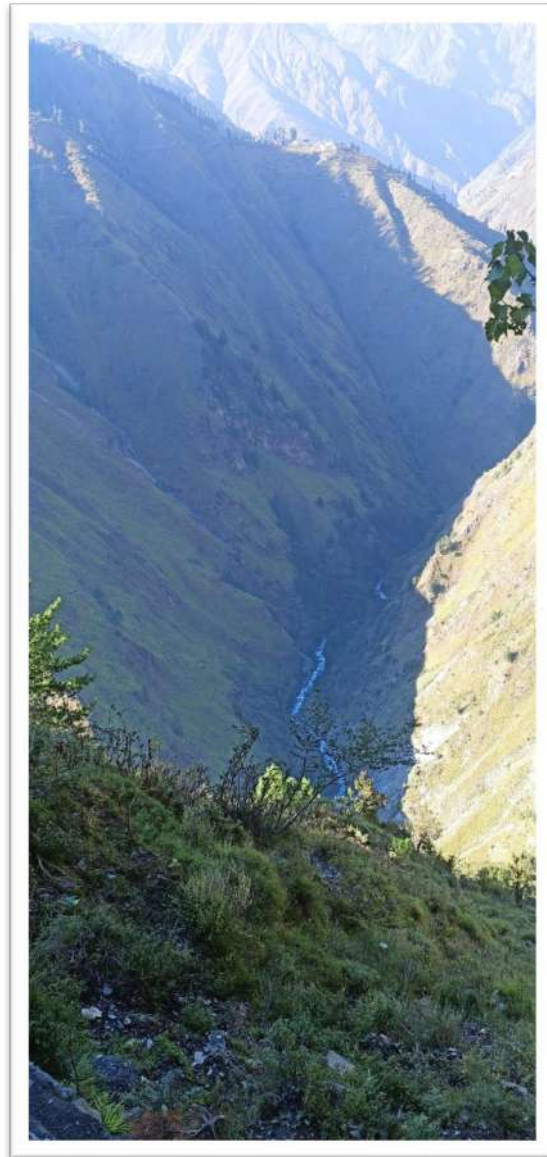


DRAFT CATCHMET AREA TREATMENT PLAN FOR TUNDAH II HEP (24 MW)



SUBMITTED BY



SAI ETERNAL FOUNDATION SAI BHAVAN, SECTOR 4 NEW SHIMLA

PREPARED BY



NAIK ENVIRONMENT RESEARCH INSTITUTE LTD, 24 IAS COLONY, PANTHAGHATI, SHIMLA

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CATCHMET AREA TREATMENT PLAN FOR TUNDAH II HEP (24 MW)

I N D E X.

CHAPTER NO.	PARTICULARS	PAGE NO.
SECTION I		
CHAPTER 1	EXECUTIVE SUMMARY	1
CHAPTER 2	INTRODUCTION, OBJECTIVE & SCOPE	7
CHAPTER 3	DISCRIPTION OF PROJECT CATCHMENT, CATCHMENT AREA & WORK PLAN	17
CHAPTER 4	CAT PLAN COMPONENTS	23
CHAPTER 5	GUIDELINES FOR FORESTRY & HABITAT MANAGEMENT	29
CHAPTER 6	GUIDELINES FOR SMC MEASURES	35
CHAPTER 7	RESEARCH, TRAINING & CAPACITY BUILDING	37
CHAPTER 8	GUIDELINES FOR PES	39
CHAPTER 9	ECO-TOURISM	43
CHAPTER 10	INFRASTRUCTURE AND FOREST PROTECTION	47
CHAPTER 11	GUIDELINES FOR WILDLIFE HABITAT IMPROVEMENT	49
CHAPTER 12	GUIDELINES FOR MONITORING & EVALUATION	55
SECTION-II		
	WRITE UP FOR SECTION II	63
CHAPTER 13	TREATMENT & COSTING FOR FOREST RANGE WL BHARMOUR OF WL CHAMBA DIVISION	65
	CAT PLAN FOR TUNDAH BEAT	69
	CAT PLAN FOR BHADRA BEAT	79
	CAT PLAN FOR BANNI BEAT	93
	CAT PLAN FOR BADGRAM BEAT	105
	CONSOLIDATED CAT PLAN FOR WL CHAMBA DIVISION	117
CHAPTER 14	TREATMENT & COSTING FOR BHARMOUR (T) RANGE OF BHARMOUR (T) DIVISION	121
	CAT PLAN FOR SIRDI BEAT	125
CHAPTER 15	TREATMENT & COSTING FOR SWAI (T) RANGE OF BHARMOUR (T) DIVISION.	137
	CAT PLAN FOR MANDHA BEAT.	141
	CAT PLAN FOR DIGU BEAT.	153
	CONSOLIDATED CAT PLAN FOR BHARMOUR (T) DIVISION.	163
CHAPTER 16	CONSOLIDATED TREATMENT PLAN FOR BHARMOUR (T) AND CHAMBA (WL) DIVISION.	167
CHAPTER 17	ANNUAL PLAN OF OPERATIONS	171
	17.1 ANNUAL PLAN OF OPERATIONS FOR CHAMBA WL DIVISION.	173
	17.2 ANNUAL PLAN OF OPERATIONS FOR BHARMOUR (T) DIVISION	175
	17.3. CONSOLIDATED ANNUAL PLAN OF OPERATIONS FOR CHAMBA(WL) AND BHARMOUR (T) DIVISIONS.	177

APPENDICES		
APPENDIX-I	ALLOTMENT LETTER OF TUNDAH II TO SAI ENGINEERING FOUNDATION	181
APPENDIX-II	CAPACITY ENHANCEMENT LETTER OF TUNDAH II PROJECT.	183
APPENDIX-III	TEC APPROVAL OF TUNDAH II PROJECT	185
APPENDIX-IV	CAT PLAN NOTIFICATION DATED 30.9.2009.	197
APPENDIX-V	HPFD NOTIFICATION DATED 21.11.19 REGARDING CAT PLAN OUTLAY.	207
APPENDIX-VI	COST NORM FOR SITE SPECIFIC PLANTATION FOR HABITAT IMPROVEMENT OF CHIR PHEASANTS	209
APPENDIX-VII	COST NORM FOR PASTURE MANAGEMENT/ WEED CONTROL	211
APPENDIX-VIII	COST NORM FOR WATER HOLE BOQ	213
APPENDIX-IX	COST MODELS AND DRAWINGS OF CHECK DAMS/ WATER HARVESTING STRUCTURES.	215
APPENDIX-X	UNDERTAKING BY SAI ETERNAL FOUNDATION	221

CATCHMET AREA TREATMENT PLAN FOR TUNDAH II HEP (24 MW)

LIST OF ABBREVIATIONS

ABBREVIATION	FULL FORM
APO	Annual Plan of Operation
AMSL	Above Mean Sea Level
BO	Block Officer
BOQ	Bill of Quantity
APCCF	Additional Principal Chief Conservator of Forests.
CAT	Catchment Area Treatment
CCAT	Comprehensive Catchment Area Treatment
CF	Conservator of Forests
DFO	Divisional Forest Officer
DPF	Demarcated Protected Forest
Div.	Division
Eco Hut	Eco Tourism Hut
FGD Hut	Forest Guard Hut
FRH	Forest Rest House
GOI	Government of India
Ha	Hectare
HDPE	High Density Poly Urethane
HEP	Hydro Electric Project
HPFD	H.P. Forest Department
HPPWD	Himachal Pradesh Public Works Department
Hort.	Horticulture
LULC	Land Use Land Cover
M&E	Monitoring & Evaluation
MW	Micro Watershed
MVVY	Mukhya Mantri Van Vistaar Yojna.
NGO	Non-Government Organization
NTFP	Non-Timber Forest Produce
NERIL	Naik Environmental Research Institute Ltd.
Pr. CCF (HoFF)	Principal Chief Conservator of Forests (Head of Forest Force)
Pr. CCF (WL)	Principal Chief Conservator of Forests (Wildlife)
PA	Protected Area
PES	Payment for Environmental Services
PF	Protected Forest
RF	Reserved Forest
RFO	Range Forest Officer
SMC	Soil & Moisture Conservation
Sq. KMs.	Square Kilo Meters.
TD	Timber Distribution
(T)	Territorial
UPF	Un-demarcated Protected Forests
WL	Wildlife
WLS	Wildlife Sanctuary

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CHAPTER 1

EXECUTIVE SUMMARY

1.1 Himachal Pradesh has a stated objective of harnessing the vast hydro-electric power potential of its five major rivers. Considering the fragile young mountain ranges of the Himalayas along with the rivers and their tributaries with their steep gradient provide a challenge, coupled with an opportunity, for the planners and engineers for optimal exploitation of hydro power potential. Tackling the hydro-electric power potential will result in improvement of the economic health of the State, as each project provides, at least 12 percent free power plus 1% LADF on all new installations.

1.2 Tundah II HEP is a run of the river development project to harness the Hydel potential of river Ravi. The project is situated on Tunda stream of Ravi River in Chamba District. The dam is planned to be located near village Panjari in Sirdi Beat at latitude 32°29'49.20" N and Longitude 76°28'31.26" E. The total capacity of the project is 24 MW. The total project cost is 22350 lacs. The CAT Plan cost at 1.5% of the project cost works out to Rs. 3,35,25,000/-.

1.3 The NERIL team held extensive and in-depth discussions with the DFOs of WL Chamba Division and Bharmour (T) Division, their rangers, and other staff.

1.4 The CAT Plan provides the guidelines for all aspects of treatments. It is divided into ranges and aims to keep the forest beat as the executing unit for the works to be undertaken. The CAT plan is divided into following 17 Chapters:

CHAPTER	PARTICULARS
SECTION-I.	
1	EXECUTIVE SUMMARY
2	INTRODUCTION, OBJECTIVES & SCOPE
3	DESCRIPTION OF PROJECT, CATCHMENT AREA AND WORKING PLAN
4	CAT PLAN COMPONENTS
5	GUIDELINES FOR FORESTRY & HABITAT MANAGEMENT
6	GUIDELINES FOR SMC MEASURES
7	GUIDELINE FOR RESEARCH TRAINING AND CAPACITY BUILDING
8	GUIDELINES FOR PES.
9	ECO TOURISM
10	INFRASTRUCTURE AND FOREST PROTECTION.
11	GUIDELINES FOR WILDLIFE HABITAT MANAGEMENT
12	GUIDELINES FOR MONITORING & EVALUATION
SECTION-II	
13	TREATMENT & COSTING FOR FOREST RANGE WL BHARMOUR (TUNDAH, BHADRA, BANNI AND BADGRAM BEATS) OF CHAMBA WL DIVISION.
14	TREATMENT & COSTING FOR FOREST RANGE BHARMOUR (T) RANGE (SIRDI BEAT) OF BHARMOUR (T) DIVISION.
15	FOREST RANGE TREATMENT & COSTING FOR SWAI (T) RANGE (MANDHA & DIGU BEATS) OF BHARMOUR (T) DIVISION.

16	CONSOLIDATED TREATMENT PLAN FOR BHARMOUR(T) AND CHAMBA (WL) DIVISIONS.
17	ANNUAL PLAN OF OPERATIONS:
17.1	ANNUAL PLAN OF OPERATIONS FOR BHARMOUR (T) DIVISION.
17.2	ANNUAL PLAN OF OPERATIONS FOR WL CHAMBA DIVISION.
17.3	CONSOLIDATED ANNUAL PLAN OF OPERATIONS FOR CHAMBA (WL) AND BHARMOUR (T) DIVISIONS.
	APPENDICES.

1.5 Chapter-1: Executive Summary. The Executive Summary in Chapter-1 provides an overview of the CAT plan.

1.6 Chapter-2: Introduction, Objective & Scope. This chapter introduces the Tundah II HEP. It provides Location Map, MWs Map and Beat Map of Tundah-II HEP and Salient features of the project.

1.7 Chapter-3: Description of Project Catchment and Area. This Chapter contains the description of the project, location and access to the project. It also contains the extracts from the Working Plan of Bharmour (T) Division. The Management Plan of WL Tundah Sanctuary being under preparation is not available till date.

1.8 Chapter-4: CAT Plan Components: The CAT Plan has to adhere to the guidelines and Notifications issued by H.P. Forest Department (HPFD) from time to time. This Chapter, therefore, provides all details of the Notifications and Guidelines of Himachal Pradesh Government and Himachal Pradesh Forest Department. Out of the total project catchment area of 266.57 Sq. KMs, an area of 28.84 Sq. KM (i.e. 10.82%) falls in Bharmour (T) Division while an area of 237.73 Sq. KMs (i.e. 89.18%) falls in Wildlife Chamba Division respectively. The actual amount provisioned under this CAT Plan is to the tune of **Rs. 3,35,41,937/-** out of which Rs. 2,63,66,305/- (78.61%) is for Chamba WL Division and Rs. 71,75,632/- (21.39%) for Bharmour (T) Division.

1.9 Chapter-5: This Chapter relates to guidelines for Forestry & Habitat Management. The Chapter contains guidelines for:

- Site Specific Plantation
- Pasture Management/ Weed Control
- Waterhole Ecosystems.

1.10 Chapter-6: Guidelines for Soil & Moisture Conservation (SMC): The cost norms of soil and water conservation works are prepared based on the prevalent schedule of work and labour rates. This Chapter provides detailed guidelines for various components of SMC along with drawings and designs of proposed structure. Mainly construction of machine wound Gabion / Crate wire check-dams and Water Harvesting Structures are planned. These are proposed on 22 nallas.

1.11 Chapter-7: Research, Training & Capacity Building: A provision of Rs. 22,81,370/- (6.80%) is made under this CAT Plan. Out of this an amount of Rs. 21,00,000/- is provisioned for WL Chamba Division and an amount of Rs. 1,81,370/- is provisioned for Bharmour (T) Division. The funds are planned to be utilized for the following activities to be controlled from

CF/ Division level:

- (a) Special Study for WL Habitat Management of brown bears to be conducted through WHI for Tundah WL Sanctuary.
- (b) Exposure visits to HPFD staff.
- (c) Meetings with Villagers and Seminars with local people.
- (d) Publicity and Awareness activities.

1.12 Chapter-8: Guidelines for Payment for Environment Services (PES). There are 28 villages in the Catchment and the total human population is 6364 with 13679 livestock population. The CAT Plan makes a provision of Rs. 22,71,000/- for 70 Solar Lights, 18 PVC Water Storage tanks, and Rs. 5,00,000/- for other activities in WL Chamba Division and Rs. 8,19,000/- for 30 Solar Lights and 12 PVC Water Storage tanks in Bharmour (T) Division.

1.12.1 Chapter-9 : Eco Tourism: Under Eco Tourism Service activities only an amount of Rs. 18,50,000/- (5.52%) is provisioned for the CAT Plan period of 10 years which is earmarked for Camping/ Tenting facilities and disposal activities during Yatra for Bani Mata Temple, Chadola Mata Temple, Diggu Temple, Mani Mahesh Yatra and other pilgrimage and trekking places in the Project Catchment. The Provision of Rs. 18,50,000/- includes Rs. 14,80,000/- for Chamba WL Division and Rs. 3,70,000/- for Bharmour (T) Division.

1.13 Chapter-10: Infrastructure & Forest Protection: Infrastructure Build Up: In chapter 8 a total provision of Rs. 47,25,000/- (i.e. Rs. 42,00,000/- for WL Chamba Division and Rs. 5,25,000/- for Bharmour (T) Division) is made for this component. This CAT Plan has a provision of Rs. 19,90,000/- (i.e. Rs. 17,80,000/- for WL Chamba Division and Rs. 2,10,000/- for Bharmour (T) Division) for renovation/ new infrastructure including repair to one Rest House and construction/ maintenance of 14 KM Bridle Paths, 7 Patrolling Kits and 3 Foot Bridges.

1.13.1 Forest Protection. Under this activity, provisions for creation of fire lines, hiring of patrolling vehicle, purchase of a Drone and engagement of fire watchers are made. An amount of Rs. 27,35,000/- (i.e. Rs. 24,20,000/- for WL Chamba Division and Rs. 3,15,000/- for Bharmour (T) Division) is earmarked for these activities.

1.14 Chapter-11: Wildlife Habitat Management: About 89.18 % area of the project catchment falls under Wildlife Chamba Division. As such major allocations under this component are made for WL Chamba Division. This chapter contains details of provisions made for different activities under this Component. Funds to the tune of Rs. 27,20,000/- are provided for WL Chamba Division. In case of Bharmour (T) Division, funds to the tune of 34,50,000/- are provided under “Site Specific Plantation for Improvement of Habitat of Chir Pheasants on the analogy of Mukhya Mantri Van Vistaar Yojna (MVVY). This will also cater to the plantation requirements of Nargaal (*Arundinaria falcata*) as suggested by DFO Bharmour (T). Chir Pheasants have been sighted in Territorial Beats of Sirdi and Mandha. Thus, the provision for wildlife habitat improvement and site-specific planning is merged with afforestation in Bharmour (T) Division. Provisions for purchase of 4 binoculars, 4 trap cameras, 1 tranquilizer gun, 3 bunkers, payment of man animal conflicts, carrying out a special study on the carrying capacity of Tundah WL Sanctuary for eco-tourism and strengthening of rescue facility at Monkey Sterilisation Centre Chamba/Bakani are made in the CAT Plan under WL Chamba Division.

1.15 Chapter-12: Monitoring Plan and Review and Evaluation Mechanism: Chapter 12 contains the Monitoring Plan and Review and Evaluation of Mechanism to be followed at various stages of the implementation of CAT Plan activities in the Catchment. The admissible limit is 5% of the amount of CAT Plan, i.e. Rs. 16,76,251/- (i.e. Rs. 14,94,880/- for WL Chamba Division and Rs. 1,81,371/- for Bharmour (I) Division) is earmarked for this activity. The funds under this component will be controlled by APCCF (CAT Plan). Out of the total funds under this component, 1% funds will be spent towards strengthening of IT Activities.

1.16 Site Specific Plans: Site specific plantation for Habitat Improvement of Chir Pheasants is made in this CAT Plan in Bharmour (I) Division. The amount is provisioned under site specific plantation,

1.17 Chapter 13: This Chapter contains the CAT Action Plan for Tundah, Bhadra, Banni and Badgran Beats of Bharmour (WL) Range of WL Chamba Division.

1.18 Chapter 14: This Chapter contains CAT Action Plan for Sirdi Beat Bharmour (I) Range of Bharmour (I) Division.

1.19 Chapter 15: This Chapter contains CAT Action Plan for Mandha and Diggu Beats of Swai (I) Range of Bharmour (I) Division. **Chapter 16:** This Chapter contains consolidated CAT Plan for WL Chamba Division and Bharmour (I) Division.

1.20 Chapter 17: Annual Plan of Operations for Bharmour (I) and WL Chamba Division are given in Chapter 17.1 and 17.2 respectively. Consolidated Annual Plan of Operations for both the Divisions is given in Chapter 17.3.

1.21 Contingencies: An amount of 9.09 % i.e., Rs. 30,49,267/- is provisioned for Contingencies out of which Rs. 23,96,937/- is for WL Chamba Division and Rs. 6,52,330/- for Bharmour (I) Division. This is left at the discretion of Forest Department and may support unforeseen expenditures as well as unplanned activities. The Contingencies fund may also be effective in setting off cost escalation in times to come.

1.22 Conclusion: The total cost of CAT Plan is made keeping in view the admissible funds under each component. It works out to Rs. 3,35,41,937/-, out of which Rs. 2,63,66,305/- is allocated for WL Chamba Division and Rs. 71,75,632/- for Bharmour (I) Division against available funds of Rs. 3,35,25,000/-.

TUNDAH II HYDRO ELECTRIC PROJECT AT A GLANCE:

S.N	Particulars	Remarks
1.	Name of Project	Tundah II HEP (24MW) project of M/s Sai Eternal Foundation
2.	Project site	Village: Panjari in Sirdi Beat of Bharmour (I) Division.
3.	Latitude of Barrage site	32°29'49.20" N
4.	Longitude at Project site	76°28'31.26" E
5.	Total Installed Capacity	24 MW
6.	Estimated cost	INR 22350 lakhs)
7.	Total Forest Division in the Catchment	2 (Bharmour (I) and WL Chamba.

Sl.No.	Particulars	Remarks
8.	Total Ranges in the Project Catchment	3 (Bharmour (T), Swai (T) and Bharmour (WL)) Total Catchment: 266.57 Sq.KM) in 7 Beats.
9.	Ranges of Bharmour (T) Division in the Project Catchment	2 (Bharmour and Swai). (Total project catchment: 28.84 Sq. KM.)
10.	Ranges of WL Division in Project Catchment	1 Bharmour (WL) Range (Total project catchment: 237.73 Sq. KM)
11.	Total culturable area in the project catchment	27.9 Sq. KM.(i.e. 9.00 Sq. KM in Bharmour (T) and 18.81 Sq. KM in WL Chamba Division).
12.	Total no. of Micro watersheds in project catchment	47
13.	CAT Plan Outlay @ 1.5% of the project cost	INR 3,35,25,000
14.	Actual amount of the CAT Plan	INR 3,35,41,937
15.	CAT Plan for WL Chamba Division	INR 2,63,66,305
16.	CAT Plan for Bharmour (T) Division	INR 71,75,632

Component wise allocation of funds:

Sl.	CAT Plan Component	Admissible amount (Rs.)	Amount provisioned	Percentage
1	Forestry	83,81,250 (25%)	61,50,000	18.34
2	Soil &Moisture Conservation Measures	83,81,250 (25%)	80,00,048	23.85
3.	Research, Training & Capacity Building	16,76,250 (5%)	22,81,371	6.80
4	Payment for Environment Services	33,52,500 (10%)	30,90,000	9.21
5	Eco Tourism	3,35,250 (1%)	18,50,000	5.52
6	Infrastructure & Forest Protection	33,52,500 (10%)	47,25,000	14.09
6. A	Renovation of existing infrastructure and construction of new buildings etc.	16,76,250 (5%)	19,90,000	5.93
6. B	Forest Protection	16,76,250 (5%)	27,35,000	8.16
7	Wildlife Habitat Management	20,11,500 (6%)	27,20,000	8.11
8	Monitoring & Evaluation	16,76,250 (5%)	16,76,251	5.00
9	Site Specific Plans	10,05,750 (3%)	0	0.00
10	Contingencies.	33,52,500 (10%)	30,49,267	9.09
	Total:	3,35,25,000(100%)	3,35,41,937	100.00

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CHAPTER 2. INTRODUCTION, OBJECTIVE & SCOPE

2.1 Rivers possess delicate ecology that depends on a regular cycle of variations within certain tolerances. The plant and animal communities that inhabit the river and its margins, have evolved to adapt to their river's own peculiar pattern of flood and drought, slow and fast pattern of current. Dams disrupt this ecology. The first effect of a dam is, it alters the topography on which the plants and animals of a river depend. However, in case of Tundah II no alteration to topography or impoundment of water is required.

2.2 Himachal Pradesh Forest Department has embarked upon major initiatives to improve the catchment areas of all the major rivers in the state. The approach of HPFD is well expressed in a document published by the department in 2012. It is pertinent to quote this approach and objectives in the current context. Himachal Pradesh is the first State in the Country to initiate and complete Basin Level CAT Plans for the four major rivers in the State. The field visit and information cater for the changes made necessary due to the passage of time between making of the CCAT for Ravi River Basin and making of Tundah II HEP location specific CAT Plan.

2.3 The Government of Himachal Pradesh, Department of Energy vide its Office letter No. DOE/CE (Energy)Bids-Eval.37/35 HGEPs/Vol.I/2016-17-1621-22 dated 25.05.2017 has awarded the work of development of the Tundah II (18 MW) project on Tundah Stream, a tributary of Ravi River, District Chamba, Himachal Pradesh to M/s Sai Engineering Foundation, Sai Bhawan, Sector-IV, New Shimla (*Appendix-I*). Subsequently vide Government of Himachal Pradesh, Department of Energy letter No. HPDOE/CE (Energy) Tundah-II-HEP/2021-167-68 dated 7.4.22 the capacity of this project was enhanced from 18 MW to 24 MW. (*Appendix-II*). The estimated cost of the project is Rs. 22350 lacs including interest during construction (IDC), escalation, financial charges (FC) and LADC. The Techno-Economic Concurrence (TEC) of Tundah-II HEP was conveyed vide Directorate of Energy Office Order No. HPDoE/C (Energy)/TC-Tundah-II/2022-1391-99 dated 20.5.2022 (*Appendix-III*). The Undertaking given by Sai Eternal Foundation for depositing the difference of CAT Plan cost in case of increase in the TEC cost is placed at (*Appendix-X*).

2.4 OBJECTIVE OF CAT PLAN: The main objective of the preparation of CAT Plan for the individual project is to identify and devise measures in the catchment area, that reduce the silt load for the HEP, buffer the flow of water by reducing storm water peaks, and to increase dry season flows through better infiltration.

2.4.1 The primary objective: The primary objective of the Catchment Area Treatment Plan is to arrest the soil loss and degradation of the area by putting an effort to reduce the runoff and soil, which is getting eroded.

2.4.2 Other objectives of the CAT Plan:

- Achieve sustainable development through improvement of forests and wildlife habitat.
- Conservation of soil and reduction of the erosion of soil in the watersheds of the project and its immediate vicinity to ensure its longevity.
- Minimise the silt load and improve the quality of Tundah stream.
- Minimise the land slides, land slips and erosion of soil. Rehabilitate the degraded forest areas by using measures like afforestation, natural regeneration of plants and pasture development.
- Enhance community participation.

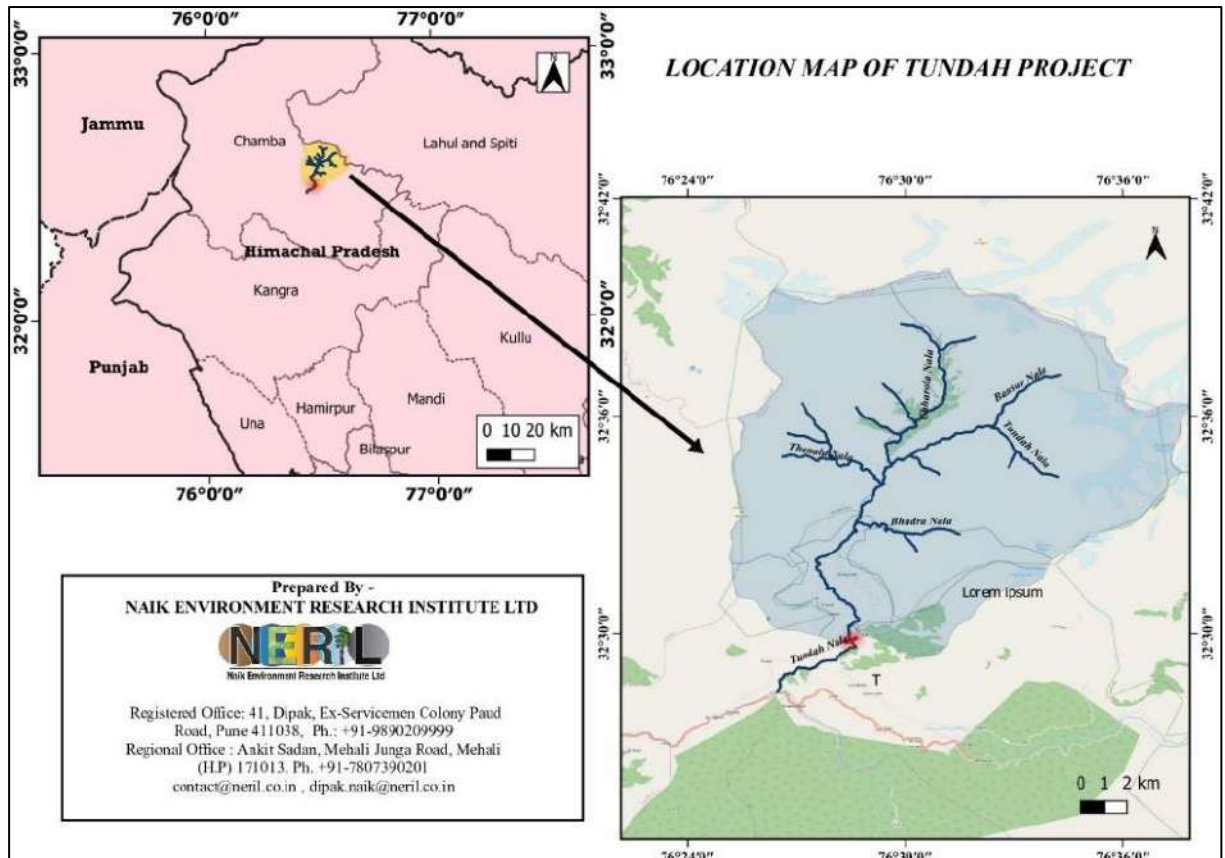
- Increase vegetative cover.
- Augment Forest Infrastructure for Eco tourism.

2.5 INTRODUCTION TO TUNDAH-II HYDRO ELECTRIC PROJECT (24 MW).

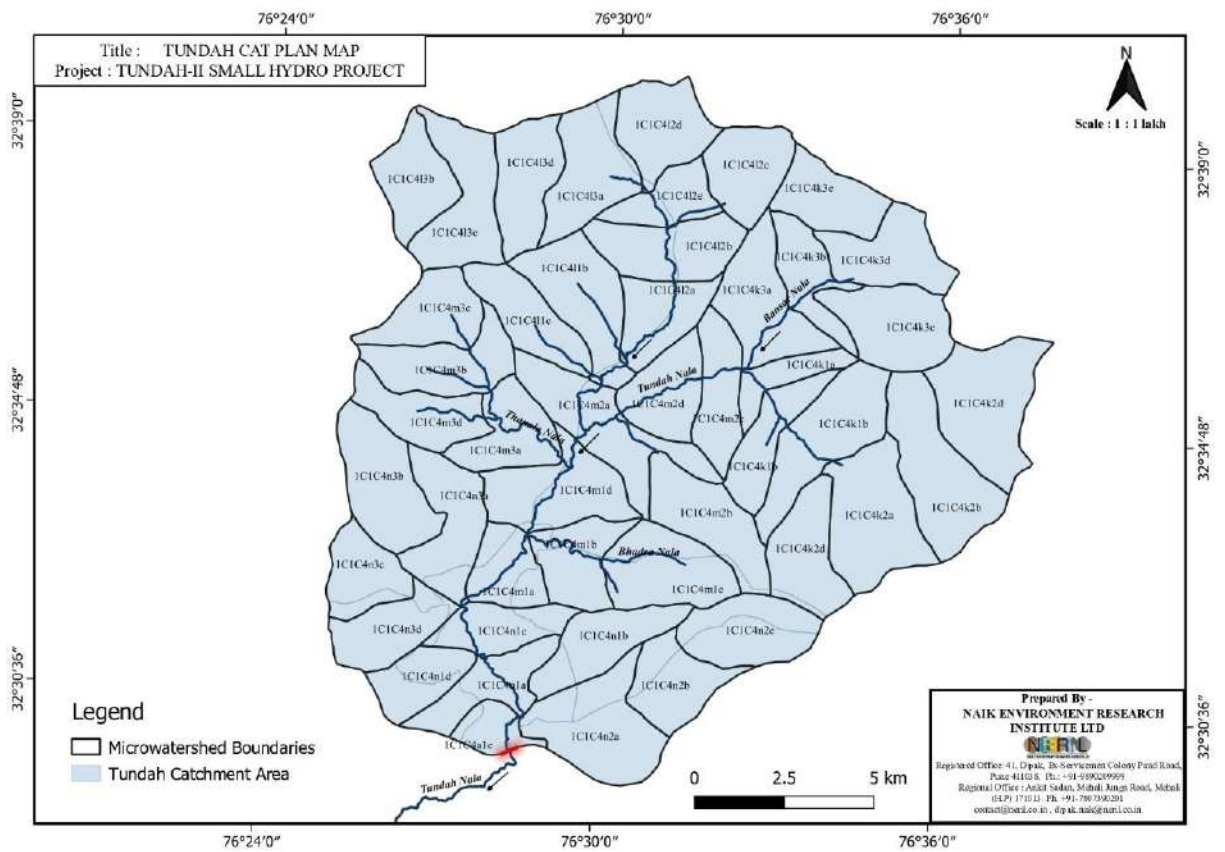
Himachal Pradesh is in the Western portion of the Great Himalayan Mountain range of North India., bounded by the state of J&K to the North, Tibet to the East and plains of North India to the South and West. The proposed project is in Chamba District of Himachal Pradesh is located on the right bank of Tundah Stream, near Panjari Village. The barrage is on Tundah Nalla at an elevation of 1625 Mtrs AMSL. The centre line of powerhouse is 1408.00 m above MSL. The project is located at about 475.5KM distance from State Capital i.e. Shimla. The nearest broad-gauge rail head is at Chandigarh and airport is Gaggal in Kangra District. The location map of the project is shown at Map 2.1. The project falls in Bharmour Forest Range of Bharmour Forest (I) Division. The Catchment of this project covers seven beats in three Ranges (i.e. 4 beats of WL Bharmour Range, 2 Beats of Swai Territorial Range and 1 beat of Bharmour (I) Range). Four beats (namely Badagran, Bhadra, Banni and Tundah beats of Bharmour WL Range, Manda and Diggu Beats of Swai Range and Sirdi Beat of Bharmour (I) Range fall in the project catchment of Tundah II. The area falls under Ravi River Basin. The project catchment is inhabited with 28 villages having human population of 6364 and livestock population of 13679 as per Table 2.1 below:

TABLE 2.1

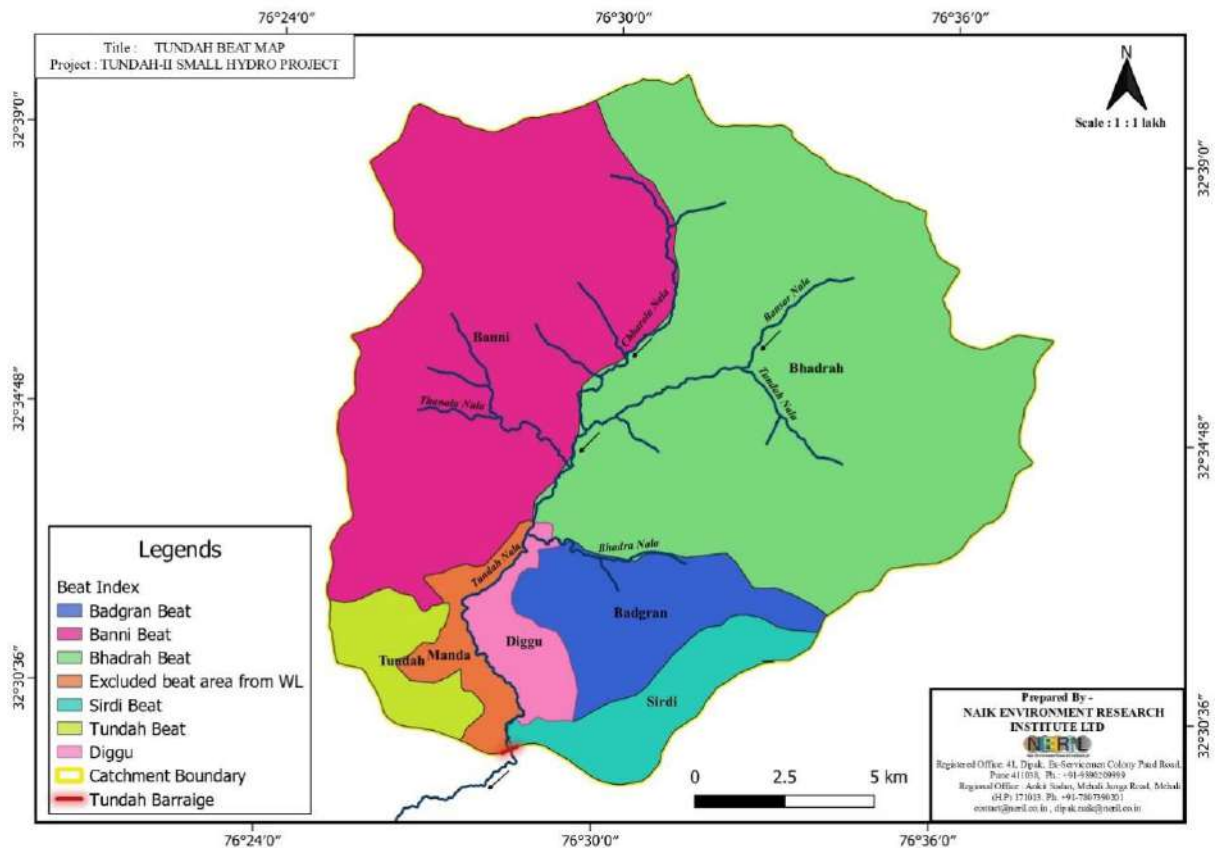
Forest Division	Forest Range	Beat	No. of villages in the beat	Population	Livestock
WL Chamba	WL Bharmour (WL Sanctuary Tundah)	Badagran and Diggu	6	1306	2215
		Bhadra	1	294	389
		Banni	4	935	790
		Tundah	5	1775	6005
Bharmour (I) Division	Swai	Manda	3	231	1115
		Diggu	Included in Badgran Beat.		
	Bharmour	Sirdi	9	1823	3165
Total:	3	7	28	6364	13679



2.1 Map of location of Project



2.2 Map of Microwatershed



2.3 Forest beat Map of Project Area

2.6 Need for the Project: Himachal Pradesh has a stated objective of harnessing the vast hydroelectric power potential of its five major rivers. Considering the fragile young mountain ranges of the Himalayas, the rivers, and their tributaries, with their steep gradient provide challenges coupled with an opportunity for the planners and engineers for optimal exploitation of hydropower potential. Several hydroelectric projects are under execution in the state by central, state, joint and private sector developers. The state follows a strategy of optimal utilisation of hydroelectric power resources to produce as much energy as possible with minimum cost and with minimum environmental negative impacts. Harnessing hydroelectric power potential will improve the economic health of the State as each project provides at least 12 percent free power plus 1% LADF (local area development fund) on all new installations. The need for the project also arises from the need to fulfil a steady increase in peak electricity demand and the growing energy deficit in the Northern Region.

2.7 Access to Project Area: The project is at about 56.5km from Chamba and about 475.5 km from the state capital Shimla, which is connected with all-weather road and rail links up to Pathankot with the rest of the country. The nearest broad-gauge rail head is at Pathankot and nearest airport is at Gagal (Kangra).

2.8 Description of Project: The table given below provides the salient features of the project:

LOCATION		
State		Himachal Pradesh
District		Chamba
Vicinity		Bharmour
Accesses	Road	Shimla- Chamba -Bharmour
	Railway	176 Km at Pathankot from site
	Airport	179 Km at Pathankot
Toposheet No.		52 D/7
* Latitude 32 ^o -29'-24" to 32 ^o -40'-4.61" North		* Longitude. 76 ^o -25'-5.92" to 76 ^o - 37'-52" East
* Latitude 32 ^o -29'-49.20" North		* Longitude 76 ^o -28'-31.26" East
* Longitude		76 ^o -27'-35.10" East
* Latitude		32 ^o -28'-31.07" North
* Altitude at Barrage		1625.00 m AMSL
* Altitude at Powerhouse		1408.00 m AMSL
* Highest altitude		5840.00 m AMSL
RIVER		
Stream		Tundah
Tributary		Ravi
Consumptive use		There is no irrigation channel upstream of the river
Type		Run of the River Scheme
HYDROLOGY		
Total Catchment area of the stream		265 Sq. km up to barrage site
Design Discharge		14.15 Cumecs
Design Flood discharge		821.00 Cumecs
Minimum Flow (90% dependable year)		1.94 Cumecs
PROJECT COMPONENTS		
DIVERSION BARRAGE		
Type		R.C.C Barrage
Full supply level		1625.00 m
Pond Level		1621.50 m
Average Riverbed level		1620.88 m
No. and width of Barrage Bays		1 No. 25 m
Crest level of Barrage Bays		EL1625.00 m
No. and width of under Sluice Bay		2 Nos. 4 m
Crest Level of under Sluice Bay		1621.00 m
Thickness of Pier		1.5 m
Divide wall		1.5 m
Vertical lift Gate		2 Nos. 4.0 m x 3.33 m(H)
Energy Dissipation		Hydraulic Jump
Upstream Foundation level (under sluice)		1618.78m
Downstream Foundation level (under sluice)		1614.28 m
Upstream Foundation level (Barrage Bay)		1618.00 m

Downstream Foundation level (Barrage Bay)	1616.38 m
Average Slope of River	1 in 10 m
Length Upstream Floor	14 m
Length of Downstream Floor	45.5 m
Overflow section	25 m
H.F.L.	1629.80 m
INTAKE STRUCTURE	
Length	11.90 m
Width	9.50 m
Main inlet gate	2 Nos. 4.0 m(width) x 3.33m(height)
Bed level	1621.00 m
Top level	1629.80 m
POWER CHANNEL	
Shape & size	Square 3.6 m x 3.6 m
Length	263 m
Slope	1 in 500
Inlet Bed level	1621.773 m
Outlet Bed Level	1621.087 m
Material	RCC M-25
Velocity of flow	1.638 m/sec
DESILTING TANK	
Type	Twin Hopper Type Surfaced
Material of construction.	Reinforced cement concrete
Length of the tank	80.00 m
Width of the tank	16.20 m
Effective Depth of the tank	8 m (ED)
Maximum Depth of Hopper end	10.10 m
Flow velocity	0.162 m/Sec
Particle size to be removed.	0.15mm and above
Silt Flushing Gate	1.10m x 1.50m
No of Chamber	Two number
Bed Level inlet	1621.087 m
Bed Level outlet	1621.370 m
F.S.L.	1625 m
Top level	1626 m
Size of silt flushing gate	1100 mm x 1500 mm
Shape /Size	D-Shaped/ 3.15m diameter
Length	222.03 m
Slope	1 in 500
Flow velocity	1.598 m/sec
Lining material	M-25
Thickness of lining	150 mm
Inlet Bed level	1621.370 m
Outlet bed Level	1620.00 m
AQUEDUCT	
Length of aqueduct	36 m
Bed Slope	1 in 500

Material	Steel IS 2062 Gr-C
Diameter & thickness	2500 mm & 20 mm thick
Level at Inlet	1620.00 m
Level at Outlet	1619.928 m
Shape	D-Shaped
Size	2.80 m internal diameter
Length of Tunnel	1010.53 m
Slope	1 in 500
Material	RCC (M-25)
Flow velocity	2.022 m/sec
Inlet Bed level	1619.928 m
Out let bed level	1617.907 m
ADIT – I	
Shape	D-shaped
Size	2.8 x 2.8 m
Length	106.59 m
Slope	1 in 200
ADIT - II	
Shape	D-shaped
Size	2.8 x 2.8 m
Length	120.33 m
SURGE SHAFT (Underground)	
Diameter	9.0 m
Type	Circular
Height of tank	18.00 m
Water level at full load	1621.406 m
Maximum surge level	1633.00 m
Minimum surge level	1616.00 m
Water level at no load	1625.00 m
Top level	1634.00 m
Bed level	1611.00 m
Diameter of penstock protection valve	2500 mm
PENSTOCK (Underground)	
Number	One No.
Design Discharge	14.15 Cumecs
Diameter of the penstock	2.5 m
Diameter of Penstock Tunnel	2.8 x 2.8 m (D-shaped tunnel)
Length of the Penstock	1458.50 m
Plate thickness	10 mm - 26 mm
No. of Penstock Units	2 Nos.
Diameter of secondary penstock	1.65 m
Steel Liner	ASTM 516 Gr-70
Plate thickness at bifurcation	26 mm
Size of MIV	1350 mm Diameter
VERTICAL DROP SHAFT	
Height	103 m
POWERHOUSE	

Type	Underground Powerhouse
Size	
Length	35.10 m
Width	12.00 m
Height	19.96 m
C/L of Turbine in Powerhouse	1408.00 m
Minimum tail water level	1409.66 m
Maximum Tail water level	1410.44 m
Tail race outfall level	1402.00 m
Machine floor level	1407.10 m
Control Room size	10.75 m x 4.45 m
Service bay level	1411.86 m
MAIN ACCESS TUNNEL	
Shape	D-Shaped
Size	5.4 x 5.4 m
Length	54 m
TURBINE	
Type of Turbine	Horizontal Shaft Francis Turbine
Number	Two
Rated Capacity	12000 KW each.
Rated discharge	7.1 Cumecs
Specific speed	128.71 m Kw units
Normal speed	750 rpm
Runaway speed	1500 rpm
GENERATOR	
Rated output	12000 kW
Rated Frequency	50 Hz
Generation voltage	11 KV
Efficiency	95%
Power Factor	0.85
Size	
Length	35.10 m
Width	12.00 m
Height	19.96 m
C/L of Turbine in Powerhouse	1408.00 m
Minimum tail water level	1409.66 m
Maximum Tail water level	1410.44 m
Tail race outfall level	1402.00 m
Machine floor level	1407.10 m
Control Room size	10.75 m x 4.45 m
Service bay level	1411.86 m
Excitation system	Brushless synchronous
Power house crane	60 MT/5 MT
Normal speed	750 rpm
Regulation system	AVR
TAIL RACE	
Shape	D-shaped tunnel

Length	400 m
FRL Chamera stage -III	1397.00 m
Tail race outfall level	1403.00 m
HFL	1401.65 m
Size	3.0 x 3.0 m
Slope	1:60
Material of lining	M -25
POWER	
Installed capacity	24 MW
Energy Generation in ideal 90% dependable year	106.163 MU
Energy Generation in ideal 75% dependable year	119.539 MU
Energy generation on the basis of Observed Discharge of Tundah stream for (2017-18)	125.715 MU
Energy generation on the basis of Observed Discharge of Tundah stream for (2018-19)	143.518 MU
Energy generation on the basis of 34 years Average discharge data of Tundah stream	130.256 MU

ESTIMATED COST	
Estimated cost of Project:	223.50 crore
Cost/ MW :	9.31 Cr/MW
Levellized tariff :	4.50 Rs/Unit
Civil Cost :	15251.28 lakh
E&M Cost :	3457.40 lakh
Transmission Works :	169.46 Lakh
(a) Total Direct Cost :	18878.14 lakh
Escalation during construction	:373.15 lakh
Front & Fee	:111.73 lakh
Interest during construction	:2656.58 lakh
(b) Sub Total :	3141.46 lakh
Total (A) + (b) :	22019.60 lakh
LADA	:330.29 lakh
Total Project Cost	:22349.89 rounded of to 223.50 crore
Debt Equity Ratio	: 70:30 lakh
Interest rate	:11.50%
Average DSCR	:2.09
IRR	:17.8%
Benefit Cost ratio	:1.76

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CHAPTER 3 DESCRIPTION OF PROJECT, CATCHMENT AREA & WORKING PLAN

3.1 TYPE OF PROJECT:

The proposed Tundah II HEP is a run of river type scheme on Tundah Stream, a tributary of Ravi River, located in Distt. Chamba. The project envisages the construction of Diversion Barrage, Intake Structure, Power Channel from Diversion barrage upto Desilting Tank, Head Race Tunnel, Aqueduct, Adit I, Adit-II, Surge Shaft, Penstock (Underground), Vertical Drop Shaft, Powerhouse and Main Access Tunnel having 24MW installed capacity located on the right bank of the Tundah Stream of Ravi River. The powerhouse is located at an elevation of 1408.00 m and its entire catchment lies in Chamba district. The Trench Weir is located at $32^{\circ}-29'-49.20''$ N $76^{\circ}-28'-31.26''$ E. The powerhouse is at $32^{\circ}-28'-31.07''$ N and $76^{\circ}-27'-35.10''$ E. The catchment area of project lies between Latitude $32^{\circ}-29'-24''$ to $32^{\circ}-40'-4.61''$ N to Longitude $76^{\circ}-25'-5.92''$ to $76^{\circ}-37'-52''$ E.

3.2 LOCATION

Tundah II hydro power project is planned on Tundah Stream – a tributary of river near Panjary Village in Chamba District. The Tundah nalla is a perennial Stream originating at the confluence of Gai Nallah and Bhansar Nallah at an Altitude of 2737 m AMSL. Bhansar Nallah originates from the slopes of the Kalicho pass in the mid-Himalayas at an elevation of about +5300 m and the Gai Nalla originates from the glaciers on the slopes of the highest mountain (Bada Kanda Elevation about 5840 m) in the Catchment area of Tundah Stream. Tundah nalla traverses a stretch of around 23 km before it merges with the waters of the Ravi River near Kharamukh. Several small nallah join the Tundah stream en-route. These include:

a) Nallas joining on the Right Bank:

1	Mander Nallah
2	Thanala Nallah
3	Charola Nallah

b) Nallas joining on the Left Bank:

1	Cho Nallah
2	Bhadra Nallah
3	Thanlu Nallah
4	Raskundi Nallah

Out of above nallas, Charola, Thanala and Cho Nallahs carry substantial discharge.

3.3 ACCESS

The Chamba district in which the project is proposed is bound by districts Lahaul and Spiti in North, Kangra in South, and Kullu in the Southeast directions. Tundah II HEP falls in Bharmaur Tehsil of Chamba District. The basin above the barrage site is located between longitude $76^{\circ}25'92''$ to $76^{\circ}37'52''$ East and $32^{\circ}29'24''$ to $32^{\circ}40'4.61''$ North. The total catchment area lies

in between 1625.00 m at weir site to EL. 5840 m above Mean Sea Level. The scheme is located near village Panjary and is approachable by an all-weather motorable road (NH-). The project is at a distance of about 56.5km from Chamba and about 475.5 km from the state capital Shimla, which is connected with all-weather road and rail links up to Pathankot with the rest of the country. The nearest broad-gauge rail head is at Pathankot and nearest airport is at Gagal (Kangra). The scheme is located near village Panjary. The powerhouse and switch yard site are not connected with road. A road of approx. 961 m long length is proposed up to powerhouse whereas the barrage site is away from the road head but connected with approach road. The distances of the proposed Tundah II HEP site from important towns are as under:

Sr.	Station	Distance of site (Km)	Connected with transport
1	Chandigarh	416.5	Road
2	Shimla	475.5	Road
3	Chamba	56.5	Road

3.4 HYDRO-METEOROLOGY OF THE CATCHMENT

The Tundah nallah drains a catchment area of 265 km² up to the diversion works of Tundah II HEP out of which 146.85 km² is under permanent snow cover. The inflow in the nallah comes from snow melt and rainfall. The catchment area contributing to surface runoff is 118.15 km². The Tundah valley receives heavy rains due to impact of the south-west monsoon from June to September. Precipitation during winter occurs in the form of snow or rain depending upon the altitude. Snow cover at higher altitudes gives rise to the gradual build-up of the glacier and it results in major run-offs during summer. There are twelve main gauge stations in the Ravi Catchment out of which two main rain gauge stations are at Chitrari and Bharmour. Annual rainfall at Chitrari and Bharmour varies from 600 to 1500 mm and 600 to 2200 mm respectively. On an annual basis, the rainfall in the region follows the pattern:

Pre-monsoon March to May 25%

Monsoon June to September 65%

Winter rains October to February 10%.

The permanent snow line lies above +4000 m, but it has been observed that at in the northern slopes of the catchment, snow exists even at elevations of +3050 m. The average annual snowfall for the area is around 111.88 cm.

3.5 EXTRACTS FROM SH. R.C. SHARMA'S WORKING PLAN OF BHARMOUR (T) DIVISION:

1.1.1 The tract of the Bharmour Forest Division is situated between latitude N76 20' 0" and N 76 52' 30" and longitude E 32 11' 0" and E 32 36' 0".

1.2 Configuration of the ground:

The tract is traversed along its length by two main Himalayan ranges viz. The him- Himalayan or Pangie ranges, and the outer Himalayan or Dalhousie range. Pangie range forms the northern boundary separating it from Lahaul. This range maintains its lofty heights and runs in a southwest to northwest direction. The Dhaula Dhar range maintains its loft height up to Dharamshala in Kangra District where it loses its magnanimity rather abruptly, and then near Banikhet, in Chamba

District, it suddenly dwarfs down to 1500 meters. Only the northern slopes of this range forms a part of Bharmour Forest Division and are wooded.

1.2.1 From these two ranges, a series of spurs emanate in random directions without any definite order. The spurs are separated by deep and narrow valleys, varying in length and width, which are drained by a number of deep and turbulent streams and nallas. The slopes of both the ranges are abrupt and sharp. Generally, the terrain is steep and precipitous throughout the tract with moderately sloped small pockets in the lower elevations. The height of the tract varies from 1285 meters near Luna in Swai Range to 6108 meters on Pangi ridge in Bharmour Range. At higher altitudes, forest growth is studded with the rock out crops and precipices.

1.2.2 Geology, Rock and Soil:

Most of the areas of the division is as yet geologically unmapped. A great mass of the mountain is formed of ancient rock of Silurian age, resting on a central mass of granite or granitic gneiss. Nearly all the hill ranges of the Himalayas follow a definite pattern of strata. They usually lie in the east-west direction with some variations. The strata dip to the north barring some variations due to orogenic movements and local disturbances. This east-west sweep of the ranges has given rise to markedly south and north exposed slopes, hence to different rock weathering conditions and vegetative cover due to the varying duration of light.

1.3.1 All over the tract schist occurs in different forms such as shales, slates, gneisses, argillaceous clay, etc. The schists provide easily worked building stones, while slates provide excellent roofing material of good quality. Underlying rock of Dhaula Dhar range are granite and gneiss almost uniform in character throughout. At the lower elevations, the rock system, mainly on the northern and eastern slopes, is very unstable, weak, and friable nature, readily prone to disintegration. The terrain in such parts is highly susceptible to landslides, landslips ridge the ridges and spurs and precipitous and southern as and erosion. The sub-soil is fairly hard, generally argillaceous shale, which is often fissured, and easily subject to disintegration near the surface when exposed. The soil depth is inversely proportional to the slopes. On ridges and spurs and precipitous and southern aspects, the soil tends to be shallow and dry with numerous out-crops of bare rocks.

1.3.2 With some exceptions, it may be said that most part of the tract bears fairly fertile, deep and well drained soils suited to trees growth.

1.4 Climate: The climate is marked temperate and varies with the altitude. Since most of the areas of the tract lies on higher elevations and northern aspects, cool weather prevails during most part of the year.

1.4.1 Seasons are well marked. The spring season is cool bright and free of haze and mist or dust and snow deposits still persists above 1839 meters, and not un-often light snowfall or sleet and rain and cold lashing winds with thunder storms plunge the tract back into spells of wintry cold. Hailstorms are a regular feature of the Dhauladhar. Hail is very injurious to the incipient growth of this season. The April slowly gives way to the must steadier months of May and June when the sun shines, the light brightest and warmest, with occasional high showers and the weather is tolerably warm. The monsoon generally starts in the first week of July and lasts up to the end of August. There are occasionally very heavy rains, which bring in devastating floods in the streams and nallas and landslides or land slips (locally called ghars). September and October is cool bright and free of haze and dust, with occasional light rains. November is cool and dry and by the middle of this month rain, hail, sleet and light snowfall begins to visit the area above 1800 meters. Snowfall is almost a regular feature from December to middle of March. It accumulates as much as 9 meters at 2700 meters elevations and above and does not persist longer below 1800 meters of elevations and southern slopes.

