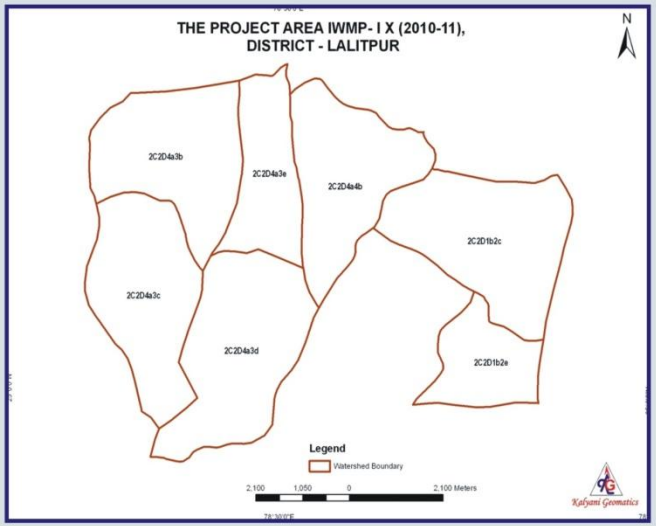
DETAILED PROJECT REPORT

OF INTEGRATED WATERSHED MANAGEMENT PROGRAMME-IX

LALITPUR



Prepared by :
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L.D.W.R., LALITPUR

Submitted to :
Dept. of Land Development &
Water Resources, LUCKNOW

CERTIFICATE

This is to certified that the proposed Watershed (IWMP-IX), Lalitpur, Uttar Pradesh has been selected for its sustainable development on watershed basis under Integrated Watershed Management Programme. The land is physically available for proposed interventions and is not overlapping with any other schemes. It will be developed as per Common Guidelines for Watershed Development Project-2008, GOI, New Delhi. The significant results will be achieved through proposed interventions on soil and water conservation, ground water recharge, availability of drinking and irrigation water, agriculture production system, livestock, fodder availability, livelihoods of asset less capacity building etc. The proposed **Detailed Project Report of IWMP-IX**, Lalitpur is approved for its implementation.

Bhoomi Sanrakshan Adhikari
IWMP - **IX**
Deptt. Of LDWR, Lalitpur-8, U.P.

Deputy Director
LDWR, Jhansi-II,
Place-Lalitpur U.P.

Project Director
DRDA, Lalitpur U.P.

Chief Development Officer
District- Lalitpur U.P.

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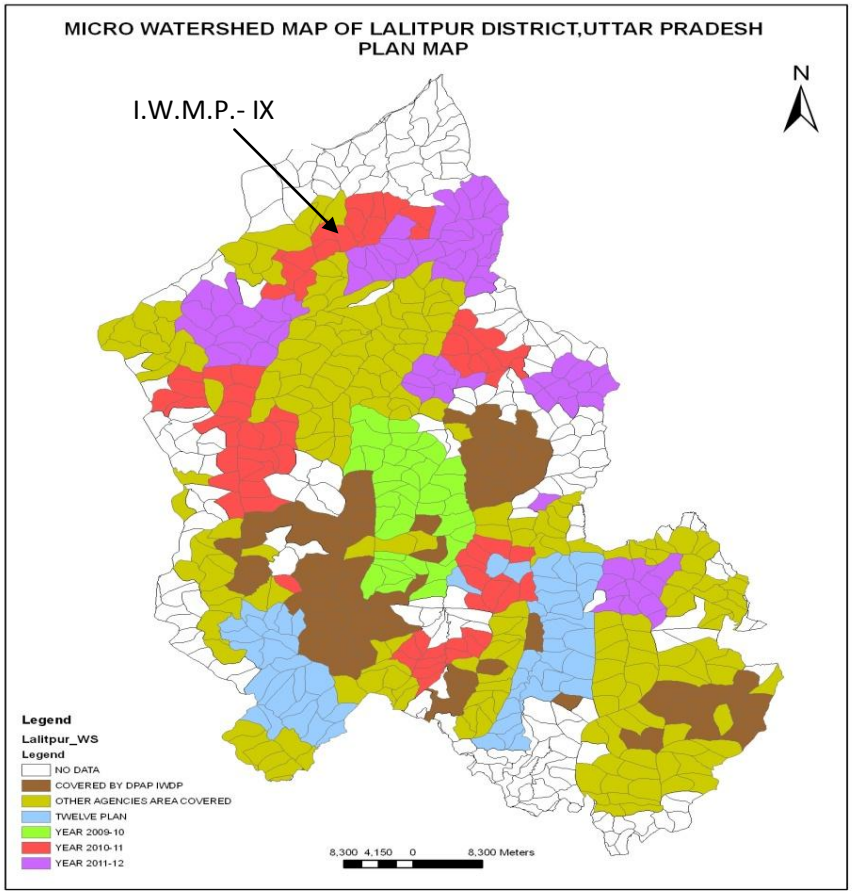
IWMP - IX (2010-11) DISTRICT – LALITPUR

Name of the project	Weigh-tage	No.of MWS	Geographial Area (ha)	Rainfed Area (ha)	Treatable area (ha)
I.W.M.P. - IX	85	07	5446	4935	4500.00



PROJECT AT A GLANCE

1.	Name of Block	TALBEHAT
2.	No. of Gram Panchayats	07
3.	Four reasons for selection of Watershed	i. Poverty index above 82% ii. Actual wages are significantly lower than minimum iii. Area under rainfed agriculture is more than 80 – 90%wages iv. Land with low production and reasonable efforts app licable.
4.	Date of approval of watershed Development Plan by DRDA/DPC	
5.	Area proposed to be treated (ha.)	4500.00 ha
6.	Date of sanction of PPR & Date of release of Ist Instalment	10-03-2010 & 15-06-2010
7.	Project duration	2010-2011 to 2013-2014
8.	Project Cost (in lac.)	540.00 Lacks
9.	Proposed mandays	280700

Table-1: PROJECT AT A GLANCE

1.	Name of Project	IWMP –IX, **KHERAR & JAMNI RIVER WATERSHED**
2.	Name of Block	TALBEHAT
3.	Name of District	LALITPUR
4.	Name of State	UTTAR PRADESH
5.	Name of Micro Watershed	Piprai-I2C2D4a3e, Budawani 2C2D4a3d, Chandrapur 2C2D4a3c, Piprai-II 2C2D4a3b, Churawani 2C2D1b2c, Karenga 2C2D1b2e, Sunori 2C2D4a4b
6.	Name of Village under Micro Watershed	Talbehat, Piprai, Tindra, Udguan, Sunora, Sunori, Avni, Hingora, Churawni, Budawni, Karenga, Chandrapur, Banguankhurd
7.	Micro Watershed Code Selected	2C2D4a3e, 2C2D4a3d, 2C2D4a3c, 2C2D4a3b, 2C2D1b2c, 2C2D1b2e, 2C2D4a4b
8.	Total Area of the Project	4935.00 Hec.
9.	Proposed Area for Treatment	4500.00 Hec.
10.	Cost per Hectare	Rs. 12000 per Hec.
11.	Project Period	YEAR 2010-11 TO 2013-14
12.	Total Cost of Project	Rs. 540.00 Lakhs

XECUTIVE SUMMARY

1. Breif about area

Uttar Pradesh portion of Bundelkhand is spatially very highly rural based where over 80% population is living in villages in an area extent of 99%. Against National figure of Rural/Urban ratio of 2.6, UP state has this ratio as 3.81 depicting overall poverty in the state.

The watershed approach has conventionally aimed at treating degraded lands with the help of low cost and locality accessed technologies such as in-situ soil and moisture conservation measures, a forestation etc. and through a participatory approach that seeks to secure close involvement of the user communities.

Land degradation control is essential if future rural production is to be maintained and improved. Land restoration measures, involving soil erosion control, enhanced vegetative cover and water run-off management will help to preserve the remaining soil and vegetation resources and assist in mitigating the severity of natural disasters. However, much of the land degradation is already irreparable and no amount of effort can overcome the existing damage. Any productive soil which is already lost through erosion has already permanently left the system.

The project area of I.W.M.P.-IXth of Lalitpur is located along Lalitpur - Jhansi Road about 05 Km. away from Block Talbahet and 45 Km from district headquarter. It lies between the longitude of 78^0 27'20" to 78^0 33'51"and latitudes 24^0 59' 14" to 25^0 03' 48", having watershed code no. 2C2D4a3e, 2C2D4a3d, 2C2D4a3c, 2C2D4a3b, 2C2D1b2c, 2C2D1b2e, 2C2D4a4b. Its altitude ranges from 294 to 344 m from the mean sea level (MSL). The total area of watershed is 5446.00 Ha. These micro watersheds are surrounded by the catchment of river kherar and jamni. This watershed is located in the North of LALITPUR District.

The project area comprises of **13** Villages namely Talbehat, Piprai, Tindra, Udguan, Sunora, Sunori, Avni, Hingora, Churawni, Budawni, Karenga, Chandrapur, Banguankhurd of Talbahet block of District Lalitpur (U.P.)

The climate of the region is characterized by long and intensive hot summer, low and irregular rainfall and short mild winter.

The catchment Kherar River covered by undulating land with slope ranges between (0.5 to 15%)and hillocks spreading here and there.

The soils of the study area can be divided into two broad groups namely red and black soils with three distinct soil associations (i) Bundelkhand coarse grained radish brown soils, (ii) Bundelkhand coarse grained grey to grayish brown soils and (iii) Bundelkhand clay loam black soils. In local parlance these soils are termed as *Rakar*, *Parwa* and *Kabar,* respectively. Horizon differentiation is almost absent. Soils are slightly acidic to neutral in nature with presence of CaCO3 granules in lower depths. Most of the soils are low in organic matter, available N and P and medium in available K. The watershed area has undulating terrain with scattered hills, crossed by the numerous streams and tributaries.

Agriculture practices in the project in the study area are **mono croping, *anna pratha***. The farmers generally leave their fields fallow for free range grazing system in Kharif season, which makes cultivation difficult. These livestock, generally sheep, goat and indigenous cattle, having low productivity are let loose for grazing. This needs changing mindset which needs massive extension efforts to address increasing demands on the land, rainfall and water resources and non manageable condition of mar and kabar soil of the district.

Though no organized orchards are present in the watershed, homestead planting of fruit trees of Lime and guava has been practiced by farmers. The sub-tropical fruits and vegetable have very good potential in the

watershed. Organized orchard, commercial vegetable cultivation, Horti-agri and other system of agro-forestry etc. are lacking but have good potential in the watershed.

The problem of erosion of the watershed is to be tackled by harvesting additional water in existing water harvesting structures, which have lost most of their capacity due to siltation and creating new water bodies. Water stored in the water harvesting structures shall be properly recycled to provide supplemental irrigation at critical growth stages of crops and for the establishment of fruit orchards and forest trees. The agricultural land will be treated with bunding along with minor leveling. Waste land will be treated with the engineering measures like staggered trenches and aforestation etc.

2. Institutional arrangement

This watershed has been identified by the state department under NWDPRA scheme by proper prioritization of different parameters for watershed selection criteria.

The area of watersheds is proposed to be taken by Bhoomi Sanrakshan Adhikari, Department of land development & water resources, Lalitpur for integrated watershed management programme (IWMP) starting from the year 2010-11. The project will be completed by 2013-14.

3. Salient project activities

The area is prone to soil degradation due to environmental impact and over exploitation of natural resources therefore it is an urgent need to restore the ecological balance for the sustainability. Fodder shortage, lack of inputs and market facility are some of the major constraints being experienced by the farmers.

It is proposed that the soil conservation and check in run-off water is required urgently. Therefore the certaine measures like contour bund, marginal bunds, and peripheral bunds are urgently required. On the other

hand to control the run-off water the water management practices like drainage treatment check dams and other practices have been propsed according to general geology of the project area.

The agricultural land will be treated with bunding along with minor levelling. Waste land will be treated with the engineering measures like staggered trenches and a forestation etc.

Most of the land of the project area is undulating because of its plateaus character, steep slopping encourage rapid run-off leading to soil erosion. Land is also degraded due to mining operation in the project area.To deal with these problems, a two- fold approach-Physical and social has to be adopted. Physical reclamation of land is achieved through chemical treatment of degraded land followed with scientific rotation of crops.Social approach on the other hand is reflected through overall rural reconstruction,promoting agriculture and its productivity in particular.

Table-2: *Watershed Development works including proposed engineering structures*

Component	Total (Lakhs) Amount	% of the bugdet
Soil & water conservation works	50.40	50%
A.Submergence bund		
B.Periferal bund	29.60	
C.Gully Plug	80.00	
Water harvesting & water resources works	100.25	
A. Earthen check dam.		
B. Water harvesting bund	69.50	
Afforestation works	6.75	
A.Horticulture works	13.50	
B.Agro forestry works	**270.00**	**50%**

Livelihood Activities (community Based)

Component	Total (Lakhs) Amount	% of the bugdet
Income generating activities through SHG's for landless and marginal farmers and livestock's development works	54.00	10%
Total	**54.00**	10%

4. Table-3: YEAR WISE PHASING (PHYSICAL & FINANCIAL) OF I.W.M.P. IX, LALITPUR (U.P.)

Area-Ha & Rs. In lakh

s.N.	Item	Physical year wise (area in ha.)					Financial year wise (Rs. In Lacs)				
		2010-11	2011-12	2012-13	2013-14	**TOTAL**	2010-11	2011-12	2012-13	2013-14	**TOTAL**
1	Administrative Cost	-	-	-	-	-	10.80	21.60	16.20	5.40	54.00
2	Expert for monitoring and evaluation	-	-	-	-	-	1.08	2.16	1.62	0.54	5.40
3	DPR Preparation	-	-	-	-	-	2.16	4.32	3.24	1.08	10.80
4	Entry Point Activities	-	-	-	-	-	4.32	8.64	6.48	2.16	21.60
5	Institutional & Capacity Building	-	-	-	-	-	5.40	10.80	8.10	2.70	27.00
6	Watershed Works	900.00	1800.00	1350.00	450.00	4500.00	54.00	108.00	81.00	27.00	270.00
7	Livelihood Programme	-	-	-	-	-	10.80	21.60	16.20	5.40	54.00
8	Production System & Micro Enterprises	-	-	-	-	-	14.04	28.08	21.06	7.02	70.20
9	Consolidation Phase	-	-	-	-	-	5.40	10.80	8.10	2.70	27.00
	TOTAL	900.00	1800.00	1350.00	450.00	4500.00	108.00	216.00	162.00	54.00	540.00

Budget for the various components is given below (I.W.M.P.- IX, LALITPUR)

S.N.	Budget Component	Total (lakhs)
A.	1.Administrative 2. Monitoring 3. Evaluation	54.00 5.40 5.40
B.	Preparatory Phase 1. Entry point activities 2. Institution and capacity building 3. Detailed Project Report(DPR)	21.60 28.50 5.40
C.	WATERSHED WORKS PHASE 1. Watershed development works, 2. Livelihood activities for the asset less persons 3. Production system and micro enterprises.	270.00 54.00 70.20
D.	CONSOLIDATION PHASE	27.00
	GRAND TOTAL	540.00

5. Treatment area and details

The main objectives of the project area are: to control damage by run-off, to manage and utilize run-off for useful purpose or soil conservation and to increase infiltration of rain water.

The main problem in a watershed is the soil erosion by rainfall. The run off water transport the sediments which may block the channel head, dam, reservoir and storage structures are the major problems faced in the project area and attempts made so far to overcome them. The other main problems in the selected watershed are : lack of awareness amongst the villagers about the deteriorating environmental condition of the area, 75% of the run off water makes it away to way towards Kherar river carrying fertile soil which has nutrients and this decreases soil fertility, there is a decline in the productivity of cereals, pulses and vegetable crops, dependency of farmers on the rain water. Therfore it is an urgent need, that rainwater should be harvested for crops and re-charged to improve the quality of the water.

Table-4: WATERSHED WISE TREATMENT AREA

S. No.	Name Of Micro Watershed	Area Of Micro Watershed (Ha)	Selected Area For Treatment (Ha)
1	Piprai-I 2C2D4a3e	520.521	431.00
2	Budawni 2C2D4a3d	990.345	820.00
3	Chandrapur 2C2D4a3c	865.303	716.00
4	Piprai-II 2C2D4a3b	868.029	716.00
5	Churawni 2C2D1b2c	970.693	802.00

6	**Karenga** 2C2D1b2e	415.900	345.00
7	Sunori 2C2D4a4b	815.209	670.00
	Total	**5446.00**	**4500.00**

6. Fact sheet about benchmark indicators

Gradually increasing soil erosion, poor harvesting management,single cropping pattern,non treated land and water resources have been required to take immediate action for conservation of soil and moistures various type earthen bunds in the watershed field, necessity has been observed, Stabilize Disturbed Areas immediately. Permanentstructures, temporary or permanent vegetation, and mulch, or a combination of these measures, should be employed as quickly as possible after the land is disturbed. Retain or Accommodate Runoff. Runoff from the development should be safely conveyed to a stable outlet using storm drains.

Table-5: Area Under Various LCC Classes Kherar and Jamni river Watershed

LCC class	Area ha
I II III IV	224.00 2700.00 902.00 674.00
Total	**4500.00**

7. Action plan at a glance

The preparation of detailed project report has been carried out by applying different steps for its compilation. A brief detail has been given below:-

Secondory or co-lateral data collection – During the field visit programme all available data spatial and non- spatial has been collected through village level from gram panchayat office and community block lavel office.

Paticipatry rural appraisal (PRA) has been conducted for detail survey of the village resource information.

Formation of User'group and self help group and different committees for the social awareness among the people of the study area have been formed.

Conducted watershed committee meetings at gram panchyat lavel, for the discussion of different problems and their appropriate solution according to need in the project area.

After gathering all required information compiled thoroughly discussed and finalized the expected out-comes and benefits specialy in the respect of livelihood for different segments.These are the target and and performers, indicators for the project area,

The draft of the detailed project report has been prepared for the approvel of the project.

CHAPTER-1

INTRODUCTION & BACKGROUND

1. PROJECT BACKGROUND:-

The broad objective was the promotion of the overall economic development and improvement of the socio-economic conditions of the resource poor sections of people inhabiting the programme areas. A comprehensive programme named Integrated Watershed Management Programme (I.W.M.P.) has been implemented under Common Guidelines on Watershed Development in 2008.

The main objectives of the IWMP are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. The outcomes are prevention of soil run-off, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table. This enables multi-cropping and the introduction of diverse agro-based activities, which help to provide sustainable livelihoods to the people residing in the watershed area. In addition, there is a Scheme of Technology Development, Extension and Training (TDET) is also being implemented to promote development of cost effective and proven technologies to support watershed management.

