	0.00	0.68	0.00	5.69	0.00	2.48	0.00	2.54	0.00	11.32
22	Monitoring and Evaluation 5%	L.S	0.00	0.33	0.00	2.83	0.00	1.23	0.00	1.27	0.00	5.66
23	Escalation 10%	L.S	0.00	0.68	0.00	5.69	0.00	2.48	0.00	2.54	0.00	11.32
	G. Total		0.00	8.89	0.00	74.11	0.00	33.27	0.00	33.29	0.00	148.29

COMPONENTWISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

Annexure-V

S.No.	ITEMS	Unit	KOTGARH DIVISION							
			KOTGARH DIVISION		KUMARSAIN RANGE		KOTGARH RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy.	Fin.
	1 ENGINEERING MEASURES									
	a) CRSM CHECK DAMS(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	b) RETENTION WALL(Mtr.)	mtrs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	c) BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	d) Nalla treatment	L.S	0.00	0.00	0.00	36.00	0.00	52.00	0.00	118.00
	Total		0.00	0.00	0.00	36.00	0.00	52.00	0.00	118.00
	2 WATER HARVESTING SYSTEM									
	a) Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	b) Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00
	c) Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00
	3 G&D STATIONS (No) (SGP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4 BIO-ENGINEERING MEASURES									
	a) Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	1.62	9.00	1.62	9.00
	b) Roadside erosion control	L.S	0.00	0.00	0.00	14.00	0.00	41.00	0.00	55.00
	c) Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	d) Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	14.00	0.00	50.00	1.62	64.00
	5 BIOLOGICAL MEASURES									
	a) Afforestation (including Maintenance)	Ha	0.00	0.00	33.67	22.69	29.34	19.66	63.21	42.35
	b) Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	c) Assisted Natural Regeneration Plantation	Ha	0.00	0.00	56.71	21.84	19.67	7.28	76.38	29.12
	d) Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	e) Replenishment Afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	f) Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	g) Enrichment plantation	Ha	0.00	0.00	85.00	21.25	85.00	23.75	190.00	45.00
	h) Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	i) Pasture improvement	Ha	0.00	0.00	25.00	1.75	20.00	1.40	45.00	3.15
	j) NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	k) Development of NTFP Plantation	Ha	0.00	0.00	30	6.04	30.00	6.54	60.00	13.08
	l) Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	m) Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	232.38	74.57	183.01	58.61	425.49	132.70
	6 NURSERY DEVELOPMENT									
	a) Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
	b) Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0
	c) Establishment of Khansu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0
	d) Modernization of Nurseries/Establishment	L.S	0	0	0	17.50	0	3.50	0	21.00
	Total		0	0	0	17.50	0	3.50	0	21.00
	7 Establishment of Grasslands	No.	0	0	0	0	0	0	0	0
	8 Energy Conservation/Forest Protection	L.S	0	0	0	9.30	0	9.30	0	18.60
	9 Fuel saving devices	L.S	0	0	0	12.5	0	12.50	0	25.00
	10 Forest Infrastructure Development	L.S	0	0	0	19.78	0	39.81	0	59.67
	11 Operational support	L.S	0	18.89	0	8.11	0	8.11	0	27.00
	12 Animal Husbandry support	L.S	0	10.00	0	0	0	0	0	10.00
	13 Agriculture support	L.S	0	0	0	0	0	0	0	0
	14 Horticulture support	L.S	0	20.00	0	0	0	0	0	20.00
	15 Wild Life Management/Improvement	L.S	0	40.00	0	0	0	0	0	40.00
	16 Joint Forest Management(incl. Micro- Planning)	L.S	0	5.00	0	0	0	0	0	5.00
	17 Research & Studies	L.S	0	10.00	0	0	0	0	0	10.00
	18 Training, Awareness & Publicity	L.S	0	0.00	0	0	0	0	0	0.00
	Total(7 to 18)		0.00	108.89	0.00	209.89	0.00	220.85	0.00	551.29
	19 Eco-Tourism 1%	L.S	0.00	1.67	0.00	3.84	0.00	2.30	0.00	6.81
	20 Eco-Battalion 3%	L.S	0.00	5.03	0.00	10.42	0.00	11.79	0.00	27.88
	21 Eco-services 10%	L.S	0.00	16.67	0.00	34.87	0.00	23.59	0.00	68.13
	22 Monitoring and Evaluation 5%	L.S	0.00	5.03	0.00	10.42	0.00	11.79	0.00	27.88
	23 Escalation 10%	L.S	0.00	16.67	0.00	34.87	0.00	23.59	0.00	68.13
	G. Total	L.S	0.00	139.76	0.00	273.36	0.00	309.02	0.00	722.17

5 Year COMPONENTWISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.No.	ITEMS	Unit	KOTGARH DIVISION							
			KOTGARH DIVISION		KUMARSAIN RANGE		KOTGARH RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy.	Fin.
1	ENGINEERING MEASURES									
a)	CRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mt.)	mtrs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES									
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside erosion control	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES									
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Regeneration Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i	Pasture Improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
j	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l	Ban Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Deo/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	17.50	0	3.50	0	21.00
	Total		0	0	0	17.50	0	3.50	0	21.00
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0	0	0	0	0	0	0
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	0	0	0	0	0
11	Operational support	L.S	0	0	0	0	0	0	0	0
12	Animal Husbandry support	L.S	0	0	0	0	0	0	0	0
13	Agriculture support	L.S	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	0	0	0	0	0
15	Wild Life Management/Improvement	L.S	0	0	0	0	0	0	0	0
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	0	0	0	0	0	0	0
17	Research & Studies	L.S	0	0	0	0	0	0	0	0
18	Training,Awareness & Publicity	L.S	0	0	0	0	0	0	0	0
	Total(1 to 18)		0.00	0.00	0.00	17.50	0.00	3.50	0.00	21.00
19	Eco-Tourism 1%	L.S	0.00	0.00	0.00	0.18	0.00	0.04	0.00	0.21
20	Eco-Battalion 5%	L.S	0.00	0.00	0.00	0.88	0.00	0.18	0.00	1.05
21	Eco-services 10%	L.S	0.00	0.00	0.00	1.75	0.00	0.54	0.00	2.10
22	Monitoring and Evaluation 5%	L.S	0.00	0.00	0.00	0.88	0.00	0.18	0.00	1.05
23	Escalation 10%	L.S	0.00	0.00	0.00	1.75	0.00	0.54	0.00	2.10
24	G. Total	L.S	0.00	0.00	0.00	22.93	0.00	4.89	0.00	27.81

1 YEAR WISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.No.	ITEMS	Unit	KOTGARH DIVISION							
			KOTGARH DIVISION		KUMARSAIN RANGE		KOTGARH RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY.	FIN.
1	ENGINEERING MEASURES									
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(MI)	mtrs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	16.80	0.00	13.00	0.00	29.80
	Total		0.00	0.00	0.00	16.80	0.00	13.00	0.00	29.80
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	1.00	3.00	1.00	3.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	1.00	3.00	1.00	3.00
3	C&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES									
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.41	2.25	0.41	2.25
b)	Roadside erosion control	L.S	0.00	0.00	0.00	3.50	0.00	10.25	0.00	13.75
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	3.50	0.41	12.5	0.41	16.00
5	BIOLOGICAL MEASURES									
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	8.47	5.47	7.34	4.52	15.80	10.59
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	14.68	5.46	4.89	1.82	19.57	7.28
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	21.25	8.31	23.75	2.94	45.00	11.25
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	6.25	3.44	5.0	5.35	11.25	8.79
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP Plantation	Ha	0.00	0.00	7.80	1.94	7.30	1.84	15.00	3.37
l)	[illegible] Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	58.19	19.21	48.49	14.66	106.63	33.18
6	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Ra/ Fir Nry	L.S	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0
7	Establishment of Gowsadans	No.	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0	0	2.33	0.00	2.33	0	4.65
9	Fuel saving devices	L.S	0	0	0	3.13	0.00	3.13	0	6.25
10	Forest Infrastructure Development	L.S	0	0	0	2.34	0	9.95	0	12.49
11	Operational support	L.S	0	3.01	0	1.55	0	1.55	0	6.10
12	Animal Husbandry support	L.S	0	2.50	0	0	0	0	0	2.50
13	Agriculture support	L.S	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	5.00	0	0	0	0	0	5.00
15	Wild Life Management/Improvement	L.S	0	10.00	0	0	0	0	0	10.00
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	1.25	0	0	0	0	0	1.25
17	Research & Studies	L.S	0	2.50	0	0	0	0	0	2.50
18	Training,Awareness & Publicity	L.S	0	1.25	0	0	0	0	0	1.25
	Total(1 to 18)	L.S	0.00	27.81	0.00	48.08	0.00	62.11	0.00	137.87
19	Eco-Tourism 1%	L.S	0.00	0.28	0.00	0.48	0.00	0.62	0.00	1.38
20	Eco-Restoration 5%	L.S	0.00	1.39	0.00	2.40	0.00	3.11	0.00	6.89
21	Eco-services 10%	L.S	0.00	2.78	0.00	4.81	0.00	6.21	0.00	13.77
22	Monitoring and Evaluation 5%	L.S	0.00	1.39	0.00	2.40	0.00	3.11	0.00	6.89
23	Escalation 10%	L.S	0.00	2.78	0.00	4.81	0.00	6.21	0.00	13.77
	G. Total	L.S	0.00	36.43	0.00	62.58	0.00	81.36	0.00	180.38

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3 YEAR WISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.No.	ITEMS	Unit	KOTGARH DIVISION: KOTGARH DIVISION Phy	KOTGARH DIVISION: KOTGARH DIVISION Fin.	KOTGARH DIVISION: KUMARSAIN RANGE Phy	KOTGARH DIVISION: KUMARSAIN RANGE Fin.	KOTGARH DIVISION: KOTGARH RANGE Phy	KOTGARH DIVISION: KOTGARH RANGE Fin.	KOTGARH DIVISION: TOTAL Phy.	KOTGARH DIVISION: TOTAL Fin.
1	ENGINEERING MEASURES									
a)	DRSM CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL (M)	mtrs	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	[illegible]
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	[illegible]
d)	Nala treatment	L.S	0.00	[illegible]	[illegible]	[illegible]	0.00	[illegible]	0.00	11.80
	Total		0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	11.80
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	O&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES									
a)	Treatment of [illegible] gullies rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]
b)	Roadside erosion control	L.S	0.00	0.00	0.00	1.40	[illegible]	[illegible]	[illegible]	[illegible]
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]
	Total		0.00	0.00	0.00	1.40	[illegible]	[illegible]	[illegible]	[illegible]
5	BIOLOGICAL MEASURES									
a)	Afforestation (including Maintenance)	Ha	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.24
b)	Regeneration Plantation of Oak & Deodar Forest	Ha	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	Assisted Natural Regeneration Plantation	Ha	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
e)	Replenishment Afforestation (New)	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
g)	Enrichment plantation	Ha	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
h)	Lantana eradication & Planting with Bamboo	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
i)	Pasture Improvement	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
j)	NTFP Plantations of Tall Plants	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
k)	Development of NTFP Plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
l)	Rim Plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
m)	Development of medicinal plants	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		0.00	0.00	[illegible]	7.41	[illegible]	[illegible]	[illegible]	[illegible]
6	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Kai Fir Nry	L.S	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
9	Fuel saving devices	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
10	Forest Infrastructure Development	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
11	Operational support	L.S	0	1.67	0	[illegible]	0	[illegible]	0	[illegible]
12	Animal Husbandry support	L.S	0	[illegible]	0	0	0	0	0	1.00
13	Agriculture support	L.S	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	[illegible]	0	0	0	0	0	[illegible]
15	Wild Life Management/Improvement	L.S	0	4.00	0	0	0	0	0	4.00
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	[illegible]	0	0	0	0	0	[illegible]
17	Research & Studies	L.S	0	[illegible]	0	0	0	0	0	[illegible]
18	Training,Awareness & Publicity	L.S	0	[illegible]	0	0	0	0	0	[illegible]
	Total(1 to 18)		0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
19	Eco-Tourism 7%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
20	Eco-Sanitation 8%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
21	Eco-services 10%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
22	Monitoring and Evaluation 8%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
23	Escalation 10%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
	G. Total	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]

3 YEAR WISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.No.	ITEMS	Unit	KOTGARH DIVISION		KUMARSAIN RANGE		KOTGARH RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY.	FIN.
1	ENGINEERING MEASURES									
a)	DRSM CHECK DAMs)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(MK)	mtrs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	9.60	0.00	5.20	0.00	11.80
	Total		0.00	0.00	0.00	9.60	0.00	5.20	0.00	11.80
2	WATER HARVESTING SYSTEM									
a	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	Nos.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (SOP)									
4	BIO-ENGINEERING MEASURES									
a)	Treatment of slips/ gullies/ nls & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.10	0.90	0.10	0.90
b)	Roadside erosion control	L.S	0.00	0.00	0.00	1.40	0.00	4.10	0.00	5.50
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.20
	Total		0.00	0.00	0.00	1.40	0.10	5.00	0.10	6.40
5	BIOLOGICAL MEASURES									
a	Afforestation (including Maintenance)	Ha	0.00	0.00	3.39	2.27	2.93	1.97	6.32	4.24
b	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	3.00	0.00	0.00	0.00	3.00	0.00
c	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	3.67	2.18	1.96	0.73	7.63	2.91
d	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e	Replenishment Afforestation (New)	Ha	3.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00
f	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g	Enrichment plantation	Ha	0.00	0.00	6.50	2.13	9.50	2.38	16.00	4.50
h	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	2.00	0.00	0.00	0.00	2.00	0.00
	Pasture Improvement	Ha	0.00	0.00	2.00	-0.18	2.00	0.14	4.00	0.32
	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k	Development of NTFP Plantation	Ha	0.00	0.00	3.00	0.85	3.00	0.85	6.00	1.71
l	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		3.00	0.00	23.56	7.41	19.39	6.06	42.95	13.47
6	NURSERY DEVELOPMENT									
a	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
b	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0
c	Establishment of Kharsu Oak/ Rai Fir Ney	L.S	0	0	0	0	0	0	0	0
d	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0
7	Establishment of Goasdans	No.	0	0	0	0.93	0	0.93	0	1.86
8	Energy Conservation/Forest Protection	L.S	0	0	0	1.25	0	1.25	0	2.50
9	Fuel saving devices	L.S	0	0	0	1.02	0	1.98	0	3.00
10	Forest Infrastructure Development	L.S	0	0	0	0.52	0	0.52	0	1.04
11	Operational support	L.S	0	1.67	0	0	0	0	0	1.67
12	Animal Husbandry support	L.S	0	1.00	0	0	0	0	0	1.00
13	Agriculture support	L.S	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	2.00	0	0	0	0	0	2.00
15	Wild Life Management/Improvement	L.S	0	4.00	0	0	0	0	0	4.00
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	0.50	0	0	0	0	0	0.50
17	Research & Studies	L.S	0	1.00	0	0	0	0	0	1.00
18	Training Awareness & Publicity		0	0.50	0	0	0	0	0	0.50
	Total to HU		0.00	10.67	0.00	10.12	0.00	22.74	0.00	52.53
19	Eco-Tourism 1%	L.S	0.00	0.11	0.00	0.19	0.00	0.23	0.00	0.53
20	Eco-Battalion 5%	L.S	0.00	0.53	0.00	0.95	0.00	1.14	0.00	2.63
21	Eco-services 10%	L.S	0.00	1.07	0.00	1.91	0.00	2.27	0.00	5.25
22	Monitoring and Evaluation 5%	L.S	0.00	0.53	0.00	0.95	0.00	1.14	0.00	2.63
23	Escalation 10%	L.S	0.00	1.07	0.00	1.91	0.00	2.27	0.00	5.25
	G. Total		0.00	13.98	0.00	25.03	0.00	29.79	0.00	68.81

P&S

4 YEAR WISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.No.	ITEMS	Unit	KOTGARH DIVISION: KOTGARH DIVISION Phy	KOTGARH DIVISION: KOTGARH DIVISION Fin.	KOTGARH DIVISION: KUMARSAIN RANGE Phy	KOTGARH DIVISION: KUMARSAIN RANGE Fin.	KOTGARH DIVISION: KOTGARH RANGE Phy	KOTGARH DIVISION: KOTGARH RANGE Fin.	TOTAL Phy	TOTAL Fin.
1	ENGINEERING MEASURES									
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(M3)	cum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
	Total		0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	0.00
	Total		0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	0.00
3	G&D STATIONS (No) (SQP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES									
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	[illegible]	0.00	[illegible]	[illegible]	[illegible]
b)	Roadside erosion control	L.S	0.00	0.00	0.00	0.70	0.00	[illegible]	0.00	[illegible]
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	0.00
	Total		0.00	0.00	0.00	[illegible]	0.00	[illegible]	[illegible]	[illegible]
5	BIOLOGICAL MEASURES									
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	1.69	[illegible]	1.47	[illegible]	[illegible]	[illegible]
b)	Regeneratory Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.20	[illegible]	0.00	[illegible]	[illegible]	[illegible]
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	2.34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	4.35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
i)	Pasture Improvement	Ha	0.00	0.00	1.25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP Plantation	Ha	0.00	0.00	1.50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	0.00
	Total		0.00	0.00	11.43	[illegible]	[illegible]	[illegible]	[illegible]	8.64
6	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak Rai Fir Nry	L.S	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
9	Fuel saving devices	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
10	Forest Infrastructure Development	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
11	Operational support	L.S	0	[illegible]	0	[illegible]	0	[illegible]	0	[illegible]
12	Animal Husbandry support	L.S	0	[illegible]	0	0	0	0	0	[illegible]
13	Agriculture support	L.S	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	[illegible]	0	0	0	0	0	[illegible]
15	Wild Life Management/Improvement	L.S	0	[illegible]	0	0	0	0	0	[illegible]
16	Joint Forest Management(incl. Micro. Planning)	L.S	0	[illegible]	0	0	0	0	0	[illegible]
17	Research & Studies	L.S	0	[illegible]	0	0	0	0	0	[illegible]
18	Training,Awareness & Publicity	L.S	0	[illegible]	0	0	0	0	0	[illegible]
	Total(1 to 18)		0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	27.81
19	Eco-Tourism 1%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
20	Eco-Battalion 5%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	1.38
21	Eco-services 10%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	2.76
22	Monitoring and Evaluation 5%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	1.38
23	Escalation 10%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	2.76
	G. Total	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	36.17

5 YEAR WISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.No.	ITEMS	Unit	KOTGARH DIVISION		KUMARSAIN RANGE		KOTGARH RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY	Fin.
1	ENGINEERING MEASURES									
a)	GABION CHECK DAM(No)	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	RETENTION WALL(No.)	mtrs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	BRUSH WOOD CHECK DAM (No)	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Nala insertion	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	Construction of Van Sarovar	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	Roof top harvesting in HPFD buildings(No)	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	SAD STATIONS (No) (SOP)		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	BIO-ENGINEERING MEASURES	No.								
a)	Treatment of minor gullies/ rills & sheet erosion (ha)		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	Roadside erosion control	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	Planting Grass Tufts (ha)	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Pine Needle Logs (No)	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	BIOLOGICAL MEASURES									
A)	Afforestation (including Maintenance)									
1)	Regeneration Plantation of Oak & Deodar Forest	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2)	Assisted Natural Regeneration Plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3)	Replenishment of Old Plantations (Planting/Sowing)	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4)	Replenishment Afforestation (New)	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6)	Enrichment plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7)	Lantana eradication & Planting with bamboo	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
i	Pasture Improvement	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
j	NTFP Plantations of Tall Plants	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
k	Development of NTFP Plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
l	Bio Plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
m	Development of medicinal plants	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	Nursery development and infrastructure development	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	Establishment of Kharsu Oak/ Rai Fir Nu	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Modernization of Nurseries/Establishment	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	Establishment of [illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	Energy Conservation/Forest Protection	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	Fuel saving devices	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	Forest Infrastructure Development	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	Operational support	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	Animal Husbandry support	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	Agriculture support	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	Horticulture support	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	Wild Life Management/Improvement	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	Joint Forest Management(incl. Micro- Planning)	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	Research & Studies	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	Training,Awareness & Publicity	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total(1 to 18)	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	Eco-Tourism 3%		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	Eco-Restoration 5%	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	Eco-services 10%	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	Monitoring and Evaluation 2%	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	Escalation 10%	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	G. Total	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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6 YEAR WISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.No.	ITEMS	Unit	KOTGARH DIVISION Phy	KOTGARH DIVISION Fin.	KUMARSAIN RANGE Phy	KUMARSAIN RANGE Fin.	KOTGARH RANGE Phy	KOTGARH RANGE Fin.	TOTAL PHY.	TOTAL FIN.
1	ENGINEERING MEASURES									
a)	DRAM CHECK DAM(No)	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	RETENTION WALL(Mtr)	mtrs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	BRUSH WOOD CHECK DAM (No)	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Nalla treatment	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	Construction of Van Sarovar	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	Roof top Harvesting in HPFD buildings(No)	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	GAD STATIONS (No) (SOP)	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	BIO-ENGINEERING MEASURES									
a)	Treatment of slips/ gullies/ rills & sheet erosion (Ha)	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	Roadside erosion control	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	Planting Grass Tufts (Ha)	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Pine Needle Logs (No)	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	BIOLOGICAL MEASURES									
a)	Afforestation (including Maintenance)	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	Assisted Natural Regeneration Plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
e)	Replenishment Afforestation (New)	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
g)	Enrichment plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
h)	Lantana eradication & Planting with saplings	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
i)	Pasture improvement	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
j)	NTFP Plantations of Tall Plants	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
k)	Development of NTFP Plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
l)	Rim Plantation	Ha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
m)	Development of medicinal plants		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	Nursery development (incl. infrastructure development)	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Modernization of Nurseries/Establishment	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	Establishment of Gosadans	No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	Energy Conservation/Forest Protection	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	Fuel saving devices	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	Forest Infrastructure Development	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	Operational support	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	Animal Husbandary support	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	Agriculture support	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	Horticulture support	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	Wild Life Management/Improvement	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	Joint Forest Management(incl. Micro- Planning)	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	Research & Studies	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	Training,Awareness & Publicity		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total(1 to 18)	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	Eco-Tourism 1%	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	Eco-Battalion 5%	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	Eco-services 10%	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	Monitoring and Evaluation 5%	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	Escalation 10%	L.S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	G. Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