1.5 Rainfall: The average annual rainfall and snowfall for the Division works out to 673.26 mm and 111.88 cm respectively. The bulk of the precipitation is received in the form of sleet and snow from the mid of November to middle of March. Rainfall is also good during monsoon from middle of July to end of August. The difference in the distribution of the snowfall is less pronounced. Generally, the inner valleys experience a heavy snowfall, where it stays longer. Droughts occur from April to middle of June and during middle of September to November. Prolonged severe droughts are common and that have adverse effect on the establishment of regeneration.

1.6 Water Supply: The nallas, streams and rivers are mainly snow fed and receive large quantities of water from the melting of high-level snow during the summer. As such they contain sufficient water for floating down sawn timber. But most of nallas and streams are studded with boulders and rocks, which hinder floating operations. In denuded localities water supply is not always satisfactory during summer and in winter the discharge is appreciably reduced in the streams and nallas. Rainwater runs down quickly and rapidly giving rise to sudden and heavy floods.

1.7 Distribution and Area: The forests are interspersed throughout the tract and are honeycombed by patches of cultivations. The total number and the area of the Reserve Forests and the previously Demarcated Protected Forests remain unchanged. Latest Forestry Survey maps on 1:150000 scale is available for almost all the Reserve and the Newly Demarcated Protected Forests of Bharmour, Swai and Gtrehta Ranges. The following table gives the distribution of area and the other particulars of the forest dealt with in this working plan:

Name of the Range	Area (in Hectares) of the			Total Area
	Reserve Forests	Newly Demarcated PFs	Pastures	
		Wooded		
Bharmour	1243.59	6457.26	21553.94	29524.79
Trehta	2462.98	14953.81	54886.76	72303.55
Swai	2437.15	6974.46	24785.82	34197.43
Total:	6143.72	28385.53	101226.52	135755.77

1.8 State of Boundaries: The Reserve Forests have been properly demarcated with masonry pillars, which are serially numbered by means of wooden posts embedded in the boundary pillars. The included cultivations or “Chaks” have also been properly demarcated on the lines of Reserve Forests with serial number engraved on slates built into the outer faces of the pillars. Uncertainties about the boundaries are very rare, but the pillars in some cases are too distant. Another disquieting feature is that many of the old boundary pillars have gone into disrepair.

1.8.1 The state of newly Demarcated Protected Forests is unsatisfactory at several places. Intermediate boundary pillars are required to be constructed. Some pillars also need repair.

1.9. Legal Position:

1.9.1 Reserve Forests: These forests were demarcated and constituted as Reserve Forests

during the period of 1881. Simultaneously the rights were also settled. They were revalidated as Reserve Forests under the Indian Forest Act by the Himachal Pradesh Administration, vide Notification No. Ft. 43-107/56 dated Shimla-4 the 15th March, 1957.

1.9.2 (Newly) Demarcated Protected Forests: Consequent upon the merger of the States and formation of Himachal Pradesh, all these forests were declared as Protected Forests by the H.P. Government vide Notification No. Ft. 29-241/49 dated Shimla 4, the 25th February, 1952. Subsequently, the Government, through the Notification No. Ft.774-1/63(M) dated 24.02.1964, ordered that these forests stand demarcated, surveyed and rights be determined and now these forests stands declared as Demarcated as Demarcated Protected Forests.

1.10 Rights and Concessions: The rights in the Reserve Forests were settled in 1878 and these are reproduced in Appendix SII. These consist of grazing, collection of firewood, grass cutting, collection of torchwoods, lopping Oak trees for fodder and right of way, etc. Right to building timber are restricted to a few cases only. These bear heavily on the few Deodar forests bounded by cultivation. One third area of any forest, burdened with rights, can be closed to the exercise of all rights and privileges for regeneration purposes.

1.11 Forest Settlement Operation in Chamba District: The settlement operations in Chamba District for the Un-Demarcated Protected Forests came into being as a result of the Govt. Notification of 1952 were ordered vide Notification No. Ft. 774-1/63(M) dated 24.02,1964. The Settlement Operations were completed by 1975-76 except for the issuance of the Notifications of some forests which continued later also. As a result of the settlement 2579 forests measuring an area of 4,27,437 ha. were constituted as Demarcated Protected Forests. But most the newly constituted Demarcated Protected Forests have not been entered in the Revenue Records. The efforts should be made to get these entered in the Revenue Records so that the purpose of the settlement is fulfilled.

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CHAPTER 4

CAT PLAN COMPONENTS

4.1 The Government of Himachal Pradesh, Forest Department is actively engaged with arriving at the most logical allocation of funds for the different components of Catchment Area Treatment Plan. The present Notification in force is No. FEE-B-F-(2)-72/2004-Pt-II dated 30.9.2009. (*Appendix IV*) The salient features of these guidelines envisaged the following mandatory requirements:

- The total CAT Plan outlay should not be less than 2.5% of the total project cost and minimum area to be treated would be approximately 15% of the effective catchment.
- Provisions with appropriate budget to be made for carrying out forestry research of relevance to the area.
- 5% budgetary provisions to be made under M&E. Provisions for Silt Observatory Posts have also to be made under this component.
- A Chapter on J.F.M. and Micro-planning component should be included.
- 1% of the CAT Plan budget to be kept for Eco Tourism.
- A separate Chapter on improvement and development of wildlife and reduction of man animal conflicts should be given.
- Under Infrastructure Component provisions have also to be made for forest protection.
- Under PES a provision of 10% of the Total CAT Plan outlay should be made.
- A provision of 10% per year to be made for Contingencies to offset inflationary trends on account of increase in the wages rate and cost of material.
- Provision should also be made for training of Forest staff.
- Provisions for Energy Saving Devices also to be made.
- Site Specific Work Plans.

4.1.1 The above guidelines are adhered to while preparing this CAT Plan. Government of Himachal Pradesh vide its Notification No FFE-B –F(5)-9/2017 dated 21st November 2019 (*Appendix-V*) has fixed the cost of CAT Plan at 1.5% of the Project cost. Thus, for Tundah II HEP, the cost of CAT Plan is Rs. 335.25 lacs which is 1.5% of the project cost of Rs.22350 lacs. Similarly, in a recent directive the cost of Infrastructure component is required to be reduced to 5% and the saving thus made is to be increased in the component of Monitoring and Evaluation. The percentage share of each component as per HPPD guidelines and modifications thereto stated above are as follows:

Table 4.1 Component wise fund allocation

Sl.	CAT Plan Component	Admissible amount.	Amount provisioned	%age
1	Forestry	83,81,250 (25%)	61,50,000	18.34
2	Soil & Moisture Conservation Measures	83,81,250 (25%)	80,00,048	23.85
3	Research, Training & Capacity Building	16,76,250 (5%)	22,81,371	6.80
4	Payment for Environment Services	33,52,500 (10%)	33,52,500	9.99

Sl.	CAT Plan Component	Admissible amount.	Amount provisioned	%age
5	Eco Tourism	3,35,250(1%)	18,50,000	5.52
6	Infrastructure & Forest Protection	33,52,500 (10%)	47,25,000	14.09
6A	Renovation of existing infrastructure and construction of new buildings.	16,76,250 (5%)	19,90,000	5.93
6B	Forest Protection	16,76,250 (5%)	27,35,000	8.16
7	Wildlife Habitat Management	20,11,500 (6%)	27,20,000	8.11
8	Monitoring & Evaluation	16,76,250 (5%)	16,76,251	5.00
9	Site Specific Plans	10,05,750 (3%)	0	0
10	Contingencies.	33,52,500 (10%)	30,49,267	9.09
	Total:	3,35,25,000	3,35,41,937	100.00

4.2 AFFORESTATION: During interaction of NERIL Team with HPFD authorities, it revealed that the forests in the project catchment are already well stocked offering little scope for Afforestation activities. Since there is little scope for afforestation activities, no new nurseries are proposed. Out of total provision of Rs. 61,50,000/- for 61 ha. of land and 4 Waterholes, an amount of Rs. 27,00,000/- is meant for Chamba WL Division and Rs. 34,50,000/- for Bharmour (I) Division. Therefore, the projections under Afforestation Component are limited as under:

Sl.	Particulars	WL Chamba Div. (Ha.)	Bharmour (I) Div. (Ha.)	Total (Ha.)	Financial provisions
i.	Site Specific Plantation for Habitat Improvement in Bharmour (I) Division.	0	6	6	3450000
ii.	Pasture Management/ Weed Control	55	0	55	1100000
v.	Waterhole & Ecosystem	4	0	4	1600000
	Total (ha.):	55	6	61	6150000

4.2.1. Site Specific Plantations on the analogy of Mukhya Mantri Van Vistaar Yojana (MVVY):

The forest in the project catchment are well stocked leaving no room for new plantation. During the process of finalisation of this CAT Plan, HPFD authorities emphasized the need for site specific plantations on a few hectares of land on the analogy of Site Specific Plantation Scheme of 1100 plants per hectare as contained in MVVY yojana. Thus, site specific plantation for habitat improvement of Chir Pheasants sited in the project catchments of Bharmour (I) Division on 6 hectares of land with a financial provision of Rs. 34,50,000/- is provided in the CAT Plan. The cost norm of Rs. 5,75,000/- per hectare for the site specific plantation has been prepared on the analogy of cost norm contained in MVVY Yojna including maintenance support of 7 years and 25% increase thereon for Tribal areas.

4.2.2 Pasture Management/ Weed Control: It is observed that due to adverse climatic and geographic conditions/ factors, there is scarcity of grass and fodder in the CAT Areas. Large herds of sheep and goat are owned by the local people. In winter, these herds are taken outside the CAT area in lower parts of Himachal Pradesh, which return during summer. Alpine pastures within the Catchment area are the main grazing grounds for these herds. The productivity of these pastures is decreasing gradually. The CAT Plan, therefore, provides an amount of Rs.20,000/- per ha. for pasture Management/ Weed Control. A total of 55 ha. of land is planned under Pasture Management/ Weed Control in WL Chamba Division with a financial provision of 11,00,000/-.

4.3 SOIL & MOISTURE CONSERVATION: Soil & Moisture Conservation Measures form the second major component of the CAT Plan. The requirement of SMC works in the catchment was assessed together with the Forest Department Officials. A large no. of streams leading to the Tundah Stream has very little silt as they come over hard rocky surfaces. Considering the size of this CAT Plan and the limited availability of funds the nallas that have clear waters for most of the year are not being given any structures. Normally, in the present-day scenario, machine wound gabion check dams are highly recommended. However, the field staff expressed their difficulty in carrying the gabion boxes over such steep hills and, therefore, crate-wire check dams are recommended. Beat wise details of Nallas are given in Chapters 12, 13 and 15 with the specification of its size. A total of 172 check dams (i.e. 147 Check dams in Bharmour WL Range and 25 in Bharmour and Swai (T) Ranges) are given. Based on the interactions and site visits, the nallas that need soil & moisture conservations are named in the beat wise plan. The requirement of funds for 100% treatment of these nallas and slips will be manifolds beyond the available funds for SMC works under this CAT Plan. Hence, projections under SMC component are restricted to permissible percentage of 23.83% i.e. Rs. 80,00,048/- (Rs. 70,03,488/- for Chamba WL Division and Rs. 9,96,560/- for Bharmour (T) Division) of machine wound gabion structures are planned as per actual site.

4.3.1 In this CAT Plan 89.18% area is under Wildlife Division, Chamba. This leaves very little scope for Afforestation. Therefore, under the Afforestation component 18.34% amount is used instead of usual 25%. This amount is utilized mainly for habitat improvement by providing waterholes eco-systems in the wildlife area and Afforestation measures in 6 ha. of Bharmour (T) Division, 55 ha. of land for Pasture Management and 4 Waterhole Eco systems in Chamba WL Division. 42.19 % of the CAT Plan amount is distributed between Forestry and SMC components.

4.4 Research, Training & Capacity Building: The Tundah WL Sanctuary is surrounded by 18 small villages. It is extremely important to obtain active participation from the local villagers in the interest of management of wildlife area. The component of capacity building, merits special attention in areas such as Bharmour Wildlife Range of Chamba Wildlife Division. Special provisions are made to have frequent seminars in the villages to motivate them and to take them along in adopting best agricultural, horticultural, and animal husbandry practices. This component is, therefore, given additional funds to the extent of Rs.605121/- i.e. 6.80% instead of 5% in the WL Division Chamba and Bharmour (T) Division. Thus, a total provision of Rs. 22,81,371 is made under this component-(Rs. 21,00,000/- for Chamba WL Division + Rs.1,81,371/- for Bharmour (T) Division). Allocation of amounts allocated under different activities under this component is as under:

Sl	Activity	WL Chamba Division	Bharmour (T) Division	Total
1	Study for Habitat Improvement of Brown Bear in Tundah WLS through WII	9,00,000	..	9,00,000
2	Exposure Visits & Training to staff	5,00,000	..	5,00,000
3	Meetings and Seminars with Villagers and staff	4,00,000	..	4,00,000
4	Publicity & Awareness Camps	3,00,000	1,81,371	4,81,371
	Total:	21,00,00	1,81,371	22,81,371

4.5 Training: The need for Training of Beat Level, Range Level and Division Level staff on latest techniques was emphasized upon by HPFD staff. It was stated that periodical trainings and exposure visits to reputed institutes in the State/ country should be organized to update the skills of HPFD staff. There is also a need of training the Territorial staff in handling the wildlife which too is proposed to be catered

under this Component. Further Publicity and Awareness Training camps for the field staff as well as to the farmers should be organized to apprise them of the latest techniques. Expenditure on providing training to Territorial as well as Wildlife staff and organizing workshops for wildlife management including publicity of 'do's and don'ts' will be met out of this component. Seminars with villagers in the wildlife area to increase awareness of coexistence with wildlife are also to be planned under this component. Therefore, a consolidated provision of Rs. 22,81,371/- is made for this component. The amount is to be utilized from Division level.

4.5.1 Awareness programs: It is well appreciated that the plantation and growth of alpine pastures can be best done with consultation and agreement between the graziers and the forest department after adequate awareness generation of graziers as well.

4.6 Payment for Environmental Services: H. P. Forest Department Guidelines for Catchment Area Treatment Plans provide 10% of the CAT Plan funds for utilisation for Payment for Environment Services. The nature of environmental services that may be provided by the people vary with the locations, living surroundings and the ecological status of each catchment area. As such, it is difficult to create precise hard and fast instructions for application of these funds. However, the common consensus always is to provide these funds to the communities and not to individuals. Activities to be propagated under PES component of this CAT Plan are providing Solar Lights and Water Storage Tanks of 2000 litres capacity each, Bee Keeping and training of farmers in Bee keeping and other miscellaneous activities. Location specific needs can change. The Gram Panchayats were consulted in this regard and their needs are explained in Chapter 8. The other activities which can be taken up at the discretion of HPFD in accordance with the guidelines in force from time to time include incentives for survival of plantation, incentive for reduction in biotic pressure, incentives to be given to villages for helping HPFD in fire prevention, preventing forest land encroachments, incentives for maintenance and development of water resources. A provision of Rs. 30,90,000/- (i.e. Rs. 22,71,000/- for Chamba WL Division and Rs. 8,19,000/- for Bharmour (I) Division) is made in this CAT Plan.

4.7 Eco Tourism: HPFD Guidelines of 2009 for preparation of CAT Plans as amended from time to time caters for only 1% of the CAT Plan cost for Eco Tourism. In the areas in Wildlife Division, Chamba such as Bharmour Wildlife Range, it is necessary to deviate and increase this allocation percentage. It is important to realise that the local population must earn their livelihood through eco tourism activities based on conservation of wildlife and therefore, get interested in and motivated to conserve wildlife to meet their own livelihood needs. Bharmour Wildlife Range has got popular trekking routes for Banni Mata, Chadola, Diggu Temple, Kali Chow Pass, Mani Mahesh Yatra. Eco tourism activities there need to be streamlined through training of guides and creation of camping/tenting sites with the help of local population. This will provide livelihood to locals and enhance protection of wildlife and the forests while providing conveniences to trekkers and pilgrims. This component, therefore, needs special attention in the form of capacity building and infrastructure also. This CAT Plan provides for Rs. 18,50,000/- under Eco Tourism activities out of which Rs. 14,80,000/- is provided for WL Division Chamba and Rs. 3,70,000/- for Bharmour (I) Division. The amount is proposed to be placed at the disposal of Eco Tourism Societies of Chamba WL Division and Bharmour (I) Division respectively.

4.8 Infrastructure Development and Forest Protection: An allocation of Rs.47,25,000/- (i.e. Rs.19,90,000/- for Infrastructure Development (Rs. 17,80,000/- for Chamba WL Division and Rs. 2,10,000/- for Bharmour (I) Division) and Rs.27,35,000/- for forest protection (i.e. Rs. 24,20,000/- for Chamba WL Division and Rs. 3,15,000/- for Bharmour (I) Division) is made for Infrastructure development and Forest Protection. In order to provide accessibility to the Forest Staff, allocations are made for foot bridges and bridle paths.

4.8.1 According to recent guidelines communicated to H.P. Forest Department from Government of India, Ministry of Forest and Environment, the projections under Infrastructure Development should be

restricted to only 5% instead of earlier limit of 10%. Thus, the total projections under Infrastructure and Forest Protection are made to the tune of 14.09% (i.e., 5.93% for renovation/ new infrastructure and 8.16% for forest protection) instead of earlier limit of 15%.

4.8.2 Forest Protection: There is need for making fire lines in all Beats. Forest Fires are very common and frequent in these Beats. A consolidated provision of Rs. 27,35,000 (i.e. Rs. 24,20,000/- for Chamba WL Division and Rs. 3,15,000/- for Bharmour (I) Division) is made for Forest Protection including maintenance of fire lines and Patrolling kit comprising of Jungle Boots, Haversack, Water bottle, Jungle Caps, Stick and Pickaxe, Helmet and other equipment. Rs.5,75,000/- are provided for the purchase of a drone. A provision of Rs. 8,00,000/- in this CAT Plan is made for hiring Patrolling vehicle in Chamba WL Division.

4.9 WILDLIFE HABITAT MANAGEMENT. Tundah Wildlife Sanctuary of WL Bharmour Range with four beats falls in the project catchment. Wildlife exists in the territorial areas as well as WL Sanctuary area of the Project catchment. Therefore, provisions for construction of 4 water holes in forest areas are planned in accordance with discussions with the field staff. These small ponds will have dual advantage i.e. (i) availability of drinking water to wildlife and (ii) availability of water for controlling forest fires to save forests and wildlife. A total provision of Rs. 27,20,000/- (including Rs. 8,70,000 for Wildlife protection equipment such as Binoculars, Trapping Cameras and 1 Tranquilizer Gun) is made for WL Chamba Division under wildlife protection component for purchase of equipment, man animal conflict, construction of 3 bunkers, study on carrying capacity of WL Sanctuary Tundah for Eco Tourism and Rs. 10.00 lacs for strengthening of rescue facilities at Monkey Sterilization Centre, Chamba/ Bakani in WL Division Chamba. The purchase of equipment will be controlled from Division Level. The recommended specifications of Trap Cameras are:

- Still Resolution: 1200 Mega Pixel
- Wide Resolution: 1280 x720
- Video Length 90-180 Second
- Data Storage: 32 GB minimum
- Night vision using low glow LED with audio recording.
- Minimum 2" colour LED.
- Power: source Recharge Lithium Ion
- Capable of transmitting photos over mobile network.
- Waterproof.
- The approximate cost of one such camera with these features is Rs.60,000/-

4.10 MONITORING AND EVALUATION. The activity of monitoring and evaluation can be split in several parts. These relate to monitoring of the conduct of implementing CAT Plan Actions and evaluating the efficacy with which the implementation takes place. The means of identifying success of the CAT Plan Actions is the measurement of silt load. The CAT Plan actions can further be classified in those which contribute directly to the conservation of the soil and moisture. These will, therefore, include all the sub-components of Afforestation measures and all the subcomponents of soil & moisture conservation measures. In addition to this, the CAT Plan Component which contribute to the capacity building of the Forest Department, such as forest infrastructure and protection, research and development, wildlife measures, eco-tourism and socio-economic incentives given through PES. The success of all these can best be measured through monitoring the silt load at periodic intervals.

4.10.1 M&E of Implementation: A lump sum provision of Rs. 16,76,251/- (i.e. Rs. 14,94,880/- for Chamba WL Division and Rs. 1,81,371/- for Bharmour (I) Division) is made for Monitoring and Evaluation which works out to 5% of the total CAT Plan. 1% funds out of 5% funds are to be utilised for strengthening I.T. activities. Checking by the Forest Guards, B.Os. Range Forest Officer and Divisional Forest Officer are prescribed. Constitution of Divisional CAT Plan Committee at Divisional Level and range Level is

recommended for this purpose there is a need to ensure effective supervision and guidance in the implementation of CAT Plan works. There is a two-tier system proposed. The first tier of monitoring will be monitored by the concerned D.F.O. and C.F. However, the second tier of monitoring envisages monitoring and reporting by third party Consultants. This monitoring has to be exhaustive and to be done after field inspection of completed works versus its comparison with planned works. It is envisaged that such monitoring exercise must be done in every alternate year to ensure appropriate quality of work besides ensuring achievement of physical and financial targets. The funds under this component will be controlled by APCCF (CAT) Plan.

4.11 CONTINGENCIES: A provision of 9.09% of the Projections under CAT Plan Cost in respect of all the components is made in the CAT Plan to offset the unforeseen expenditure on account of cost escalation and increase in the labour rates from time to time. This is left at the discretion of Forest Department and may support unforeseen expenditures as well as unplanned activities which may arise from time to come. If maintained at the level of 9.77% the Contingencies, fund may also be effective in setting off cost escalation in times to come. A provision of Rs.30,49,267/- (i.e. Rs. 23,96,937/- for Chamba WL Division and Rs. 6,52,330/- for Bharmour (I) is made under this component.

4.12 Conclusion: The CAT Plan amount works out to Rs. 3,35,41,937/- (i.e. Rs. 2,63,66,305/- for Chamba WL Division and Rs. 71,75,632/- for Bharmour (I) Division). Thus, NERIL's approach to Tundah II HEP CAT plan is in conformity with the HPFD guidelines for allocation of funds and its utility.

CHAPTER 5

GUIDELINES FOR FORESTRY & WILDLIFE MANAGEMENT

5.1 Introduction. Forests play an important role in the economy of the State. They meet our requirement of timber, fuel wood, fodder, paper pulp, sports goods, match wood, plywood, resin, packing cases, and agricultural implements, other minor forest produce and medicinal plants. Forests are a major natural system to complete the water cycle. Owing to increasing pressure on forests due to enhanced grazing and other human interference, the natural regeneration on which we had depended a few decades ago is now very scarce. It has therefore, become necessary to restock the forests by planting suitable tree, shrub and grass species. Forests are also the natural habitat for the entire biota from microorganisms to large species such as leopards. Management of Forests is important for the existence and propagation of all wildlife. It is, therefore, important that the habitat for wildlife animals must be improved, niche areas must be protected, and key stone species must be conserved. This CAT Plan provides budgets and methods to achieve these objectives.

5.1.1 The most important component of management of catchment areas is Forestry. Forests must be protected if they are well stocked, new plantations are to be made, if culturable areas exist, gaps may have to be filled in new plantations where the survival has been poor in plantations which have finished with their maintenance period or enrichment plantation has to be carried out to ensure that old forests where the stock has depleted is enriched again. Grasslands and Pastures play a key role in the continuity of food chain. They are as important for the migrant shepherds as for the ungulates.

5.2 As stated in Chapter 2, the catchment area of Tundah II HEP is spread over two Ranges (3 Beats) of Territorial Forest Division, Bharmour and 1 Range (4 Beats) of Bharmour WL Range. In keeping with the principles of minimum interference/ human signature in wildlife areas the approach to Afforestation Measures is different for wildlife as compared to territorial forests.

5.3 It can be seen that this area is well stocked and has no room for new plantation. This opinion was also voiced by the respective D.F.Os. and their staff. Afforestation component, therefore, consists of Site-Specific Plantation, Pasture Development and waterhole ecosystem development. Considering the limitations of available funds, no additional facilities / nursery etc. is provided.

5.4 Afforestation in Territorial Forests: (Refer Appendix VI). The afforestation measures suggested for Sirdi in Bharmour Territorial Range and Mandha and Diggu in Swai Territorial Range therefore, includes following:

- **Site Specific Plantation** on the analogy of MVVY for habitat improvement of Chir Pheasants. A provision of Rs. 34,50,000/- for 6 ha. plantation is made for this activity in Bharmour (T) Division.
- **Pasture Management (Weed Control).** A provision of Rs. 11,00,000/- for 55 ha. land in Chamba WL Division is made. To ensure minimum human interference in wildlife areas de-weeding is planned every alternate year i.e. five times in 10 years at the rate of Rs. 20,000/- per hectare (Refer Appendix-VII).
- **Waterholes Eco System.** A provision of Rs. 16,00,000/- in Chamba WL Division is made for 4 Eco system waterholes. The cost norm for Waterhole Eco System is Rs. 4,00,000/- per location. (Refer Appendix-VIII.)

5.4.1 Site Specific Plantation: This is modelled after the MVV Yojana and follows very similar cost model for plantation and maintenance. Sites that face substantial difficulty in afforestation is selected and the hurdles are addressed by using advanced plantation technology. Modern technology like use of resilient seedlings and saplings, bioengineering, hydrogel, bio fertilization, geo textiles and import of fertile forest soil is to be adopted to ensure a high rate of survival under difficult edaphic and climatic conditions. Sirdi beat has about 108 Ha of southeast / southwest area. The Manda beat has about 297 Ha of similar South facing refractory slopes. Four hectares in Sirdi and two Ha in Mandha are selected respectively for this site-specific model. The site-specific plantation model to be adopted for these sites will include plantation of 300 tall plants (*Pinus deodara*), 800 Nargaal plants (*Arundinaria falcata*) and native bio engineering shrubs and grasses. Addition of vermi-compost, bio fertilizer, and staggered contour trenches for moisture conservation is also made in this site-specific model. The per hectare cost of plantation for tribal areas is Rs. 5,75,000/- (i.e. Rs. 2,50,000/- and 7 years maintenance Rs. 3,25,000/-). This plantation pattern is to be carefully executed to ensure survival and improvement of habitat for the Chir pheasant which have been sighted in these beats.

5.4.1.1 Plantation Process for native bio-engineering shrubs and grasses: -

Normally, any plantation to succeed it should be provided with protection. However, at the heights of alpine pasture it is physically difficult and economically impractical to erect RCC Poles with barbed wire fencing. The plantation is carried out either by the pit method or by the strip method. In the present case, we have considered strip method with a combination of legumes and grasses 50% each. It is recommended that the palletized grass seed be broadcast, in addition to tufts of grass being sown along with legume seeds. The suitable species and seed rate for these altitudes of grasses and legumes as researched by the “Regional Research Centre, Indian Grassland and Fodder Research Institute, Palampur” are as follows:

- **Grasses:** - *Lolium perenne*, *Festuca pratense*, *F. rubra*, *Phleum pratense*. In sub alpine areas *Festuca arundinacea*, *Phalaris arundinacea* and *P.Tuberosa* are also suitable.
- **Legumes:** - *Trifolium repens*, *T. pratense*, for subalpine areas, *Trifolium sub Terraneum*. *Lotus corniculatus*, *Medicago sativa* and *Onobrychisviciaefolia* are also suitable. In the context of the pastures, it is very important to create mixed vegetation so that the herbage availability is assured the season round.
- **Transplantation:** -Nurseries of grass seedlings should be raised on well drained elevated soils 45 days before the date of transplantation. Manure @ 100 kg per hectare should be added. An ideal bed size would be 4m x 2m. Seed should be evenly spread on the soil and a thin layer of soil not more than 2 cms above the seed should be spread over it. Light shower with a sprinkler should be provided after sowing. The bed should then be covered with mulch which should be removed when these seedlings reach two leaf stages, and the bed then should be irrigated regularly. The seedlings are ready to be transplanted in the pits/ strips when they are 20 cms long. Two hours before the transportation of seedlings to the site the bed should be flood irrigated. Thereafter, the seedlings can be uprooted and tied in small bundles or tufts and transported. At site the strip should be made ready after moving the sward and

the soil cleaned and dug up to 10 to 15 cms. At site the upper portion of the seedlings should be chopped off and length of only about 10 cms from base should be maintained for the seedling. Minimum of two seedlings should be transplanted at one spot and these spots should be 10 cms apart.

- **Time of sowing:** - For the best survival of the seedlings of grasses and legumes, sowing should be made during March and April in sub alpine areas and during April and May in Alpine region. The survival rate will be adversely affected if the sowing time is at variance than that recommended in the spring. Exact time may have to be determined after considering the time of snow melt availability of clear pasture area and weather conditions.
- **Post sowing activities:** -The next stage of operation will be the next year and identical to the first. The interspaces of strips should be replanted in the same way as described above to ensure greater spread of the desired grasses. The newly transplanted/ resown grasses will need one year for establishment. The entire area should not be planted in one go. Half the area should be improved and protected from grazing for one year and it may be opened for grazing in the following area when the rest of the area may be re-sown or transplanted. In order to maximize production, regular management practices like fertigation and regulated grazing need to be followed.

5.4.2 Pasture Development/ Grazing Land) It is observed that due to adverse climatic and geographic conditions/ factors, there is scarcity of grass and fodder in the CAT Areas. The ungulates are a key factor in the food chain. Increase in carrying capacity of ungulates can be achieved through pasture development. However, the conflict of interests arises from the dependence of migratory graziers and local livestock also being dependent on the same pastures. In this case, controlled entry exit in enriched pastures and awareness of mutual needs of the wildlife is recommended. Large herds of sheep and goat are owned by the local people. In winter these herds are taken outside the CAT area in lower parts of Himachal Pradesh to be taken back during summer.

5.4.2.1 Pasture Management/ Weed Control: Tundah Wildlife Sanctuary has got 3181.19 ha. of Alpine Pastures. Out of this 56.67-hectare pastures are in Mumri Dhar in Tundah WL Beat of WL Chamba Division as per Draft Final Management Plan of Tundah WL Sanctuary. The cost norm prepared by NERIL works out to Rs. 20000/- @ Rs. 4000/- per hectare per weeding. It is planned to do 5 de-weeding operations in 10 years. As stated earlier, the human interference and human imprint in wildlife areas must be kept to bare minimum. Almost 90% of the catchment area is in the Tundah Wildlife Sanctuary. This sanctuary has a presence of Ghoral, Musk Deer, Ibex, Tahir among the ungulates. The presence of the Brown Bear, Black Bear, Fox, Leopards and Snow Leopards is also reported. The area also contains pheasants which include Chakore, Ram Chakore, Monal, Koklas and Kaleez. In view of this the **afforestation measures are renamed as habitat improvement measures in the Tundah Wildlife Sanctuary.** The interventions consist of following:

- Pasture Management/Weed Control.
- Waterhole Eco System

5.4.2.2 Waterhole Ecosystem: Waterholes form an important part of improvement of wildlife habitat. The waterhole has to be developed not merely as water storage facility but it must be developed as an eco-system providing water, hide-outs, breeding grounds

and foraging grounds for the hierarchy of wildlife ranging from the invertebrates to vertebrates including reptiles, Rhodend, small animals to ungulates, higher canine, feline species as well as the avifauna. A total of 4 Waterholes are provided in Bharmour WL Range. Each waterhole has a capacity of approximately 720 cubic meters i.e. 7,20,000 litres. Care has to be exerted to ensure that one end of the waterhole is gradually sloping in order to ensure that there is no abrupt fall and that all animals can approach the water even when it recedes due to consumption and evaporation losses. It is advised to keep a stack of logs in the close vicinity for rodents and other minor mammals to hide. Old dead tree trunks should be used to make a snag for the birds. Some of the notional shrub enrichment area should also be planted close to the waterhole. A symbolic representation is given in chapter 11. A total of 4 Waterholes are planned as follows:

Beat	Location	No. of Water holes
Tundah	i.Mummri Dhar	1
Bhadra	ii. Chhajjala	1
Banni	iii.Chadhola	1
Badgram	iv.Saad Dhar	1
Total:		4

5.5 Plantation Techniques: The Catchment area is highly mountainous with steep to moderate slopes covered largely by coniferous forests in the higher reaches and by the horticultural crops in the gently sloping lower areas. The Forest area around sparsely populated villages is under severe threat of encroachments and other biotic pressures especially from villagers and graziers etc. It is, therefore, the need of the hour to secure the physical protection of the forests as first charge of the department, by resorting to repair and renovation of existing boundary pillars of Reserve and Demarcated Protected Forests and demarcation of the Un-Demarcated Protected Forests including the updating of the demarcation records.

5.6 Agricultural areas/ Private lands: The agricultural and other categories of the lands falling outside the forest area should always be preferred for planting of the horticultural species ensuring least disturbance to the soil and maximum vegetative coverage of the soil. The local people should be educated and made aware of the benefit of the horticultural crop cultivation viz-a-viz cultivation of soil depleting crops like maize, rice, potato, and wheat etc. The area surroundings heavy populations should preferably be planted with local fuel and fodder species.

5.7 Protection of Plantation Sites: The proper fencing of plantation areas is essential to protect the seedlings from damage by the cattle and wild animals. The choice of fencing depends on the type of terrain, soil depth and the kind of soil. Since most of the Afforestation programmes are employment oriented, a fence type with high labour input is preferred. Cost of fencing is another important criterion. RCC Fence posts not being successful in snowbound areas and involvement of heavy carriage cost to far off and very steep heights Wooden Fence Posts are recommended in this CAT Plan with 7 years maintenance support on the basis of HPFD Plantation Cost Norms 22-23.

5.8 Barbed wire fencing with wooden fence posts: In areas where stones are not easily available or where cartage of stones is expensive due to long distances, the plantation area should be protected by barbed wire fencing. Wooden posts are used for this purpose with a length of 3 m and a girth of 30 cm to 45 cm. The upper ends of the posts are fashioned in conical shape to avoid rainwater from rotting it. The lower end which remains in contact of the soil is painted with coal tar to avoid damage by white

ants and wood decay fungi. The posts are dug 30 cm deep and placed 2.5 m to 3 m apart. Three strands of barbed wire at the height of 22, 52 and 74 cm from the ground level are stretched and fixed to these posts with the help of iron staples. To make this barbed wire fencing more effective thorny bushes are put along the fencing. For entry in the plantation area wooden ladders are provided. From the landing point of the ladder an inspection path is made inside the plantation area. Areas having nilgai menace or damage by animals like deer etc. requires at least 4 rows of barbed wire fixed at an interval of 30 cm each with two strands of barbed wire inclined at 45° to the poles to provide extra strength.

5.8.2 RCC Fencing: The HPFD has promulgated use of RCC pillars instead of wooden posts for fencing. In this CAT Plan, Fencing with Wooden Posts is provided as explained in para 5.18 above.

5.8.3 Social fencing: In community areas and areas close to habitations, local villagers have to be encouraged to resolve among themselves about not sending their cattle in plantation areas and protect grasses in the plantation areas to be cut after maturity by mutual agreement. In such cases, the money earmarked for fencing must be utilized to pay the villagers who choose to stay at the plantation site and protect it from grazing. The grasses so produced can be shared by the villagers as per the mutual agreement.

5.8.4 Fire protection: A 1.5 m wide strip along the outer periphery of the fencing should be cleared of grass and bushes and the strip scrapped with spade for fire protection so that any fire from outside may not enter the plantation area. A hut should be constructed inside the plantation area, preferably at the entrance point for the stay of people during rains and for the stay of Chowkidar deputed to look after the plantation.

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6.1 INTRODUCTION- Soil & Moisture conservation measures are a set of activities which range from RCC, Gabion, Random Rubble, Brushwood to bio-engineering measures. The main objective of devising site- specific measures is to minimize soil erosion, reducing velocity of water from natural drainage and surface run off by using locally available materials in the most effective manner. In the Himalayan ranges soil is invariably loose, rocks are sedimentary, slopes are steep and long and debris flow is quite common. This Chapter introduces the different treatment measures generically referred to as SMC measures with details. This CAT Plan specifies location specific SMC measures which include construction of check dams and water harvesting structures. The details of drawings and designs together with specification of materials and its cost estimate of the structure are given in **Appendix – IX**. A provision of Rs. 80,00,048/- is made in the CAT Plan for 172 Nos Check dams and 4 Water Harvesting Structures.

6.2 Check Dams: These are small, sediment-storage dams built in the channels of steep gullies to stabilize the channel bed. They are commonly used in all countries to control channelized debris-flow frequency and volume. Channelized debris flows are associated with channel gradients over 25 degrees and obtain most of their volume by scouring the channel bed. They serve three purposes when installed in the channels:

- To mitigate the incidence of failure by reducing the channel gradient in the upper channel.
- To reduce the volume of channel-stored material by preventing down Cutting of the channel with subsequent gully sidewall destabilization and by providing toe support to the gully slopes.
- To store debris-flow sediment, when installed in the lower part of the channel.

6.2.1 When installed on debris slides, the dams store gravelled material, which eventually creates small terraces on the slide, reducing the surface slope. The spacing of dams depends on channel gradient and dam height. For example, a 2-m-(6 foot) high dam in a 20-degree channel with 10-degree sloping channel infill will be spaced every 12 m (36 feet). Lateral stream erosion and scour by spillway water is the main drawback. Normally machine bound gabion boxes should be used. However, in case of Tundah the field staff expressed that it is difficult to carry along the steep slopes of the nallas and hence requested to provide crate-wire check dams. It is pertinent to mention that while costing the cost of gabion check dam is taken so as to provide a flexibility to use machine bound gabions.

6.2.2 Measures to be taken to prevent check dam failure: -During construction, the wing walls and log crib ends must be tied securely into the canyon wall and stream bed to withstand backfill pressures and lateral scour. Wing walls should slope at about 70 percent and extend a minimum of 1–2 meters (3 to 6 feet) into the banks. The foundation of the dam should have a minimum width of one-third the total height of the dam and be deeper than any scour holes likely to develop. Back filling the dam, rather than allowing it to fill naturally, reduces the dynamic loading on the structure and results in a more stable design. The slope of the backfill should be less than one-half the channel gradient. Dams that have been back-filled usually will survive a debris flow. The backfill material will not be scoured during or after a torrent.

6.3 Proper drainage management: In-appropriate & in-adequate drainage management is very commonly observed in majority of slides investigated in MWs. Water infiltration in the overburden during heavy rains and consequent increase in pore pressure within the overburden reduces the strength of the material and causes sliding of the landmass. This can be minimized by reducing infiltration by providing adequate drainage network. In this regard, a dual-pronged strategy must be adopted such as reducing flow of water into the vulnerable slope material by constructing interceptor

drain, trench drain, diverting side drains and by channelization of all drains and second ,by draining out the remaining water by horizontal to sub-horizontal drainage system (using perforated pipes) including construction of collection chamber and diverting the water to existing channel and removal of any blockade to existing drainage system. Most important, all drainage systems need regular maintenance and surveillance for detecting any change in the flow pattern or pour water pressure by installing inexpensive piezometers at selected locations.

6.3.1 Ditches and drains: -Surface drainage can be through either surface ditches or shallow sub-surface drains. Surface drainage is especially important at the head of the slide, where a system of cut off ditches that cross the headwall of the slide, and lateral drains to lead runoff around the edge of the slide are effective. Ditch gradient should be at least 2 percent, to ensure rapid flow away from the unstable area. The simplest type of subsurface drain is the lateral trench constructed above an unstable slope. Drainage trenches are economical only for shallow soils overlying bed rock or hard impermeable till. The trenches should be excavated to the base of the shallow soil to intercept any ground-water flow along the failure plane. They are backfilled with coarse gravel to prevent sloughing of the ditch sidewalls. An improvement is to use drainpipe and then backfill the area with coarse gravel. Engineering measures are more effective in conserving soil and water when they are supplemented by vegetative methods. But in certain situations, only engineering measures can be proposed. This section gives a brief about the various engineering measures that are suggested for soil and water conservation for the project area. These measures have been suggested after site visits carried out by the group of experts. Four different types of structures with varying dimensions have been suggested for the project area. These engineering structures are as follows:

- Check dam.
- Check/Retaining wall.
- Water harvesting structure.

These structures have been defined with fixed width and height and the length varies as per the requirements of the treatment site. The cost of each structure varies with the length. These measures must be selected depending upon the site's topography and weather. Conditions like torque and stress caused by wind and water also need to be considered before constructing these structures. The drawings and cost estimates for the different soil and water conservation measures are given *ibid* in **Appendix IX**.

6.3.2 Diversion Drains: Diversion drains intercept the storm water which could otherwise flow down from higher ground on to the arable land which it protects. It is the first line of defence and vital for protection systems and structures below down as it effectively controls the runoff from outside the arable land and conducts it safely to natural outlet. The diversion drains should be aligned on non-erosive and non-silting grades. It must also be protected from silting. A narrow and deep ditch does not get silted up as rapidly as a broad and shallow ditch of the same cross-sectional area and is therefore, self-maintaining. The soil excavated from the diversion drain shall be deposited on lower side of the drain, leaving a berm of 0.30 m and sectioned in a trapezoidal shape with side slopes not steeper than 1:1. The outlet end of the diversion drain should be taken to the existing or stabilized safe natural drainage lines or outlets so as to conduct the runoff properly without causing erosion. Suitable spreading type of grasses must be planted.

6.4 Larger part of the catchment lies under snow cover for most of the year. As such the Rills, Nallas and Rivulets are subject to snow and debris flow. The flow pressure of debris in these conditions can be of the order of 100 k N/m/h fl. Traditional rigid SMC structures such as dry stone or crate wire check dams will not last long under these conditions. A combination of machine wound gabion check dams together with NTFP plantation is therefore planned.

7.1 Research, Training Capacity Building: This is an important activity for this ecologically sensitive area that is increasingly subjected to anthropogenic stress due to farming, tourism, and hydropower development. It is essential to ensure that the needs of human development are met through sustainable practices that ensure protection and improvement of the habitat of these fellow inhabitants of our planet. The existing flora and fauna is discussed in Chapter-9 of this CAT Plan. However, the list of existing fauna in the project catchment is reproduced below:

1. Ghoral (*Nemorthaedus goral*).
2. Himalayan Tahr (*Hemitragus jemlahicus*)
3. Himalyan ibex (*Caprasibiricabemalayanus*)
4. Musk Deer (*Moschus moschieferus*)
5. Snow Leopard (*Panthera Uncia*)
6. Leopard (*Panthera pardus*)
7. Brown Bear (*Selenarctos thibetanus*)
8. Black Bear (*Selenarctos thibetanus*)
9. Fox (*Vulpes vulpus, lomri*)
10. Gorthu - Himalayan Pine Martin (*Martes flavigula*)
11. Shahi - Indian Porcupine (*Hystrix indica*)
12. Monal (*Lophophorus impejanus*)
13. Kaleej, (*Lophuraleucomelanos*)
14. Chakor (*Alectoris chukar*)
15. Koklas (*Pucrasiamacrolopha*).
16. Cheer pheasant – (*Cateruswallichi*)
17. Titar - Black Partridge – (*Francolinusfrancolinus*)
18. Junglee Murga - Red Jungle Fowl – (*Gallus gallus*)

7.2 Research: During meeting with the APPCF WL, he suggested that a study on the brown bear population estimation and habitat be conducted under this CAT plan. Divisional Forest Officer, Chamba, Range Officers and staff, emphasized the need for conducting a special study through an institution of repute like Wildlife Institute of India (WII) for WL Habitat Management and the Flora and Fauna of Tundah Wildlife Sanctuary. The study will also include Food Chain Study for snow leopard (*Uncia uncia*), Leopard (*Panthera pardus*) and other endangered species. The habitat conservation measures that need to be adopted for the Monal (*Lophophorus impejanus*), Chakor (*Alectoris chukar*), Himalayan snow cock (*Tetraogallus himalayensis*) and other birds and pheasants listed above need to be studied. Study will also indicate the ways and means for developing the food chain for wildlife of the Sanctuary. Develop competence-based training programmes including Research on their food chain and habitat improvement is planned. This must include the identification of grasses and plant species and entomological details of the species on which these bird feed.

7.3 The activities suggested under this component by the HPFD/ Wildlife authorities include:

- i) Study on Habitat Improvement for Ground Brown Bear in Tundah Wildlife Sanctuary through WII
- ii) Exposure visits and training of staff regarding handling of wildlife.
- iii) Seminars with villagers.
- iv) Publicity and Awareness Camps.

7.4 This CAT Plan has a provision of Rs. 22,81,371/- (i.e. Rs. 21,00,000/- for Chamba WL Division and Rs. 1,81,371/- for Bharmour (T) Division under Research Training and Capacity Building. This available amount is proposed to be kept at the discretion of Conservator of Forests/ Divisional Forest Officer (WL) in the following manner:

A) Chamba Wildlife Division:

i.	Study for Improvement for Brown Bear	Rs. 9,00,000/-
ii.	Exposure visits and training to staff	Rs.5,00,000/-
iii.	Meeting with Villagers & Seminars	Rs 4,00,000/-
iv.	Publicity and Awareness Camps	Rs.3,00,000/-

B) Bharmour (T) Division:

Consolidated amount earmarked	Rs. 1,81,371/-
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7.5 Training & Capacity Building: The need for Training of Beat Level, Range Level and Division Level staff on latest techniques was emphasized upon by HPFD staff. It was stated that periodical trainings and exposure visits to reputed institutes in the State/ country should be organized to update the skills of HPFD staff. There is also a need of training the Territorial staff in handling the wildlife which too is proposed to be catered under this Component. Further Publicity and Awareness Training camps for the field staff as well as to the farmers should be organized to apprise them of the latest techniques. Expenditure on providing training to Territorial as well as Wildlife staff and organizing workshops for wildlife management including publicity of 'do's and don'ts' will be met out of this component. Seminars with villagers in the wildlife area to increase awareness of coexistence with wildlife are also to be planned under this component. Therefore, a consolidated provision of Rs. 22,81,371/- is made for this component. The amount is to be utilized from Division level. The component of capacity building, merits special attention in areas such as Bharmour Wildlife Range of Chamba Wildlife Division. The Tundah WL Sanctuary is surrounded by 18 small villages. It is extremely important to obtain active participation from the local villagers in the interest of management of wildlife area. Special provisions are made to have frequent seminars in the villages to motivate them and to take them along in adopting best agricultural, horticultural and animal husbandry practices. This component is, therefore, given additional funds to the extent of Rs. 22,81,371/- (Rs. 21,00,000/- for WL Chamba Division +1,81,371/- for Bharmour (T) Division) i.e. 6.79% instead of 5% in the WL Division Chamba and Bharmour (T) Division. Therefore, a provision of Rs. 21,00,000/- is made for Bharmour WL Range of Chamba WL Division. Thus, a total provision of Rs. 22,81,371 is made under this component.

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CHAPTER 8

GUIDELINES FOR PES

8.1 Payment for Ecosystem Services (PES): -Government of Himachal Pradesh, Department of Forest has issued a notification No. FFE-B-C(15)-3/2005-II dated 5th November 2013 regarding the “State Policy on Payment for Ecosystem Services (PES) in HP. In addition, the Forest Department Guidelines for Catchment Area Treatment Plans No. FFE-B-F-(2)-72/2004-Pt-II dated 30.09.2009 stipulate that 10% of the CAT Plan funds are for utilization for Payment for Eco system Services. The nature of Eco system services that may be provided by the people vary with the locations, living surroundings and the ecological status of each catchment area. As such it is difficult to create precise hard and fast instructions for application of these funds. However, the common consensus has always been to provide these funds to the communities and not to individuals.

8.1.1 The Payment for Ecosystem Services was introduced with an objective to ensure that the people in the catchment area get adequately enthused to participate in conservation of Ecosystem Services in the catchment. The expenditure on this account must, therefore, be made to ensure firstly, that the activity results in substantial contribution to conservation of Ecosystem Services, which in turn should conserve the soil and moisture regime in the catchment and secondly, it should ensure that the amount spent under this head must be for the common good of the community. It must also be ensured that any reference to the expenditure incurred on PES must receive wide publicity so that other villagers and people in the catchment get equally enthused and encouraged to contribute their part.

8.2 Establishing Institutional arrangements: The notification dated 5th November, 2013 stipulates establishing institutional arrangements as under:

“Local level community-institutions and other state level institutions, either existing or newly created shall be enabled and strengthened so as to act as key drivers in main streaming eco-systems approach and securing the supply of ES. These institutions shall work in tandem with the existing Panchayati Raj bodies at various levels which shall have the role of:

- a) *Organising and empowering communities to manage the resources which provide the ecosystem services and engage with ES beneficiaries.*
- b) *Mainstreaming eco-system-based approaches in decision-making processes, through creation of a dedicated cell in each department which shall steer and institutionalize the processes.”*

8.3 Determination of types and levels of payments:

- a) Payments can be for outcomes, outputs, or a combination thereof.
- b) They may be in cash or kind or a combination thereof.
- c) The payments in all cases (whether community driven or individual) would be coordinated/ regulated through community groups operating in the area.
- d) Payments would be made on the basis of agreements that may include the management steps, the basis for the payment, timeframe, monitoring requirements etc.

8.4 Applying an ecosystems approach to decision making may include the following:

- a) Identifying strategic dependence of different departments and sectors.
- b) Reviewing existing plans and practices, and identifying opportunities and instruments to work with natural systems to deliver policy objectives.

Sl.	Name of village.	Population	Cattle/Sheep/Goat.	Beat
1.	2.	3.	4.	
1.	Bhadra.	294	389	Bhadra
	Total:1	294	389	Bhadra
2.	Banni.	250	205	Banni
3.	Sarontha.	290	195	Banni
4.	Mandha.	275	245	Banni
5.	Kumarkari.	120	145	Banni
	Total:4	935	790	Banni
6.	Badgran.	450	480	Diggu/ Badgram
7.	Khanbag.	176	175	Diggu/ Badgram
8.	Kuthal.	375	470	Diggu/ Badgram
9.	Ladogi.	50	315	Diggu/ Badgram
10.	Morthu.	65	390	Diggu/ Badgram
11.	Pallani	190	385	Diggu/Badgran
	Total :6	1306	2215	Diggu/Badgran
12.	Phat	75	235	Mandha
13.	Chulad.	74	470	Mandha
14.	Sulo.	82	410	Mandha
	Total:3	231	1115	Mandha
15.	Kandhelu.	29	79	Sirdi
16.	Thathana.	46	118	Sirdi
17.	Panjari.	28	120	Sirdi
18.	Bagru	100	220	Sirdi
19.	Poolan	600	880	Sirdi
20.	Palan	500	785	Sirdi
21.	Chunjni	70	265	Sirdi
22.	Suppa	300	430	Sirdi
23.	Frakka	150	268	Sirdi
	Total:9	1823	3165	Sirdi
24.	Sulla	200	470	Tundah
25.	Thalla	500	4070	Tundah
26.	Gowar	400	650	Tundah
27.	Tundah	300	345	Tundah
28.	Silpari	375	470	Tundah
29.	Mumar	--	--	Tundah
	Total: 6	1775	6005	
	GRAND TOTAL:	6364	13679	
Villages in Bhadra - 1		294	389	Bhadra
Villages in Banni - 4		935	790	Banni
Villages in Diggu/Badgram - 6		1306	2215	Diggu/Badgran
Villages in Mandha - 3		231	1115	Mandha
Villages in Sirdi - 9		1823	3165	Sirdi
Villages in Tundah - 6		1775	6005	Tundah
GRAND TOTAL:29		6364	13679	

8.5 Monitoring: Based on well-defined and measurable criteria, indicators, and mechanisms for regular monitoring of physical flow of ES and subsequent adjustments to PES mechanisms for ensuring maximum impact shall be established.

8.6 Partnerships in Capacity Building: This policy envisages developing long term partnerships amongst different departments and with communities and accordingly build capacities at all levels. Research Institutions and NGOs will also be encouraged to participate and support this process.

8.7 Safeguards: The process of developing PES programme and agreements should include safeguards such as reducing scope of leakage so that protection at one place does not simply shift the pressures elsewhere, identifying interests of marginal stakeholders, and ensuring that communities have the benefit of longer timeframes and stability of tenure.

8.8 Operational Guidelines: To achieve the above-mentioned policy objectives the CCF/ DFO will frame operational guidelines from time to time in consultation with Stakeholders such as District Agriculture Officer, District Horticulture Officer and District Animal Husbandry Officers.

8.9 PES In Tundah II HEP Cat Plan. The Tundah II Catchment contains 29 villages in 7 Beats (4 WL Beats and 3 Territorial Beats) having human population of 6364 and Cattle population of 13679. The population density is very low. The PES disbursement, therefore, will have to be in proportion to the size of the community. The 2021 population per village and the no. of domestic animals along with the Beats is tabulated below for reference.

8.10 The available amount for PES (10% of CAT plan) in Tundah II HEP CAT Plan is Rs. 33,52,500/- against which provisions are made to the tune of Rs. 30,90,000/-. When spread over the seven beats in proportion to the population the amount available per beat will be as follows:

A. BHARMOUR (T) DIVISION:

i. Sirdi Beat	Rs. 1,66,955
ii. Mandha Beat	Rs. 97,893
iii. Diggua Beat	Rs. 97,892
Total:	Rs. 3,62,740

B. WL CHAMBA DIVISION:

i. Tundah Beat	Rs. 1,16,332
ii. Bhadra Beat	Rs. 15,41,480
iii. Banni Beat	Rs. 10,78,164
iv. Badgram Beat	Rs. 2,53,784
Total:	Rs. 29,89,760

8.11 Some of the suggested activities are as follows:

- Construction of Community Storage Tanks / provision of 2000 Ltrs PVC tanks
- Water Ponds,
- Distribution of energy saving devices,
- Solar lights,
- Solar cookers,
- Reward schemes to village societies in prevention of forest fires and anti-poaching activities.

8.12 Opinions of Village Panchayat Members were obtained on their most preferred requirements. Most of them have indicated the need for Solar Street Lights and PVC Storage Tanks of 2000 litres each.

8.12.1 A provision for 30 PVC Water Tanks of 2000 litres capacity (Rs.14,000/- each) amounting to **Rs. 4,20,000/-** is made. Out of 30 PVC Tanks, 18 are provided for Chamba WL Division and 12 for Bharmour (T) Division.

8.12.2 There are many types of solar lights available with varying wattages and battery life. Considering that CAT Plan funds will be available for a period of 10 years it is recommended that the 15-Watt Solar Street Lights with a battery life and warranty of five years mounted on six-meter pole will be appropriate. The cost per complete light with transportation and installation will be Rs. 21,700/- each. A provision of Rs. 21,70,000/- is made for purchase and installation of 100 Solar Street Lights. The recommended specifications are as follows:

Sl	Product Details	Unit Price	Qty	GST (%)	Amount
1	SOLARSTREETLIGHTSET Solar Tubular Pole-6Mtr Class-B(38Kg) HDG(0.90Micron) With PV Coat.	5100	1Set	18	5,100
2	60w mono DCRsolar panel sun 2 earth (MNRE approved)	2200	1Set	18	2,200
3	18ah lipo 4 battery cell-3c Make- Roffer/Panasonic, waterproof casting IP – 67 certified	4500	1Set	18	4,500
4	15wSolarStreetLight Led5050 Osram Oslo square cssrm 2 pm MPPT charge controller with programmable dimming with 5 years warranty	3550	1Set	18	3,550
5	Solar Panel Bracket With HDG(0.90Micron)with hardware	950t	1Set	18	950
6	Luminary bracket With hdg & weather proof PU coating	1200	1Set	18	1,200
7	Foundation work concrete filling 1: 3: 6 rating with 20 to 25 mm stone metal duly plastered	1200	1 Set	18	1,200
8	Installation, Erection, and Transport	3000	1 Set	NIL	3,000
	Total for One Street Light				21,700
	Total for 100 Street Lights				21,70,000

8.13 A total amount of Rs. 30,90,000/- is provided under PES Component out of which Rs.22,71,000/- is meant for Chamba WL Division and Rs. 8,19,000/- for Bharmour (T) Division. Out of the total amount provisioned under this component, an amount of Rs. 25,90,000/- is provisioned for providing 100 Solar Lights (70 in Chamba WL Division and 30 in Bharmour (T) Division) and 30 PVC Tanks. The remaining amount of Rs. 5,00,000 is left at the discretion of Divisional Forest Officer, WL Chamba Division towards Bee Keeping and other activities in accordance with the guidelines of Govt. of Himachal Pradesh/ H.P. Forest Department from time to time.