The study area is a cluster of 07 (SEVEN) micro- watershed, with code No.2C2D4a3e, 2C2D4a3d, 2C2D4a3c, 2C2D4a3b, 2C2D1b2c, 2C2D1b2e, 2C2D4a4b having area of 5446.00 Ha, is located in North of the Lalitpur district of U.P. The area of watersheds is proposed to be taken by Bhoomi Sanrakshan Adhikari, Department of land development & water resources, Lalitpur for integrated watershed management programme (IWMP-IX) starting from the year 2010-11. The project will be completed by 2013-14.

Most of the land comes under agriculture. The livelihood of these people is primarily based on rainfed agriculture, animal husbandry, wage labour and goat keeping..

Table-1.1: Basic Project Information

S. No.	Name of the Project	Villages	Gram Panchayat	Block	District	Total area of The Project	Area proposed to be treated	Total Project cost (Rs. in Lacs)	PIA
1.	I.W.M.P. - IX	Talbehat, Piprai, Tindra, Udguan, Sunora, Sunori, Avni, Hingora, Churawni, Budawni, Karenga, Chandrapur, Banguankhurd	Udguan, Budawani, Sunora, Sunori, Churawni, Hasarkalan	Talbahet	Lalitpur	5446.00	4500.00	540.00	Bhoomi Sanrakshan Adhikari Department of Land Development and Water Resource Lalitpur

2. NEED AND SCOPE FOR WATERSHED DEVELOPMENT

The main objectives are

(a) To control damage by run-off.

(b) To manage and utilize run-off for useful purpose or soil conservation

(c) To increase infiltration of rain water

Main problem in watershed Area

The main problem in a watershed is the soil erosion by rainfall. The run off water transport the sediments which may block the channel head, dam, reservoir and storage structures are the major problems faced in the project area and attempts made so far to overcome them. Following are the main problem in the selected watershed.

(a) Lack of awareness amongst the villagers about the deteriorating environmental condition of the area.

(b) 75% of the run off water makes it away to way towards Kherar river carrying fertile soil with has nutrients and this decreases soil fertility, there is a decline in the productivity of cereals,pulses and vegetable crops.

(c) Due to over grazing, vegetative cover is declining on community land. There is no grasses and even shrub. Vegetation is vanishing, River carry a huge silt every year

(d) Due to continuous cutting of trees, overgrazing bushes and shrubs ecological balance of the area has been hardly distrubed.

(e) Due to increasing populasion pressure of man and animal there is camptition for collection of food, fodder and fuel resources.

(f) The ground water of the watershed area is smelly and oily hence irrigation is not possible by this ground water. Farmers depends on the rain water., which flows directly of Kherarriver. Ther fore it is an urgent need, that rainwater should be harvested for crops and re-charged to improve the quality of the water.

3. WEIGHTAGE FOR SELECTION OF WATERSHED

Problem Identification And Prioritization

Food sufficiency, economic growth and environmental security were identified as the major issues to be addressed in the watershed area. The area has flat topography hence highly prone to soil erosion. Lack of irrigation water is the greatest problem experienced by the people followed by low function of field crops, lack of fodder availability and low animal productivity.

Problems identified and prioritized during the transact walk and PRA exercises in all villages Silgan, Gangari, Kakarua, Dawani, Nakwana, Bairwara, Durjanpura, Budwar, Patourakhurd, Jugpura, Kuatala, Paronda, Khiriyamishr, Pathagori, Maheshpura, Patourakalan, Pipariya Bansha were pooled and a list of nine problems representing the whole watershed was prepared. Problems were ranked as per their total weightage in these villages.

Problem identification and prioritization for watershed

S. No.	Problems	Rank
1	Low production of field crops	3
2	Lack of irrigation water	1
3	Lack of drinking water	4
4	Non availability of fuel wood	6
5	Lack of inputs like quality seeds, fertilizers, pesticides etc.	2
6	Medical and health care facilities for milching animals and low productivity	5
7	Lack of fodder availability and low annual productivity	7
8	Lack of medical educational and transportation facilities	8

Strength, Weakness, Opportunity And Threat (Swot) Analysis Is A Useful Decision Support Tool

A SWOT analysis of the project area is presented as below:

Strength (S)	**Weakness(W)**
1- Cooperative work culture is traditional activities 2- Close ethnic tier 3- Road at the top as well as outlet of the watershed 4- Hard working man power 5- Resource pool of crop genetic diversity 6- Awareness of farmers about watershed management program 7- Well established CPR maintaining and sharing system 8- Well maintained seasonal water bodies. 9- Social outlook of the community towards	1- Poor water management 2- Resource poor farmers 3- Out migration of youth 4- Low and erotic rain fall 5- Fragile geography 6- Fragmented land holding. 7- Heavy infestation of wild animals 8- Problem of fuel and fodder
Opportunities(O)	**Threats (T)**
1- Wide range of annual and personal crops 2- Scope of regular employment opportunity to check out migration 3- Strengthening of existing irrigation system 4- Conductive climate for rainfed crop diversification 5- Good scope for agro forestry and dry land horticulture. 6- Potential for collective active action and magement of CPRs.	1- Prone to adverse climate like drought 2- High market risk 3- Social conflicts owing to PRI & WSM policies and local policies. 4- Weak coordination among line departments. 5- Lack of expertise of implementing agencies in different aspect of WSM.

4. Table-1.2: Weightage of the project

Project Name	Project Type	Weightage													
IWMP - IX	IWMP	i	ii	iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii	xiv
		7.5	5	5	10	0	0	10	7.5	10	15	0	15	Na	85

Table-1.3: Criteria and weightage for selection of watershed

S.No.	Criteria	Maximum Score	Ranges & Scores			
i	Poverty index (% of poor to population)	10	Above 80 % (10)	80 to 50 % (7.5)	50 to 20 % (5)	Below 20 % (2.5)
ii	% of SC/ ST population	10	More than 40 % (10)	20 to 40 % (5)	Less than 20 % (3)	
iii	Actual wages	5	Actual wages are significantly lower than minimum wages (5)	Actual wages are equal to or higher than minimum wages (0)		
iv	% of small and marginal farmers	10	More than 80 % (10)	50 to 80 % (5)	Less than 50 % (3)	
v	Ground water status	5	Over exploited (5)	Critical (3)	Sub critical (2)	Safe (0)
vi	Moisture index/ DPAP/ DDP Block	15	-66.7 & below (15) DDP Block	-33.3 to -66.6 (10) DPAP Block	0 to -33.2 (0) Non DPAP/ DDP Block	
vii	Area under rain-fed agriculture	15	More than 90 % (15)	80 to 90 % (10)	70 to 80% (5)	Above 70 % (Reject)

viii	Drinking water	10	No source (10)	Problematic village (7.5)	Partially covered (5)	Fully covered (0)
ix	Degraded land	15	High – above 20 % (15)	Medium – 10 to 20 % (10)	Low- less than 10 % of TGA (5)	
x	Productivity potential of the land	15	Lands with low production & where productivity can be significantly enhanced with reasonable efforts (15)	Lands with moderate production & where productivity can be enhanced with reasonable efforts (10)	Lands with high production & where productivity can be marginally enhanced with reasonable efforts (5)	
xi	Contiguity to another watershed that has already been developed/ treated	10	Contiguous to previously treated watershed & contiguity within the micro watersheds in the project (10)	Contiguity within the micro watersheds in the project but non contiguous to previously treated watershed (5)	Neither contiguous to previously treated watershed nor contiguity within the micro watersheds in the project (0)	
xii	Cluster approach in the plains (more than one contiguous micro-watersheds in the project)	15	Above 6 micro-watersheds in cluster (15)	4 to 6 micro watersheds in cluster (10)	2 to 4 micro watersheds in cluster (5)	
xiii	Cluster approach in the hills (more than one contiguous micro-watersheds in the project)	15	Above 5 micro-watersheds in cluster (15)	3 to 5 micro watersheds in cluster (10)	2 to 3 micro watersheds in cluster (5)	
	Total	**150**	**150**	**90**	**41**	**2.5**

5. Table-1.4: WATERSHED INFORMATION

Name of the Project	No. of water sheds to be treated	Watershed Code	Watershed regime/type/order
IWMP - IX	07	2C2D4a3e, 2C2D4a3d, 2C2D4a3c, 2C2D4a3b, 2C2D1b2c, 2C2D1b2e, 2C2D4a4b	Micro Watershed

6. OTHER DEVELOPMENTAL PROJECTS/SCHEMES RUNNING IN THE VILLAGES:

These villages of the project area being very backward therefore have been on top priority for a number of developmental projects. These programmes are Swarnajayanti Gram Swarojgar Yojana (SGSY) and Indira Awas Yojana (IAY). Integrated Watershed Management Programme in other areas of the district is under operation in the department of Agriculture DPAP Programme is also running in the project area.

Table-1.5: Details on ongoing Development Programme

Sr. No.	Name of Programme	Impleme-nting agency	Objectives of the programme	Year of Commencement	Villages covered	Project Cost
1	Swarnajayanti Gram Swarojgar Yojana (SGSY)	DRDA	Farmulation of groups for weaker section of the BC/SC	On going	All the villages of the project area	-
2	Indira Awas Yojana (IAY)	DRDA	Provide low cast houses to the weaker section SC/ST	On going	All the villages of the project area	-

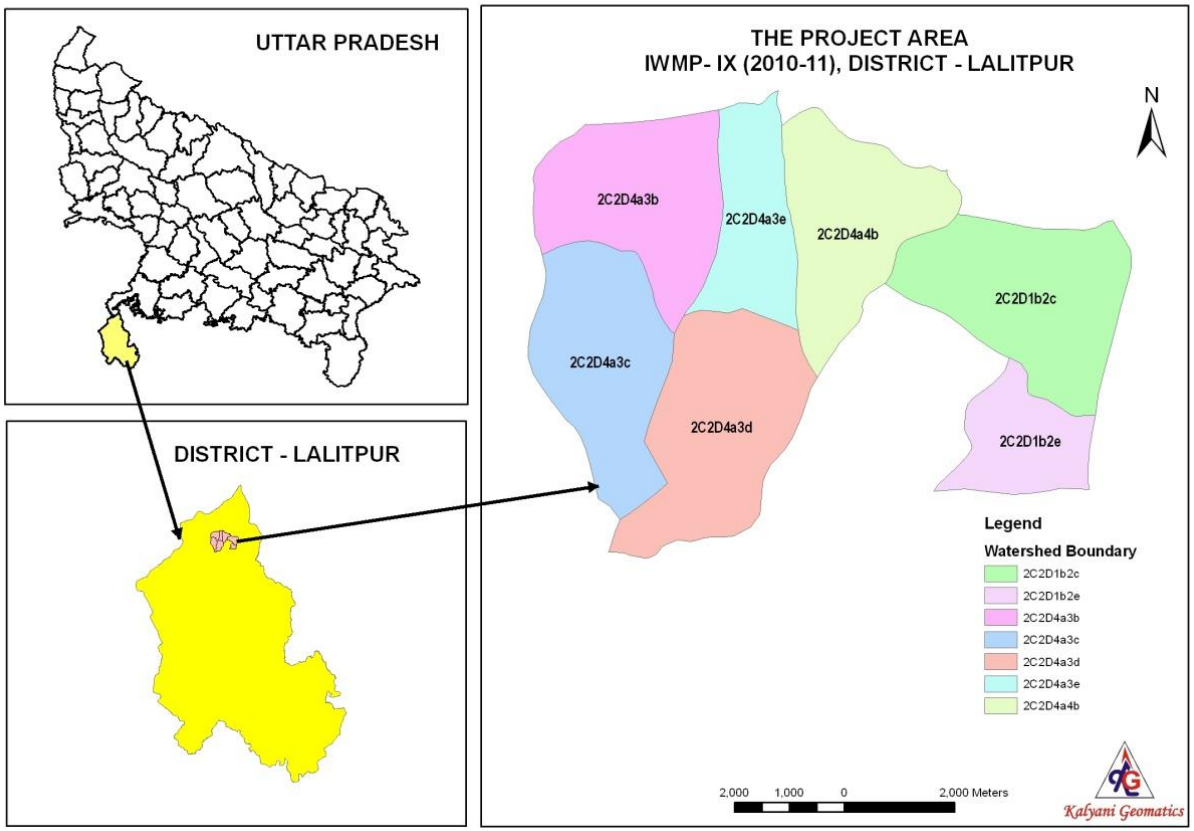
CHAPTER – 2

GENERAL DESCRIPTION OF PROJECT AREA

1. LOCATION

The selected watershed I.W.M.P. IX of Lalitpur district (UP) is located along Jhansi to Lalitpur Road about 05 km away from block Talbahet and 45 Km from district Lalitpur. It is located between the longitude of 78^0 27'20" to 78^0 33'51"and latitudes 24^0 59' 14" to 25^0 03' 48". There are 07 gram panchayat and 13 revenue villages in the project.

LOCATION MAP OF THE PROJECT AREA



2. AREA

Table-2.1: LANDUSE PATTERN OF THE PROJECT AREA

S. No	Name of District	No. of Micro-watershed	No. of Villages	Geographical Area (ha)	Rainfed Area (ha)	Forest(ha)	Land under agricultural use (ha)	Wasteland (ha)	Fallow Land (ha)
1	LALITPUR	07	13	5446.00	4935.00	1273.87	2064.00	1963	107

3. AGRO-CLIMATE CONDITIONS

The Agro-Climate condition of the project area including the Agro-Climate Zone of the project area, soil type, rainfall, major crops etc., of LALITPUR district is briefly describe below.

Table-2.2: DETAILS OF AGRO-CLIMATE CONDITIONS

S. No.	Name of Project	Name of Agro-climate Zone covered	Area (Ha)	Major Soil Type	Topography	Average Rainfall (mm)	Major crops	
							Name	Area (ha)
1	IWMP -IX, LALITPUR	Bundelkhand Zone	5446.00	Parwa, Kabar, Mar	Undulating with moderate slope	750 mm	Maize, Jowar, Wheat, Pulses	2460.00

4. PHYSIOGRAPHY

The watershed is in the Bundelkhand region having moderate slopes and drains into Kherar River. About 60% of the watershed area has slopes up to 3 %, 20% area has slopes up to 1% and 20% area has slopes from 3 to 5 %. A number of streams join the main perennial stream of Kherar and Jamni.

AREA OF THE SLOPE ACCORDING TO ITS %

Sl no	watershed Code	Category of slope in %	Area in ha
1	**I.W.M.P.IX**	**0 - 1**	**515.99**
		1 -3	**2641.36**
		3 -5	**1633.55**
		5 - 10	**326.38**
		10 - 15	**35.02**
		15 - 35	**7.40**

Total 119 numbers of streams of different order are found in watershed; with total length is 69500 meters.

Stream characteristics of watershed

Stream order	Stream Number	Mean stream length (m)
1st order	40	6400
2nd order	51	16000
3rd order	22	20600
4rd order	06	26500
Total	**119**	**69500**

Table-2.3: ELEVATION RANGE, LONGITUDE LATITUDE, RELIEF HEIGHT DIFFERENCE ETC,

S. No.	Detail s of the watershed	Settlement	Location		Elevation of watershed from Mean Sea level		
			Latitude (N)	Longitude (E)	Highest in Meters	Lowest in Meters	Relief Height Difference
1	2C2D4a3e	Piprai-I	25^0 01′ 35″ to 25^0 03′ 49″	78^0 29′02″ to 78^0 30′13″	329	296	33
2	2C2D4a3d	Budawani	24^0 59′ 14″ to 25^0 01′ 39″	78^0 28′15″ to 78^0 30′28″	344	309	35
3	2C2D4a3c	Chandrapur	24^0 59′ 34″ to 25^0 02′ 18″	78^0 27′21″ to 78^0 28′54″	344	305	39
4	2C2D4a3b	Piprai-II	25^0 01′ 24″ to 25^0 03′ 36″	78^0 27′21″ to 78^0 29′25″	329	300	29
5	2C2D1b2c	Churawani	25^0 00′ 46″ to 25^0 02′ 37″	78^0 31′11″ to 78^0 33′51″	321	294	27
6	2C2D1b2e	Karenga	24^0 59′ 53″ to 25^0 01′ 13″	78^0 31′46″ to 78^0 33′28″	322	304	18
7	2C2D4a4b	Sunori	25^0 00′ 59″ to 25^0 03′ 38″	78^0 30′07″ to 78^0 31′59″	331	297	34

5. CLIMATE

The watershed falls under the semi-arid region of tropical climate. The average annual precipitation is 750 mm spreading over 35 rainy days. Most of the rainfall (about 90 %) is received during July to September. The rainfall is of moderate to high intensity. The area receives no or scanty rainfall in the winter season. The temperature variation ranges from as high as 48º C in the month of May - June to as low as 4º C in December - January.

Table-2.4: Climate Conditions

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
	F %DEP.	R/F %DEP.	R/F %DEP.	R/F %DEP.	R/F %DEP.	R/F %DEP.	R/F %DEP.	R/F %DEP.	R/F %DEP.	R/F %DEP.	R/F %DEP.	R/F %DEP.
2006	0.0 -100	0.0 -100	75.0 862	0.0 -100	25.6 282	63.7 -32	309.5 -11	183.1 -46	67.4 -61	0.0 -100	0.0 -100	0.0 -100
2007	0.0 -100	49.6 310	0.0 -100	1.0 -70	0.0 -100	78.5 -16	176.9 -49	199.2 -42	88.1 -49	0.0 -100	------	-----
2008	0.0 -100	0.0 -100	0.0 -100	10.4 55	514.5 453	142.2 -59	64.0 -81	11.5 -93	4.0 -87	-----	------	-----
2009	26.0 7	-----	1.5 -78	44.5 -52	216.5 -37	184.5 -46	121.5 -30	96.5 209	50.0 255	11.5 34	------	-----
2010	3.0 -88	9.5 -21	0.0 -100	0.0 -100	0.0 -100	22.0 -76	322.0 -7	201.0 -41	119.0 -31	29.0 -7	47.0 233	1.5 -83

6. WIND VELOCITY

The Wind velocity of the Project area ranges from 4-17 Km/hr.

7. WATERSHED CHARACTERISTICS

Shape and Size

The shape of watershed (IWMP - IX, LALITPUR) is more or less Cylindrical in shape. The direction of the slope in the project area is north-east to south- west. The maximum length and width of IWMP -IX watersheds, are 10826 m and 8194 m, respectively with the length: width ratio 1.32:1

Table-2.5: SHAPE AND SIZE OF WATERSHED

S. N.	Micro watershed Code	Area (ha)	Shape	Approximate size in meter		Ratio Length: width
				Length	Width	
1	2C2D4a3e	520.521	Rectangle	4007	1301	3.07:1
2	2C2D4a3d	990.386	Elongate	4999	3245	1.54:1
3	2C2D4a3c	865.303	Rectangle	4949	2663	1.85:1
4	2C2D4a3b	868.029	Square	3700	3610	1.02:1
5	2C2D1b2c	970.693	Rectangle	3160	2536	1.24:1
6	2C2D1b2e	415.900	Square	4054	3226	1.25:1
7	2C2D4a4b	815.209	Traingle	4358	3174	1.37:1

8. GEOMORPHOLOGY

The area lies in the middle of District-Lalitpur of Bundelkhand region. The soil is mainly clay soil which is easily transportable after detaching causing soil erosion. Topography is Moderate and Undulating with steep slopes.