7 YEAR WISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.No.	ITEMS	Unit	KOTGARH DIVISION							
			KOTGARH DIVISION		KUMARSAIN RANGE		KOTGARH RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	PHY.	FIN.
1	ENGINEERING MEASURES									
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	mtrs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	6.60	0.00	5.20	0.00	11.80
	Total		0.00	0.00	0.00	6.60	0.00	5.20	0.00	11.80
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES									
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.16	0.90	0.16	0.90
b)	Roadside erosion control	L.S	0.00	0.00	0.00	1.40	0.00	4.10	0.00	5.50
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	1.40	0.16	5.00	0.16	6.40
5	BIOLOGICAL MEASURES									
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	3.39	2.27	2.97	1.97	6.32	4.24
b)	Regeneration Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	5.47	2.19	1.96	0.73	7.80	2.91
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.30
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	8.50	2.11	6.50	2.38	15.00	4.50
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	2.50	0.18	2.00	0.14	4.50	0.32
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP Plantation	Ha	0.00	0.00	3.00	0.65	3.00	0.66	6.00	1.31
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	23.25	7.41	18.39	5.86	42.64	13.27
6	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0
d)	Modernisation of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0
7	Establishment of Gaushala	No.	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0	0	0.93	0	0.93	0	1.86
9	Fuel saving devices	L.S	0	0	0	1.25	0	1.25	0	2.50
10	Forest Infrastructure Development	L.S	0	0	0	1.02	0	3.98	0	5.00
11	Operational support	L.S	0	1.67	0	0.52	0	0.52	0	2.71
12	Animal Husbandry support	L.S	0	1.00	0	0	0	0	0	1.00
13	Agriculture support	L.S	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	2.00	0	0	0	0	0	2.00
15	Wild Life Management/Improvement	L.S	0	4.00	0	0	0	0	0	4.00
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	0.50	0	0	0	0	0	0.50
17	Research & Studies	L.S	0	1.00	0	0	0	0	0	1.00
18	Training,Awareness & Publicity	L.S	0	0.50	0	0	0	0	0	0.50
	Total(1 to 18)		0.00	10.67	0.00	19.12	0.00	22.74	0.00	52.53
19	Eco-Tourism 1%	L.S	0.00	0.11	0.00	0.19	0.00	0.23	0.00	0.53
20	Eco-Battalion 5%	L.S	0.00	0.53	0.00	0.96	0.00	1.14	0.00	2.63
21	Eco-services 10%	L.S	0.00	1.07	0.00	1.91	0.00	2.27	0.00	5.25
22	Monitoring and Evaluation 5%	L.S	0.00	0.53	0.00	0.96	0.00	1.14	0.00	2.63
23	Escalation 10%	L.S	0.00	1.07	0.00	1.91	0.00	2.27	0.00	5.25
	G. Total	L.S	0.00	13.86	0.00	25.05	0.00	29.73	0.00	68.81

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S.N	ITEMS	Unit	KOTGARH DIVISION: KOTGARH DIVISION Phy	KOTGARH DIVISION: KOTGARH DIVISION Fin.	KOTGARH DIVISION: KUMARSAIN RANGE Phy	KOTGARH DIVISION: KUMARSAIN RANGE Fin.	KOTGARH DIVISION: KOTGARH RANGE Phy	KOTGARH DIVISION: KOTGARH RANGE Fin.	TOTAL Phy.	TOTAL Fin.
1	ENGINEERING MEASURES									
a)	CRCM CHECK DAMS(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mt.)	mtrs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
d)	Nalla treatment	L.S	[illegible]	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11.85
	Total		0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	11.85
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	No.	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	[illegible]
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	[illegible]
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	[illegible]
	Total		0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	[illegible]
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	[illegible]
4	BIO-ENGINEERING MEASURES									
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.16	[illegible]	0.16	[illegible]
b)	Roadside erosion control	L.S	0.00	0.00	0.00	1.40	0.00	4.10	0.00	5.50
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	1.40	0.16	[illegible]	0.16	[illegible]
5	BIOLOGICAL MEASURES									
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	[illegible]	2.27	[illegible]	1.97	[illegible]	4.24
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	5.87	2.18	1.96	[illegible]	7.83	2.91
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.50
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	2.50	[illegible]	2.00	0.14	4.50	[illegible]
i)	Pasture Improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
k)	Development of NTFP Plantation	Ha	0.00	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00
l)	Rin Plantation	Ha	0.00	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	23.25	7.41	13.39	[illegible]	[illegible]	13.27
6	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
b)	Nursery development (incl. infrastructure development)	L.S	0	0	0	0	0	0	0	0
c)	Establishment of Kheray Dev/ Kai Fir Nrs	L.S	0	0	0	0	0	0	0	0
d)	Modernisation of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	0	[illegible]	0	[illegible]	0	[illegible]
8	Energy Conservation/Forest Protection	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
9	Fuel saving devices	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
10	Forest infrastructure Development	L.S	0	1.67	0	[illegible]	0	[illegible]	0	2.70
11	Operational support	L.S	0	1.00	0	0	0	0	0	1.00
12	Animal Husbandry support	L.S	0	0	0	0	0	0	0	0
13	Agriculture support	L.S	0	2.00	0	0	0	0	0	2.00
14	Horticulture support	L.S	0	4.00	0	0	0	0	0	4.00
15	Wild Life Management/Improvement	L.S	0	0.50	0	0	0	0	0	0.50
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	1.00	0	0	0	0	0	1.00
17	Research & Studies	L.S	0	0.50	0	0	0	0	0	0.50
18	Training, Awareness & Publicity	L.S	0.00	10.67	0.00	19.12	0.00	22.74	0.00	[illegible]
	Total(1 to 18)		0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
19	Eco-Tourism 1%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	1.14	0.00	[illegible]
20	Eco-Battalion 2%	L.S	0.00	[illegible]	0.00	1.81	0.00	2.27	0.00	[illegible]
21	Eco-services 10%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	1.14	0.00	[illegible]
22	Monitoring and Evaluation 2%	L.S	0.00	[illegible]	0.00	1.81	0.00	2.27	0.00	[illegible]
23	Escalation 10%	L.S	0.00	13.93	0.00	[illegible]	0.00	25.79	0.00	38.81
	Gt. Total									

9 YEAR WISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.No.	ITEMS	Unit	KOTGARH DIVISION: KOTGARH DIVISION Phy	KOTGARH DIVISION Fin.	KUMARSAIN RANGE Phy	KUMARSAIN RANGE Fin.	KOTGARH RANGE Phy	KOTGARH RANGE Fin.	TOTAL PHY.	TOTAL FIN.
1	ENGINEERING MEASURES									
a)	DRSM CHECK DAMS(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(M)	mtrs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
	Total		0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	Ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van Sarovar	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	GAD STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES									
a)	Treatment of vipar gullies/ rills & sheet erosion (Ha)	Ha	0.00	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]
b)	Roadside erosion control	L.S	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
c)	Planting Grass Tufts (Ha)	Ha	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
	Total		0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
5	BIOLOGICAL MEASURES									
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b)	Regeneration Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	[illegible]
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	2.94	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
g)	Enrichment plantation	Ha	0.00	0.00	4.25	[illegible]	4.75	[illegible]	[illegible]	[illegible]
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
i)	Pasture improvement	Ha	0.00	0.00	[illegible]	[illegible]	1.00	[illegible]	[illegible]	[illegible]
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
k)	Development of NTFP Plantation	Ha	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
l)	Ban Plantation	Ha	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
m)	Development of medicinal plants	Ha	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total		0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0
d)	Modernisation of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0
7	Establishment of Gosadans	No.	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0	0	0.47	0	0.47	0	[illegible]
9	Fuel saving devices	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
10	Forest infrastructure Development	L.S	0	0	0	[illegible]	0	[illegible]	0	[illegible]
11	Operational support	L.S	0	[illegible]	0	[illegible]	0	[illegible]	0	[illegible]
12	Animal Husbandry support	L.S	0	[illegible]	0	0	0	0	0	[illegible]
13	Agriculture support	L.S	0	0	0	0	0	0	0	[illegible]
14	Horticulture support	L.S	0	1.00	0	0	0	0	0	[illegible]
15	Wild Life Management/Improvement	L.S	0	2.00	0	0	0	0	0	[illegible]
16	Joint Forest Management(incl. Micro- Planning)	L.S	0	[illegible]	0	0	0	0	0	[illegible]
17	Research & Studies	L.S	0	[illegible]	0	0	0	0	0	[illegible]
18	Training,Awareness & Publicity	L.S	0	[illegible]	0	0	0	0	0	[illegible]
	Total(1 to 18)		0.00	[illegible]	0.00	[illegible]	0.00	11.11	0.00	[illegible]
19	Eco-Tourism 1%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
20	Eco-Battalion 5%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
21	Eco-services 10%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	1.11	0.00	[illegible]
22	Monitoring and Evaluation 5%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]	0.00	[illegible]
23	Escalation 10%	L.S	0.00	[illegible]	0.00	[illegible]	0.00	1.11	0.00	[illegible]
	G. Total	L.S	0.00	[illegible]	0.00	12.19	0.00	[illegible]	0.00	[illegible]

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10 YEAR WISE COST ABSTRACT OF KOTGARH DIVISION (in Lakhs)

S.N	ITEMS	Unit	KOTGARH DIVISION							
			KOTGARH DIVISION		KUMARSAIN RANGE		KOTGARH RANGE		TOTAL	
			Phy	Fin.	Phy	Fin.	Phy	Fin.	Phy.	Fin.
1	ENGINEERING MEASURES									
a)	CHAL (CHECK DAM/Nos)	No.	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00
b)	RETENTION WALL(Mt)	cubic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (Ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	0.00	1.00	2.90	1.00	2.90
	Total		0.00	0.00	0.00	0.00	1.26	2.90	1.00	2.90
2	WATER HARVESTING SYSTEM									
a)	Staggered Water harvesting trenches	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of Van talaiyan	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPF/ buildings/No	Ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&S STATIONS (No)(SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A	BIO-ENGINEERING MEASURES									
a)	Treatment of slope gullies/ nala & sheet erosion (Ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside erosion control	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (Ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (Mts)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIOLOGICAL MEASURES									
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	1.00	1.12	1.47	2.00	2.47	3.12
b)	Regeneration Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted Natural Regeneration Plantation	Ha	0.00	0.00	2.44	1.09	0.98	0.39	3.41	1.48
d)	Replenishment of Old Plantations (Planting/Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment Afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	4.75	1.08	4.75	1.08	9.50	2.15
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	1.20	0.58	1.20	0.58	2.40	1.16
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP Plantation	Ha	0.00	0.00	1.000	0.00	1.000	0.00	2.00	0.00
l)	Bio Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	11.63	3.70	9.70	3.93	21.33	6.64
5	NURSERY DEVELOPMENT									
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0
b)	Nursery development and infrastructure development	L.S	0	0	0	0	0	0	0	0
c)	Establishment of Khasru Oak Rai Fir Nry	L.S	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries/Establishment	L.S	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0
7	Establishment of Outposts	No.	0	0	0	0	0	0	0	0
8	Energy Conservation/Forest Protection	L.S	0	0	0	0.47	0	0.47	0	0.93
9	Fuel saving devices	L.S	0	0	0	0.63	0	0.63	0	1.25
10	Forest infrastructure Development	L.S	0	0	0	0.11	0	1.69	0	1.80
11	Operational support	L.S	0	0	0	0	0	0	0	0
12	Animal husbandry support	L.S	0	0.00	0	0	0	0	0	0.00
13	Agriculture support	L.S	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	1.00	0	0	0	0	0	1.00
15	Wild Life Management/improvement	L.S	0	2.00	0	0	0	0	0	2.00
16	Joint Forest Management(Incl. Micro-Planning)	L.S	0	0.20	0	0	0	0	0	0.20
17	Research & Studies	L.S	0	0.50	0	0	0	0	0	0.50
18	Training,Awareness & Publicity	L.S	0	0.20	0	0	0	0	0	0.20
	Total(7 to 18)		0.00	4.40	0.00	0.20	0.00	11.11	0.00	34.51
19	Eco-Tourism 1%	L.S	0.00	0.04	0.00	0.05	0.00	0.11	0.00	0.34
20	Eco-Battalion 6%	L.S	0.00	0.23	0.00	0.47	0.00	0.66	0.00	1.39
21	Eco-services 12%	L.S	0.00	0.46	0.00	0.93	0.00	1.11	0.00	3.44
22	Monitoring and Evaluation 8%	L.S	0.00	0.23	0.00	0.47	0.00	0.66	0.00	1.39
23	Escalation 15%	L.S	0.00	0.46	0.00	0.93	0.00	1.11	0.00	2.49
	G. Total	L.S	0.00	5.82	0.00	13.16	0.00	14.84	0.00	52.54

COMPONENT WISE COST ABSTRACT OF ANNI DIVISION (in Lakhs)

Annexure-VI

S. No.	Name of Component	Unit	Division		Area		Nither		Chowal		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	CRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	90.10	20.00	185.29	40.00	340.38	60.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	36.00	12.00	54.00	18.00	84.00	28.00	174.00	58.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	666.67	10.00	666.67	10.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	165.00	0.00	160.00	0.00	225.00	0.00	550.00
	Total		0.00	0.00	36.00	177.00	114.10	198.00	935.96	323.00	1081.05	698.00
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	21.66	6.66	13.16	5.00	21.05	8.00	55.26	21.00
b)	Construction of van sanvar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	0.00	15.00	0.00	15.00	0.00	15.00	0.00	45.00
	Total		0.00	0.00	21.66	21.66	13.16	20.00	21.05	23.00	55.26	66.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	1.00	3.40	0.00	0.00	0.00	0.00	1.00	3.40
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ nls & sheet erosion (ha)	Ha.	0.00	0.00	13.60	75.00	12.80	70.00	10.90	60.00	36.90	205.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	57.14	4.00	57.14	4.00	57.14	4.00	171.43	12.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	400.00	2.00	400.00	2.00	400.00	2.00	1200.00	6.00
	Total		0.00	0.00	470.84	81.00	469.74	76.00	467.94	66.00	1408.33	223.00
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	81.27	54.45	106.06	71.09	171.57	114.95	358.94	240.49
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	36.12	24.30	0.00	0.00	119.64	80.16	155.76	104.36
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	315.86	117.50	154.57	57.50	84.09	35.00	954.52	210.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast. Growing Fuel wood & Fodder Species	Ha	0.00	0.00	170.00	112.20	100.00	66.00	125.00	82.50	395.00	260.70
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	18.00	5.40	20.00	6.00	12.00	3.60	50.00	15.00
i)	Pasture Improvement	Ha	0.00	0.00	150.00	10.50	60.00	4.20	90.00	6.30	300.00	21.00
j)	NTFP Plantations of Tail Plants	Ha	0.00	0.00	70.00	23.10	80.00	26.40	50.00	16.50	200.00	66.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	165.09	280.00	0.00	0.00	165.09	280.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	841.25	347.35	686.70	511.19	662.30	326.01	2189.31	1187.54
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	10.00	0	10.00	0	10.00	0	30.00
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	25.00	0	15.00	0	25.00	0	65.00
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	3.00	0	0	0	8.00	0	11.00
d)	Modernization of Nurseries	L.S	0	0	0	10.00	0	10.00	0	10	0	30.00
	Total		0	0	0	48.00	0	35.00	0	53.00	0	136.00
7	Goestans	No.	0	0	0	0	0	0	1.00	33.00	1.00	33.00
8	Energy Conservation/ Forest Protection	L.S	0	0	0	25.00	0	25.00	0	25.00	0	75.00
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	10.00	0	80.00	0	55.00	0	150.00
11	Operational support	L.S	0	65.00	0	0	0	0	0	0	0	65.00
12	Animal Husbandry support	L.S	0	0	0	10.00	0	10.00	0	15.00	0	35.00
13	Agriculture support	L.S	0	0	0	8.00	0	8.00	0	10.00	0	26.00
14	Horticulture support	L.S	0	0	0	10.00	0	10.00	0	10.00	0	30.00
15	Wild Life Improvement	L.S	0	0	0	8.00	0	8.00	0	8.00	0	24.00
16	Joint Forest Management incl. micro planning	L.S	0	0	0	10.00	0	10.00	0	10.00	0	30.00
17	Research & Studies	L.S	0	0	0	8.00	0	8.00	0	8.00	0	24.00
18	Training, Awareness & Publicity	L.S	0	25.00	0	0	0	0	0	0	0	25.00
	Total (1-18)		0.00	90.00	0.00	773.75	0.00	999.19	0.00	970.01	0.00	2833.94
19	Eco-Tourism 1%	L.S	0.00	3.90	0.00	7.74	0.00	9.99	0.00	9.70	0.00	28.33
20	Eco-Battalion 5%	L.S	0.00	4.80	0.00	38.69	0.00	49.96	0.00	48.50	0.00	141.65
21	Eco-services 10%	L.S	0.00	9.00	0.00	77.38	0.00	99.93	0.00	97.00	0.00	283.29
22	Escalation 10%	L.S	0.00	9.00	0.00	77.38	0.00	99.93	0.00	97.00	0.00	283.29
23	Monitoring and Evaluation 5%	L.S	0.00	4.80	0.00	38.69	0.00	49.96	0.00	48.50	0.00	141.65
	G. Total		0.00	117.50	0.00	1013.61	0.00	1308.93	0.00	1270.72	0.00	3711.18

0 YEAR COST ABSTRACT OF ANNI DIVISION

S. No.	Name of Component	Unit	Division		Aresu		Nithar		Chowai		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (Ha)	Ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ hills & sheet erosion (ha)	Ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tali Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	10.00	0	12.00	0	10.00	0	30.00
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	25.00	0	15.00	0	25.00	0	65.00
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	3.00	0	0	0	8.00	0	11.00
d)	Modernization of Nurseries	L.S	0	0	0	10.00	0	10.00	0	10.00	0	30.00
	Total		0	0	0	48.00	0	37.00	0	53.00	0	136.00
7	Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	0	0	0	0	0	0	0
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	0	0	0	0	0	0	0
11	Operational support	L.S	0	0	0	0	0	0	0	0	0	0
12	Animal Husbandry support	L.S	0	0	0	0	0	0	0	0	0	0
13	Agriculture support	L.S	0	0	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	0	0	0	0	0	0	0
15	Wild Life Improvement	L.S	0	0	0	0	0	0	0	0	0	0
16	Joint Forest Management incl. micro planning	L.S	0	0	0	0	0	0	0	0	0	0
17	Research & Studies	L.S	0	0	0	0	0	0	0	0	0	0
18	Training, Awareness & Publicity	L.S	0	0	0	0	0	0	0	0	0	0
	Total (1-18)		0.00	0.00	0.00	48.00	0.00	37.00	0.00	53.00	0.00	136.00
19	Eco-Tourism 1%	L.S	0.00	0.00	0.00	0.48	0.00	0.37	0.00	0.53	0.00	1.36
20	Eco-Battalion 3%	L.S	0.00	0.00	0.00	2.40	0.00	1.75	0.00	2.65	0.00	6.80
21	Eco-services 10%	L.S	0.00	0.00	0.00	4.80	0.00	3.80	0.00	4.30	0.00	13.60
22	Escalation 10%	L.S	0.00	0.00	0.00	4.80	0.00	3.80	0.00	4.30	0.00	13.60
23	Monitoring and Evaluation 5%	L.S	0.00	0.00	0.00	2.40	0.00	1.75	0.00	2.65	0.00	6.80
	G. Total	L.S	0.00	0.00	0.00	62.88	0.00	48.86	0.00	69.43	0.00	178.14