CHAPTER 9

ECO TOURISM

9.1 The prevalent guidelines for Eco Tourism stipulate that 1% of CAT Plan funds are to be earmarked for Eco tourism activities. Thus, an amount of Rs.3,32,500/- will only be available @ 1% which is quite insufficient. This Catchment comprises of six major centres of pilgrimage and many popular trekking routes. In the interest of safeguarding the wildlife habitats, it is important to institutionalize eco-tourism by providing facilities along specified routes for wildlife observation, trekking and pilgrimage. Interaction with DFO (WL) Chamba revealed that there is an immense need of setting up Camping sites enroute these trekking places. Even though, this CAT Plan cannot meet the full requirement of the eco-tourism needs of the catchment, an effort is made to maximise the amount. Thus, an amount of Rs. 18,50,000/- is provisioned for Eco tourism.



9.1.1 Eco tourism is an intrinsic part of Payment for Environmental Services (PES). Together, these two aspects of CAT Plan, link people and their livelihood with conservation of flora and fauna by using these natural assets to promote tourism. The famous places of pilgrimage in Tundah II.



Banni Mata temple Tundah

Project Catchment include:

- Banni Mata Temple in Banni WL Beat,
- Diggu Temple in Badgram Beat
- Kali Chow Pass in Badgram Beat
- Chadola Mata Temple in Bhadra Beat
- Mani Mahesh Temple in Hadsar Beat and
- Kather Pal Temple in Sirdi Beat of Bharmour (T) Division.



Mani Mahesh Temple

9.1.2 These are the prominent pilgrimage places in the project catchment which are visited by many people every year. On foot journey to Mani Mahesh Temple is 13 KMs from the road-head while

Kather Pal Temple involves onfoot journey of 5 KMs.Besides this, there are some other tourist places which attract a good number of tourists from Wildlife point of view. Considering the limitation of funds, five camp sites can be selected on these six pilgrimage/ trekking passages. The location is left to the discretion of the Divisional Forest Officer, WL, Chamba and Divisional Forest Officer (T) Bharmour. It is recommended that 4 Camping sites should be in WL Chamba Division and 1 Camping site in Bharmour (T) Division involving a total financial out lay of Rs. 18.50 lac out of which Rs. 14.80 lac is provisioned for Chamba WL Division and Rs. 3.70 lac for Bharmour (T) Division.

9.2 Each camping site will comprise of the following:

Sl.No.	Particulars	Quantity	Rate per unit	Total
1.	Construction of Tent Pitching Platform. Size 14' X 10'	6	14000	84000
2	4 Persons Tent Wildcraft or equivalent - size 9'x7'x4'	4	10000	40000
3.	Family Camping Tent Large Size 410 X 305 X 200 cms	1	30000	30000
4	HDPE Portable Toilet with Commode	2	60000	120000
5	Construction of Septic Tank	1	20000	20000
	Total:			294000
	Add GST 18%			52290
	Transportation & Labour	L/s		20000
	Grand Total:			3,66,920 or say 3,70,000

Toilet Specifications



- Size- 5X5X7 ft
- Floor Space-25sq.ft..
- Toilet Section- EWC (Western Toilet)-1 qty,
- Wash Basin-1 qty
- Material of construction-Puff Panel
- Door -High Quality UPVC door
- Lighting-All Lights will be motion based
- Ventilation-Ventilation will be provided.
- Mirror will be provided
- Exhaust Fan will be provided
- Water Tank-500Ltr and Septic Tank-1000 ltrs.

9.3 While planning the eco-tourism layouts of these places, it must be ensured that the impact of tourism on the ecology and surroundings is as low as possible. The pilgrims very often throw garbage in open thereby causing adverse impact on environment. With these objectives in view, the eco-tourism plan is made with following objectives:

- a) It should empower people for their participation.
- b) It should create local stakeholders.
- c) It should link the benefits to conservation.
- d) It should be suited for the site-specific conditions.

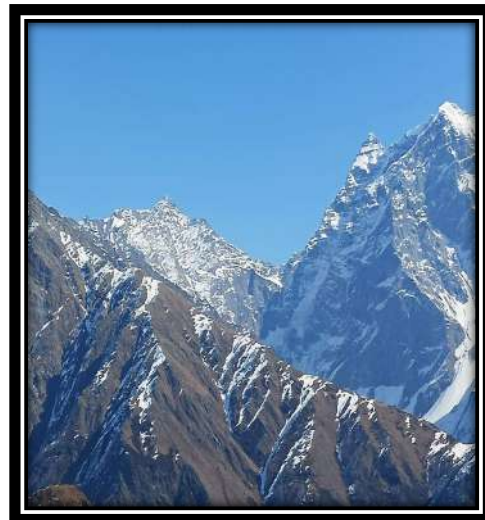


9.4 The tourism should contribute to the maintenance of habitats; either directly through conservation or indirectly by providing revenue to the local community. Setting up of camping sites, setting up garbage collection/ storage facilities at appropriate places and arrangements for disposal of the garbage so accumulated activities will be of great utility.

Base Camp Bansar



Kali Chow Pass



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CHAPTER 10: INFRASTRUCTURE & FOREST PROTECTION

10.1. Infrastructure needs of HPFD Ranges in the Catchment Area.

Execution of this CAT Plan provides an opportunity to ensure better stocking of the forests in the catchment. It also adds a very large amount of work to be carried out by the Forest Department staff. It is, therefore, imperative that the department's infrastructure be strengthened to enable them to take on such a large task. NERIL has discussed and obtained the precise needs of the forest officials for strengthening infrastructure. Considering the latest guidelines of Govt. of India through H.P. Forest Department the stipulate the permissible percentage under this component to 10% of the CAT Plan outlay (i.e. 5% for infrastructure development and 5% for Forest Protection). In view of rugged and difficult terrain, it is our considered opinion that the infrastructure facility available to the Range Staff must be made substantially more robust than the existing available infrastructure. Our approach, therefore, has recommended appropriate infrastructure improvements. Works recommended under this head are as follows:

- Repair to Forest Rest House
- Construction/repair of Bridle Paths.
- Provision of Foot Bridges.
- Patrolling kits

10.2 Forest Protection: Another important subcomponent under this is Forest Protection. The activity proposed is purchase of a drone to enable surveillance of large areas, making fire lines, fire watch towers and provision of funds for hiring additional manpower as fire watchers.

10.2.1 A provision of Rs. 47,25,000/- is made under Infrastructure and Forest Protection Components as under:

Sl.	Particulars	Amount
1	Patrolling Kits	Rs. 1,40,000/-
2	Renovation of Forest Rest House	Rs. 1,00,000/-
3	Repair/ Construction of Bridle Paths	Rs.10,50,000/-
4	Foot Bridges	Rs. 7,00,000/-
5	Construction of fire lines	Rs. 9,10,000/-
6	Hiring of Patrolling Vehicle	Rs. 8,00,000/-
7	Fire watchers	Rs. 4,50,000/-
8	Drone	Rs .5,75,000/-
Total:		Rs. 47,25,000

10.3 Protection from Forest fires: Co-operation and goodwill of the local residents is the main factor for ensuring protection of forests. Accumulation of dry Pine Needles, tarring of roads during summer/fire season, lack of fire watch facilities etc. are some of the factors which cause loss to the forests. It is felt that the residents of local villages should be properly educated through wide publicity and camps about the methods of adopting various measures for forest protection. Restriction of Tarring of Roads in summers/fire seasons should be imposed. Fire lines have to be created. Fire is a major factor that causes considerable damage to the forests of this division. Fires both accidental and incendiary are very common in this

tract. Also, some of the forests lie in dry/higher reaches of steep and precipitous slopes. As most of the forests are either Deodar or scrub forests. Fire has an adverse effect on soil, water and ecological balance of the affected area. Soil becomes vulnerable to soil erosion and its structure gets affected, thereby retarding plant growth. The soil building micro-organisms are destroyed, and the area is ultimately rendered susceptible to erosion and decreasing productivity. The young regeneration is wiped out, growth of surviving vegetation is adversely affected, the yield of forest produce is immensely reduced, and the vegetation damaged by the fire becomes vulnerable to insect and fungal attack. In the fire burnt forests, change in crop pattern takes place, resulting in mixed crop in the forests.

10.4 Fire Prevention Measures include:

- Earning Good Will of Local People
- Education and Publicity
- Restriction on Road Tarring during Fire Season
- Developing concept of Joint Forestry Management Committees/ Village Forest Societies
- Thinning in Regeneration areas by clearing a strip of at least 1 meter.
- Removal of Pine Needles

10.5 Timely detection of forest fires and information to concerned staff.

- Provision for engaging the Fire Watchers, and formation of firefighting squads at Division and Range Level.
- Provision for Fire Detection Drones.
- Construction of Fire Watch Towers.
- Storage of adequate water at dispersed locations.
- Provision of Fire Fighting Equipment.
- Field staff should be imparted training for effectively controlling forest fires.

10.6 Provisions made for WL Chamba Division and Bharmour (T) Division: Out of total provision of Rs. 47,25,000/- including Rs. 42,00,000/- (i.e. Rs. 17,80,000/- for renovation of existing/ new infrastructure and Rs. 24,20,000/- for forest protection) is made for WL Chamba Division In the case of Bharmour (T) Division, total provision of Rs. 5,25,000/- (i.e. Rs. 2,10,000/- for Infrastructure and Rs. 3,15,000/- for Forest protection) is made in the CAT Plan.

CHAPTER 11

GUIDELINES FOR WILDLIFE
HABITAT IMPROVEMENT

11.1 The Government of Himachal Pradesh, Department of Forest, Notification No. FFE-B-F(2)-72/2004 Pt. II dated 30.09.2009 has promulgated the guidelines for the preparation of Catchment Area Treatment Plan. The guidelines further stipulated that every CAT Plan being submitted by the User Agency shall mandatorily conform to the requirements in this Notification. The requirement at serial no. 10 stipulates that “A separate chapter for improvement and development of Wildlife and reduction of Human-Animal Conflicts duly vetted by the Pr. Chief Conservator of Forests (Wildlife) will be incorporated. “Nearly 89.18% (2337 ha.) of the Catchment Area of Tundah II HEP falls in Tundah Wildlife Sanctuary. This CAT Plan, therefore, has to pay great attention to Wildlife Habitat Improvement possibilities while taking care that the activities in the catchment do not cause any major human imprint that may disturb the wildlife.

11.2 Flora. The major flora of the area consists of following:

S.N.	Scientific Name	Vernacular Name
1	<i>Cedrela serrata</i>	Dhauri
2	<i>Aesculus indica</i>	Goon
3	<i>Acer caesium</i>	Mandar
4	<i>Rhus continus</i>	Tung
5	<i>Rhus parviflora</i>	Tungla
6	<i>Dalbergia sissoo</i>	Tailor Shis Shinshu
7	<i>Pyrus communis</i>	Nakh
8	<i>Pyrus malus</i>	Seo (Green Oak)
9	<i>Cotoneaster bacillaris</i>	Rheuns
10	<i>Rubus biflorus</i>	Akhre (Raspberry Red)
11	<i>Rubus niveus</i>	Akhre (Raspberry Yellow)
12	<i>Rhododendron arboretum</i>	Cheo
13	<i>Fraxinus floribunda</i>	Sanoooh (Ash)
14	<i>Morus alba</i>	Karun (Mulberry)
15	<i>Ficus roxbughii</i>	Trambal
16	<i>Ficus religiosa</i>	Pipal
17	<i>Populus ciliata</i>	Chaloon (Wild pomegranate)
18	<i>Alnus nepalensis</i>	Piak (Alder)
19	<i>Quercus semicarpifolia</i>	Kharsu (Red Rhododendron)
20	<i>Texusbaccata</i>	Barmi
21	<i>Cedrus deodara</i>	Diyar (Deodar)
22	<i>Abies pindrow</i>	Rai (Silver Fir)
23	<i>Piceasmithiana</i>	Himalayan Spruce
24	<i>Cupressus torulosa</i>	Devidiyar (Cyprus).

11.2.1. A list of shrubs of the area consists of the following:

1. Ramban (*Agave americana*),
2. Mukh Nihani (*Ainslea aptera*),
3. Kemal/ Kashmal (*Berberis aristata*),
4. Bathu (*Chenopodiun album*),
5. Rheuns (*Cotoneaster acuminata*, *Cotoneaster bacilaris*, *Cotoneaster microphylla*, *Cotoneaster vulgaris*),
6. Niggi (*Daphne cannabina*),

7. Bans (*Dendro calamus strictus*),
8. Pre (*Desmodium tiliaefolium*),
9. Batti (*Deutzia corymbosa*), *Eulaliopsis binata*, *Euphorbia royleana*,
10. Strawberry (*Fragaria incida*, *Frageriavesca*), *Gallium asperifolium*, *Gellium ptunifolium*)
11. Ain (*Giardiana heterophylla*).
12. Padara (*Harmitonia suaveolens*),
13. Kanderu (*Ilex dipyrena*),
14. Kathi (*Indigolera gerardiana*), *Indigofera Pulchella*,
15. Bither (*Juniperus communis*), *Juniper usrecurva*,
16. Kantias (*Lonicera angustifolia*),
17. Bakhru (*Lonicera quinquelocularis*), *Mimosa rubicaulis*,
18. Malori (*Oxalis corniculata*),
19. Killar (*Parrotiajacque montiana*),
20. Isagbol (*Plantago lanceolata*), *Plantago tibetica*,
21. Kuthal (*Plectranthus rugosus*), *Potentilla Spp.*, *Primulla Spp.*
22. Kangora (*Prinspea utilis*),
23. Lingar (*Pteris aquiline*),
24. Luhish (*Rhamnus purpurea*),
25. Tung (*Rhus continus*),
26. Tunpla (*Rhus parviflora*),
27. Karer, Bangulab (*Rosa macrophylla*),
28. Akhre (*Rubus biflorus*), *Rubus niveus*
29. Iyar (*Juniperus indica*),
30. Diun (*Sarcococca pruniformis*), *Sarcococcasaligna*,
31. Chitra (*Staphylea emodi*), *Strobilanthes calbousianus*, *Trifolium repens*,
32. Talanj (*Viburnum cotinifolium*), *Viburnum foetens*, *Birurnum nervosum*, *Vigurnum stellulatum*,
33. Dhawa (*Woodfordia floribunda*, *Woodfordia fruticosa*).

11.3 Fauna. A discussion and presentation in the office of D.F.O. (WL) Chamba, Sh. Rajiv Kumar, was of great use to understand the prevalence of species in this area. The species present are as follows:

1. Ghoral (*Nemorthaedes goral*).
2. Himalayan Tahr (*Hemitragus jemalabicus*)
3. Himalyan ibex (*Caprasibirica hemalayanus*)
4. Musk Deer (*Moschus moschieferus*)
5. Snow Leopard (*Panthera Uncia*)
6. Leopard (*Panthera pardus*)
7. Brown Bear (*Selenarctos thibetanus*)
8. Black Bear (*Selenarctos thibetanus*)
9. Fox (*Vulpes vulpus*, lomri)
10. Gorthu - Himalayan Pine Martin (*Martes flavigula*)
11. Shahi - Indian Porcupine (*Hystrix indica*)
12. Monal (*Lophobphorus impejanus*)
13. Kaleej,
14. Chakor (*Alectoris chukar*)
15. Koklas (*Pucrasia macrolopha*).
16. Cheer pheasant – (*Caterus wallichi*)
17. Titar - Black Partridge – (*Francolinus francolinus*)
18. Junglee Murga - Red Jungle Fowl – (*Gallus gallus*)

11.4 Habitat Improvement in Wildlife Areas. analysis of LISS III Imagery on NRSA Portal “Bhuvan” indicates that the catchment has 78.36 Sq. KMs of well stocked forests which is about 1/3rd of the Catchment Area. The analysis also brings forward that there are 45 sq. KMs of grasslands, 9.5 Sq. KMs of open scrub and 71.42 Sq. KMs of waste land. The human interference and human imprint in wildlife areas must be kept to bare minimum in the wildlife sanctuaries. 89.18% of the catchment area is in the Tundah Wildlife Sanctuary. In view of this the Afforestation measures are renamed as habitat improvement measures in the Tundah Wildlife Sanctuary. With this data and analysis, the wildlife habitat improvement can be focused on two major activities. These are:

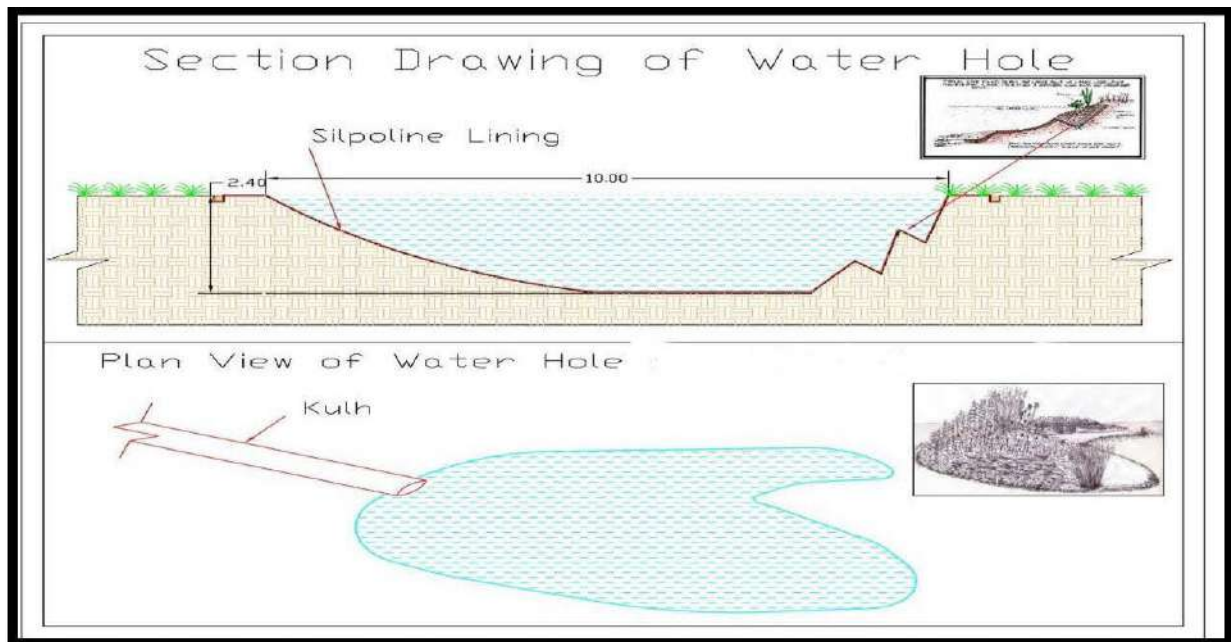
- Pasture Management/ Weed Control
- Waterhole Eco System

11.4.1 Pasture Management/ Weed Control (Refer Cost Model at Appendix-VII).-It is observed that due to adverse climatic and geographic conditions/ factors, there is scarcity of grass and fodder in the CAT Areas. The ungulates are a key factor in the food chain. Increase in carrying capacity of ungulates can be achieved through pasture development. However, the conflict of interests arises from the dependence of migratory graziers and local livestock also being dependent on the same pastures. In this case, controlled entry exit in enriched pastures and awareness of mutual needs of the wildlife is required. Large herds of sheep and goat are owned by the local people. In winter these herds are taken outside the CAT area in lower parts of Himachal Pradesh to be taken back during summer. Alpine pastures within the Catchment area and areas adjoining to it are the main grazing ground for these herds. These pastures are heavily grazed and there has been a decline in the quantity and quality of grass in these pastures. The productivity of these pastures has been decreasing gradually. For improvement of these pastures, it is proposed to augment the existing grass production by way of:

- Patch sowing of palatable grass seed in 60x60x25 cm patches
- Broadcast sowing of seed after making pellets with cow dung
- Removal of obnoxious weeds and unpalatable grasses
- Application of Farmyard manure to augment fertility.
- Planting of grass tufts in 0.30x0.30 cm gradian structure/trenches over-ridge
- Awareness programmes: It is well appreciated that the plantation and growth of alpine pastures can best be done with consultation and agreement between the graziers and the forest department after adequate awareness generation.

11.4.2 Waterhole Ecosystem: (Refer Cost Model at Appendix VIII). Waterholes form an important part of improvement of wildlife habitat. The waterhole has to be developed not merely as water storage facility, but it must be developed as an eco-system providing water, hide-outs, breeding grounds and foraging grounds for the hierarchy of wildlife ranging from the invertebrates to vertebrates including reptiles, Rodents, small animals to ungulates, higher canine, feline species as well as the avifauna. A total of 4 Waterholes are provided in Bharmour WL Range. Each waterhole has a capacity of approximately 720 cubic meters i.e. 7,20,000 litres. Care must be exerted to ensure that one end of the waterhole is gradually sloping to ensure that there is no abrupt fall and that all animals can approach the water even when it recedes due to consumption and evaporation losses. It is advised to keep a stack of logs in the close vicinity for rodents and other minor mammals to hide. Old dead tree trunks should be used to make a snag for the birds. Some of the notional shrub enrichment area should also be planted close to the waterhole.

A symbolic representation is produced below:



A total of four waterholes are planned as follows:

Beat	Location	No. of Water holes
Tundah	Mummri Dhar	1
Bhadra	Chhajjala	1
Banni	.Chadhola	1
Badgram	Saad Dhar	1
Total:		4

11.5 Specific Provisions for Efficient Management of Wildlife

11.5.1 WL Division Chamba: It is essential to augment the equipment given to the field staff in order to increase their efficiency. After discussions with both the D.F.Os. it was decided and planned to provide each Beat Guard with a Patrolling kit and binoculars. In addition, a Trapping Camera is provided for each beat which will help in detecting and estimating the wildlife population. A provision of Rs. 1,50,000/- is made for construction of three bunkers. During discussion with DFO WL (HQ) in the office of CCF (WL) Dharamshala, it was suggested that a study on the carrying capacity of WL Tundah Sanctuary for Eco Tourism is required. For this purpose, an amount of Rs. 5,00,000/- is provisioned in the CAT Plan. A provision of Rs. 10,00,000/- is also made for strengthening rescue facility at Chamba/Bikani Monkey Sterilisation Centre. Thus, a total provision of Rs. 27,20,000/- is made in the CAT Plan for Wildlife Management for Chamba (WL) Division.

11.5.2 Bharmour (T) Division: After discussions with D.F.O.(T) Bharmour it revealed that Chir Pheasants are sited in territorial beats of Sirdi and Mandha. The D.F.O. indicated the need for

providing suitable habitat improvement of Chir Pheasants for which plantation activity of Nargaal (*Arundinaria falcata*) was needed in Sirdi and Mandha Beats. Therefore, this CAT Plan provides for 6 ha. of Site-Specific Plantation at a cost of Rs. 34,50,000/- in these two beats which will also cater to the habitat improvement requirement of Chir Pheasants. The plantation activity will include plantation of Nargaal (*Arundinaria falcata*) and other grass species suitable for Chir Pheasants. Thus, the Plan for Wildlife Habitat Management is covered in total provision for Rs. 34,50,000/-, made under Site Specific Plantation of Afforestation Component.

11.6 Wildlife and People. The Tundah II HEP catchment has 29 villages in the wildlife area. These have a combined population of 6364 and combined livestock of 13679. It is important to provide for the possibility of man-animal conflict and for better coordination between the forest / wildlife staff and the local population particularly in the event of forest fires. Beat wise details of the villages are given below.

Beat	No. of villages	Human Population	Cattle/horses/ sheep/ goats
1.Bhadra (WL)	1 (Bhadra)	294	389
2.Banni (WL)	4 (Banni, Sarontha, Mandha, Kumkari)	935	790
3.Badgran(WL)	6 (Badgran, Khanbag, Kuthal, Ladogi,	1306	2215
4. Diggū (T)	Morthu, Pillani)		
5.Tundah (WL)	6 (Sulla, Thalla, Gowar, Tundah, Silpari, Mumer)	1775	6005
6. Mandha (T)	3 (Phat, Chulad, Sullo)	231	1115
7. Sirdi (T)	9(Kandhelu, Thathana, Panjari, Bagru, Poolan, Palan, Chunjni, Suppa, Frakka.)	1823	3165
Total: 7	28	6364	13679

11.6.1 Man-Animal Conflict. In case of Tundah II HEP, Tundah Wildlife Sanctuary of Bharmour WL Range (comprising of Bhadra, Banni, Badgram and Tundah Beats) of Chamba WL Division falls under the project catchment. Besides this Diggū, Mandha and Sirdi Beats of Bharmour Territorial Division also fall under the project catchment. It is worth mentioning here that Diggū and Mandha Beats have recently been carved out of Badgram and Tundah WL Beats. Sirdi Beat is also quite adjacent to Mandha and Tundah Beats and existence of wildlife is noted in these beats as well. There are 28 villages falling in the project catchment having human population of 6364 and cattle population of 13679 (cows, oxen, goats, sheep, horses). The population of people and domestic animals is sparse. An amount of Rs. 2,00,000/- is earmarked for cases of human wildlife conflicts in WL Chamba Division.

11.6.2 Participation of local people in control of forest fires: It will be useful if the PES funds are efficiently utilized to encourage participation of local people in control of forest fires and in conservation of wildlife. Additionally, there is provision of funds under Research, Training and Capacity Building component for dissemination of information, putting up Boards and signages, conducting seminars for the villagers and increasing their awareness about benefits of rotational grazing and benefits of co-existence with wildlife.

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CHAPTER 12 MONITORING PLAN, REVIEW, EVALUATION MECHANISM AND CONTINGENCIES

12.1 INTRODUCTION. Monitoring Plan and Review and Evaluation Mechanism is considered as a management tool, for effective and efficient project implementation. Monitoring Plan and Review and Evaluation Mechanism is considered as an integral part of the project's regular operations. The Mechanism will provide information on key issues, progress, performance, social and environmental impacts, which are immediately fed back to decision makers. The main objective of CAT Plan is to ensure arresting soil erosion in catchment and to provide clear water to the stakeholders of the project. Hence the key focus of the project is prevention of soil erosion and land degradation, rehabilitation of degraded forests and slopes, improvement of land capability and moisture regime and to ensure people's participation. It is therefore crucial for the project to develop a reliable information system which is timely and accessible, and which is also reflective of the project's processes. Out of Rs. 16,76,251/- provisioned under this component, a provision of Rs. 14,94,880 is made for Chamba WL Division and Rs. 1,81,371/- for Bharmour (I) Division. 1% of the amount planned under this activity will be utilized for IT related activities. The funds will be controlled from APCCF (CAT Plan) level.

12.2 Monitoring: is a process of measuring, recording, collecting, processing, and communicating information. It continuously tracks performance and provides information on whether progress is being made towards achieving the targets. Monitoring looks at the processes and changes in conditions of target groups, institutions, and natural resources.

12.3 Evaluation: is the periodic assessment of the relevance, performance, efficiency, and impact (both expected and unexpected) of the project in relation to stated objectives. It is a process by which inputs and activities are analyzed and judged against planned schedules and anticipated goals. It relies on data generated through monitoring activities as well as information obtained from other sources.

12.4 The Role of M&E Plan. The role of Monitoring Plan and Review and Evaluation Mechanism is to:

- Provide timely, accurate, reliable, and relevant information on the progress and performance of Micro-watershed developmental activities.
- Reflect the true picture, emphasize/improvements rather than mere reports.
- Collect, Analyze and Communicate data, avoiding gaps and delays.
- Disseminate M&E observations and ensure effective feedback mechanism.
- Use monitored information for decision making.
- Monitor the functioning and performance of User Groups, Line Dept and NGO's.
- Identify and share the best practices and lessons learnt.

12.5 Guiding Principles. Monitoring Plan and Review and Evaluation Mechanism shall be guided by the principles that:

- The mechanism generates only relevant information that is required and used at the appropriate level and frequency for the decision-making process.
- The mechanism should help in assessing the outcomes and impact of the project vis-a-vis the objectives.

12.6 The Structure of M & E Mechanism. Following the common guidelines for watershed development projects by Government of India, appropriate institutional/ or implementation

arrangements would be made at various levels for effective and professional execution of the Tunda II HEP CAT Plan. The various levels suggested are State, Forest Division and Forest Range. The Designated Divisional Forest Office will be the Nodal Agency. The state existing state level mechanism is quoted before the project specific M & E mechanism to provide continuity of the chain of command. The project specific composition, functions and roles & responsibilities of each agency is described thereafter.

12.7 STATE LEVEL NODAL AGENCY (State CAMPA). The implementation arrangement at the State Level Nodal Agency are planned to ensure that existing institutional mechanism of State CAMPA are undisturbed. The Aims, Objectives, Functions, Accounting Procedures, Monitoring & Evaluation of the Works etc. are same as given in the Government of Himachal Pradesh, Department of Forest Notification No. FFE-B-F (2)-72/2004-Pt-II. dated 3rd August, 2009. The institutional mechanism of State CAMPA to function through a Governing Body, a Steering Committee and an Executive Committee are reiterated below:

12.7.1 Governing Body. The Governing Body shall lay down the broad policy framework for the functioning of State level CAMPA and review its working from time to time. The composition of Governing Body is as follows:

<i>Sr. No.</i>	<i>Personnel</i>	<i>Status</i>
(i)	Chief Minister	Chairperson.
(ii)	Forest Minister	Vice Chairperson
(iii)	Minister for Panchayati Raj & Rural Development	Member
(iv)	Minister for Tribal Welfare	Member
(v)	Chief Secretary	Member
(vi)	Addl. Chief Secretary (Forests)	Member
(vii)	Pr. Secretary (Finance & Planning)	Member
(viii)	Pr. Secretary (Tribal Welfare)	Member
(ix)	Pr. Secretary (Panchayati Raj & Rural Development)	Member
(x)	Pr. Secretary (Environment)	Member
(xi)	Chief Wildlife Warden	Member
(xii)	Principal Chief Conservator of Forests H.P.	Member Secretary

12.7.2 Steering Committee. The composition of Steering Committee is as follows:

<i>Sr. No.</i>	<i>Personnel</i>	<i>Status</i>
(i)	Chief Secretary	Chairperson
(ii)	Addl. Chief Secretary (Forests)	Member
(iii)	Principal Chief Conservator of Forests	Member
(iv)	Principal Secretary (Finance)	Member
(v)	Principal Secretary (Rural dev Deptt. And Panchayati Raj)	Member
(vi)	Principal Secretary (Environment)	Member
(vii)	Chief Wildlife Warden	Member
(viii)	Nodal Officer (CAMPA)	Member
(ix)	A representative of the Ministry of Environment & Forests	Member
(x)	Two eminent NGO's to be nominated by the State Government for a period of 2 years at a time who shall be eligible for re-nomination	Member
(xi)	Addl. Pr. Chief Conservator of Forests (CAT Plans)	Member

12.7.3 Powers & Functions of the Steering Committee:

- Lay down and/ or approve rules and procedures for the functioning of the body and its Executive Committee, subject to the overarching objectives and core principles of State CAMPA;
- Monitor the progress of the utilization of funds released by the State CAMPA;
- Approve the Annual Plan of Operation (APO) prepared by the Executive Committee.
- Approve the annual reports and audited accounts of the State CAMPA.
- Ensure inter-departmental coordination.
- Meet at least once in six months.

12.7.4 Executive Committee. The composition of Executive Committee is as follows:

Sr. No.	Personnel	Status
(i)	Principal Chief Conservator of Forests	Chairperson
(ii)	Chief Wildlife Warden	Member
(iii)	Addl. Pr. Chief Conservator of Forests (CAT Plans)	Member
(iv)	Addl. Pr. Chief Conservator of Forests (Finance)	Member
(v)	Financial Controller in the o/o PCCF HP	Member
	Two eminent NGO's to be nominated by the State Government for a period of 2years at a time who shall be eligible for re-nomination	
(vii)	Nodal Officer (CAMPAs)	Member Secretary

12.7.5 Powers & Functions of Executive Committee:

- Take all steps for giving effect to the State CAMPA and overarching objectives and core principles, in accordance with rules and procedures approved by the Steering Committee and the approved APO;
- Prepare the APO of the State for various activities, submit it to the Steering Committee before end of December for each financial year, and obtain the Steering Committee's concurrence for release of funds, while giving break-up of the proposed activities and estimated costs;
- Supervise the works being implemented in the State out of the funds released from the State CAMPA;
- Be responsible for proper auditing of both receipt and expenditure of funds;
- Develop the code for maintenance of the account at the implementing agency level;
- Submit reports to the Steering Committee for review/consideration; and
- Prepare Annual Report by end-June for each financial year.

12.7 DIVISIONAL LEVEL NODAL AGENCY (FORESTDIVISIONS)**12.8.1 The composition of Divisional Level Nodal Agency is as follows:**

Sr. No.	Personnel	Status
(i)	Divisional Forest Officer	Chairperson
(ii)	Representative from Tundah HEP	Member
(iii)	Representative from Panchayati Raj Institutions (Forest Range wise)	Member
(iv)	Representative of Women Self Help Group	Member
(v)	Assistant Conservator of Forests	Member Secretary

12.8.2 The functions of Divisional Level Nodal Agency will be as follows:

- a) Take up the overall responsibility of facilitating the preparation of strategic and annual action plans for CAT Plan activities in respective forest division.
- b) Capacity building of staff with reference to technical, financial, administrative and managerial aspect of the programme through meeting, workshop, training and exposure visits at various levels.
- c) Assist Gram Panchayat / Gram Sabha in constitution of the CAT Plan Implementing Agency and their functioning.
- d) O r g a n i z i n g and nurturing User Groups and Self-Help Groups.
- e) Maintaining project accounts and ensure smooth flow of funds for carrying out CAT Plan activities.
- f) Monitoring, checking, assessing, and undertaking physical verification and measurements of the work done.
- g) Arranging physical, financial and social audit of the work undertaken.
- h) Establish and maintain the Divisional Level Data Cell.
- i) Ensure timely submission of required documents to Nodal Agency of the Department.
- j) Setting up arrangements for post-project operation, maintenance and future development of the assets created during the project period.

12.8 CAT PLAN IMPLEMENTING AGENCY (FOREST RANGE LEVEL). The CAT Plan Implementing Agency will function at Forest Range level. The concerned Range Officer will be directly responsible for field level planning, execution and monitoring of implementation of work as specified under annual plan of operation (APO) in the CAT Plan.

12.9.1 The staff structure of CAT Plan Implementing Agency (for one forest range) is as follows:

Sr. No.	Personnel
(i)	Range Officer
(ii)	Forest Block Officers
(iii)	Forest Beat Guards
(iv)	Intermediate Panchayats
(vi)	Other operational staff

12.9.2 The functions of CAT Plan Implementing Agency will be as follows:

- To create awareness about CAT Plan activities.
- Conducting the capacity building of village communities and Panchayats through workshops, training, and exposure visits.
- Convergence and networking with respective line departments.
- Formation and activation of fuser groups and Self-Help Groups.
- Ensure quality of work and implementation of the CAT Plan activities as per work plan.

- To ensure timely submission of prescribed reports to the ACF designated as CAT Plan coordinator.
- Ensure proper maintenance of records of project activities.
- Convening quarterly meetings of Gram Sabha, Gram Panchayat and SHGs for collating opinions regarding the process of implementation of the programme.
- Taking follow up action on all decisions.
- To identify and allot extension work to the local NGOs and/ or SHGs through his operational staff.
- Maintenance and sustainability of assets created after completion of the projects.

12.9.3 In addition to the above functions CAT Plan Implementing Agency should also take care of institutional arrangements at the village level and people's participation in order to have overall development and achieve the goal of integrated catchment area treatment plan.

12.9.4 Self Help Groups: The CAT Plan Implementing Agency shall constitute SHGs from amongst poor, small, and marginal farmer households, landless/asset less poor agricultural labourers, women, shepherds and SC/ST persons in active collaboration with Gram Panchayat/ Sabha. These Groups shall be homogenous groups having common identity and interest who are dependent on the watershed area for their livelihood.

12.9.5 User Groups: The CAT Plan Implementing Agency shall also constitute User Groups in active collaboration with Gram Panchayat/Sabha. These shall be homogenous groups of persons most affected by each work/ activity and shall include those having land holdings within the watershed areas. Each User Group shall consist of those who are likely to derive direct benefits from a watershed work or activity. The User Groups will be responsible for the operation and maintenance of all the assets created under the project in close collaboration with the Gram Panchayat and the Gram Sabha.

12.10 Reports. A monthly, quarterly, half yearly and the annual reports in the formats already promulgated by HPFD web-based application software RCIS will be generated after completion status submitted by RFO to A.C.F. which will be reviewed at respective Divisional Level.

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SECTION II

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SECTION-II.**Division, Range, Beat wise CAT Plan**

1. Section II deals with Division-wise, Range-wise and Beat wise CAT Plan Actions of areas falling under the catchment of Tundah II HEP. The working unit of the Forest Department for executing the CAT Plan is the Beat which are controlled administratively and supervised physically by the Range. Therefore, the physical and financial targets of the Micro watersheds have been distributed to Beat level for Afforestation and SMC measures. The other components, such as Research, Training & Capacity Building, PES, Eco Tourism, Forest Infrastructure and Forest Protection, Wildlife Management, Monitoring & Evaluation, Site Specific Planning and Contingencies are left with the APCCF CAT Plan, Divisional Forest Officers and at Range level.

2. The project catchment of Tundah II HEP covers 7 Beats in 3 Ranges of Bharmour (I) and WL Chamba Forest Divisions as under:

a) Bharmour (T) Division:

- i. Sirdi Beat of Bharmour (I) Range.
- ii. Mandha and Diggu Beats of Swai (I) Range.

b) WL Chamba Division:

- i. Tundah Beat.
- ii. Bhadra Beat.
- iii. Banni Berat.
- iv. Badgran Beat.

c) The total area of the project catchment in the above beats works out to 266.57 Sq. Km. The culturable area of the project catchment after excluding areas having slope more than 45°, areas having elevation of more than 3200 meter, Settlements, Water bodies and perma frost areas is 2790 Hectares (i.e. 10.46%) of the total area as per details given below:

area

Division	Range	Beat	Total (Sq.Kms)	Net culturable area (Sq. Kms)
1. Bharmour (I)	Bharmour (I)	Sirdi	13.28	0.55
		Swai (I)		
			Mandha	7.51
		Diggu	8.05	4.70
Total:1	2	3	28.84	9.09
2. WL Chamba	Bharmour (WL)	Tundah	9.26	1.85
		Bhadra	122.56	5.08
		Banni	85.73	9.86
		Badgram	20.18	2.02
Total:2	1	4	237.73	18.81
GRAND TOTAL:	3	7	266.57	27.9

3. The Beat wise data is presented in the following sequence for Sirdi, Mandha, Diggu, Tundah, Bhadra, Banni and Badgram Beats:

- i. Location Map.
- ii. MWs. Map of the Beat.
- iii. Elevation Map.
- iv. Slope Map.
- v. Aspect Map.
- vi. LULC Map.
- vii. Drainage Map.

3.1 These maps are followed with Beat wise projections under different CAT Plan components for respective Beats.

4. The summary of Range-wise CAT Plan allocations under each major component is as under:

SUMMARY OF RANGEWISE PROJECTIONS:						
	Bharmour (T) Division			WL Chamba Division	Action by	
Component	Bharmour (T)	Swai (T)	Total (Col.2+3)	Bharmour (WL)	Grand Total (Col.4+5)	
1	2	3	4	5	6	7
1. Afforestation & Wildlife Habitat Improvement	230000	1150000	3450000	2700000	6150000	Beat
2. SMC Measures	502736	493824	996560	7003488	8000048	Beat
3. Research, Training & Capacity Building	Given at Division level		181371	2100000	2281371	Division
4. PES			819000	2271000	3090000	Division
5. Eco Tourism			370000	1480000	1850000	Division
6. Infrastructure & Forest Protection:						
(a) Renovation & new Infrastructure	150000		210000	1780000	1990000	Division
(b) Forest Protection	210000	105000	315000	2420000	2735000	
7. Wildlife Protection & Management.	Included in Afforestation under Site Specific Plantation.			2720000	2720000	Division
8. Monitoring & Evaluation	Given at Division Level		181371	1494880	1676251	APCCF CAT Plan
9. Contingencies			652330	2396937	3049267	Division
Grand Total:	3162736	1748824	7175632	26366305	33541937	

**CHAPTER 13-BEATWISE PROJECTIONS FOR
BHARMOUR WL RANGE OF CHAMBA (WL) DIVISION.**



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CONSOLIDATED PROJECTIONS FOR BHARMOUR (WL) RANGE OF CHAMBA WL DIVISION UNDER TUNDAH II HEP CAT PLAN

Sl.No.	Component/ Activity	Unit	Unit Cost (Rs.)	CAT Plan Allocations		%age	Remarks
				Phy.	Fin.		
1	2	3	4	5	6	7	8
I.	AFFORESTATION/HABITAT IMPROVEMENT MEASURES					26366305	
	a. Pasture Management/ Weed Control (5 Weedings in 10 years)		20000	55	1100000		
	b. Water-hole Eco System		400000	4	1600000		
	TOTAL I: AFFORESTATION			59	2700000	10.24	
II.	SOIL & MOISTURE ONSERVATION MEASURES -25%						
	a. Cratewire Checkdams	Nos.		147	6691488		
	b. Water Harvesting Structures.	Nos.	104000	3	312000		
	TOTA:L II SMC MEASURES:			150	7003488	26.56	
III.	RESEARCH, TRAINING & CAPACITY BUILDING-5%		L/s		2100000	7.96	To be controlled at Division
IV.	PAYMENT FOR ENVIRONMENT SERVICES (PES)- 10%		L/s		2271000	8.61	To be controlled at Division
	a. Solar Lights	Nos.	21700	70	1519000		
	b. PVC Water Tanks 2000 Litres	Nos.	14000	18	252000		
	c. Other activities		L/s		500000		
V.	ECO TOURISM ACTIVITIES-1%		L/s		1480000	5.61	To be controlled at Division
VI.	INFRASTRUCTURE & FOREST PROTECTION-10%						To be controlled at Division
	A. RENOVATION OF CONSTRUCTION OF NEW INFRASTRUCTURE-5%						
	i. Patrolling kits to HPFD staff.		20000	4	80000		To be controlled at Division
	ii. Forest Rest House	Nos.	100000	1	100000		To be controlled at Division
	iii. Bridle Path Tundah to Mandha(Mgt Plan 6..3.1 Sl. 2)	KMs	75000	12	900000		To be controlled at Division
	iv. Construction of Foot Bridges	L/s	L/S	3	700000		To be controlled at Division
	VI A: TOTAL:			20	1780000	6.75	
	B. FOREST PROTECTION- 5%						
	i. Creation of Firelines	KMs	35000	17	595000		
	ii. Hiring of Patrolling Vehicle	Nos.	L/s	0	800000		To be controlled at Division
	iii Engagemnt of staff for fire watching/ anti poaching activites.	L/s	0	3	450000		
	iv. Purchase of Drone with Higher Flight Capacity	L/s	575000	1	575000		To be controlled at Division
	VI B: TOTAL			21	2420000	9.18	
	TOTAL VI A+B.			41	4200000	15.93	
VII.	WILDLIFE HABITAT MANAGEMENT-6%:						
	i. EQUIPMENT:						
	a. Binoculars	Nos.	45000	4	180000		To be controlled at Division
	b. Trapping Cameras.	Nos.	60000	4	240000		To be controlled at Division
	e. Tranquillizer Gun	Nos.	450000	1	450000		To be controlled at Division
	Total:			9	870000		To be controlled at Division
	ii. Man Animal Conflicts.	L/s	200000	0	200000		To be controlled at Division
	iii. Special study for WL Habitat Management for Brown Bear to be conducted through WII		L/s	0	0		Provisions made at Division Level under Research Training and Capacity Building.
	iv. Special study on carrying capacity of WL Sanctuary Tundah for Eco- Tourism		L/s	1	500000		To be controlled at Division
	v.Strengthening of Rescue facility Monkey Sterlization Centre at Chamba/ Bakani			1	1000000		To be controlled at Division
	vi. Construction of bunkers/ shelter place.	Nos.	50000	3	150000		To be controlled at Division
	Total:			14	2720000	10.32	
VIII.	MONITORING & EVALUATION-5%		L/s	0	1494880	5.67	To be controlled at Division
IX.	CONTINGENCIES-10%			0	2396937	9.09	To be controlled at Division
	GRAND TOTAL:				26366305	100.00	
	FUNDS TO BE CONTROLLED FROM DIVISION LEVEL (WL CHAMBA DIVISION)				15617817		
	FUNDS TO BE CONROLLED FROM RANGE/ BEAT LEVEL				10748488		
					26366305		

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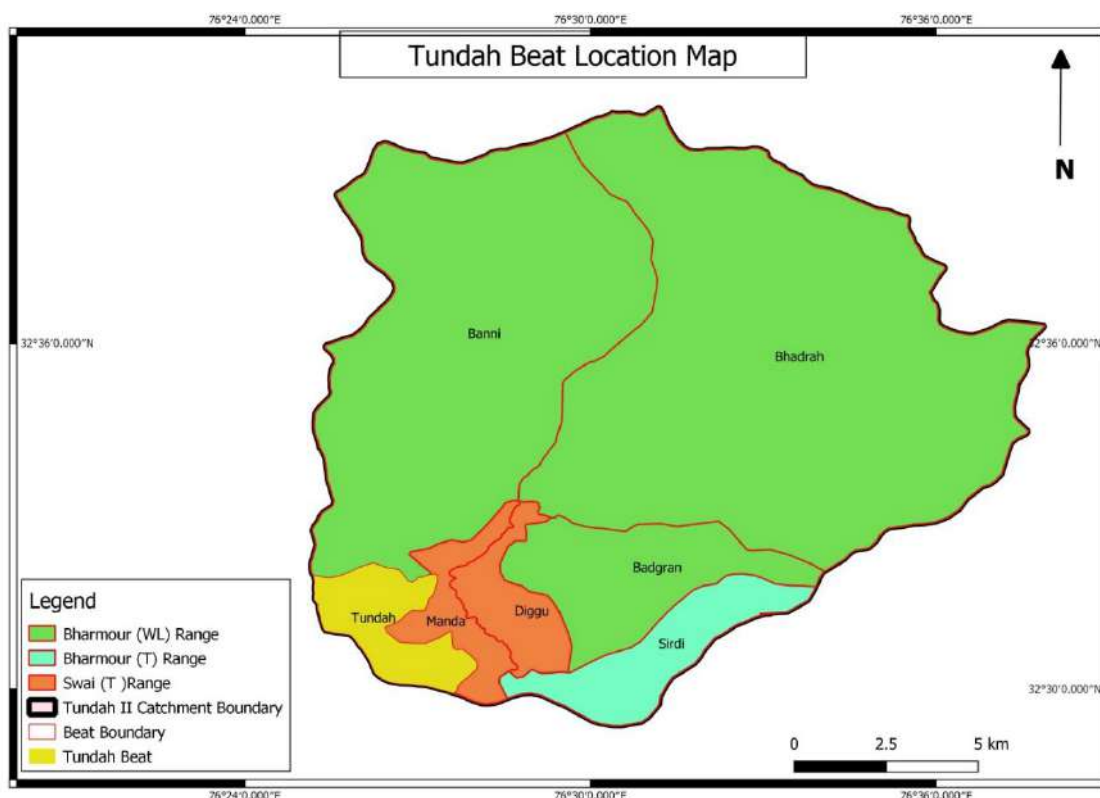
TUNDAH BEAT

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GIS ANALYSIS OF THE BEATS IN BHARMOUR (WL) FOREST RANGE

TUNDAH BEAT (BHARMOUR(WL) RANGE)

Tundah beat comes under Bharmour (WL) range. The total catchment area coming under this beat is 9.26 Sq.km i.e 926 Hectares. The Funds tune of Rs.21,41,656 are planned for this beat. The location map is given below

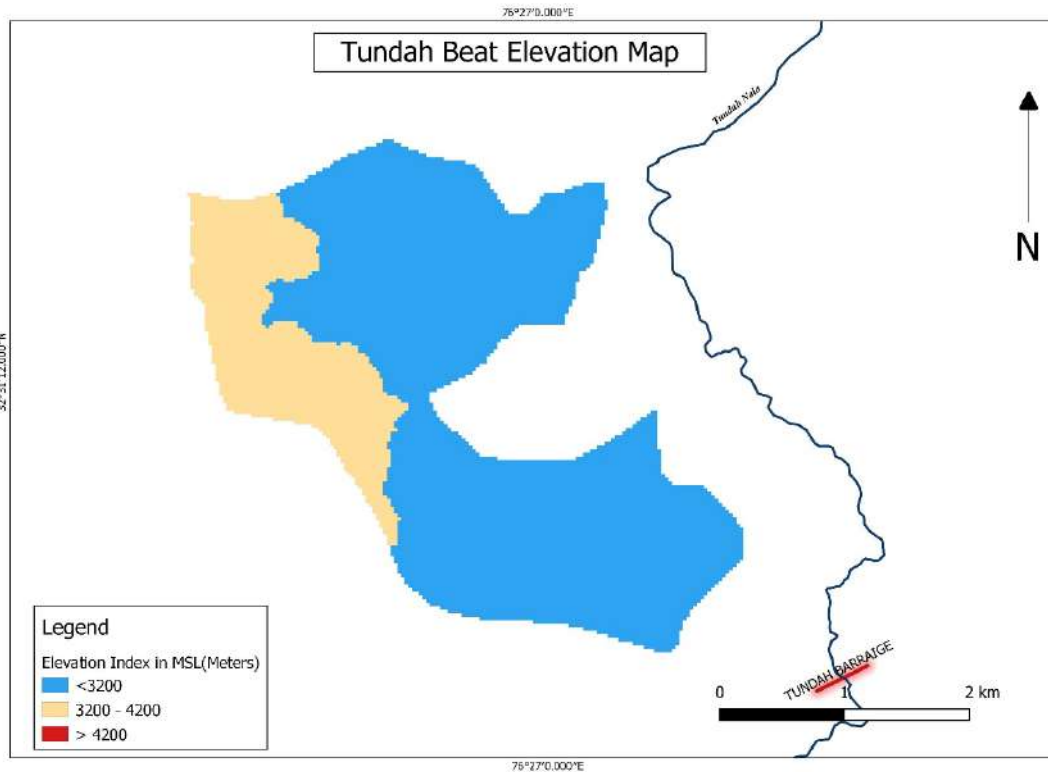


Location Map of Tundah Beat

In total the area is divided into 6 micro-watersheds. The area details of each micro watershed are tabulated below.

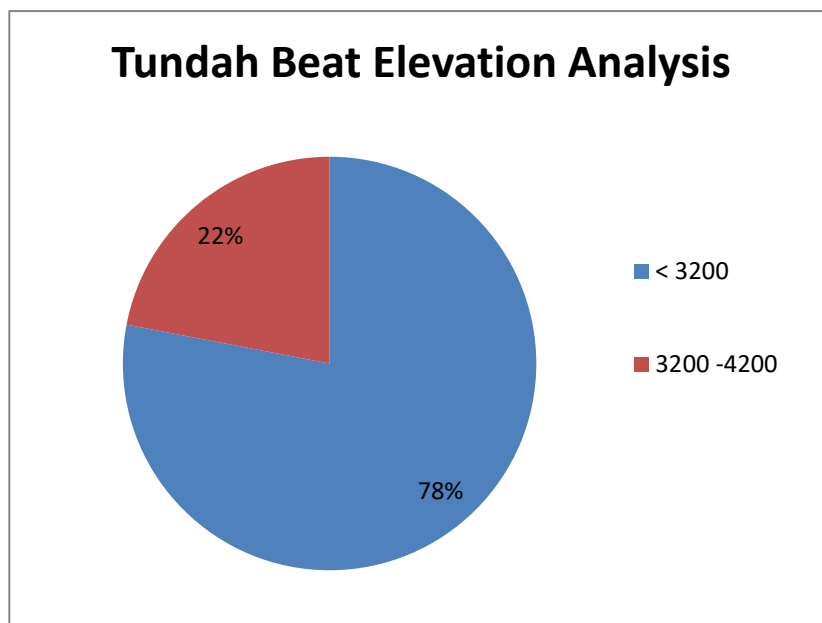
Table :Beat wise micro-watershed list & Area statement				
SI No.	Beat Name	Micro-watershed name	Area in Sq.Km	Ha.
7	Tundha (WL)	1C1C4a1c	2.28364	228.364
		1C1C4n1d	3.85182	385.182
		1C1C4n1c	4.16970	416.970
		1C1C4n3d	4.94337	494.337
		1C1C4n3c	4.34100	434.100
		1C1C4n1a	4.60141	460.141
Total			24.19094	2419.094

ELEVATION /DEM-The elevation of this catchment area of Tundah beat is from 4500-3200 mtrs. Table below shows the elevation classification of this Beat. The DEM is shown below.