Table-2.6: DETAIL OF SOIL EROSION (I.W.M.P.- IX) LALITPUR

S. No.	Name of the Project	Water Erosion (Ha)				Run-Off (mm/yr)	Average Soil Loss in tons/ha/yr	Wind Erosion
		Sheet	Rill	Gully	Total			
1	IWMP - IX	3132	1791	377	5300.00	430	25 to 30	N.A.

9. SOILS

In the watershed area mainly four typos of soil named. Mar, Kaber, Padawa & Rocker which are the main soil type of Bundelkhand region. Main crops are pulses that need more phosphorous. Therefore deficiency of phosphorous is very prevalent in this area.

10. DRAINAGE

Due to moderate to steep slopes and presence of a number of drainage lines, drainage is adequate. The watershed forms a part of the KHERAR river

11. NATURAL VEGETATION

Natural vegetation of the watershed is very poor. The forest vegetation is predominant with *vilayati Babool* (prosopis Juliflora) followed by *babool* (Acacia nilotica). There is occasional occurance of Neem, Mango, Guava, Lemon, Amla, Mahua and Shisham. There is no reserve pasture land in the watershed. Grass patches are seen only on the bunds, road sides and other such places. The principal grasses are Doob & Munj.

CHAPTER-3

BASELINE SURVEY

A DETAILED BASELINE SURVEY OF THE PROJECT AREA WAS CONDUCTED TO THE STUDY MAJOR SOCIO-ECONOMIC AND BIOPHYSICAL CONSTRAINTS TO SUSTAINABLE CROP PRODUCTION. THE FOLLOWING INFORMATION WAS COLLECTED

Sustainability and Environmental Security

In the proposed watershed management plan of Sajnam proper blending of bio engineering measures will be applied. The proposed land use plan will improve the land utilization index and crop diversification index significantly as compared to existing one. It will help in maintaining ecosystem integrity on sustained basis.

Economic Analysis

Economic analysis of the project is carried out by taking direct benefits and costs, considering 30 year project life at 10% discount rate. For the purpose of economic analysis, whole watershed development plan is divided into four sectors namely agriculture (rain fed and irrigated), pure horticulture, agro-horticulture and silvi pastoral (Silvi-Pastoral + sericulture). Net present value (NPV), Benefit Cost Ratio (BCR), Pay Back Period (PBR) and Internal Rate of Return (IRR) criteria is employed to judge the economic efficiency of each enterprise, sector and project as a whole.

DEMOGRAPHIC INFORMATION

HUMAN AND LIVESTOCK POPULATION

The I.W.M.P – IX, watershed project has a total population of 20999 out of which 11268 are male and 9731 are female.

Table-3.1: HUMAN AND LIVESTOCK POPULATION

Village	Total no. of House hold	Total Population	Male	Female	SC Population	ST Population	SC Population Female
Churawni	246	1240	662	578	204	107	97
Karenga	140	812	427	385	442	235	207
Evani	215	1076	572	504	567	306	261
Hingora	154	892	491	401	278	150	128
Sunora	103	662	377	285	125	71	54
Chandrapur	178	822	477	345	216	130	86
Sunori	455	2407	1309	1098	767	430	337
Piprai	245	1135	620	515	459	233	226
Budawni	196	986	524	462	172	88	84
Udguan	108	561	311	250	171	94	77
Tindra	50	424	229	195	124	66	58
Vanguankhurd	53	355	182	173	43	21	22
Talbehat	2377	14043	7490	6653	1455	-	-
TOTAL	4520	25415	13671	11844	5023	1939	1637

EMPLOYMENT GENERATION

Labor migration in search of gainful employment is one of the major problems in the remote watershed in particular. Causal employment opportunities to the tune of more than0.35 lacs will be generated during the implementation of the project activities. However, the changes in land use pattern and adoption of other subsidiary enterprises will generate employment opportunities for persons of 199.80 lakhs in the watersheds.

MIGRATION PATTERN

Labour migration in search of gainful employment is one of the major problems in the remote watershed in particular. People migrate during summer season to different parts of the state as daily wagers, agricultural labours and construction workers. The detail is given below.

Table-3.2: DETAILS OF MIGRATION (I.W.M.P.-IX) LALITPUR

S.No.	No. of the villages	No. of persons migrating	No. of days per year of migration	Main reason for migration	Expected reduction in no. of persons migrating
1	13	224	150	Poverty & Unemployment	124

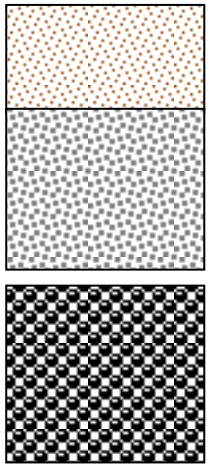
Soil and land Capability Classification

Soil Morphology: The selected area is situated in the North of District- Lalitpur. The entire watershed is topographically divided into two major land forms. Accordingly, the soils of watershed have been grouped in the two major categories.

1- Slope land

2- sloppy and Heavy sloppy land

Soil Profile: **A Representative Soil Profile**



1-1.5 (Heavy texture clay-soil Blackish Brown in color)

5 -8m (Locally called "Potni soil")

7 –8 m [Bed rock (red sand stone)]

Morphology Of Typical Solid Profile Of Watershed

Horizon	Depth(Cm)	Morphology
A	0-150	Blackish brown in colour, clay content > 80%, soft and easily erodible when moist, hard when dry, high elasticity, Cracks occur when dried.
B	150-800	whitish brown in colour, very hard when dry, clay content > 60%
C	>800	Bedrock(Red and White sand stone)

Soil Characteristics and Fertility Status:

Three types of soils are in the watershed area. The fertility status is about normal range due to production of major pulses crops. There is scarcity of phosphorus due to continuous growing of pulses. The four soil samples of each village, three for nutrients analysis and one for sulphur and micro nutrients analysis have been send to laboratory. After receiving the analysis report effort will be made to motivate the farmers to use nutrients and micronutrients according to the any analysis report. For this demonstration of crop in Kharif and Rabi both seasons have been proposed under agriculture production activity.

Land Capability Classification (LCC):

Land capability classification(LCC) is crucial for appropriate land use planting consisting of practiced like choice of vegetation /crops, tillage practices, use of scientific method of cultivation and desirous conservation practices, Detailed LCC Survey carried out in the Kherar watershed brought out the prevailing LCC classes as I,II,III,IV

LCCmaps prepared by PRA method. *Situ* moisture conservation practices. In class III submergence bund, marginal and peripheral bund are planned and in class IV, gully plugging structures, earthen check dam and water harvesting bunds are proposed with permanent Pucca Drop Spill Way structures.

PRESENT LAND USE IN THE WATERSHED

Spatial information on land use/land cover is a necessary prerequisite in planning, utilizing and management of natural resources. In the current days context of development planning, information on land use/land cover and the changes over a period of time attain prominence because of its primary requirement in all the planning activities. The present watershed have varied land/use land cover categories as shown in table below. One such map of land use/ land cover of the watershed is shown in Annexure Map. The details of the Landuse/Landcover catagories in the project area is given in below

Table-3.3: THE LAND UNDER DIFFERENT CATEGORIES WITHIN WATERSHED

S. N.	Watershed Code	Name of villages falling in the watershed	Built-Up Land	Fallow Land	Wasteland all types	Agriculture	Water Bodies	Forest	Total
1	2C2D4a3e	Piprai-I	6.13	2.10	231.83	158.00	-	122.46	520.52
2	2C2D4a3d	Budawani	52.15	2.2	273.88	440.44		221.67	990.34
3	2C2D4a3c	Chandrapur	7.14	5.45	208.66	462.95		181.18	865.30
4	2C2D4a3b	Piprai-II	2.13	5.10	357.71	447.36	10.12	45.60	868.029
5	2C2D1b2c	Churawani	8.72	4.5	379.52	390.68		187.27	970.69
6	2C2D1b2e	Karenga	3.78	7.45	171.57	149.57	5.62	75.91	415.912
7	2C2D4a4b	Sunori	12.89	8.12	432.12	211.69	5.05	147.28	815.209
		Total	92.94	34.92	2055.29	2260.69	20.79	981.37	5446.00

Present Landuse/Landcover of the project area

S.N	Landuse	Area (ha)	%
1	Built-up land	92.94	1.7
2	Waste Land	2055.29	37.73
3	Water Bodies	20.79	0.38
4	Agricultural Land	2260.69	41.53
5	Forest Land	981.37	18.02
6	Fellow	34.92	0.64
Total		**5446**	**100**

DESCRIPTION

The present LU/LC map has been depicted through the satellite data of January, 2010 (Google). A total no. of 5 major categories of LU/LC has been mapped.

BUILT-UP LAND

All the major settlement areas have been mapped under this category and the total area under category is 92.94Hectare which is 1.7 % of the total mapped area. Under this category road network and other built-up area has also been included.

WASTE LAND

Land which is deteriorating for lack of appropriate water and soil on account of natural causes comes under this category. The total area under this category comes about 2055.29Hectare which is 37.73% of the total mapped area. The sub categories are like Salt affected land, Gullied/Ravenous Land, Scrub Land etc.

WATER BODIES

This category comprises area with surface water either impounder in the form of ponds, lake & reservoirs. The total area under this category comes about 20.79Hectare which is 0.38 % of the total mapped area.

AGRICULTRAL LAND

These are the lands primarily used for farming and for production of food; it includes land under the (irrigated and un-irrigated). Areas with standing crop as on the date of satellite overpass. Cropped areas are in varying shape and size in a contiguous and non contiguous pattern. They are widely distributed in different terrains; prominently appear in the irrigated areas irrespective of the source of irrigationIt is important to know that the project area has maximum two crop areas i.e. Kharif and Rabi. The average size of the agricultural field is less than 0.5 Hectare. The total area under this category comes about 2260.69 Hectare which is 41.53 % of the total mapped area.

FOREST LAND

These are the areas bearing an association predominantaly of trees and other vegitation (within the notified forest boundaries) Capable of producing timber and other forest produce. The total area under this category comes about 981.37Hectare which is 18.02 % of the total mapped area.

AGRICULTURE

Various agricultural land uses in the watershed are extended to diversified land capabilities starting from marginal to good class II lands. The watershed distinctly has three types of lands i.e. leveled, sloping and degraded and undulating. The agriculture is practiced on all these soil types though the productivity considerably varies. The total area under agriculture in the watershed is about 5815 ha out of which 6382 ha is under rain-fed agriculture. The water (both irrigated and drinking) is most scarce natural resource in the watershed. The operation of tube wells for irrigation of agricultural crops frequently leads to the drinking water problem to the farmers of watershed forcing them to carry drinking water from outside the watershed area. The agricultural field bunds are common in the watershed, however, they frequently breach on heavy rains adversely affecting the *in situ* percolation of rain water in the soils.

The agriculture soils in the watershed have diversified texture i.e. loam sand, silty clay loam and boulder mixed textures which are located in patches throughout the watershed. The heavy soils are almost kept fallow during rainy season. The agricultural soils also have hard calcium pan at variable depths. The irrigation water is conveyed in earthen channels and surface irrigation methods following mainly border method or flood method of irrigation by the farmers in the watershed. These factors substantially reduce the water use efficiency of limited available and valuable irrigation

water in the watershed. The quality of irrigation water needs to be tested for assessing fitness of the quality for irrigation and other purposes.

Rehabilitation of waste lands with appropriate drought hardy species like *Prosopis juliflora*, introduction of suitable multi-purpose trees, promoting agro-forestry on agricultural lands with appropriate fruit and forest species, suitable vegetative barriers on sloping lands can of high future value in meeting out not only fire wood and fodder demands in the watershed but also for soil and water conservation, rehabilitation of wasteland and substantial income generation for socio-economic upliftment of farmers in the watershed.

One year rotation

Single cropping

Fallow-Lentil, urd- Gram, Urd-wheat, Arhar, Maize-pea.

Double cropping

Black gram/ green gram- mustard/ wheat/ gram/ lentil/ winter vegetables

Irrigated agriculture

One year rotation

Black gram/ green gram- mustard/ wheat/ winter vegetables

Crop Productivity

Food crop production is a major land based activity in the watershed. Traditional cultivation practices, coupled with poor quality seeds and long duration crops varieties result in low crop yields. Crops are taken under rain fed as well as irrigated conditions. The yield levels of rain fed crops are particularly very poor. Large variation has been noticed in productivity of wheat (9-19 Qtl/ha) under rain fed and irrigation, condition respectively. At present level of rain fed farming. The total produce from Rabi and Kharif crops obtained by a medium size of holding owning family can meet food requirements for up to 6 to 7 months only.

The farmers also do not have suitable cropping systems to deal aberrant weather. Weeds impose considerable constraint in producing of both Kharif and Rabi crops under irrigation as well as rain-fed production system. Use of weedicide is rare in the watershed.

The mixed cropping is in practice in limited area with Kharif crops like jowar+Arhar but it is not only irrational but also unscientific and beset with low productivity. Subsequent rabi crops in general are raised on residual soil moisture under rain-fed production system during past monsoon season. Imbalanced use of fertilizers is common in not only Rabi and Kharif crops but also in rain fed and irrigated production system. The recommended deep ploughing for enhanced in situ residual soil moisture conservation and higher production is also not followed in the watershed. The shallow ploughing tractors drawn tillage implements are available with the farmers in the watershed but deep ploughing implements yet need to be introduced.

The soil fertility/health restoration practices like green manuring, crop rotations and intercropping specially with legumes, use of FYM/compost, vermi-compost , bio fertilizers ,soil and water conservation measures, use of brought up or in situ mulches are widely lacking in the watershed. The soil and water conservation measures are limited to mechanical/earthen measures created by the state Govt. agencies. Conservation agronomical measures like seeding and ploughing across the slope, wed mulching, agro-forestry, vegetative barriers etc also completely lack in the watershed.

Indigenous Technological Knowledge (ITK)

Agriculture is an old age occupation which farmers have practiced and improved in their own manner to earn livelihood under the condition of area. The villagers have their traditional village ponds, practice of field bunding, production of Arhar, til crop on the bunds in paddy area which typically constitute agriculture related ITKs in the watershed. The indigenous farming technology in the watershed is observed to cover a vast spectrum of

activities involving tillage, implement crop selection, storage of produce and value condition in Buldelkhand region line showing is in the traditional practice due to the soil condition. Seed drill, seed comfort drill is used with tractor and Nai/chonga with indigenous plough. These ITKs are eco-friendly, cost effective and involve use of local materials with farmers own wisdom. These techniques equip farmers with skills and strength to adapt to the prevailing adverse conditions.

Economics of The agriculture sector.

S. No.	Sector	Area (ha)	NPV (Rs.)	BC ratio
1	Irrigated agriculture	1353	73500000	1.6:1
2	Rain fed agriculture	3947	8290170000	1.2:1
3	**Total**	**5300**	**8363670000**	**1.4:1**

Mono cropping of the above mentioned crops is the usual practice. Selection of crops is very traditional. They go for species those are being cultivated since their forefathers due to non-availability of improved varieties of seeds and lack of awareness. But this area is suitable for non-paddy crops like Sugarcane, mustard, potato & wheat. Our major initiative will be to encourage inter cropping of paddy with local Arhar, The other feasible options should be intercropping of cereals + pulses/deep rooted + shallow rooted/ long duration + short duration varieties to reduce the risk factor & make optimum utilization of soil nutrients.

Local seeds are being used in all crops except for vegetables in which some high yielding varieties are being used. As far as use of pesticides is concerned, pesticide and fertilizer are being used only for paddy, ragi, and vegetables.

Ackages for improvement in the present status of agriculture

i) Cultivation on scientific basis i.e., line sowing, space maintenance, use of good quality & sufficient quantity of organic compost, proper irrigation and proper storing technique.

ii) Introduction of new potential crops like Sugarcane, Mustard and Wheat which has more economic value and opportunities for wider replication.

iii) Use of improved or high yielding variety seeds along with the local varieties Cultivation of profitable vegetables on large scale for which the area is very suitable to generate income and take care of the nutrition aspect. During the current ($2^{nd)}$ year it as per area suitability & beneficiaries' choice rabi vegetable cultivation has been taken up.

iv) Cultivation of grafted mango, grafted cashew, high yielding papaya varieties and drumstick on large scale so as to generate profit and as well as conserve the soil & moisture. In the current year itself mango, papaya, drumstick & guava have been taken up.

As far as agricultural implement is concerned, they are all very traditional. There is no usage of modern implements. Training of key farmers and volunteers will be one of the priority areas to ensure implementation of the work at field level. The different topics to be covered are:

i) Preparation of compost pit, Magic/vermi compost and other organic farming techniques.

ii) Judicious use of chemical fertilizers, its dose, application stage and method of application.

iii) Demonstrations on bio-fertilizers usage and benefits.

iv) Preparation and application method of indigenous organic pesticides along with judicious use of common chemical pesticides, its dose and application technique.

Agriculture Development

- Demonstration of better agriculture practices like sustainable and organic practices; the demonstration plots to an extent of 0.50 ac per each demonstration are identified.
- Training on sustainable agriculture practices through organic approach
- Construction of a new check dam in the upper ridge.
- 20 families will take up compost demonstration and production exercise
- Take up vegetable cultivation in the backyard
- Liaison with the agriculture department for better organic farming practices in 10 Ha.

Crop production

Mulching and crop residue management

The sources of mulching material as brought up mulch i.e. litter or pruned material of trees etc are scarce in the watershed. The weeds, *in situ* grown legume and multipurpose trees (as hedge row or on marginal and degraded lands) are some of the options available with growers for mulching the rain-fed crops for moisture conservation, fertility restoration and other purposes. Therefore, weed mulching and hedge row of MPTs will be demonstrated in the watershed for benefit of the rural community.

Green manuring

Intensive cropping with inadequate application of organic manures i.e. FYM, compost etc, has over exploited the existing agricultural production system in the watershed. In order to improve the fertility as well as physico-chemical properties of soils green manuring *insitu* and *ex-situ* with suitable crops like *dhaincha*, sun-hemp and Neel are proposed to be demonstrated in the watershed areas.

Vermi-composting

In order to provide quality manure with high nutrient content to various field crops, vegetables and cash crops, to save time and proper disposal of on farm organic refuse and cow dung as well as to promote organic farming, vermin-composting will be demonstrated to the farmers so that within a short period they can be able to produce manure from organic waste.