1 YEAR COST ABSTRACT OF ANNI DIVISION

S.No.	Name of Component	Unit	Division		Anni		Nither		Chowai		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	15.00	5.00	45.07	15.00	60.10	20.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	9.00	3.00	13.50	4.50	21.06	7.00	43.50	14.50
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	166.67	2.50	166.67	2.50
d)	Nala treatment	L.S	0.00	0.00	0.00	41.25	0.00	40.00	0.00	56.25	0.00	137.50
	Total		0.00	0.00	9.00	44.25	28.50	49.50	232.74	80.75	270.27	174.50
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	5.26	2.00	3.29	1.25	5.26	2.00	13.82	5.25
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	1.00	15.00	0.00	0.00	0.00	0.00	1.00	15.00
	Total		0.00	0.00	5.26	17.00	3.29	1.25	5.26	2.00	14.82	20.25
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha.	0.00	0.00	3.38	18.75	3.15	17.50	2.70	15.00	9.23	51.25
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	14.29	1.00	14.29	1.00	14.29	1.00	42.86	3.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	100.00	0.50	100.00	0.50	100.00	0.50	300.00	1.50
	Total		0.00	0.00	117.68	30.25	117.44	19.00	116.99	16.50	352.08	55.75
5	BIOLOGICAL MEASURES											
a	Afforestation (including Maintenance)	Ha	0.00	0.00	30.32	13.61	26.52	17.77	42.89	28.74	99.73	60.12
b	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	9.03	6.05	0.00	0.00	29.91	20.04	38.94	26.09
c	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	78.97	29.38	38.64	14.38	23.62	8.75	141.13	52.50
e	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	42.50	28.06	25.00	16.50	31.25	20.63	98.75	65.19
g	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	4.50	1.35	5.00	1.50	3.00	0.90	12.50	3.75
i	Pasture Improvement	Ha	0.00	0.00	37.94	2.63	15.09	1.05	22.50	1.58	75.00	5.25
j	NTFP Plantations of Tall Plants	Ha	3.60	0.00	17.50	5.78	20.00	6.60	12.50	4.12	50.00	16.50
k	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l	Rim Plantation	Ha	0.00	0.00	0.00	0.00	41.27	70.00	0.00	0.00	41.27	70.00
m	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	210.31	86.84	171.44	127.80	165.68	84.75	547.33	299.39
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharpu Oak/ Rai Fir Nty	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Gosadans	No.	0	0	0	0	0	0	1.00	25.00	1.00	25.00
8	Energy Conservation/ Forest Protection	L.S	0	0	0	6.25	0	6.25	0	6.25	0	18.75
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	3.75	0	20.00	0	13.75	0	37.5
11	Operational support	L.S	0	19.5	0	0	0	0	0	0	0	19.5
12	Animal Husbandry support	L.S	0	0	0	2.50	0	2.50	0	3.75	0	8.75
13	Agriculture support	L.S	0	0	0	2.00	0	2.00	0	2.50	0	6.50
14	Horticulture support	L.S	0	0	0	2.50	0	2.50	0	2.50	0	7.50
15	Wild Life improvement	L.S	0	0	0	2.00	0	2.00	0	2.00	0	6.00
16	Joint Forest Management incl. micro planning	L.S	0	0	0	2.50	0	2.50	0	2.50	0	7.50
17	Research & Studies	L.S	0	0	0	2.00	0	2.00	0	2.00	0	6.00
18	Training, Awareness & Publicity	L.S	0	0.25	0	0	0	0	0	0	0	0.25
	Total (1-18)		0.00	26.75	0.00	191.84	0.00	237.30	0.00	244.25	1165.49	699.14
19	Eco-Tourism 1%	L.S	0.00	0.25	0.00	1.92	0.00	2.37	0.00	3.44	0.00	6.99
20	Eco-Battalion 5%	L.S	0.00	1.29	0.00	9.59	0.00	11.86	0.00	12.21	0.00	34.96
21	Eco-services 10%	L.S	0.00	2.58	0.00	19.18	0.00	23.73	0.00	24.43	0.00	69.91
22	Escalation 10%	L.S	0.00	2.58	0.00	19.18	0.00	23.73	0.00	24.43	0.00	69.91
23	Monitoring and Evaluation 5%	L.S	0.00	1.29	0.00	9.59	0.00	11.86	0.00	12.21	0.00	34.96
	G. Total	L.S	0.00	33.73	0.00	251.31	0.00	310.86	0.00	319.97	0.00	915.87

2 YEAR COST ABSTRACT OF ANNI DIVISION

S No.	Name of Component	Unit	Division		Area		Nither		Chowai		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	6.01	2.00	18.03	6.00	24.04	8.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	3.80	1.20	5.40	1.80	8.40	2.80	17.40	5.80
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	66.67	1.00	66.67	1.00
d)	Nala treatment	L.S	0.00	0.00	0.00	16.50	0.00	16.00	0.00	22.50	0.00	55.00
	Total		0.00	0.00	3.80	17.70	11.41	19.80	93.10	32.30	108.11	69.80
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	2.11	0.80	1.33	0.50	2.11	0.80	5.53	2.10
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	0.00	0.00	1.00	15.00	0.00	0.00	1.00	15.00
	Total		0.00	0.00	2.11	0.80	2.33	15.50	2.11	0.80	6.53	17.10
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha.	0.00	0.00	1.35	7.50	1.26	7.50	1.08	6.00	3.69	20.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	5.71	0.40	5.71	0.40	5.71	0.40	17.14	1.20
d)	Pine Needle Logs (No)	No.	0.00	0.00	40.00	0.20	40.00	0.20	40.00	0.30	120.00	0.80
	Total		0.00	0.00	47.06	8.10	46.97	7.60	46.79	6.60	140.83	22.30
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	6.13	5.45	10.61	7.11	17.16	11.35	33.89	24.05
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	3.81	2.42	0.00	0.00	11.96	8.02	15.58	10.44
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	31.99	11.75	15.46	5.75	9.41	3.50	56.45	21.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	17.00	11.33	10.00	6.80	12.35	8.25	39.35	26.37
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.02	1.80	0.54	2.00	0.60	1.20	0.36	5.00	1.50
i)	Pasture Improvement	Ha	0.00	0.00	15.00	1.05	6.00	0.42	9.00	0.63	30.00	2.10
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	7.00	2.31	6.00	2.64	5.00	1.65	20.00	6.60
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	16.51	28.00	0.00	0.00	16.51	28.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	84.13	34.74	68.58	51.12	66.23	33.90	218.93	119.75
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fr Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Gosadara	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	2.50	0	2.50	0	2.50	0	7.50
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	1.50	0	8.00	0	5.50	0	15.00
11	Operational support	L.S	0	6.50	0	0	0	0	0	0	0	6.50
12	Animal Husbandry support	L.S	0	0	0	1.00	0	1.00	0	1.50	0	3.50
13	Agriculture support	L.S	0	0	0	0.80	0	0.40	0	1.00	0	2.60
14	Horticulture support	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
15	Wild Life Improvement	L.S	0	0	0	0.80	0	0.40	0	0.80	0	2.40
16	Joint Forest Management incl. micro planning	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
17	Research & Studies	L.S	0	0	0	0.80	0	0.80	0	0.80	0	2.40
18	Training & Publicity	L.S	0	2.50	0	0	0	0	0	0	0	2.50
	Total (1-18)		0.00	9.00	0.00	70.74	0.00	109.82	0.00	87.70	0.00	277.26
19	Eco-Tourism 1%	L.S	0.00	0.09	0.00	0.71	0.00	1.10	0.00	0.88	0.00	2.77
20	Eco-Battalion 5%	L.S	0.00	0.45	0.00	3.54	0.00	5.50	0.00	4.39	0.00	13.87
21	Eco-services 10%	L.S	0.00	0.90	0.00	7.07	0.00	10.99	0.00	8.77	0.00	27.74
22	Escalation 10%	L.S	0.00	0.90	0.00	7.07	0.00	10.99	0.00	8.77	0.00	27.74
23	Monitoring and Evaluation 5%	L.S	0.00	0.45	0.00	3.54	0.00	5.50	0.00	4.39	0.00	13.87
	G. Total	L.S	0.00	11.79	0.00	92.66	0.00	143.99	0.00	114.89	0.00	363.33

3 YEAR COST ABSTRACT OF ANNI DIVISION

S. No.	Name of Component	Unit	Division		Area		Hither		Chowal		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	6.01	2.00	18.03	6.00	24.04	8.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	3.60	1.20	5.40	1.80	9.40	2.80	17.40	5.80
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	66.67	1.00	66.67	1.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	16.50	0.00	10.00	0.00	22.50	0.00	50.00
	Total		0.00	0.00	3.60	17.70	11.41	13.80	93.10	32.30	108.11	69.80
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	2.11	0.82	1.32	0.50	2.11	0.80	5.53	2.12
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	1.00	15.00	1.00	15.00
	Total		0.00	0.00	2.11	0.82	1.32	0.50	3.11	15.80	6.53	17.10
3	G&D STATIONS (Not (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slore/ gullies/ rills & sheet erosion (ha)	Ha.	0.00	0.00	1.39	7.50	1.26	7.00	1.08	6.00	3.69	20.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	3.00	0.00	3.71	0.40	3.71	0.40	3.71	0.40	17.14	1.20
d)	Pine Needle Logs (No)	No.	0.00	0.00	40.00	0.20	40.00	0.20	40.00	0.20	120.00	0.60
	Total		0.00	0.00	47.06	8.10	46.97	7.60	46.79	6.60	140.83	22.30
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	8.13	5.45	10.91	7.11	17.19	11.50	35.89	24.05
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	3.61	2.42	0.00	0.00	11.99	8.02	15.58	10.44
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	31.59	11.75	15.46	5.75	9.41	3.50	56.45	21.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	17.00	11.22	10.00	6.60	12.50	8.25	39.50	26.07
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.80	0.94	2.00	0.40	1.20	0.36	5.00	1.53
i)	Pasture improvement	Ha	0.00	0.00	15.00	1.35	8.00	0.47	9.00	0.83	32.00	2.12
j)	NTFP Plantations of Tat Plants	Ha	0.00	0.00	7.00	2.31	8.00	2.64	5.00	1.65	20.00	6.60
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	18.51	28.00	0.00	0.00	18.51	28.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	84.13	34.74	68.88	51.12	66.33	33.99	218.93	119.75
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (Incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	2.50	0	2.50	0	2.50	0	7.50
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	1.50	0	5.00	0	5.50	0	12.00
11	Operational support	L.S	0	6.50	0	0	0	0	0	0	0	6.50
12	Animal Husbandry support	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
13	Agriculture support	L.S	0	0	0	0.80	0	0.80	0	1.00	0	2.60
14	Horticulture support	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
15	Wild Life Improvement	L.S	0	0	0	0.80	0	0.80	0	0.80	0	2.40
16	JGM Forest Management Incl. micro planning	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
17	Research & Studies	L.S	0	0	0	0.80	0	0.80	0	0.80	0	2.40
18	Training, Awareness & Publicity	L.S	0	2.50	0	0	0	0	0	0	0	2.50
	Total (1-18)		0.00	9.00	0.00	70.74	0.00	94.92	0.00	103.70	0.00	277.36
19	Eco-Tourism 1%	L.S	0.00	0.09	0.00	0.71	0.00	0.95	0.00	1.03	0.00	2.77
20	Eco-Battalion 5%	L.S	0.00	0.45	0.00	3.54	0.00	4.75	0.00	5.14	0.00	13.87
21	Eco-services 10%	L.S	0.00	0.90	0.00	7.07	0.00	9.49	0.00	10.27	0.00	27.74
22	Escalation 10%	L.S	0.00	0.90	0.00	7.07	0.00	9.49	0.00	10.27	0.00	27.74
23	Monitoring and Evaluation 5%	L.S	0.00	0.45	0.00	3.54	0.00	4.75	0.00	5.14	0.00	13.87
	G. Total	L.S	0.00	11.79	0.00	92.66	0.00	124.34	0.00	134.54	0.00	363.33

4 YEAR COST ABSTRACT OF ANNI DIVISION

S. No.	Name of Component	Unit	Division		Area		Nither		Chowai		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	GRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	3.01	1.00	9.01	3.00	12.02	4.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	1.80	0.60	2.70	0.90	4.20	1.40	8.70	2.90
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	33.33	0.50	33.33	0.50
d)	Nala treatment	L.S	0.00	0.00	0.00	8.25	0.00	6.00	0.00	11.25	0.00	27.50
	Total		0.00	0.00	1.80	8.85	5.71	7.90	46.55	16.15	54.05	34.90
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	1.05	0.40	0.66	0.25	1.05	0.40	2.76	1.05
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HFFD buildings(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.05	0.40	0.66	0.25	1.05	0.40	2.76	1.05
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha.	0.00	0.00	0.56	3.75	0.63	3.50	0.34	3.00	1.93	10.25
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	2.86	0.20	2.86	0.20	2.86	0.20	8.57	0.60
d)	Pine Needle Logs (Nm)	No.	0.00	0.00	20.00	0.10	20.00	0.10	20.00	0.10	80.00	0.30
	Total		0.00	0.00	23.53	4.05	23.49	3.80	23.40	3.30	70.43	11.15
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	4.06	2.72	5.30	3.56	8.56	5.75	17.85	12.02
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	1.81	1.31	0.00	0.00	3.98	4.01	7.79	5.32
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	15.79	5.98	7.72	2.88	4.70	1.75	28.23	10.60
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	8.50	5.81	5.00	3.30	6.25	4.13	19.75	13.04
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.90	0.27	1.00	0.30	0.60	0.18	2.50	0.75
i)	Pasture Improvement	Ha	0.00	0.00	7.50	0.53	3.00	0.21	4.50	0.32	15.00	1.06
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	3.50	1.16	4.00	1.32	2.50	0.83	10.00	3.30
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	8.25	14.00	0.00	0.00	8.25	14.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	47.06	17.37	34.29	25.56	33.12	16.96	109.47	59.88
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Kai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	1.25	0	1.25	0	1.25	0	3.75
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	0.75	0	4.00	0	2.75	0	7.50
11	Operational support	L.S	0	6.50	0	0	0	0	0	0	0	6.50
12	Animal Husbandry support	L.S	0	0	0	0.5	0	0.50	0	0.75	0	1.75
13	Agriculture support	L.S	0	0	0	0.40	0	0.40	0	0.50	0	1.30
14	Horticulture support	L.S	0	0	0	0.50	0	0.50	0	0.50	0	1.50
15	Wild Life improvement	L.S	0	0	0	0.40	0	0.40	0	0.40	0	1.20
16	Joint Forest Management incl. micro planning	L.S	0	0	0	0.50	0	0.50	0	0.50	0	1.50
17	Research & Studies	L.S	0	0	0	0.40	0	0.40	0	0.40	0	1.20
18	Training, Awareness & Publicity	L.S	0	1.25	0	0	0	0	0	0	0	1.25
	Total (1-18)		0.00	7.75	0.00	35.37	0.00	47.45	0.00	43.88	0.00	134.43
19	Eco-Tourism 1%	L.S	0.00	0.08	0.00	0.35	0.00	0.47	0.00	0.44	0.00	1.34
20	Eco-Battalion 5%	L.S	0.00	0.39	0.00	1.77	0.00	2.37	0.00	2.19	0.00	6.72
21	Eco-services 10%	L.S	0.00	0.78	0.00	3.54	0.00	4.75	0.00	4.39	0.00	13.44
22	Escalation 10%	L.S	0.00	0.78	0.00	3.54	0.00	4.75	0.00	4.39	0.00	13.44
23	Monitoring and Evaluation 5%	L.S	0.00	0.39	0.00	1.77	0.00	2.37	0.00	2.19	0.00	6.72
	G. Total	L.S	0.00	10.15	0.00	46.33	0.00	62.17	0.00	57.44	0.00	176.10

5 YEAR COST ABSTRACT OF ANNI DIVISION

S No.	Name of Component	Unit	Division		Aras		Nilther		Chowal		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	CRSM CHECK DAM(Ns)	No	0.00	0.00	0.00	0.00	6.00	2.09	18.53	6.30	34.04	8.39
b)	RETENTION WALL (Mtr.)	Mtr.	0.00	0.00	3.60	1.20	2.40	1.80	8.40	2.80	17.40	5.80
c)	BRUSH WOOD CHECK DAM (Ns)	No	0.00	0.00	0.00	0.00	0.00	0.00	66.67	1.00	66.67	1.00
d)	Nalla treatment	L.S	0.50	0.00	0.00	16.50	0.00	15.00	0.00	22.50	0.00	55.00
		Total	0.00	0.00	3.60	17.70	11.41	19.89	93.60	32.30	108.11	69.89
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	2.11	0.80	1.32	0.50	2.11	0.80	5.53	2.10
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	0.00	0.00	2.11	0.80	1.32	0.50	2.11	0.80	5.53	2.10
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ nits & sheet erosion (ha)	Ha.	0.00	0.00	1.33	7.50	1.26	7.00	1.06	6.00	3.65	20.50
b)	Roadside Erosion Control (LS)	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	5.71	0.40	5.71	0.40	5.71	0.40	17.14	1.20
d)	Pine Needle Logs (Ns)	No.	0.00	0.00	40.00	0.20	40.00	0.20	40.00	0.20	120.00	0.60
		Total	0.00	0.00	47.04	8.10	46.97	7.60	46.79	6.60	140.83	22.30
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	8.13	5.45	10.61	7.11	17.16	11.50	35.89	24.05
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	3.61	2.42	0.00	0.00	11.96	8.02	15.58	10.44
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	31.56	11.75	15.46	5.75	9.41	3.50	56.43	21.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	17.00	11.33	10.00	6.66	12.50	8.25	39.50	26.33
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.80	0.84	2.00	0.80	1.20	0.38	5.00	1.50
i)	Pasture improvement	Ha	0.00	0.00	15.00	1.88	6.00	0.42	9.00	0.63	30.00	2.13
j)	NTFP Plantations of Tal Parts	Ha	0.00	0.00	7.00	2.31	8.00	2.64	5.00	1.65	20.00	6.60
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	16.51	26.00	0.00	0.00	16.51	26.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	0.00	0.00	84.13	34.74	68.58	51.12	66.23	33.90	218.93	119.75
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	0	0	0	0	0	0
7	Gosadana	No.	0	0	0	2.50	0	2.50	0	2.50	0	7.50
8	Energy Conservation/ Forest Protection	L.S	0	0	0	0	0	0	0	0	0	0
9	Fuel saving devices	L.S	0	0	0	1.50	0	8.00	0	5.50	0	15.00
10	Forest Infrastructure Development	L.S	0	0	0	0	0	0	0	0	0	0
11	Operational support	L.S	0	6.50	0	0	0	0	0	0	0	6.50
12	Animal Husbandry support	L.S	0	0	0	1.00	0	1.00	0	1.50	0	3.50
13	Agriculture support	L.S	0	0	0	0.60	0	0.80	0	1.00	0	2.80
14	Horticulture support	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
15	Wild Life improvement	L.S	0	0	0	0.60	0	0.80	0	1.00	0	2.40
16	Joint Forest Management incl. micro planning	L.S	0	0	0	1.00	0	1.50	0	1.50	0	4.00
17	Research & Studies	L.S	0	0	0	0.60	0	0.80	0	0.80	0	2.40
18	Training, Awareness & Publicity	L.S	0	2.50	0	0	0	0	0	0	0	2.50
		Total (1-18)	0.00	9.00	0.00	70.74	0.00	94.52	0.00	67.70	0.00	252.36
		L.S	0.00	8.09	0.00	0.71	0.00	0.95	0.00	0.85	0.00	2.42
19	Eco-Tourism 1%	L.S	0.00	8.09	0.00	3.54	0.00	4.75	0.00	4.39	0.00	13.12
20	Eco-Battalion 5%	L.S	0.00	0.40	0.00	3.54	0.00	4.75	0.00	4.39	0.00	13.12
21	Eco-services 10%	L.S	0.00	0.80	0.00	7.07	0.00	9.49	0.00	8.77	0.00	26.24
22	Escalation 10%	L.S	0.00	0.80	0.00	7.07	0.00	9.49	0.00	8.77	0.00	26.24
23	Monitoring and Evaluation 5%	L.S	0.00	0.40	0.00	3.54	0.00	4.75	0.00	4.39	0.00	13.12
		G. Total	0.00	11.79	0.00	92.56	0.00	124.54	0.00	114.89	0.00	343.48

6 YEAR COST ABSTRACT OF ANNI DIVISION

S No.	Name of Component	Unit	Division		Aras		Nither		Chowai		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	8.01	2.00	16.00	6.00	24.04	8.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	3.60	1.20	5.40	1.80	8.40	2.80	17.40	5.80
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	66.67	1.00	66.67	1.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	16.50	0.00	16.00	0.00	22.50	0.00	55.00
	Total		0.00	0.00	3.60	17.70	11.41	19.80	93.10	32.30	108.11	69.80
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	2.11	0.80	1.33	0.50	2.11	0.80	5.53	2.10
b)	Construction of van sanvar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	2.11	0.80	1.33	0.50	2.11	0.80	5.53	2.10
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	1.00	3.40	0.00	0.00	0.00	0.00	1.00	3.40
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slope pockets/ rills & sheet erosion (ha)	Ha.	0.00	0.00	1.35	7.50	1.26	7.00	1.08	6.00	3.69	20.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	5.71	0.40	5.71	0.40	5.71	0.40	17.14	1.20
d)	Pine Needle Logs (No)	No.	0.00	0.00	40.00	0.20	40.00	0.20	40.00	0.20	120.00	0.60
	Total		0.00	0.00	47.06	8.10	46.97	7.60	46.79	6.60	140.83	22.30
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	8.13	6.45	10.81	7.11	17.16	11.50	36.89	24.05
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	3.61	2.42	0.00	0.00	11.96	8.02	15.58	10.44
c)	Assisted natural regeneration plantation	Ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	31.58	11.79	15.46	5.76	9.41	3.50	56.45	21.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	17.00	11.22	10.00	6.60	12.50	8.25	39.50	26.07
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.80	0.54	2.00	0.60	1.20	0.36	5.00	1.50
i)	Pasture Improvement	Ha	0.00	0.00	15.00	1.05	6.00	0.42	9.00	0.63	30.00	2.10
j)	NTFP Plantations of Tal Plants	Ha	0.00	0.00	7.00	2.31	8.00	2.64	5.00	1.65	20.00	6.60
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	16.51	28.00	0.00	0.00	16.51	28.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	84.13	34.74	68.58	51.12	66.23	33.90	218.93	119.75
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery devlopment (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	2.50	0	2.50	0	2.50	0	7.50
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	1.50	0	8.00	0	3.50	0	13.00
11	Operational support	L.S	0	0.50	0	0	0	0	0	0	0	0.50
12	Animal Husbandry support	L.S	0	0	0	1.00	0	1.00	0	1.50	0	3.50
13	Agriculture support	L.S	0	0	0	0.80	0	0.80	0	1.00	0	2.60
14	Horticulture support	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
15	Wild Life improvement	L.S	0	0	0	0.80	0	0.80	0	0.80	0	2.40
16	Joint Forest Management incl. micro planning	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
17	Research & Studies	L.S	0	0	0	0.80	0	0.80	0	0.80	0	2.40
18	Training, Awareness & Publicity	L.S	0	2.50	0	0	0	0	0	0	0	2.50
	Total (1-18)		0.00	8.00	0.00	74.14	0.00	94.92	0.00	87.70	0.00	264.76
19	Eco-Tourism 1%	L.S	0.00	0.09	0.00	0.74	0.00	0.95	0.00	0.88	0.00	2.64
20	Eco-Battalion 8%	L.S	0.00	0.45	0.00	3.71	0.00	4.75	0.00	4.39	0.00	13.29
21	Eco-services 10%	L.S	0.00	0.90	0.00	7.41	0.00	9.49	0.00	8.77	0.00	26.58
22	Escalation 10%	L.S	0.00	0.90	0.00	7.41	0.00	9.49	0.00	8.77	0.00	26.58
23	Monitoring and Evaluation 5%	L.S	0.00	0.45	0.00	3.71	0.00	4.75	0.00	4.39	0.00	13.29
	G. Total	L.S	0.00	10.79	0.00	97.12	0.00	124.34	0.00	114.89	0.00	348.14