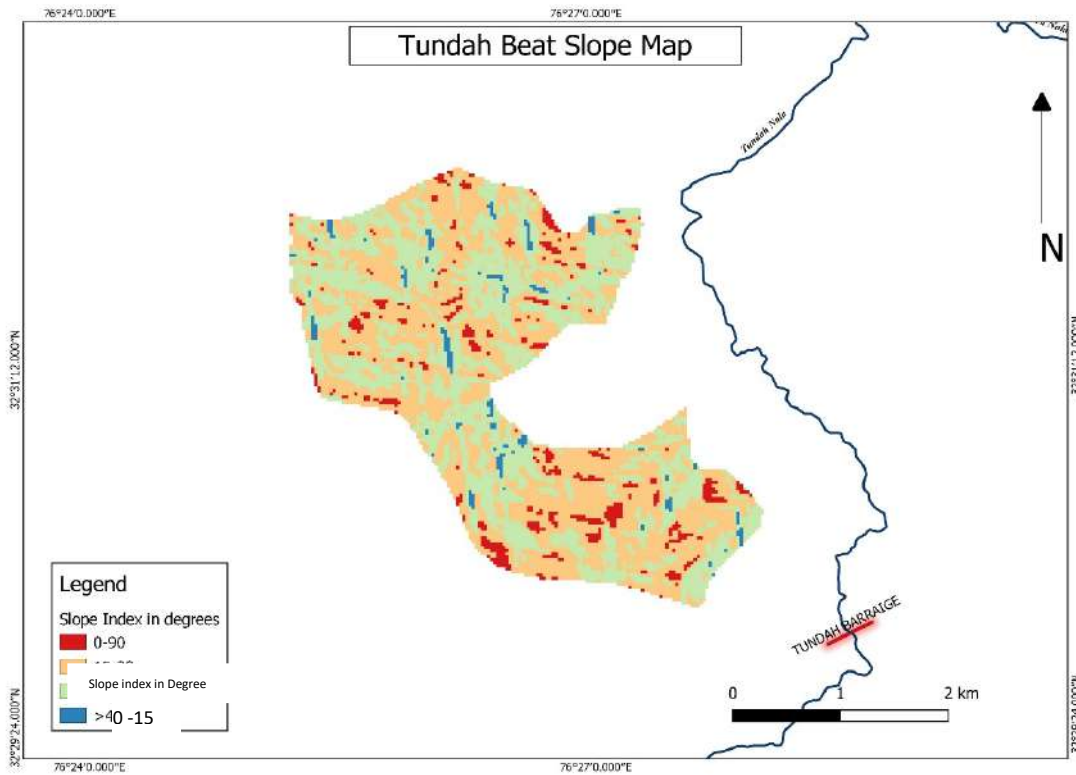


Map : DEM of Tundah Beat

Sl.No	Elevation	Sq.Km	Hectares
1	< 3200	7.21	721
2	3200 -4200	2.03	203
Total		9.24	924

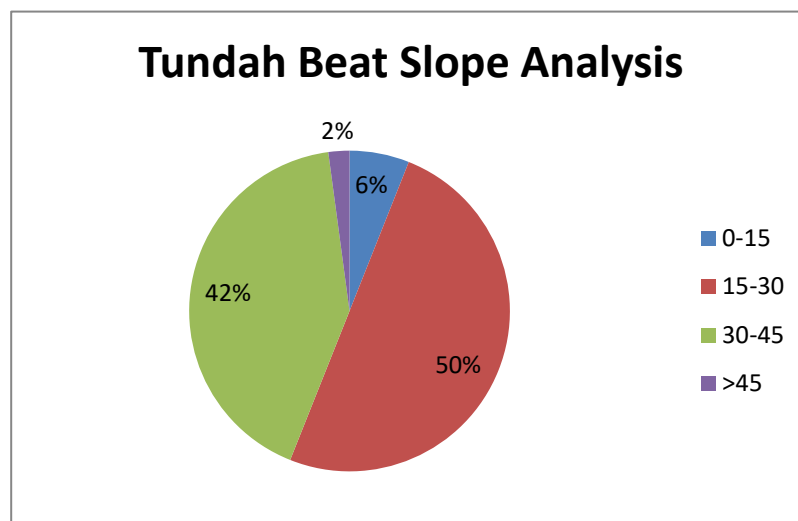


SLOPE: The areas falling under various slope are tabulated below in Table. The slope map is shown below.

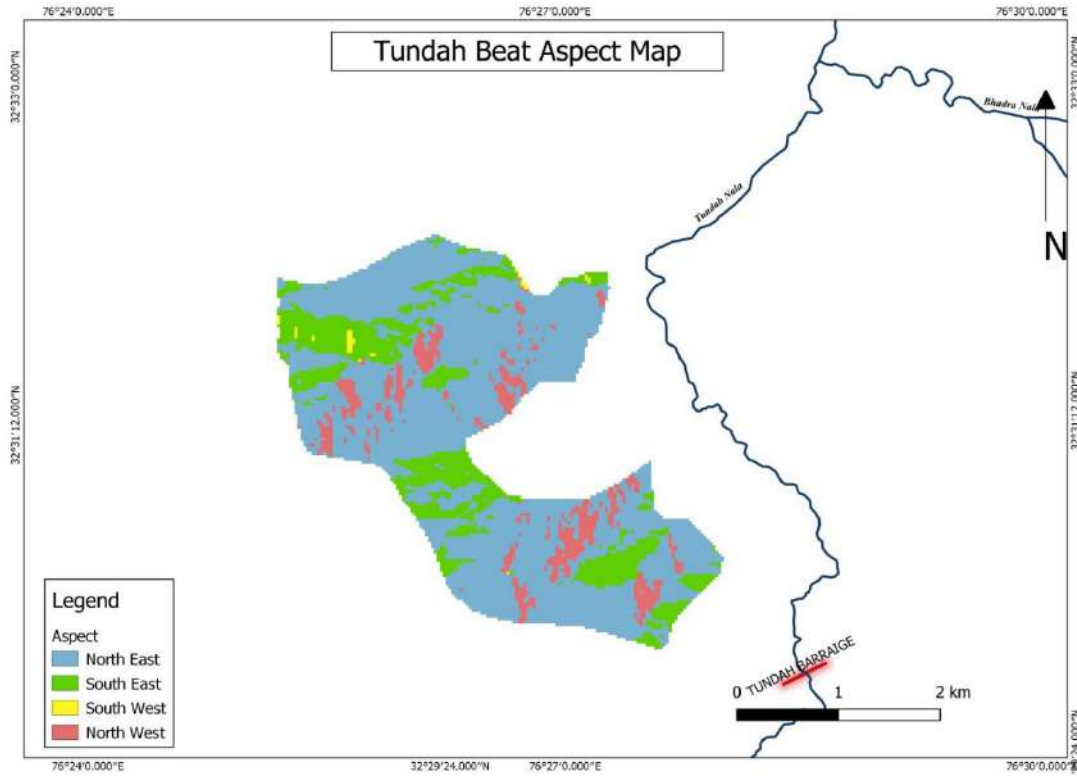


Slope map of Tundah Beat

Sl.No	Slope in degrees	Sq.Km	Hectare
1	0-15	0.53	52.81
2	15-30	4.38	438.26
3	30-45	3.67	366.71
4	>45	0.19	18.58

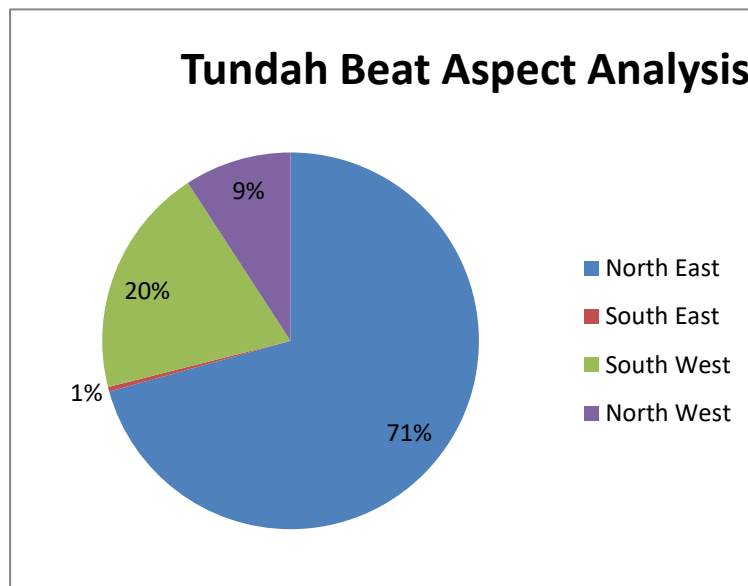


ASPECT ANALYSIS: The following Map and table gives the details of aspect analysis of the beat.

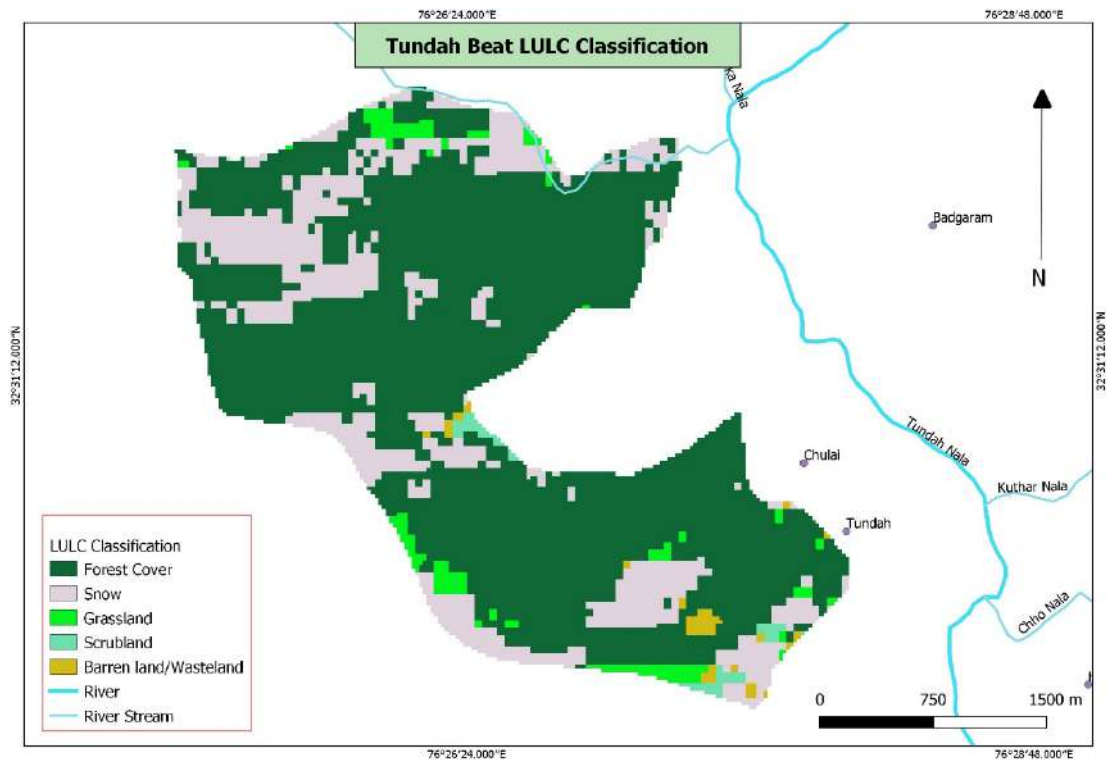


Aspect map of Tundah Beat

Sl.No	Aspect	Sq.km	Hectares
1	North East	6.19	619
2	South East	0.04	4
3	South West	1.73	173
4	North West	0.80	80

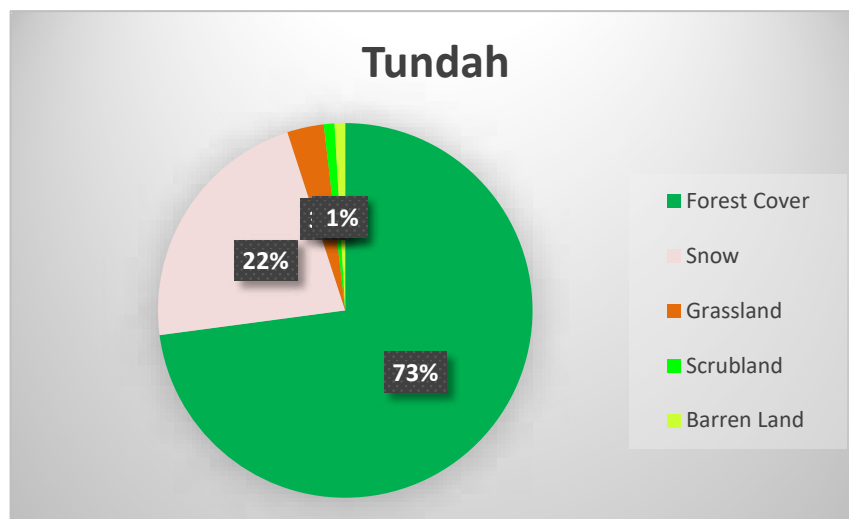


LULC (Land use Land Cover) -The classified land use map of the catchment area, considered for the study, is shown in below map. Land use classification is specifically done for Forest cover, agricultural, barren land, snow or permafrost and water bodies as shown in Table below.

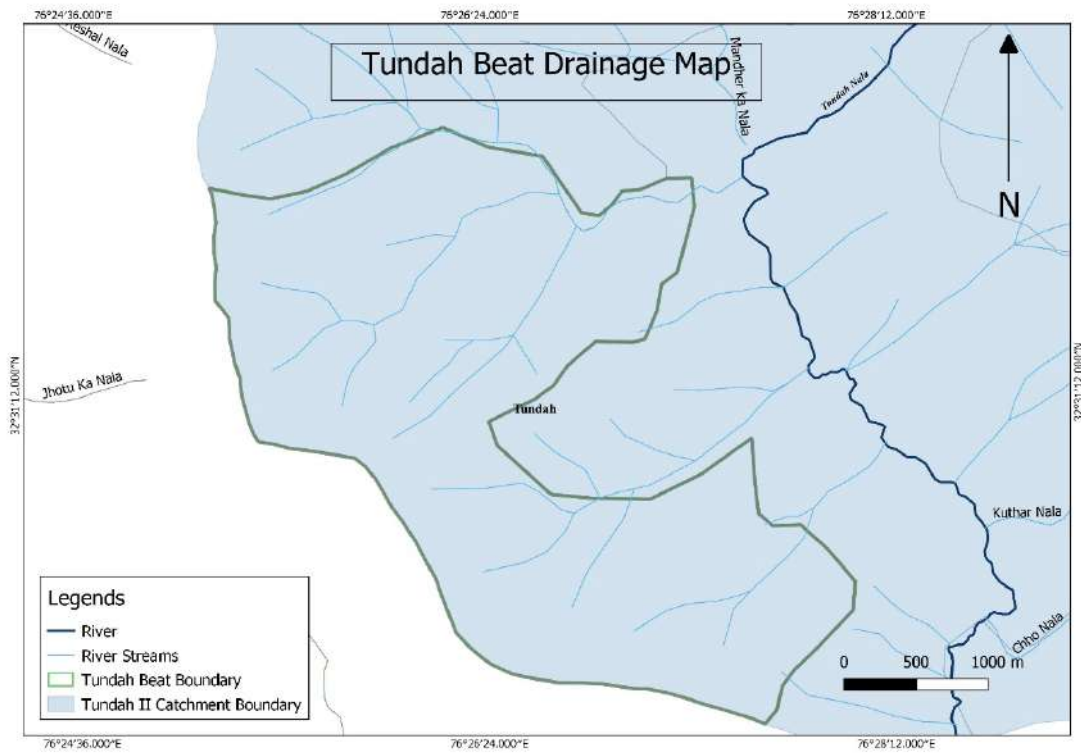


LULC classification of Tundah Beat

Sl.No	Class_name	Sq.km	Hectare
1	Forest Cover	6.74	674
2	Snow	2.05	205
3	Grassland	0.29	29
4	Scrubland	0.09	9
5	Barren Land	0.08	8



DRAINAGE: The drainage map of the Beat is shown below.



Drainage map of Tundah Beat

PROJECTIONS FOR TUNDAH BEAT OF BHARMOUR WL RANGE IN WILDLIFE CHAMBA DIVISION FOR TUNDAH II HEP CAT PLAN MWs Th5a, TH5b, Th6a, Th6b										
Component/ Activity					CAT Plan Allocations					
SI	Length	Lat-Long	Unit	Unit Cost (Rs.)	Size (M)	(RMT)	Phy.	Fin.		
1	2	3	4	5	6	7	8	9	10	
I. AFFORESTATION/HABITAT IMPROVEMENT MEASURES										
a.	Pasture Management / Weed Control (5 Weedings in 10 years)- in Mumridhar Alpine Pasture		Ha.	20000	55	1100000		
b.	Water-hole Eco Systems									
i.	Mummri Dhar		Nos.	400000			1	400000		
TOTAL I : AFFORESTATION							56	1500000		
II SOIL & MOISTURE ONSERVATION MEASURES (SMC)-25%										
a.	Cratewire Checkdams									
i.	Kuthar Nala	2 KM.	N32°30'46" E76°26'57"	Nos.	13680	2x2.5	2	2	54720	
					23024	3x4	3	1	69072	
ii.	Tandai Nala	2.5 KM	N32°32'09" E76°26'15"	Nos.	13680	2x2.5	2	2	54720	
					23024	3x4	3	2	138144	
			Total:		13680	2x2.5	2	4	109440	
					23024	3x4	3	3	207216	
Total: a: Cratewire Checkdams				Nos.			7	316656		
b.	Water Harvesting Structures.				Nos.	104000	..	0	0	
TOTAL II. SMC MEASURES:							7	316656		
III. RESEARCH, TRAINING & CAPACITY BUILDING-5%										
				To be controlled at Division			0	0		
IV. PAYMENT FOR ENVIRONMENT SERVICES (PES).-10%										
				To be controlled at Division			0	0		
V. ECO TOURISM ACTIVITIES-1%										
				To be controlled at Division			0	0		
VI. INFRASTRUCTURE & FOREST PROTECTION-10%										
A. RENOVATION OF CONSTRUCTION OFNEW INFRASTRUCTURE-5%										
i.	Patrolling kits to HPFD staff.				Nos.	To be controlled at Division			0	0
ii.	Bridle Path Tundah to Mandha(Mgt Plan 6..3.1 Sl. 2)				Nos.	To be controlled at Division			0	0
VI A: TOTAL:							0	0		
B. FOREST PROTECTION-5%										
i.	Creation of Firelines									
a.	Silpari DPF-II,III				KM	35000		1	35000	
b.	Tundah DPF IV,V,VI				KM	35000		1	35000	
c.	Ardpanni DPF				KM	35000		1	35000	
d.	Tundah DPF IV,V,VI				KM	35000		1	35000	
e.	Gowar DPF				KM	35000		1	35000	
Total							5	175000		
ii.	Hiring of Patrolling Vehicle				L/s	To be controlled at Division			0	0
iii.	Engagemnt of staff for fire watching/ anti poaching activites.				Nos.			1	150000	
iv.	Purchase of Drone with Higher Flight Capacity.				Nos.	To be controlled at Division			0	0
VI B: TOTAL							6	325000		
TOTAL VI A+B.							6	325000		
VII. WILDLIFE HABITAT MANAGEMENT-6%										
i.	EQUIPMENT				To be controlled at Division					
a.	Binoculars				Nos.	45000		0	0	
b.	Trap Camera				Nos.	60000		0	0	
c.	Tranquilizer Gun				Nos.	450000		0	0	
Total:							0	0		
ii.	Man Animal Conflicts.				To be controlled at Division			0	0	
iii.	Special study for WL Habitat Management for Brown Bear to be conducted through WII				Provisions made at Division Level under Research Training and Capacity Building.			0	0	
iv.	Special study on carrying capacity of WL Sanctuary Tundah for Eco Tourism.				To be controlled at Division			0	0	
v.	Strengthening of Rescue facility Monkey Sterlization Centre at Chamba/ Bakani				To be controlled at Division			0	0	
Total:VII							0	0		
VIII. MONITORING & EVALUATION-5%										
				To be controlled at Division			0	0		
IX. CONTINGENCIES- 10%										
				To be controlled at Division			0	0		
GRAND TOTAL:							2141656			

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BHADRA BEAT

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CAT ACTION PLAN FOR BHADRAH WL BEAT

Bhadrah Beat falls in Bharmour (WL) Range of WL Chamba Forest Division. It has an area of 122.56 Sq. Kms which is 45.98% of the project catchment of Tundah HEP II. The Beat consists of 25 MWs. The beat is bounded by Lahul Beat in the East, in the West Banni Beat, Lahul Division in North and Bhadgran Beat in the South. It has only one village namely Bhadra with human population of 294 and livestock population of 389.

Bhadrah has got 10 Nallas as under:

- I. Galda Nala
- ii. Patnli Nala
- iii. Bhansar Nalla
- iv. Julehar Nalla
- v. Liundi Nalla
- vi. Dadoon
- vii. Chanjala
- viii. Bhansar
- ix. Kathla Nalla
- x. Bari Nalla

The funds to the tune of Rs.40,38,272/- are planned for this beat.

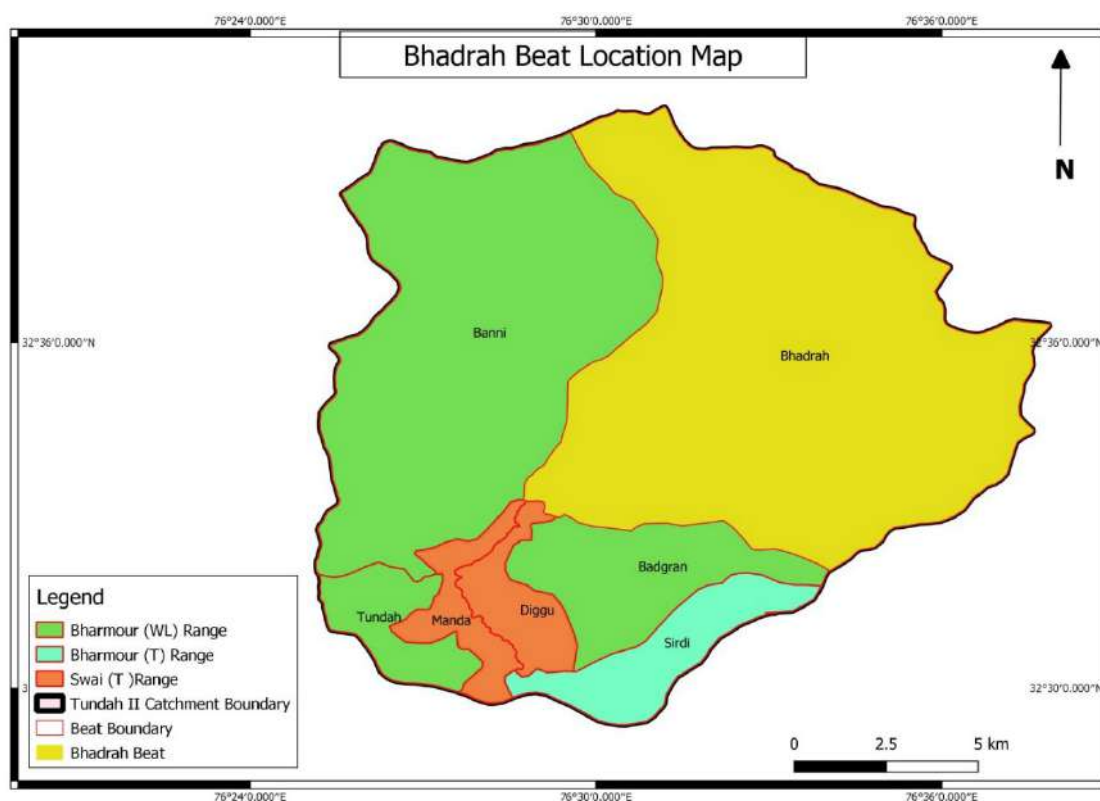
The following maps in respect of Bhadrah Beat are given hereunder:

1. Location Map
2. MWs Map.
3. Elevation Map.
4. Slope Map.
5. Aspect Map.
6. LULC Map.
7. Drainage Map.

GIS ANALYSIS OF THE BEATS IN BHARMOUR (WL) FOREST RANGE

BHADRAH BEAT (BHARMOUR(WL) RANGE)

Bhadrah beat comes under Bharmour (I) range. The total catchment area coming under this beat is 122.56 Sq.km i.e 1225 Hectares. The location map is given below

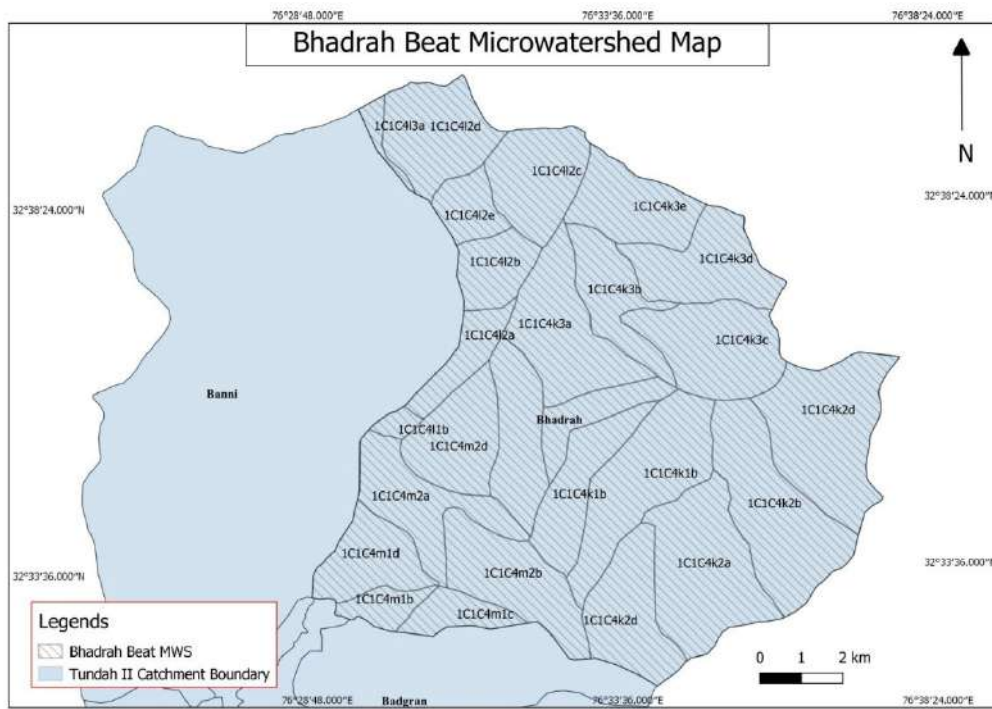


Location Map of Bhadrah Beat

In total the area is divided in to 25 micro-watersheds. The area details of each micro watershed are tabulated below.

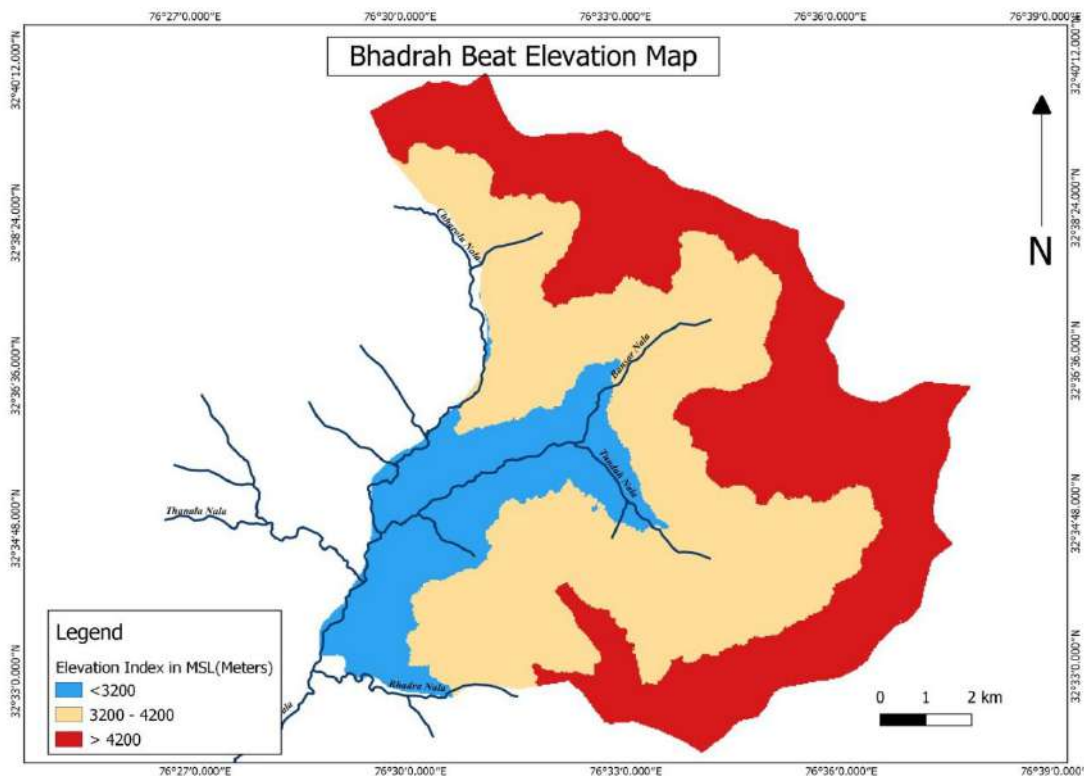
Table :Beat wise micro-watershed list & Area statement				
SI No.	Beat Name	Micro-watershed name	Area in Sq.Km	Ha.
6	Bhadra	1C1C4m2a	7.89794	789.794
		1C1C4k1b	7.79218	779.218
		1C1C4m2c	4.66606	466.606
		1C1C4l1b	7.11947	711.947
		1C1C4l2a	4.69598	469.598

		1C1C4l2b	6.15296	615.296
		1C1C4m2d	4.89126	489.126
		1C1C4k3a	6.88840	688.840
		1C1C4l2e	3.57613	357.613
		1C1C4k1a	2.60974	260.974
		1C1C4l2d	5.73164	573.164
		1C1C4l3a	6.62807	662.807
		1C1C4l2c	5.16044	516.044
		1C1C4m1d	7.15476	715.476
		1C1C4m1c	6.80454	680.454
		1C1C4m1b	4.80380	480.380
		1C1C4k3e	4.83528	483.528
		1C1C4k3b	4.13357	413.357
		1C1C4k3d	5.63513	563.513
		1C1C4k2d	5.71239	571.239
		1C1C4k2d	8.92658	892.658
		1C1C4k2b	8.83278	883.278
		1C1C4k2a	8.61016	861.016
		1C1C4k3c	6.60415	660.415
		1C1C4m2b	6.34458	634.458
Total			152.208	15220.8



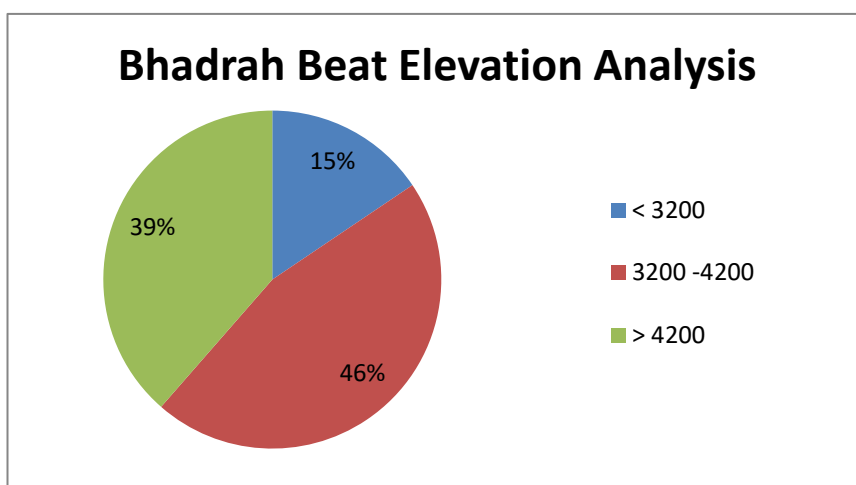
Micro-watershed map of Bhadrah Beat

ELEVATION /DEM-The elevation of this catchment area of Bhadrah beat is < 3200 Mtrs to >4200Mtrs. Table below shows the elevation classification of this Beat. The DEM is shown below.

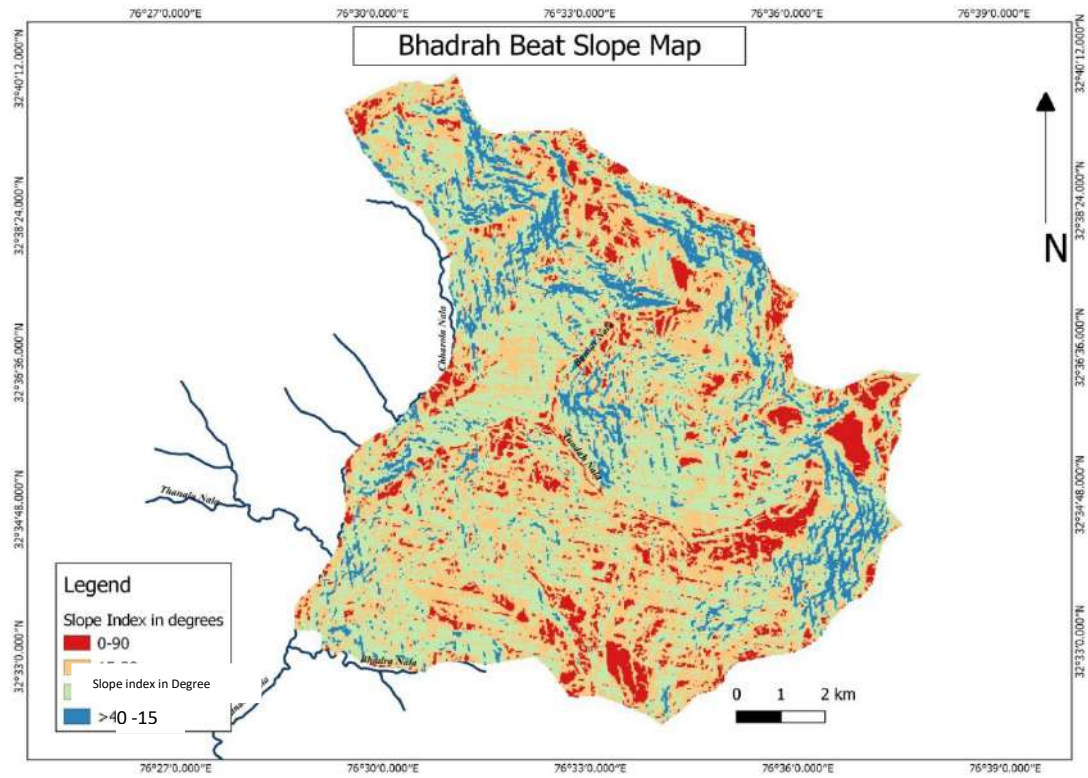


Elevation Map of Bhadrah Beat

Sl.No	Elevation	Sq.Km	Hectares
1	< 3200	19.07	1907
2	3200 - 4200	56.20	5620
3	> 4200	47.26	4726

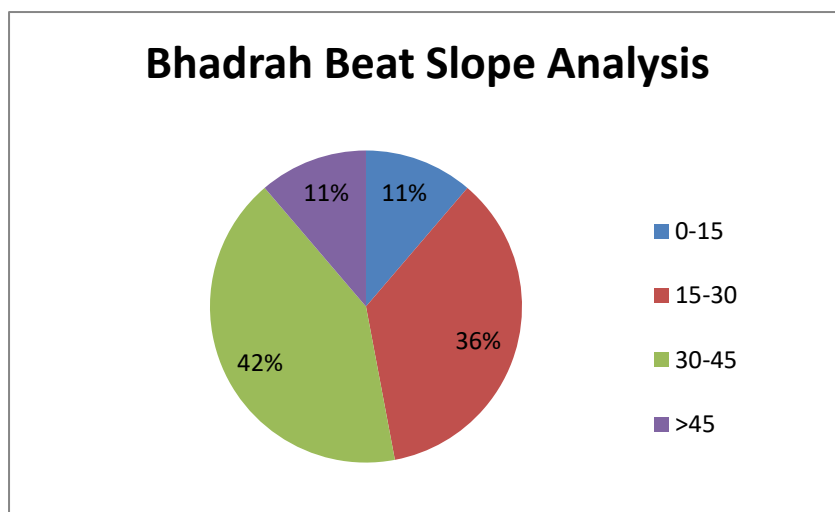


SLOPE: The areas falling under various slope are tabulated below in Table. The slope map is shown below.

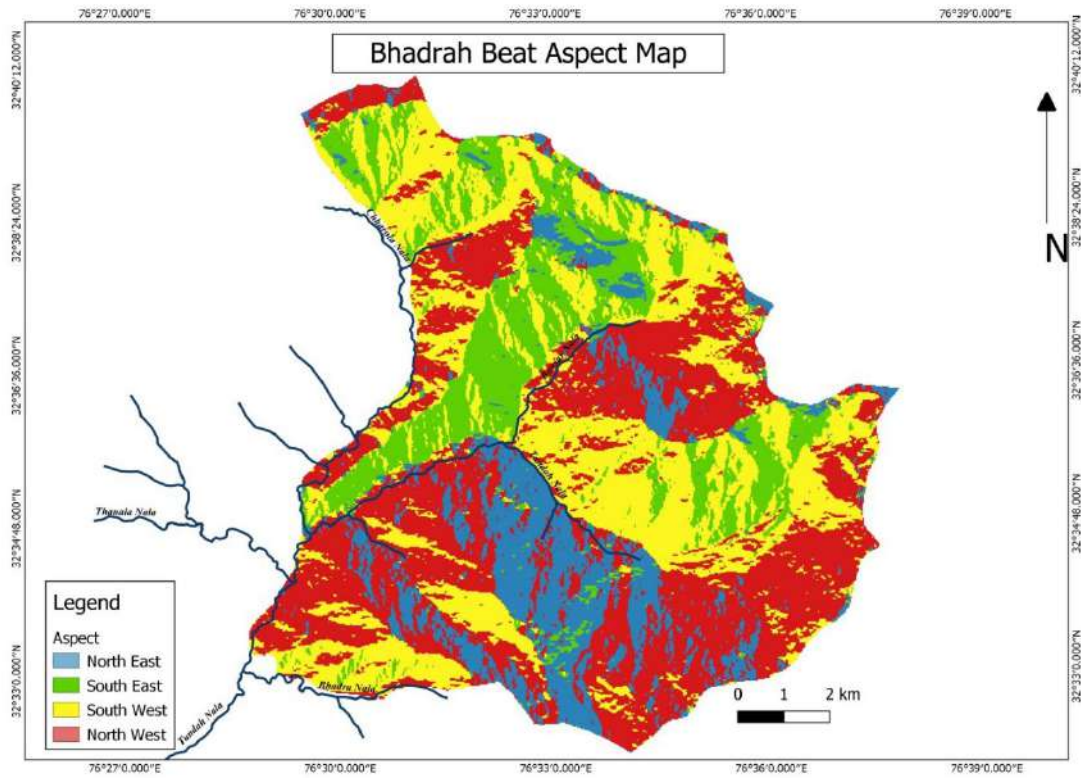


Slope map of Bhadrah Beat

Sl.No	Slope in degrees	Sq.Km	Hectare
1	0-15	13.68	1368
2	15-30	43.42	4342
3	30-45	50.65	5065
4	>45	13.66	1366

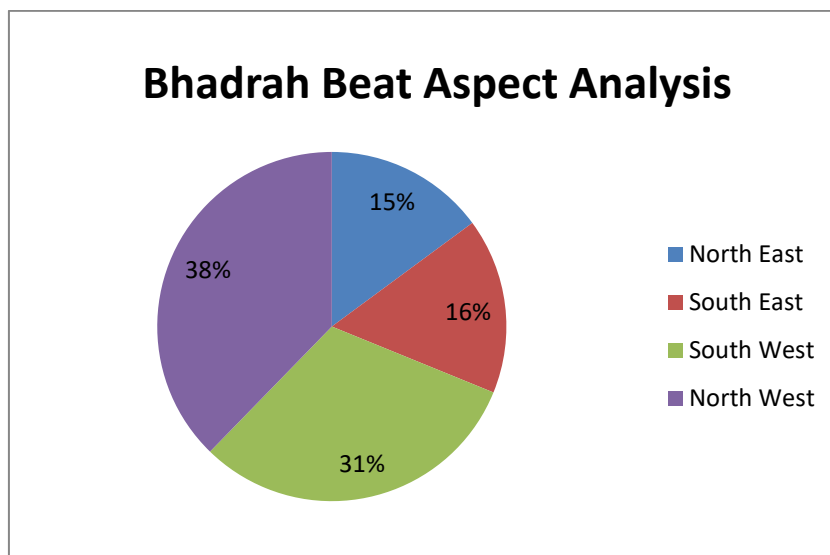


ASPECT ANALYSIS: The following Map and table gives the details of aspect analysis of the beat.

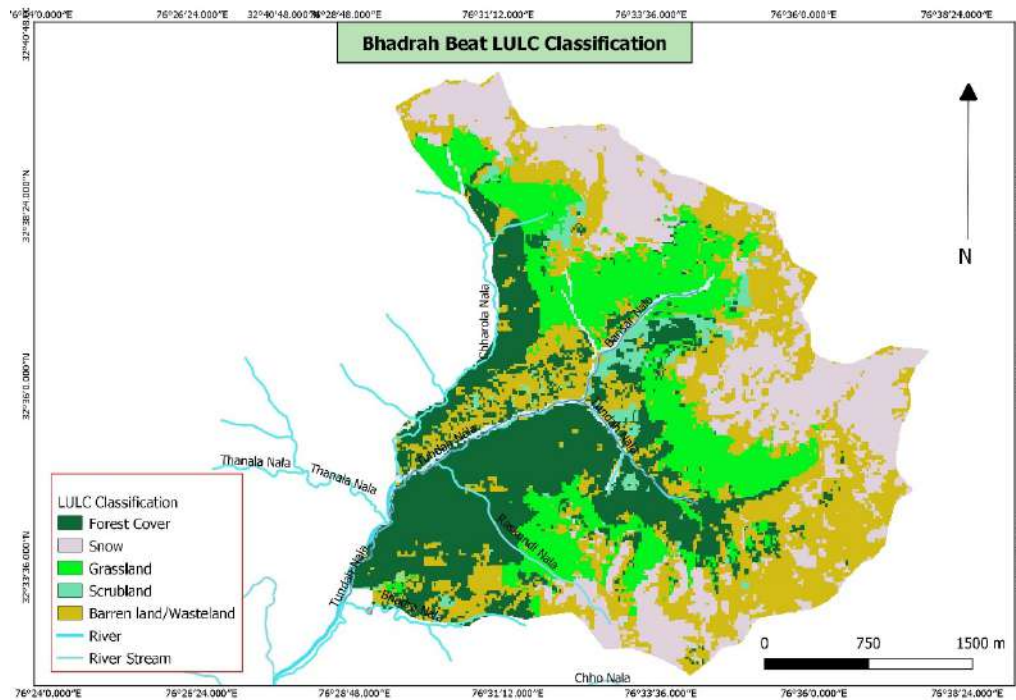


Aspect map of Bhadrah Beat

Sl.No	Aspect	Sq.km	Hectares
1	North East	18.07	1807
2	South East	19.76	1976
3	South West	37.79	3779
4	North West	45.78	4578

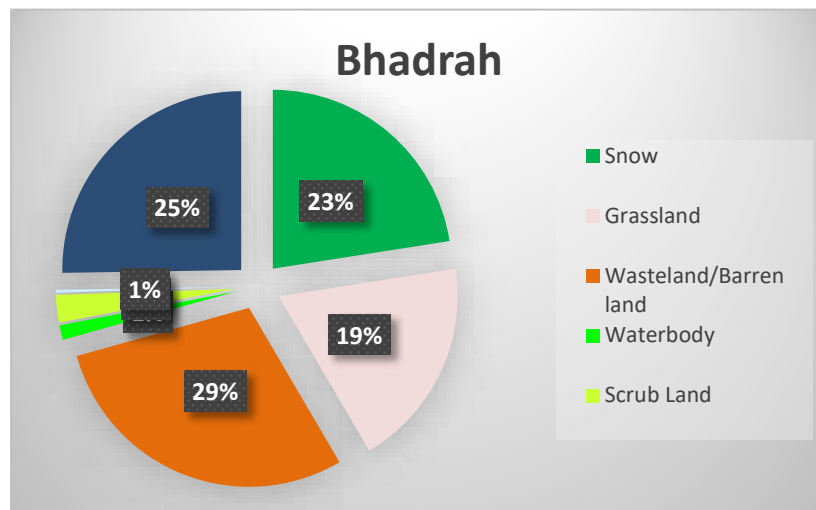


LULC (Land use Land Cover) -The classified land use map of the catchment area, considered for the study, is shown in below map. Land use classification is specifically done for Forest cover, agricultural, barren land, snow or permafrost and water bodies as shown in Table below.

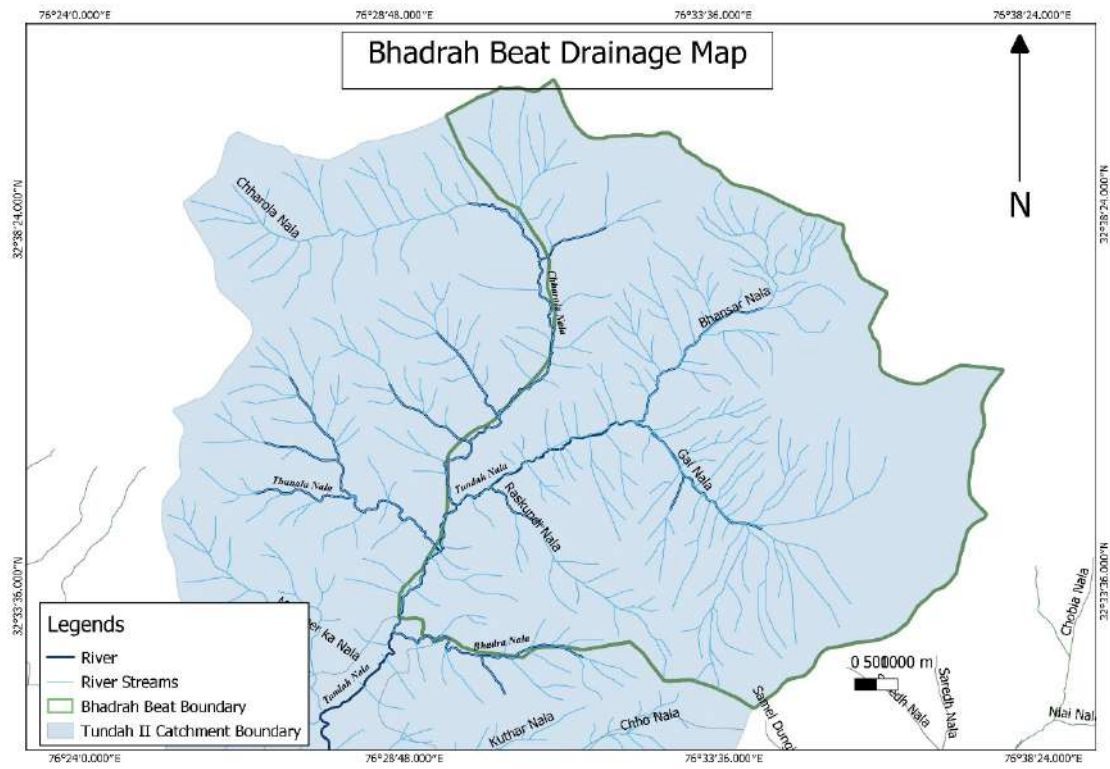


LULC classification of Bhadrah Beat

Sl.No	Class_name	Sq.km	Hectare
1	Snow	27.60	2760
2	Grassland	23.31	2331
3	Wasteland/Barren land	35.66	3566
4	Waterbody	1.62	162
5	Scrub Land	3.05	305
6	Agriculture	0.34	34
7	Forest Cover	30.94	3094



DRAINAGE: The drainage map of the Beat is shown below.



Map: Drainage map of Bhadrah Beat

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PROJECTIONS FOR BHADRA BEAT OF BHARMOUR WL RANGE IN WILDLIFE CHAMBA DIVISION FOR TUNDAH II HEP CAT PLAN (MWs Th5g, Th6g)										
Sl.No.	Component/ Activity	Length	Lat-Long	Unit	Unit Cost (Rs.)	CAT Plan Allocations.				
						Size (M)	(RMT)	Phy.	Fin.	
1	2	3	4	5	6	7	8	9	10	
I.	AFFORESTATION/HABITAT IMPROVEMENT MEASURES									
	a. Pasture Management/ Weed Control (5 Weedings in 10 years)				Ha.				0	0
	b. Water-hole Eco Systems									
	i. Chhanjala				Nos.	400000			1	400000
	TOTAL: I AFFORESTATION								1	400000
II.	SOIL & MOISTURE CONSERVATION MEASURES (SMC)-25%									
	a. CRATE WIRE Checkdams									
	i. Galda Nala	3 KM	N32°32'59" E76°29'01"		Nos.	13680	2x2.5	2	5	136800
						23024	3x4	3	4	276288
	ii. Patnli Nala	4 KM	N32°33'53" E76°30'44"		Nos.	13680	2x2.5	2	7	191520
						23024	3x4	3	5	345360
	iii. Bhansar Nalla	1 KM	N32°36'54" E76°33'28"		Nos.	13680	2x2.5	2	2	54720
						23024	3x4	3	2	138144
	iv. Julehar Nalla	6 KM	N32°36'11" E76°30'39"		Nos.	13680	2x2.5	2	7	191520
						23024	3x4	3	6	414432
	v. Liundi Nalla	4 KM	N32°35'22" E76°29'42"		Nos.	13680	2x2.5	2	7	191520
						23024	3x4	3	5	345360
	vi. Kathla Nalla	2.5 KM	N32°34'18" E76°29'51"		Nos.	13680	2x2.5	2	4	109440
						23024	3x4	3	3	207216
	vii. Bari	6 KM	N32°34'28" E76°33'39"		Nos.	13680	2x2.5	2	7	191520
						23024	3x4	3	6	414432
			Total			13680	2x2.5	2	39	1067040
						23024	3x4	3	31	2141232
	Total:								70	3208272
	b. Water Harvesting Structures					104000			0	0
	TOTAL II: SMC MEASURES								70	3208272
III.	RESEARCH, TRAINING AND CAPACITY BUILDING-5%						Division		0	0
IV.	PAYMENT FOR ENVIRONMENT SERVICES (PES)-10%						Division		0	0
V.	ECO TOURISM- 1%						To be controlled at Division		0	0
VI.	INFRASTRUCTURE & FOREST PROTECTION-10%									
	A. RENOVATION OF EXISTING INFRASTRUCTURE-5%									
	i. Patrolling Kits to HPFD staff						To be controlled at Division		0	0
	ii. Bridle Paths						To be controlled at Division		0	0
	iii. Foot Bridges:						To be controlled at Division			
	a. Bani Nalla	Nos.			MTrs.		To be controlled at Division		1	0
	b. Bhansar Nalla	Nos.			MTrs.		To be controlled at Division		1	0
	Total A:								2	0
	B. FOREST PROTECTION:								2	0
	i. Creation of Firelines									
	a. Digalla RF I				KMs	35000			1	35000
	b. Digalla RF II				KMs	35000			1	35000
	c. Digalla RF III				KMs	35000			1	35000
	d. RF III				KMs	35000			1	35000
	e. DPF I				KMs	35000			1	35000
	f. DPF II				KMs	35000			1	35000
	g. Chanjala				KMs	35000			1	35000
	h. Dadoon				KMs	35000			1	35000
	Total:					35000			8	280000
	ii. Hiring of Patrolling Vehicle				No.		To be controlled at Division		0	0
	iii. Fire Watcher / anti poaching manpower				No.	0			1	150000
	iv. Purchase of Drone with Higher Flight Capacity.				No.		To be controlled at Division		0	0
	Total VI B:								9	430000
	Total VI: A & B.								11	430000
VII.	WILDLIFE HABITAT MANAGEMENT-6%									
	i. Equipment:						To be controlled at Division			

BANNI BEAT

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CAT ACTION PLAN FOR BANNI BEAT

Banni Beat falls in Bharmour (WL) Range WL Chamba Forest Division. It has an area of 85.73 Sq. KM which is 32.16% of the project catchment of Tundah HEP II. The Beat consists of 21 MWs. The beat is Bound by in the Bhadrach beat in the East, Almi beat by in the west, Lahul division by North and Tundah and Diggu beat in the South. It has 4 villages with a human population of 935 and livestock population of 790 as under:

Name of Village	Human Population	Livestock Population
Banni.	250	205
Sarontha.	290	195
Mandha.	275	245
Kumarkari.	120	145
Total:4	935	790

The following ten Nallas, are flowing in this Beat:

- i. Choi Nalla
- ii. Banni Nalla
- iii. Mandha Nalla
- iv. Fatani Nalla
- v. Goo Nalla
- vi. Ghold Nalla
- vii. Ghulard Nalla
- viii. Tundah Nalla
- ix. Shinda Nalla
- x. Tarla Nalla

The funds to the tune of Rs.33,40,528-/ are planned for this beat under the cat plan.

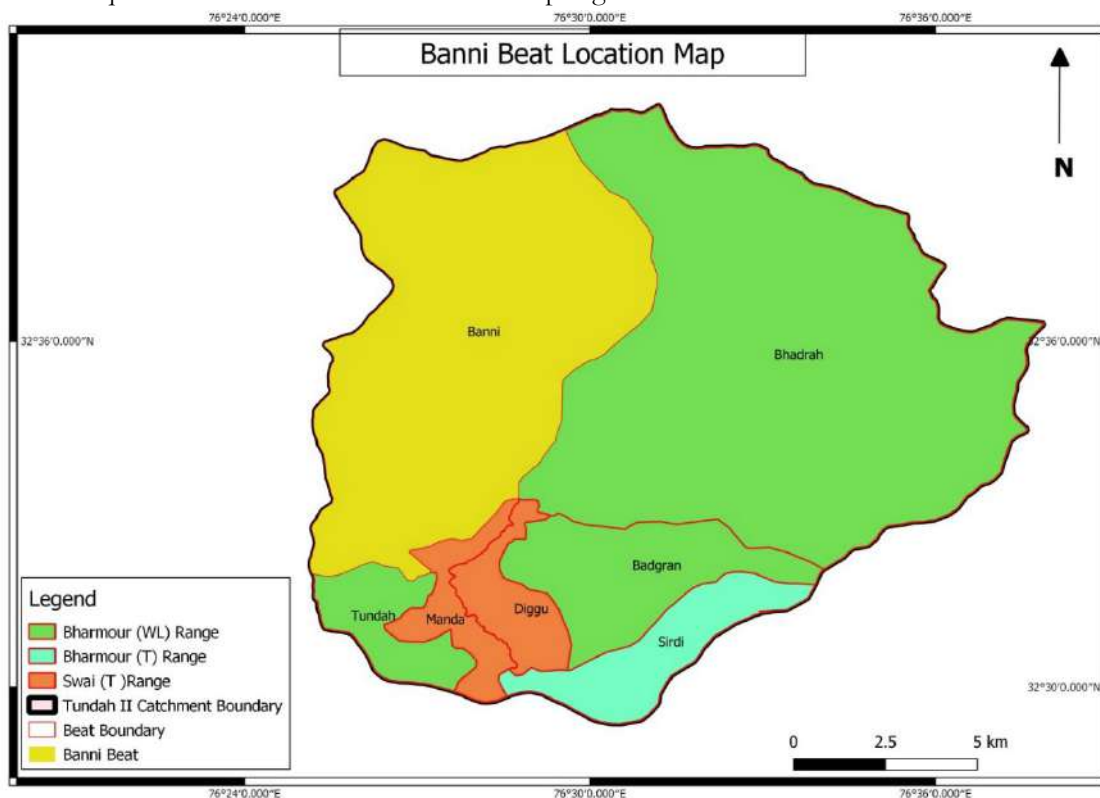
The following maps in respect of Banni Beat are given hereunder:

1. Location Map.
2. MWs Map.
3. Elevation Map.
4. Slope Map.
5. Aspect Map.
6. LULC Map.
7. Drainage Map.

GIS ANALYSIS OF THE BEATS IN BHARMOUR (WL) FOREST RANGE

BANNI BEAT (BHARMOUR(WL) RANGE)

Banni beat comes under Bharmour (WL) range. The total catchment area coming under this beat is 85.73Sq.km i.e 857 Hectares. The location map is given below

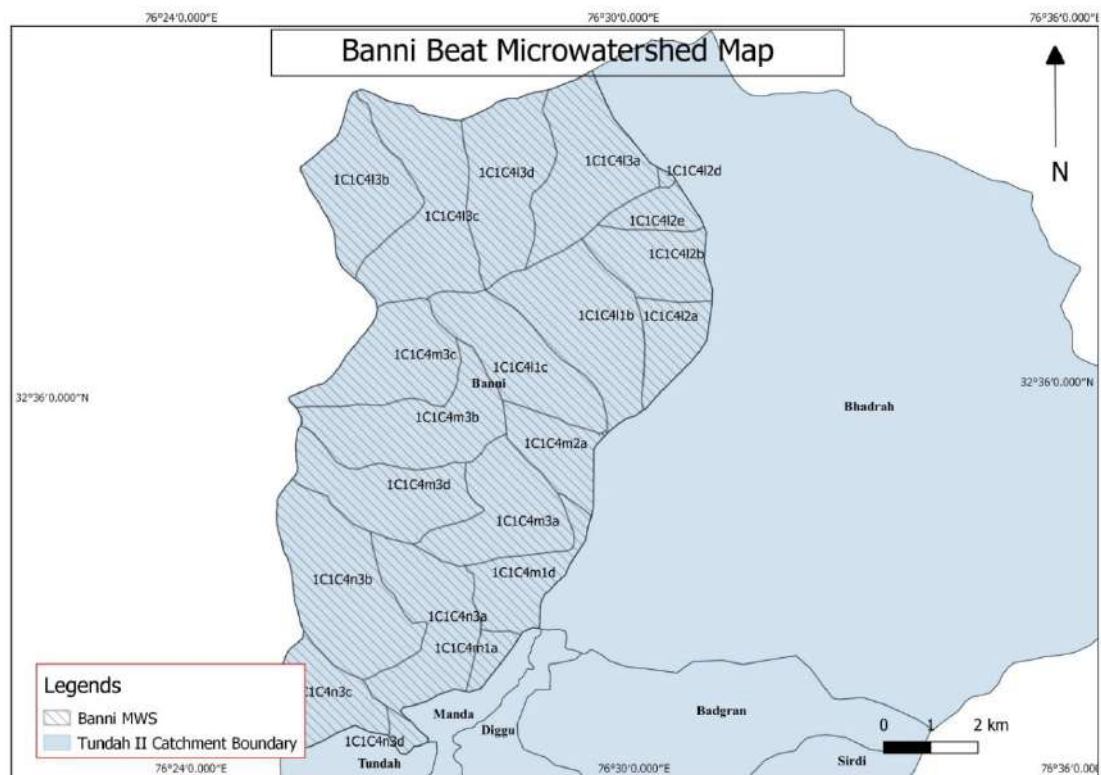


Location Map of Banni Beat

In total the area is divided in to 21 micro-watersheds. The area details of each micro watershed are tabulated below.