Crop rotation and intercropping

In order to diversify farm produce, minimize the farming risk, mitigate soil erosion, to ensure nutritional security and to optimize farm return, intercropping of legumes (black gram and green gram) in inter row spaces of bajra are proposed to be undertaken in the watershed during *kharif* season. Sustainable and profitable crop-rotations suiting to various needs of the people of the watershed will be demonstrated.

Bio-fertilizers

The various beneficial bio-fertilizers like nitrogen fixers, phosphate solubliser and organic matter decomposers for both legumes and non legumes will be demonstrated in the farmer's field under the watershed villages.

Tillage operations

Deep tillage technology developed at the Agra center holds promising in enhancing post monsoon residual soil moisture conservation and improving the yield of subsequent mustard crop. This technology is proposed to be demonstrated for benefit of farmers in the watershed.

Introduction of improved seeds of high yielding varieties (HYV)

Replacement of low yielding traditional varieties of jowar, gram and lentil in the villages in the watershed with improved varieties is necessary for improving the productivity and farm income. These HYVs will be demonstrated in the watershed for the benefit of the farmers.

Balanced fertilizer use

Inadequate and imbalanced fertilizer use in bajra and jowar during *kharif* season and in wheat, mustard, gram and lentil in *Rabi* season are one of the major constraints in agricultural production system of the watershed. Therefore, balanced fertilizer use in different crops will be demonstrated in the watershed for the benefits of the farming community.

Control of insect pest and diseases

Aphid in the mustard and pod borer in gram are the major insects in the watershed areas leading to loss in crop productivity. Similarly white blister is also a common disease in the mustard crop. The management strategies of these insect pests and diseases will also be demonstrated in the watershed for benefit of the growers.

VEGETATION

(a) Natural Vegetation:

Natural vegetation of the watershed is very poor. The forest vegetation is predominant with *vilayati Babool* (prosopis Juliflora) followed by *babool* (Acacia nilotica). There is occasional occurance of Neem, Mango, Guava, Lemon, Amla,
Mahua and Shisham. There is no reserve pasture land in the watershed. Grass patches are seen only on the bunds, road sides and other such places. The principal grasses are Doob & Munj.

Management of the crop

The recommended technology (14) of crop management will be demonstrated to the farmers in half plot trial approach so as to enable the farmers to assess the benefits and impact of each technology or package of practice for their ultimate adoption in the watershed**.** The interventions scheduled on prioritization of problems in the crop production following PRA and surveys target specifically solution of the each and problem related to the crop production as per interventions at 14. The specific problems, if any shall be dealt with contingency budget.

Dry land Horticulture

About 14.50 ha of land is suitable for horticultural development. Species like Bael and Ber will be planted at suitable spacing in the watershed.

Agri- Horticultures

Amla and Sahjan would be a suitable horticultural crop to the locality. Therefore, about 4.00 ha land in the farmers field shall be selected and brought under Agri-horti system. The cropping system followed will be Bajra and Wheat.

The watershed does not have organized orchards; however, farmers have fruit plants (mango, ber, bel, guava, mahua, amla etc.) near the homesteads and kitchen gardens. The climate and soil of the area is favorable for fruit growing for sub tropical fruits in the lower reaches. Organized orchards, commercial vegetable cultivation, agro horticulture, and other system of agro forestry etc. are lacking but have good potential in the watershed. The watershed is located near the national highway and North Central railway line and has scope to transport the produce to the nearest market Kanpur, Jhansi even to Delhi.

Farmers Preferences

Fruit Trees

Farmers' preferences for fruit trees are solicited in terms of attributes like production, market availability and timber wood value. Overall, Amla, Guava, Ber, Lemon, Papaya is found most preferred fruit tree.

Fodder Trees

Farmers also do not have any preferred fodder tree in the watershed in spite of fact that watershed falls in semi arid tract. The marketing facilities, lack of follow up of modern scientific package of practices of cropping potential in the watershed, socio-economical factors etc. is found to be most important factors deciding the preferences of farmers pertaining to selection and cultivation of agricultural crops, fruits, or fodder trees in the watershed.

Land ownership details

Non-legal possession of government or patta land has become a common feature to the community dwellers as they carry a notion that the existing land and forest belongs to their forefathers and the govt. has nothing to do with this. As a result the encroachment is one of the main issues to be tackled in future course of post management of the watershed project. The encroachment by the community in the forest, pasture and other common land area is increasing at a disproportion rate. It is observed by the project social workers that rich farmers are encroaching the more common lands than landless families in the watershed. It is felt that persons with more man-power and better financial status are enjoying the CPR at higher rate than compared to the land less laborers

Labour Requirement

Labour requirement is found to be maximum during October-November, when the harvesting of Kharif and sowing of Rabi crops are done simultaneously. The other crucial periods are March-April when harvesting and threshing of Rabi crop is done and July-August when sowing of Kharif crops tales place. Other income generating enterprises having potential during the remaining month should be planned to reduce the migration of labours.

Agro forestry

The agro forestry practices are highly lacking in the watershed though it has good potential under existing dispositions and may play a vital role particularly with respect to minimization of cropping risk, built up soil fertility and productivity soil conservation, partly meeting out the fire wood demand of rural community and moreover, optimizing the watershed the other agro-forestry systems like agri-silvi, silvi-pastoral, bund and boundary plantations also have good potential to cater the firewood and fodder demands of the rural community in the watershed. The existing area under agro forestry is almost negligible. *Prosopis juliflora* may be planted as block or sole plantation especially on marginal and degraded lands in the watershed. The agro-forestry interventions comprising of ber, bel, amla, guava, teak etc may be applied for benefit of farmers under rain fed to irrigated production systems on leveled to slopy and marginal agricultural using proper planting techniques and termite control measures. The multipurpose trees may also help in supplementing fire wood and fodder

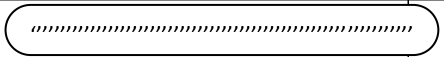
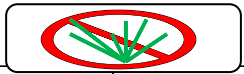
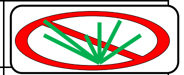
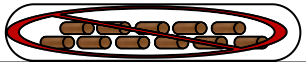
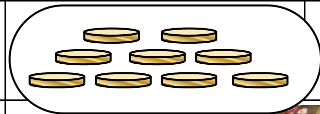
demands of the rural community in the watershed and may be planted as hedge rows on rain-fed, marginal and degraded lands.

Horticulture

The fruit trees are in limited in number like Mango, guava, papaya, lemon, lime, ber, aonla as well as vegetables like cucurbits, okra, radish, tomato, cauliflower, cabbcge, garlic, onion, brinjal, chilly but they are found surviving well in the watershed villages. The subtropical fruits and vegetables have very good potential in the watershed. Organized orchards, commercial vegetable cultivation, horti-agri and other systems of agro-forestry etc are lacking but have good potential in the watershed.

SEASONAL ANALYSIS

Seasonal analysis has done with the help of farmers about rainfall patterns, cultivated crops, employment, income, availability of fuel, fodder, migration, transport and health hazards, etc. with respect to seasonal variation in a year which is shown as below:

Month Item	January	February	March	April	May	June	July	August	September	October	November	December
Festivals			Holi	Baisakhi			Rakshabandhan			Dashara	Diwali	Guru Parv
Sowing crops/ harvesting			Mustard			Maize, Paddy, Arhar				Wheat		
				Wheat, Arhar					Maize, Paddy			
Disease	Cough & Cold					Gastro Intestinal/ Loose-motion.			Fever			
Purchase/ Expending					☺☺☺☺☺						☺☺☺☺☺☺☺☺☺☺	
Rains												
Fodder Scarcity												
Fuel/ wood scarcity												
Loaning period (required)												
Marriage Period												
Drinking Water Scarcity												
Irrigation Water Scarcity												

LAND HOLDING PATTERN

Majority of the watershed farmers are in category of marginal (< 1 ha) and small (1-2 ha). These small land holding are further scattered in different places which makes cultivation very difficult.

S. No.	Name & Code no. of micro watershed	Land holding classification				Percentage		
		Marginal	Small	Others	Total	Marginal	Small	Others
1	Piprai-I 2C2D4a3e	36	160	106	302	12	53	35
2	Budawni 2C2D4a3d	63	310	201	754	11	54	35
3	Chandrapur 2C2D4a3c	44	308	137	489	9	63	28
4	Piprai-II 2C2D4a3b	67	282	164	513	13	55	32
5	Churawni 2C2D1b2c	67	297	196	561	12	53	35
6	**Karenga** 2C2D1b2e	29	128	85	242	12	53	35
7	Sunori 2C2D4a4b	56	272	141	469	12	58	30
	Total	363	1758	1029	3150	11.6	55.6	32.9

IVESTOCK POPULATION

The information on live stock collected through PRA Levels .Total livestock population of the watershed is 6851. Buffalo is preferred as milch animal compared to cow, but milk yield is very low. Goats are also kept for milk as well as for meat purpose. The breakup of livestock population is as follows.

Table-3.4: VILLAGE WISE ANIMAL POPULATION

Village	Buffalo	Cow	Ox	Calf	Buffalo child(M)	Buffalo child(F)	Goat/Sheep	Birds etc.
Village	**Buffalo**	**Cow**	**Ox**	**Calf**	**Buffalo child(M)**	**Buffalo child(F)**	**Goat/Sheep**	**Birds etc.**
Talbehat	13	29	32	29	37	34	71	61
Piprai	56	81	24	13	9	13	104	23
Tindra	19	33	18	13	7	5	33	19
Udguan	78	216	38	53	21	23	82	149
Sunora	84	172	38	42	19	21	117	99
Sunori	96	183	44	61	27	30	18	116
Evani	93	129	38	43	29	27	161	172
Hingora	87	44	49	39	31	32	23	94
CHurawni	89	163	34	34	29	27	119	89
Budawni	79	131	38	27	19	23	89	119
Karenga	73	118	29	62	21	17	101	113

LIVELIHOOD ACTIVITIES

Agriculture is the primary source of livelihood for medium and large farmer, whereas landless, marginal & small farmers depend on daily wage during more than 6 months every year. The secondary source of livelihood for landless & very poor families are shifting cultivation, animal husbandry and collection & marketing due to unsystematic agricultural practice, erratic rain and absence of technical know-how, people lack in agriculture sector, people have shifted from agriculture based livelihood towards non-agriculture based livelihood. Mostly it is found that, people do prefer to go for daily labour work to nearby towns for earning.

As it is analyzed during the PRA exercises, the total cost of cultivation of major crops like paddy, Wheat, is slightly more than the total cost of production. Therefore emphasis has to be given on increased crop productivity. As it was understood that there is distress sale of animal husbandry is not profitable at present, therefore initiatives has to be taken for increased animal productivity and scope should be created for collective marketing.

The watershed has moderate communication facilities and all 17 villages and Concern majra are approachable through motorable road. Mostly villages are electrified and have TV & telephonic connection. Nearest small market is about 8-15 km and nearest big market is about 12-15 km from the watershed. Religious and ritual features are almost common as in other part of the U.P. Small land holding (average less than0.46 ha) with large family size (average 7 person) and more than 25 % of the labor force of the totai population living below

poverty line indicate poor socio economic status of the watershed community. However, strong community spirit among the villager's show positive indication for the success of any programmed to be implemented in participatory mode. Traditionally the entire village community participates in the individual works, map of the watershed villages drawn by villagers themselves, depicting various village features is shown in TaMe as below:

Table-3.5 INFRASTRUCTURE FACILITIES IN THE PROJECT AREA

s. No.	Name of Village	Linkage to main road	Electricity	Primary School	Junior High School	Inter Collage	Post Office	P.H.C./District Hospital	Bank	Vetnary Hospital	Co-op. Society	Market	Agri. Service Center
1	Talbehat	Yes	Yes	Yes	Yes	3	3	3	3	3	3	3	3
2	Piprai	3	Yes	Yes	Yes	3	8	3	8	8	8	8	8
3	Tindra	5	Yes	Yes	Yes	2	10	5	10	10	10	10	10
4	Udguan	5	Yes	Yes	Yes	2	10	5	10	10	10	10	10
5	Sunora	Yes	Yes	Yes	Yes	5	Yes	8	10	10	10	10	10
6	Sunori	Yes	Yes	Yes	Yes	15	2	8	10	10	10	10	10
7	Evani	Yes	Yes	Yes	Yes	5	2	17	17	17	17	17	17
8	Hingora	Yes	Yes	Yes	Yes	Yes	Yes	15	15	15	15	15	15
9	CHurawni	Yes	Yes	Yes	Yes	3	3	13	13	13	13	13	13
10	Budawni	2	Yes	Yes	Yes	5	Yes	15	15	15	15	15	15
11	Karenga	Yes	Yes	Yes	Yes	5	5	yes	15	15	15	15	15
12	Vanguankhurd	Yes	Yes	Yes	Yes	7	3	13	13	13	13	13	13

MEANS OF COMMUNICATION

The watershed can approached from two main roads

1- Talbeht to Poora Kalan Road.

DEPENDENCY ON FOREST FOR FUEL WOOD AND FODDER

(A) Fuel wood:

Some villagers of the selected villages are using LPG to meet their cooking energy requirements. The main source of fuel is from cow dung cake, woody stem of Arhar crop and Mustard. About 65 to 70 percent of the domestic energy requirement is met from the Agro By-Product and cow dung cake. Rest is met out from the forest outside the village and watershed boundary. Fuel wood is obtained from the forest which is situated in the Block-Birdha Outside the Watershed Boundary. About 30 ha land will be taken from the waste land falling in the class-VII category in the watershed. These lands will be planted with species like *Prosopis juliflora, Acacia nilotica*, *Prosopis cineraria* and *Holoptelia integrifolia*.

(B) Fodder:

Villages do not have any significant dependency on forest based fodder as these sources are not available in the forests. There is shortage of green fodder in winter and summer due to inadequate irrigation facility. Due to lack of fodder availability, there is *Anna Pratha (tradition of leaving cattle free by villagers)* in this area, which is also one of the most important reasons for more mortality rate of planted trees.

LACK OF ADEQUATE FARM MACHINERY

Even today a large number of farmers in water shade area use wooden ploughs and bullocks. They don't have adequate machinery like seed drill. So, old machineries take more time in tillage practices.

HYDROLOGY AND WATER RESOURCE CATEGORIES

Water resources are divisible into two distinct categories : the surface-water resources & the ground-water resources. Each of these categories is a part of the earth's water circulatory system,called the hydrologic cycle, & is ultimately derived from precipitation,which is rainfall plus snow. They are interdependent & frequently the loss of one is the gain of the other. The brief description of the run-off cycle,which is a part of the hydrologic cycle,will help us to understand the origin & the interdependence of these two categories of water resources.

The precipitation that falls upon land & is the ultimate source for both the categories of water resources is dispersed in several ways. A sizeable portion is intercepted by the vegetal cover or temporarily detained in surface depressions.Most of it is later lost through evaporation. When the available interception or the depression storage are completely exhausted & when the rainfall intensity at the soil surface exceeds the infiltration capacity of the soils, the overland flow begins.Once the overland flow reaches a stream channel, it is called surface run-off, which together with other components of flow, forms the total run-off.

Part of the water that infiltrates into the surface soil may continue to move laterally at shallow depth as interflow owing to the presence of relatively impervious lenses just below the soil surface & may eventually reach the stream channel when it is called the sub-surface runoff. A part of the sub-surface run-off may enter the stream promptly, whereas the remaining part may take a long time before joining the stream flow.

A second part of the precipitation which infiltrates is lost through evapo-transpiration via plant roots & thermal gradients just below the soil surface. A third part may remain above the water table in the zone of unsaturated flow.A fourth remaining part percolates deeply into the ground-water.Part of this ground-water may eventually reach the stream channel & become the base flow of the stream. This portion is termed ground-water run-off or ground-water flow.

Apart from infiltrated rain-water, the seepage from canals,ponds,tanks,lakes,irrigated fields,etc.is also dispersed & accounted for in the same manner.

The total run-off in the stream channel includes the snow-melt, the surface run-off the sub-surface run-off, the ground-water run-off & the channel precipitation, i.e. the precipitation falling directly on the water surface of streams,lakes,etc. It constitutes what is known as the surface-water resources. The portion of the precipitation which, after infiltration,reaches the ground-water-table, together with the contribution made to ground water from a neighbouring basin, influent rivers,natural lakes,ponds,artificial storage reservoirs,canals,irrigation,& constitutes the ground-water resources.That quantity of water in the ground-water reservoir, which is not annually replenishable, is not taken into account, as it is a sort of dead storage which cannot be used on a continuing basis from year to year.

The above phase of the run-off cycle pinpoints the inflow components for the surface-as well as for the ground-water resources. It has to be appreciated that there is always a balance between the inflow factors making up water resources of a region, whether surface or ground, & the outflow components. The surface water resource of a given basin in excess of the withdrawal use is accounted for on the outflow side by one or more of the following factors:

(i) Stream outflow from the basin;

(ii) loss through evaporation;and

(iii) the influent recharge to the ground water.

Similarly, the unutilised ground-water resource of a basin is accounted for by the following outflow factors:

(i) Evapo-transpiration from the ground-water-table;
(ii) outflow to the neighbouring ground-water basin;
(iii) the effluent discharge to the streams;and
(iv) the addition to the ground-water storage.

The interrelationship between the surface-water & the ground-water resources is evident from the above analysis.The surface-water resources contribute to the ground-water recharge in various ways:

(i)by influent recharge from the streams;

(ii)by seepage from natural lakes,ponds,etc;

(iii)seepage from artificial storage reservoirs,canal systems,etc, &

(iv)return flow from irrigation. These factors presently contribute to about 25 percent of the country's total ground-water resources.

On the other hand, the bulk of the base-flow in the rivers, which represents the sustained fair-weather run-off is contributed by the ground-water resources. This contribution,presently, is roughly assessed at about 25 percent of the total surface-water resources of the country.

Factors Affecting Water Resources

The water resources of a region,conceived as a dynamic phase of the hydrologic cycle, are influenced by the following three major groups of factors:

A. **Climatic Factors**
B. Rainfall : its intensity,duration & distribution.
C. Snow
D. Evapo-transpiration

1. Physiographic Factors

A. Basic characteristics.
    1. Geometric factors : drainage area,shape,slope & stream density.
    2. Physical factors : land use, surface infiltration conditions,soil types,etc.
B. Channel characteristics : carrying capacity & storage capacity.

2. Geological Factors

A. Lithologic including composition, texture, sequenceof rock types & the thickness of rock formations.
B. Structural, including chief faults & folds that interrupt the uniformity of occurence of rock types or sequence of rock types also beds, joints, fissures, cracks,etc.
C. Hydrologic characteristics of the aquifers permeability, porosity, transmissivity, storability,etc

The physiographic features (including geological factors) not only influence the occurence & distribution of water resources within a region but these, particularly the orography, play a significant role in influencing rainfall & other climatic factors, such as temperature, humidity & wind. However, within a geographical location & physiographic framework, it is primarily the rainfall (its intensity, duration & distribution) & the climatic factors affecting evapo-transpiration that determine the totality of water resources in the region.