7 YEAR COST ABSTRACT OF ANNI DIVISION

S No.	Name of Component	Unit	Division		Aras		Nilber		Chinnai		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	CRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	6.81	2.05	18.03	5.39	24.84	8.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	3.60	1.20	5.40	1.80	8.40	2.80	17.40	5.80
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	66.67	1.00	66.67	1.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	16.50	0.00	16.00	0.00	22.50	0.00	55.00
	Total		0.00	0.00	3.60	17.70	11.41	19.80	93.10	32.39	108.11	69.80
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	2.11	0.80	1.32	0.50	2.11	0.80	5.53	2.10
b)	Construction of rain sanwar (No)	Nu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPPD buildings(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	2.11	0.80	1.32	0.50	2.11	0.80	5.53	2.10
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha.	0.00	0.00	1.35	7.50	1.35	7.50	1.08	6.00	3.88	20.50
b)	Roadside Erosion Control (LS)	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	5.71	0.40	5.71	0.40	5.71	0.40	17.14	1.20
d)	Pine Needle Logs (No)	No.	0.00	0.00	40.00	0.20	40.00	0.20	40.00	0.20	120.00	0.60
	Total		0.00	0.00	47.06	8.10	46.87	7.89	46.79	6.60	140.83	22.30
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	8.13	5.45	10.61	7.11	17.16	11.50	35.89	24.06
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	3.51	2.42	3.80	3.00	11.88	8.02	19.38	13.44
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	31.59	11.75	15.46	5.75	9.41	3.52	56.46	21.00
e)	Replenishmenn afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	17.50	11.22	10.00	6.60	12.50	8.25	39.50	26.07
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.80	0.54	2.00	0.60	1.20	0.36	5.00	1.50
i)	Pasture improvement	Ha	0.00	0.00	15.00	1.35	6.00	0.42	9.00	0.63	30.00	2.10
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	7.00	2.31	8.00	2.64	5.00	1.65	20.00	6.60
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rini Plantation	Ha	0.00	0.00	0.00	0.00	16.51	28.00	0.00	0.00	16.51	28.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	84.13	34.74	68.58	51.12	66.23	33.90	218.93	119.76
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Gosadana	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	2.50	0	2.50	0	2.50	0	7.50
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	1.00	0	6.00	0	8.50	0	15.50
11	Operational support	L.S	0	8.50	0	0	0	0	0	0	0	8.50
12	Animal Husbandry support	L.S	0	0	0	1.00	0	1.00	0	1.50	0	3.50
13	Agriculture support	L.S	0	0	0	0.80	0	0.80	0	1.00	0	2.60
14	Horticulture support	L.S	0	0	0	1.00	0	1.00	0	1.20	0	3.20
15	Wild Life Improvement	L.S	0	0	0	0.80	0	0.80	0	0.80	0	2.40
16	Joint Forest Management incl. micro planning	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
17	Research & Studies	L.S	0	0	0	0.80	0	0.80	0	0.80	0	2.40
18	Training, Awareness & Publicity	L.S	0	2.50	0	0	0	0	0	0	0	2.50
	Total (1-18)		0.00	8.00	0.00	70.74	0.00	94.92	0.00	87.70	0.00	262.36
19	Eco-Tourism 1%	L.S	0.00	0.09	0.00	0.71	0.00	0.95	0.00	0.88	0.00	2.62
20	Eco-Battalion 5%	L.S	0.00	0.45	0.00	3.54	0.00	4.75	0.00	4.39	0.00	13.12
21	Eco-services 10%	L.S	0.00	0.90	0.00	7.07	0.00	9.49	0.00	8.77	0.00	26.24
22	Escalation 10%	L.S	0.00	0.90	0.00	7.07	0.00	9.49	0.00	8.77	0.00	26.24
23	Monitoring and Evaluation 5%	L.S	0.00	0.45	0.00	3.54	0.00	4.75	0.00	4.39	0.00	13.12
	G. Total	L.S	0.00	11.79	0.00	92.66	0.00	124.34	0.00	114.89	0.00	343.68

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5 YEAR COST ABSTRACT OF ANNI DIVISION

S No.	Name of Component	Unit	Division		Aras		Nilher		Chowal		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	6.01	2.90	18.33	5.00	24.34	8.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	3.60	1.20	5.40	1.80	8.40	2.80	17.40	5.80
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	66.67	1.00	66.67	1.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	15.50	0.00	10.00	0.00	22.50	0.00	55.00
		Total	0.00	0.00	3.60	17.70	11.41	13.80	93.10	32.30	108.11	69.80
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	2.11	0.80	1.32	0.80	2.11	0.80	5.53	2.10
b)	Construction of vish sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	0.00	0.00	2.11	0.80	1.32	0.80	2.11	0.80	5.53	2.10
3	G&D STATIONS (Not (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slope gullies/ rills & sheet erosion (ha)	Ha.	0.00	0.00	1.35	7.50	1.26	7.00	1.08	6.00	3.69	20.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Turfs (ha)	Ha.	0.00	0.00	5.71	0.40	5.71	0.40	5.71	0.40	17.14	1.20
d)	Pine Needle Logs (No)	No.	0.00	0.00	40.00	0.20	40.00	0.20	40.00	0.20	120.00	0.60
		Total	0.00	0.00	47.06	8.10	46.97	7.60	46.79	6.60	140.83	22.30
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	8.13	5.45	10.61	7.11	17.16	11.50	35.89	24.06
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	3.61	2.42	0.00	0.00	11.96	8.02	15.58	10.44
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	31.59	11.75	15.46	5.75	9.41	3.50	56.45	21.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	17.90	11.22	10.90	6.80	12.56	8.25	39.50	26.07
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.80	0.54	2.60	0.80	1.20	0.36	5.60	1.50
i)	Pasture improvement	Ha	0.00	0.00	15.00	1.65	5.00	0.42	9.00	0.83	30.00	2.10
j)	NTFP Plantations of Tail Plants	Ha	0.00	0.00	7.00	2.31	8.00	2.64	5.00	1.65	20.00	6.60
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	16.31	28.00	0.00	0.00	16.31	28.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total	0.00	0.00	84.13	34.74	68.88	51.13	66.33	33.90	218.83	119.78
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery devlopment (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharlu Dev/ Rai Fr. Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	0	0	0	0	0	0
7	Gosadans	No.	0	0	0	2.50	0	2.50	0	2.50	0	7.50
8	Energy Conservation/ Forest Protection	L.S	0	0	0	0	0	0	0	0	0	0
9	Fuel saving devices	L.S	0	0	0	1.50	0	8.00	0	5.50	0	15.00
10	Forest Infrastructure Development	L.S	0	6.50	0	0	0	0	0	0	0	6.50
11	Operational support	L.S	0	0	0	1.00	0	1.00	0	1.50	0	3.50
12	Animal Husbandry support	L.S	0	0	0	0.80	0	0.80	0	1.00	0	2.60
13	Agriculture support	L.S	0	0	0	1.00	0	1.00	0	1.20	0	3.00
14	Horticulture support	L.S	0	0	0	0.80	0	0.80	0	0.80	0	2.40
15	Wild Life Improvement	L.S	0	0	0	1.00	0	1.00	0	1.00	0	3.00
16	Joint Forest Management incl. micro planning	L.S	0	0	0	0.80	0	0.80	0	0.80	0	2.40
17	Research & Studies	L.S	0	2.50	0	0	0	0	0	0	0	2.50
18	Training, Awareness & Publicity	Total (1-18)	0.00	9.00	0.00	70.74	0.00	94.52	0.00	87.76	0.00	262.36
		L.S	0.00	0.09	0.00	0.71	0.00	0.95	0.00	0.88	0.00	2.62
19	Eco-Tourism 1%	L.S	0.00	0.45	0.00	3.54	0.00	4.73	0.00	4.39	0.00	13.12
20	Eco-Battalion 5%	L.S	0.00	0.90	0.00	7.07	0.00	9.45	0.00	8.77	0.00	26.34
21	Eco-services 10%	L.S	0.00	0.90	0.00	7.07	0.00	9.45	0.00	8.77	0.00	26.34
22	Escalation 10%	L.S	0.00	0.45	0.00	3.54	0.00	4.73	0.00	4.39	0.00	13.12
23	Monitoring and Evaluation 5%	G. Total	0.00	11.79	0.00	93.66	0.00	134.34	0.00	114.69	0.00	343.68

9 YEAR COST ABSTRACT OF ANNI DIVISION

S No.	Name of Component	Unit	Division		Arsu		Nither		Chowai		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	GRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	3.01	1.00	9.01	3.00	12.02	4.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	1.80	0.60	2.70	0.90	4.20	1.40	8.70	2.90
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	33.33	0.50	33.33	0.50
d)	Nalla treatment	L.S	0.00	0.00	0.00	8.25	0.00	8.00	0.00	11.25	0.00	27.50
	Total		0.00	0.00	1.80	8.85	5.71	9.90	46.55	16.15	54.05	34.90
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	1.05	0.40	0.66	0.25	1.05	0.40	2.76	1.05
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.05	0.40	0.66	0.25	1.05	0.40	2.76	1.05
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha.	0.00	0.00	0.68	3.75	0.63	3.50	0.54	3.00	1.85	10.25
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	2.80	0.20	2.80	0.20	2.80	0.20	8.57	0.60
d)	Pine Needle Logs (No)	No.	0.00	0.00	20.00	0.10	20.00	0.10	20.00	0.10	60.00	0.30
	Total		0.00	0.00	23.53	4.05	23.49	3.80	23.40	3.30	70.42	11.18
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	4.06	2.72	5.30	3.55	8.58	5.75	17.95	12.02
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	1.81	1.31	0.00	0.00	5.98	4.01	7.79	5.22
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	15.79	5.68	7.73	2.88	4.70	1.79	28.29	10.50
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	8.50	5.61	5.00	3.30	8.25	4.13	19.75	13.04
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.90	0.27	1.00	0.30	0.60	0.18	2.50	0.75
i)	Pasture Improvement	Ha	0.00	0.00	7.50	0.53	3.00	0.21	4.50	0.32	15.00	1.05
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	3.50	1.16	4.00	1.32	2.50	0.83	10.00	3.30
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	8.25	14.00	0.00	0.00	8.25	14.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	42.06	17.37	34.29	25.56	33.12	16.95	109.47	59.88
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery devlopment (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fr Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Goasdens	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	1.25	0	1.25	0	1.25	0	3.75
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	2	0.75	0	4.00	0	2.75	0	7.50
11	Operational support	L.S	0	0	0	0	0	0	0	0	0	0
12	Animal Husbandry support	L.S	0	0	0	0.50	0	0.50	0	0.75	0	1.75
13	Agriculture support	L.S	0	0	0	0.40	0	0.40	0	0.5	0	1.30
14	Horticulture support	L.S	0	0	0	0.50	0	0.50	0	0.5	0	1.50
15	Wild Life Improvement	L.S	0	0	0	0.40	0	0.40	0	0.4	0	1.20
16	Joint Forest Management incl. micro planning	L.S	0	0	0	0.50	0	0.50	0	0.5	0	1.50
17	Research & Studies	L.S	0	0	0	0.40	0	0.40	0	0.4	0	1.20
18	Training, Awareness & Publicity	L.S	0	1.25	0	0	0	0	0	0	0	1.25
	Total (1-18)		0.00	1.25	0.00	39.37	0.00	47.46	0.00	43.85	0.00	127.93
19	Eco-Tourism 1%	L.S	0.00	0.01	0.00	0.35	0.00	0.47	0.00	0.44	0.00	1.28
20	Eco-Battalion 5%	L.S	0.00	0.06	0.00	1.77	0.00	2.37	0.00	2.19	0.00	6.40
21	Eco-services 10%	L.S	0.00	0.13	0.00	3.54	0.00	4.75	0.00	4.39	0.00	12.79
22	Escalation 10%	L.S	0.00	0.13	0.00	3.54	0.00	4.75	0.00	4.39	0.00	12.79
23	Monitoring and Evaluation 5%	L.S	0.00	0.06	0.00	1.77	0.00	2.37	0.00	2.19	0.00	6.40
	G. Total	L.S	0.00	1.64	0.00	49.33	0.00	62.17	0.00	57.44	0.00	167.58

10 YEAR COST ABSTRACT OF ANNI DIVISION

Sr No.	Name of Component	Unit	Division		Arsu		Nither		Chowai		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES											
a)	DRSM CHECK DAM(No)	No	0.00	0.00	0.00	0.00	3.01	1.00	9.01	3.00	12.02	4.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	1.80	0.60	2.70	0.90	4.20	1.40	8.70	2.90
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	33.33	0.50	33.33	0.50
d)	Nala treatment	L.S	0.00	0.00	0.00	9.25	0.00	8.00	0.00	11.25	0.00	27.50
	Total		0.00	0.00	1.80	9.85	5.71	9.90	46.55	16.15	54.05	34.90
2	WATER HARVESTING SYSTEM											
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	1.05	0.40	0.66	0.25	1.05	0.40	2.76	1.05
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.05	0.40	0.66	0.25	1.05	0.40	2.76	1.05
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES											
a)	Treatment of slips/ gullies/ rils & sheet erosion (ha)	Ha.	0.00	0.00	0.68	3.75	0.63	3.50	0.54	3.00	1.85	10.25
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha.	0.00	0.00	2.86	0.20	2.86	0.20	2.86	0.20	8.57	0.60
d)	Pine Needle Logs (No)	No.	0.00	0.00	20.00	0.13	20.00	0.10	20.00	0.10	60.00	0.30
	Total		0.00	0.00	23.53	4.08	23.49	3.80	23.40	3.30	70.42	11.15
5	BIOLOGICAL MEASURES											
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	4.06	2.72	5.30	3.55	8.58	5.75	17.95	12.02
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	1.81	1.21	0.00	0.00	5.98	4.01	7.79	5.22
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	15.79	5.68	7.73	2.88	4.75	1.75	28.23	10.50
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	9.50	5.61	5.00	3.30	6.25	4.13	19.75	13.04
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.90	0.27	1.00	0.30	0.60	0.18	2.50	0.75
i)	Pasture Improvement	Ha	0.00	0.00	7.50	0.83	3.00	0.21	4.50	0.32	15.00	1.05
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	3.50	1.16	4.00	1.32	2.50	0.83	10.00	3.30
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	8.25	14.00	0.00	0.00	8.25	14.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
	Total		0.00	0.00	42.06	17.37	34.29	25.56	33.12	16.95	109.47	59.88
6	NURSERY DEVELOPMENT											
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0
7	Gosadans	No.	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	1.25	0	1.25	0	1.25	0	3.75
9	Fuel saving devices	L.S	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	0.75	0	4.00	0	2.75	0	7.5
11	Operational support	L.S	0	0	0	0	0	0	0	0	0	0
12	Animal Husbandry support	L.S	0	0	0	0.50	0	0.50	0	0.75	0	1.75
13	Agriculture support	L.S	0	0	0	0.40	0	0.40	0	0.5	0	1.30
14	Horticulture support	L.S	0	0	0	0.50	0	0.50	0	0.5	0	1.50
15	Wild Life Improvement	L.S	0	0	0	0.40	0	0.40	0	0.4	0	1.20
16	Joint Forest Management incl. micro planning	L.S	0	0	0	0.50	0	0.50	0	0.5	0	1.50
17	Research & Studies	L.S	0	0	0	0.40	0	0.40	0	0.4	0	1.20
18	Training, Awareness & Publicity	L.S	0	1.25	0	0	0	0	0	0	0	1.25
	Total (1-18)		0.00	1.25	0.00	35.37	0.00	47.46	0.00	43.85	0.00	127.93
19	Eco-Tourism 1%	L.S	0.00	0.01	0.00	0.35	0.00	0.47	0.00	0.44	0.00	1.28
20	Eco-Battalion 6%	L.S	0.00	0.06	0.00	1.77	0.00	2.37	0.00	2.19	0.00	6.40
21	Eco-services 10%	L.S	0.00	0.13	0.00	3.54	0.00	4.75	0.00	4.39	0.00	12.79
22	Escalation 10%	L.S	0.00	0.13	0.00	3.54	0.00	4.75	0.00	4.39	0.00	12.79
23	Monitoring and Evaluation 5%	L.S	0.00	0.06	0.00	1.77	0.00	2.37	0.00	2.19	0.00	6.40
	G. Total	L.S	0.00	46.64	0.00	46.33	0.00	63.17	0.00	57.44	0.00	167.58

Annexure-VII

COMPONENT WISE COST ABSTRACT OF KARSOG DIVISION (in Lakhs)

S.No.	Name of Component	Unit	Division		Magnoo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	DNSM CHECK DAM(Nos)	No.	0.00	0.00	43.89	27.92	111.87	37.23	134.25	44.68	33.56	11.17	323.57	121
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	150.00	90.00	150.00	90.00	225.00	75.00	30.00	10.00	555.01	185
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	1333.33	20.00	2000.00	30.00	3333.33	50.00	666.67	10.00	7333.33	110
d)	Nala treatment	L.S	0.00	0.00	0.00	40.00	0.00	50.00	0.00	75.00	0.00	30.00	0.00	195
	Total		0.00	0.00	1567.23	137.92	2261.87	167.23	3692.59	244.68	730.23	61.17	8251.91	611
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	78.95	30.00	52.63	20.00	78.95	30.00	31.58	12.00	242.11	92.00
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No.	0.00	0.00	10.00	20.00	10.00	20.00	37.50	75.00	10.00	20.00	97.50	195.00
	Total	No.	0.00	0.00	88.95	50.00	62.63	40.00	116.45	105.00	41.58	32.00	339.61	287.00
3	O&D STATIONS (No) (SOP)		0.00	0.00	1.00	7.50	1.00	7.50	1.00	7.50	1.00	7.50	4.00	30.00
4	BIO-ENGINEERING MEASURES													
a)	Treatment of slips/ gullies/ nils & sheet erosion (ha)	Ha	0.00	0.00	2.70	15.00	5.40	30.00	8.10	45.00	2.70	15.00	18.90	105.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	28.57	2.00	142.86	10.00	600.00	42.00	28.57	2.00	800.00	56.00
d)	Pine Needle Logs (No)	No	0.00	0.00	791.67	3.95	1266.67	6.32	950.00	4.74	791.67	3.95	3800.00	18.96
	Total		0.00	0.00	822.94	20.95	1414.92	46.32	1558.10	91.74	822.94	20.95	4618.90	179.96
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	111.94	75.00	89.55	60.00	231.34	155.00	14.93	10.00	447.76	300.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	11.94	8.00	22.39	15.00	34.33	23.00	5.97	4.00	74.63	50.00
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	53.76	20.00	53.76	20.00	80.65	30.00	26.88	10.00	215.05	80.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	4.55	3.00	4.55	3.00	22.73	15.00	3.03	2.00	34.85	23.00
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	16.67	5.00	83.33	25.00	83.33	25.00	83.33	25.00	266.67	80.00
i)	Pasture improvement	Ha	0.00	0.00	71.43	5.00	71.43	5.00	171.43	12.00	42.86	3.00	357.14	25.00
j)	NTFP Plantations of Tali Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	18.18	5.50	36.36	10.00	54.54	15.00	24.24	6.66	127.37	42.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	288.47	122.50	365.31	138.00	678.39	278.00	201.34	62.66	1523.37	600.00
6	NURSERY DEVELOPMENT													
	Raising of High Value Medicinal Species for distribution to	L.S	0	0	0	10.00	0	15.00	0	30.00	0	15.00	0	70
a)	farmers	L.S	0	0	0	25.00	0	40.00	0	50.00	0	30.00	0	145
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	20.00	0	10.00	0	10.00	0	7.00	0	47
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	15.00	0	15.00	0	15.00	0	15.00	0	60
d)	Modernization of Nurseries	L.S	0	0	0	70.00	0	90.00	0	105.00	0	67.00	0	322
	Total		0	0	0	70.00	0	90.00	0	105.00	0	67.00	0	322
7	Gosadans	No	0	0	0	0	1.00	50.00	1.00	50.00	1.00	50.00	3.00	150
8	Energy Conservation/ Forest Protection	L.S	0	75.00	0	0	0	0	0	0	0	0	0	75.00
9	Fuel Saving Devices	L.S	0	75.00	0	0	0	0	0	0	0	0	0	75.00
10	Forest Infrastructure Development	L.S	0	150.00	0	0	0	0	0	0	0	0	0	150.00
11	Operational support	L.S	0	75.00	0	0	0	0	0	0	0	0	0	75.00
12	Animal Husbandry support	L.S	0	50.00	0	0	0	0	0	0	0	0	0	50.00
13	Agriculture support	L.S	0	50.00	0	0	0	0	0	0	0	0	0	50.00
14	Horticulture support	L.S	0	50.00	0	0	0	0	0	0	0	0	0	50.00
15	Wild Life Improvement	L.S	0	40.00	0	0	0	0	0	0	0	0	0	40.00
16	Joint Forest Management incl. micro-planning	L.S	0	30.00	0	0	0	0	0	0	0	0	0	30.00
17	Research & Studies	L.S	0	30.00	0	0	0	0	0	0	0	0	0	30.00
18	Training, awareness & Publicity	L.S	0	60.00	0	0	0	0	0	0	0	0	0	60.00
	Total (1-18)		0.00	685.00	0.00	408.37	0.00	529.55	0.00	881.92	0.00	350.62	0.00	2804.96
19	Eco-Tourism 1%	L.S	0.00	6.85	0.00	4.08	0.00	5.29	0.00	8.82	0.00	3.51	0.00	28.05
20	Eco-Battalion 8%	L.S	0.00	54.80	0.00	32.67	0.00	42.36	0.00	70.55	0.00	28.05	0.00	224.40
21	Eco-services 10%	L.S	0.00	68.50	0.00	40.84	0.00	52.91	0.00	88.19	0.00	35.06	0.00	280.50
22	Monitoring & Evaluation 5%	L.S	0.00	34.25	0.00	20.42	0.00	26.45	0.00	44.10	0.00	18.02	0.00	140.25
23	Escalation 10%	L.S	0.00	68.50	0.00	40.84	0.00	52.91	0.00	88.19	0.00	35.06	0.00	280.50
	G. Total	L.S	0.00	917.10	0.00	534.98	0.00	693.06	0.00	1155.32	0.00	460.51	0.00	3674.66