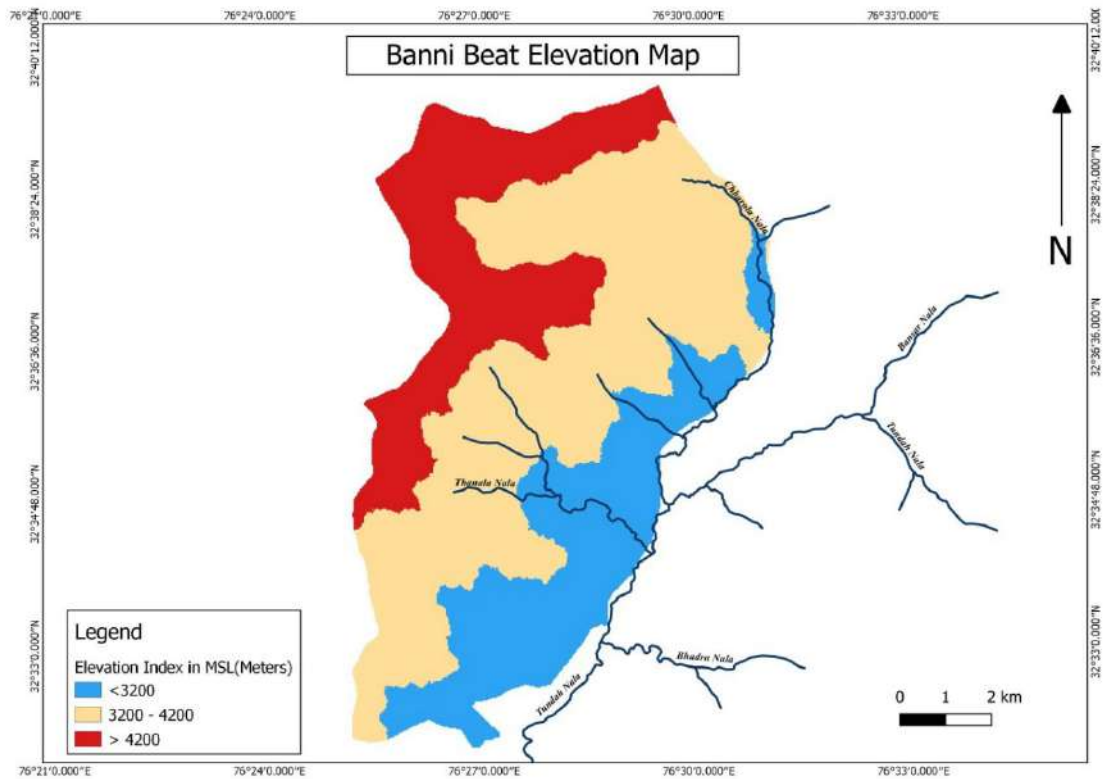
Table :Beat wise micro-watershed list & Area statement				
SI No.	Beat Name	Micro-watershed name	Area in Sq.Km	Ha.
5	Banni	1C1C4l1b	7.119478	711.947
		1C1C4m2a	7.897949	789.794
		1C1C4l2b	6.152964	615.296
		1C1C4l2a	4.695989	469.598
		1C1C4l2e	3.576135	357.613
		1C1C4n3d	4.943376	494.337
		1C1C4m3c	4.894661	489.466
		1C1C4n3c	4.341002	434.100
		1C1C4l2d	5.73164	573.164

		1C1C4l3a	6.628073	662.807
		1C1C4l3b	4.988848	498.884
		1C1C4n3b	7.305784	730.578
		1C1C4m3d	4.826255	482.625
		1C1C4m3b	5.842241	584.224
		1C1C4l3d	5.649985	564.998
		1C1C4l3c	6.954457	695.445
		1C1C4m1a	3.979554	397.955
		1C1C4m1d	7.154761	715.476
		1C1C4m3a	4.972724	497.272
		1C1C4n3a	6.250131	625.013
		1C1C4l1c	5.04567	504.567
Total			118.9517	11895.16



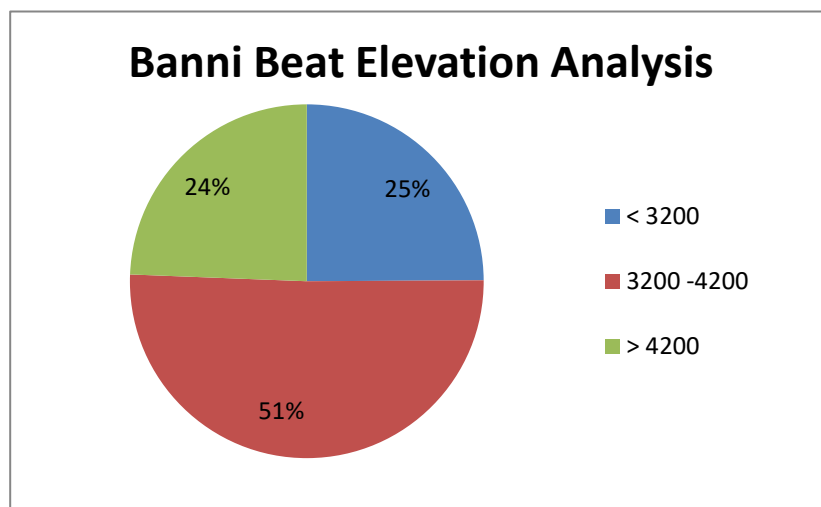
Micro-watershed map of Banni Beat

ELEVATION /DEM-The elevation of this catchment area of Diggu beat is <3200 Mtrs to >4200 Mtrs. Table below shows the elevation classification of this Beat. The DEM is shown below.

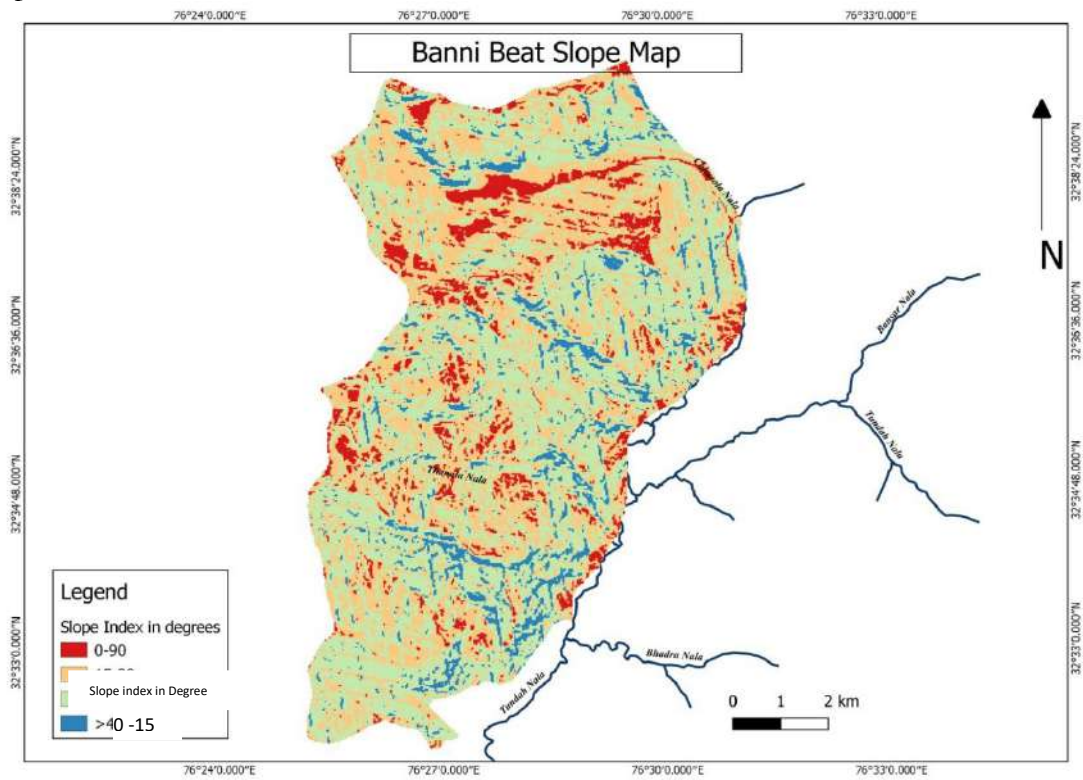


DEM Map of Banni Beat

Sl.No	Elevation	Sq.Km	Hectares
1	< 3200	21.35	2135
2	3200 -4200	43.45	4345
3	> 4200	20.90	2090

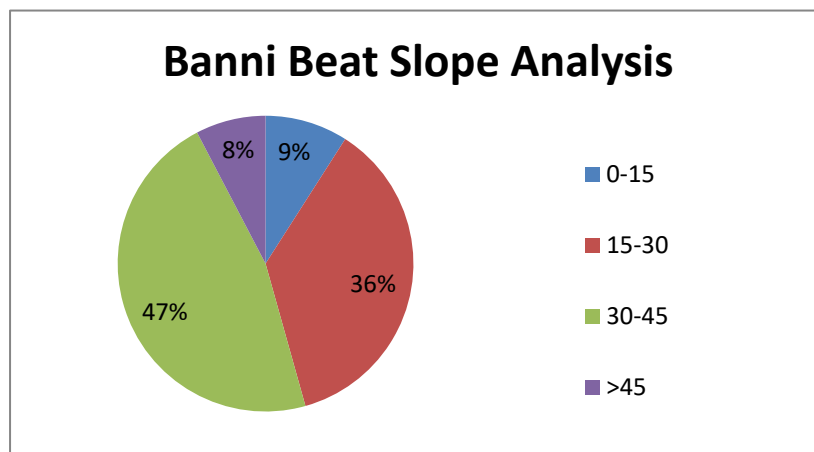


SLOPE: The areas falling under various slope are tabulated below in Table. The slope map is shown below.

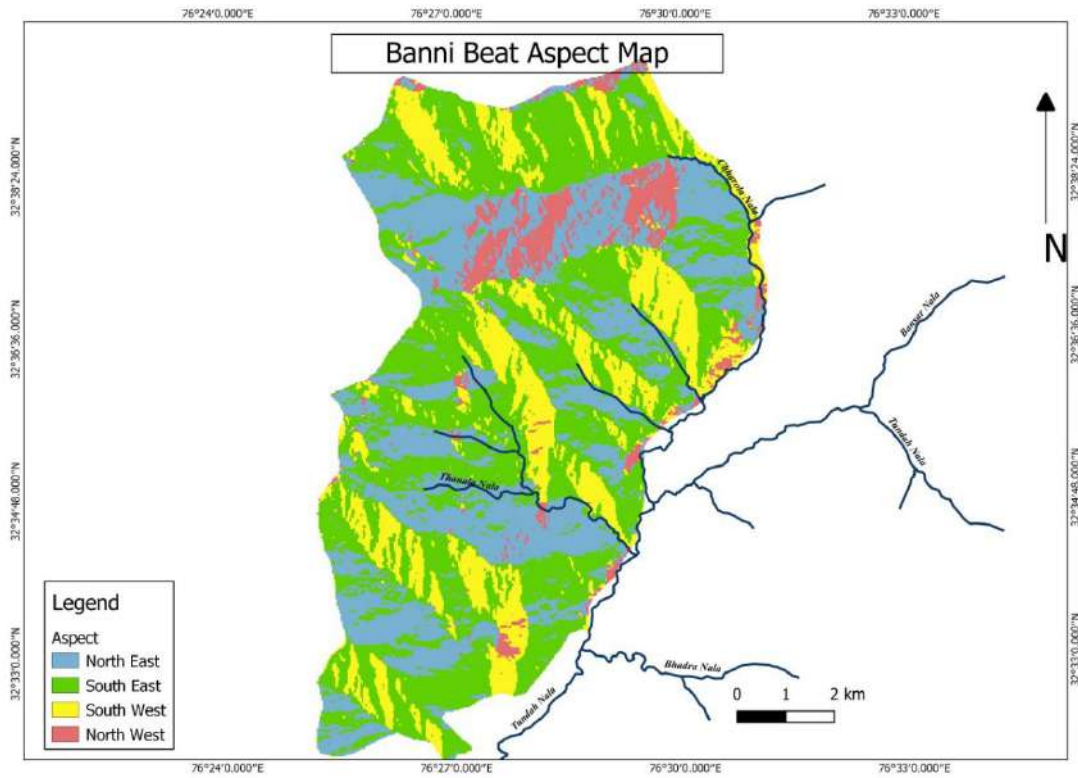


Slope map of Banni Beat

Sl.No	Slope in degrees	Sq.Km	Hectare
1	0-15	7.68	768
2	15-30	31.00	3100
3	30-45	39.56	3956
4	>45	6.49	649

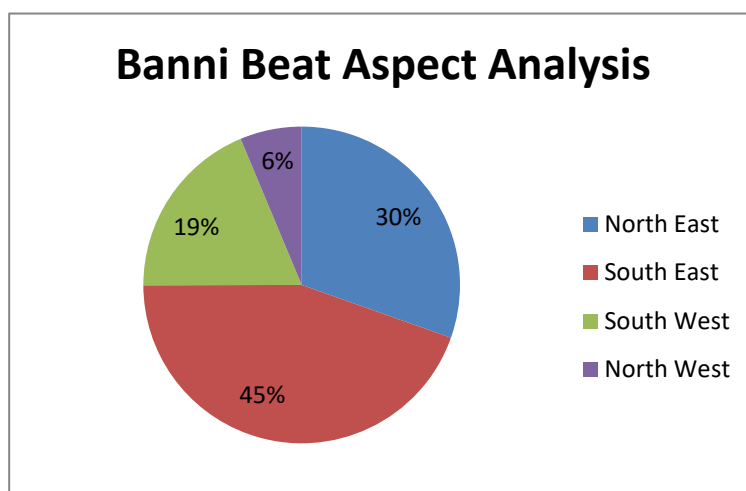


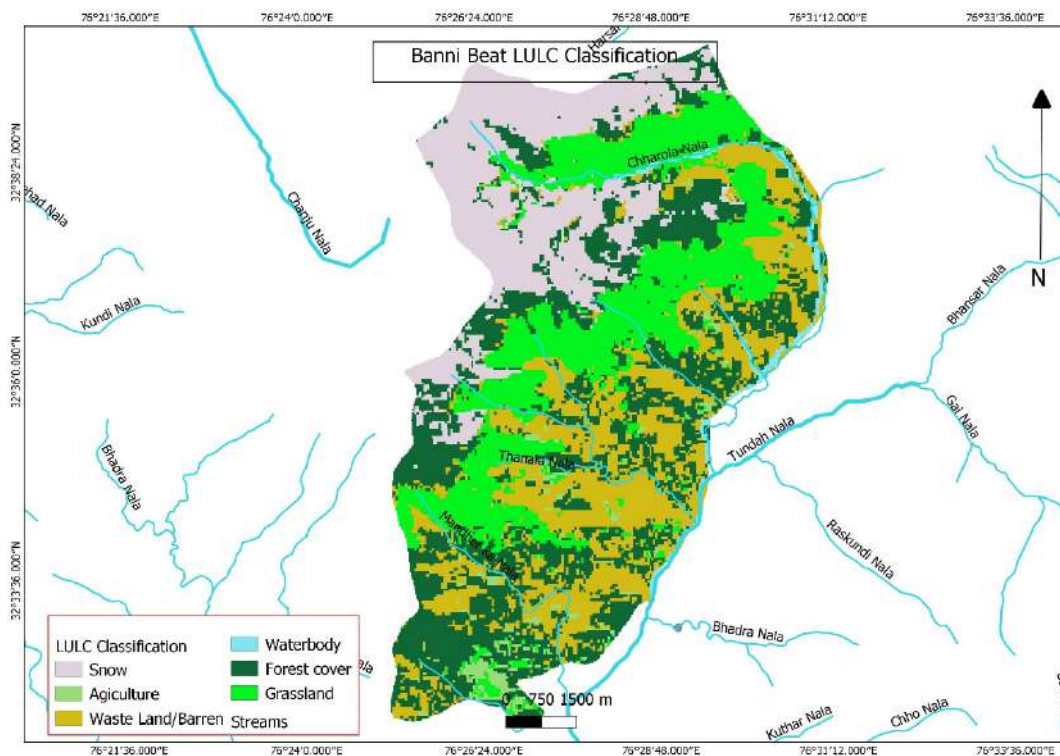
ASPECT ANALYSIS: The following Map and table gives the details of aspect analysis of the beat.



Map : Aspect map of Banni Beat

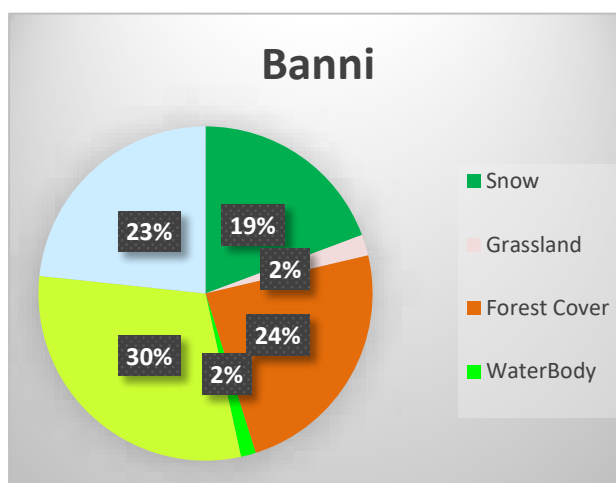
Sl.No	Aspect	Sq.km	Hectares
1	North East	25.77	2577
2	South East	37.75	3775
3	South West	15.88	1588
4	North West	5.34	534



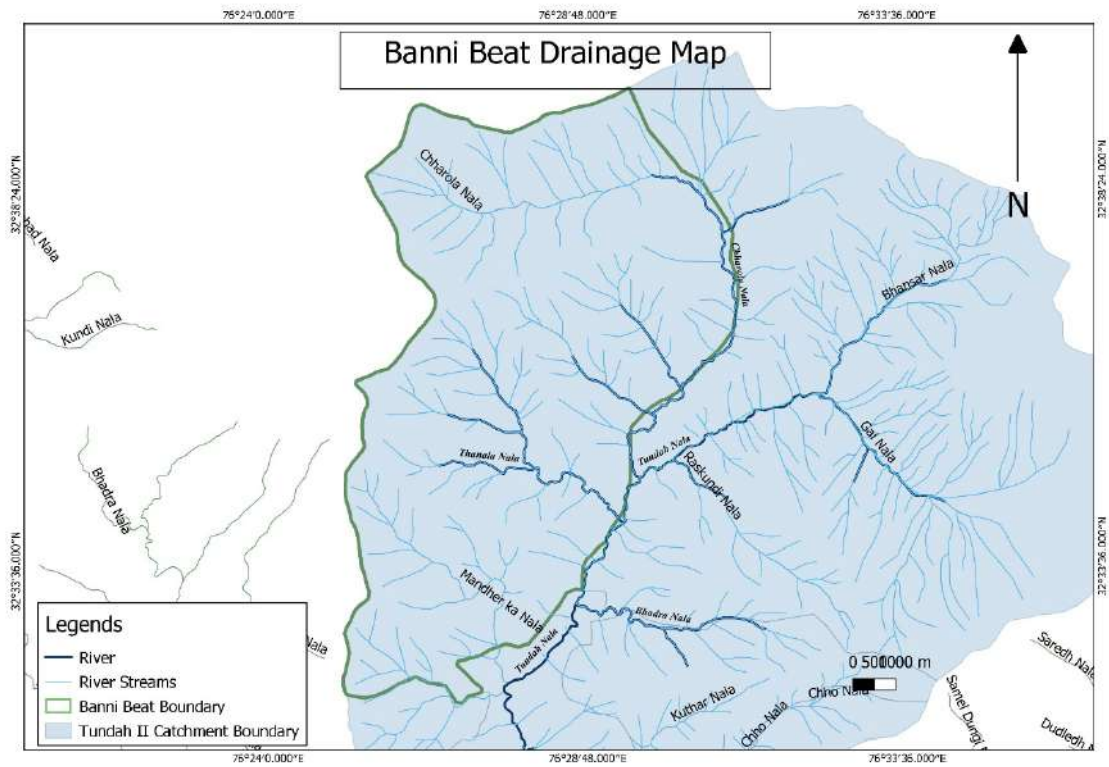


Map : LULC classification of Banni Beat

Sl.No	Class_name	Sq.km	Hectare
1	Snow	16.54	1654
2	Grassland	1.74	174
3	Forest Cover	20.41	2041
4	WaterBody	1.24	124
5	Wasteland/Barren Land	25.79	2579
6	Agriculture	19.98	1998



DRAINAGE: The drainage map of the Beat is shown below.



Map: Drainage map of Banni Beat

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BADGRAN BEAT

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CAT ACTION PLAN FOR BADGRAN BEAT

Badgran Beat falls in Bharmour (WL) Range WL Chamba Forest Division. It has an area of 20.18 Sq. KM which is 7.5% of the project catchment of Tundah HEP II. The Beat consists of 11 MWs. Six villages falling in this Beat are listed in Diggu Beat above. The beat is bound by in the Chobia Beat in East, Mandha Beat in the west, Bhadrah Beat in the North and Sirdi beat in the South.

The following five Nallas, are flowing in this Beat:

- i. Khedu Nalla
- ii. Badai Nalla
- iii. Bhadra Nalla
- iv. Dhadoon Nalla
- v. Palohi Nalla

The funds to the tune of Rs. 21,23,032-/- are Planned for this beat under the cat plan.

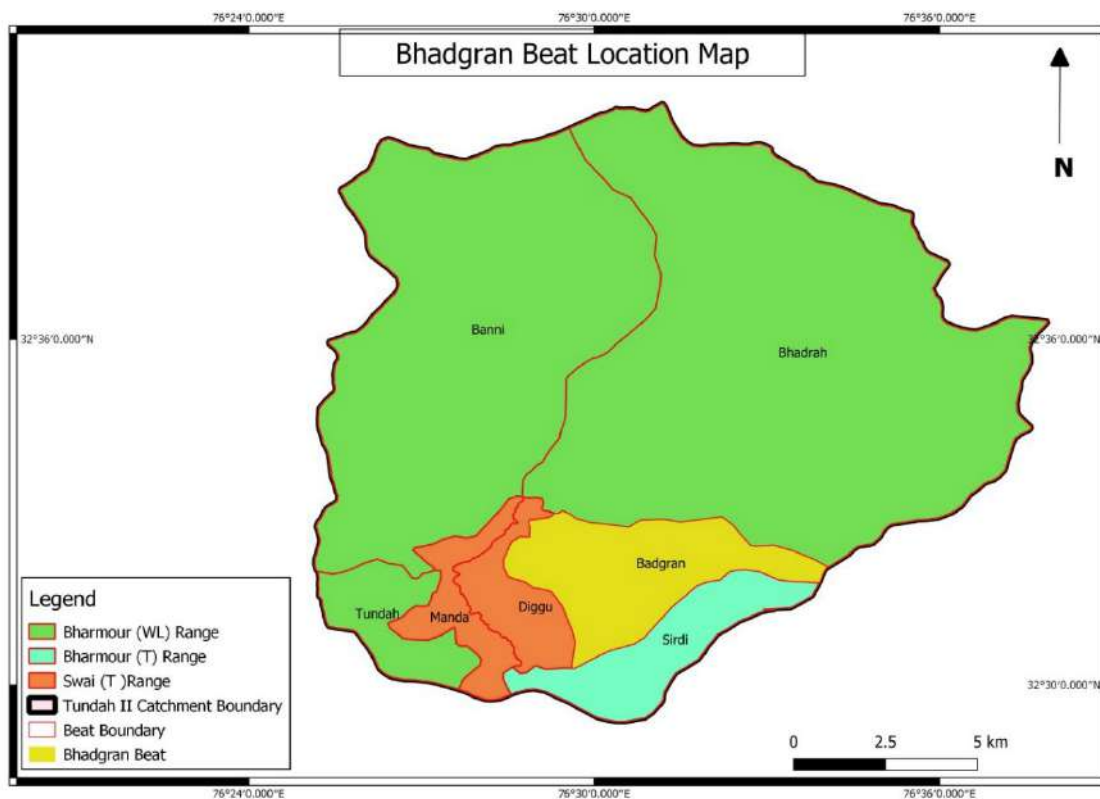
The following maps in respect of Bhadgran Beat are given hereunder:

1. Location Map.
2. MWs Map.
3. Elevation Map.
4. Slope Map.
5. Aspect Map.
6. LULC Map.
7. Drainage Map.

GIS ANALYSIS OF THE BEATS IN BHARMOUR (WL) FOREST RANGE

BHADGRAN BEAT (BHARMOUR(WL) RANGE)

Bhadgran beat comes under Swai (T) range. The total catchment area coming under this beat is 20.18 Sq.km i.e. 201 Hectares. The location map is given below

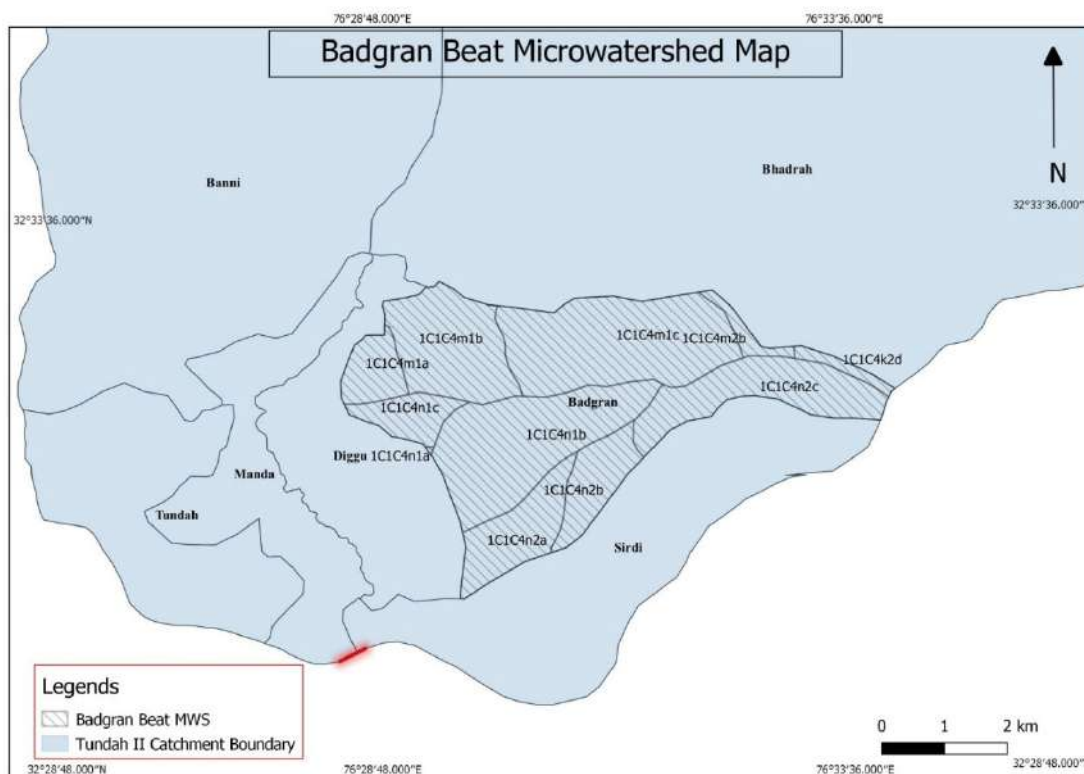


Location Map of Bhadgran Beat

In total the area is divided in to 11 micro-watersheds. The area details of each micro watershed are tabulated below.

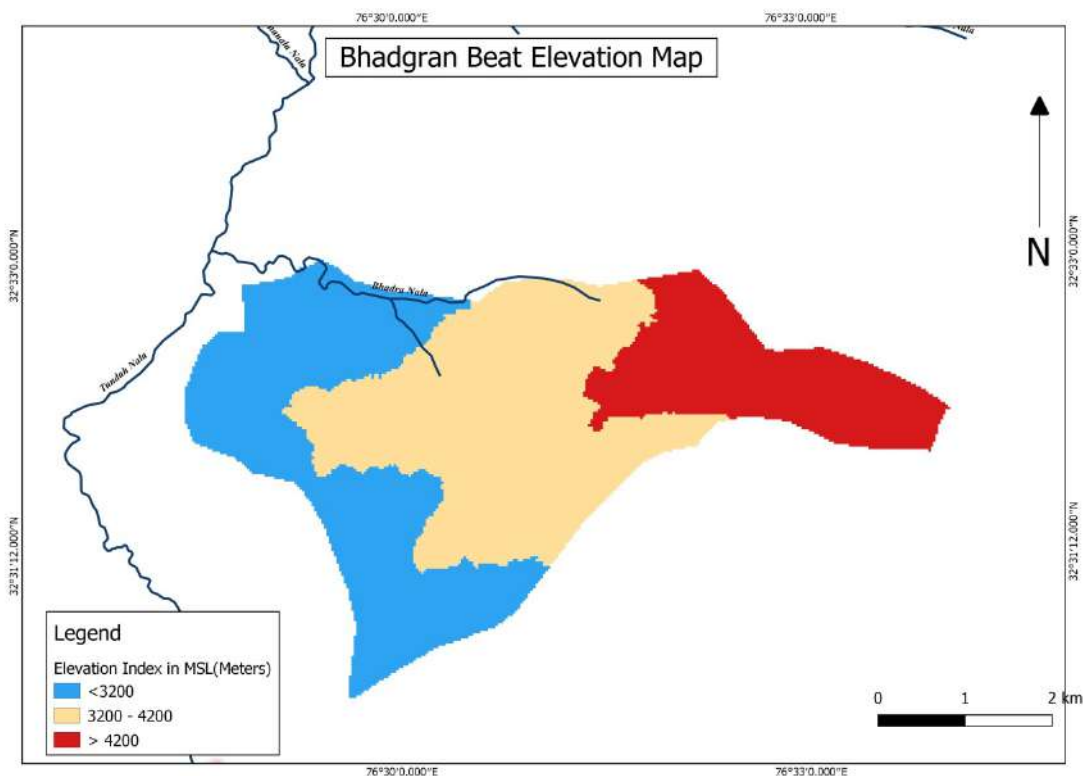
Table: Beat wise micro-watershed list & Area statement				
SI No.	Beat Name	Micro-watershed name	Area in Sq.Km	Ha.
4	Badgran	1C1C4n2a	8.41501	841.501
		1C1C4n2b	4.97731	497.731
		1C1C4k2d	5.71239	571.239
		1C1C4m2b	6.34458	634.458
		1C1C4m1b	4.80380	480.380
		1C1C4m1c	6.804542	680.454
		1C1C4n1b	5.441877	544.187
		1C1C4n1a	4.601411	460.141

		1C1C4n1c	4.169708	416.970
		1C1C4n2c	6.243356	624.335
		1C1C4m1a	3.979554	397.955
Total			61.49355	6149.351



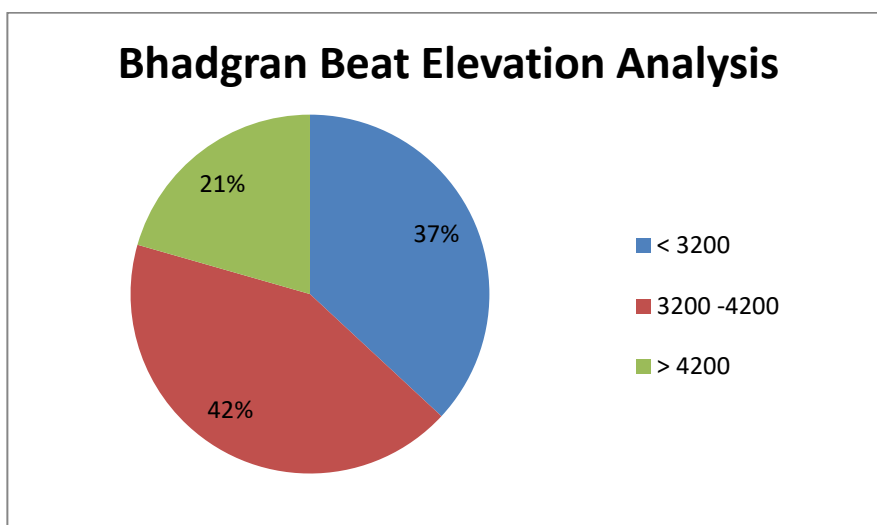
Map : Micro-watershed map of Bhadgran Beat

ELEVATION /DEM-The elevation of this catchment area of Diggu beat is < 3200 to >4200. Table below shows the elevation classification of this Beat. The DEM is shown below.

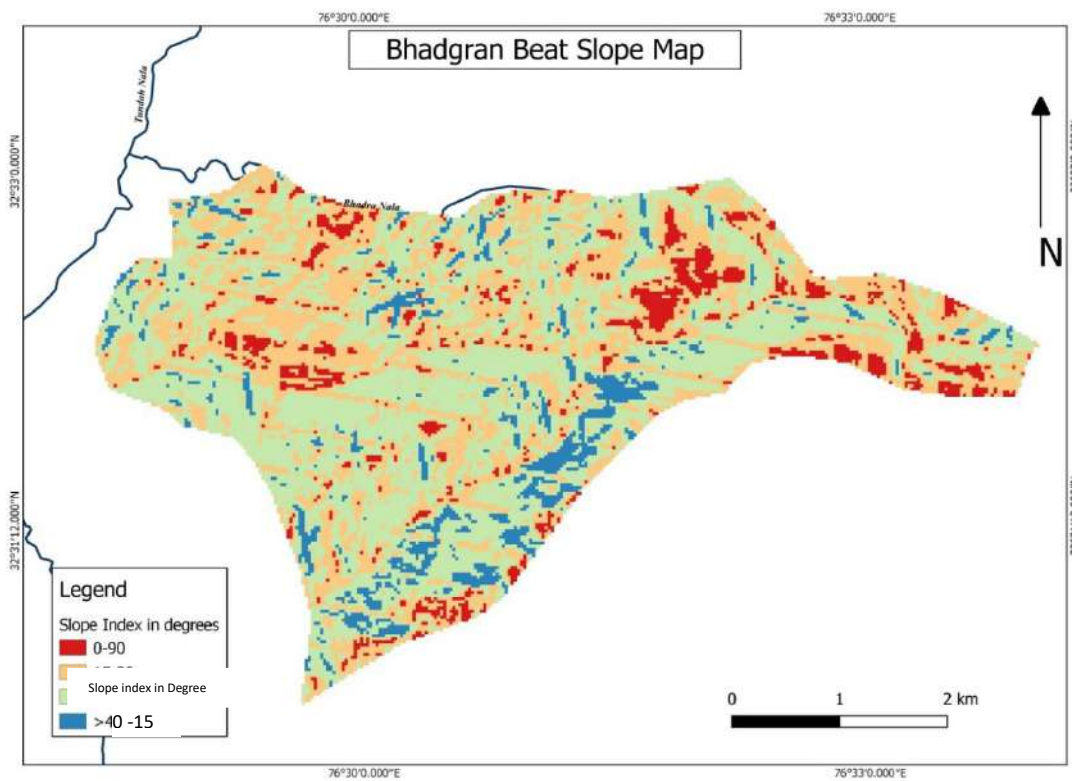


DEM of Bhadgran Beat

Sl.No	Elevation	Sq.Km	Hectares
1	< 3200	7.45	745
2	3200 -4200	8.58	858
3	> 4200	4.15	415

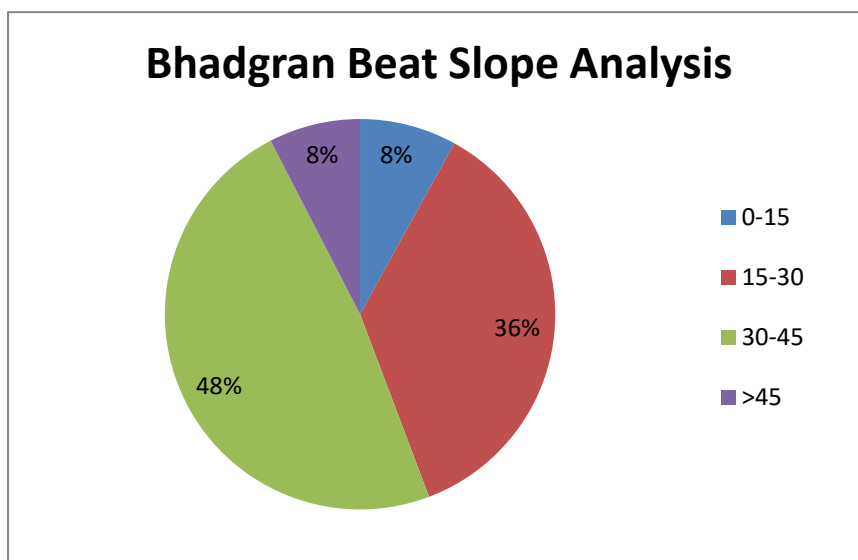


SLOPE: The areas falling under various slope are tabulated below in Table. The slope map is shown below.

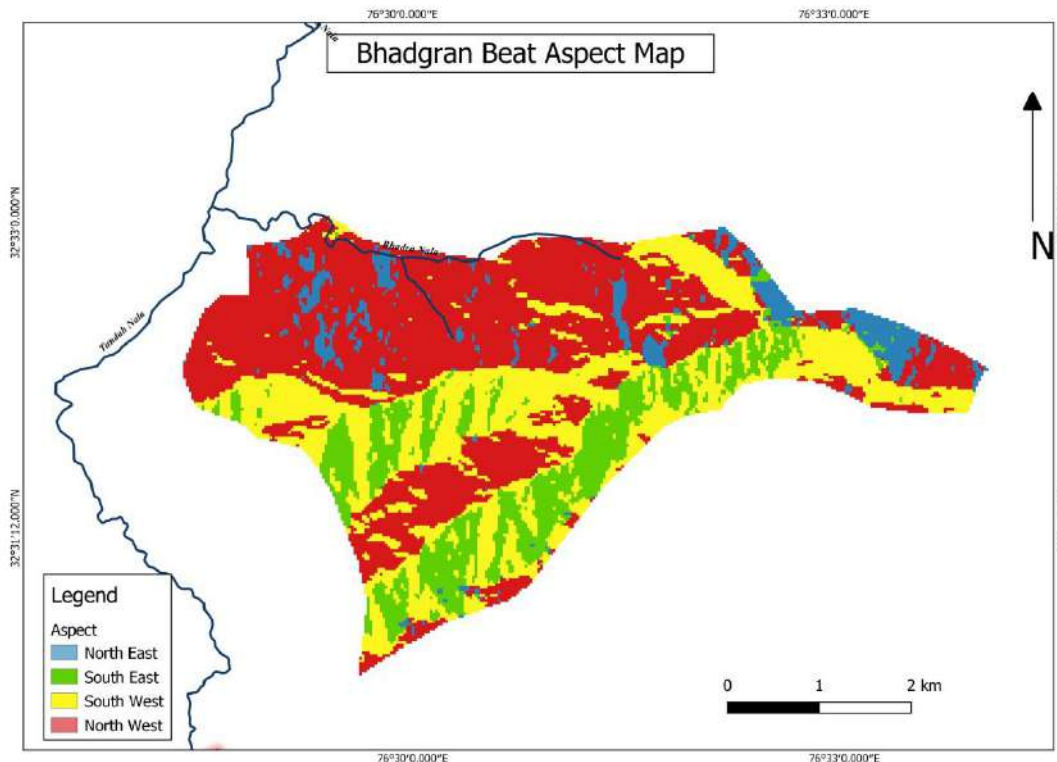


Slope map of Bhadgran Beat

Sl.No	Slope in degrees	Sq.Km	Hectare
1	0-15	1.58	158
2	15-30	7.11	711
3	30-45	9.45	945
4	>45	1.49	149

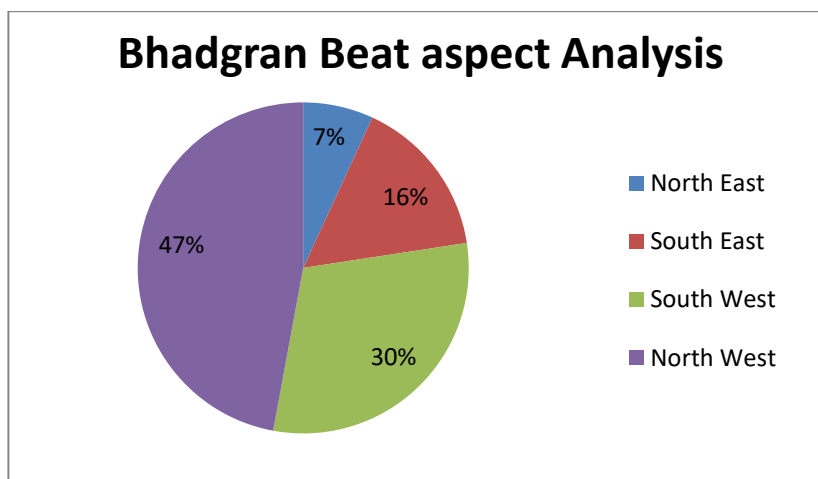


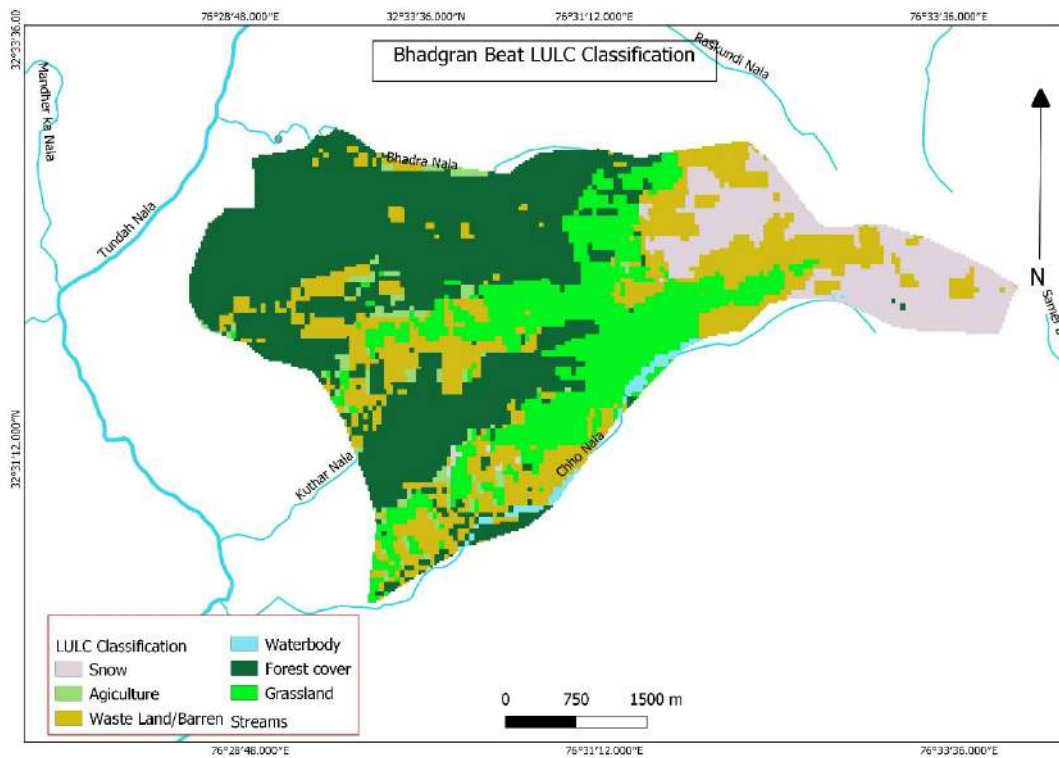
ASPECT ANALYSIS: The following Map and table gives the details of aspect analysis of the beat.



Aspect map of Aspect Beat

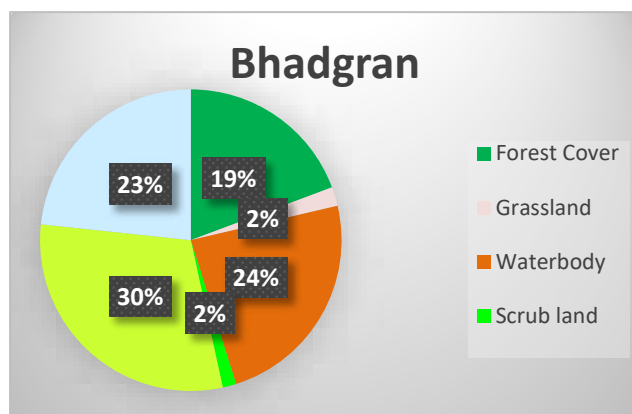
Sl.No	Aspect	Sq.km	Hectares
1	North East	1.35	135
2	South East	3.08	308
3	South West	5.95	595
4	North West	9.24	924



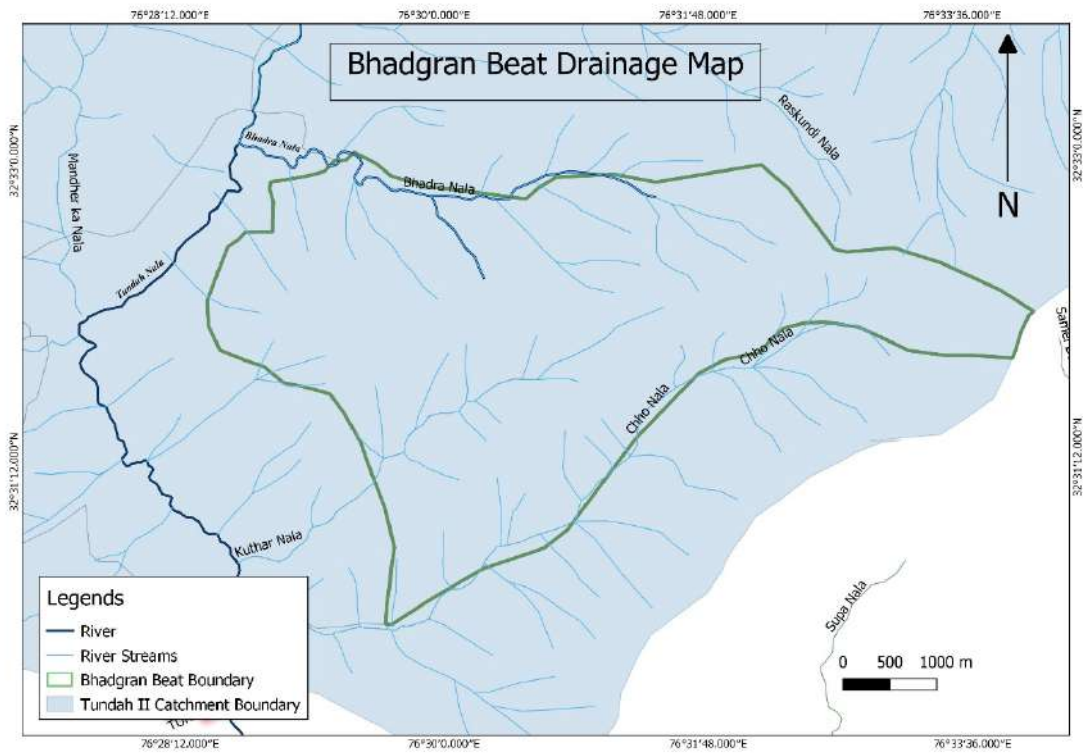


LULC classification of Bhadgran Beat

Sl.No	Class_name	Sq.km	Hectare
1	Forest Cover	16.54	1654
2	Grassland	1.74	174
3	Waterbody	20.41	2041
4	Scrub land	1.24	124
5	Snow	25.79	2579
6	Wasteland/BarreLand	19.98	1998



DRAINAGE: The drainage map of the Beat is shown below.