SOIL AND MOISTURE CONVERSATION AND EFFICIENT USE OF WATER

Water is essential for all life and is used in many different ways - for food production, drinking and domestic uses and industrial use. It is also part of the larger ecosystem on which bio diversity depends. Precipitation, converted to soil and groundwater and thus accessible to vegetation and people, is the dominant pre-condition for biomass production and social development in drylands. The amount of available water is equivalent to the water moving through the landscape. It also fluctuates between the wet and dry periods. Fresh water scarcity is not limited to the arid climatic regions only. Even in areas with good supply, the access to safe water is becoming a critical problem. Lack of water is caused by low water storage capacity, low infiltration capacity, large inter-annual and annual fluctuations of precipitation and high evaporative demand.

A variety of essential soil moisture and water conservation technologies must be adopted to reduce the cost of irrigation, extend it throughout and promote sustainable small-scale irrigation on a watershed basis. These technologies are essential especially in drought-prone areas. Even though drought is a purely natural calamity caused by the failure of (monsoon) rain, it can be minimized by careful planning and operation. During good rainy years, excess rainwater should be stored in the soil and also underground using suitable soil moisture conservation measures and water harvesting structures on a watershed basis. This stored water can subsequently be used for irrigation.

Conceptual approach

Watershed development and management implies an integration of technologies within the natural boundary of a drainage area for optimum development of land, water and plant resources, to meet the people's basic needs in a sustained manner. A watershed is an area from which runoff resulting from precipitation flows past a single point into a large stream, river, lake or pond. Each watershed is an independent hydrological unit. It has become an acceptable unit of planning for optimum use and conservation of soil and water resources.

The concept of integrated watershed development refers to the development and management of the resources in the watershed to achieve higher sustainable production without deterioration in the resource base and any ecological imbalances. This concept requires the formulation and implementation of a package of programmes with activities for optimum resource use in the watershed without adversely affecting the soil and water base or life supporting system. The concept assumes more importance in the context of planning for sustained development. Watershed development aims at preventing watershed degradation resulting from the interaction of physiographic features. It eliminates unscientific land use, inappropriate cropping patterns and soil erosion, thereby improving and sustaining productivity of resources leading to higher income and living standards for the inhabitants in the watershed area. It therefore involves restoration of the ecosystem, protecting and utilizing the locally available resources within a watershed to achieve sustainable development.

Rainfall failure occurs once every 3 to 5 years and is usually below 50% of the average annual rainfall of the region. During periods of rainfall failure, the groundwater level lowers since fluctuations in the water table levels depend on the rainfall when both surface and groundwater availability becomes critical. Drought begins to prevail and there is difficulty to cope up with the water demand during this period. Similarly, in some locations or areas water shortage is observed just before the rainy season commences. These two situations can be managed if suitable soil and moisture conservation measures are systematically implemented on a small watershed basis.

There are always strong links between soil conservation and water conservation measures. Many actions are directed primarily to one or the other, but most contain an element of both. Reduction of surface runoff can be achieved by constructing suitable structures or by changes in land management. Further, this reduction of surface runoff will increase infiltration and help in water conservation.

Appropriate structures and their functions

To increase the period of water availability and overcome water scarcity in drought years, the following activities can be implemented in the field for a compact, viable watershed of about 200 - 500 ha.

Soil and water conservation can be approached through agronomic and engineering procedures. Agronomic measures include contour farming, off season tillage, deep tillage, mulching and providing vegetative barriers on the contour. These measures mainly prevent soil erosion but will also help in improving soil moisture availability in the watershed.

Soil and water conservation measures on a watershed basis

The engineering measures adopted differ with location, slope of the land, soil type, amount and intensity of rainfall. Depending on these parameters, the methods commonly used are contour trenching, contour stone walls, construction of temporary and permanent check dams and gully plugging structures. Additionally, percolation ponds, silt detention tanks and irrigation tanks are constructed to harvest water and recharge it to the groundwater for use in agriculture (irrigation). Farm ponds can also be constructed for every 4-5 ha in the watershed to provide protective/supplemental irrigation.

The above soil and water conservation management and water harvesting programme should be implemented in an integrated manner on a catchment/watershed basis.

Functions of the structures

Contour bunds, contour barriers (vegetative and stone), contour trenches and contour stone walls will not only prevent soil erosion but also obstruct the flow of runoff water. Consequently, the obstructed water will increase the soil moisture and recharge the groundwater in the area.

Check dams: This may be a temporary structure constructed with locally available materials. The various types are: Brush wood dam, loose rock dam and woven wire dam. The main function of the check dam is to impede the soil and water removed from the watershed. This structure is cheap, but lasts about 2-5 years. The cost of the structure depends on the materials used, the size of the gully and the height of the obstruction (dam). A permanent check dam can be constructed using stones, bricks and cement. Small earth work is also needed on both sides. This water recharges the groundwater.

Percolation Pond: The percolation pond is a multipurpose conservation structure depending on its location and size. It stores water for livestock and recharges the groundwater. It is constructed by excavating a depression, forming a small reservoir or by constructing an embankment in a natural ravine or gully to form an impounded type of reservoir. The capacity of these ponds or tanks varies from 0.3 to 0.5 mcft (10 000 - 15 000 m^3). Normally 2 or 3 fillings are expected in a year (season) and hence the amount of water available in one year in such a tank is about 1 mcft to 1.5 mcft (30 000 - 45 000 m^3). This quantity of water, if it is used for irrigation, is sufficient to irrigate 4-6 hectares of irrigated dry crops (maize, cotton, pulse, etc.) and 2-3 hectares of paddy crop.

Irrigation Tank: The main function of this storage structure is irrigating crops. It is constructed below the above-mentioned structures in a watershed. Each tank can irrigates from 10 to 5 000 hectares. Earthen bunds are reinforced with masonry to collect and store rainwater for irrigation. The cost of this tank (dam) depends upon the size, location and site condition. Water from the tanks is normally used to grow paddy crop.

Apart from the above, to increase moisture availability to agricultural and tree crops, in situ moisture conservation techniques must be adopted in addition to the large scale soil and moisture conservation and water harvesting structures in the watershed.

The following are some of the *in situ* moisture conservation measures which can be practised in the watershed to increase production.

For agricultural crops, the measures adopted are forming ridges and furrows, broad bed and furrows, basins, tie ridging (random tie ridges) and water spreading.

For tree crops micro catchment, saucer basin, semi-circular bund, crescent shaped bunds, V ditch technology, catch pits and deep pitting can be practised.

In addition to the above measures and structures, small storage structures with a water storage capacity for an area of about 0.4 to 0.5 ha can be constructed in large numbers one for every 10 to 20 ha catchment or watershed at the foot hills slopes and hilly areas. These storage facilities would attenuate the floods during storms. These measures will also ensure soil moisture for good growth of trees grown down stream recharging the groundwater in the region and making available more water for drinking and irrigation water.

PROBLEMS AND NEEDS

The main problem in a watershed is the soil erosion by rainfall. The run off water transport the sediments which may block the channel head, dam, reservoir and storage structures are the major problems faced in the project area and attempts made so far to overcome them. The other main problems in the selected watershed are : lack of awareness amongst the villagers about the deteriorating environmental condition of the area, 75% of the run off water makes it away to way towards Kherarrivers carrying fertile soil which has nutrients and this decreases soil fertility, there is a decline in the productivity of cereals, pulses and vegetable crops, dependency of farmers on the rain water. Therfore it is an urgent need, that rainwater should be harvested for crops and re-charged to improve the quality of the water.

FIELD PHOTOGRAPHS OF PRA EXERCISE

CHAPTER - 4

INSTITUTION BUILDING & PROJECT MANAGEMENT

PARTICIPATORY RURAL APPRAISAL (PRA)

The past experience of watershed has given tremendous input to focus on creating accountability of the stakeholders towards the program. This has created an emphasis to include all the stakeholder communities and their local and Indigenous Technological Knowledge (ITK) while planning for any activity. Participatory approach provides a new path for planning, implementing, and monitoring and post- withdrawal activities with a complete accountability of the stakeholders. Various PRA techniques like resource mapping, social mapping, and season calendars were used to understand the physical and social orientation of the village in general and watershed in specific. These tools put the villagers in ease than the complicated questionnaires. Various tools like matrix ranking, venn diagram were used to identify various local vegetations (apt for afforestation), fodders crops.

PROJECT IMPLEMENTING AGENCY (PIA)

U.P. Government, Land Development And Water Resources Department section -1 Lucknow has nominated as PIA to Bhoomi Sanrakshan Unit, Land development and water resources Department Dist – Lalitpur for IWMP.

Table-4.1: DETAILS OF PIA STAFF I. W. M. P. – VIII, LALITPUR

S. No.	Name	Designation	`Qualification
1.	Sri. A. K. Awasthi	B.S.A.	Diploma in Civil Engineering
2.	Sri Ramji Yadav	JE	Diploma in Civil Engineering
3.	Sri Ajit Kumar Jain	Accountant	M.Com.
4.	Sri. S. N. Rana	D. Man	Diploma in Ag. Engg.
5.	Sri Rakesh Kumar	ASCI	M.Sc. Ag.
6.	Sri Praveen Kumar	ASCI	M.Sc. Ag.
7.	Sri Sant Prasad	Ziledar	M.A.
8.	Sri Laldhari Ram	Junior Clerk	B.A.
9.	Sri Om Prakash	Seenchpal	M.A.
10.	Sri Chandra Shekhar	,,	High School
11.	Sri Subhash Chandra Verma	,,	Intermediate
12.	Sri Ashok Kumar Gupta	Fourth Class	Intermediate

ROLES AND RESPONSIBILITIES OF THE PIA

The project Implementing Agency(PIA) will provide necessary technical guidance to the Gram Panchayat for preparation of development plans for the watershed through Participatory Rural Appraisal(PRA) exercise,

undertake community organization and training for the village communities, supervise watershed development activities, inspect and authenticate project accounts, encourage adoption of low cost technologies and build upon indigenous technical knowledge, monitor and review the overall project implementation and set up institutional arrangements for post-project operation and maintenance and further development of the assets created during the project period.

The PIA, after careful scrutiny, shall submit the action plan for watershed development project for approval of the DWDU/DRDA and other arrangements. The PIA shall submit the periodical progress report to DWDU. The PIA shall also arrange physical, financial and social audit of the work undertaken. It will facilitate the mobilization of additional financial resource from other government programs, such as NREGA, BRGF, SGRY, National Horticulture Mission, Tribal Welfare Schemes, Artificial Ground Water Recharging, Greening India, etc.

WATERSHED DEVELOPMENT TEAM

S.No.	Name	Designation	Qualifiaction	Address
1	Dr S.P. Singh	Ex- Scientist NBRI LKO	Phd	Gomti Nagar,lko
2.	Mr Raj Kamal Kapoor	Expert in land Resource Management	Bio Technology	Gomti Nagar,lko
3.	Mr. Asha Ram Bharti	Social Scientist	M.S.W.	Raurdha, LALITPUR
4.	Mr Praveen Kumar	A.S.C.I.	Msc Ag	Talbehat

The WDT is an integral part of the PIA and will be set up by the PIA. Each WDT should have at least four members, broadly with knowledge and experience in agriculture, soil science, water management, social mobilization and institutional building. At least one of the WDT members should be a woman. The WDT members should preferably have a professional degree. However, the qualification can be relaxed by the DWDU with the approval of SNLA in deserving cases keeping in view the practical field experience of the candidate. The WDT should be located as close as possible to the watershed project. At the same time, it must be ensured that the WDT should function in close collaboration with the team of experts at the district and state level. The expenses towards the salaries of the WDT members shall be charged from the administrative support to the PIA. DWDU will facilitate the training of the WDT members.

As per new common guideline direction/instruction given in Para 5.3 points 40, P. I. A. has been constituted Watershed Development Team as given in table below:

ROLES AND RESPONSIBILITIES OF WDT

The WDT will guide the watershed committee (WC) in the formulation of the watershed action plan. An indicative list of the roles and responsibilities of the WDT would include among other s, the following.

a. Assist Gram Panchayat /Gram Sabha in constitution of the watershed committee and their functioning.
b. Organizing and nurturing User Groups and Self-Help Groups.
c. Mobilizing women to ensure that the perspectives and interests of women are adequately related in the watershed action plan.
d. Conducting the participatory base –line surveys, training and capacity building.

e. Preparing detailed resource development plans including water and soil conservation or reclamation etc. to promote sustainable livelihood at household level.
f. Common property resource management and equitable sharing.
g. Preparing Detailed Project Report (DPR) for the consideration of Gram Sabha.
h. Undertake engineering surveys, prepare engineering drawing and cost estimates for any structure to be built.
i. Monitoring, checking, accessing, and undertaking physical verification and measurement of work done.
j. Facilitating the development of livelihood opportunities for the landless.
k. Maintaining project accounts.
l. Arranging physical, financial and social audit of the work undertaken.
m. Setting up suitable arrangements for post-project operation, maintenance and future development of the assets created during the project period.

WATERSHED COMMITTEE (WC)

It is a committee that is constituted by Gram Panchayat to implement the watershed project with technical support of WDT in the village. This committee is registered under society Registration Act 1860. The Gram Panchayat of the village selects the chairperson of the watershed committee with the secretary who will be a paid functionary. A watershed Committee was formed accordingly in the village. Capacity building training to the watershed committee is given by WDT.

The watershed committee has a pivotal role to play during and after the project implementation period

Table-4.3 Water shed committees

Piprai-I 2C2D4a3e

S.N.	Name	Father's/Husband's Name	Caste/Category	Qualification	Remarks
1	Sri Jai Pal Singh	Sri Nathu Ram	OBC	High School	President
2	Sri Bahadur Singh	Sri Ratan Singh	OBC	8th	Secretary
3	Smt. Rameshwari	Sri Prakash	SC	Illiterate	GP/SHG Member
4.	Sri Kailash	Sri Dayali	SC	Literate	Landless
5	Sri Ramesh	Sri Damme	Sahariya	5th	
6	Sri Bharat Singh	Sri Gyan Singh	Gen	High School	
7	Sri Sri Ram	Sri Raghuverdayal	OBC	10th	
8	Sri Chhalone	Sri Munne	SC	Illiterate	
9	Smt. Sandhya	Sri Jai Pal Singh	OBC	5th	SHG Member
10	Smt. Bharti	Sri Veer Pal	OBC	12th	SHG Member
11	Sri Rakesh Kumar	ASCI	SC	M.Sc. Ag	Project I/c
12	Sri Praveen Kumar	ASCI	SC	M.Sc. Ag.	WDT Member

Budawani 2C2D4a3d

S.N.	Name	Father's/Husband's Name	Caste/Category	Qualification	Remarks
1	Sri Rajendra Prasad Goswami	Sri Salig ram	Gen	8th	President
2	Sri Rati Ram	Sri Jagan Lal	OBC	B.A.	Secretary
3	Sri Mahendra Pal	Sri Hardayal	SC	8th	SHG Member
4.	Sri Neeraj	Sri Gabdu	SC	Literate	
5	Smt. Bunda Bai	Sri Dalpa	ST	Illiterate	GP Member
6	Smt. Parvati	Sri Ram Bihari	SC	Literate	
7	Sri Suraj	Sri Dashrath	OBC	5th	Landless
8	Sri Har Charan	Sri Shiv Raj	OBC	4th	
9	Sri Kunwar Lal	Sri Ram Das Yadav	OBC	5th	SHG Member
10	Sri Bhagwan Singh	Sri Komal Singh Yadav	OBC	5th	SHG Member
11	Sri Praveen Kumar	ASCI	SC	M.Sc. Ag	Project I/c
12	Sri N.S. Rana	Draft Man	ST	Diploma in Ag.	WDT Member

Chandra pur 2C2D4a3c

S.N.	Name	Father's/Husband's Name	Caste/Category	Qualification	Remarks
1	Sri Om Prakash	Sri Ram Sevak	Gen	10th	President
2	Sri Rajendra Kumar Sharma	Sri Tulsi Das	Gen	10th	Secretary
3	Smt. Suman	Sri Bihari Lal Jha	OBC	5th	SHG Member
4.	Smt. Komal	Sri Dashrath Viswakarma	OBC	Literate	SHG Member
5	Smt. Kallo Bai	Sri Shiv Dayal	SC	Literate	
6	Sri Chhedi Lal	Sri Bala Ram	SC	5th	
7	Sri Neeraj Kumar	Sri Pramod Kumar	Gen	8th	
8	Sri Mahendra Rajak	Sri Sindhu Rajak	SC	5th	
9	Smt. Parvati	Sri Uday Bhan	SC	Literate	SHG Member
10	Smt. Sirku Devi	Sri Hazrat	SC	Literate	SHG Member
11	Sri Praveen Kumar	ASCI	SC	M.Sc. Ag	Project I/c
12	Sri N.S. Rana	Draft Man	ST	Diploma in Ag.	WDT Member

Piparai-II 2C2D4a3b

S.N.	Name	Father's/Husband's Name	Caste/Category	Qualification	Remarks
1	Sri Ramji Lal	Sri Nirbhay	OBC	5th	President
2	Sri Daya Shankar	Sri Ram Prasad	OBC	8th	Secretary
3	Smt. Kusum	Sri Babu Lal	OBC	Literate	SHG Member
4.	Smt. Saroj	Sri Rakesh	OBC	Literate	SHG Member
5	Sri Parsu Ahirwar	Sri Munna	SC	Literate	Land Less
6	Sri Ram Swaroop	Sri Bhaiya Lala	OBC	5th	
7	Smt. Rani	Sri Harban	Gen	8th	
8	Sri Kanta Prasad	Sri Darme	OBC	10th	
9	Smt. Gyan Bai	Sri Gore Lal	OBC	Literate	SHG Member
10	Smt. Meena	Sri Singram	OBC	Literate	SHG Member
11	Sri Praveen Kumar	ASCI	SC	M.Sc. Ag	Project I/c
12	Sri N.S. Rana	Draft Man	ST	Diploma in Ag.	WDT Member

Churawani 2C2D1b2c

S.N.	Name	Father's/Husband's Name	Caste/Category	Qualification	Remarks
1	Sri Ram Swaroop	Sri Arjun	OBC	5th	President
2	Sri Vinod Kumar	Sri Bhaiya Lal MIshra	Gen	10th	Secretary
3	Smt. Siya	Sri Prakash	OBC	Literate	SHG Member
4.	Sri Ram Pal	Sri Durju	OBC	Literate	Users Group
5	Smt. Vandana	Sri Shivraj	SC	12th	GP Member
6	Sri Suk Dev	Sri Bhupat	OBC	Literate	
7	Sri Bavlesh	Sri Kishan	OBC	8th	
8	Sri NArendra	Sri Daya Ram	OBC	8th	
9	Sri Shiv Dayal	Sri Veerendra Singh	OBC	8th	SHG Member
10	Sri Roshan	Sri Bhairav	OBC	Literate	SHG Member
11	Sri Subhash Chand Verma	Seench Pal	OBC	Intermediate	Project I/c
12	Sri N.S. Rana	Draft Man	ST	Diploma in Ag.	WDT Member