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0 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

S.No	Name of Component	Unit	Division		Magroo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	CRSM CHECK DAM(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES													
a)	Treatment of steep/ gullies/ rills & (Road erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Spe	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	NURSERY DEVELOPMENT										129.00	0.00	0.00	0.00
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	10.00	0	15.00	0	30.00	0	15.00	0	70.00
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	25.00	0	40.00	0	50.00	0	30.00	0	145.00
c)	Establishment of Khansu Oak/ Rai Fir Nty	L.S	0	0	0	20.00	0	10.00	0	10.00	0	7.00	0	47.00
d)	Modernization of Nurseries	L.S	0	0	0	15.00	0	15.00	0	15.00	0	15.00	0	60.00
	Total		0	0	0	70.00	0	80.00	0	105.00	0	67.00	0	322.00
7	Gosadara	No	0	0	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	0	0	0	0	0	0	0	0	0
9	Fuel Saving Devices	L.S	0	0	0	0	0	0	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	0	0	0	0	0	0	0	0	0
11	Operational support	L.S	0	0	0	0	0	0	0	0	0	0	0	0
12	Animal Husbandry support	L.S	0	0	0	0	0	0	0	0	0	0	0	0
13	Agriculture support	L.S	0	0	0	0	0	0	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	0	0	0	0	0	0	0	0	0
15	Wild Life Improvement	L.S	0	0	0	0	0	0	0	0	0	0	0	0
16	Joint Forest Management incl. micro-planning	L.S	0	0	0	0	0	0	0	0	0	0	0	0
17	Research & Studies	L.S	0	0	0	0	0	0	0	0	0	0	0	0
18	Training, awareness & Publicity	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total (1-18)		0.00	0.00	0.00	70.00	0.00	80.00	0.00	105.00	0.00	67.00	0.00	322.00
19	Eco-Tourism 1%	L.S	0.00	0.00	0.00	0.70	0.00	0.80	0.00	1.05	0.00	0.67	0.00	3.22
20	Eco-Sensitive 3%	L.S	0.00	0.00	0.00	2.10	0.00	2.40	0.00	3.15	0.00	2.01	0.00	9.66
21	Eco-services 10%	L.S	0.00	0.00	0.00	7.00	0.00	8.00	0.00	10.50	0.00	6.70	0.00	32.20
22	Monitoring & Evaluation 5%	L.S	0.00	0.00	0.00	3.50	0.00	4.00	0.00	5.25	0.00	3.35	0.00	16.10
23	Escalation 10%	L.S	0.00	0.00	0.00	7.00	0.00	8.00	0.00	10.50	0.00	6.70	0.00	32.20
	G. Total	L.S	0.00	0.00	0.00	91.70	0.00	104.80	0.00	137.55	0.00	87.77	0.00	421.82

1 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

S.No.	Name of Component	Unit	Division		Magroo		Sarl		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	20.97	6.98	27.97	9.31	33.96	11.17	8.39	2.79	90.89	30.25
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	37.50	12.50	37.50	12.50	56.25	18.75	7.50	2.50	138.75	46.25
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	333.33	5.00	500.00	7.50	833.33	12.50	166.67	2.50	1833.33	27.50
d)	Nalla treatment	L.S	0.00	0.00	0.00	10.00	0.00	12.50	0.00	18.75	0.00	7.50	0.00	48.75
	Total		0.00	0.00	391.81	34.48	565.47	41.81	923.15	61.17	182.56	15.29	2062.58	152.75
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	19.74	7.50	13.16	5.00	19.74	7.50	7.89	3.00	60.53	23.00
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top harvesting in HFFD building (no)	No	0.00	0.00	87.50	20.00	0.00	0.00	0.00	0.00	0.00	0.00	87.50	20.00
	Total		0.00	0.00	87.24	27.50	13.16	5.00	19.74	7.50	7.89	3.00	138.03	43.00
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES													
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.68	3.75	1.35	7.50	2.03	11.25	0.68	3.75	4.73	26.25
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	7.14	0.50	35.71	2.50	150.00	10.50	7.14	0.50	200.00	14.00
d)	Fine Needle Logs (No)	No	0.00	0.00	197.92	0.99	316.67	1.58	237.50	1.19	197.92	0.99	950.00	4.74
	Total		0.00	0.00	205.73	5.24	353.73	11.58	389.53	22.94	205.73	5.24	1154.73	45
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Hg	0.00	0.00	37.99	18.75	22.39	15.00	57.84	38.75	3.73	2.50	111.94	75.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	2.99	2.00	5.60	3.75	8.58	5.75	1.49	1.00	18.66	12.50
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	13.44	5.00	13.44	5.00	20.16	7.50	6.72	2.50	53.76	20.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	1.14	0.75	1.14	0.75	5.68	3.75	0.76	0.50	8.71	5.75
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	4.17	1.25	20.83	6.25	20.83	6.25	20.83	6.25	66.67	20.00
i)	Pasture Improvement	Ha	0.00	0.00	17.86	1.25	17.86	1.25	42.86	3.00	10.71	0.75	89.29	6.25
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	4.55	1.50	7.58	2.50	13.64	4.50	6.06	2.00	31.82	10.50
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	72.12	30.50	88.83	34.50	169.55	69.50	50.31	15.50	380.84	150.00
6	NURSERY DEVELOPMENT													
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0
7	Gosadans	No	0	0	0	0	1.00	50.00	0	0	0	0	1.00	50.00
8	Energy Conservation/ Forest Protection	L.S	0	18.75	0	0	0	0	0	0	0	0	0	18.75
9	Fuel Saving Devices	L.S	0	18.75	0	0	0	0	0	0	0	0	0	18.75
10	Forest Infrastructure Development	L.S	0	37.50	0	0	0	0	0	0	0	0	0	37.50
11	Operational support	L.S	0	22.5	0	0	0	0	0	0	0	0	0	22.50
12	Animal Husbandry support	L.S	0	12.50	0	0	0	0	0	0	0	0	0	12.50
13	Agriculture support	L.S	0	12.50	0	0	0	0	0	0	0	0	0	12.50
14	Horticulture support	L.S	0	12.50	0	0	0	0	0	0	0	0	0	12.50
15	Wild Life Improvement	L.S	0	10.00	0	0	0	0	0	0	0	0	0	10.00
16	Joint Forest Management incl. micro-planning	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
17	Research & Studies	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
18	Training, awareness & Publicity	L.S	0	15.00	0	0	0	0	0	0	0	0	0	15.00
	Total (1-18)		0.00	175.00	0.00	87.72	0.00	142.89	0.00	161.11	0.00	39.03	0.00	616
19	Eco-Tourism 1%	L.S	0.00	1.75	0.00	0.88	0.00	1.43	0.00	1.61	0.00	0.39	0.00	6.16
20	Eco-Battalion 5%	L.S	0.00	8.75	0.00	4.39	0.00	7.14	0.00	8.06	0.00	1.95	0.00	30.79
21	Eco-services 10%	L.S	0.00	17.5	0.00	8.77	0.00	14.29	0.00	16.11	0.00	3.90	0.00	61.57
22	Monitoring & Evaluation 5%	L.S	0.00	8.75	0.00	4.39	0.00	7.14	0.00	8.06	0.00	1.95	0.00	30.79
23	Escalation 10%	L.S	0.00	17.5	0.00	8.77	0.00	14.29	0.00	16.11	0.00	3.90	0.00	61.57
	G. Total	L.S	0.00	229.3	0.00	126.01	0.00	187.18	0.00	211.06	0.00	51.13	0.00	806.62

2 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

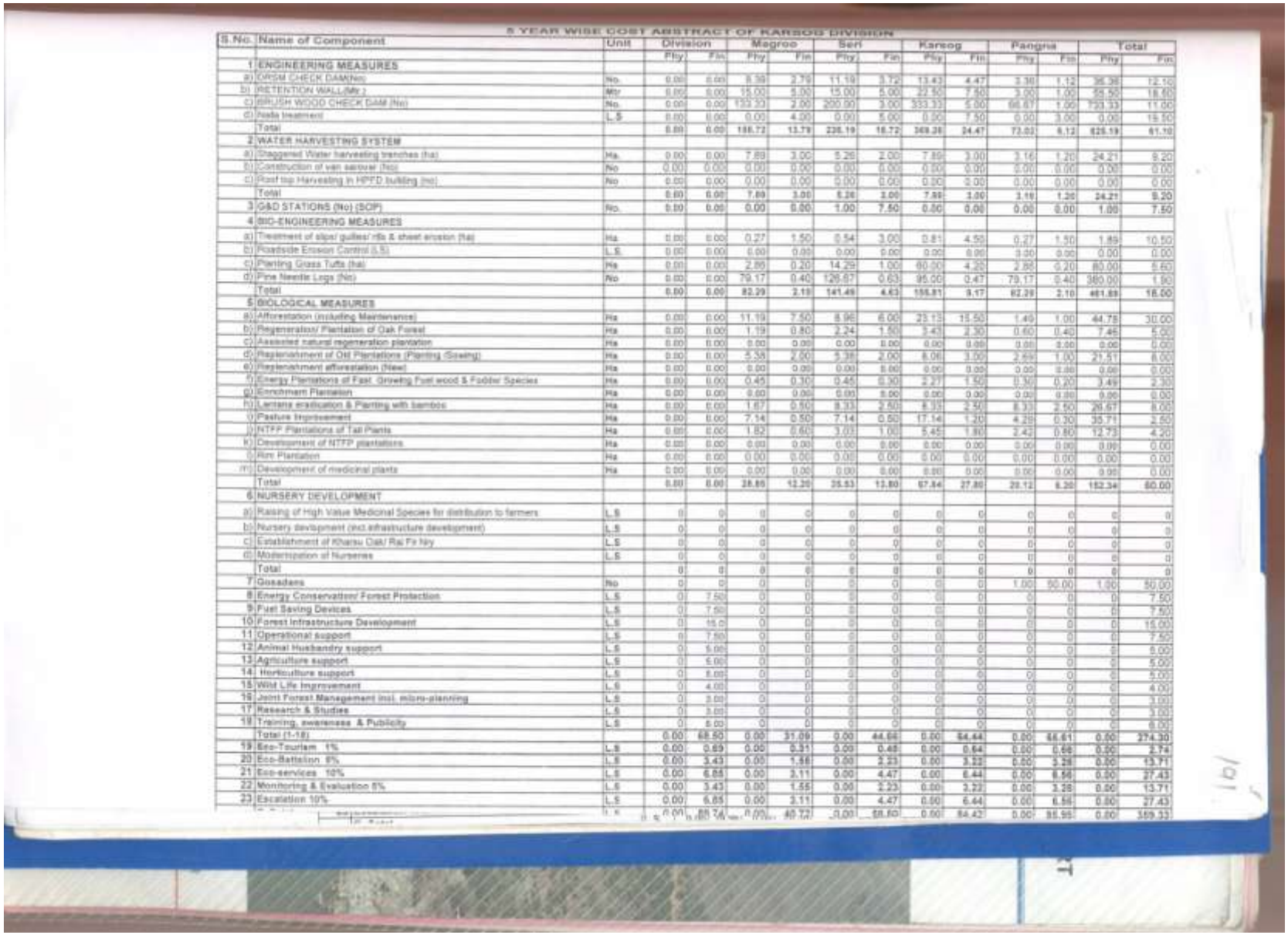
S.No.	Name of Component	Unit	Division		Magnoo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	ORSM CHECK DAM(No)	No.	0.00	0.00	8.39	2.79	11.19	3.72	13.43	4.47	3.36	1.12	36.36	12.10
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	15.00	5.00	15.00	5.00	22.50	7.50	3.00	1.00	55.50	18.50
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	133.33	2.00	200.00	3.00	333.33	5.00	66.67	1.00	733.33	11.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	4.00	0.00	5.00	0.00	7.50	0.00	3.00	0.00	19.50
	Total		0.00	0.00	156.72	13.79	226.19	16.72	369.26	24.47	73.03	6.12	825.19	61.10
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	7.89	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	10.00	20.00	0.00	0.00	0.00	0.00	10.00	20.00
	Total		0.00	0.00	7.89	3.00	15.26	22.00	7.89	3.00	3.16	1.20	34.21	29.20
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES													
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.27	1.50	0.54	3.00	0.81	4.50	0.27	1.50	1.89	10.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	2.86	0.20	14.29	1.00	80.00	4.20	2.86	0.20	80.00	5.60
d)	Pine Needle Logs (No)	No	0.00	0.00	79.17	0.40	126.67	0.63	95.00	0.47	79.17	0.40	380.00	1.90
	Total		0.00	0.00	82.29	2.10	141.49	4.63	155.81	9.17	82.29	2.10	461.89	18.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	11.19	7.50	8.96	6.00	23.13	15.50	1.49	1.00	44.78	30.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	1.19	0.80	2.24	1.50	3.43	2.30	0.60	0.40	7.46	5.00
c)	Assisated natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	5.38	2.00	5.38	2.00	8.06	3.00	2.69	1.00	21.51	8.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Speci	Ha	0.00	0.00	0.45	0.30	0.45	0.30	2.27	1.50	0.30	0.20	3.49	2.30
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.67	0.50	6.33	2.50	6.33	2.50	6.33	2.50	26.67	8.00
i)	Pasture Improvement	Ha	0.00	0.00	7.14	0.50	7.14	0.50	17.14	1.20	4.29	0.30	35.71	2.50
j)	NTFP Plantations of Tail Plants	Ha	0.00	0.00	1.82	0.60	3.03	1.00	5.45	1.80	2.42	0.80	12.73	4.20
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	28.85	12.20	35.53	13.80	67.84	27.80	20.12	6.20	152.34	60.00
6	NURSERY DEVELOPMENT													
a)	Farmers	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery devlopment (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Khansu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0
7	Gosadans	No	0	0	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
9	Fuel Saving Devices	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
10	Forest Infrastructure Development	L.S	0	15.00	0	0	0	0	0	0	0	0	0	15.00
11	Operational support	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
12	Animal Husbandry support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
13	Agriculture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
14	Horticulture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
15	Wild Life Improvement	L.S	0	4.00	0	0	0	0	0	0	0	0	0	4.00
16	Joint Forest Management incl. micro-planning	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
17	Research & Studies	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
18	Training, awareness & Publicity	L.S	0	6.00	0	0	0	0	0	0	0	0	0	6.00
	Total (1-18)		0.00	68.50	0.00	31.09	0.00	67.16	0.00	64.44	0.00	15.61	0.00	236.80
19	Eco-Tourism 1%	L.S	0.00	0.69	0.00	0.31	0.00	0.67	0.00	0.64	0.00	0.16	0.00	2.37
20	Eco-Battalion 5%	L.S	0.00	3.43	0.00	1.55	0.00	3.36	0.00	3.22	0.00	0.78	0.00	11.84
21	Eco-services 10%	L.S	0.00	6.85	0.00	3.11	0.00	6.72	0.00	6.44	0.00	1.56	0.00	23.68
22	Monitoring & Evaluation 5%	L.S	0.00	3.43	0.00	1.55	0.00	3.36	0.00	3.22	0.00	0.78	0.00	11.84
23	Escalation 10%	L.S	0.00	6.85	0.00	3.11	0.00	6.72	0.00	6.44	0.00	1.56	0.00	23.68
	G. Total	L.S	0.00	95.74	0.00	40.72	0.00	94.87	0.00	94.42	0.00	20.45	0.00	310.20

3 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

S.No	Name of Component	Unit	Division		Magnoo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	8.39	2.79	11.15	3.72	13.43	4.47	3.36	1.12	36.36	12.10
b)	RETENTION WALL(Mtr)	Mtr	0.00	0.00	15.00	4.50	15.00	4.50	22.50	7.50	3.00	1.00	55.50	18.50
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	133.33	2.00	266.80	3.99	333.33	5.00	66.67	1.00	733.33	11.00
d)	hola treatment	L.S	0.00	0.00	0.00	4.00	0.00	6.00	0.00	7.50	0.00	3.00	0.00	19.50
	Total		0.00	0.00	156.72	13.29	226.19	18.22	369.26	24.47	73.02	6.13	825.19	61.10
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	7.99	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top rhervesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	0.00	0.00	37.00	75.00	0.00	0.00	37.00	75.00
	Total		0.00	0.00	7.99	3.00	5.26	2.00	44.89	78.00	3.16	1.20	61.21	84.20
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES													
a)	Treatment of slips/ gullies/ rifs & sheet erosion (ha)	Ha	0.00	0.00	0.27	1.50	0.54	3.00	0.81	4.50	0.27	1.50	1.89	10.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	2.00	0.20	14.29	1.00	60.00	4.20	2.86	0.20	80.00	5.60
d)	Pine Needle Logs (No)	No	0.00	0.00	79.17	0.40	126.67	0.63	95.00	0.47	79.17	0.40	380.00	1.90
	Total		0.00	0.00	81.29	2.10	141.49	4.63	155.81	9.17	82.29	2.10	461.89	18.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	11.15	7.50	8.96	6.00	23.13	15.50	1.49	1.00	44.73	30.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	1.19	0.80	2.24	1.50	3.43	2.30	0.80	0.40	7.46	5.00
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	5.36	2.00	5.36	2.00	8.06	3.00	2.69	1.00	21.51	8.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Sp	Ha	0.00	0.00	0.45	0.30	0.45	0.30	2.27	1.50	0.30	0.20	3.49	2.30
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.67	0.50	6.33	2.50	9.33	2.50	6.33	2.50	26.67	8.00
i)	Pasture improvement	Ha	0.00	0.00	7.14	0.50	7.14	0.50	17.14	1.20	4.29	0.30	36.71	2.50
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	1.82	0.60	3.03	1.00	5.45	1.80	2.42	0.80	12.73	4.20
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	28.85	12.20	36.83	13.80	67.84	27.80	30.12	8.20	152.34	60.00
6	NURSERY DEVELOPMENT													
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0
7	Gosadans	No	0	0	0	0	0	0	1.00	50.00	0	0	1.00	50.00
8	Energy Conservation/ Forest Protection	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
9	Fuel Saving Devices	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
10	Forest infrastructure Development	L.S	0	15.00	0	0	0	0	0	0	0	0	0	15.00
11	Operational support	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
12	Animal Husbandry support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
13	Agriculture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
14	Horticulture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
15	Wild Life Improvement	L.S	0	4.00	0	0	0	0	0	0	0	0	0	4.00
16	Joint Forest Management incl. micro-planning	L.S	0	1.00	0	0	0	0	0	0	0	0	0	1.00
17	Research & Studies	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
18	Training, awareness & Publicity	L.S	0	4.00	0	0	0	0	0	0	0	0	0	4.00
	Total (1-18)		0.00	68.50	0.00	31.09	0.00	27.18	0.00	189.44	0.00	15.61	0.00	341.80
		L.S	0.00	0.69	0.00	0.31	0.00	0.27	0.00	1.89	0.00	0.16	0.00	3.42
19	Eco-Tourism 1%	L.S	0.00	3.43	0.00	1.55	0.00	1.35	0.00	9.47	0.00	0.78	0.00	17.09
20	Eco-Battalion 5%	L.S	0.00	6.85	0.00	3.11	0.00	2.72	0.00	18.94	0.00	1.56	0.00	34.18
21	Eco-services 10%	L.S	0.00	3.43	0.00	1.55	0.00	1.35	0.00	9.47	0.00	0.78	0.00	17.09
22	Monitoring & Evaluation 5%	L.S	0.00	6.85	0.00	3.11	0.00	2.72	0.00	18.94	0.00	1.56	0.00	34.18
23	Escalation 10%	L.S	0.00	89.74	0.00	40.72	0.00	48.67	0.00	248.17	0.00	20.45	0.00	447.75
	G. Total													