Drainage Map of Bhadgran Beat

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CONSOLIDATED CAT PLAN FOR CHAMBA WL DIVISION

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CHAPTER 13: CONSOLIDATED PROJECTIONS FOR BHARMOUR (WL) RANGE OF CHAMBA WL DIVISION UNDER TUNDAH II HEP CAT PLAN.							
Sl.No.	Component/ Activity	Unit	Unit Cost (Rs.)	CAT Plan Allocations		%age	Remarks
				Phy.	Fin.		
1	2	3	4	5	6	7	8
I.	AFFORESTATION/HABITAT IMPROVEMENT MEASURES					26366305	
	a. Pasture Management/ Weed Control (5 Weedings in 10 years)		20000	55	1100000		
	b. Water-hole Eco System		400000	4	1600000		
	TOTAL I: AFFORESTATION			59	2700000	10.24	
II.	SOIL & MOISTURE ONSERVATION MEASURES -25%						
	a. Cratewire Checkdams	Nos.		147	6691488		
	b. Water Harvesting Structures.	Nos.	104000	3	312000		
	TOTA:L II SMC MEASURES:			150	7003488	26.56	
III.	RESEARCH, TRAINING & CAPACITY BUILDING-5%		L/s		2100000	7.96	To be controlled at Division
IV.	PAYMENT FOR ENVIRONMENT SERVICES (PES)- 10%		L/s		2271000	8.61	To be controlled at Division
	a. Solar Lights	Nos.	21700	70	1519000		
	b. PVC Water Tanks 2000 Litres	Nos.	14000	18	252000		
	c. Other activities		L/s		500000		
V.	ECO TOURISM ACTIVITIES-1%		L/s		1480000	5.61	To be controlled at Division
VI.	INFRASTRUCTURE & FOREST PROTECTION-10%						To be controlled at Division
	A. RENOVATION OF CONSTRUCTION OF NEW INFRASTRUCTURE-5%						
	i. Patrolling kits to HPFD staff.		20000	4	80000		To be controlled at Division
	ii. Forest Rest House	Nos.	100000	1	100000		To be controlled at Division
	iii. Bridle Path Tundah to Mandha(Mgt Plan 6..3.1 Sl. 2)	KMs	75000	12	900000		To be controlled at Division
	iv. Construction of Foot Bridges	L/s	L/s	3	700000		To be controlled at Division
	VI A: TOTAL:			20	1780000	6.75	
	B. FOREST PROTECTION- 5%						
	i. Creation of Firelines	KMs	35000	17	595000		
	ii. Hiring of Patrolling Vehicle	Nos.	L/s	0	800000		To be controlled at Division
	iii Engagemnt of staff for fire watching/ anti poaching activities.	L/s	0	3	450000		
	iv. Purchase of Drone with Higher Flight Capacity	L/s	575000	1	575000		To be controlled at Division
	VI B: TOTAL			21	2420000	9.18	
	TOTAL VI A+B.			41	4200000	15.93	
VII.	WILDLIFE HABITAT MANAGEMENT-6%:						
	i. EQUIPMENT:						
	a. Binoculars	Nos.	45000	4	180000		To be controlled at Division
	b. Trapping Cameras.	Nos.	60000	4	240000		To be controlled at Division
	e. Tranquilizer Gun	Nos.	450000	1	450000		To be controlled at Division
	Total:			9	870000		To be controlled at Division
	ii. Man Animal Conflicts.	L/s	200000	0	200000		To be controlled at Division
	iii. Special study for WL Habitat Management for Brown Bear to be conducted through WII		L/s	0	0		Provisions made at Division Level under Research Training and Capacity Building.
	iv. Special study on carrying capacity of WL Sanctuary Tundah.		L/s	1	500000		To be controlled at Division
	v.Strengthening of Rescue facility Monkey Sterlization Centre at Chamba/ Bakani			1	1000000		To be controlled at Division
	vi. Construction of bunkers/ shelter place.	Nos.	50000	3	150000		To be controlled at Division
	Total:			14	2720000	10.32	
VIII.	MONITORING & EVALUATION-5%		L/s	0	1494880	5.67	To be controlled at Division
IX.	CONTINGENCIES-10%			0	2396937	9.09	To be controlled at Division
	GRAND TOTAL:				26366305	100.00	
	FUNDS TO BE CONTROLLED FROM DIVISION LEVEL (WL CHAMBA DIVISION)				15617817		
	FUNDS TO BE CONROLLED FROM RANGE/ BEAT LEVEL				10748488		
					26366305		

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**CHAPTER-14. BEATWISE PROJECTIONS FOR
BHARMOUR (T) RANGE OF BHARMOUR (T) DIVISION.**

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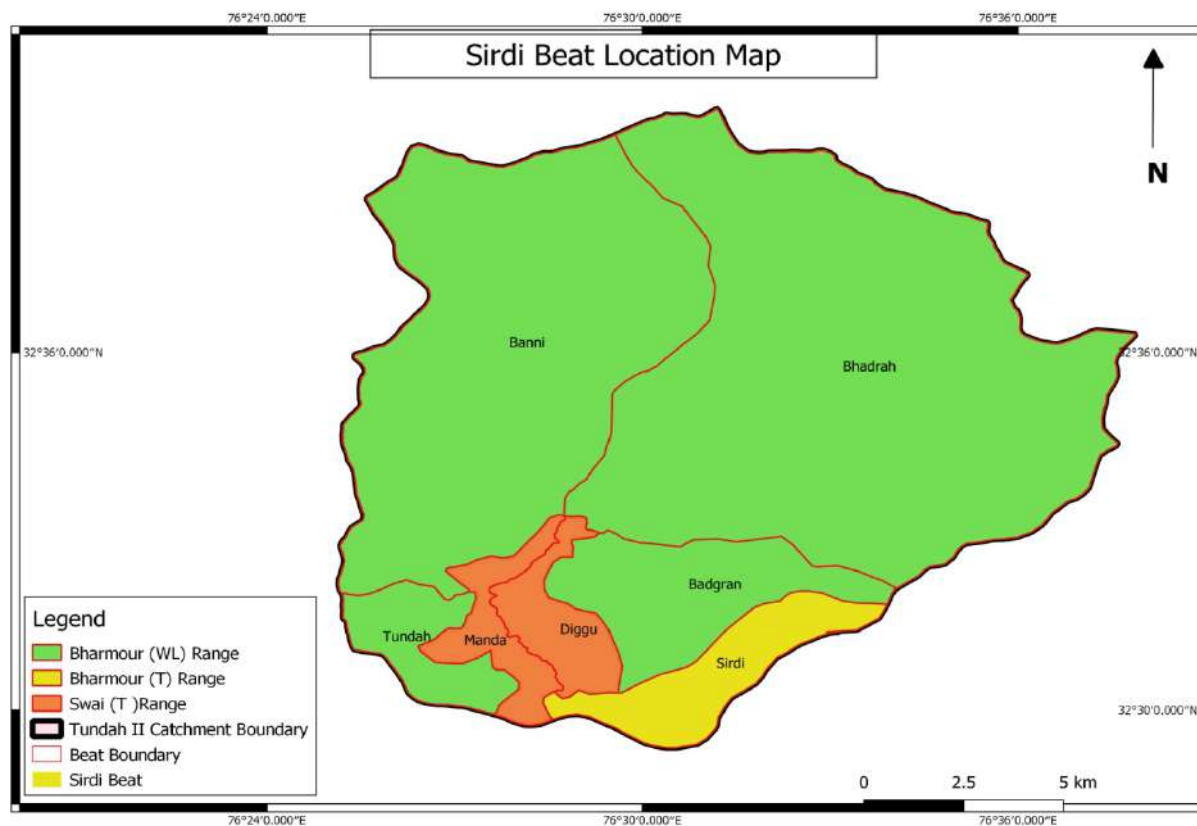
SIRDI BEAT

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GIS ANALYSIS OF THE BEATS IN BHARMOUR (T) FOREST RANGE

1. SIRDI BEAT (BHARMOUR RANGE)

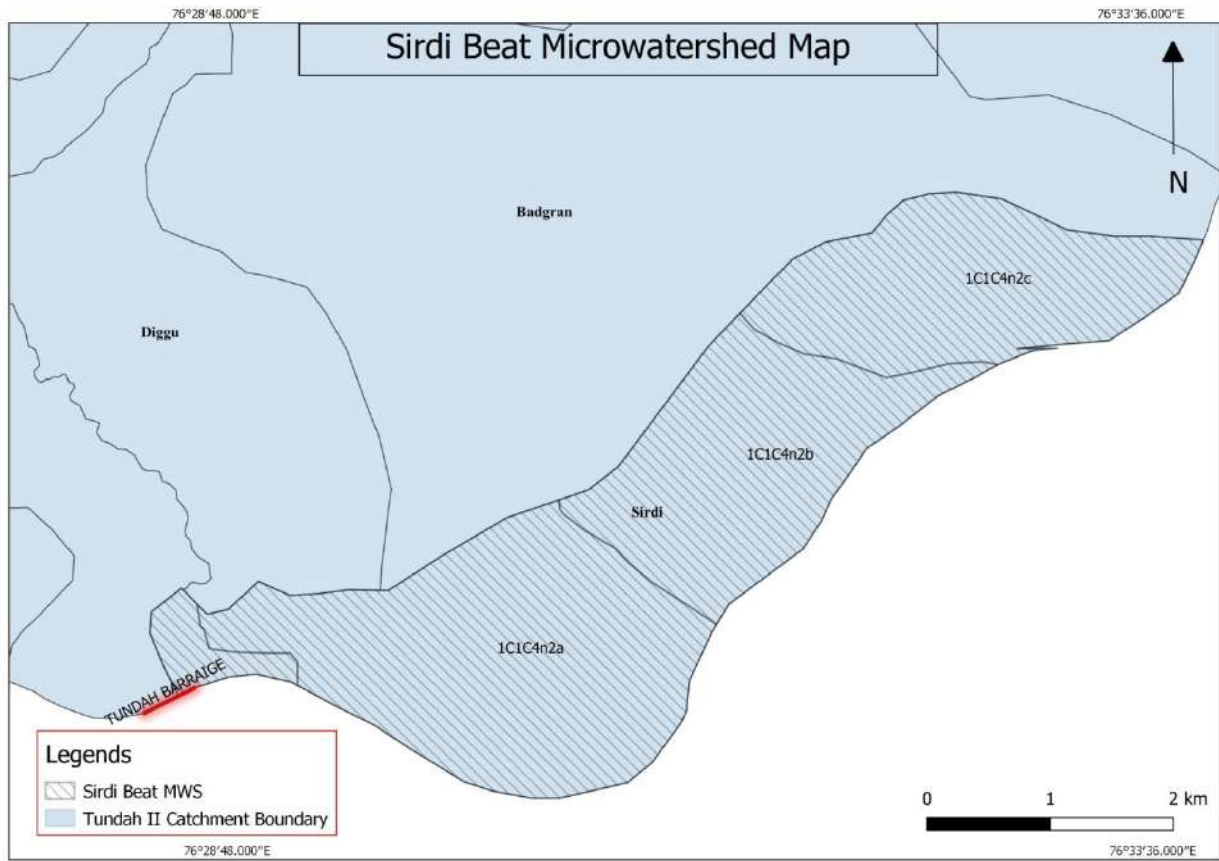
LOCATION: Sirdi beat comes under Bharmour (T) range. The total catchment area coming under this beat is 13.28 Sq.km i.e. 1328 Hectares. funds to the tune of Rs.31,62,736/- are planned for this Beat. The location map is given below



Location Map of Sirdi Beat

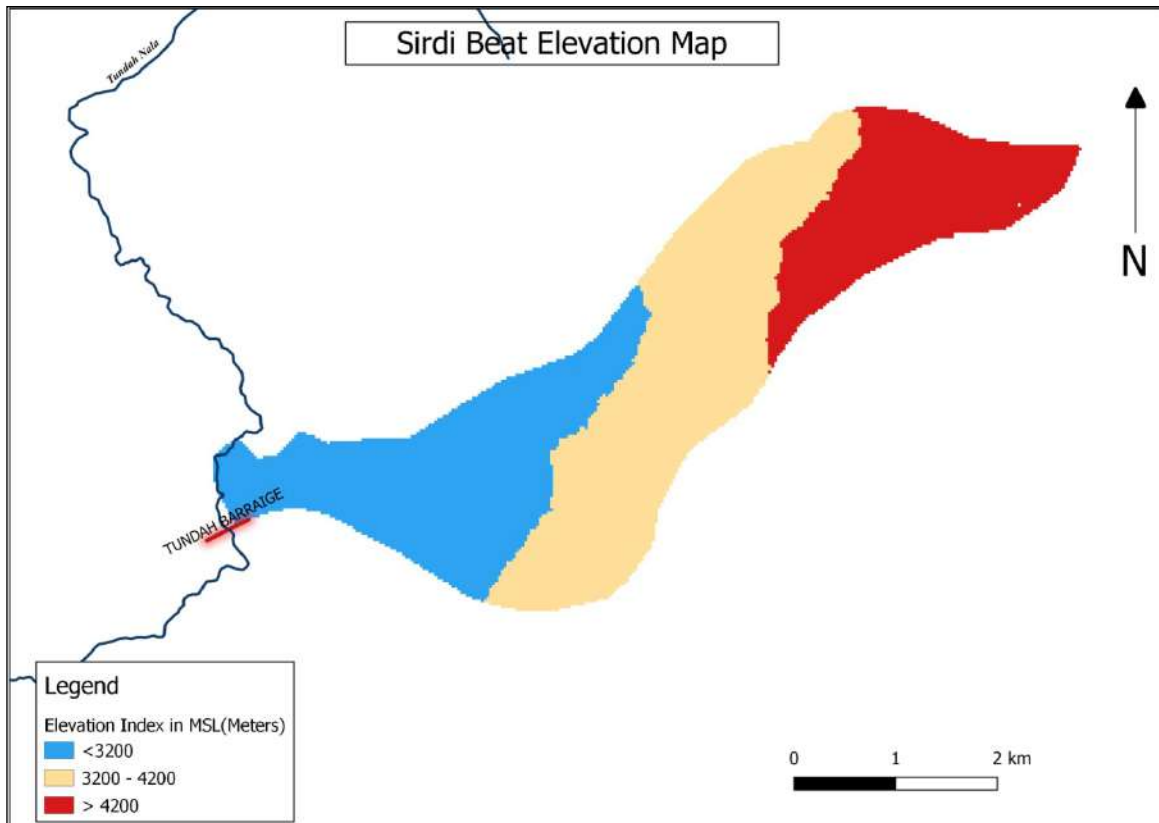
In total the area is divided into four micro-watersheds. The area details of each micro watershed are tabulated below.

Table :Beat wise micro-watershed list & Area statement				
SI No.	Beat Name	Micro-watershed name	Area in Sq.Km	Ha.
1	Sirdi	1C1C4n2c	6.24335	624.335
		1C1C4n2a	8.41501	841.501
		1C1C4n2b	4.97731	497.731
		1C1C4a1c	2.28364	228.364
Total			21.91932	2191.932



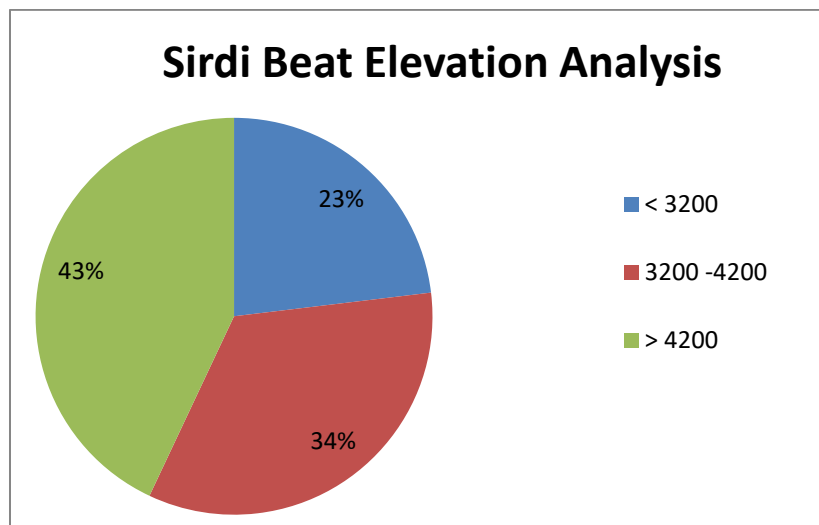
Micro-watershed map of Sirdi Beat

ELEVATION /DEM-The elevation of this catchment area of Sirdi beat varies from <3200 to 4200. Table below shows the elevation classification of this Beat. The DEM is shown below.

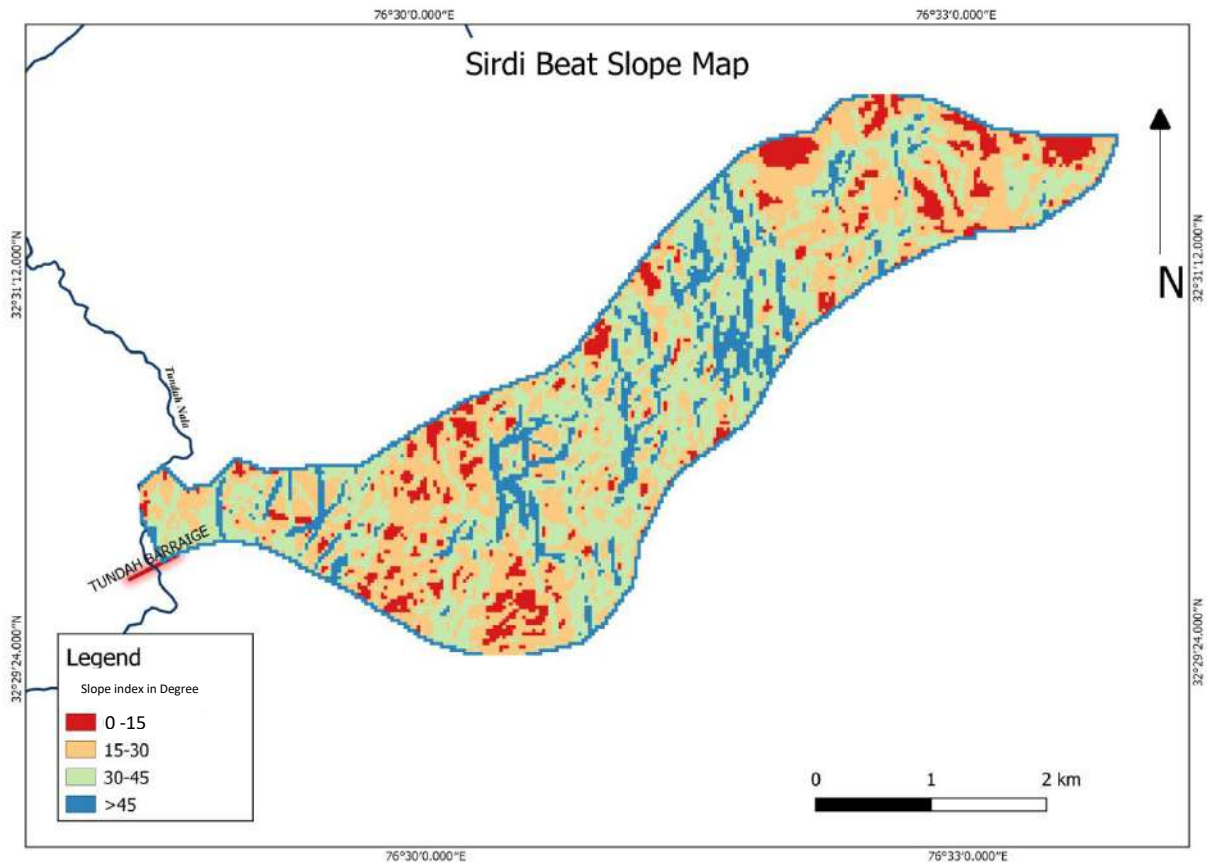


DEM of Sirdi Beat

Sl.No	Elevation	Sq.Km	Hectares
1	< 3200	3.07	306.68
2	3200 -4200	4.50	450.24
3	> 4200	5.71	570.85
Total		13.28	1327.77

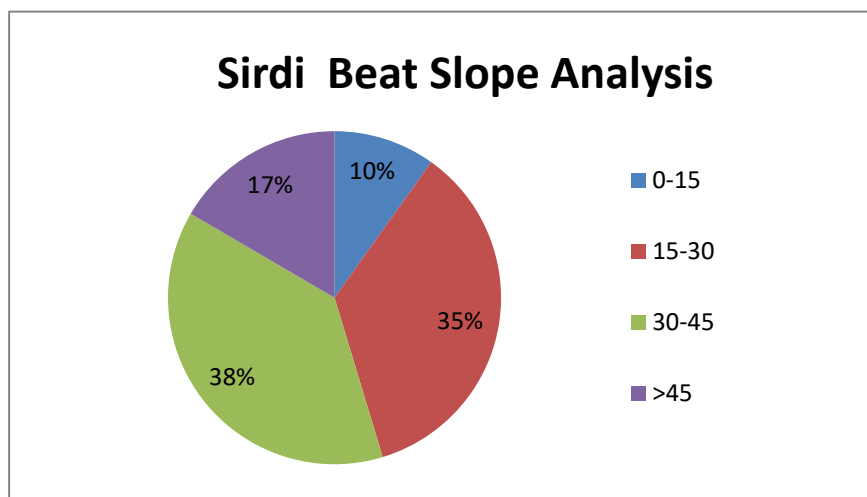


SLOPE:The areas falling under various slope are tabulated below in Table. The slope map is shown below.

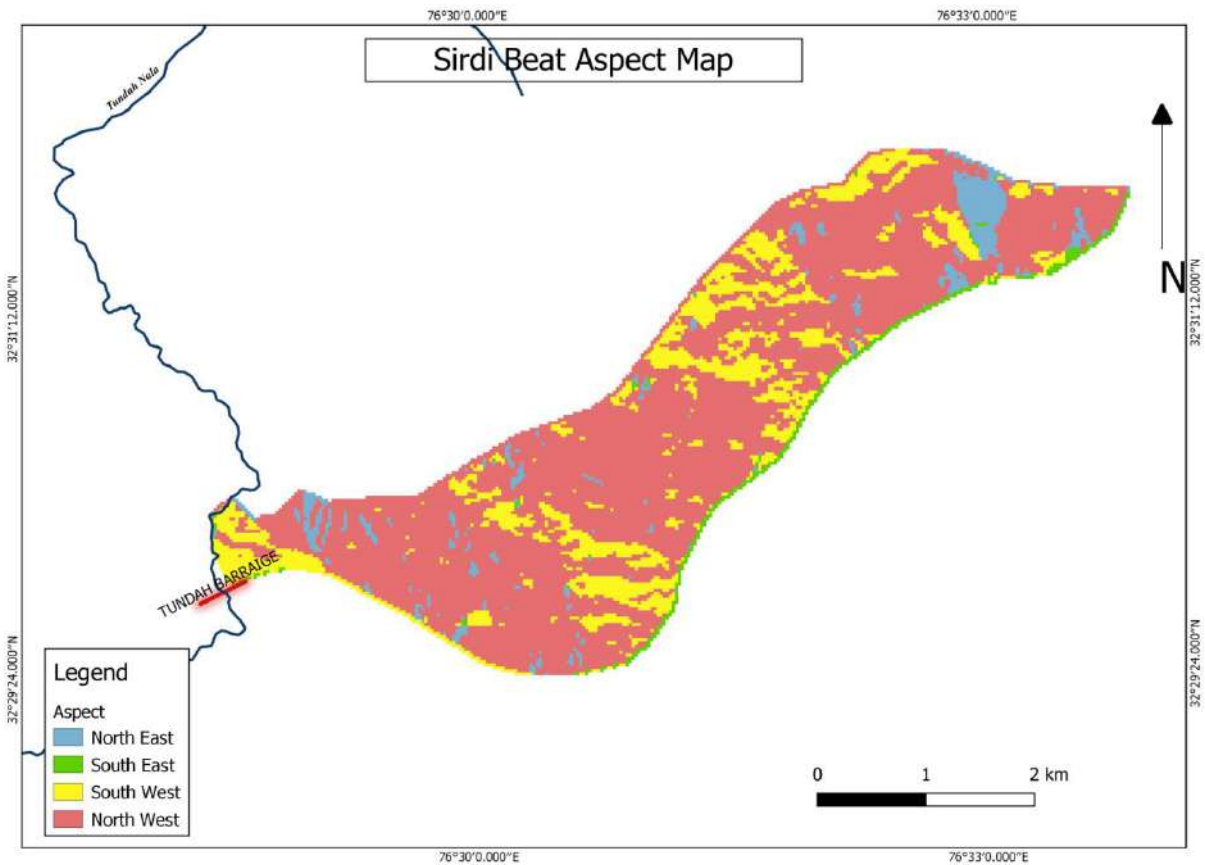


Slope map of Sirdi Beat

Sl.No	Slope in degrees	Area(Sq.Km)	Area (Hectare)
1	0-15	1.31	131.00
2	15-30	4.71	470.89
3	30-45	5.06	506.74
4	>45	2.20	220.27
Total		13.28	1328.90

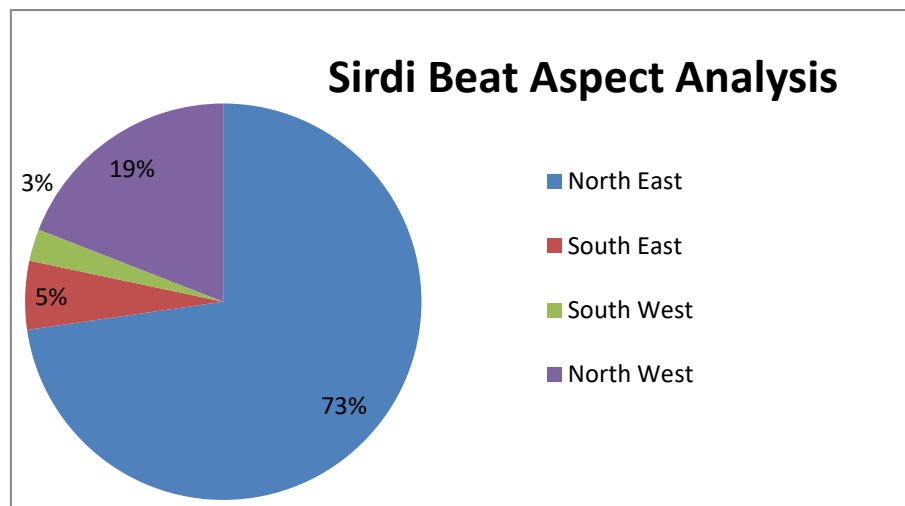


ASPECT ANALYSIS: The following Map and table gives the details of aspect analysis of the beat.

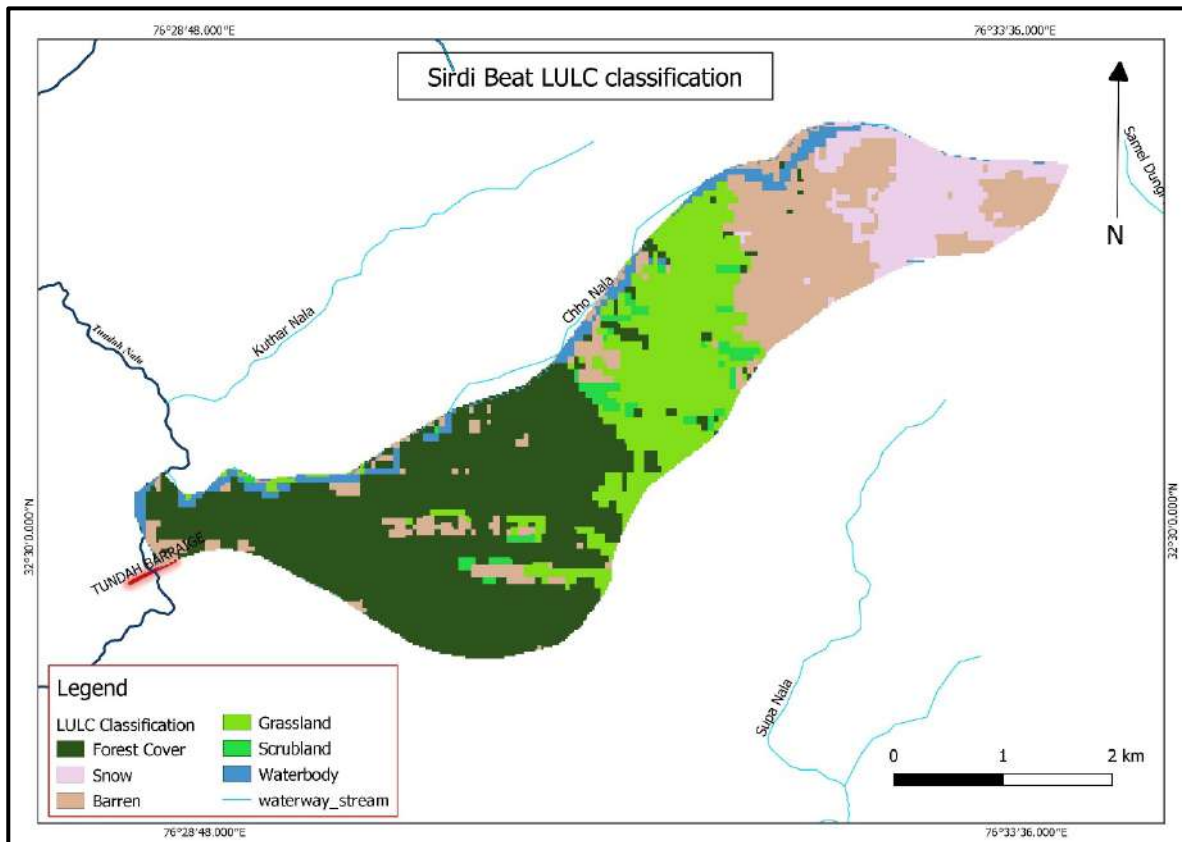


Aspect map of Sirdi Beat

Sl.No	Aspect	Sq.km	Hectares
1	North East	9.66	965.76
2	South East	0.74	74.33
3	South West	0.35	34.55
4	North West	2.53	253.28
Total		13.28	1327.92

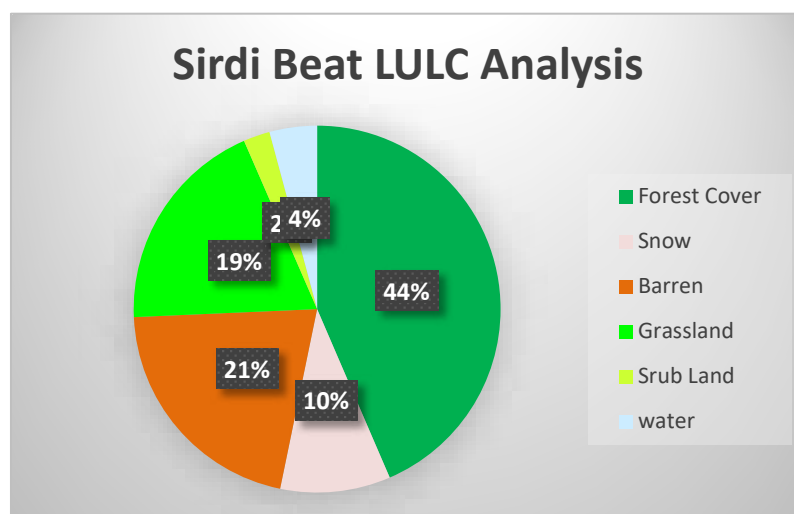


LULC (Land use Land Cover) -The classified land use map of the catchment area, considered for the study, is shown in below map. Land use classification is specifically done for Forest cover, agricultural, barren land, snow or permafrost, and water bodies as shown in Table below.

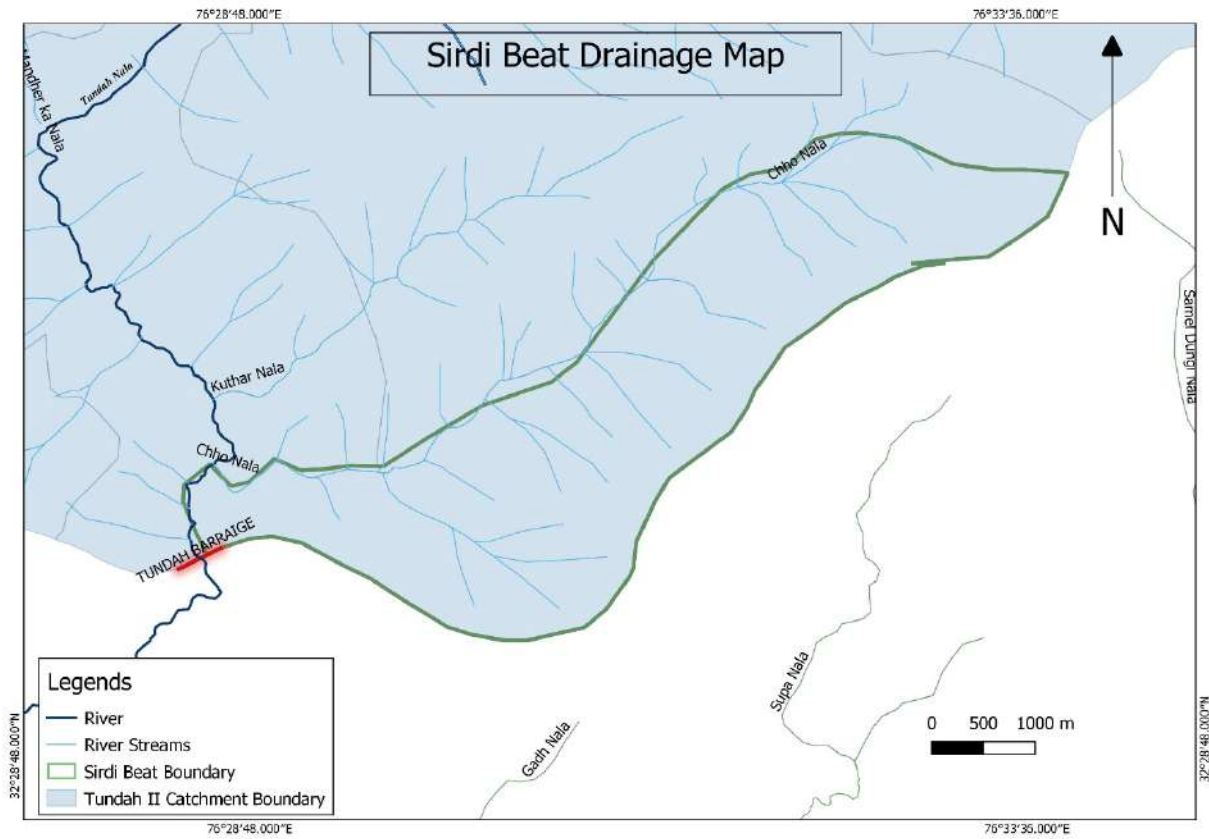


LULC classification of Sirdi Beat

SI.NO	Class_Name	Area Sq.km	Area Hectare
1	Forest Cover	5.7764	577.64
2	Snow	1.2888	128.88
3	Barren	2.796	279.6
4	Grassland	2.5448	254.48
5	Srub Land	0.3104	31.04
6	water	0.5552	55.52



DRAINAGE: The drainage map of the Beat is shown below.



Map: Drainage map of Sirdi Beat

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**CHAPTER 15-CONSOLIDATED PROJECTIONS FOR SWAI('T')
RANGE OF BHARMOUR ('T') DIVISION**

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CONSOLIDATED PLAN FOR SWAI(TERRITORIAL) RANGE UNDER TUNDAH II HEP CAT PLAN.						
Sl.No.	Component/ Activity	Unit	Unit Cost	CAT Plan Allocations		
				Phy.	Fin.	
1	2	3	4	5	6	7
I.	AFFORESTATION-25%					
	a. Site Specific Plantation for Habitat Improvement of Chir Pheasants.			575000	2	1150000
	Total I:AFFORESTATION				2	1150000
II.	SOIL & MOISTURE ONSERVATION MEASURES-25%					
	a. Cratewire Checkdams					
	i. 2x2.5M	No.	13680		13	355680
	ii. 3x4 M	No.	23024		2	138144
	Total:				15	493824
	b. Water Harvesting Structures.	No.	104000		0	0
	II. TOTAL SMC MEASURES:				15	493824
III.	RESEARCH, TRAINING & CAPACITY BUILDING 5%			Controlled at Division		0
IV.	PAYMENT FOR ENVIRONMENT SERVICES (PES-10%)			Controlled at Division		0
V.	ECO TOURISM ACTIVITIES- 1%:			Controlled at Division		0
VI.	INFRASTRUCTURE & FOREST PROTECTION-10%					
	A. RENOVATION & CONSTRUCTION OF NEW INFRASTRUCTURE-5%					
	i. Patrolling kits to HPFD staff.	Nos.		Controlled at Division		0
	VI A: TOTAL:				0	0
	B. FOREST PROTECTION- 5%					
	i. Creation of Firelines	KMs	35000		3	105000
	VI B: TOTAL				3	105000
	TOTAL VI A+B.				3	105000
VII.	WILDLIFE HABITAT MANAGEMENT-6%:					
	Habitat Improvement for Chir Pheasants.			Controlled at Division		0
	Total VII.					0
VIII.	MONITORING & EVALUATION-5%			Controlled at Division		0
IX.	CONTINGENCIES- 10%			Controlled at Division		0
	GRAND TOTAL:					1748824

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MANDHA BEAT

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CAT ACTION PLAN FOR MANDHA BEAT

Mandha Beat falls in Bharmour (T) Range of Bharmour (T) Forest Division. It has an area of 9.87 Sq. Km which is 3.7% of the project catchment of Tundah HEP II. The Beat consists of 10 MWs. The beat is bounded by Bhadgran in the East, Diggu in the West Banni to the North and Sirdi in the South. Mandha Beat has got 3 villages with human population of 231 and livestock population of 1115 as under:

Name of Village	Human Population	Livestock Population
Phat	75	235
Chulad.	74	470
Sulo.	82	410
Total:3	231	1115

The following ten Nallas, are flowing in this Beat:

i.Choi Nalla
ii.Banni Nalla
iii.Mandha Nalla
iv.Fatani Nalla
v.Goo Nalla
vi.Ghold Nalla
vii.Ghulard Nalla
viii.Tundah Nalla
ix.Shinda Nalla
x.Tarla Nalla

Funds to The Tune of Rs.14,77,444-/ are planned for this Beat under the Cat Plan.

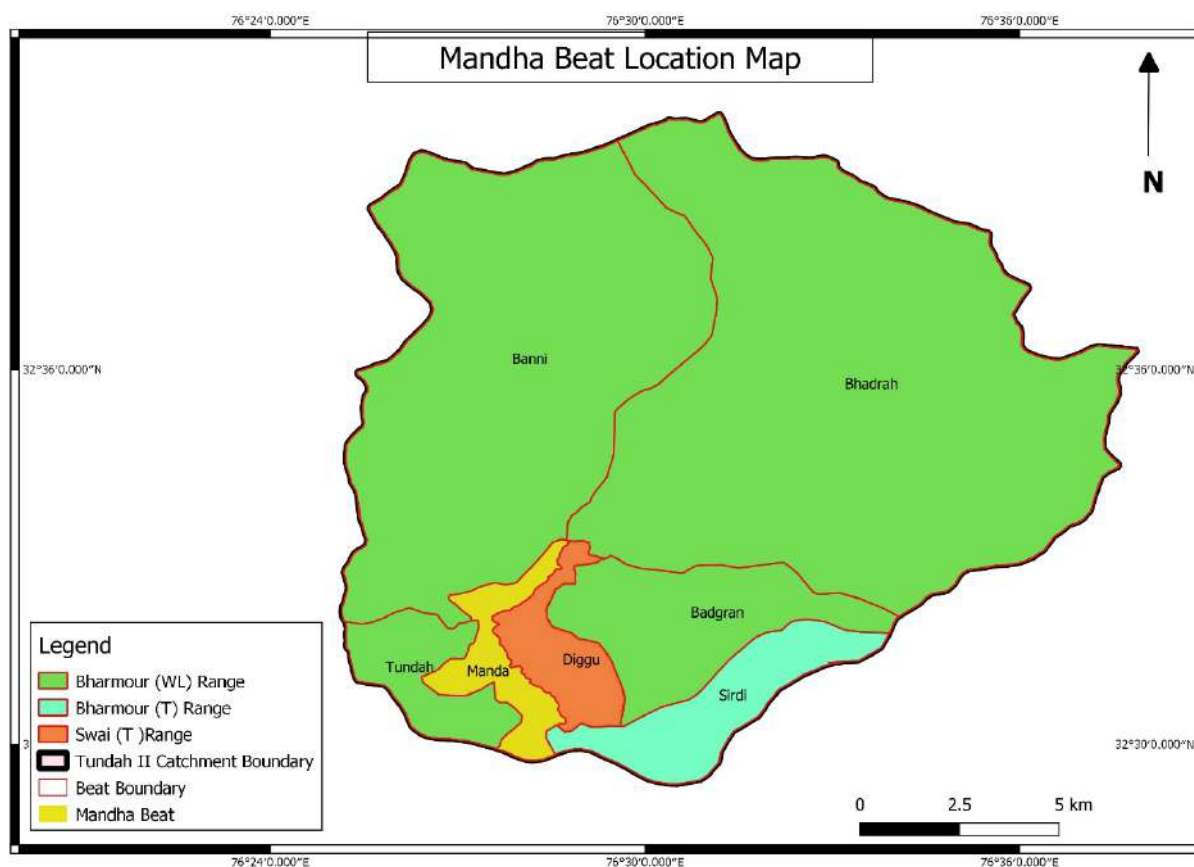
The following maps in respect of Mandha Beat are given hereunder:

1. Location Map.
2. MWs Map.
3. Elevation Map.
4. Slope Map.
5. Aspect Map.
6. LULC Map.
7. Drainage Map.

GIS ANALYSIS OF THE BEATS IN SWAI (T) FOREST RANGE

1. MANDHA BEAT (BHARMOUR RANGE)

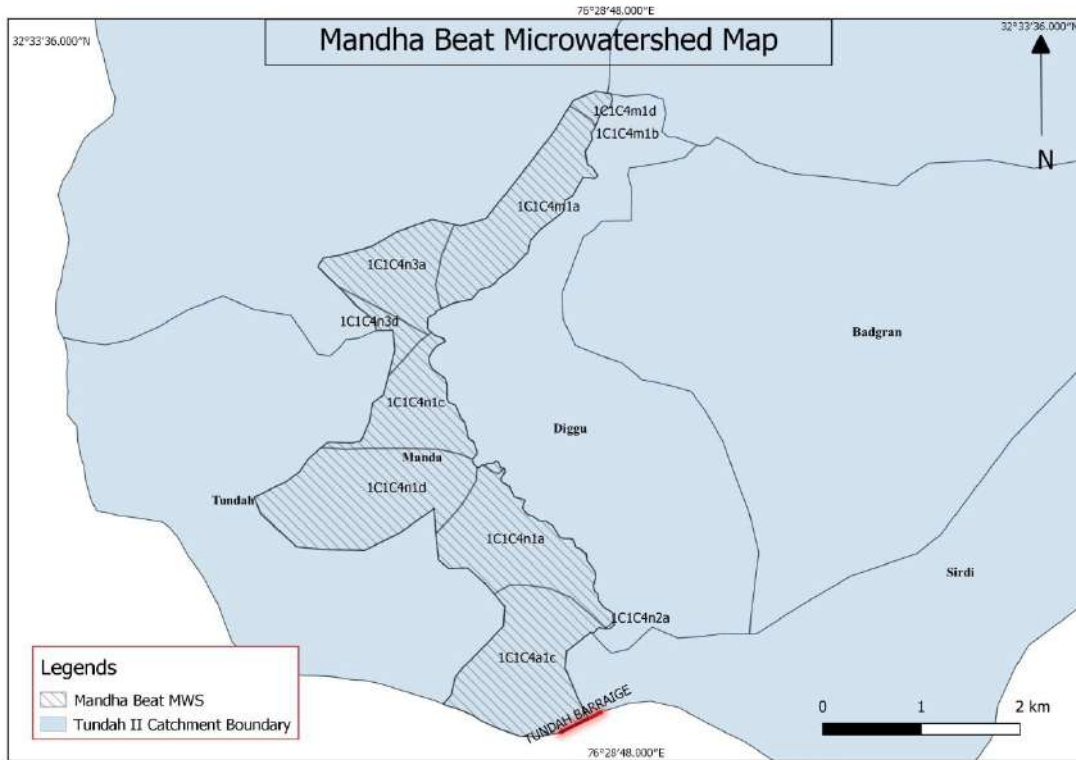
Mandha beat comes under Swai (T) range. The total catchment area coming under this beat is 7.51 Sq.km i.e 751 Hectares. The location map is given below



Location Map of Mandha Beat

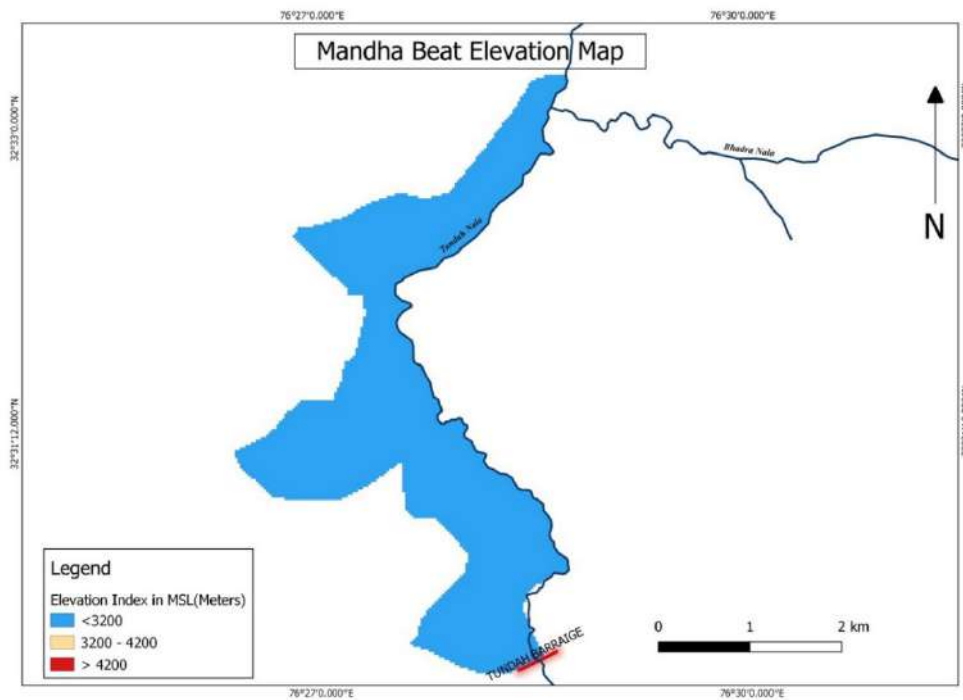
In total the area is divided into 10 micro-watersheds. The area details of each micro watershed are tabulated below.

Table: Beat wise micro-watershed list & Area statement				
SI No.	Beat Name	Micro-watershed name	Area in Sq.Km	Ha.
1	Mandha	1C1C4n1d	3.85182	385.182
2		1C1C4n1a	4.60141	460.141
3		1C1C4m1d	7.15476	715.476
4		1C1C4m1a	3.97955	397.955
5		1C1C4m1b	4.80380	480.380
6		1C1C4n3d	4.94337	494.337
7		1C1C4a1c	2.28364	228.364
8		1C1C4n1c	4.16970	416.970
9		1C1C4n2a	8.41501	841.501
10		1C1C4n3a	6.25013	625.013
Total			50.45321	5045.319



Micro-watershed map of Mandha Beat

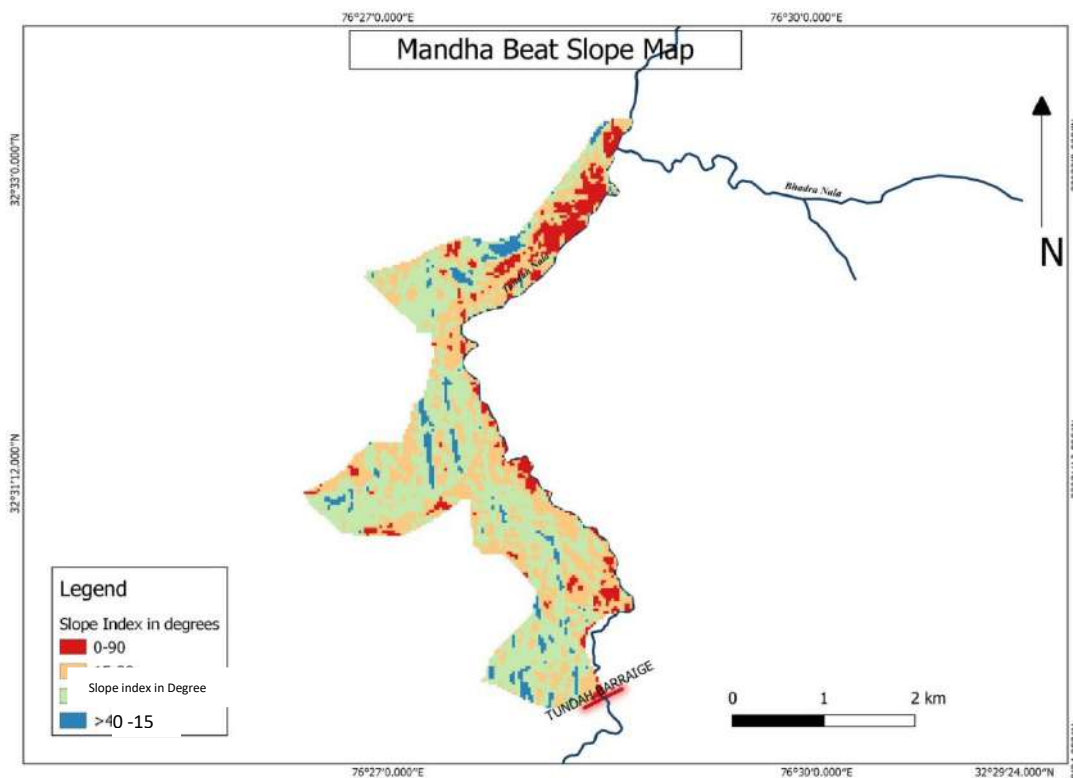
ELEVATION /DEM-The elevation of this catchment area of Mandha beat is below 3200. Table below shows the elevation classification of this Beat. The DEM is shown below.



DEM of Mandha Beat

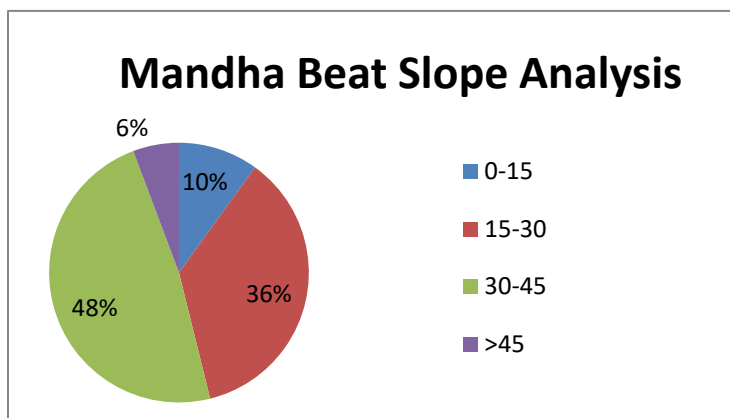
Sl.No	Elevation	Sq.Km	Hectares
1	< 3200	7.51	751

SLOPE: The areas falling under various slope are tabulated below in Table. The slope map is shown below.

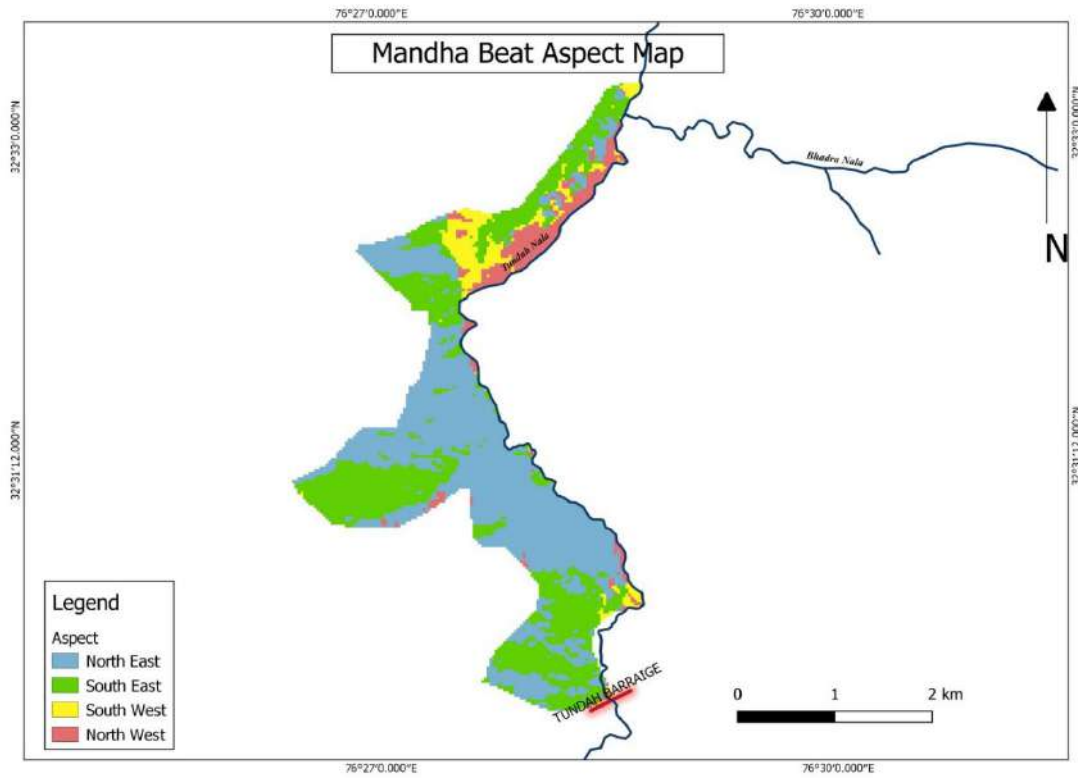


Slope map of Mandha Beat

Sl.No	Slope in degrees	Sq.Km	Hectare
1	0-15	0.70	69.51
2	15-30	2.52	252.30
3	30-45	3.36	335.75
4	>45	0.40	39.93
Total		6.97	697

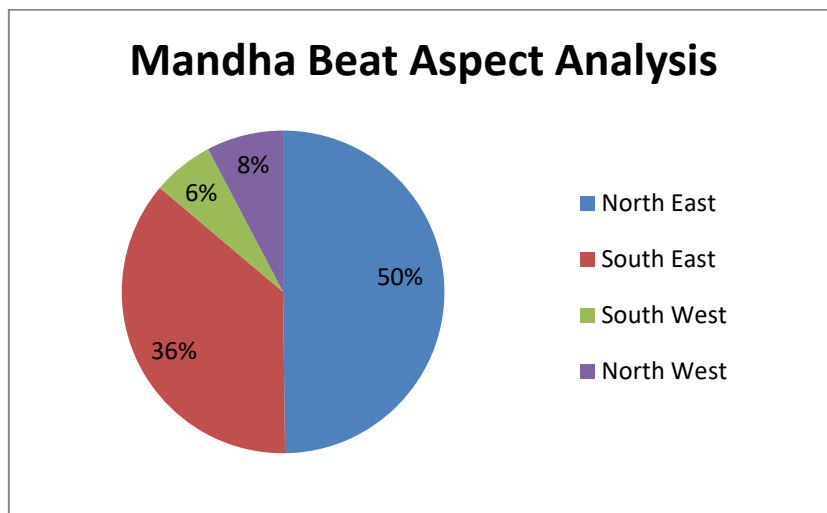


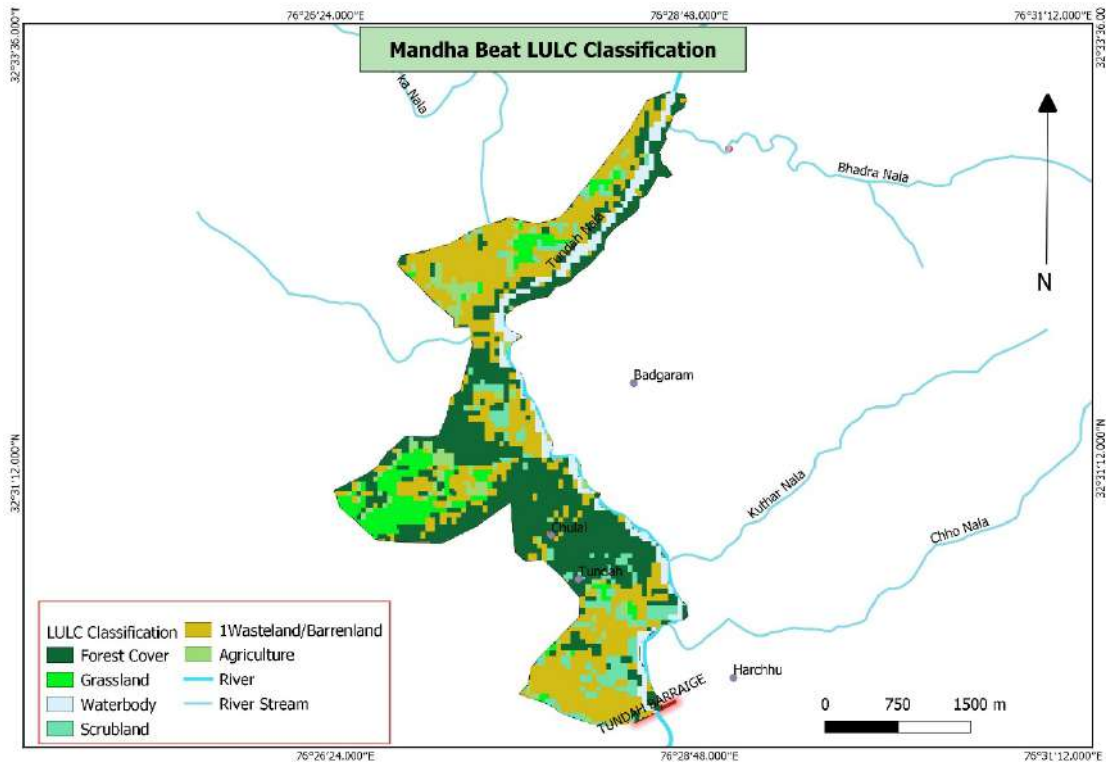
ASPECT ANALYSIS: The following Map and table gives the details of aspect analysis of the beat.