Karenga 2C2D1b2e

S.N.	Name	Father's/Husband's Name	Caste/Category	Qualification	Remarks
1	Sri Pradeep Kumar	Sri Nathu Ram	Gen	8th	President
2	Sri Vishnu Datt Pathak	Sri Banshi Dhar	Gen	8th	Secretary
3	Smt. Murli Bai	Sri Uddi	SC	Illiterate	SHG Member
4.	Sri Sripati	Sri Tulsiya	ST	Illiterate	Land Less
5	Sri Dinesh Purohit	Sri Tunne Lal	Gen	Literate	
6	Sri Prakash Pathak	Sri Ram Charan	OBC	Literate	
7	Sri Komal	Sri Kharga Ahirwar	SC	Literate	
8	Sri Anand Gangele	Sri Hari Ram Gangele	Gen	B.Ed.	
9	Sri Bhagwat	Sri Shiv Ram	Gen	Literate	SHG Member
10	Sri Ramjivan	Sri Hari Shankar	Gen	Literate	SHG Member
11	Sri N.S. Rana	Draft Man	ST	Diploma in Ag.	Project I/c
12	Sri Sant Prasad	Jiledar	SC	M.A.	WDT Member

Sunori 2C2D4a4b

S.N.	Name	Father's/Husband's Name	Caste/Category	Qualification	Remarks
1	Sri Bindrawan	Sri Adhar	OBC	8th	President
2	Sri Suresh Yadav	Sri Raja Ram	OBC	10th	Secretary
3	Sri Govind Singh	Sri Bhawani Singh	Gen	5th	SHG Member
4.	Smt. Ram Rati	Sri Heera Lal Banskar	SC	5th	
5	Sri Pran Singh	Sri Toran Singh	OBC	8th	
6	Smt. Rekha	Sri Dhani Ram	OBC	5th	
7	Smt. Phoolan	Sri GanpatOBC	OBC	Illiterate	GP Member
8	Sri Vhaturbhuj	Sri Raghu Ahirwar	SC	10	
9	Sri Jashwant	Sri Dalpat	OBC	Literate	SHG Member
10	Sri Shiv Kumar	Sri Daya Ram	OBC	Literate	SHG Member
11	Sri N.S. Rana	Draft Man	ST	Diploma in Ag.	Project I/c
12	Sri Sant Prasad	Jiledar	SC	M.A.	WDT Member

Watershed Committee :

- Gram Panchayat Member (02)
- SHG Member (02)
- Usersgroup (04)
- Project Incharge (department) (01)
- WDT Member (01)
- President (01)
- Secretary (01)

Total Member (12)

Self Help Group (SHG)

Self Help Groups are motivated, small homogenous groups organized together through credit and thrift activities. Self help group's initiative will be especially for women to help and uplift their livelihood. Generally self help groups include landless and poor women. Before formation of the SHGs, during PRA activities, Focused Group Discussions (FGDs) were held with the women, which came up with the following observations:

a) Lack of proper credit facilities due to low intervention of formal financial credit institution.
b) Excessive exploitation of weaker section by money lenders
c) Lack of attitude for saving among poor people
d) Lack of knowledge on credit and thrift activity and banking.

A detailed discussion took place with some of the local NGOs working in the area like SEWA, which has planned to have some capacity building training regarding these SHG activities. It was also proposed to have some livelihood activities which will promote women empowerment.

Table-4.4 DETAILS OF SELF HELP GROUP

S. No.	Name Of Micro Watershed	Name of SHG	President	Secretary	Activity
1	2	3	4	5	
1	Piprai-I 2C2D4a3e	Ram Janki	Smt. Sandhya	Smt. Baby Raja	Goat Rearing
		Sri Ram	Smt. Bharti	Smt. Phool Kunwar	Goat Rearing
2	Budawni 2C2D4a3d	Jai Santoshi Maa	Smt. Uma	Smt. Vimla	Goat Rearing
		Jai Kishan	Sri Halkai	Sri Basanta	Goat Rearing
3	Chandrapur 2C2D4a3c	Jai Chaturbhuj	Sri Akrtat Singh	Sri Kiran	Dairy
		Balram	Sri Bhagwan Singh	Sri Jahar Singh	Dairy
4	Piprai-II 2C2D4a3b	Jai Bajrangbali	Smt. Meena	Smt,. Saroj	Goat Rearing
		Maa Jalpa	Smt. Guddi	Smt. Parvati	Goat Rearing
5	Churawni 2C2D1b2c	Anjali Kishan	Sri Narendra Rajput	Smt. Devkali	Zinger Farming
		Radha Swami	Sri Roshan	Sri Jai Ram	`
6	**Karenga** 2C2D1b2e	Bhole Baba	Sri Bhagwat Narayan	Sri Tilak am	Dairy
		Jai Hanuman	Sri ramjivan	Sri Jeevan	Goat Rearing
7	Sunori 2C2D4a4b	Kishan	Sri Jashwant	Smt. Vimla	Goiat Rearing
		Jai Bheem	Sri Uddet	Smt. Parvati	Goat Framing

USER GROUP

User Groups are normally formed to manage an activity or asset created under the programme on a long term basis. The user group collects user charges from their members, oversee the works and manage the benefits. It was decided that each group would formulate certain internal rules and have a feeling of ownership with community spirit.

Table-4.5 DETAILS OF USER GROUP

S. No.	Name Of Micro Watershed	Area Of Micro Watershed (Ha)	Selected Area For Treatment (Ha)	No. Of User Group Constituted
1	Piprai-I 2C2D4a3e	520.521	431.00	9
2	Budawni 2C2D4a3d	990.818	820.00	17
3	Chandrapur 2C2D4a3c	865.303	716.00	14
4	Piprai-II 2C2D4a3b	868.029	716.00	14
5	Churawni 2C2D1b2c	970.693	802.00	16
6	**Karenga** 2C2D1b2e	415.900	345.00	7
7	Sunori 2C2D4a4b	815.209	670.00	13
	Total	**5446.00**	**4500.00**	**90**

INSTITUTIONAL ARRANGEMENT AT PROJECT LEVEL

The SLNA would evolve appropriate mechanisms for selecting and approving the PIAs, who would be responsible for implementation of watershed projects in different districts. These PIAs may include relevant line departments, Autonomous organizations under State/Central Governments, Government Institutes/Research bodies, Intermediate Panchayats, Voluntary Organizations (VOS).

However, the following criteria may be observed in the selection of these PIAs:

1- They should preferably have prior experience in watershed related aspects or management of watershed development projects.
2- They should be prepared to constitute dedicated Watershed Development Teams.

Selected PIAs will sign a contract/MOU with the concerned DWSUs/District Level Committee as referred in para29 that will spell out well –defined annual outcomes, against which the performance of each PIA will be monitored each year and evaluated on a regular basis by institutional evaluators from a panel approved by the SLNA/Departmental Nodal Agency at the central level.

Each PIA must put in position a dedicated watershed development team (WDT) with the approval of DWDU. The WDT will be hired on contract/deputation. Transfer etc for a term not exceeding the project period. The composition of the WDT will be indicated in the contract/MOU. No programme funds for DPR and watershed works under any circumstances should be released to either the PIA or Watershed Committee (WC) unless the composition of the WDT has been clearly indicated in the MOU/contract and the team members are fully in place.

CHAPTER – 5

MANAGEMENT / ACTION PLAN

PROBLEM AND NEED OF THE AREA

Integrated Watershed Development Programme is aimed at the socio-economic upliftment of the dwellers of watershed area and to create trust about the programme to be implemented so that they can coordinate in participatory mode for success of the programme. As per the New Common Guidelines total financial outlay for entry point activities is 4% of the total project cost. To increase the per capita availability of drinking water, older wells of the village will be renovated as well as the chabootra will be constructed, to increase the irrigation water availability, older Bund which already exists but not functioning will be reconstructed or renovated. Repairing and maintenance of water bodies have been proposed on priority basis. Schools lies in the watershed area will be equipped with drinking water facility and extracurricular activities will be promoted among the children's of the water by supplying sport goods to the schools. For environmental purpose in the villages, tree planting will be done. Construction of bathrooms, renovation of ponds and drainage as well as hand pump will be completed. Total estimated cost for these activities is Rs. 25.44 Lakh.

ENTRY POINT ACTIVITY (EPA)

EPA activities are taken up under watershed projects to build a rapport with the village community at the beginning of the project; generally, certain important works which are in urgent demand of the local community are taken up. A group Discussion was conducted with watershed Development Committee regarding the EPA activity, It was conveyed to the WC that an amount of Rs. 25.44 Lakh was allotted for EPA activity, which was 4 per cent of total allocated budget. The villagers discussed various activities which they felt is important but after a brief discussion it was conveyed to them that only those activities can be taken, which revive the common natural resources. It was also taken into

priority that there should be an instrument of convergence which will result in sustainability of activities.

WATER HARVESTING STRUCTURES, ENERGY AND RESOURCE CONSERVATION

For soil and moisture conservation, water resource developments, horticulture, besides agro-forestry vegetation/plantation work, engineering structure have also been proposed under the project. Engineering structures are important components of soil and water conservation that can play a vital role in erosion control on arable land. Engineering measures usually involve creating mechanical barriers across the direction of flow of water and thus retard or retain runoff on the following principles:

- Increase the time of concentration.
- Break a long slope into several short ones.
- Protection of drainage channels against damage.
- Prevent excessive soil and water losses.

Watershed Development works is proposed to be taken up from 2nd year of the initiation of the project. These works are proposed to be taken up from village to village. And allocation of Rs 43.20 Lakh & 60% of the total cost has been made for watershed development works

CONTOUR, MARGINAL AND PERIPHERAL BUND

Contour bunding is effective for erosion control and moisture conservation measures in dry areas having less than 2% slope to reduce the length of slope. Contour bund will be constructed against the slope in the treatment area. Marginal bund is the engineering structure to reduce the volume and speed

of runoff. Those locations where there is a change in slope and soil texture. Peripheral bund will constructed along with the nala bank.

WATER HARVESTING STRUCTURE/CHECK DAM

These structure of built of masonry. Check dams have been proposed constructed in big gullies/ravines carrying relatively high run of and sediment load. Water stored in check dams will be utilized as source of irrigation water during post Monsoon season.

AGRO FORESTRY

Land will be taken from the waste land falling in the class-VII category in the watershed. The Eucalyptus and Sagon plants planted by the farmers.

DRY LAND HORTICULTURE

Lawn will be taken for the plantation of fruit trees like Guava, Mango will be planted at suitable spacing in the watershed.

AREA TREATMENT PLAN

Integrated watershed development program envisage treatment of proposed area with soil & water conservation works along with development of Horticulture, Afforestation & development of silvi pastoral system in denuded land unfit for cultivation, following works are proposed under watershed Development works.

1. Constructions of bunds (Field bund, contour bund, submergence bund, Marginal & peripheral).

2. Renovation of Existing Bund for in-situ moisture conservation.
3. Rain fed Horticulture with and without fencing.
4. Construction of recharge Filter.
5. Construction of new & renovation of Existing structures/ gully plugs/Check dams.
6. Afforestation and development of silvi– pastoral system.
7. Drainage line treatment (pucca structures, gully plug, check dams).

Details of activities of preparatory phase :

Name of villages	Institutional and capacity buildings	Detailed Project Report	Total estimated cost
12	31.80	6.36	38.16

PASTURE MANAGEMENT

The sound animal industry in any country centres around good quality feed and fodders. The livestock population in India is nearly 15%of the total livestock population of the world, tough we have only 2% of the world's geographical area. The project on for green and dry fodder requirement in India has been estimated at 1061 and 590 million by 2010 A-D, while the present feed and fodder resources in the country can meet only 4% of the requirement. The grazing intensity is very high i.e., 26 adult cattle unit (ACU)/ha as against 0.8 ACU in the developing countries.

The importance of grasses for protection and production, the two aspects of soil and water conservation is well known. Grass is unique in that it is the only resource utilized in situ by grazing. A "grassland" or more appropriately, a "range" is defined as "the areas which are predominantly covered with grasses or grass like plants and are primarily utilized as for age for grazing animals or used as hay." The grasslands are the major sources of food to the animals.

Pasture Management: All grazing areas are referred to as pastures, but ore specifically the term is applied to cultivated grassland used for grazing. Thus pastures are artificial grasslands with or without non-grass vegetation (such as legumes) that are created with selected high forage-yielding grass and legume species and with inputs like fertilizers and irrigation and carefully managed to exclude all other vegetation. Pastures are usually fenced and used for grazing, for gay and silage making or for both.

Intensive Fodder Production: In areas where the major enterprise of the farmers centers on the milk production. Continuous supply of green fodder round the year is the basis for success of such as industry. Under the aegis of ICAR's all India coordinated Research Project on Forage Crops, several highly productive fodder cropping system have been tested and recommendations made for their general use. For central region important intensive crop rotations are presented as given below

Conservation on of Forages: In order to sustain animal production, it is essential that the optimum feeding should be maintained round the year. In India, we have two seasons, rainy season and winter season, when surplus quantities of green fodder is available-country to this there are 2 to 3 months of lean periods(October-November and April to July) when the fodder availability to animals is at its low. In the summer months, it is difficult even to meet the maintenance requirements of the animals. The conservation of forages could be done in the form of silage from cultivated fodders (legumes and

cereals) and also pasture grasses. Forages could also be conserved in the form of hay when dried to its nutrients. This feed stuff is quantitatively important from both maintenance and nutritional point of view.

Agro-forestry system for fodder production: A number of fodder trees play an important role in human food security through their function as animal food sources, especially as drought services. Agro-forestry systems consisting of such tress and animals and/or pasture are called Silvo-Pastoral system.

Silvi-Pasture (or Silvo-Pastoral system) is the most promising alternate land use system which integrates multipurpose trees, shrubs, legumes and grasses mostly on non-arable, degraded and marginal lands for optimizing land productivity. It helps in conservation of vegetation, soil and nutrients and provides forage, timber and fuel wood on a sustainable basis.

Potentials of Semi-arid region for different forage production systems

Region	Forge Production Systems
Semi arid	Integration of Agro-Silvi-Pasture, dry land agriculture on cultivated lands.
	Forage-cum-Copping forming on the marginal and sub marginal lands with intercropping dry lands cereals and legumes

ROLE OF GRASSLAND IN SOIL CONSERVATION

The grass plant itself protects the soil from the forces of water erosion including the impact of rain drops and surface flow. Grass acts a spring cushion intercepting and broking up the falling rain drops in their way down. Conducting the water down the blades and stems of the plants and finally allowing it to reach the ground as fine sprays without disturbing the surface. Clamps of grass plants, in a mechanical way, obstruct-flowing water and reduce its rate of flow.

In fact to control soil erosion whatever technique is adopted, there are four approaches to deal with the problem:

1- To condition the soil to make it resistant to determent and transportation and create more absorptive surface layer.

2- To cover the soil so that it is protected from the impact of wind and rain drops.

3- To decrease the velocity of wind or runoff water.

4- To provide safe disposal outlet for surplus run off.

Grass in the nature highly efficient device to protect the soil from destructive forces like rain, wind etc. Grass and legumes increase the aggregation of soil particles; improve soil structure and water holding capacity of the soil. Grasses gives quicker protection to eroded lands. To establish gully sides, water ways, gully head and check dams. Grass is perhaps the most effective and economical tool. It can put to various uses in soil conservation:

1- Strip cropping, rotational cropping or lay farming.

2- Stabilization of bunds and terraces.

3- Stabilization of gullies, diversion or drainage channels.

4- Stabilization of sand dunes.

5- Meadows and pasture on steep slopes.

6- Fertility builder for eroded soil.

HORTICULTURE DEVELOPMENT FOR WATERSHED MANAGEMENT

Horticulture is an important component of land use management. Now India is the second largest producer of fruits in the world after Brazil.

However, 53% of the total geographical area of the country is degraded due to various reasons. Fruit trees and fruit based systems are the viable alternatives for economic utilization of such lands. The basic philosophy behind the conservation horticulture is the use of available resources and skilful choice of fruits. The use of available soil moisture , collection of the runoff water from the catchment area to make up the deficit requirements as well as in situ water harvesting techniques are some of the measures . The in situ water harvesting techniques should be used for growing trees in such a way that each tree has its own micro catchment area. The success of the conservation of horticulture entirely depends on the selection of economically viable hardy varieties of fruit crops resistant to moisture stress or drought and other adverse climate conditions. The fruit crops selected for degraded lands must be such that their maximum growth take place during the period of maximum water availability in the soil and should have low demand.

The main constraints which restrict development of the horticulture land use in degraded lands are enumerated below:

(A) Basic constraints

1- Lack of suitable agro-techniques for degraded lands

2- Lack of trained resource persons

3- Inadequate dissemination of the technologies

4- Lack of community approach

5- High biotic interference

6- Lack of infrastructure including marketing.

(B) Soil constraints

1- Poor nutrient status of the soil

2- Physical impediment

3- Moisture stress / water logging / inadequate drainage.

(C) Plant related constraints

1- Problem of plant establishment

2- Physiological disorders

3- Fruit drop and poor productivity

4- Incidence of insects-pests.

However , apart from the above mentioned constraints, the measure bottleneck in horticulture development are poor technological advancements, high initial establishment cost, high input demand , timely operation and seasonal shortage of labours, etc.

CONCEPTS AND ADVANTAGES OF CONSERVATION HORTICULTURE

Conservation horticulture or horticulture land use based on soil and water conservation principle is a suitable alternative for utilization and management of land under rainfed conditions. Thus horticulture development in watershed management appears to be the most appropriate technique for sustained productivity as well as for restoration of degraded lands. In fact, horticulture system meet all the basic needs-food, fruits, fodder, fuel and timber besides, providing employment and sustaining a number of products for industries.

The fruit trees grown with crops can provide fuel from pruned shoots and dried branches, leaf fodder for animals and leaf litter that can be utilized as mulch material and organic matter the leaf litter of deciduous fruit trees not only protects the top soil from the impact of raindrops but also improve soil structure, reduces evapotranspiration, increases infiltration and add to the nutrient status of soil. Therefore conservation based horticulture land use system assumes great significance as fruit trees on degraded lands provide higher returns and offer alternative opportunity in non-arable areas where cropping may not be possible.