4 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

Sr.No	Name of Component	Unit	Division		Magroo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	4.19	1.40	5.59	1.86	6.71	2.23	1.68	0.56	18.18	6.06
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	7.50	2.50	7.50	2.50	11.25	3.75	1.50	0.50	27.75	9.25
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	66.67	1.00	100.00	1.50	166.67	2.50	33.33	0.50	366.67	5.50
d)	Nalla treatment	L.S	0.00	0.00	0.00	2.00	0.00	2.50	0.00	3.75	0.00	1.50	0.00	9.75
	Total		0.00	0.00	78.36	6.90	113.09	8.36	184.63	12.23	36.51	3.06	412.60	30.55
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	3.95	1.50	2.63	1.00	3.95	1.50	1.58	0.60	12.11	4.60
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	20.00	10.00	20.00
	Total		0.00	0.00	3.95	1.50	2.63	1.00	3.95	1.50	11.58	20.60	22.11	24.60
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	1.00	7.50	0.00	0.00	0.00	0.00	0.00	0.00	1.00	7.50
4	BIO-ENGINEERING MEASURES													
a)	Treatment of slope gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.14	0.75	0.27	1.50	0.41	2.25	0.14	0.75	0.95	5.25
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	1.43	0.10	7.14	0.50	30.00	2.10	1.43	0.10	40.00	2.80
d)	Pine Needle Logs (No)	No	0.00	0.00	39.58	0.20	83.33	0.32	47.50	0.24	39.58	0.20	190.00	0.95
	Total		0.00	0.00	41.15	1.05	76.75	2.33	77.91	4.59	41.15	1.06	230.95	9.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	5.60	3.75	4.48	3.00	11.57	7.75	0.75	0.50	22.39	15.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	0.60	0.40	1.12	0.75	1.72	1.15	0.30	0.20	3.73	2.50
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	2.69	1.00	2.69	1.00	4.03	1.50	1.34	0.50	10.75	4.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.23	0.15	0.23	0.15	1.14	0.75	0.15	0.10	1.74	1.15
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.83	0.25	4.17	1.25	4.17	1.25	4.17	1.25	13.33	4.00
i)	Pasture Improvement	Ha	0.00	0.00	3.57	0.25	3.57	0.25	8.57	0.60	2.14	0.15	17.86	1.25
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.91	0.30	1.52	0.50	2.73	0.90	1.21	0.40	6.38	2.10
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	14.42	6.15	17.77	6.90	33.82	13.90	10.06	3.10	76.17	30.00
6	NURSERY DEVELOPMENT													
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Ney	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0
7	Gosadans	No	0	0	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	3.75	0	0	0	0	0	0	0	0	0	3.75
9	Fuel Saving Devices	L.S	0	3.75	0	0	0	0	0	0	0	0	0	3.75
10	Forest Infrastructure Development	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
11	Operational support	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
12	Animal Husbandry support	L.S	0	2.50	0	0	0	0	0	0	0	0	0	2.50
13	Agriculture support	L.S	0	2.50	0	0	0	0	0	0	0	0	0	2.50
14	Horticulture support	L.S	0	2.50	0	0	0	0	0	0	0	0	0	2.50
15	Wild Life Improvement	L.S	0	2.00	0	0	0	0	0	0	0	0	0	2.00
16	Joint Forest Management incl. micro-planning	L.S	0	1.50	0	0	0	0	0	0	0	0	0	1.50
17	Research & Studies	L.S	0	1.50	0	0	0	0	0	0	0	0	0	1.50
18	Training, awareness & Publicity	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
	Total (1-18)		0.00	39.00	0.00	23.04	0.00	18.58	0.00	32.22	0.00	27.81	0.00	139.65
19	Eco-Tourism 1%	L.S	0.00	0.38	0.00	0.23	0.00	0.19	0.00	0.32	0.00	0.28	0.00	1.40
20	Eco-Battalion 5%	L.S	0.00	1.90	0.00	1.15	0.00	0.93	0.00	1.61	0.00	1.39	0.00	6.98
21	Eco-services 10%	L.S	0.00	3.80	0.00	2.30	0.00	1.86	0.00	3.22	0.00	2.78	0.00	13.96
22	Monitoring & Evaluation 5%	L.S	0.00	1.90	0.00	1.15	0.00	0.93	0.00	1.61	0.00	1.39	0.00	6.98
23	Escalation 10%	L.S	0.00	3.80	0.00	2.30	0.00	1.86	0.00	3.22	0.00	2.78	0.00	13.96
	G. Total	L.S	0.00	48.78	0.00	30.19	0.00	24.34	0.00	42.21	0.00	36.43	0.00	182.94



5 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

S.No.	Name of Component	Unit	Division		Megroo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	CRSM CHECK DAM(No)	No.	0.00	0.00	8.39	2.79	11.19	3.72	13.43	4.47	3.36	1.12	36.36	12.10
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	15.00	5.00	15.00	5.00	22.50	7.50	3.00	1.00	55.50	18.50
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	133.33	2.00	200.00	3.00	333.33	5.00	66.67	1.00	733.33	11.00
d)	Nala treatment	L.S	0.00	0.00	0.00	4.00	0.00	5.00	0.00	7.50	0.00	3.00	0.00	19.50
	Total		0.00	0.00	156.72	13.79	226.19	16.72	369.26	24.47	73.03	5.12	825.19	61.10
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	7.89	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
b)	Construction of van sanjivar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	7.89	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	1.00	7.50	0.00	0.00	0.00	0.00	1.00	7.50
4	BIO-ENGINEERING MEASURES													
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha.	0.00	0.00	0.27	1.50	0.54	3.00	0.81	4.50	0.27	1.50	1.89	10.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.01	0.00	2.86	0.20	14.29	1.00	60.00	4.20	2.86	0.20	80.00	5.60
d)	Pine Needle Logs (No)	No	0.00	0.00	79.17	0.40	126.67	0.63	95.00	0.47	79.17	0.40	380.00	1.90
	Total		0.00	0.00	82.29	2.10	141.49	4.63	155.81	9.17	82.29	2.10	461.89	18.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	11.19	7.50	8.96	6.00	23.13	15.50	1.49	1.00	44.78	30.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	1.19	0.80	2.24	1.50	3.43	2.30	0.60	0.40	7.46	5.00
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	5.38	2.00	5.38	2.00	8.06	3.00	2.69	1.00	21.51	8.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast. Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.45	0.30	0.45	0.30	2.27	1.50	0.30	0.20	3.46	2.30
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.67	0.50	8.33	2.50	8.33	2.50	8.33	2.50	26.67	8.00
i)	Pasture Improvement	Ha	0.00	0.00	7.14	0.50	7.14	0.50	17.14	1.20	4.29	0.30	35.71	2.50
j)	NTFP Plantations of Tali Plants	Ha	0.00	0.00	1.82	0.60	3.03	1.00	5.45	1.80	2.42	0.80	12.73	4.20
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rint Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	28.85	12.20	35.53	13.80	67.84	27.80	29.12	6.20	152.34	60.00
6	NURSERY DEVELOPMENT													
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0
7	Gosadans	No	0	0	0	0	0	0	0	0	1.00	50.00	1.00	50.00
8	Energy Conservation/ Forest Protection	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
9	Fuel Saving Devices	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
10	Forest Infrastructure Development	L.S	0	15.0	0	0	0	0	0	0	0	0	0	15.00
11	Operational support	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
12	Animal Husbandry support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
13	Agriculture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
14	Horticulture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
15	Wild Life Improvement	L.S	0	4.00	0	0	0	0	0	0	0	0	0	4.00
16	Joint Forest Management incl. micro-planning	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
17	Research & Studies	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
18	Training, awareness & Publicity	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
	Total (1-18)		0.00	68.50	0.00	31.09	0.00	44.66	0.00	64.44	0.00	56.61	0.00	274.30
19	Eco-Tourism 1%	L.S	0.00	0.69	0.00	0.31	0.00	0.45	0.00	0.64	0.00	0.56	0.00	2.74
20	Eco-Battalion 6%	L.S	0.00	3.43	0.00	1.56	0.00	2.23	0.00	3.22	0.00	2.78	0.00	13.71
21	Eco-services 10%	L.S	0.00	6.85	0.00	3.11	0.00	4.47	0.00	6.44	0.00	5.56	0.00	27.43
22	Monitoring & Evaluation 5%	L.S	0.00	3.43	0.00	1.55	0.00	2.23	0.00	3.22	0.00	2.78	0.00	13.71
23	Escalation 10%	L.S	0.00	6.85	0.00	3.11	0.00	4.47	0.00	6.44	0.00	5.56	0.00	27.43
			0.00	89.74	0.00	40.72	0.00	58.50	0.00	84.42	0.00	73.85	0.00	359.23

6 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

S.No.	Name of Component	Unit	Division		Magroo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	CRSM CHECK DAM(Nc)	No.	0.00	0.00	8.39	2.79	11.19	3.72	13.43	4.47	3.36	1.12	36.36	12.10
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	15.00	5.00	15.00	5.00	22.50	7.50	3.00	1.00	55.50	18.50
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	133.33	2.00	200.00	3.00	333.33	5.00	66.67	1.00	733.33	11.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	4.00	0.00	5.00	0.00	7.50	0.00	3.00	0.00	19.50
	Total		0.00	0.00	156.72	13.79	226.19	16.72	369.26	24.47	73.02	6.12	825.19	61.10
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	7.89	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	7.89	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	1.00	7.50	0.00	0.00	1.00	7.50
4	BIO-ENGINEERING MEASURES													
a)	Treatment of slope/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.27	1.50	0.54	3.00	0.81	4.50	0.27	1.50	1.89	10.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	2.96	0.20	14.29	1.00	80.00	4.20	2.86	0.20	80.00	5.60
d)	Pine Needle Logs (No)	No	0.00	0.00	79.17	0.40	126.67	0.63	95.00	0.47	79.17	0.40	380.00	1.90
	Total		0.00	0.00	82.29	2.10	141.49	4.63	155.81	9.17	82.29	2.10	461.89	18.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	11.19	7.50	8.96	6.00	23.13	15.50	1.49	1.00	44.78	30.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	1.19	0.89	2.24	1.50	3.43	2.30	0.60	0.40	7.46	5.00
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	5.38	2.00	5.38	2.00	8.06	3.00	2.69	1.00	21.51	8.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Spec	Ha	0.00	0.00	0.45	0.30	0.45	0.30	2.27	1.50	0.30	0.20	3.48	2.30
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.67	0.50	8.33	2.50	8.33	2.50	8.33	2.50	26.67	8.00
i)	Pasture Improvement	Ha	0.00	0.00	7.14	0.50	7.14	0.50	17.14	1.20	4.29	0.30	35.71	2.50
j)	NTFP Plantations of Tali Plants	Ha	0.00	0.00	1.82	0.60	3.63	1.00	5.45	1.80	2.42	0.80	12.73	4.20
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	29.85	12.29	35.53	13.80	67.84	27.50	20.12	6.20	152.34	60.00
6	NURSERY DEVELOPMENT													
a)	farmers	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Ney	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0
7	Gosadara	No	0	0	0	0	0	0	0	0	0	0	0	7.50
8	Energy Conservation/ Forest Protection	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
9	Fuel Saving Devices	L.S	0	7.50	0	0	0	0	0	0	0	0	0	15.00
10	Forest Infrastructure Development	L.S	0	15.00	0	0	0	0	0	0	0	0	0	7.50
11	Operational support	L.S	0	7.50	0	0	0	0	0	0	0	0	0	15.00
12	Animal Husbandry support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
13	Agriculture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
14	Horticulture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	4.00
15	Wild Life Improvement	L.S	0	4.00	0	0	0	0	0	0	0	0	0	3.00
16	Joint Forest Management incl. micro-planning	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
17	Research & Studies	L.S	0	3.00	0	0	0	0	0	0	0	0	0	6.00
18	Training, awareness & Publicity	L.S	0	6.00	0	0	0	0	0	0	0	0	0	6.00
	Total (1-18)		0.00	68.50	0.00	31.09	0.00	37.16	0.00	71.94	0.00	15.81	0.00	224.30
19	Eco-Tourism 1%	L.S	0.00	0.69	0.00	0.31	0.00	0.37	0.00	0.72	0.00	0.16	0.00	2.24
20	Eco-Battalion 5%	L.S	0.00	3.43	0.00	1.55	0.00	1.86	0.00	3.60	0.00	0.78	0.00	11.21
21	Eco-services 10%	L.S	0.00	6.85	0.00	3.11	0.00	3.72	0.00	7.19	0.00	1.56	0.00	22.43
22	Monitoring & Evaluation 5%	L.S	0.00	3.43	0.00	1.55	0.00	1.86	0.00	3.60	0.00	0.78	0.00	11.21
23	Escalation 10%	L.S	0.00	6.85	0.00	3.11	0.00	3.72	0.00	7.19	0.00	1.56	0.00	22.43
	Total		0.00	89.74	0.00	40.72	0.00	48.71	0.00	94.24	0.00	20.43	0.00	293.82

7 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

S. No	Name of Component	Unit	Division		Magroo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	CRSM CHECK DAM(No)	No.	0.00	0.00	6.59	2.79	11.19	5.72	13.43	4.47	3.36	1.12	36.36	12.10
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	15.00	5.00	15.00	5.00	22.50	7.50	3.50	1.00	55.50	18.50
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	133.33	2.00	200.00	3.00	333.33	5.00	66.67	1.00	733.33	11.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	4.00	0.00	5.00	0.00	7.50	0.00	3.00	0.00	19.50
	Total		0.00	0.00	154.72	13.79	226.19	16.72	369.26	24.47	73.02	6.12	825.19	61.10
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	7.89	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	7.89	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	7.50	1.00	7.50
4	BIO-ENGINEERING MEASURES													
a)	Treatment of slips/ gullies/ rifs & sheet erosion (ha)	Ha	0.00	0.00	0.27	1.50	0.54	3.00	0.81	4.50	0.27	1.50	1.89	10.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Turfs (ha)	Ha	0.00	0.00	2.86	0.20	14.29	1.00	60.00	4.20	2.86	0.20	80.00	5.60
d)	Pine Needle Logs (No)	No	0.00	0.00	79.17	0.46	126.67	0.83	95.00	0.47	79.17	0.46	380.00	1.80
	Total		0.00	0.00	82.29	2.16	141.49	4.83	155.81	9.17	82.29	2.16	461.89	18.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (Including Maintenance)	Ha	0.00	0.00	11.19	7.50	8.96	6.00	23.13	15.50	1.49	1.00	44.78	30.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	1.19	0.80	2.24	1.50	3.43	2.30	0.40	0.40	7.46	5.00
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	5.39	2.00	5.39	2.00	8.08	3.00	2.69	1.00	21.51	8.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.45	0.30	0.45	0.30	2.27	1.50	0.30	0.20	3.49	2.30
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.67	0.50	8.33	2.50	8.33	2.50	8.33	2.50	26.67	8.00
i)	Pasture Improvement	Ha	0.00	0.00	7.14	0.50	7.14	0.50	17.14	1.20	4.29	0.30	35.71	2.50
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	1.82	0.60	3.03	1.00	5.45	1.80	2.42	0.80	12.73	4.20
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	28.85	12.20	35.53	13.80	67.84	27.80	20.12	6.20	152.34	60.00
6	NURSERY DEVELOPMENT													
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery devlopment (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nrs	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0
7	Gosadans	No	0	0	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
9	Fuel Saving Devices	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
10	Forest Infrastructure Development	L.S	0	15.00	0	0	0	0	0	0	0	0	0	15.00
11	Operational support	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
12	Animal Husbandry support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
13	Agriculture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
14	Horticulture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
15	Wild Life improvement	L.S	0	4.50	0	0	0	0	0	0	0	0	0	4.50
16	Joint Forest Management Incl. micro-planning	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
17	Research & Studies	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
18	Training, awareness & Publicity	L.S	0	6.00	0	0	0	0	0	0	0	0	0	6.00
	Total (1-18)		0.00	69.50	0.00	31.09	0.00	37.15	0.00	84.44	0.00	23.11	0.00	334.30
19	Eco-Tourism 1%	L.S	0.00	0.69	0.00	0.31	0.00	0.37	0.00	0.84	0.00	0.23	0.00	2.34
20	Eco-Battalion 5%	L.S	0.00	3.42	0.00	1.55	0.00	1.86	0.00	3.22	0.00	1.16	0.00	11.21
21	Eco-services 10%	L.S	0.00	6.85	0.00	3.11	0.00	3.72	0.00	6.44	0.00	2.31	0.00	22.43
22	Monitoring & Evaluation 5%	L.S	0.00	3.43	0.00	1.55	0.00	1.86	0.00	3.22	0.00	1.16	0.00	11.21
23	Escalation 10%	L.S	0.00	6.85	0.00	3.11	0.00	3.72	0.00	6.44	0.00	2.31	0.00	22.43
	G. Total	L.S	0.00	89.7	0.00	40.72	0.00	48.67	0.00	84.42	0.00	30.28	0.00	293.83

8 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

Sr.No	Name of Component	Unit	Division		Majroo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	8.39	2.79	11.19	3.72	13.43	4.47	3.36	1.12	36.36	12.10
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	15.00	5.00	15.00	5.00	22.50	7.50	3.00	1.00	55.50	18.50
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	133.33	2.00	200.00	3.00	333.33	5.00	66.67	1.00	733.33	11.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	4.00	0.00	5.00	0.00	7.50	0.00	3.00	0.00	19.50
	Total		0.00	0.00	156.72	13.79	226.19	16.72	369.26	24.47	73.02	6.12	825.19	61.10
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	7.89	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
b)	Construction of van sanrver (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	7.89	3.00	5.26	2.00	7.89	3.00	3.16	1.20	24.21	9.20
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO ENGINEERING MEASURES													
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.27	1.50	0.54	3.00	0.81	4.50	0.27	1.50	1.89	10.50
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	2.86	0.20	14.29	1.00	80.00	4.20	2.86	0.20	80.00	5.60
d)	Pine Needle Logs (No)	No	0.00	0.00	79.17	0.40	126.67	0.63	95.00	0.47	79.17	0.40	380.00	1.90
	Total		0.00	0.00	82.29	2.10	141.49	4.63	155.81	9.17	82.29	2.10	461.89	18.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	11.19	7.50	8.96	6.00	23.13	15.50	1.49	1.00	44.78	30.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	1.19	0.60	2.24	1.50	3.43	2.30	0.60	0.40	7.46	5.00
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	5.38	2.00	5.38	2.00	8.06	3.00	2.69	1.00	21.51	8.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.45	0.30	0.45	0.30	2.27	1.50	0.30	0.20	3.49	2.30
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	1.67	0.50	8.33	2.50	8.33	2.50	8.33	2.50	26.67	8.00
i)	Pasture Improvement	Ha	0.00	0.00	7.14	0.50	7.14	0.50	17.14	1.20	4.29	0.30	35.71	2.50
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	1.82	0.60	3.03	1.00	5.45	1.80	2.42	0.80	12.73	4.20
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	28.88	12.20	35.53	13.80	67.84	27.80	20.12	6.20	152.34	60.00
6	NURSERY DEVELOPMENT													
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai/ Fir/ Nry	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0
7	Gosadans	No	0	0	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
9	Fuel Saving Devices	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
10	Forest Infrastructure Development	L.S	0	15.00	0	0	0	0	0	0	0	0	0	15.00
11	Operational support	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
12	Animal Husbandry support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
13	Agriculture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
14	Horticulture support	L.S	0	5.00	0	0	0	0	0	0	0	0	0	5.00
15	Wild Life Improvement	L.S	0	4.00	0	0	0	0	0	0	0	0	0	4.00
16	Joint Forest Management incl. micro-planning	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
17	Research & Studies	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
18	Training, awareness & Publicity	L.S	0	6.00	0	0	0	0	0	0	0	0	0	6.00
	Total (1-18)		0.00	69.50	0.00	31.09	0.00	37.15	0.00	64.44	0.00	15.61	0.00	216.80
19	Eco-Tourism 1%	L.S	0.00	0.69	0.00	0.31	0.00	0.37	0.00	0.64	0.00	0.16	0.00	2.17
20	Eco-Battalion 5%	L.S	0.00	3.43	0.00	1.55	0.00	1.86	0.00	3.22	0.00	0.78	0.00	10.84
21	Eco-services 10%	L.S	0.00	6.85	0.00	3.11	0.00	3.72	0.00	6.44	0.00	1.56	0.00	21.68
22	Monitoring & Evaluation 5%	L.S	0.00	3.43	0.00	1.55	0.00	1.86	0.00	3.22	0.00	0.78	0.00	10.84
23	Escalation 10%	L.S	0.00	6.85	0.00	3.11	0.00	3.72	0.00	6.44	0.00	1.56	0.00	21.68
	G. Total	L.S	0.00	99.74	0.00	45.72	0.00	48.67	0.00	84.42	0.00	20.45	0.00	284.00

9 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

S.No.	Name of Component	Unit	Division		Magrom		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	4.19	1.40	5.59	1.86	6.71	2.23	1.68	0.56	18.16	6.05
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	7.50	2.50	7.50	2.50	11.25	3.75	1.50	0.50	27.75	9.25
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	66.67	1.00	100.00	1.50	166.67	2.50	33.33	0.50	366.67	5.50
d)	Nala treatment	L.S	0.00	0.00	0.00	2.00	0.00	2.50	0.00	3.75	0.00	1.50	0.00	9.75
	Total		0.00	0.00	78.36	6.90	113.09	8.36	184.63	12.23	36.51	3.06	412.60	30.55
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	3.95	1.52	2.63	1.00	3.95	1.50	1.58	0.60	12.11	4.60
b)	Construction of Van samrod dam	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	3.95	1.52	2.63	1.00	3.95	1.50	1.58	0.60	12.11	4.60
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES													
a)	Treatment of slope/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	2.14	0.75	0.27	1.50	6.41	2.25	0.14	0.75	0.96	5.25
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	1.43	0.10	7.14	0.50	35.00	2.10	1.43	0.10	40.00	2.80
d)	Pine Needle Logs (No)	No	0.00	0.00	39.58	0.20	63.33	0.32	47.50	0.24	39.58	0.20	190.00	0.96
	Total		0.00	0.00	41.15	1.05	70.75	2.32	77.91	4.59	41.15	1.05	230.96	9.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (Including Maintenance)	Ha	0.00	0.00	5.60	3.75	4.48	3.00	11.57	7.75	0.75	0.50	22.39	15.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	0.60	0.40	1.12	0.75	1.72	1.15	0.30	0.20	3.73	2.50
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	2.69	1.00	2.68	1.00	4.03	1.50	1.34	0.50	10.75	4.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Spec	Hs	0.00	0.00	0.23	0.15	0.23	0.15	1.14	0.75	0.15	0.10	1.74	1.15
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.83	0.25	4.17	1.25	4.17	1.25	4.17	1.25	13.33	4.00
i)	Pasture Improvement	Ha	0.00	0.00	3.57	0.25	3.57	0.25	8.57	0.60	2.14	0.15	17.86	1.25
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.91	0.35	1.52	0.58	2.73	0.90	1.21	0.40	6.36	2.10
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	14.42	6.10	17.77	6.90	33.92	13.90	10.06	3.10	76.17	30.00
6	NURSERY DEVELOPMENT													
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nty	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0
7	Gosadans	No	0	0	0	0	0	0	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	3.75	0	0	0	0	0	0	0	0	0	3.75
9	Fuel Saving Devices	L.S	0	3.75	0	0	0	0	0	0	0	0	0	3.75
10	Forest Infrastructure Development	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
11	Operational support	L.S	0	0	0	0	0	0	0	0	0	0	0	0
12	Animal Husbandry support	L.S	0	2.50	0	0	0	0	0	0	0	0	0	2.50
13	Agriculture support	L.S	0	2.50	0	0	0	0	0	0	0	0	0	2.50
14	Horticulture support	L.S	0	2.50	0	0	0	0	0	0	0	0	0	2.50
15	Wild Life Improvement	L.S	0	2.00	0	0	0	0	0	0	0	0	0	2.00
16	Joint Forest Management incl. micro-planning	L.S	0	1.50	0	0	0	0	0	0	0	0	0	1.50
17	Research & Studies	L.S	0	1.50	0	0	0	0	0	0	0	0	0	1.50
18	Training, awareness & Publicity	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
	Total (1-18)		0.00	30.50	0.00	15.54	0.00	18.56	0.00	32.22	0.00	7.81	0.00	104.65
19	Eco-Tourism 1%	L.S	0.00	0.31	0.00	0.16	0.00	0.19	0.00	0.32	0.00	0.08	0.00	1.05
20	Eco-Rattalion 5%	L.S	0.00	1.53	0.00	0.78	0.00	0.93	0.00	1.61	0.00	0.39	0.00	5.23
21	Eco-services 10%	L.S	0.00	3.05	0.00	1.55	0.00	1.86	0.00	3.22	0.00	0.78	0.00	10.46
22	Monitoring & Evaluation 5%	L.S	0.00	1.53	0.00	0.78	0.00	0.93	0.00	1.61	0.00	0.39	0.00	5.23
23	Escalation 10%	L.S	0.00	3.05	0.00	1.55	0.00	1.86	0.00	3.22	0.00	0.78	0.00	10.46
			0.00	39.99	0.00	20.39	0.00	24.34	0.00	42.21	0.00	10.23	0.00	137.08