Aspect map of Mandha Beat

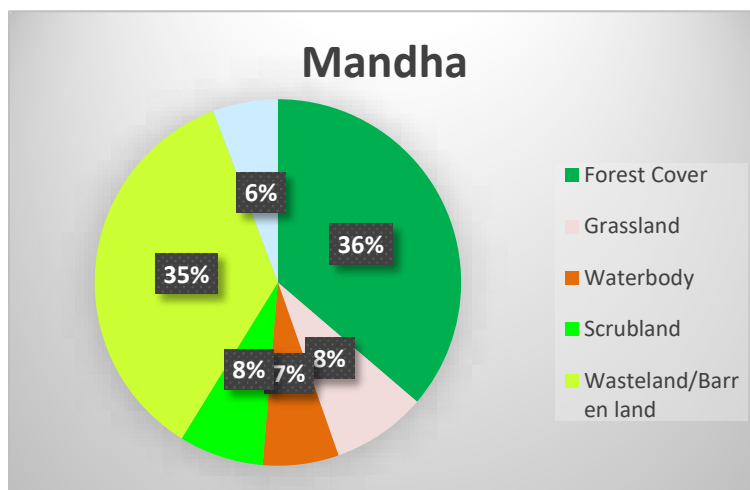
Sl.No	Aspect	Sq.km	Hectares
1	North East	3.47	347
2	South East	2.54	254
3	South West	0.43	43
4	North West	0.54	54



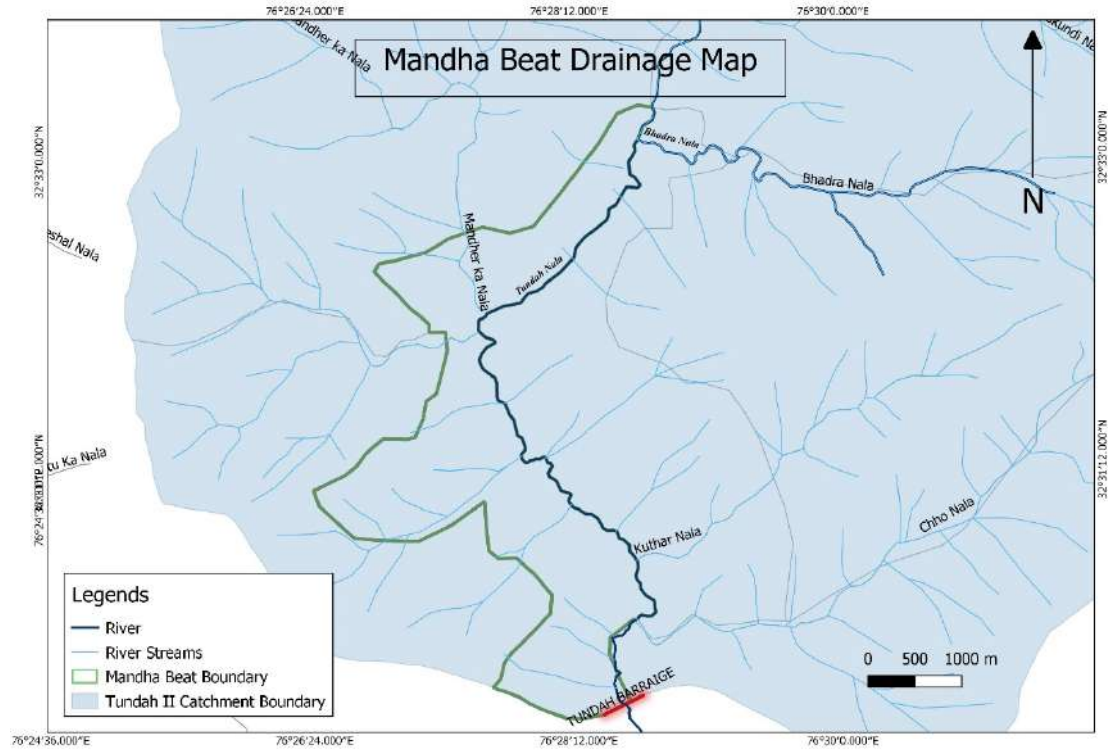


LULC classification of Mandha Beat

Sl.No	Class_name	Sq.km	Hectare
1	Forest Cover	2.72	272
2	Grassland	0.63	63
3	Waterbody	0.50	50
4	Scrubland	0.56	56
5	Wasteland/Barren land	2.66	266
6	Agriculture	0.43	43



DRAINAGE: The drainage map of the Beat is shown below.



Drainage map of Mandha Beat

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DIGGU BEAT

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CAT ACTION PLAN FOR DIGGU BEAT

Diggu Beat falls in Bharmour (T) Range of Bharmour (T) Forest Division. It has an area of 5.69 Sq. Km which is 2.13 % of the project catchment of Tundah HEP II. The Beat consists of 4 MWs. The beat is bounded by Mandha in the East, Tundah in the West, Banni and Bhadrah to the North and Sirdi in the South. Diggu Beat has got 6 villages with human population of 1306 and livestock population of 2215 as under:

Name of Village	Human Population	Livestock Population
Badgran.	450	480
Khanbag.	176	175
Kuthal.	375	470
Ladogi.	50	315
Morthu.	65	390
Pallani	190	385
Total :6	1306	2215

The following seven Nallas, are flowing in this Beat:

- i. Kuthar Nalla
- ii. Palani Nalla
- iii. Badgram Nalla
- iv. Kaluni Nalla
- v. Marthu Nalla
- vi. Forka Nalla
- vii. Sua Nalla

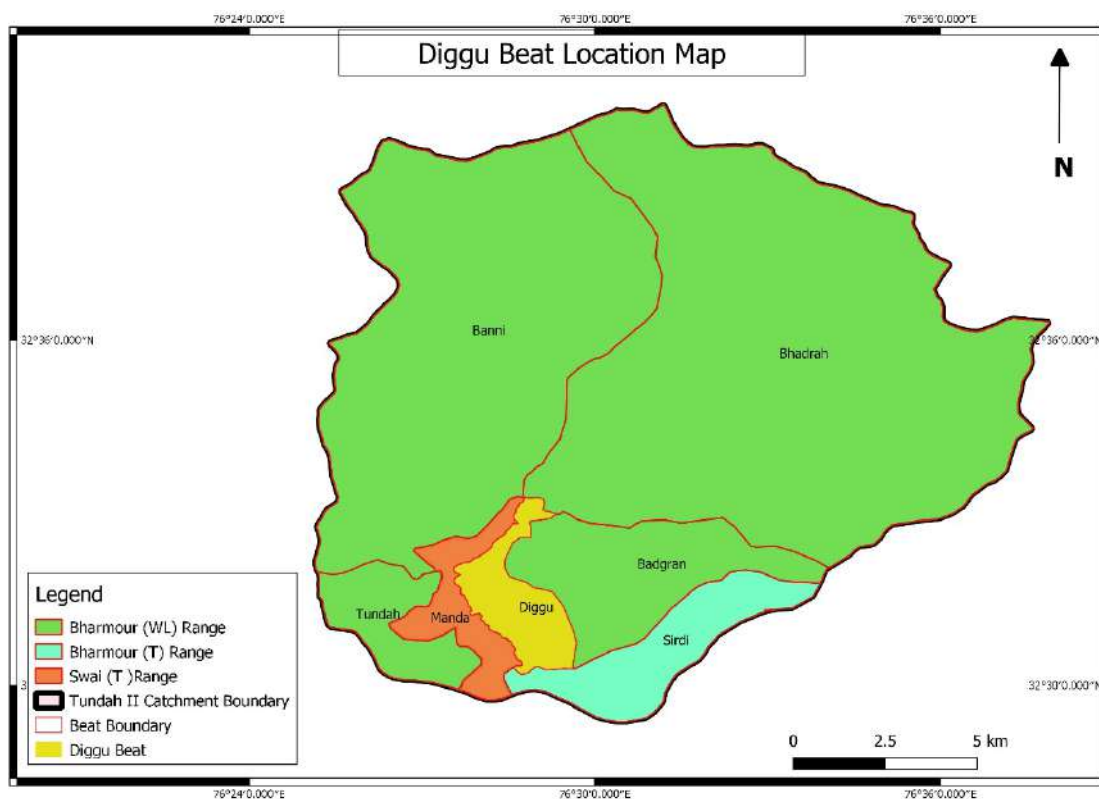
Funds to tune of Rs.2,71,380/- are Planned for This Beat under The cat plan. The following maps in respect of Diggu Beat are given hereunder:

1. Location Map.
2. MWs Map.
3. Elevation Map.
4. Slope Map.
5. Aspect Map.
6. LULC Map.
7. Drainage Map.

GIS ANALYSIS OF THE BEATS IN BHARMOUR (T) FOREST RANGE

DIGGU BEAT (BHARMOUR RANGE)

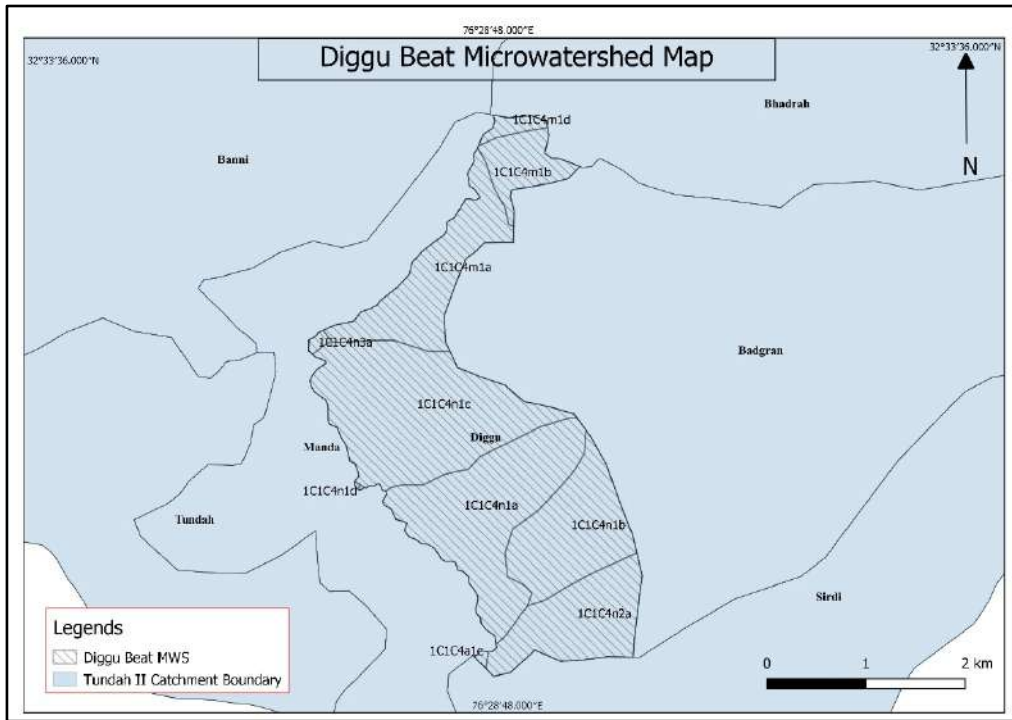
Diggu beat comes under Swai (T) range. The total catchment area coming under this beat is 8.05 Sq.km i.e 805 Hectares. The location map is given below



Location Map of Diggu Bea

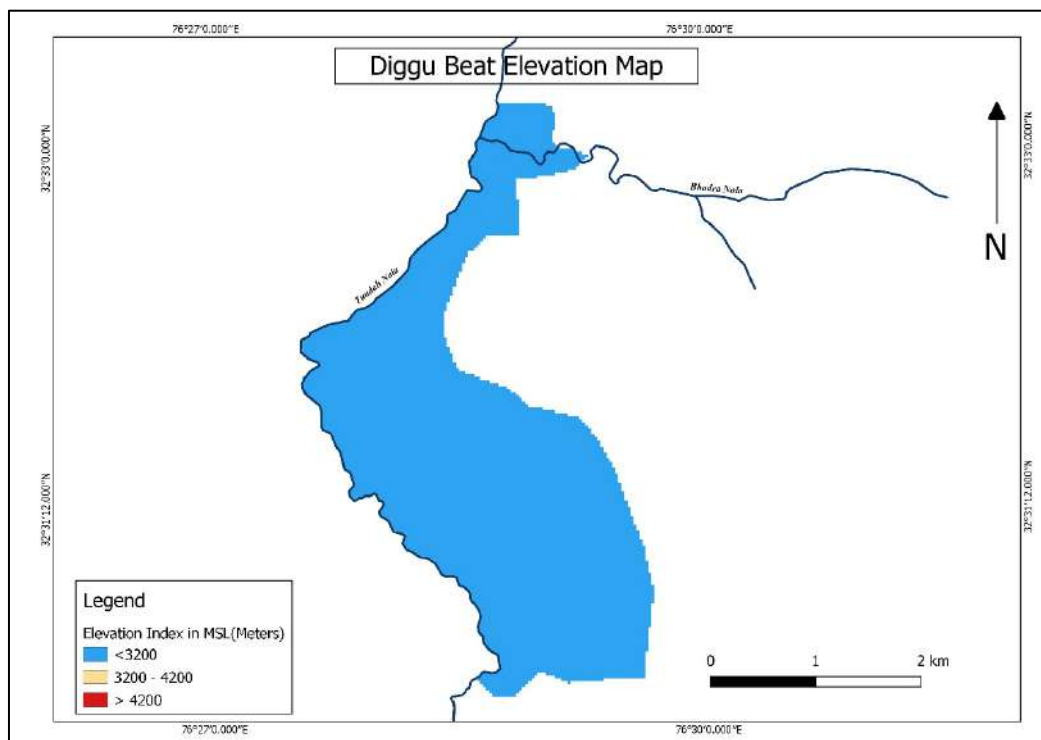
In total the area is divided in to 10 micro-watersheds. The area details of each micro watershed are tabulated below.

TABLE :BEATWISE MICRO-WATERSHEDS AND AREA STATEMENT				
Sl.No.	Beat name	Micro-water shed Name	Area in Sq. KM	Area in Ha.
1	Diggu	ICIC4m1d	7.15	715
2		ICIC4m1b	4.80	480
3		ICIC4m1a	3.98	398
4		ICIC4n3a	6.25	625
5		ICIC4n1c	4.17	417
6		ICIC4n1d	3.85	385
7		ICIC4n1a	4.60	460
8		ICIC4n1b	5.44	544
9		ICIC4n2a	8.42	842
10		ICIC4a1e
		10	48.66	4866



Micro-watershed map of Diggu Beat

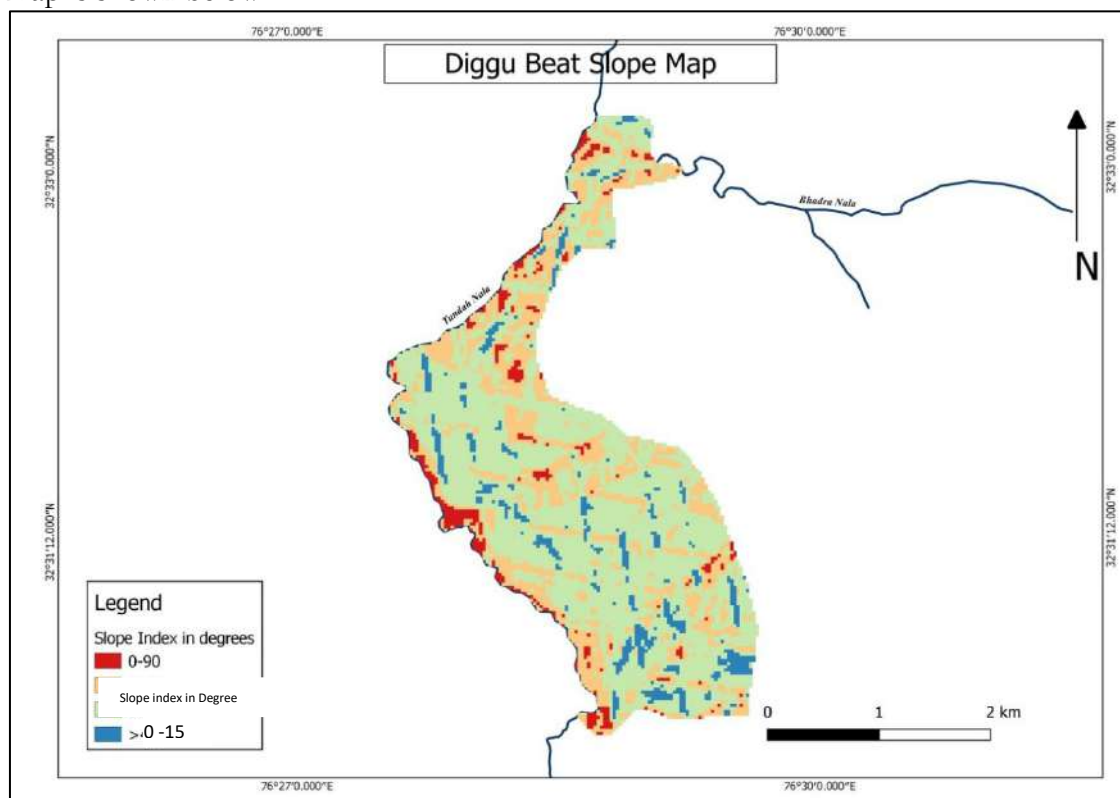
ELEVATION /DEM-The elevation of this catchment area of Diggu beat is below 3200. Table below shows the elevation classification of this Beat. The DEM is shown below.



DEM of Diggu Beat

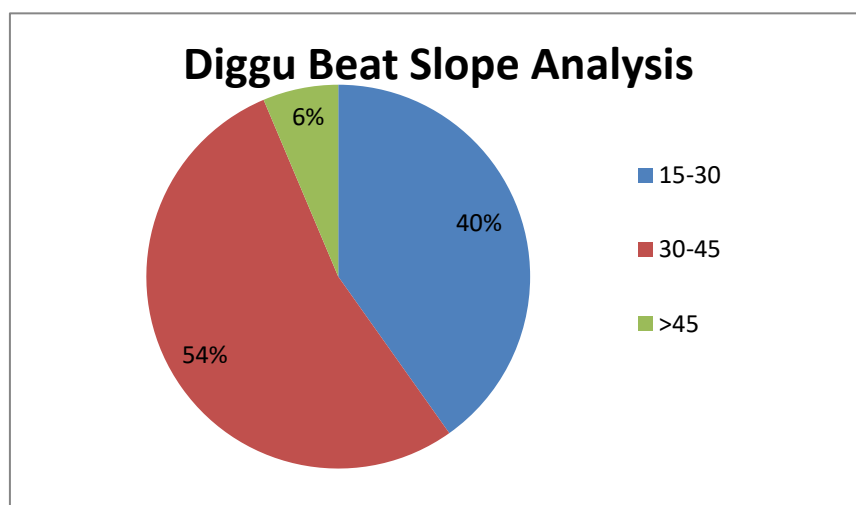
Sl.No	Elevation	Sq.Km	Hectares
1	< 3200	8.05	805

SLOPE: The areas falling under various slope are tabulated below in Table. The slope map is shown below.

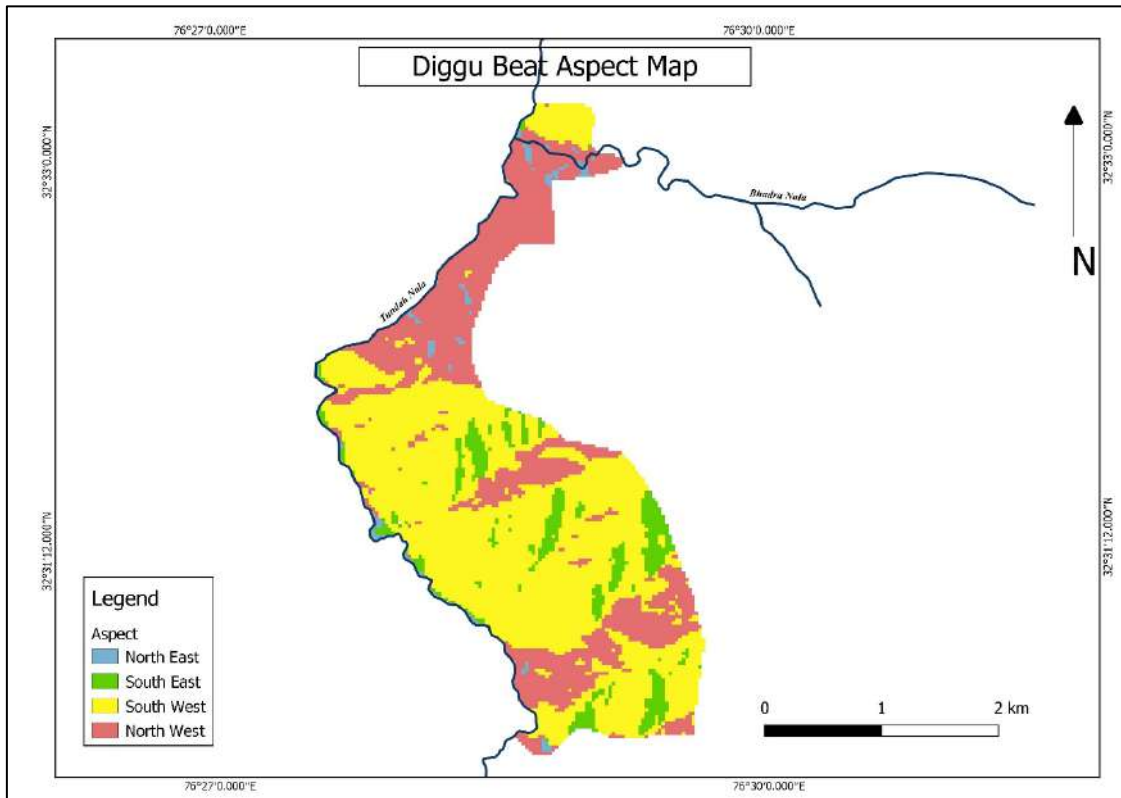


Slope map of Diggu Beat

Sl.No	Slope in degrees	Sq.Km	Hectare
1	15-30	2.52	252
2	30-45	3.36	336
3	>45	0.40	40

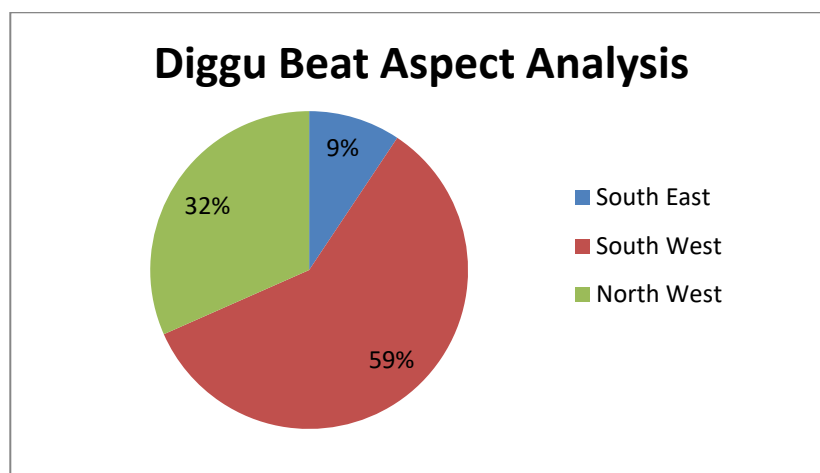


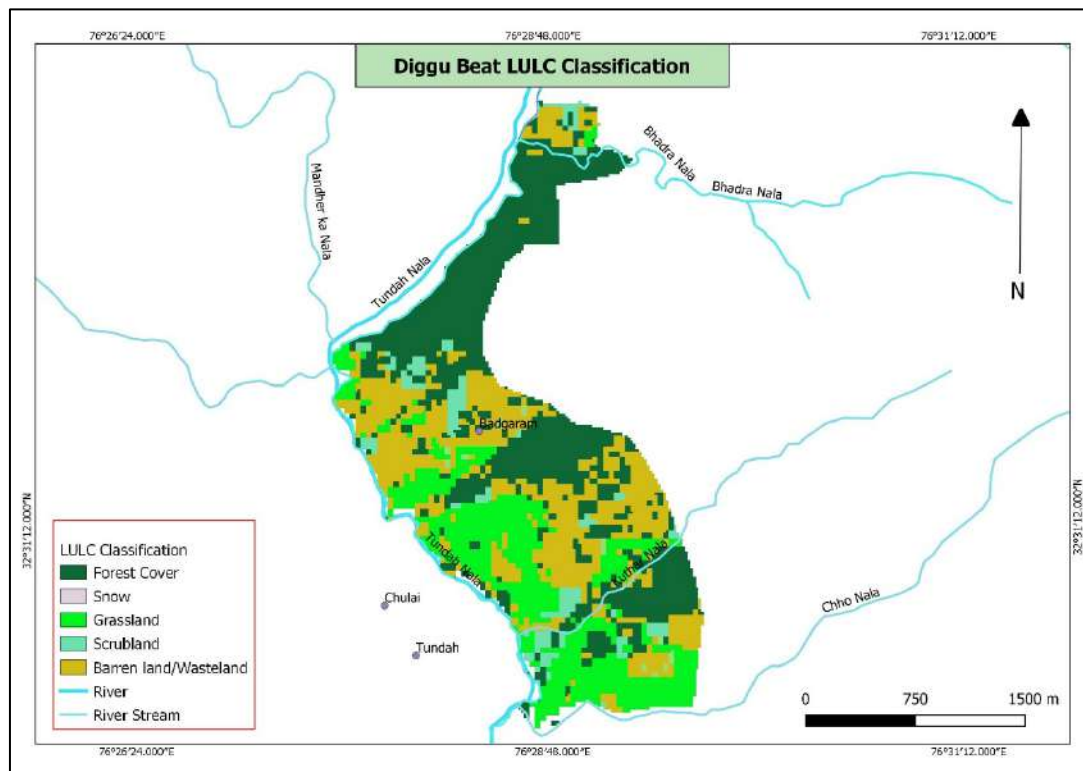
ASPECT ANALYSIS: The following Map and table gives the details of aspect analysis of the beat.



Aspect map of Diggu Beat

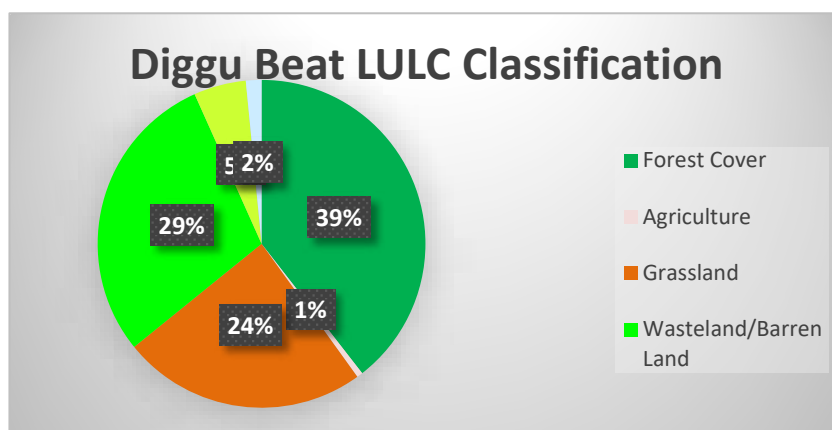
Sl.No	Aspect	Sq.km	Hectares
1	South East	0.72	72
2	South West	4.55	455
3	North West	2.44	244



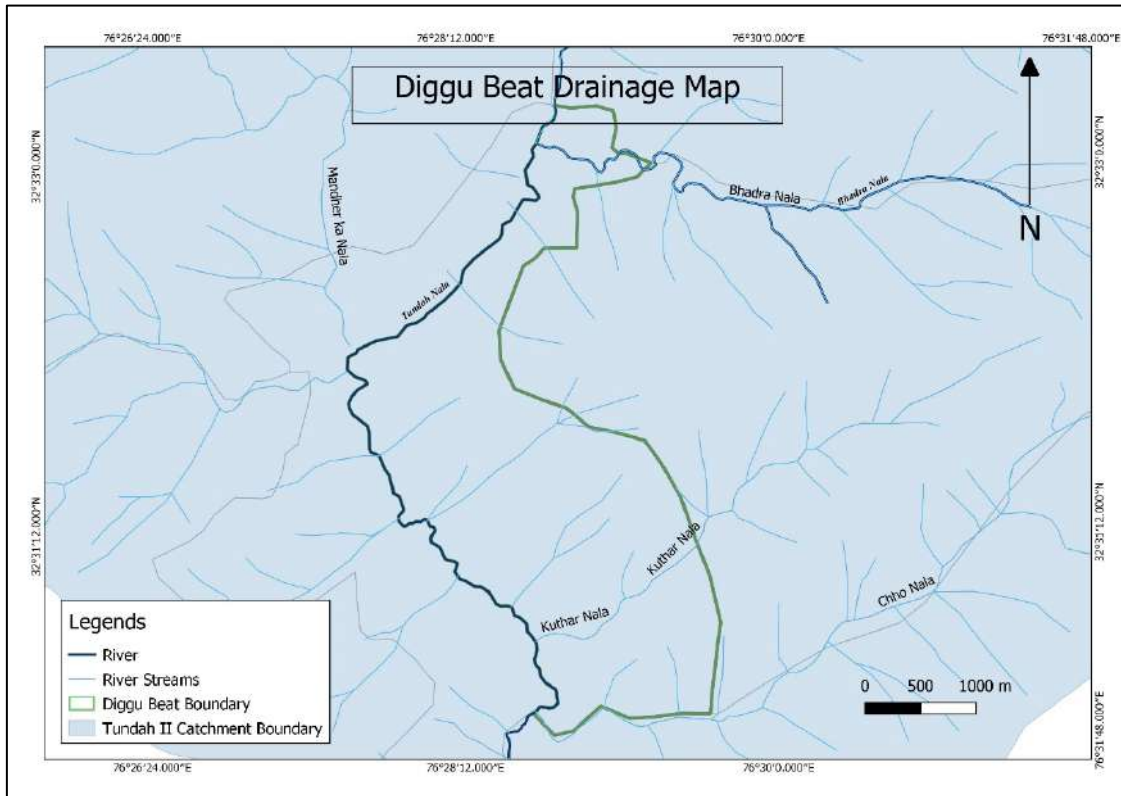


LULC classification of Digger Beat

Sl.No	Class name	Sq.km	Hectare
1	Forest Cover	3.18	318
2	Agriculture	0.05	5
3	Grassland	1.94	194
4	Wasteland/Barren Land	2.35	235
5	Open scrub Land	0.42	42
6	Waterbody	0.12	12
	Total	8.05	805



DRAINAGE: The drainage map of the Beat is shown below.



Drainage map of Diggu Beat

PROJECTIONS FOR DIGGU BEAT OF BHARMOUR (T) DIVISION FOR TUNDAH II HEP CAT PLAN										
							CAT Plan Allocations			
SL.	a.	Length	Lat-Long	Unit	Unit Cost	Size (M)	(RMT)	Phy.	Fin.	
1	2	3	4	5	6	7	8	9	10	
I.	AFFORESTATION 25%									
	a. Site Specific Plantation for Habitat Improvement of Chir Pheasants.									
				Ha.				0	0	
	TOTAL I: AFFORESTATION									
								0	0	
II.	SOIL & MOISTURE ONSERVATION MEASURES (SMC)-25%									
	a. Cratewire Checkdams									
	Kuthar Nalla	4KM	N32.516093 E76.488817	Nos.	13680	2x2.5	2	8	218880	
	Total: a: Cratewire Checkdams				13680	2x2.5	2	8	218880	
	TOTAL II SMC MEASURES:									
								8	218880	
III	RESEARCH, TRAINING & CAPACITY BUILDING-5%				To be controlled at Division			0	0	
IV	PAYMENT FOR ENVIRONMENT SERVICES (PES).-10%				To be controlled at Division			0	0	
V	ECO TOURISM ACTIVITIES- 1%				To be controlled at Division			0	0	
VI	INFRASTRUCTURE & FOREST PROTECTION -10%				To be controlled at Division			0	0	
	A. RENOVATION OF CONSTRUCTION OFNEW INFRASTRUCTURE 5%									
	i Patrolling kits to HPFD staff.			Nos.	To be controlled at Division			0	0	
	Total VI A:									
								0	0	
	B. FOREST PROTECTION- 5%									
	i. Creation of Firelines									
	Tundah DPF	2KM		KM	35000			1.5	52500	
	VI B:Total Firelines					0		1.5	52500	
	TOTAL VI A+B.									
								1.5	52500	
VII	WILDLIFE HABITAT MANAGEMENT 6%									
	i. Habitat Improvement for Chir Pheasants			2 Ha.	To be controlled at Division			0	0	
								0	0	
VIII	MONITORING & EVALUATION 5%				To be controlled at Division			0	0	
IX	CONTINGENCIES- 10%.				To be controlled at Division			0	0	
	GRAND TOTAL:									
									271380	

CONSOLIDATED CAT PLAN BHARMOUR (T) DIVISION

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PROJECTIONS FOR BHARMOUR (T) DIV. UNDER TUNDAH II HEP CAT PLAN.							
Sl.	Component/ Activity	Unit	Unit Cost	CAT Plan Allocations			Remarks
				Phy.	Fin.	%age	
1	2	3	4	5	6	7	8
I	AFFORESTATION-25%					7175632	
	a. Site Specific Plantation for Habitat Improvement of Chir Pheasants.		575000	6	3450000		
	b. Pasture Management/Weed Control (5 Weedings in 10 years)	Ha.	20000	0	0		
	Total I:AFFORESTATION			6	3450000	48.08	
II	SOIL & MOISTURE CONSERVATION MEASURES-25%						
	a. Cratewire Checkdams						
	i. 2x2.5M		13680	20	547200		
	ii. 3x4 M		23024	5	345360		
	Total:			25	892560		
	b. Water Harvesting Structures.	No.	104000	1	104000		
	TOTAL II: SMC MEASURES			26	996560	13.89	
III	RESEARCH, TRAINING & CAPACITY BUILDING 5%		L/s		181371	2.53	Controlled at Division
IV	PAYMENT FOR ENVIRONMENT SERVICES (PES-10%).		L/s		819000	11.41	Controlled at Division
	a. Solar Lights	Nos.	21700	30	651000		Controlled at Division
	b. PVC Water Tanks 2000 Ltrs.	Nos.	14000	12	168000		Controlled at Division
V	ECO TOURISM ACTIVITIES- 1%:		L/s		370000	5.16	Controlled at Division
VI	INFRASTRUCTURE & FOREST PROTECTION-10%						
	A. RENOVATION & CONSTRUCTION OF NEW INFRASTRUCTURE-5%						
	i. Construction of Bridle Paths	KMs	75000	2	150000		Controlled at Division
	i. Patrolling kits to HPFD staff.	Nos.	20000	3	60000		Controlled at Division
	VI A: TOTAL:			5	210000	2.93	
	B. FOREST PROTECTION- 5%						
	i. Creation of Firelines	KMs	35000	9	315000		
	VI B: TOTAL			9	315000	4.39	
	TOTAL VI A+B.			14	525000	7.32	
VII	WILDLIFE HABITAT MANAGEMENT-6%:						
	i. Habitat Improvement for Chir Pheasants Provided in Site specific Plantation		L/s				Controlled at Division
	Total VII.			0	0	0.00	Controlled at Division
VIII	MONITORING & EVALUATION-5%		L/s	0	181371	2.53	Controlled at Division
IX	CONTINGENCIES- 10%		L/s	0	652330	9.09	Controlled at Division
	GRAND TOTAL:				7175632	100.00	

FUNDS TO BE CONTROLLED FROM DIVISION LEVEL	2264072
FUNDS TO BE CONTROLLED FROM RANGE/ BEAT LEVEL	4911560
TOTAL CAT PLAN FOR BHARMOUR (T) DIVISION	7175632

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CHAPTER-16-CONSOLIDATED CAT PLAN FOR BHARMOUR (T) AND CHAMBA (WL) DIVISIONS.

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CHAPTER: 16: CONSOLIDATED PLAN FOR BHARMOIUR (T) AND WL CHAMBA DIVISION.												
Sl.No.	Activity	Unit	Unit cost	Bharmour (T) Division		L Chamba Division		Grand Total for Bharmour (T) and WL		%age	Remarks	
				Phy.	Fin.	Phy.	Fin.	Phy.	Fin.			
1	2	3	4	5	6	7	8	9	10	11	12	
I.	AFFORESTATION / HABITAT IMPROVEMENT										33541937	
	i.Site Specific Plantation for habitat Improvement in Bharmour (T) Division	Ha.	575000	6	3450000	0	0	6	3450000			
	ii. Pasture Management/ Weed Control (5 Weedings in 10- years)	Ha.	20000	0	0	55	1100000	55	1100000			
	iii.Waterhole Eco System	No.	400000	0	0	4	1600000	4	1600000			
	Total:I			6	3450000	59	2700000	61	6150000	18.34		
II.	SOIL & MOISTURE CONSERVATION MEASURES (SMC)											
	i. Cratewire Check dams	Nos.	13680/ 23024	25	892560	147	6691488	172	7584048			
	ii. Water Harvesting structures	Nos.	104000	1	104000	3	312000	4	416000			
	Total: II			26	996560	150	7003488	176	8000048	23.85		
III.	RESEARCH, TRAINING & CAPACITY BUILDING				181371	L/s	2100000	L/s	2281371	6.80	To be controlled at Division	
IV.	PAYMENT FOR ENVIRONMENT SERVICES				819000	L/s	2271000	L/s	3090000	9.21	To be controlled at Division	
V.	ECO TOURISM ACTIVITIES				370000	L/s	1480000	L/s	1850000	5.52	To be controlled at Division	
VI.	INFRASTRUCTURE & FOREST PROTECTION											
	Infrastructure											
	i. Patrolling kits to HPFD staff.	Nos.	20000	3	60000	4	80000	7	140000		To be controlled at Division	
	ii. Forest Rest House	Nos.	10000	0	0	1	100000	1	100000		To be controlled at Division	
	iii. Construction of Bridle Paths	KMs	75000	2	150000	12	900000	14	1050000		To be controlled at Division	
	iv. Construction of Foot Bridges	Nos.	L/s	0	0	3	700000	3	700000		To be controlled at Division	
	Total: VI A:			5	210000	20	1780000	25	1990000	5.93		
	B. Forest Protection											
	i. Creation of Firelines	KMs	35000	9	315000	17	595000	26	910000			
	ii. Hiring of Patrolling vehicle	Nos.	L/s	0	0	0	800000	0	800000		To be controlled at Division	
	iii. Engagemnt of staff for fire watching/ anti poaching activites.	Nos.	150000	0	0	3	450000	3	450000			
	iv. Purchase of Drone with Higher Flight Capacity	Nos.	575000	0	0	1	575000	1	575000		To be controlled at Division	
	Total 6 B:			9	315000	21	2420000	30	2735000	8.15		
	Total VI A +B			14	525000	41	4200000	55	4725000	14.09		
VII.	WILD LIFE MANAGEMENT											
	i. Equipment:											
	a. Binoculars	Nos.	45000	0	0	4	180000	4	180000		To be controlled at Division	
	b. Trapping Cameras.	Nos.	60000	0	0	4	240000	4	240000		To be controlled at Division	
	c. Tranquilizer Gun	Nos.	450000	0	0	1	450000	1	450000		To be controlled at Division	
	ii. Man Animal Conflicts.	L/s	200000	0	0	0	200000	0	200000		To be controlled at Division	
	iii. Construction of bunkers/ shelter place.	Nos.	50000	0	0	3	150000	3	150000		To be controlled at Division	

CHAPTER: 16: CONSOLIDATED PLAN FOR BHARMOIUR (T) AND WL CHAMBA DIVISION.												
Sl.No.	Activity	Unit	Unit cost	Bharmour (T) Div			WL Chamba Divisio			Grand Total for Bharmour (T) and WL	%age	Remarks
	iv Special study for WL Habitat Management of brown bear to be conducted through WII for Tundah WL Sanctuary.									0	0	To be controlled at Division
	v. Special study on carrying capacity of WL Sanctuary Tundah for Eco Tourism.	No.	500000	0	0	1	500000	1	500000			To be controlled at Division
	vi. Strengthening of Rescue Facility at Chamba/Bkani Monkey Sterlization Centre	No.	1000000	0	0	1	1000000	1	1000000			To be controlled at Division
	vii. Habitat Improvement for Chir Pheasants in Bharmour (T) Division.	No.	L/s	0	0	0	0	0	0			To be controlled at Division
	TOTAL VII:			0	0	14	2720000	14	2720000	8.11		
VIII.	MONITORING & EVALUATION		L/s		181371		1494880	0	1676251	5.00		To be controlled at Division
IX.	CONTINGENCIES		L/s		652330		2396937	0	3049267	9.09		To be controlled at Division
	GRAND TOTAL:				7175632		26366305		33541937	100.00		
					Bharmour (T) Divison		Chamba WL Division		Total:			
	Funds to be controlled at Division Level				2264072		15617817		17881889			
	Funds to be controlled at Range/ Beat Level				4911560		10748488		15660048			
	Total:				7175632		26366305		33541937			

CHAPTER 17- ANNUAL PLAN OF OPERATIONS:

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CHAPTER 17.1: ANNUAL PLAN OF OPERATIONS FOR BHARMOUR (T) DIVISION																										
Sl.No.	Activity	a	Norm	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total		
				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy
I. AFFORESTATION																										
a. Site Specific Plantation for Habitat Improvement of Chir Pheasants.																										
i) Plantation of 1100 plants	Ha.	250000	0	0	6	1500000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1500000	
ii) Maintenance for 7 Years:																										
Ist Year (30%)	Ha.	75000	0	0	0	0	6	450000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	450000	
2nd Year (30%)	Ha.	75000	0	0	0	0	0	0	6	450000	0	0	0	0	0	0	0	0	0	0	0	0	0	6	450000	
3rd Year -20%	Ha.	50000	0	0	0	0	0	0	0	0	6	300000	0	0	0	0	0	0	0	0	0	0	0	6	300000	
4th Year- (15%)	Ha.	37500	0	0	0	0	0	0	0	0	0	0	6	225000	0	0	0	0	0	0	0	0	0	6	225000	
5th Year (15%)	Ha.	37500	0	0	0	0	0	0	0	0	0	0	0	0	6	225000	0	0	0	0	0	0	0	6	225000	
6th Year (10%)	Ha.	25000	0	0	0	0	0	0	0	0	0	0	0	0	0	6	150000	0	0	0	0	0	0	6	150000	
7th Year (10%)	Ha.	25000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	150000	0	6	150000	0	0	6	150000	
Total Afforestation (i)+(ii)		575000	0	0	6	1500000	6	450000	6	450000	6	300000	6	225000	6	225000	6	150000	6	150000	0	0	6	3450000		
II. SOIL & MOISTURE CONSERVATION MEASURES																										
i. Nalla Treatment																										
a. Cratewire Cherk dams/ Check Walls																										
2x2.5M	Nos	13680	6	164160	7	191520	7	191520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	547200	
3x4M	Nos	23024	2	138144	3	207216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	345360	
Total			8	302304	10	398736	7	191520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	892560	
b. Water Harvesting structures	Nos.	104000	1	104000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	104000	
Total SMC Measures:			9	406304	10	398736	7	191520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	996560	
III. RESEARCH, TRAINING & CAPACITY BUILDING (RTC&B)																										
Exposure Visits of staff, Training & Seminars and Publicity & Awareness.		earmarked by DFO to various activities.				60457					60457					60457									181371	
Total:						60457	0	0	0	0	60457	0	0	0	0	60457	0	0	0	0	0	0	0	0	181371	
IV. PAYMENT FOR ENVIRONMENT SERVICES (PES)																										
i. PES activities through HPFD & JFMCs																										
(a) Solar Lights -30 Nos.@ Rs.21700/-each		Amount to be earmarked by DFO at his discretion	30	651000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	651000	
each			12	168000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	168000
(d) Other Misce. Activities.			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total PES:				819000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	819000	
V. ECO TOURISM		0		200000		170000																			370000	
VI. INFRASTRUCTURE & FOREST PROTECTION.																										
A. HPFD Building Infrastructure:																										
a. Patrolling Kits		20000	3	60000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	60000	
b. Construction of Bridle Paths (KMs)		75000	0	0	2	150000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	150000	
Total:			3	60000	2	150000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	210000	
B. Forest Protection:																										

Sl.No.	Activity	a	Norm	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total			
				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	a. Creation of Firelines (KMs)		35000	4	140000	3	105000	2	70000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	315000		
	Total:			4	140000	3	105000	2	70000	0	0	0	0	0	0	0	0	0	0	0	0	0	9	315000			
	Total Infrastructure & Forest Protection.			7	200000	5	255000	2	70000	0	0	0	0	0	0	0	0	0	0	0	0	0	14	525000			
VII. WILDLIFE PROTECTION																											
	habitat improvement of Chir Pheasants under Afforestation Component.	L/s		0	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0		
VIII. MONITORING & EVALUATION (M&E)																											
	i. M & E activities.	L/s			0				60457						60457											181371	
	IX. CONTINGENCIES	L/s			65233		65233		65233		65233		65233		65233		65233		65233		65233		65233		65233	652330	
	GRAND TOTAL:				671537		3298426		1007210		575690		365233		411147		290233		215233		275690		65233		7175632		

CHAPTER 17.2: ANNUAL PLAN OF OPERATIONS FOR (BHARMOUR WL RANGE) CHAMBA WL DIISION.

Sl.No.	Activity	Unit	Norm	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total	
				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
I. AFFORESTATION/HABITAT IMPROVEMENT																									
(ii) Pasture Management/ Weed Cobntrol	Ha.	40000 per weeding	55	220000	0	0	55	220000	0	0	55	220000	0	0	55	220000	0	0	55	220000	0	0	55	1100000	
(iii) Waterhole Eco Systems	No.	400000	2	800000	2	800000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1600000	
Total:			57	1020000	2	800000	55	220000	0	0	55	220000	0	0	55	220000	0	0	55	220000	0	0	59	2700000	
II. SOIL & MOISTURE CONSERVATION MEASURES																									
i. Nalla Treatment																									
a. Cratewire Cherk dams/																									
2x2.5M	RMT	13680	20	547200	23	629280	20	547200	20	547200	0	0	0	0	0	0	0	0	0	0	0	0	0	83	2270880
3x4M	RMT	23024	16	1105152	16	1105152	16	1105152	16	1105152	0	0	0	0	0	0	0	0	0	0	0	0	0	64	4420608
Total:			36	1652352	39	1734432	36	1652352	36	1652352	0	0	0	0	0	0	0	0	0	0	0	0	147	6691488	
b. Water Harvesting tructures	No.	104000	1	104000	1	104000	1	104000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	312000	
Total SMC Measures:			37	1756352	40	1838432	37	1756352	36	1652352	0	0	0	0	0	0	0	0	0	0	0	0	150	7003488	
III. RESEARCH, TRAINING & CAPACITY BUILDING (RTC&B)																									
a. Special Study for Wildlife Habitat Management of Brown Bear through WII			0	0		450000		450000		0		0		0		0		0		0		0		900000	
b. Exposure Visits and Training to staff			0	0		200000		0		200000		0		100000		0		0		0		0		500000	
c. Meetings with Villagers and Seminars			0	100000		0		100000		0		100000		0		100000		0		0		0		400000	
d. Publicity & Awareness Camps			0	100000		0	0	0	0	100000	0	0	0	100000	0	0	0	0	0	0	0	0	0	300000	
Total:			0	200000	0	650000	0	550000	0	300000	0	100000	0	200000	0	100000	0	0	0	0	0	0	0	2100000	
IV. PAYMENT FOR ENVIRONMENT SERVICES (PES)																									
i. PES activities through HPFD & JFMCs																									
(a) Solar Lights @ Rs. 21700/- each			0	0	20	434000	15	325500	15	325500	10	217000	10	217000	0	0	0	0	0	0	0	0	0	70	1519000
(b) PVC Water Tanks of 2000 Litres @ Rs. 14000/- each			0	0	6	84000	0	0	6	84000	0	0	6	84000	0	0	0	0	0	0	0	0	0	18	252000
(d) Other Misc. Activities. L/s				500000																				500000	
Total PES:			0	500000	26	518000	15	325500	21	409500	10	217000	16	301000	0	0	0	0	0	0	0	0	0	88	2271000
V. ECO TOURISM @ Rs. 370000/- each site			0	0	2	740000	0	0	2	740000	0	0	0	0	0	0	0	0	0	0	0	0	4	1480000	
VI. INFRASTRUCTURE & FOREST PROTECTION.																									
A. HPFD Building Infrastructure:																									
a. Patrolling Kits		20000	4	80000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	80000
b. Renovation of Forest Rest House		100000	0	0	1	100000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100000
c. Construction of Bridle Paths KM		75000	4	300000	4	300000	4	300000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	900000
d. Construction of Foot Bridges		L/s	1	250000	1	250000	1	200000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	700000
Total:			9	630000	6	650000	5	500000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	1780000	
B. Forest Protection:																									
a. Creation of Firelines (KMs)		35000	5	175000	5	175000	5	175000	2	70000	0	0	0	0	0	0	0	0	0	0	0	0	0	17	595000
b. Hiring of Patrolling vehicle		L/s	0	80000	0	80000	0	80000	0	80000	0	80000	0	80000	0	80000	0	80000	0	80000	0	80000	0	0	800000
c. Engaging Fire Watchers L/s		L/s		45000		45000		45000		45000		45000		45000		45000		45000		45000		45000		45000	450000
d. Purchase of Drone		575000	0	0	1	575000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	575000
Total:			5	300000	6	875000	5	300000	2	195000	0	125000	0	125000	0	125000	0	125000	0	125000	0	125000	0	18	2420000
Total Infrastructure & Forest Protection.			14	930000	12	1525000	10	800000	2	195000	0	125000	0	125000	0	125000	0	125000	0	125000	0	125000	0	38	4200000

Sl.No.	Activity	Unit	Norm	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total	
				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
VII. WILDLIFE PROTECTION																									
i. Purchase of WL Protection Equipment																									
a. Binoculars	Nos.	45000	4	180000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	180000
b. Trap Cameras	Nos.	60000	4	240000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	240000
c. Tranquilizer Gun	Nos.	450000	1	450000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	450000
Total:	Nos.		9	870000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	870000
ii. Compensation for man animal conflict L/s																									
				200000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200000
iii. Construction of Bunkers																									
	Nos.	50000	1	50000	2	100000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	150000
iv. Study on carrying capacity of WL Sanctuary, Tundah for Eco Tourism																									
		500000	1	500000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	500000
v. Strengthening of Rescue facility at Chamba/Bakani Monkey Sterlization Centre																									
		1000000	0	0	0	400000	0	0	0	300000	0	0	0	0	300000	0	0	0	0	0	0	0	0	0	1000000
Total:			11	1620000	2	500000	0	0	0	300000	0	0	0	0	300000	0	0	0	0	0	0	0	0	13	2720000
VIII. MONITORING & EVALUATION (M&E)																									
i. M & E activities.																									
	L/s	0	0	0	0	0	498294	0	0	0	0	0	498293	0	0	0	0	0	498293	0	0	0	0	0	1494880
X. CONTINGENCIES																									
	L/s	0	239694	0	239694	0	239694	0	239694	0	239694	0	239694	0	239694	0	239693	0	239693	0	239693	0	239693	0	2396937
GRAND TOTAL:																									
				6266046	84	6811126	117	4389840	61	3836546	65	901694	16	1363987	55	984694	0	364693	55	1082986	0	364693	352	26366305	

Sl.No.	Activity	Unit	Norm	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10		Total			
				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	d. Purchase of Drone			0	0	1	575000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	575000		
	Total:			9	440000	9	980000	7	370000	2	195000	0	125000	0	125000	0	125000	0	125000	0	125000	0	125000	27	2735000		
	Total Infrastructure & Forest Protection.			21	1130000	17	1780000	12	870000	2	195000	0	125000	0	125000	0	125000	0	125000	0	125000	0	125000	52	4725000		
VII. WILDLIFE PROTECTION																											
	i. Purchase of WL Protection Equipment																										
	a. Binoculars	Nos	45000	4	180000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	180000		
	b. Trap Cameras	Nos	60000	4	240000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	240000		
	c. Tranquilizer Gun	Nos	450000	1	450000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	450000		
	Total:	Nos		9	870000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	870000		
	ii. Man animal conflict			0	200000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200000	
	iii. Construction of Bunkers			0	50000	2	100000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	150000		
	iv. Study on Carrying Capacity of WL SanctuaryTundah for Eco Tourism			1	500000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	500000		
	v. Strengthening of Rescue facility at Chamba/Bakani Monkey Sterlization Centre			0	0	0	400000	0	0	0	300000	0	0	0	0	300000	0	0	0	0	0	0	0	0	0	1000000	
	Total:			11	1620000	2	500000	0	0	0	300000	0	0	0	0	300000	0	0	0	0	0	0	0	13	2720000		
VIII. MONITORING & EVALUATION (M&E)																											
	M&E Activities						558751	0	0	0	0	0	558750	0	0	0	0	0	558750	0	0	0	0	0	0	1676251	
	IX. CONTINGENCIES	L/s			304927	0	304927	0	304927	0	304927	0	304927	0	304927	0	304927	0	304926	0	304926	0	304926	0	304926	0	3049267
	GRAND TOTAL:				6937583	105	10109552	132	4838299	67	4412236	71	1266927	22	1216384	61	1274927	6	579926	61	799926	0	429926	440	33541937		

APPENDICES

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Registered Post

DIRECTORATE OF ENERGY
GOVERNEMENT OF HIMACHAL PRADESH
SHANTI BHAWAN, PHASE-III, SECTOR-6, NEW SHIMLA-171009
Ph. +91 177 2673552, FAX +91 177 2673553, e mail: ceenergy09@gmail.com
No: DOE/CE(Energy)/Bids-Eval. 37/35 HEPs, Vol.-II/2016-17- 1621 22 Dated 25/05/2017

To
 ✓ M/s Sai Engineering Foundation
 Sai Bhawan, Sector-IV, New Shimla-171009 (H.P.)

Subject: Your bid submitted for Tundah-II (18 MW) - Issue of Letter of Allotment.

Dear sir,

In pursuance to this office Letter of Intent issued 17.04.2017 and subsequent deposit of amount of Rs.10,89,000/- vide your letter No. SEF/SML/2017/955 dated 17.05.2017 on account of 1st installment of the quoted Upfront Premium @ Rs.1,21,000/- per MW of installed capacity of the Project, the Government has decided to allot Tundah-II (18 MW) HEP in your favour.

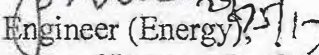
Now, you are required to sign Pre-Implementation Agreement with the Government of HP within a period of 30 days of issue of letter. The draft of Pre-Implementation Agreement is enclosed herewith.

You will be required to furnish the following documents before signing of the Pre-Implementation Agreement.

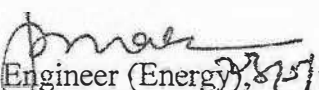
Sr. No.	Particulars
1	Printed copy of Memorandum of Articles & Memorandum of Association and Certificate of incorporation in respect of the Company / Consortium Members / joint Venture Companies, as the case may be.
2	Authorization in favour of the person who shall sign the Pre-Implementation Agreement in shape of resolution passed by the Board of Directors.

You are, requested to take necessary action to sign the Pre-Implementation Agreement within the stipulated period for which you may send intimation in respect of the date of signing in advance to this office and may attend the office of the undersigned one day before actual date of signing the agreement so that necessary documents can be prepared.

Yours sincerely,


 Chief Engineer (Energy),
 Directorate of Energy, GoHP.

Copy to the Additional Chief Secretary (MPP & Power), to the GoHP, Shimla-171001 for your kind information please.


 Chief Engineer (Energy),
 Directorate of Energy, GoHP.

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APPENDIX - II

DIRECTORATE OF ENERGY
GOVERNMENT OF HIMACHAL PRADESH
SHANTI BHAWAN, PHASE-III, SECTOR-6, NEW SHIMLA-171009
Ph. +91 177 2673551, FAX +91 177 2673553, e mail: dir.doehp@nic.in

No. HPDOE/CE(Energy)/Tundah-II HEP/2021- 167 - 68

Dated: 07.04.2022

From

The Director,
Directorate of Energy, GoHP.

To

M/s Sai Engineering Foundation,
Sai Bhawan, Sector-4, New Shimla, Shimla-09.

Subject: Enhancement of capacity of Tundah-II SHEP from 18.00 MW to 24.00 MW in Chamba District of Himachal Pradesh – Approval thereof.

Sir,

On the subject cited above, I am directed to intimate that the Govt. of Himachal Pradesh has accorded in-principle approval inline with Swaran Jayanti Energy Policy for capacity enhancement from 18 MW to 24 MW in respect of Tundah-II HEP subject to the condition that Capacity Addition Charges @ Rs. 1 Lakh / MW on additional capacity amounting to Rs. 6,00,000/- (Six Lakh) and Processing fee @ Rs.10,000 per MW amounting to Rs. 60,000/- (Sixty Thousand) is deposited and revised capacity agreement for 24 MW capacity is signed.

Therefore, it is requested to deposit Capacity Addition Charges amounting to Rs. 6,00,000/- (Six Lakh) and Processing fee amounting to Rs. 60,000/- (Sixty Thousand) within 30 days and sign revised capacity agreement i.e. Implementation Agreement for 24 MW capacity within 2 months from the date of grant of TC.

This is for information and necessary action at your end please.