Horticulture Practices (For plantation)

Some of the important practices are given below:

1- Selection of Suitable Fruits Types:

For the success of conservation horticulture, selection of hardy varieties resistant to diseases and pests and use of local or other hardy root stocks for raising fruit-trees is of great importance. The major part of the reproductive cycle i.e. Period from flowering to fruiting must also fall during maximum water availability period and the root ripening must be completed before the onset of dry summer (April-May).

Ber, Guava, Karonda, Bel, Amla, Lemon, and Phalsa etc. are the plants which fulfill this requirement and all these fruit plants are most suitable for this region.

2-Planting Techniques:

For degraded lands, pits should be dug of 1m x 1m x 1m size, the excavated soil is mixed with Farmyard Manure (FYM) @ 5-10kg/pit with doses of potash and phosphorous and some insecticide / pesticide (numicide / aldrex) for prevention of white ant. Planting of the fruits plants should be done with the onset of monsoon.

3-Use of Root Stokes:

Budding and grafting on the wild root stock gives benefit of the establishment root and in turn provides better quality fruits with high field potential. For example, Ziziphun mauritiana, a wild ber can be successful budded with scion of improved cultivars, this practice is only successful where sizable patch of wild root stock is available. The budded/grafted stock needs intensive management as it is required to be protected from the wild animals, birds, insects, pests etc. The wild root stock develops efficient top root to provide moisture and nutrients to the scion. Amla. Bel is other examples of raising the improved cultivation the wild root stock.

4-In Site Water Harvesting:

Since on slopy lands, runoff water is considerably higher, therefore, it should be harvested and used. The run off can be utilized for growing fruit plants in such a way that each tree in the established plants is at the time of fruit setting and fruiting. Moisture available at this critical period improves the fruit yield.

Runoff water will be harvested and stored in tanks during the rains. The stored water will be utilized at the time when the fruit trees show moisture stress during dry months. Counter trenches will dig between the rows of fruit trees because this is effective in conserving moisture and providing soil erosion.

5-Mulching:

Mulching is practiced to conserve moisture. It prevents the loss of moisture by evaporation and improve water intake by the soils. Various organic (Straw, hay, manure, tree leaves, dry wads) Mulches are used for mulching. Use of plastic mulch has been taken in rainfed and dryfarming conditions to increase the productivity by minimizing evapotranspiration losses.

6-Drip Irrigation:

Drip irrigation saves water by 40 to 70 percent and two to three times mare area can be irrigated with the same amount of available water. It has the advantages that it ensures uniform distribution of water, provides perfect control over water application and minimizing the losses during convergence and seepage.

COST IN PLANTING ONE PLANT WITH DIGGING, FILLING MIXED WITH FYM AND COST OF PLANT

S.No.	Particular	No.	L	B	D/H	Quantity	Rate	Amount
1	Earth work in digging	1	1.0	1.0	1.00	1.00	36.66	36.66
2	Cost of FYM, in Kg/pit	1	-	-	-	10Kg	8.00	80.00
3	Filling of pits mixed with FYM and soil	1	1.0	1.0	1.0	1.00	36.66	36.66
4	Cost of plants	1	-	-	-	1	18.00	18.oo
Total								**171.32**
Say Rs.								**172.00**

ESTIMATE FOR SILVI-PASTORAL SYSTEM
(RS. ha^{-1}) PLANTATIONS (800 PLANTS ha^{1})

Sl. No.	Particulars of work	Rate (Rs.)	Cost (Rs.)
1-	Clear felling or bush clearance of area	LS	550.00
2-	The area is to be protected Infected with *Lantana* etc. including Cost of burning		
3-	Soil working –earth work, digging of Pits/holes 60 cm deep, 30cm dia -800 Nos. Including cost of refilling and trenching (400 trenches/ha)	LS	6085.00
4-	Cost of seedlings for 900 nos. and grass Rs.2.00 per seeding /legumes seeds and planning/sowing	-	2050.00
5-	Weeding and hoeing (2 Nos.)	LS	300.00
	Total		**8985**
	Maintenance 2nd year 15% of the 1st year expenditure including being up of 1st year failure		
	Grand total		**10,335.00**
	Say		**10,350.00**

Estimate of Orchard Development in the Watersheds Per Hectare (With Fencing)

S.No.	Particulars	Quantity	Rate	Amount	Remarks
A. Horticulture					
1.	Soil working 1m x 1m x 1m size pits (270nos.) including cost of refilling	270.00 cum	36.66/cum	9898.20	Since, the project is to be operated in a participatory mode, contribution in the form of labour input for pit digging, FYM and its applications, weeding and hoeing are to be provided by the participating farmers, hence the costs are not included in the estimates.
2.	Application of Farmyard Manure, including cost		L.S.	450.00	
3.	Cost of NPK mixture, neemicide @ 250 gm/plant		L.S.	400.00	
4.	Cost of plants (including 15% etc. for mortality) including transportation and planting	310 nos.	15.00/Plant	4650.00	
5.	Casualty replacement @ 10% of item No. 4 & 5			465.00	
6.	Cost of 2 weedings and hoeing		1.00/Plant	540	
7.	Contingency and unforeseen (3%)			492.00	
	Total			**Rs. 6,007.00**	
	Say			**Rs. 6,000.00**	
	Maintenance cost 2nd year onwards – 15 % of 1st year cost			900.00	
	For next 5 years i.e., Rs. 900 x 5			4500.00	
	Total Cost			**Rs. 10,500.00**	
	Say			**Rs. 10,500.00**	
B. Agro-Horticulture (cost per ha)					
1.	Cost of raising 270 plants up to 5 years @ Rs. 10,000.00			10500.00	The remarks mentioned under Horticulture are also applicable for Agro-Horticulture.
2.	Cost of raising agricultural crops @ Rs. 5,000 per hectare per year			5000.00	
3.	Fencing			45300.00	
	Total			**Rs. 60,800.00**	

Estimate of Orchard Development in the Watersheds Per Hectare (Without Fencing)

S.No.	Particulars	Quantity	Rate	Amount	Remarks
A. Horticulture					
1.	Soil working 1m x 1m x 1m size pits (270nos.) including cost of refilling	270.00 cum	36.66/cum	9898.20	Since, the project is to be operated in a participatory mode, contribution in the form of labour input for pit digging, FYM and its applications, weeding and hoeing are to be provided by the participating farmers, hence the costs are not included in the estimates.
2.	Application of Farmyard Manure, including cost		L.S.	450.00	
3.	Cost of NPK mixture, neemicide @ 250 gm/plant		L.S.	400.00	
4.	Cost of plants (including 15% etc. for mortality) including transportation and planting	310 nos.	15.00/Plant	4650.00	
5.	Casualty replacement @ 10% of item No. 4 & 5			465.00	
6.	Cost of 2 weedings and hoeing		1.00/Plant	540	
7.	Contingency and unforeseen (3%)			492.00	
	Total			**Rs. 6,007.00**	
	Say			**Rs. 6,000.00**	
	Maintenance cost 2nd year onwards – 15 % of 1st year cost			900.00	
	For next 5 years i.e., Rs. 900 x 5			4500.00	
	Total Cost			**Rs. 10,500.00**	
	Say			**Rs. 10,500.00**	
B. Agro-Horticulture (cost per ha)					
1.	Cost of raising 270 plants up to 5 years @ Rs. 10,000.00			10500.00	The remarks mentioned under Horticulture are also applicable for Agro-Horticulture.
2.	Cost of raising agricultural crops @ Rs. 5,000 per hectare per year			5000.00	
	Total			**Rs. 15,500.00**	

DEMONSTRATION OF AGRO-HORTICULTURE USING PLASTIC DRUM OF 2OO LITRES CAPACITY

To promote horticulture with crops a demonstration model using plastic drums for horticulture is made. Mainly crops roots go in to the soil up to “4-5” in cereal crops and “6-9” in pulses. Using plastic drums the plants will be planted 50-60 cm below the ground level which is below the root zone of crops. Therefore trees will not able to take nutrients from upper layer of fields and there will no effect of plants on crops.

In summer season up to 1 to 1.50m depth of soil becomes dry causes more mortality rate of plants, using drums plants are planted below 50-60 from Ground level and in rainy and winter season up to February roots of plants goes below 2.10m below where moisture will be available and plants will be safe in summer also. Using barbed wire fencing the plants will be protected by Anna Pratha.

Therefore, it is hoped that farmers will adapt this procedure for Agro-forestry and will become prosperous.

DETAIL ESTIMATE OF DEMONSTRATION OF HORTICULTURE AND MIXED CROPPING

For 1.00 Hectare

S.No.	Description of Work	No.	L.	B.	D./H.	Quantity
1.	Earth work in cutting	156	3.14 x 1.20	-	1.35	793.54
	Trench	156	1.50	0.75	0.75	131.62
	Fencing Poll	133	0.20	0.20	0.20	1.064
	Total					**926.22 cum**
2.	Farm yard manure	156x10				1560 kg
3.	Filling of earth work with farm yard manure	156	3.14 x 1.00	-	1.20	587.80 cum
4.	C.C.W. 1:2:4 for fencing poll	133	0.20	0.20	0.20	1.064 cum
5.	Angle iron for poll	133	1.80	-	-	239.40 m
6.	Barbed wire	3	400	-	-	1200.00 m
7.	Plants	156	-	-	-	156 nos.
8.	Plastic drums (200 litre)	156	-	-	-	156 nos.

CONSUMPTION OF MATERIALS

S.No.	Description of Work	Quantity	Farmyard Manure (kg)	Cement Bags (nos)	Coarse Sand (cum)	G.S.Grit 10-20 mm	Angle Iron (m)	Barbed Wire (kg)	Planting Drum (nos)
1.	C.C.W. 1:2:4	1.064 cum	-	6.49	0.446	0.883	-	-	-
2.	Angle iron	239.4 m	-	-	-	-	239.40	-	-
3.	Barbed wire	1200.0 m	-	-	-	-	-	1200.0	-
4.	Farmyard manure	1560.0 kg	1560 kg	-	-	-	-	-	-
5.	Plastic drum	156 nos.	-	-	-	-	-	-	156
Total			**1560.0 kg**	**6.49**	**0.446**	**0.883**	**239.40**	**1200.0**	**156**
Say			**1560.0 kg**	**6.50 bags**	**0.450 cum**	**0.900 cum**	**239.40**	**1200.0 m**	**156**

COST OF MATERIALS

S.No.	Particulars	Quantity	Rate	Amount
1.	Farm yard manure	1560.0 kg	10.00/kg	15600.00
2.	Barbed wire	1200.0 m/120.0 kg	60.50/kg	7260.00
3.	Angle iron	239.40 m/785 kg	40.50/kg	31792.50
4.	Plastic drum	156 nos	690.00 each	107640.00
5.	Cement	6.50 bags	285.00/bag	1852.50
6.	Coarse sand	0.450 cum	2500.00/cum	1125.00
7.	G.S.Grit 10-20 mm	0.900 cum	1250.00/cum	1125.00
8.	Plants	156 nos	18.00 each	2808.00
Total				**Rs. 1,69203.50**

LABOUR CHARGES

S.No.	Particulars	Quantity	Rate	Amount
1.	Earth work	1514.02 cum	36.66/cum	55503.97
2.	C.C.W. 1:2:4	1.064 cum	492.00/cum	523.88
3.	Fixing of angle iron	10 Man Days	100/Man Day	1000.00
4.	Fixing of barbed wire	15 Man Days	100/Man Day	1500.00
Total				**Rs. 58,527.85**

Total Expenditure	
1. Cost of materials	1,69203.50
2. Labour Charges	58,527.85
Total	**Rs. 227730.35**
Say	**Rs. 2,27,730.00 only**

DEMONSTRATION OF GREEN MANURING

Green Manuring is very useful but due to sowing of Kharif season crop, lack of suitable type of seeds, and limitation of moisture, it is not widely practiced. Green Manuring brings immediate advantage because of its quick decomposition where as FYM and compost improves the soil physical

condition in the long-run. Benefits of Green Manuring accrue from substitution of chemical fertilizers, enhance soil biological activities and erosion control due to vegetative cover.

Sesbania Species (Dhaincha) and *Crotolaria Juneea* (Sunhemper Sanai) are most common green manure crops. They accumulate about 100 kg N/ha in their biomass and 64-88% of this is derived from atmosphere. Apart from direct benefit of green Manuring as a source of nutrients and organic matter, it has the capacity to mobilize soil phosphorus and other nutrients. It also helps in reclamation of problem of soil, e.g., *Sesbania* helps in removing exchangeable sodium and reclamation of salt affected soils.

In I.W.M.P. VIII Project, efforts will be made to oblise the farmers for Green Manuring.

A typical estimate is made for Green Manuring is given below:

ESTIMATE FOR GREEN MANURING IN THE WATERSHED (PER ha)

S.No.	Particulurs	Rate	Cost	Remark
1	Seed of Sesbania (Dhaincha)25Kg/ha	25.00/Kg	625	Since the project is to be operated in a participatory mode, contribution in the form of tillage will be done by farmers is not included in the estimate.
2	Tillage operation before sowing and to plough the plants of Dhaincha after 40-45 days of sowing for Green Manuring.	1000/ha Before and after saring	2000.00	
Total			**Rs. 625.00**	

Therefore cost per hectare of Green Manuring is Rs. 625.00/ha

CHAPTER – 6

CAPACITY BUILDING

CAPACITY BUILDING

Capacity Building is the process of assisting the group or individuals to identify and address issues and gain the insights, knowledge and experience needed to solve problems and implement change.

There is a realization in the development sector that there is a need to appraise the success of development interventions by going beyond the conventional development targets and measures of success (e.g. in the form of commodities, goods and services) to take into account improvements to human potential. Capacity building of stakeholders is also increasingly viewed as an important factor in developmental projects that involve participation of stakeholders at all levels for effective implementation of projects.

SCOPE OF CAPACITY BUILDING AT PROJECT AREA

- Alternative Land Use Plan
- Scientific technique of Soil and Moisture conservation
- Improved and Scientific agriculture practices
- Fodder development and Management
- Forestation
- Meteorological Information
- Dairy Development and Management
- Rural Craft
- Income Generation Activities
- Stitching
- Food Processing
- Post Harvest management practices

CHAPTER -7

PHASING OF PROGRAMME & BUDGETING

WATERSHED ACTIVITIES

Watershed management as a strategy has been adopted by Government of India especially in the rain-fed regions of semi-arid tropics. These regions are characterized by low and undependable rain, low soil fertility, poor infrastructure development, low literacy and high incidence of migration. Several studies have identified that there is a dire need of a systematic and scientific approach to deal with watershed development. The common guidelines generate a fresh and flexible framework for the next generation watershed development.

Scientific Planning

Cluster Approach

This envIsages intregrated development of Geo-hydrological unit ie. Treatment of cluster of micro - watershed the IWMP - VIII Project consist of 07 micro watershed namely **2C2D1g1e, 2C2D1g1d, 2C2D1g1c, 2C2D5b2d, 2C2D5b2c , 2C2D5c1e, 2C2D1g2c , 2C2D1g2b**,

Base line Survey

To access the impact of any watershed development programme a detailed baseline survey has to be conducted. This acts a benchmark for any intervention during and pest implementation of any development programme. A detailed baseline survey was undertaken which involved household census survey, Bio-physical survey and Village level data collection from Gram Panchayate AdhikarL Household census survey includes a . detailed questionnaire which has been filled by visiting each and every household in the village. This gave in the details of the demographic profile of the village, the literacy percentage, SC/ST population, number of BPL household, cattle population, net consumption rate in the village, average milk production of the cattle and various schemes running and their benefits.

Bio-physical survey was undertaken to identify various natural resources available in the village. It included the soil type, well in the area, crop under taken in the field. Cropping pattern, fertilizer used and various sources of irrigation in the field.

Participatory Rural Appraisal (PRA)

The past experience of watershed has given tremendous input to focus on creating accountability of the stakeholders towards the programme. This has created an emphasis to include all the stakeholder communities and their local and Indigenous Technological Knowledge *(YTK}* while planning for any activity. Participatory approach provides a new path for planning, implementing, monitoring and post- withdrawal activities with a complete accountability of the stakeholders. Various PRA techniques like resource mapping, social mapping, and season calendars were used to understand the physical and social orientation of the villagp in general and watershed in specific. These tools put the villagers in ease than the complicated questionnaires-

Use of GIS and Remote sensing for planning

Use of various high science tools has been promoted at various stages of watershed development.

Prioritization

Geographical Information System(GIS) has been used for prioritization process. Various layer maps were created like Geo-morpholodigital. Soil, BPL Population, SC/ST population. Ground water Status, Drinking water situation Slope percent These were all given proper weight age according to the DoLR specification. This helped in prioritization of various watershed a-eas.

Planning

Action plan matrix was formulated by State Level Nodal Agency (SLNA] taking into account various features like the slope percent, soil Depth Soil Texture, Soil erosion in the area for wasteland, forest land and agricultural " land. Global position ng System (GPS) was used to identify each and every water conservation structures available in the project area. Thi: was used to create a map. Contour Map of vertical interval of 0.3 meter at a scale of 1:4000 was used for identifying various locations for soil and water conservation structures.

Hydrological modeling

Hydrology modeling technique was used for locating drainage, stream length, flow direction, sink, Flow accumulation. This model overlaid over cadastral map to calculate the catchment area of each structures like the check dam etc This has helped to remove the human error which generally occurs while calculating the catchment area of a check dam.