10 YEAR WISE COST ABSTRACT OF KARSOG DIVISION

S.No.	Name of Component	Unit	Division		Magroo		Seri		Karsog		Pangna		Total	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES													
a)	DRSM CHECK DAM(No)	No.	0.00	0.00	4.19	1.40	5.59	1.86	8.11	2.23	1.68	0.56	19.58	6.05
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	7.50	2.50	7.50	2.50	11.25	3.75	1.50	0.50	27.75	9.25
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	66.67	1.00	100.00	1.50	166.67	2.50	33.33	0.50	366.67	5.50
d)	Nala treatment	L.S	0.00	0.00	0.00	2.00	0.00	2.50	0.00	3.75	0.00	1.50	0.00	9.75
	Total		0.00	0.00	78.36	6.90	113.09	8.36	184.03	12.23	36.51	3.06	412.50	30.55
2	WATER HARVESTING SYSTEM													
a)	Staggered Water harvesting trenches (ha)	Ha	0.00	0.00	3.95	1.50	2.63	1.00	3.95	1.50	1.58	0.60	12.11	4.60
b)	Construction of van sanrver (No)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building (no)	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	No.	0.00	0.00	3.95	1.50	2.63	1.00	3.95	1.50	1.58	0.60	12.11	4.60
3	G&D STATIONS (No) (SCP)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES													
a)	Treatment of sipal gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.14	0.75	0.27	1.50	0.41	2.25	0.14	0.75	0.95	5.25
b)	Roadside Erosion Control (LS)	L.S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	1.43	0.10	7.14	0.50	30.00	2.10	1.43	0.10	40.00	2.80
d)	Pine Needle Logs (No)	No	0.00	0.00	39.58	0.20	83.33	0.32	47.50	0.24	39.58	0.20	190.00	0.95
	Total		0.00	0.00	41.15	1.05	70.75	2.32	77.91	4.59	41.15	1.05	230.95	9.00
5	BIOLOGICAL MEASURES													
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	5.60	3.75	4.48	3.00	11.57	7.75	0.75	0.50	22.39	15.00
b)	Regeneration/ Plantation of Oak Forest	Ha	0.00	0.00	0.60	0.40	1.12	0.75	1.72	1.15	0.30	0.20	3.73	2.50
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	2.69	1.00	2.69	1.00	4.03	1.50	1.34	0.50	10.75	4.00
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Spe	Ha	0.00	0.00	0.23	0.15	0.23	0.15	1.14	0.75	0.15	0.10	1.74	1.15
g)	Enrichment Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.83	0.25	4.17	1.25	4.17	1.25	4.17	1.25	13.33	4.00
i)	Pasture Improvement	Ha	0.00	0.00	3.57	0.25	3.57	0.25	8.57	0.60	2.14	0.15	17.86	1.25
j)	NTFP Plantations of Tail Plants	Ha	0.00	0.00	0.91	0.30	1.52	0.50	2.73	0.90	1.21	0.40	6.36	2.10
a)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	14.42	6.10	17.77	6.90	33.92	13.90	10.06	3.10	76.17	30.00
6	NURSERY DEVELOPMENT													
a)	Raising of High Value Medicinal Species for distribution to	L.S	0	0	0	0	0	0	0	0	0	0	0	0
b)	Nursery devlopment (incl.infrastructure development)	L.S	0	0	0	0	0	0	0	0	0	0	0	0
c)	Establishment of Khansu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0	0	0	0	0	0	0
	Total	Nc	0	0	0	0	0	0	0	0	0	0	0	0
7	Oosadans	L.S	0	3.75	0	0	0	0	0	0	0	0	0	3.75
8	Energy Conservation/ Forest Protection	L.S	0	3.75	0	0	0	0	0	0	0	0	0	3.75
9	Fuel Saving Devices	L.S	0	7.50	0	0	0	0	0	0	0	0	0	7.50
10	Forest Infrastructure Development	L.S	0	0	0	0	0	0	0	0	0	0	0	0
11	Operational support	L.S	0	2.50	0	0	0	0	0	0	0	0	0	2.50
12	Animal Husbandry support	L.S	0	2.50	0	0	0	0	0	0	0	0	0	2.50
13	Agriculture support	L.S	0	2.50	0	0	0	0	0	0	0	0	0	2.50
14	Horticulture support	L.S	0	2.00	0	0	0	0	0	0	0	0	0	2.00
15	Wild Life Improvement	L.S	0	1.50	0	0	0	0	0	0	0	0	0	1.50
16	Joint Forest Management incl. micro-planning	L.S	0	1.50	0	0	0	0	0	0	0	0	0	1.50
17	Research & Studies	L.S	0	3.00	0	0	0	0	0	0	0	0	0	3.00
18	Training, awareness & Publicity		0.00	30.00	0.00	15.54	0.00	15.55	0.00	32.23	0.00	7.81	0.00	104.65
	Total (1-18)	L.S	0.00	5.31	0.00	0.16	0.00	0.19	0.00	0.32	0.00	0.00	0.00	1.98
19	Eco-Tourism 1%	L.S	0.00	1.63	0.00	0.78	0.00	0.93	0.00	1.61	0.00	0.39	0.00	5.33
20	Eco-Battalion 3%	L.S	0.00	3.05	0.00	1.55	0.00	1.86	0.00	3.22	0.00	0.78	0.00	10.46
21	Eco-services 10%	L.S	0.00	1.63	0.00	0.78	0.00	0.93	0.00	1.61	0.00	0.39	0.00	5.33
22	Monitoring & Evaluation 5%	L.S	0.00	3.05	0.00	1.55	0.00	1.86	0.00	3.22	0.00	0.78	0.00	10.46
23	Escalation 18%	L.S	0.00	20.98	0.00	10.38	0.00	12.44	0.00	21.71	0.00	5.27	0.00	71.78
	G. Total		0.00	39.98	0.00	20.38	0.00	24.34	0.00	42.31	0.00	10.23	0.00	137.09

COMPONENT WISE COST ABSTRACT OF SAMALA DIVISION (in Lakhs)

Annexure-VII

S.No.	Name of Component	Unit	Chiloria Division		Bhaji Range		Total	
			Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
1	ENGINEERING MEASURES							
a)	GRSM /BRUSH WOOD CHECK DAM(No)	No	0.00	0.00	133.41	44.40	133.41	44.40
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
		Total	0.00	0.00	133.41	44.40	133.41	44.40
2	WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	15.00	5.70	15.00	5.70
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
c)	Construction of van sarovar (No)	No.	0.00	0.00	5.00	10.00	5.00	10.00
d)	Roof top Harvesting in HP/PD buildings(No)		0.00	0.00	20.00	15.70	20.00	15.70
		Total	0.00	0.00	0.00	0.00	0.00	0.00
3	G&D STATIONS (No) (SCP)	No.						
4	BIO-ENGINEERING MEASURES							
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
		Total	0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	45.15	30.25	45.15	30.25
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	166.09	111.29	166.09	111.29
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	278.90	103.75	278.90	103.75
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	950.00	237.50	950.00	237.50
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
		Total	0.00	0.00	1440.14	482.78	1440.14	482.78
6	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	3.00	0	3.00
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	15.00	0	15.00
c)	Establishment of Khansu Oak/ Rai Fir Ney	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	15.00	0	15.00
		Total	0	0	0	33.00	0	33.00
7	Gosadans	No	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	23.00	0	23.00
9	Fuel Saving Devices	L.S	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	40.00	0	40.00
11	Operational support	L.S	0	10.00	0	10.00	0	22.00
12	Animal husbandry support	L.S	0	0	0	2.00	0	2.00
13	Agriculture support	L.S	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	5.00	0	5.00
15	Wildlife support	L.S	0	0	0	0	0	0
16	Joint Forest Management incl. micro planning	L.S	0	8.00	0	3.00	0	11.00
17	Research & Studies	L.S	0	2.00	0	0	0	2.00
18	Training Awareness & Publicity	L.S	0	0	0	0	0	0
		Total (1-18)	0.00	20.00	0.00	156.00	0.00	179.00
19	Eco-Tourism 1%	L.S	0.00	0.39	0.00	5.40	0.00	5.79
20	Eco-Siviution 5%	L.S	0.00	1.99	0.00	33.94	0.00	33.94
21	Eco-services 10%	L.S	0.00	3.99	0.00	63.89	0.00	67.89
22	Monitoring and Evaluation 5 %	L.S	0.00	1.99	0.00	33.94	0.00	33.94
23	Escalation 10%	L.S	0.00	3.99	0.00	63.89	0.00	67.89
		G. Total	0.00	36.39	0.00	863.13	0.00	899.53

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5 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)

S. No.	Name of Component	Unit	Shimla Division		Sheoji Range		Total	
			Phy.	Fin	Phy.	Fin	Phy.	Fin
	1 ENGINEERING MEASURES							
a)	DRISM /BRUSH WOOD CHECK DAM(No)	No	0.00	0.00	0.00	0.00	0.00	0.00
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
	2 WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	0.00	0.00	0.00	0.00
b)	Construction of van sanvyar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD building(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
	3 G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	4 BIO-ENGINEERING MEASURES							
a)	Treatment of slope/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Turfs (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Fine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
	5 BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	0.00	0.00	0.00	0.00
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replacement of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
e)	Replacement afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment/ plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tali Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
	6 NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	3.00	0	3.00
b)	Nursery development (excl infrastructure development)	L.S	0	0	0	15.00	0	15.00
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	15.00	0	15.00
	Total		0	0	0	33.00	0	33.00
	7 Grasslans	Ha	0	0	0	0	0	0
	8 Energy Conservation/ Forest Protection	L.S	0	0	0	0	0	0
	9 Fuel Saving Devices	L.S.	0	0	0	0	0	0
	10 Forest Infrastructure Development	L.S	0	0	0	0	0	0
	11 Operational support	L.S	0	0	0	0	0	0
	12 Animal Husbandry support	L.S	0	0	0	0	0	0
	13 Agriculture support	L.S	0	0	0	0	0	0
	14 Horticulture support	L.S	0	0	0	0	0	0
	15 Wildlife support	L.S	0	0	0	0	0	0
	16 Joint Forest Management Inst. micro planning	L.S	0	0	0	0	0	0
	17 Research & Studies	L.S	0	0	0	0	0	0
	18 Training Awareness & Publicity	L.S	0	0	0	0	0	0
	Total (1-18)	L.S	0.00	0.00	0.00	33.00	0.00	33.00
	19 Eco-Tourism 1%	L.S	0.00	0.00	0.00	0.33	0.00	0.33
	20 Eco-Sensitive 5%	L.S	0.00	0.00	0.00	1.65	0.00	1.65
	21 Eco-services 10%	L.S	0.00	0.00	0.00	3.30	0.00	3.30
	22 Monitoring and Evaluation 5 %	L.S	0.00	0.00	0.00	1.65	0.00	1.65
	23 Escalation 10%	L.S	0.00	0.00	0.00	3.30	0.00	3.30
	G. Total		0.00	0.00	0.00	43.23	0.00	43.23

1 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)

S.No	Name of Component	Unit	Shimla Division		Bhajji Range		Total	
			Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES							
a)	DRSM /BRUSH WOOD CHECK DAM(No)	No.	0.00	0.00	33.35	11.10	33.35	11.10
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	33.35	11.10	33.35	11.10
2	WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (ha)	Ha.	3.00	0.00	3.75	1.43	3.75	1.43
b)	Construction of van sanvar (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	1.00	0.00	1.00	2.00	1.00	2.00
	Total		0.00	0.00	4.75	3.43	4.75	3.43
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES							
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	11.29	7.56	11.29	7.56
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	41.52	27.82	41.52	27.82
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	69.73	20.94	69.73	25.94
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Spec	Ha	0.00	0.00	237.50	89.38	237.50	89.38
g	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tali Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	360.04	120.70	360.04	120.70
6	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0
b)	Nursery development (not infrastructure development)	L.S	0	0	0	0	0	0
c)	Establishment of Khasru Oak/ Rai Fir Nur	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0
	Total		0	0	0	0	0	0
7	Goasdans	no	0	0	0	3.75	0	3.75
8	Energy Conservation/ Forest Protection	L.S	0	0	0	0	0	0
9	Fuel Saving Devices	L.S	0	0	0	10.00	0	10.00
10	Forest infrastructure Development	L.S	0	3.00	0	3.00	0	6.00
11	Operational support	L.S	0	0	0	0.50	0	0.50
12	Animal Husbandry support	L.S	0	0	0	0	0	0
13	Agriculture support	L.S	0	0	0	1.21	0	1.21
14	Horticulture support	L.S	0	0	0	0	0	0.00
14	Wildlife support	L.S	0	0	0	2.75	0	2.75
16	Joint Forest Management incl. micro planning	L.S	0	2.00	0	0	0	0.50
17	Research & Studies	L.S	0	0.50	0	0	0	0
18	Training Awareness & Publicity	L.S	0	0	0	0	0	0
	Total	L.S	0.00	5.50	0.00	196.47	0.00	181.97
19	Eco-Tourism 1%	L.S	0.00	0.06	0.00	1.96	0.00	1.83
20	Eco-Battalion 3%	L.S	0.00	0.28	0.00	7.83	0.00	8.10
21	Eco-services 10%	L.S	0.00	0.55	0.00	15.65	0.00	16.20
22	Monitoring and Evaluation 5 %	L.S	0.00	0.28	0.00	7.83	0.00	8.10
23	Escalation 10%	L.S	0.00	0.55	0.00	15.65	0.00	16.20
	G. Total	L.S	0.00	7.21	0.00	204.98	0.00	212.18

2 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (In Lakhs)

S.No	Name of Component	Unit	Shimla Division		Bhajji Range		Total	
			Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES							
a)	DRISM /BRUSH WOOD CHECK DAM(No)	No	0.00	0.00	13.34	4.44	13.34	4.44
b)	RETENTION WALL(Mtr)	Mtr.	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	13.34	4.44	13.34	4.44
2	WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	1.50	0.57	1.50	0.57
b)	Construction of van sarpwar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	1.00	2.00	1.00	2.00
	Total		0.00	0.00	2.50	2.57	2.50	2.57
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES							
a)	Treatment of slope gullies/ ntr & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES							
a)	Afforestation (Including Maintenance)	Ha	0.00	0.00	4.52	3.03	4.52	3.03
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	16.61	11.13	16.61	11.13
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	27.89	10.38	27.89	10.38
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	95.00	23.75	95.00	23.75
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tat Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rin Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	144.01	48.28	144.01	48.28
6	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0
	Total		0	0	0	0	0	0
7	Gosadans	no	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	2.50	0	2.5
9	Fuel Saving Devices	L.S	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	4.00	0	4.00
11	Operational support	L.S	0	1.50	0	1.00	0	2.50
12	Animal Husbandry support	L.S	0	0	0	0.30	0	0.30
13	Agriculture support	L.S	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	0.50	0	0.50
15	Wildlife support	L.S	0	0	0	0	0	0
16	Joint Forest Management incl. micro planning	L.S	0	0.50	0	0.20	0	1.70
17	Research & Studies	L.S	0	0	0	0	0	0.20
18	Training Awareness & Publicity	L.S	0	0	0	0	0	0
	Total (1-18)	L.S	0.00	2.00	0.00	63.59	0.00	65.59
19	Eco-Tourism 1%	L.S	0.00	0.02	0.00	0.64	0.00	0.66
20	Eco-Battalion 5%	L.S	0.00	0.10	0.00	3.18	0.00	3.28
21	Eco-services 10%	L.S	0.00	0.20	0.00	6.36	0.00	6.56
22	Monitoring and Evaluation 5 %	L.S	0.00	0.10	0.00	3.18	0.00	3.28
23	Escalation 10%	L.S	0.00	0.20	0.00	6.36	0.00	6.56
	G. Total	L.S	0.00	2.62	0.00	83.30	0.00	85.92

4 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)

S.No	Name of Component	Unit	Shimla Division		Bhajji Range		Total	
			Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES							
a)	DRSM /BRUSH WOOD CHECK DAM(No)	No	0.00	0.00	13.34	4.44	13.34	4.44
b)	RETENTION WALL(Mtr.)	Mtr	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	13.34	4.44	13.34	4.44
2	WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	1.50	0.57	1.50	0.57
b)	Construction of van sarowar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	1.00	2.00	1.00	2.00
	Total		0.00	0.00	2.50	2.57	2.50	2.57
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES							
a)	Treatment of slips/ gullies/ nils & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	4.52	3.03	4.52	3.03
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	16.61	11.13	16.61	11.13
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	27.59	10.38	27.59	10.38
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	95.00	23.75	95.00	23.75
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tail Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	144.01	48.28	144.01	48.28
6	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nty	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0
	Total		0	0	0	0	0	0
7	Goadians	no	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	2.30	0	2.30
9	Fuel Saving Devices	L.S	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	4.00	0	4.00
11	Operational support	L.S	0	1.00	0	1.00	0	2.00
12	Animal Husbandry support	L.S	0	0	0	0.20	0	0.20
13	Agriculture support	L.S	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	2.80	0	0.60
15	Wildlife support	L.S	0	0	0	0	0	0
16	Joint Forest Management incl. micro planning	L.S	0	0.80	0	0.30	0	1.10
17	Research & Studies	L.S	0	0.20	0	0	0	0.20
18	Training Awareness & Publicity	L.S	0	0	0	0	0	0
	Total (1-18)		0.00	2.00	0.00	83.59	0.00	85.59
19	Eco-Tourism 1%	L.S	0.00	0.02	0.00	0.64	0.00	0.66
20	Eco-Battalion 5%	L.S	0.00	0.10	0.00	3.18	0.00	3.28
21	Eco-services 10%	L.S	0.00	0.20	0.00	6.36	0.00	6.56
22	Monitoring and Evaluation 5 %	L.S	0.00	0.10	0.00	3.18	0.00	3.28
23	Escalation 10%	L.S	0.00	0.20	0.00	6.36	0.00	6.56
	Total	L.S	0.00	2.62	0.00	83.30	0.00	85.92

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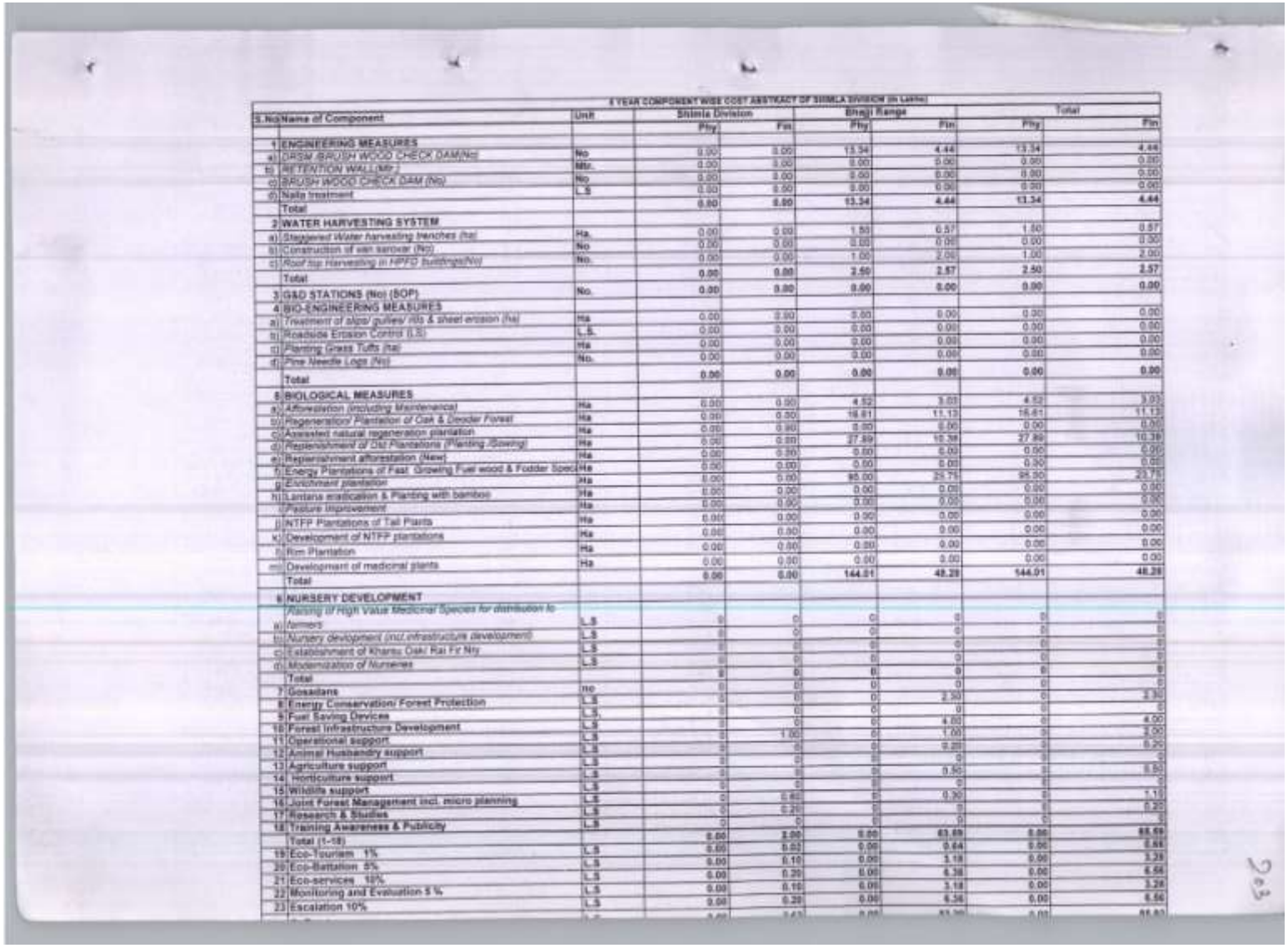
5 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)