Yours faithfully,

K. Saini
Chief Engineer,
Directorate of Energy.

Copy of the above is forwarded to the Additional Chief Secretary (MPP & Power) to the Government of Himachal Pradesh-171002, for kind information please.

K. Saini
Chief Engineer,
Directorate of Energy.

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**DIRECTORATE OF ENERGY
GOVERNMENT OF HIMACHAL PRADESH
SHANTI BHAWAN, PHASE-III, SECTOR-VI, NEW SHIMLA-171009(HP)**

OFFICE ORDER

Directorate of Energy (DoE), Govt. of Himachal Pradesh, is pleased to accord Technical Concurrence (TC) to Tundah- II SHIP (24.00 MW) within allotted domain of El 1629.50 m to El 1403 m on Tundah nallah, a tributary of Ravi river in Ravi Basin, Distt. Chamba, Himachal Pradesh, allotted to "M/s Sai Engineering Foundation, Sai Bhawan, Sector 4, New Shimla- 171009 (H.P.)" at an estimated cost of Rs. 223.50 Crore (Rupees Two Hundred Twenty Three Crore and Fifty Lakh) only including Interest During Construction (IDC), Escalation, Financial Charges (FC) and LADF @ 1.50 % of total project cost with the following stipulations:

1.
 - i) The abstract of the Estimated Cost approved by DoE, GoIP is enclosed at **Annex-I**, summary of financial package as considered by DoE, GoIP is enclosed at **Annex-II** and the Salient Features of the scheme are enclosed at **Annex-III**.
 - ii) The completion cost shall not exceed the above cost except on account of the following:-
 - a) Interest During Construction (IDC) and Financial Charges (FC) shall be as per actuals but not exceeding the amount as indicated at **Annex-I & II**, unless revised by DoE, GoIP while according concurrence under Section-8 of Indian Electricity Act 2003 after review of the financial package.
 - b) Change in rates of Indian taxes and duties such as Goods and Service Tax (GST), Custom Duty and levy of any other taxes/duties subsequent to issue of Concurrence.
 - c) Change in Indian law resulting in change in the cost.
2. The Concurrence is subject to the fulfillment of the following conditions:
 - i) Completed cost/ Technical Concurrence (TC) shall not be re-opened due to the following:
 - a) Non acquisition of land.
 - b) Non finalization of Power Purchase Agreement (PPA)
 - c) Delay in financial closure.
 - ii) The final financial arrangement shall not be inferior to the financing arrangement projected in the Detailed Project Report (DPR) for TC.
 - iii) The cost of the project cleared by the DoE, GoIP is indicative and shall have no binding on the regulator while fixing the tariff. The tariff of the project shall be regulated by the appropriate Electricity Regulatory Commission.
 - iv) The public issue expenses, if any, shall be reconsidered at the time of approval of completion cost based on documentary proof and in accordance with Security Exchange Board of India (SEBI) guidelines regarding regulation of public issue expenses.
 - v) Fulfillment of conditions stipulated in Central Electricity Authority (CEA)/Central Water Commission (CWC) guidelines in respect of civil works at the stage of detailed designs/execution.
 - vi) In case, changes are made in design parameters during construction due to site conditions or otherwise, the same shall be intimated and got Concurred from DoE, GoIP before implementation of such changes.
 - vii) Any increase in the cost estimate due to design modifications and geological surprises would be absorbed by the Independent Power Producer (IPP) i.e. "M/s Sai Engineering Foundation, Sai Bhawan, Sector 4, New Shimla- 171009 (H.P.)".
 - viii) No additional cost shall be allowed due to Resettlement & Rehabilitation (R&R) Plan.




- ix) Normal operation life of the hydro power plant shall be as per provisions of latest CWC/CEA guidelines or Central Electricity Regulatory Commission (CERC)/ Himachal Pradesh Electricity Regulatory Commission (HPERC) regulations.
- x) The Concurrence is subject to clearance of the project and Transmission Line by MoE&F from environmental and forests angle. The statutory and administrative clearances as per **Annex-IV** shall be obtained before execution/ implementation of the project.
- xi) For evacuation of power, the interconnection point with the State grid and interconnection facilities at the interconnection point shall be provided, operated and maintained at the cost of the IPP.
- xii) The cost of providing and/or strengthening/additions etc. of the system at and beyond the Interconnecting Sub-station, which may also include the cost of replacement of switchgear/ protection and provision of shunt capacitors, strengthening of bus bars, apart from other works required at injection voltage level and other one or more successively higher voltages, civil works relocation of existing bays etc. shall be recovered by HPSEBL/HPPTCL, as per the regulations of HPERC read with the clarifications/decisions by HPERC and/or any other competent authority as may be finally applicable. The share of IPP on this account shall be paid by the IPP to Himachal Pradesh State Electricity Board Limited (HPSEBL)/ Himachal Pradesh Power Transmission Corporation Limited (HPPTCL) as per the final decision of the competent authority.
- xiii) Whereas the HPSEBL/HPPTCL shall endeavor to provide the power evacuation system at the earliest, the scheduled date for providing evacuation arrangements shall be spelt out in the PPAs on case to case basis inter-alia, keeping in view the time lines indicated in the relevant plan and approved by HPERC.
- xiv) The powerhouse generating equipment as well as other electrical equipment to be provided by the IPP shall be compatible for parallel operation with the State grid after interfacing. The IPP shall be responsible for any loss of generation on this account.
- xv) O&M charges for maintenance of inter connection facilities at the interconnection sub-station shall be paid by the IPP to HPSEBL/HPPTCL throughout the period, the IPP runs the project and the same shall be reviewed at the beginning of every financial year.
- xvi) The power from Tundah-II SHEP shall be evacuated by constructing dedicated 33 kV transmission line upto 33/220/400 kV Substation of HPPTCL at Lahal.
- xvii) The project line shall be provided, operated and maintained by the IPP at his cost as per normal conditions after obtaining approval of HP Govt. under Section 68 (1) of Electricity Act, 2003.
- xviii) The above mentioned evacuation arrangements shall be subject to the HPERC/CERC approval of "Comprehensive area wise plan for augmenting and establishing of transmission/sub-transmission system for evacuation of power from small HEPs" which has already been submitted to HPERC. The Transmission/Distribution Licensee may however also evolve alternate system(s) depending on the site conditions and subsequent developments with the approval of HPERC.
- xix) The Developer shall develop operate and maintain the Project including the dedicated transmission system subject to compliance with the following:
- Grid code and standards of grid connectivity.
 - Technical as well as Mechanical standards for construction of Electrical lines.
 - Norms of System Operation of the concerned State Load Dispatch Center (SLDC) or Regional Load Dispatch Center (RLDC).
 - Directions of the concerned SLDC or RLDC regarding operation of dedicated transmission line.
 - The Developer will only be allowed to inject power in HP system with the undertaking that necessary action to provide tele-metering to SLDC shall be provided by them and specifications required to be got approved from the office of SLDC, HP Load Dispatch

Handwritten signature and initials in blue ink, including a large 'S' and 'P' and some illegible scribbles.

Society, Shimla from compatibility point of view with existing Supervisory Control and Data Acquisition (SCADA) system.

- xx) The Hydro generating units shall be capable of generating up to 110% of rated capacity (Subject to rated head being available) on continuous basis as per Sr. No 7 (Part-II) of Ministry of Power (Central Electricity Authority) notification No 12/X/STD (CONN) GM / CEA dated 15/10/2013 and subsequent amendments thereof.
 - xxi) The conditions on these lines shall have to be suitably included by the IPP in the PPA etc. apart from other standard conditions.
 - xxii) The Geological explorations as per CWC guidelines should be carried out before execution of the project and reports be submitted to DoE, GoHP.
 - xxiii) The observations of DoE, GoHP on the DPR and replies thereof shall form an integral part of the DPR.
 - xxiv) Minimum 15% release of water immediately downstream of diversion structure shall be ensured all the times including lean season as per IIP Govt. Swaran Jayanti Energy Policy, 2021. The necessary monitoring equipment as per recommendations of the Pollution Control Board shall be installed by the IPP during execution of the project.
 - xxv) The levels as specified and approved shall strictly be adhered to for construction of project, also the riparian distances within upstream and downstream projects as per allotment of projects or any other project specific directions / conditions shall be maintained.
 - xxvi) The authenticity of benchmark considered for carrying out survey as ensured and intimated by IPP to DoE shall be the sole responsibility of the IPP.
 - xxvii) The proposed arrangement of laying Penstock with length 1458.50 m should be designed w.r.t. all necessary parameters of earth pressure/water pressure in empty/full condition, earthquake condition and with regard to all safety standards norms. The design should be vetted from an authorized & approved agency.
 - xxviii) LADC/LADF amount and activities shall be implemented as per IIP Govt. Swaran Jayanti Energy Policy, 2021.
 - xxix) The additional 1% (one percent) free power from the project shall be provided and earmarked for a Local Area Development Fund(LADF) as per the provision stipulated in the IIP Govt. Swaran Jayanti Energy Policy, 2021 and subsequent amendments thereof, if any.
 - xxx) The Concurrence is based on the reports and data furnished by the IPP in the DPR and the relevant information provided therein. It is presumed that information furnished is correct and has been collected reliably after carrying out detailed field investigations and surveys under the supervision of competent personnel. The scrutiny of DPR does not cover the examination of the detailed designs & working drawings of project components in regard to their structural, hydraulic and mechanical performance, safety and also of their positioning and fixing at site. This shall be ensured by the IPP as per standard norms & manuals.
3. The project shall be completed within 36 months from the date of start of the construction work at site i.e. zero date.
 4. The completion cost of the scheme shall be submitted to DoE, GoHP within 3 months from the Commercial Operation Date (COD) of the plant.
 5. The project promoters/project authorities shall give free accessibility to the officers and representatives of DoE, Himurja and other relevant Govt. Departments, Commissions etc. to have on the spot assessment of various aspects of the project.
 6. The firm financial package and tie-up of balance inputs/clearances shall be completed within the period as stipulated in the IIP Govt. Swaran Jayanti Energy Policy, 2021 and amendments thereof /Implementation Agreement (IA)/Supplementary Implementation Agreement (SIA).

7. In case the time gap between the Concurrence of the scheme and actual start of work on the project is three years or more, a fresh Concurrence shall be obtained from DoE, GoHP before start of actual work.
8. The project developer shall submit monthly hydrological and meteorological data observed at the project site and monthly progress reports on the prescribed format along with expenditure actually incurred, duly certified by statutory auditors shall be submitted to the DoE, GoHP till the Commercial Operation of the plant.
9. The DoE, GoHP reserve the right to revoke the Concurrence, if the conditions stipulated above are not complied with to the satisfaction of the GoHP.

BY ORDER OF THE GoHP

Director,
Directorate of Energy, GoHP,
New Shimla-171009(HP)

No. HPDoE/CE(Energy)/TC-Tundah- II/2022- 1391- 99

Dated: 20/5/2022

Copy for information and necessary action to the:

1. Addl. Chief Secretary (MPP & Power) to H.P. Govt., Shimla-171002 (HP).
2. Addl. Chief Secretary (NES) to H.P. Govt., Shimla-171002 (HP).
3. Secretary, Ministry of Non-Conventional Energy Sources (MNES), Block No.24,CGO Complex, Lodhi Road, New Delhi-110003.
4. Director, Environmental & Scientific Technologies, Narayan Villa, Near Wood Villa Palace, Shimla-171002 (HP).
5. Deputy Commissioner, Chamba, Himachal Pradesh – 176310 (HP).
6. General Manager, HPPTCL, Himfed Bhawan, Panjari, Below Old MLA Quarters, Shimla-171005 (HP).
7. Chief Engineer (SP), HPSEB Ltd, Uttam Bhawan, Dogra Lodge, Shimla-171004 (HP).
8. Chief Engineer (SO), HPSEB Ltd, Vidyut Bhawan, Shimla –171004 (HP).
- ✓ 9. M/s Sai Engineering Foundation, Sai Bhawan, Sector 4, New Shimla- 171009 (H.P.)

Director,
Directorate of Energy, GoHP,
New Shimla-171009(HP).

4
AEE (TCS)

ANNEXURE-I


Tundah- II SHEP (24.00 MW) in District Chamba of Himachal Pradesh allotted to "M/s Sai Engineering Foundation, Sai Bhawan, Sector 4, New Shimla- 171009 (H.P.)".

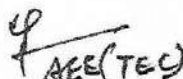
ABSTRACT OF COST ESTIMATE

Sr. No. (a)	Description of works	Amount (In Rs. lakh)	
1	Civil works i/c other Misc. Expenses	15251.28	} Price Level October, 2019
2.	Electro Mechanical works	3457.40	
2.	Transmission works	169.46	
	Sub Total (a)	18878.14	
(b)			
1.	Interest During Construction(IDC)	2656.58	
2.	Escalation	373.15	
3.	Financial Charges (FC)	111.73	
	Sub Total (b)	3141.46	
	Total (a+b)	22019.60	
(c)	LADC @1.50 % of (a+b)	330.29	
	Grand Total (a+b+c)	22349.89	

Say Rs. 223.50 crore

(Rupees Two Hundred Twenty Three Crore and Fifty Lakh Only)


Director,
Directorate of Energy, GoHP,
New Shimla-171009(HP).


AEE(TEC)



ANNEXURE-II

Tundah- II SHEP (24.00 MW) in District Chamba of Himachal Pradesh allotted to "M/s Sai Engineering Foundation, Sai Bhawan, Sector 4, New Shimla- 171009 (H.P.)"


I. Tentative Financial Package

Debt : Equity - 70 : 30

Sr. No.	Description	Amount (In Rs. crore)
A	Debt. from Financial Institutions	156.45
B	Equity	67.05
	Total (Debt. + Equity)	223.50

II. Terms of Loan

Sr. No.	Item	Package
1.	Source of Debt.	Financial Institutions
2.	Loan Amount (in Rs. crore)	156.45
3.	Rate of Interest	11.50 %
4.	Repayment Period	15 Years


 Director,
 Directorate of Energy, GoHP,
 New Shimla-171009(HP).


 ABB(TEC)

ANNEXURE-III

Tundah- II SHEP (24.00 MW) in District Chamba of Himachal Pradesh allotted to "M/s Sai Engineering Foundation, Sai Bhawan, Sector 4, New Shimla- 171009 (H.P.)"

SALIENT FEATURES


I.	Location			
	A	State	Himachal Pradesh	
	B	District	Chamba	
	C	Vicinity/Village	Bharmour	
	D	Proposal	Diversion Barrage is proposed across Tundah Nallah with Full Supply Level (FSL) at El 1629.50 m and Power house on left bank of Tundah Nallah at El. 1408 with Tail Race Outfall Level at El 1403.00 m.	
	E	Accessibility by : Road	45 km from Chamba, 176 km from Pathankot and 410 km from Shimla	
	F	Railway Line	Broad Gauge Line 176 km from Pathankot	
	G	Airport	Gaggal (Kangra), Pathankot (PB)	
II.	Geographical Coordinates		Barrage Site	Power House
	A	Latitude	32° 29' 49.20" N	32°28' 31.07" N
	B	Longitude	76° 28' 31.26"E	76° 27' 35.10" E
	C	Sol Toposheet	52 D/7	
Hydrology				
A	Stream/Nallah	Tundah Stream		
B	Tributary of/Basin	Tributary of Ravi River/Ravi basin		
C	Total Catchment area	265.00 Sq.Km (upto Diversion Barrage)		
D	Design Discharge	14.15 cumecs		
E	Design Flood	821.00 cumecs		
F	HFL.	Barrage Site	Power House	
		El 1627.00 m	El 1401.65 m	
PROJECT COMPONENTS				
A	Diversion Structure			
	1	Type of Structure	R.C.C Barrage	
	2	Full Supply Level (FSL)	El 1625.00 m	
	3	Pond Level	El 1621.50 m	
	4	Average River Bed Level	El 1620.88 m	
	5	No. and Width of Barrage	1 no. , 25.00 m	
	6	Crest level of Barrage Bays	El 1625.00 m	


7	No. and width of under Sluice Bay	2 no. , 4.00 m
8	Crest level of under Sluice Bay	El 1621.00 m
9	Thickness of pier	1.50 m
10	Thickness of Divide Wall	1.50 m
11	Vertical Lift Gate	2 no. , 4.00 m (W) x 3.33 m (H)
12	Upstream Foundation Level (under sluice)	El 1618.00 m
13	Downstream Foundation Level (under sluice)	El 1614.28 m
14	Upstream Foundation Level (Barrage bay)	El 1618.00 m
15	Downstream Foundation Level (Barrage bay)	El 1616.38 m
16	Average Slope of River	1 in 10 m
17	Length Upstream Floor	14.00 m
18	Length Downstream Floor	45.50 m
19	Over flow Section	25.00 m
20	Design Discharge	14.15 cumecs plus flushing & overloading dis.
B Intake Structure		
1	Length	11.90 m
2	Width	9.50 m
3	Main inlet gate	2 no. , 4.00 m x 3.33 m
4	Bed Level	El 1621.00 m
5	Top Level	El 1629.80 m
6	Design Discharge	14.15 cumecs plus flushing & overloading dis.
C Power Channel (from Diversion Barrage upto Desilting Tank)		
1	Shape/Type	Square, RCC Box Section
2	Size	3.60 m x 3.60 m
2	Length	225.089 m
3	Design Discharge	14.15 cumecs plus flushing & overloading dis.
4	Bed level at inlet	El 1621.773 m
5	Bed level at outlet	El 1621.087 m
6	Slope	1 in 500
7	Velocity of flow	1.638 m/sec
D De-silting Tank		
1	Type	RCC Surfaced, Twin Hopper Type
2	Size	80.00 m (L) x 16.20 m (W) x 8.00 m (ED)
3	Max. Depth of Hopper end	10.10 m
4	Full Supply Level (FSL)	El 1625.00 m
5	Flow Through Velocity	0.162 m/sec
6	Design Discharge	14.15 cumecs plus flushing & overloading dis.

	7	Particle size to be removed	0.15 mm and above
	8	Silt Flushing Gate	1.10 m x 1.50 m
	9	Bed level at inlet	El 1621.087 m
	10	Bed level at outlet	El 1621.370 m
E	Head Race/Power Tunnel (from D-Tank upto Aqueduct)		
	1	Shape	D Shaped tunnel
	2	Length	222.03 m
	3	Size of Tunnel	3.15 m Ø
	4	Design Discharge	14.15 cumecs plus overloading dis.
	5	Slope	1 in 500
	6	Velocity of flow	1.598 m/sec
	7	Lining Material/Thickness	M-25/150 mm
	8	Bed level at inlet	El 1621.37 m
	9	Bed level at outlet	El 1620.00 m
F	AQUEDUCT		
	1	Shape/Material	Circular, IS 2062 Gr-C Steel
	2	Diameter and Thickness	2500 mm Ø, 20.00 mm
	3	Length of Aqueduct	36.00 m
	4	Bed Slope	1 in 500
	5	Level at inlet	El 1620.00 m
	6	Level at outlet	El 1619.928 m
G	Head Race/Power Tunnel (from Aqueduct upto Surge Shaft)		
	1	Shape	D Shaped tunnel
	2	Length	1010.53 m
	3	Size of Tunnel	2.80 m Ø
	4	Design Discharge	14.15 cumecs plus overloading dis.
	5	Slope	1 in 500
	6	Velocity of flow	2.022 m/sec
	7	Lining Material	M-25
	8	Bed level at inlet	El 1619.928 m
	9	Bed level at outlet	El 1617.907 m
	10	Number of Adits	Two
	11	Shape	D-Shaped Tunnel
	12	Size of each adit	2.80 m x 2.80 m
	13	Slope	1 in 200
	14	Length	Adit I- 106.59 m, Adit II- 120.33 m
H	Surge shaft		
	1	Type/Shape	Underground, Circular Tank
	2	Size	9.00 m dia., 18.00 m height
	3	Top level	El 1634.00 m
	4	Maxm. Up surge Level	El 1633.00 m

	5	Water Level at No Load	El 1625.00 m
	6	Water Level at Full Load	El 1621.00 m
	7	Min. Draw Down Level (MDDL)	El 1617.50 m
	8	Minm. Surge Level	El 1616.00 m
	9	Bed Level	El 1611.00 m
	10	Diameter of penstock protection valve	2500 mm Ø
I Penstock			
	1	Type	Underground steel penstock inside D shaped Tunnel
	2	Number of penstocks/Size	One/2500 mm internal Ø
	3	Size of penstock Tunnel	2.80 m x 2.80 m
	3	Length	1458.50 m
	4	Plate thickness of steel liner	Varies from 10 mm to 26 mm
	5	Material of steel liner	ASTM 516 Grade 70 steel
	6	Design discharge	14.15 cumecs plus overloading dis.
	7	Number of Branch penstocks	Two
	8	Size of Branch penstocks	1.65 m Ø , 26.00 mm thick (each)
	9	Number/Size of MIV	One, 1350 mm Ø
	10	Vertical Drop Shaft	103.00 m Height before Bifurcation near PH
J Power House			
	1	Type	Underground Power House
	2	Installed Capacity	24.00 MW (2 units of 12 MW each)
	3	Size	35.10 m (L) x 12.00 m (W) x 19.96 m (H)
	4	Design Head at Normal Operating Level	207.06 m
	5	Net head	202.35 m
	6	C/L of turbine in power house	El 1408.00 m
	7	Power house Crane	60 MT/5 MT EOT
	8	Machine Floor Level	El 1407.10 m
K Turbine (s)			
	1	Type	Horizontal shaft Francis turbine
	2	Number	Two
	3	Rated Capacity	12000 KW each
	4	Normal speed	750 rpm
L Generator (s)			
	1	Type	Brushless Synchronous
	2	Number	Two

	3	Rated Capacity	12000 KW each
	4	Power Factor	0.85 lag
	5	Frequency	50 Hz.
	6	Normal speed	750 rpm
	7	Generation Voltage	11 kV
	9	Continuous Overloading	10 %
	M Tail Race		
	1	Shape/Type	D- Shaped/RCC Tunnel
	2	Size	3.00 m x 3.00 m
	3	Length	190.60 m
	4	Bed Slope	1 in 60
	5	Tail Race Outfall Level	El 1403.00 m
	6	Min. Tail Water Level	El 1409.44 m
IV.	Energy and Cost of Generation		
	a	Annual Design Energy in 75% Dependable Year	119.54 MU (At 95% plant availability)
	b	Levellised Tariff for 40 years	Rs. 4.50/KWH
V.		Construction Period	36 months


 Director,
 Directorate of Energy, GoHP,
 New Shimla-171009(HP).


 FREE (TEJ)

ANNEXURE-IV

Tundah- II SHIP (24.00 MW) in District Chamba of Himachal Pradesh allotted to "M/s Sai Engineering Foundation, Sai Bhawan, Sector 4, New Shimla- 171009 (H.P.)"

LIST OF STATUTORY AND ADMINISTRATIVE CLEARANCES REQUIRED

Sr.No.	ITEM	AGENCY	REMARKS
1.	WATER AVAILABILITY	1. State Govt. 2. CWC	Interaction with State Govt. Deptt. & CWC required. Relevant Irrigation Act of the State & Central Water Commission to be implemented.
2.	HPSEBL CLEARANCE	1. HPSEBL. 2. State Govt.	As per Indian Electricity Act, 2003.
3.	POLLUTION CLEARANCE WATER AND AIR	State/Central Pollution Control Board	Water (Prevention & Control of Pollution) Act, 1974 Air (Prevention & Control of Pollution) Act, 1981.
4.	FOREST CLEARANCE	1. State Govt. 2. MoEF& CC, GoI.	Coordination with State Forest Deptt./ Min. of Environment & Forest (MoEF & CC) regarding Forest (Conservation) Act, 1980.
5.	ENVIRONMENT & FOREST CLEARANCE	1. State Govt 2. MoEF& CC, GoI.	As per item (3) & (4) and Latest Govt. Policy in force.
6.	REGISTRATION	Registrar of Companies.	Under Indian Companies Act, 1950.
7.	REHABILITATION & RESETTLEMENT OF DISPLACED FAMILIES BY LAND ACQUISITION	1. State Govt 2. MoEF& CC, GoI.	
8.	EQUIPMENT PROCUREMENT	Directorate General of Foreign Trade (DGFT)	As per Import & Export Acts.

Director,
Directorate of Energy, GoHP,
New Shimla-171009(HIP)

NOTIFICATION

No. FFE-B-F-(2)-72/2004-Pt-II

Dated Shimla-2, the 30.9.2009.

In supersession of the earlier notification No.FFE-B-F-(2)-72/2004-Pt-II dated 3rd August 2009, concerning the guidelines for the preparation of the Catchment Area Treatment Plans (CAT Plans), it is stipulated that apart from the regular activities like afforestation, fuel-fodder plantation, pasture development, soil and moisture conservation measures including erosion control and protection against floods, forest protection including construction/ repair of boundary pillars, Forest infrastructure development, publicity, awareness, capacity building, training and Socio-economic development, every CAT Plan being submitted by the User Agencies shall mandatorily conform to the following requirements:

1. The CAT Plan size should be based on the actual extent of works to be done in the catchment, but shall not be less than 2.5% of the total project cost. The CAT Plan size would cover the outlay for all components/treatment measures, provisions for offsetting cost escalation, and other special provisions viz. Payments for Environmental Services (PES), Eco-Battalion, Monitoring & Evaluation, Eco-tourism etc. Total Project Cost shall be the cost of the project proposal mentioned in the Techno-Economic Clearance (TEC Cost).
2. Minimum area to be treated under the CAT Plan would be approximately 15% of the total effective catchment.
3. The total cost of the CAT Plan would be deposited by the User Agency in equal yearly instalments spread over the duration from commencement to commissioning of the project, with the last instalment payable at least 6 months before the commissioning of the Project.
4. A provision with appropriate budget is to be made in the CAT Plan for carrying out forestry research of relevance to the area.
5. A provision for establishment of silt observation posts at strategic points for recording soil and silt data at regular intervals.
6. Areas of operations may be depicted clearly on the Survey of India topo-sheet for effective monitoring and location of work sites.
7. A detailed chapter depicting the Joint Forest Management (JFM) processes/ activities including micro-planning may also be included.
8. 1% of the CAT Plan budget should be earmarked for Eco-tourism.
9. 5% provision for monitoring and evaluation activities.
10. A separate chapter for improvement and development of wildlife and reduction of human-animal conflicts duly vetted by the Pr.CCF (WL), H.P will be incorporated.
11. A provision is to be made for forest protection measures in view of the induction of a large number of outside work force/labour in the area for project activities.
12. A provision of 10% of total CAT Plan outlay is to be ear-marked for Payment for Eco-services to the local communities.
13. A provision of 10% per year to offset inflationary trends (Contingencies) to absorb any escalation in the cost of plan proposals on account of increase in wage- rate and material cost would be made. This provision could also be utilised to meet any

- unforeseen expenses, arising in future, necessary for the achievement of the objectives of the CAT Plan.
14. A provision is to be incorporated for training of the forest staff involved and sensitisation of local communities.
 15. Adequate provision for energy-saving devices to reduce the load on forests for firewood is required.
 16. Rural infrastructure component may be deleted as similar works are provided for under the Local Area Development Fund (LADF) of the Hydro Electric Projects.

These instructions will apply to all CAT Plans which have not yet been approved by the H.P. Forest Department or forwarded to the Govt. of India, henceforth. It is further reiterated that the express approval of the HP Forest Department, to the CAT Plan, is mandatory before the said document can be submitted to the Environment Wing of the HP Government for onward transmission to Ministry of Environment and Forests, Government of India.

By order,

Sd-

Additional Chief Secretary (Forests) to the
Government of Himachal Pradesh.

Endst.No. As above

Dated Shimla-2, the :

Copy is forwarded to:

1. Sh. Vijay Sharma, secretary, Ministry of Environment and Forests, Govt. of India, CGO Complex, Lodhi Road, New Delhi.
2. The Director General (Forests) & Spl. Secy., GOI, MoEF, Paryavaran Bhawan, New Delhi.
3. The Conservator of Forests (Central), Ministry of Environment & Forests, Govt. of India, Northern Regional Office, Bays No. 24-25, Sector 31-A, Chandigarh 160030.
4. The Principal Secretary to the Chief Minister, HP.
5. The P.S. to the Forest Minister, HP.
6. The P.S. to the Chief Secretary to the Govt. Of HP.
7. All the Administrative Secretaries to the Govt. of HP.
8. Pr. Chief Conservator of Forests, HP, Shimla.
9. The Managing Director, HPSFC, SDA Complex, Shimla-9.
10. The Secretary to the Governor HP, Shimla-2.
11. All APCCF/CCF/CFs in HP.
12. The Controller P & S Department, Shimla-9 with the request to publish the Notification in extra ordinary gazette at an early date.
13. Section Officer (Forest-A).
14. Guard file.

Sd-

Joint Secretary (Forests) to the

Instructions for User Agencies for Preparation of Catchment Area Treatment Plans

The hydro-power sector is witnessing a rapid growth in India, particularly in the Himalayan region. While hydropower is considered by many as a clean source of energy it is both affected by, and impacts, local environmental quality. Since 1994, Environmental Impact Assessment (EIA) has been required for clearance to build hydro-electric projects (HEPs). In addition to the Environment Impact Assessment (EIA) report, the process mandates a public hearing, and environmental management plans (EMPs) designed to mitigate environmental damage and impacts of displacement. One of these plans is the catchment area treatment (CAT) plan which aims to improve the quality of environmental and especially watershed services from the catchment.

The Ministry of Environment & Forests has been stipulating the condition of preparation and implementation of Catchment Area Treatment Plan in cases related to diversion of forest land for medium and major irrigation projects and for hydroelectric power projects under Forest Conservation Act, 1980. The Catchment Area Treatment Plan is an essential document as it portrays the ecological health of the catchment area and various soil & moisture conservation and watershed management programmes are required to arrest soil erosion to improve free drainage in the area and to rejuvenate the degraded eco system in the catchment.

So far as implementation of CAT Plans in Himachal Pradesh is concerned, HPFD's position is driven by the directives of Government of India and the Apex Court judgments, passed from time to time. The HPFD has to ensure that CAT Plans are prepared by the user agency (Power producers) as per provisions of the FCA, 1980. At the same time, the user agency has the right to ask as to where funds are being spent, and whether proper CAT plans were implemented to ensure longevity of the power projects. The preparation of CAT Plans is an iterative process. With the increasing number of Power Projects and increase in investments in power sector in the state, HPFD needs to build its capacity and expertise to deliver, and to fill required gaps in the implementation of the CAT Plans. Private areas needed to be tackled simultaneously so that the catchments are treated holistically. Both Comprehensive and project specific CAT Plans need to co-exist as both serve a different but important purpose. The comprehensive river basin CAT Plans are generalized and provide information, data, approach and methodology of treatments on large mosaic; while the individual CAT Plans focus specifically on site specific treatment. Comprehensive CAT Plans are further written over a longer period of time and individual CAT Plans address the dynamic need of the specific area, providing immediate relief to the power projects. Modification and revision of individual site specific CAT plan is essential to address the issue of dynamicity in watershed management.

The developmental activities, including hydroelectric projects, often have some impacts on natural resources. The environmental impacts of such projects together with faulty land management practices ultimately lead to environmental degradation and consequently to rapid sedimentation of reservoirs. Accelerated soil erosion in the catchment areas of reservoirs and transport of detached material through the drainage network gives rise to a series of problems, notably siltation, depletion of flow capacity, steady loss of storage capacity, consistent drop in hydro-electric power generation and frequent floods. Therefore for sustainable hydropower development with least negative impact on the environment, catchment management plays a pivotal role. In order to minimize the damage to the project as

well as the immediate environment, the watershed management programmes involving extensive soil conservation measures in the catchment have assumed tremendous importance. Watershed management primarily involves collection of information on a wide range of parameters of static and dynamic nature related to geology, hydrology, soil, geomorphology, topography, drainage conditions, land use / land cover, climate, etc. required for formulation of detailed and comprehensive Catchment Area Treatment (CAT) Plan. A comprehensively detailed Catchment Area Treatment Plan (CAT) should focus on:

- Mitigation measures for the soil erosion and landslide hazards resulting from the hydropower project activities i.e., activities in the direct impact zone (DIZ).
- The problem of silt and debris load to river from the susceptible areas of the catchment.
- Checking the sediment load from the tributaries directly discharging into the reservoir.
- Protecting the directly draining catchment from scouring / sloughing and slips.

It is a well-established fact that reservoirs formed by dams on rivers are subjected to sedimentation. The process of sedimentation embodies the sequential processes of erosion, entrainment, transportation, deposition and compaction of sediment. The study of erosion and sediment yield from catchments is of utmost importance as the deposition of sediment in reservoir reduces its capacity, and thus affecting the water availability for the designated use. The eroded sediment from catchment when deposited on streambeds and banks causes braiding of river reach. The removal of top fertile soil from catchment adversely affects the agricultural production. Thus, a well-designed Catchment Area Treatment (CAT) Plan is essential to ameliorate the above-mentioned adverse process of soil erosion. In hilly catchment areas, soil erosion due to water is a common phenomenon.

The catchment area treatment involves; understanding of the erosion characteristics of the terrain and, suggesting remedial measures to reduce the erosion rate. The main objective of the CAT plan is to incorporate measures in the catchment area that reduce silt load problems for hydro-electric projects. The aim is also to buffer the flow of water by reducing storm water peaks, and increasing dry season flows through better infiltration.

Strategy and Approach:

It is suggested that while formulating the Catchment Area Treatment Plan following aspects should be considered:

1) The CAT Plan size shall be based on the actual extent of works to be done in the catchment. It shall not be less than 2.5% of the total project cost. The CAT Plan size would cover the outlay for all components/treatment measures, provisions for offsetting cost escalation, and other special provisions viz. Payments for Environmental Services (PES), Eco-Battalion, Monitoring & Evaluation, and Eco-tourism etc. Total Project Cost shall be the cost of the project proposal mentioned in the Techno-Economic Clearance (TEC Cost). The User Agency shall get the CAT Plan prepared from the Panel of Consultants/institutions approved by the HP Forest Department.

Emphasis must be laid on sustainability of treatment measures and minimum area to be treated under the CAT Plan would be approximately 15% of the total effective catchment. Adequate attention must be paid for ground-truthing and understanding of ecological and socio-economic conditions by the user agency that prepares the CAT plan. Areas of operations may be depicted clearly on the 'Survey of India' topo-sheet for effective

monitoring and location of work sites. All prescribed activities should be geo-referenced (latitude, longitude and altitude). A detailed chapter depicting the Joint Forest Management (JFM) processes/ activities including micro-planning, with focus on women and poorer section of local community may also be included.

2. The user agency will deposit the funds for CAT Plan(s) in single installment.

3. A land use map of the catchment area should be prepared for identifying critically eroded areas so that extensive soil conservation measures are launched in synchronization with the construction/civil work. The agricultural lands should be terraced, bunded and stall feeding of cattle should be encouraged and promoted particularly in areas where there is pressure of grazing. The requisite soil conservation measures should be adopted for restoration of degraded catchment areas.

4. The free draining catchment of HEPs and other projects should be clearly identified and marked on the SOI topo sheets. The catchment relevant to the HEP should also be clearly brought out and marked similarly.

5. The life of the CAT Plan will be generally eleven years and intensity of new work will be maximum from 2nd to 5th years of implementation. Minimum new works should be proposed in the 7th-11th year of CAT Plan implementation.

6. In the dense forest areas major concentration should be on soil & water conservation including water harvesting, for which, various water harvesting structures like check dams, gully plugging, gabion dams, contour trenches and vegetative structures should be made. In the open forest besides taking up soil & water conservation measures plantation of local indigenous tree and shrub species should be done. In higher altitudes Deodar can be planted but plantation of Chir should be avoided.

7. A lot of pressure of the cattle is on forests and these forests form an important component of the catchment. The CAT plan should therefore, include a component of fodder development on the private grasslands and forests or on revenue/private lands in order to meet the requirement of fodder/small timber/firewood and in turn reduce pressure on Reserve Forest for the purpose. Plantation of rare/medicinal species should also be taken up. The CAT plan should invariably have a component for socio-economic component like supply of gas connection the project affected families. This component should be implemented through Forest Development Agencies or Joint Forest Management Committees.

8. The infrastructure component like construction of buildings, vehicles, salaries of staff etc. should constitute a very small percentage of the CAT plan as the main emphasis is on soil & water conservation and ecological improvement of the area, Wherever development/procurement of infrastructure is required it should be site specific and should be supported by proper justification.

9. It is very essential that proper and regular monitoring is carried out for effective implementation of the CAT plan. The Chief Project Officer of the user agency must be associated in implementation as well as monitoring of the progress of CAT plan. The monitoring on monthly basis should be done by the concerned Conservator of Forest where respective DFO and representative of User Agency should participate.

10. The perception of CAT Plan funds as a regulatory mechanism has to be changed – rather this is an effort to treat the upstream catchment and secure environmental and particularly watershed services. Stand alone civil works are temporary measures to control silt and have little long-term impact unless supported by green planting. A focus on tree planting leads to inadequate attention given to shrubs and grasses, which can more effectively meet the objectives of the CAT plan. Rather than treating degradation, catchment area treatment plans must be designed to mitigate the impacts of agents that cause degradation. When local communities are responsible they must be included in finding solutions. Integrated efforts at catchment treatment can develop livelihoods for local people and uplift them from a cycle of isolation and poverty.

11. A separate chapter for improvement and development of wildlife and reduction of human-animal conflicts will be incorporated in the CAT Plan in consultation with concerned Wildlife Warden/Chief Wild life Warden.

12. Provision is to be made for forest protection measures in view of the induction of a large number of outside work force/labour in the area for project activities.

13. Special emphasis is to be given on the Training and skill up-gradation of staff as, some of the CAT Plan activities are technical in nature and lot of investment cost/money is involved in implementation. Capacity building of local communities must also be paid due attention to ensure sustainability of benefits.

Mechanism for preparation and adoption of CAT Plans:

H.P. Forest Department has initiated the process of developing Comprehensive CAT Plans for all major river basins of the State. The Comprehensive CAT Plans (CCP) will serve the purpose of establishing the base line and identifying priority micro-watersheds. It would be prudent for the user agencies to make extensive use of the data and information available in the CCPs. The user-agencies are expected to derive individual CAT Plans from the CCPs, through the use of consultants of the panel of H.P. F.D. The consultants would consult the HPFD field staff (including Wildlife Wing) during the course of preparation of CAT Plans. The draft CAT Plans would be discussed and presented at a Circle level Workshop involving all relevant stakeholders. The comments offered at such workshops would be addressed by the consultants and draft CAT Plan resubmitted to the concerned Conservator of Forests, who will process the same for obtaining approval within one month.

Major Components and Activities:

The first requirement in the write-up of a CAT Plan is to have a good 1: 15,000 scale map of the catchment, showing contour lines at 3600 mts, 3000 mts, 2700 mts, 2400 mts, 2100 mts, 1800 mts and 900 mts, clearly depicting administrative and forest boundaries of Beats, Blocks, Range(s); drainage of catchment; existing and proposed forest infrastructure-buildings, watch towers, silt observation post nurseries, inspection paths, rest houses, plantations & soil and water conservation works and any other relevant information that can help in implementation of Cat Plan.

Activities need to be oriented to achieve the objective of CAT plans. Catchment treatment must identify and address the causes of high silt load. Management of existing lands is more important than attempting to convert land use. It is stipulated that apart from the regular

activities like afforestation, fuel-fodder plant conservation measures including erosion control and protection including construction/ repair of boundary pillars, forest development, publicity, awareness, capacity building, training and socio-economic development, every CAT Plan being submitted by the User Agencies shall mandatorily confirm to the following components, while submitting the plan for quick and timely scrutiny by the staff. Reducing the number of activities in favour of those that provide most benefits would bring down the per hectare cost of land treatment. Thus, activities should be selected according to the relation between their costs and their benefits. The activities listed are indicative and can be increased or decreased depending upon the ground realities of the catchment area in consonance with the strategy explained above. The activities should be prescribed on the approved and prevailing schedule of Forest Department rates for the works and the daily waged rate of the year of writing of CAT Plan. For activities not listed in the HPFD schedule of rates, the Conservator in-charge of the Circle will incorporate rates based on Public Works Department schedule of rates. The details about the activities are explained in Appendix.

S.No	Component	Indicative Activities	% Outlay of total Cat Plan cost
1	Afforestation	1) Normal Afforestation 2) Enrichment Planting 3) Energy Plantations 4) Rim plantation 5) Treatment of Invasive & Alien Species prone areas 6) Pasture management 7) Nurseries 8) NTFP plantations	25%
2	Soil & Water Conservation	1) Moisture retention measures 2) Bio-engineering activities 3) Drainage line treatment 4) Civil structures for soil and water conservation 5) Landslide and Slip control measures 6) Glacier control measures 7) Silt monitoring stations	25%
3	PES & Eco-tourism	1) All treatments on private lands 2) Devising incentive based mechanisms (IBMs) for securing watershed protection services 3) Voluntary rotational closures of pastures 4) eco-tourism centric activities	10%
4	Research, Training and Capacity	1) Participatory Action Research for adaptive	5%

	Building	management 2) Site/issue specific research/study/survey 3) Training and capacity building of Staff and communities 4) Information dissemination	
5	Infrastructure Development	1) Logistic support to forest staff 2) Maintenance of departmental buildings, inspection paths 3) Operational support to staff	10%
6	Forest Protection	1) Forest fire protection 2) Construction and repairs of Boundary pillars 3) Promotion of non-conventional energy devices	5%
7	Wildlife Management	1) Support to monkey sterilization programme (at least 1% of CAT Plan cost) 2) Human-animal conflict 3) Habitat improvement 4) Bio-diversity conservation 5) Survey and census 6) Logistic support to staff	6%
8	M&E	Three tier monitoring	6%
9	Site-specific Work-plan	1) Micro-planning 2) Disaster mitigation plan	3%
10	Contingencies	Unforeseen expenditure	5%

Monitoring and Evaluation:

A need was being felt to put in place a multi-tier monitoring mechanism to highlight the achievements and shortcomings of the impact of implementation of Catchment Area Treatment plans in the state. A three tier monitoring system has immediately been put in place by the HPFD for effective supervision, guidance and bringing transparency that was required for implementation of CAT Plan works. Under this system, the first two tiers of monitoring will be in-house while the third tier would involve connected State Universities and Institutes (HPU, Dr. YS Parmar UHF Nauni and KVV Palampur & IHBT Palampur, HFRI, FSI) and in their absence, approved and empanelled vendors.

The first tier of monitoring (in-house) would be done by the field functionaries up to the level of CFs and will be physical monitoring exercise. It may be noted that there are no changes in the percentages of checking of plantations from the existing system of Mandatory Field Inspection of the Forest Department. The results will be evaluated by CCF (M&E) and shall be shared and discussed with the field staff.

313

The second tier of in-house monitoring would be done by the teams of officers from the Direction Office and shall serve as mentoring exercise along with performance monitoring. The teams will monitor to the extent of 2% of all the works in the following manner:-

- a) The teams will monitor 1% of the works already monitored and reported.
- b) The teams will monitor 1% of the works not monitored.

Schedule of inspections and submission of reports:-

The teams will inspect the areas in October-November of the following year and submit their reports by 30th November.

Third Party Monitoring will be a sort of impact monitoring and will be carried out CAT Plan-wise through institutions/ entities in the State like the Universities & Forest Research Institutes; in their absence by approved/ empanelled consultants, after calling bids from the qualified consulting firms on the Terms of Reference, duly approved by the HP Forest Department. The results of all the three types of monitoring processes/exercises will be placed on the website of the department to share them with the public and user agencies.

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No. FFE-B-F-(5)-9/2019

Dated: Shimla-2, 21st November, 2019NOTIFICATION

In partial modification of the earlier Notification No. 111-1-1121-72/2004-Pt. II dated 30-09-2009, the Governor, Himachal Pradesh is pleased to revise the outlay of Catchment Area Treatment Plan from existing 7.5% to 15% of the total project cost for all the Hydro Electric Projects having capacity above 10MW in Himachal Pradesh. The remaining terms as mentioned in the aforesaid Govt. of H.P. Notification No. FFE-B-F(2)-72/2004-Pt.-II dated 30-09-2009 shall remain the same.

The revised outlay shall become applicable to all the Catchment Area Treatment Plan(s) which shall be submitted by the User Agencies to the Forest Department on or after the date of issue of this notification.

By Order

Ram Subhag Singh

Addl. Chief Secretary (Forests) to the
Government of Himachal Pradesh.Endst. No. As above Dated, Shimla-2 the 21st November, 2019

- 1 All Administrative Secretaries to the Government of Himachal Pradesh.
- 2 The Pr.CCF(HoFF) Shimla-1. He is requested to circulate this notification to all the CCFs/CFs/DFOs(WL.&T) in H.P.
- 3 The Pr.CCF(W.L) Talland, Shimla-1.
- 4 The APCCF-cum-Nodal Officer(FCA) Talland Shimla.
- 5 The Under Secretary (GAD) to the GoHP w.r.t Cabinet Item No. 22 dated 18-11-2019.
- 6 The Private Secretary to the Chief Minister, Himachal Pradesh.
- 7 The Private Secretary to the Forest Minister Himachal Pradesh.
- 8 The Private Secretary to the Chief Secretary to the GoHP.
- 9 Guard File.

(Sat Pal Dhiman) 21-11-2019

Joint Secretary (Forests) to the
Government of Himachal Pradesh.S/FCA
APCCF(FCA)
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APPENDIX-VI.**COST NORM FOR PER HECTARE SITE SPECIFIC PLANTATION TO BE CARRIED OUT UNDER TUNDAH II CAT PLAN FOR HABITAT IMPROVEMENT OF CHIR PHEASANTS-**

(1100 Plants/ Ha. i.e. 300 Tall Plants + 800 Normal Plants/ Bamboo, addition of vermi compost/ bio fertilizer, staggered contour trenches for moisture conservation, bio engineering native shrubs & grasses)

Sr. No	Particulars of Work	Unit	Qty.	Rate per unit at Wage rate of Rs. 150/-	Amount at wage rate of Rs. 150 for non-tribal areas
A. PLANTATION					
1.	Survey & Demarcation of Plantation Area	Ha.	1	101.00	101.00
2.	Digging of Pits 60x60x60 cm Size for tall plants	No.	300	17.45	525.00
3.	Filling of Pits of 60x60x60 cm Size for tall plants.	No.	300	2.54	762.00
4.	Digging of Pits of 45x45x45 cm size	No.	800	9.54	7,632.00
5.	Filling of Pits of 45x45x45 cm size	No.	800	2.72	2,176.00
6.	Planting of Tall Plants	No.	300	654.30/100	1,962.00
7.	Planting of Normal Plants	No.	800	2.18	1,744.00
8.	Construction of Inspection Path	Rmt.	100	11	1,100.00
9.	Construction of staggered contour trenches	Rmt.	600	12	7,050.00
10.	Planting in gradional trenches	No.		LS	2,000.00
11.	Cost of RCC/ Wooden Fence posts	No.	50	450	22,500.00
12.	Fixing of RCC/ Wooden Fence post i/c struttino	No.	50	696.35	348.18
13.	Carriage of RCC/Wooden Fence Posts		50	L/S	4,000.00
14.	Carriage of B/Wire over a distance of 2 KMs	KM/ Qtl.	0.75	73.65	110.48
15.	Stretching & Fixing of Barbed Wire in 5 Strands	Rmt.	750	4.80	3,600.00
16.	Interlacing of Thorny Bushes along the Fence	Rmt.	150	4.00	600.00
17.	Cost of Barbed Wire	Qtl.	1.10	9000.00	9,900.00
18.	Cost of U-Nails	Qtl.	0.05	8800.00	440.00
19.	Carriage of Tall Plants over Distance of 2 KM uphill/ downhill	No.	300	14.76	4,428.00
20.	Digging of forest soil, carriage and mixing in the pits	No.		L/S	12,000.00
21.	Carriage of normal plants over distance of 2 KM uphill/ downhill	KM/ No.	800	1.9	1,520.00
22.	Cost of manure, carriage and application in pits	No.		L/S	3,000.00
23.	Mulching with local grasses/ shrubs	No.	1100	84.80/100	932.80
24.	Weeding & hoeing	No.	1100	70.85/100	779.35
25.	Watering during lean season	No.	4	L/S	8,000.00
26.	Sign Board & Fixing	No.	0	L/S	450.00

Sr. No	Particulars of Work	Unit	Qty.	Rate per unit at Wage rate of Rs. 150/-	Amount at wage rate of Rs. 150 for non-tribal areas
(A)	Increase in wage component (Rs. 46082/-) @ 150% due to increase in wage rate from Rs. 150/- to Rs. 375/- per day (Sl.No. 1 to 10, 12 to 16, 19, 21, 23 & 24).				1,15,205.00
(B)	Cost of material etc. (Sl.No. 11,17,18,20,22, 25 & 26)				56,290.00
(C)	GRAND TOTAL (A) + (B)				1,71,495.00
(D)	Contingency, Photogography & IT Costs @ 3%				5,144.00
(E)	Cost of Tall Plants	No.	300	68.68	20,604.00
(F)	Cost of Normal Plants	No.	800	20.83	16,664.00
	Grand Total C+D+E+F				2,13,907.00
	Restricted to Rs./ Ha.				2,00,000.00
G.	Plantation cost after allowing 25% increase in tribal areas.				2,50,000.00
B. MAINTENANCE (7 YEARS)					
1.	Ist Year			30%	60,000.00
2.	2 nd Year			30%	60,000.00
3.	3 rd Year			20%	40,000.00
4.	4 th Year			15%	30,000.00
5.	5 th Year			15%	30,000.00
6.	6 th Year			10%	20,000.00
7.	7 th Year			10%	20,000.00
	Total:				2,60,000.00
H.	Maintenance cost after allowing 25% increase in Tribal Areas.				3,25,000.00
GRAND TOTAL (G)+ (H) FOR PLANTATION AND MAINTENANCE					5,75,000.00

APPENDIX-VII.

COST NORM FOR PASTURE MANAGEMENT/ WEED CONTROL.

Sl.No.	Activity	Unit	Unit Rate (Rs.)	Physical	Cost Norm (Rs.)
1	Average Wage Rate per person per day	Manday	400	1	400
2	Manpower required for weeding 1 Hectare area per weeding	Mandays	400	10	4000
3	No. of weedings required in every alternate year	Nos.		5	
4	Per hectare norm for doing 5 weeding in 10 years	Nos.	4000	5	20000
	Per hectare cost norm for Weeding: Rs. 20000/-				

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APPENDIX-VIII.									
Cost norm for construction of Waterhole for Wildlife (Pond Size- 30x10x2.4)									
Item	Particulars of items	No	Length	Breadth	Depth	Qty	Unit	Rate	Amount
1	Excavation by Labour								
1.i	Upto 0 m to 1 m depth	1	30	10	1	300	cum	375	112500
1.ii	Upto 1 m to 2m depth	1	30	10	1	300	cum	408	122400
1.iii	Upto 2 m to 3 m depth	1	30	10	0.4	120	cum	448	53760
3	Silpauline for lining	1	46	16		736	sqm	150	110400
								Total	399060
Rounding off to 400000									

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Crateweire/ Gabion CHECK DAM 2 x 2.50 ESTIMATE

Item No	No	Length	Breadth	Depth	Quantity	Rate	Unit	Amount	Say Per Rm
Check Dam Gabion Providing & laying steel Gabions or equivalent type of required section including boxes made of mechanically woven, double Twisted , hexagonal shaped steel wire mesh Gabions as per En standards mesh type 10 x 12 as per EN 10223 , edges are to be mechanically selvedge made of heavily (Zn+PVC) coated G.I. wire as per B.S. 443 mesh wire 3 mm die & edge wire dia 3.9mm dia of maccaferri type or equivalent type & filled with 20 to 50 kg weight trap Stones ,including conveying with all leads & lifts and required placing at required places in required line , level, slope, section as directed. etc complete under tidal condition. Gabions of Size 2X2.5M									
a) Earth Work ii)Pick Work	1	1	2.5	0.5	1.25				
	1	1	3.5	0.3	1.05				
					2.3	198.6	m3	456.78	
b) Gabion Structure	1	1	1	1	1				
	1	1	1.5	1	1.5				
	1	1	2	0.5	1				
	1	1	2.5	0.5	1.25				
c) Apron	1	1	3.5	0.3	1.05				
					5.8	2280	m3	13224	
						Total		13680	13680

Crateweire/ Gabion CHECK DAM 3Mx4M ESTIMATE

Item No	No	Length	Breadth	Depth	Quantity	Rate	Unit	Amount	Say Per Rm
Check Dam Gabion Providing & laying steel Gabions or equivalent type of required section including boxes made of mechanically woven, double Twisted , hexagonal shaped steel wire mesh Gabions as per En standards mesh type 10 x 12 as per EN 10223 , edges are to be mechanically selvedge made of heavily (Zn+PVC) coated G.I. wire as per B.S. 443 mesh wire 3 mm die & edge wire dia 3.9mm dia of maccaferri type or equivalent type & filled with 20 to 50 kg weight trap Stones ,including conveying with all leads & lifts and required placing at required places in required line , level, slope, section as directed. etc complete under tidal condition. Gabions of Size 3x4M									
a) Excavation	1	1	3	0.5	1.5				
	1	1	4.5	0.3	1.35				
					2.85	198.6	m3	566.01	
b) Gabion Structure	1	1	1	1	1				
	1	1	1.5	1	1.5				
	1	2	2	1	2				
	1	1	2.5	1	2.5				
	1	1	3	0.5	1.5				
c) Apron					5.8				
	1	1	4.5	0.3	1.35				
					9.85	2280	m3	22458	
								23024	

Item No	No	Length	Breadth	Depth	Quantity	Rate	Unit	Amount	Say Per Rm
Water Harvesting Structure Gabions of Size 2X4M									
a) Excavation	2	1	3	1	6				
	1	1	2	0.5	1				
					7	178.25	m3	1247.75	
b) Gabion Structure	2	1	1	1	2				
	2	1	1.5	1	3				
	2	1	2	1	4				
	2	1	2.5	1	5				
	2	1	3	1	6				
c) Apron	1	1	2	0.5	1				
					21	2900	m3	60900	
						Total		62147.75	62150
Add 34% Cost escalation									21130
Total:									83280
Add 25% increase for Tribal areas									20820
GRAND TOTAL:									104100 rounded off to Rs. 1,04,000

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"OM SAI RAM"

SAI ETERNAL FOUNDATION

(Formerly known as Sai Engineering Foundation)

(Non-Profitable company Regd. under Section-8 of the Companies Act-2013)

CIN - U85300HP2022NPL009076

SAI BHAWAN, SECTOR-4, NEW SHIMLA-171009 (H.P.)

Phone : 0177-2670349, Fax : 0177-2672915

E-mail : saieternalfoundation@gmail.com

Ref. No. SEF/SML/2024/285

Dated 15-05-2024

UNDERTAKING

This is to certify that the Tundah II Hydro Electric Project (24 MW) in Chamba District, Himachal Pradesh, is being implemented by M/s Sai Eternal Foundation. It is further certified that, according to the Techno Economic Clearance (TEC) issued by Directorate of Energy, Government of Himachal Pradesh, the estimated cost of this project is Rs. 22,350 lakhs. In case of any future revision/increase in the TEC and the Project Cost, the difference of the CAT Plan Cost will be deposited by Sai Eternal Foundation with the Forest Department.


General Manager(M),
Sai Eternal Foundation.