S.No	Name of Component	Unit	Shimla Division		Bhajji Range		Total	
			Phy	Fin	Phy	Fin	Phy	Fin
I	ENGINEERING MEASURES							
a)	LOCM /BRUSH WOOD CHECK DAM(No)	No	0.00	0.00	6.67	2.22	6.67	2.22
b)	RETENTION WALL(Rft)	Mtr.	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
d)	Soils treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	6.67	2.22	6.67	2.22
II	WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (Ha)	Ha.	0.00	0.00	0.75	0.75	0.75	0.75
b)	Construction of van sarovar (Nos)	No	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD Buildings(No)	Nos.	0.00	0.00	1.00	2.00	1.00	2.00
	Total		0.00	0.00	1.75	2.75	1.75	2.75
III	O&G STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
IV	BIO-ENGINEERING MEASURES							
a)	Treatment of slope gullies/ nits & sheet erosion (Ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Turfs (Ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (Nos)	Nos.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
V	BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	2.26	1.51	2.26	1.51
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	8.36	5.56	8.36	5.56
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replacement of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	13.94	5.19	13.95	5.19
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	47.50	11.88	47.50	11.88
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Ber Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	72.01	24.14	72.01	24.14
VI	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nty	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0
	Total		0	0	0	0	0	0
7	Grassland	Ha	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	1.11	0	1.11
9	Fuel Saving Devices	L.S	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	2.00	0	2.00
11	Operational support	L.S	0	1.00	0	1.00	0	2.00
12	Animal Husbandry support	L.S	0	0	0	0.10	0	0.10
13	Agriculture support	L.S	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	0.21	0	0.21
15	Wildlife support	L.S	0	0	0	0	0	0
16	Joint Forest Management incl. micro planning	L.S	0	0.40	0	0.15	0	0.55
17	Research & Studies	L.S	0	0.10	0	0	0	0.10
18	Training Awareness & Publicity	L.S	0	0	0	0	0	0
	Total (1-18)		0.00	1.50	0.00	33.29	0.00	34.79
19	Eco-Tourism 1%	L.S	0.00	0.02	0.00	0.33	0.00	0.35
20	Eco-Battalion 4%	L.S	0.00	0.09	0.00	1.66	0.00	1.74
21	Eco-services 10%	L.S	0.00	0.15	0.00	3.33	0.00	3.48
22	Monitoring and Evaluation 5 %	L.S	0.00	0.08	0.00	1.66	0.00	1.74
23	Escalation 10%	L.S	0.00	0.15	0.00	3.33	0.00	3.48
	G. Total	L.S	0.00	1.97	0.00	43.63	0.00	48.58



5 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)

S.No	Name of Component	Unit	Shimla Division		Bhajji Range		Total	
			Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES							
a)	DRSM /BRUSH WOOD CHECK DAM(No)	No	0.00	0.00	13.34	4.44	13.34	4.44
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	13.34	4.44	13.34	4.44
2	WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	1.50	0.57	1.50	0.57
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	1.00	2.00	1.00	2.00
	Total		0.00	0.00	2.50	2.57	2.50	2.57
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES							
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	4.52	3.03	4.52	3.03
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	16.61	11.13	16.61	11.13
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	27.89	10.39	27.89	10.39
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Speci	Ha	0.00	0.00	95.00	23.75	95.00	23.75
g)	Enrichment plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tail Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	144.01	48.28	144.01	48.28
6	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nty	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0
	Total		0	0	0	0	0	0
7	Gossaltara	no	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	2.30	0	2.30
9	Fuel Saving Devices	L.S	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	4.00	0	4.00
11	Operational support	L.S	0	1.00	0	1.00	0	2.00
12	Animal Husbandry support	L.S	0	0	0	0.20	0	0.20
13	Agriculture support	L.S	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	0.50	0	0.50
15	Wildlife support	L.S	0	0	0	0	0	0
16	Joint Forest Management incl. micro planning	L.S	0	0.80	0	0.30	0	1.10
17	Research & Studies	L.S	0	0.20	0	0	0	0.20
18	Training Awareness & Publicity	L.S	0	0	0	0	0	0
	Total (1-18)		0.00	2.00	0.00	63.69	0.00	65.69
19	Eco-Tourism 1%	L.S	0.00	0.02	0.00	0.64	0.00	0.66
20	Eco-Battalion 5%	L.S	0.00	0.10	0.00	3.18	0.00	3.28
21	Eco-services 10%	L.S	0.00	0.20	0.00	6.38	0.00	6.58
22	Monitoring and Evaluation 5 %	L.S	0.00	0.10	0.00	3.18	0.00	3.28
23	Escalation 10%	L.S	0.00	0.20	0.00	6.38	0.00	6.58

6 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)

S.No	Name of Component	Unit	Shimla Division Phy	Shimla Division Fin	Bhajji Range Phy	Bhajji Range Fin	Total Phy	Total Fin
1	ENGINEERING MEASURES							
a)	DRSM /BRUSH WOOD CHECK DAM(No)	No	0.00	0.00	13.34	4.44	13.34	4.44
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	13.34	4.44	13.34	4.44
2	WATER HARVESTING SYSTEM							
a)	Staggered water harvesting trenches (ha)	Ha.	0.00	0.00	1.50	0.57	1.50	0.57
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.50	0.57	1.50	0.57
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES							
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	4.52	3.03	4.52	3.03
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	16.61	11.13	16.61	11.13
c)	Assissted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	27.89	10.38	27.89	10.38
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Spe	Ha	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	95.00	23.75	95.00	23.75
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	144.01	48.28	144.01	48.28
6	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to	L.S	0	0	0	0	0	0
b)	Nursery devlopment (incl infrastructure development)	L.S	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0
	Total		0	0	0	0	0	0
7	Gosadans	no	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	2.30	0	2.30
9	Fuel Saving Devices	L.S.	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	4.00	0	4.00
11	Operational support	L.S	0	1.00	0	1.00	0	2.00
12	Animal Husbandry support	L.S	0	0	0	0.20	0	0.20
13	Agriculture support	L.S	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	0.50	0	0.50
15	Wildlife support	L.S	0	0	0	0	0	0
16	Joint Forest Management incl. micro planning	L.S	0	0.80	0	0.30	0	1.10
17	Research & Studies	L.S	0	0.20	0	0	0	0.20
18	Training Awareness & Publicity	L.S	0	0	0	0	0	0
	Total (1-18)		0.00	2.00	0.00	61.59	0.00	63.59
19	Eco-Tourism 1%	L.S	0.00	0.02	0.00	0.62	0.00	0.64
20	Eco-Battalion 5%	L.S	0.00	0.10	0.00	3.08	0.00	3.18
21	Eco-services 10%	L.S	0.00	0.20	0.00	6.16	0.00	6.36
22	Monitoring and Evaluation 5 %	L.S	0.00	0.10	0.00	3.08	0.00	3.18
23	Escalation 10%	L.S	0.00	0.20	0.00	6.16	0.00	6.36
	G. Total	L.S	0.00	2.82	0.00	80.68	0.00	83.35

7 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)								
S.No	Name of Component	Unit	Shimla Division		Bhagi Range		Total	
			Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES							
a)	DRSM /BRUSH WOOD CHECK DAM(No)	No.	0.00	0.00	13.34	4.44	13.34	4.44
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	13.34	4.44	13.34	4.44
2	WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	1.50	0.57	1.50	0.57
b)	Construction of van sarovar (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.50	0.57	1.50	0.57
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES							
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	4.52	3.00	4.52	3.00
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	16.61	11.13	16.61	11.13
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	27.88	10.38	27.88	10.38
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00
g	Enrichment plantation	Ha	0.00	0.00	95.00	23.75	95.00	23.75
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i	Pasture Improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Ren Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	144.01	48.28	144.01	48.28
6	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0
b)	Nursery devlopment (incl.infrastructure development)	L.S	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0
	Total		0	0	0	0	0	0
7	Grasslans	Ha	0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S	0	0	0	2.30	0	2.30
9	Fuel Saving Devices	L.S	0	0	0	0	0	0
10	Forest Infrastructure Development	L.S	0	0	0	4.00	0	4.00
11	Operational support	L.S	0	1.00	0	1.00	0	2.00
12	Animal Husbandry support	L.S	0	0	0	0.20	0	0.20
13	Agriculture support	L.S	0	0	0	0	0	0
14	Horticulture support	L.S	0	0	0	0.50	0	0.50
15	Wildlife support	L.S	0	0	0	0	0	0
16	Joint Forest Management incl. micro planning	L.S	0	0.80	0	0.30	0	1.10
17	Research & Studies	L.S	0	0.20	0	0	0	0.20
18	Training Awareness & Publicity	L.S	0	0	0	0	0	0
	Total (1-18)		0.00	2.80	0.00	61.09	0.00	63.89
19	Eco-Tourism 1%	L.S	0.00	0.03	0.00	0.62	0.00	0.64
20	Eco-Battalion 5%	L.S	0.00	0.14	0.00	3.09	0.00	3.18
21	Eco-services 10%	L.S	0.00	0.28	0.00	6.18	0.00	6.36
22	Monitoring and Evaluation 5 %	L.S	0.00	0.14	0.00	3.09	0.00	3.18
23	Escalation 10%	L.S	0.00	0.28	0.00	6.16	0.00	4.36
	G. Total	L.S	0.00	3.82	0.00	80.48	0.00	83.30

Ṡ05

5 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)

S.No	Name of Component	Unit	Shimla Division		Bhaji Range		Total	
			Phy	Fin	Phy	Fin	Phy	Fin
1	ENGINEERING MEASURES							
a)	DRSM /BRUSH WOOD CHECK DAM(No)	No.	0.00	0.00	13.34	4.44	13.34	4.44
b)	RETENTION WALL(Mtr.)	Mtr.	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	13.34	4.44	13.34	4.44
2	WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (ha)	Ha.	0.00	0.00	1.50	0.67	1.50	0.67
b)	Construction of van sarovar (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	1.50	0.67	1.50	0.67
3	G&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES							
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	4.52	3.03	4.52	3.03
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	16.61	11.13	16.61	11.13
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	27.69	10.38	27.69	10.38
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing Fuel wood & Fodder Species	Ha	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	95.00	23.75	95.00	23.75
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture Improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tali Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	144.01	48.28	144.01	48.28
6	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0
b)	Nursery development (incl.infrastructure development)	L.S	0	0	0	0	0	0
c)	Establishment of Khasnu Oak/ Rai Fir Nrs	L.S	0	0	0	0	0	0
d)	Modernisation of Nurseries	L.S	0	0	0	0	0	0
	Total		0	0	0	0	0	0
7	Gosadans	no	0	0	0	2.30	0	2.30
8	Energy Conservation/ Forest Protection	L.S	0	0	0	0	0	0
9	Fuel Saving Devices	L.S	0	0	0	4.00	0	4.00
10	Forest Infrastructure Development	L.S	0	1.50	0	1.00	0	2.50
11	Operational support	L.S	0	0	0	0.20	0	0.20
12	Animal Husbandry support	L.S	0	0	0	0	0	0
13	Agriculture support	L.S	0	0	0	0.50	0	0.50
14	Horticulture support	L.S	0	0	0	0	0	0
15	Wildlife support	L.S	0	0.80	0	0.30	0	1.10
16	Joint Forest Management incl. micro planning	L.S	0	0.20	0	0	0	0.20
17	Research & Studies	L.S	0	0	0	0	0	0
18	Training Awareness & Publicity							
	Total (1-18)		0.00	2.00	0.00	61.59	0.00	63.59
19	Eco-Tourism 1%	L.S	0.00	0.02	0.00	0.42	0.00	0.44
20	Eco-Battalion 5%	L.S	0.00	0.10	0.00	3.06	0.00	3.16
21	Eco-services 10%	L.S	0.00	0.20	0.00	6.16	0.00	6.36
22	Monitoring and Evaluation 5 %	L.S	0.00	0.10	0.00	3.08	0.00	3.18
23	Escalation 10%	L.S	0.00	0.20	0.00	6.16	0.00	6.36
	G. Total	L.S	0.00	2.62	0.00	80.48	0.00	83.10

5 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)

S.No	Name of Component	Unit		Shimla Division Phy	Shimla Division Fin	Bhajji Range Phy	Bhajji Range Fin	Total Phy	Total Fin
1	ENGINEERING MEASURES								
a)	DRSM BRUSH WOOD CHECK DAM(No)	No		0.00	0.00	6.67	2.22	6.67	2.22
b)	RETENTION WALL(Mtr)	Mtr		0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No		0.00	0.00	0.00	0.00	0.00	0.00
d)	Nalla treatment	L.S		0.00	0.00	0.00	0.00	0.00	0.00
	Total			0.00	0.00	6.67	2.22	6.67	2.22
2	WATER HARVESTING SYSTEM								
a)	Staggered Water harvesting trenches (ha)	Ha.		0.00	0.00	0.75	0.25	0.75	0.25
b)	Construction of wall renewal (No)	No		0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.		0.00	0.00	0.00	0.00	0.00	0.00
	Total			0.00	0.00	0.75	0.25	0.75	0.25
3	GAD STATIONS (No) (SOP)	No.		0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES								
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha		0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S		0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha		0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.		0.00	0.00	0.00	0.00	0.00	0.00
	Total			0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES								
a)	Afforestation (including Maintenance)	Ha		0.00	0.00	2.25	1.51	2.25	1.51
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha		0.00	0.00	4.50	5.56	4.50	5.56
c)	Assisted natural regeneration plantation	Ha		0.00	0.00	0.00	0.00	0.00	0.00
d)	Replenishment of Old Plantations (Planting /Sowing)	Ha		0.00	0.00	13.95	5.19	13.95	5.19
e)	Replenishment afforestation (New)	Ha		0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing fuel wood & fodder spec	Ha		0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha		0.00	0.00	47.50	11.88	47.50	11.88
h)	Lantana eradication & Planting with Bamboo	Ha		0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha		0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tall Plants	Ha		0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha		0.00	0.00	0.00	0.00	0.00	0.00
l)	Rin Plantation	Ha		0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha		0.00	0.00	0.00	0.00	0.00	0.00
	Total			0.00	0.00	72.01	24.14	72.01	24.14
6	NURSERY DEVELOPMENT								
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S		0	0	0	0	0	0
b)	Nursery development (incl infrastructure development)	L.S		0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S		0	0	0	0	0	0
d)	Modernisation of Nurseries	L.S		0	0	0	0	0	0
	Total			0	0	0	0	0	0
7	Gosadans	No		0	0	0	0	0	0
8	Energy Conservation/ Forest Protection	L.S		0	0	0	0	0	0
9	Fuel Saving Devices	L.S		0	0	0	0	0	0
10	Forest Infrastructure Development	L.S		0	0	0	1.11	0	1.11
11	Operational support	L.S		0	0	0	0	0	0
12	Animal Husbandry support	L.S		0	0	0	2.00	0	2.00
13	Agriculture support	L.S		0	0	0	0	0	0
14	Horticulture support	L.S		0	0	0	0.10	0	0.10
15	Wildlife support	L.S		0	0	0	0	0	0
16	Joint Forest Management incl. micro planning	L.S		0	0	0	0.25	0	0.25
17	Research & Studies	L.S		0	0.4	0	0	0	0.4
18	Training Awareness & Publicity	L.S		0	0.1	0	0.15	0	0.25
	Total (1-18)			0.00	0.50	0.00	30.29	0.00	30.79
19	Eco-Tourism 1%	L.S		0.00	0.01	0.00	0.30	0.00	0.31
20	Eco-Battalion 6%	L.S		0.00	0.03	0.00	1.81	0.00	1.84
21	Eco-services 10%	L.S		0.00	0.05	0.00	3.03	0.00	3.08
22	Monitoring and Evaluation 5 %	L.S		0.00	0.03	0.00	1.81	0.00	1.54
23	Escalation 10%	L.S		0.00	0.05	0.00	3.03	0.00	3.08
	G. Total	L.S		0.00	0.66	0.00	39.68	0.00	40.34

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10 YEAR COMPONENT WISE COST ABSTRACT OF SHIMLA DIVISION (in Lakhs)

S. No	Name of Component	Unit	Shimla Division Phy	Shimla Division Fin	Bhaji Range Phy	Bhaji Range Fin	Total Phy	Total Fin
1	ENGINEERING MEASURES							
a)	CRSM /BRUSH WOOD CHECK DAM(No)	No	0.00	0.00	6.67	2.22	6.67	2.22
b)	RETENTION WALL(Mtr)	Mtr	0.00	0.00	0.00	0.00	0.00	0.00
c)	BRUSH WOOD CHECK DAM (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
d)	Nala treatment	L.S	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	6.67	2.22	6.67	2.22
2	WATER HARVESTING SYSTEM							
a)	Staggered Water harvesting trenches (ha)	Ha	0.00	0.00	0.75	0.29	0.75	0.29
b)	Construction of rain harvest (No)	No	0.00	0.00	0.00	0.00	0.00	0.00
c)	Roof top Harvesting in HPFD buildings(No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.75	0.29	0.75	0.29
3	D&D STATIONS (No) (SOP)	No.	0.00	0.00	0.00	0.00	0.00	0.00
4	BIO-ENGINEERING MEASURES							
a)	Treatment of slips/ gullies/ rills & sheet erosion (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
b)	Roadside Erosion Control (LS)	L.S.	0.00	0.00	0.00	0.00	0.00	0.00
c)	Planting Grass Tufts (ha)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Pine Needle Logs (No)	No.	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	0.00	0.00	0.00	0.00
5	BIOLOGICAL MEASURES							
a)	Afforestation (including Maintenance)	Ha	0.00	0.00	2.26	1.51	2.26	1.51
b)	Regeneration/ Plantation of Oak & Deodar Forest	Ha	0.00	0.00	8.30	5.58	8.30	5.58
c)	Assisted natural regeneration plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
d)	Replacement of Old Plantations (Planting /Sowing)	Ha	0.00	0.00	13.95	5.19	13.95	5.19
e)	Replenishment afforestation (New)	Ha	0.00	0.00	0.00	0.00	0.00	0.00
f)	Energy Plantations of Fast Growing fuel wood & fodder species	Ha	0.00	0.00	0.00	0.00	0.00	0.00
g)	Enrichment plantation	Ha	0.00	0.00	47.50	11.88	47.50	11.88
h)	Lantana eradication & Planting with bamboo	Ha	0.00	0.00	0.00	0.00	0.00	0.00
i)	Pasture improvement	Ha	0.00	0.00	0.00	0.00	0.00	0.00
j)	NTFP Plantations of Tall Plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
k)	Development of NTFP plantations	Ha	0.00	0.00	0.00	0.00	0.00	0.00
l)	Rim Plantation	Ha	0.00	0.00	0.00	0.00	0.00	0.00
m)	Development of medicinal plants	Ha	0.00	0.00	0.00	0.00	0.00	0.00
	Total		0.00	0.00	72.01	24.14	72.01	24.14
6	NURSERY DEVELOPMENT							
a)	Raising of High Value Medicinal Species for distribution to farmers	L.S	0	0	0	0	0	0
b)	Nursery devlopment (incl.infrastrucure development)	L.S	0	0	0	0	0	0
c)	Establishment of Kharsu Oak/ Rai Fir Nry	L.S	0	0	0	0	0	0
d)	Modernization of Nurseries	L.S	0	0	0	0	0	0
	Total		0	0	0	0	0	0
7	Gosadans	No	0	0	0	1.15	0	1.15
8	Energy Conservation/ Forest Protection	L.S	0	0	0	0	0	0
9	Fuel Saving Devices	L.S	0	0	0	2.00	0	2.00
10	Forest Infrastructure Development	L.S	0	0	0	0	0	0
11	Operational support	L.S	0	0	0	0.10	0	0.10
12	Animal Husbandry support	L.S	0	0	0	0	0	0
13	Agriculture support	L.S	0	0	0	0.25	0	0.25
14	Horticulture support	L.S	0	0	0	0	0	0
15	Wildlife support	L.S	0	0.40	0	0.15	0	0.55
16	Joint Forest Management incl. micro planning	L.S	0	0.10	0	0	0	0.10
17	Research & Studies	L.S	0	0	0	0	0	0
18	Training Awareness & Publicity		0.00	0.50	0.00	30.29	0.00	30.79
	Total (1-18)	L.S	0.00	0.01	0.00	0.30	0.00	0.31
19	Eco-Tourism 1%	L.S	0.00	0.03	0.00	1.51	0.00	1.54
20	Eco-Battalion 5%	L.S	0.00	0.05	0.00	3.03	0.00	3.08
21	Eco-services 10%	L.S	0.00	0.03	0.00	1.51	0.00	1.54
22	Monitoring and Evaluation 5 %	L.S	0.00	0.05	0.00	3.03	0.00	3.08
23	Escalation 10%	L.S	0.00	0.66	0.00	39.68	0.00	40.34
	G. Total							