Table-7.1: Details of Scientific Planning and Inputs in IWMP projects

Scientific criteria / input used	Whether scientific criteria was used
(A) Planning	
Cluster approach	Yes
Whether technical back-stopping for the project has been arranged? If yes, mention the name of the Institute	-
Baseline survey	Yes

Hydro-geological survey	Yes
Contour mapping	Yes
Participatory Net Planning (PNP)	Yes
Remote sensing data-especially soil/ crop/ run-off cover	-
Ridge to Valley treatment	-
Online IT connectivity between	-
(1) Project and DRDA cell/ZP	Yes
(2) DRDA and SLNA	Yes
(3) SLNA and DoLR	Yes
Availability of GIS layers	Yes
Cadastral map	Yes
Village boundaries	Yes
Drainage	Yes
Soil (Soil nutrient status)	Yes
Land use	Yes
Ground water status	Yes
Watershed boundaries	Yes
Activity	Yes
Crop simulation models	No
Integrated coupled analyzer/ near infrared visible spectroscopy/ medium	No
Normalized difference vegetation index (NDVI)#	No

Weather Station	-
(B) Inputs	NO
Bio-pesticides	No
Organic manures	No
Vermi compost	Yes
Bio-fertilizer	Yes
Water saving devices	Yes
Mechanized tools/ implements	Yes
Bio-fencing	Yes
Nutrient budgeting	Yes
Automatic water level recorders & sediment samplers	NO
Any other (please specify)	NO

Table-7.2: PHASING OF WORKS (Financial and Physical)

Abstract of estimation and costing of the watershed

S. No.	Component	Total (Rs. In Lacs)
A	**ADMINISTRATIVE COSTS**	
1	Administrative cost -TA&DA, POL / Hiring of vehicles/office and payment of electricity and phone bill etc. computer, stationary and office consumable and Contingency	54.00
2	Expert for monitoring and evaluation, DPR Preparation	16.20
	Sub Total	**70.20**
B	**PREPARATORY PHASES**	
1	Entry Point Activities like improvement in drinking water system, water harvesting works and etc.	21.60
2	Institutional and capacity building	27.00
	Sub Total	**48.60**
C	**WATERSHED WORKS**	
a	Watershed development works	
1	Submergence bund	34.58
2	Periferal bund	32.02
3	Gully Plug	80.88

b.	Water harvesting works	
1	Earthen Check dam	46.87
2	Water harvesting bund	58.12
c.	A forestation works	
1	Dry land horticulture	3.99
2	A forestation	13.54
	Sub Total	**270.00**
D.	**LIVILIHOOD PROGRAMME(Community based)**	
1	Income generating activities through SHG's for landless and marginal farmers and Livestock development activities	54.00
	Sub Total	**54.00**
E.	**PRODUCTION SYSTEM AND MICRO ENTERPRISES**	
1	Crop production, diversification of agriculture and introduction of agro-forestry and Demonstration of improved composting system	70.20
	Sub Total	**70.20**
F.	**CONSOLIDATION PHASE**	27.00
	Sub Total	**27.00**
	GRAND TOTAL	**540.00**

CHAPTER -8
QUALITATIVE ISSUES

PLAN FOR MONITORING OF THE PROJECT

The above project would be monitored regularly by the Watershed Development Team as per the norms of common guideline 2008. There will be every fortnight monitoring schedule have been proposed by the PIA of the project. A Web-based GIS system is being developed for monitoring and evaluating the project in its planning & implementation phases. The system would be available on a public domain and can be accessed by all the stakeholder of the project. The system shows the entire state of Uttar Pradesh and all of those areas selected over the next 18 years. Filtering allows the user to zoom onto one particular project. Details related to soil type, Land-use classification, inhabitation etc., can be obtained village-wise. Furthermore, survey-number wise details related to ownership, irrigation source, yield etc., can also be accessed by the users of the system. This system is being used for pooling up the details obtained from the DPR. In other words, the DPR is made available online in the form of a database which will help the stakeholders know areas of importance viz., already treated areas/historical works in the area, proposed areas for treatment etc., for further treatment and planning. The system would also show the satellite imageries of various years from the project inception stage to the project closing stages. This allows the user to evaluate the effectiveness of the treatment and thereby plan corrective measures for the project area. The system would serve as an aiding tool to the planners and evaluate the effectiveness of the treatment and thereby plan corrective measures for the project area. The system would serve as an aiding tool to the planners and evaluators for judging the efficacy of the project.

PLAN FOR EVALUATION OF THE PROJECT

The evaluation of the project would be done by the state and central agency as proposed by the SLNA of the state. The evaluation of the project would also be done by the expert of the respective field like Water Management and Land Resources Management after the completion of the project.

PLAN FOR PROJECT MANAGEMENT

The project management of a watershed programme is very important. It mainly depends upon the community organisation and the village level institutes. In watershed committee and various user groups have been formulated for post project operation and maintenance of assets created during project period. Major emphasis will on equity and sustainable benefit of the project even after implementation stage. A proper linkup will be built during project period with various institutes and capacity building organisation. They will act as a major kingpin during post implementation for scaling up the successful experience during project.

CHAPTER -9
CONSOLIDATION / EXIT STRATEGY

WATERSHED DEVELOPMENT FUND

The major source of financial assistance after post implementation period is Watershed Development Fund. The contribution of it will comes mainly from the fund generated .

USER CHARGES

Various user groups will be formed in village. These user groups will collect user according to the designated rules formed during the formation of user group. These funds will be transferred to the WDF funds as per these formulated rules. The secretary of watershed committee (WC) shall maintain the records.

Sustainability and Environmental Security

In the proposed watershed management plan of Sajnam proper blending of bio engineering measures will be applied. The proposed land use plan will improve the land utilization index and crop diversification index significantly as compared to existing one. It will help in maintaining ecosystem integrity on sustained basis.

Economic Analysis

Economic analysis of the project is carried out by taking direct benefits and costs, considering 30 year project life at 10% discount rate. For the purpose of economic analysis, whole watershed development plan is divided into four sectors namely agriculture (rain fed and irrigated), pure horticulture, agro-horticulture and silvi pastoral (Silvi-Pastoral + sericulture). Net present value (NPV), Benefit Cost Ratio (BCR), Pay Back Period (PBR) and Internal Rate of Return (IRR) criteria is employed to judge the economic efficiency of each enterprise, sector and project as a whole.

AGRICULTURE

In rain fed agriculture, the development cost can be recovered within one year as the present rain fed agriculture is being done on well maintained field, therefore, does not require much investment. In irrigated agriculture, investment of Rs. 818.00 lakhs is proposed to be made. The BC ratio of this sector is 1.6 **:** 1 within three years payback period.

Economics of agriculture sector

S. No.	Sector	Area (ha)	NPV (Rs.)	BC ratio
1	Irrigated agriculture	1353	47355000	1.6**:**1
2	Rain fed agriculture	3947	8290170000	1.2**:**1
3	**Total**	**5300**	**8337525000**	**1.4:1**

HORTICULTURE

Economic analysis of horticulture plantation in Agri-horti system at Sajnam watershed. Project life is considered to be 25 years and discount rate for NPV estimation is 10%.

S.N.	Common Name	Scientific name	Area (ha)	NPV of Net Benefit (Rs)	B:C Ratio
1	Amala	Embelica officinalis	14	978721	3.97:1
2	Ber	Zyziphus mauritiana	14	705492	2.81:1
3	Bael	Aegle marmelos	12	407728	2.84:1
	Total		40	2051941	3.512

FOREST/ FUEL WOOD PLANTATION

Economic analysis of fuel wood plantation at Sajnam watershed. Project life is considered to be 25 years and discount rate for NPV estimation is 10 %.

S.N.	Common Name	Scientific name	Area (ha)	NPV of Net Benefit (Rs)	B:C Ratio
1	Vilayati Babul, Kanji, Shesome, Sagon	*Prosopis juliflora*	210	2883614	2.11:1

FOOD SUFFICIENCY

Achieving self sufficiency in food production is one of the prime objectives of the project.

Status of food requirement and availability per annum in watershed

Sr. No.	Items	Requirement (q/yr)	Before project		Proposed	
			Availability (q/yr)	Deficit or surplus (q/yr)	Availability (q/yr)	Deficit or surplus (q/yr)
1	Cereals	93991	39476	54515	99838	+5847
2	Pulses	11738	10212	1526	12868	+1130
3	Oil seeds	12059	16882	4823	17659	+5600
4	Vegetable	1172	246	926	1302	+130

CHAPTER -10
EXPECTED OUTCOME

EMPLOYMENT RELATED OUTCOMES

Employment has always been a problem in the village. The principal occupations of the people are dry land agriculture, animal husbandry and casual labour work. Animal husbandry does not keep them engaged full time, Thus the people mainly depend upon casual labour, either in the village itself or outside it.

The project plans for creation of both wage employment and self employment opportunities. Wage employment would be created by engaging people in watershed physical works like construction of earthen bunds, farm bunds, village pond, plantation, etc. Self employment would be created by providing the people with cash support in the form of direct livelihood activities like agriculture, animal husbandry and other enter prise development.

Labour migration in search of gainful employment is one of the major problems in the remote watershed in particular. Causal employment opportunities will be generated during the implementation of the project activities. However, the changes in land use pattern and adoption of other subsidiary enterprises will generate employment opportunities for persons in the watershed. The details of the employment generation is given in below.

Table-10.1: EXPECTED EMPLOYMENT RELATED OUTCOMES

SN	No. of the Villages	Wage employment										Self employment				
		No. of mandays (Lakhs)					No. Of beneficiaries					No. Of beneficiaries				
		SC	ST	Others	Women	Total	SC	ST	Others	Women	Total	SC	ST	Others	Women	Total
1	13	0.8694	-	1.6048	0.134	2.6082	1306	-	1472	142	2920	110	-	155	25	290

MIGRATION PATTERN

On account of agriculture and animal husbandry providing only part time employment for some part of the year, the people migrate for a better half of the year for wage labour. Employment opportunities in the local area as mentioned above will ensure lessening seasonal migration from the area. The detail of the migration is given below.

Table-10.2:DETAILS OF MIGRATION (I.W.M.P.-IX) LALITPUR

S.No.	No. of the villages	No. of persons migrating	No. of days per year of migration	Main reason for migration	Expected reduction in no. of persons migrating
1	13	211	150	Poverty & Unemployment	119

WATER RELATED OUTCOMES

As a result of the watershed activities, it is expected that the quantity and quality of drinking water would be improve. The ground water quality of the project area is normal to good, the average Ph value is 6.7 to 7.8, the Electric conductivity of the ground water is about 957 to 1125 U . The overall analysis of the ground water shows that the water is good for the drinking purpose. The water level in the project area ranges from 5.5 to 6.0 metre. Status of the drinking water is given in below.

Table-10.3: STATUS OF DRINKING WATER

S. N.	No. of the villages	Availabilty of drinking water (no. of months in a year)		Quality of drinking water	
		Pre-project	Expected Post-Project	Pre-project	Expected Post-Project
1	12	10 months	12 months	General	Soft water

Table-10.4:DETAILS OF AVERAGE GROUND WATER TABLE DEPTH IN THE PROJECT AREAS (IN METERS)

S. N.	No. of the villages	Sources	Pre-project	Expected Post-Project	Remarks
1	13	Open wells	6.00 mtr.	5.00-5.25 mtr.	-
		Bore wells	-	-	-

VEGETATION/ CROP RELATED OUTCOMES

Food crop production is a major land based activity in the watershed. Traditional cultivation practices, coupled with poor quality seeds and long duration crops varieties result in low crop yields. Crops are taken under rainfed as well as irrigated conditions. The yield levels of rainfed crops are particularly very poor. Large variation has been noticed in productivity of wheat and Jowar under rainfed and irrigation, condition respectively. At present level of rainfed farming, the total produce from Rabi and Kharif crops obtained by a medium size of holding owning family can meet food requirements for up to 6 to 7 months only.

The farmers also do not have suitable cropping systems to deal aberrant weather. Weeds impose considerable constraints in producing of both Kharif and rabi crops under irrigation as well as rain-fed production system. Use of weedicide is rare in the watershed. It is expected that the post project period would see a substantial increase in agriculture production and yield from them. It is expected that after compilation of the project, the crop productivity of Rice-Wheat will certainly enhance, It would be around Paddy (24.00 qt/ha),Wheat (28.00 qt/ha). There will be an improvement in soil health of the study area after conservation measures

Table-10.5: MAJOR CROPS GROWN AND THEIR PRODUCTIVITY IN THE PROJECT AREA

S. N.	Names of the crop	Current status		Expected Post-Project Status	
		Area (ha)	Productivity (kg/ha)	Area(ha)	Productivity(kg/ha)
1	Kharif	4118.00	1550.00	4300.00	1800.00
2	Rabi	1574.00	2075.00	1800.00	2200.00
3	Zaid/Other season	363.00	438.00	450.00	500.00

LIVESTOCK

The village has quite a good of livestock population. These include cows, bullocks, buffaloes, goats. The interventions like provision of good quality cows and buffaloes, the establishment of a fodder bank and other such related activities would spur up the dairy development in the village. It is expected that the post project period would see a substantial increase in livestock population and yield from them.

FOREST/VEGETATIVE COVER RELATED OUTCOMES

There is 52.86 % land under forest cover. The village has a forest area which consists of only *Prosopis Juliflora* (babool). Trees like Neem and *Alianthus* are seen just here and there, not concentrated in any area. It is planned that land to be covered under new plantation.

ABTRACT OF OUTCOMES

The over all assessment of the project certain parameters have been evaluated on the present and future basis. As mentioned in the above the food grain production according to the expenditure have been analysised after the completion of the project.

Table-10.6: SUMMARY OF EXPECTED/ESTIMATED OUTCOMES (MIS TABLE-M (PO) F1)

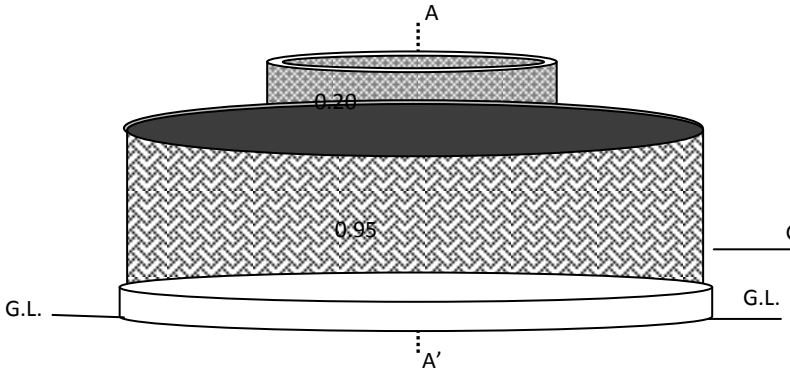
Sl.No.	Name of District	Item	Unit of Meadurement	Pre-Project Status	Expected Post Project Status	Remarks
1	2	3	4	5	6	7
1	**LALITPUR IWMP-IX**	Status of Water Table	Miter	6.0	5.00	
2		Ground Water Structures repaired/rejuvenated	No.	--	70	
3		Quality of Drinking water	--	General	Soft	
4		Availability of Drinking Water	Days	10 Month	12 Month	
5		Increase in Irrigation Potential	%	--	5%	
6		Change in Corpping/land use pattern	--	--	--	
7		Area under agricultural crop	Ha.	2689.66	3055.00	
8		i. Area under single crop.	Ha.	1200.00	1864.00	
9		ii. Area under double crop	Ha.	1650.00	1965.00	
10		iii. Area under multiple crop	Ha.	600.00	850.00	
11		Net increase in crop production area	Ha.	--	--	

12		Increase in area under vegetation	Ha.	30	70	
13		Increase in area under horticulture	Ha.	25	85	
14		Increase in area under fuel & fodder	Ha.	--	--	
15		Increase in milk Production	Av/Lt/Days/Cattle	--	5%	
16		No. of SHGs	No.	--	4	
17		Increase in no. of livelihoods	No.	--	--	
18		Increase in income	Rs.	6230	9130	
19		Migration	No.	611	312	
20		SHG Federations formed	--	--	--	
21		Credit Linkage with banks	--	--	4	
22		Resource use agreements	--	--	Agreed	
23		WDF collection & Management	5% to 10%		5% to 10%	
24		Summary of lessons learnt				

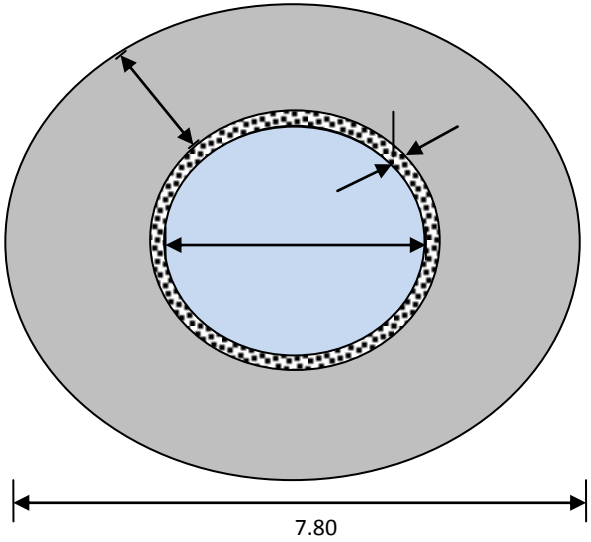
Chapter-11

COST NORMS & DESIGN OF STRUCTURE PROPOSED

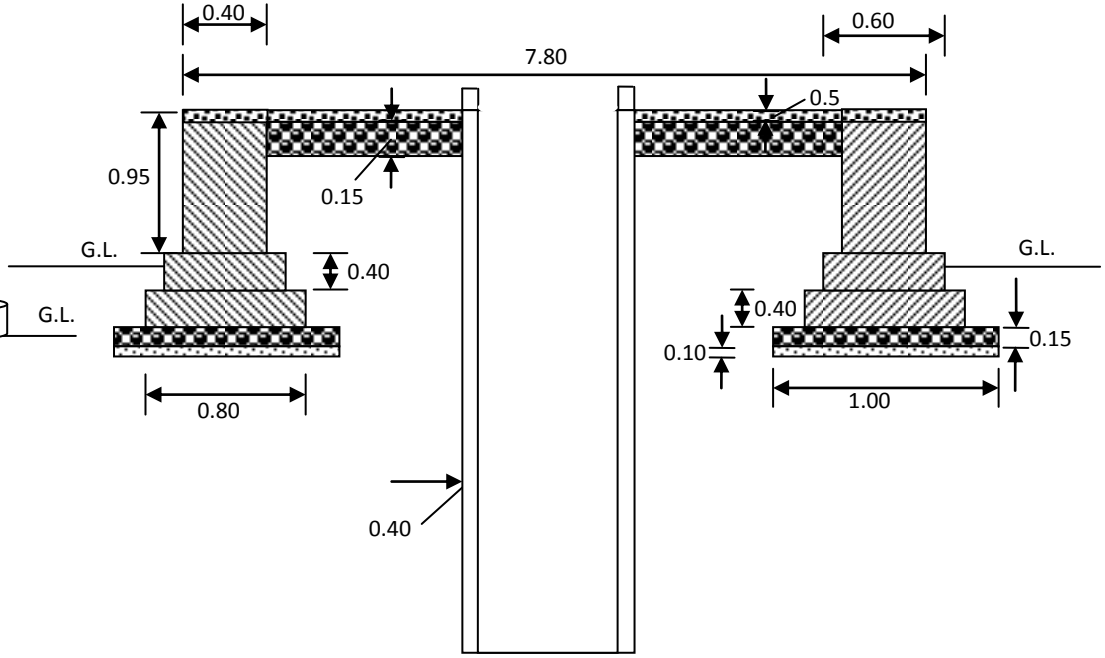
DRAWING OF WELL



ISOMETRIC VIEW OF WELL



PLAN



SECTION AT A-A'

DESCRIPTION

1. C.C.W. - 1:4:8.
2. Brick Work- 1:4
3. Plastering- 1:4
4. Raised Pointing- 1:3.

DETAIL ESTIMATE OF JAGAT OF WELL

S.No.	Description of Work	No.	L	B	D/H	Quantity
1.	Earth work in foundation	1	3.14 x 7.4	1.20	1.00	27.88
2.	Laying of sand	1	3.14 x 7.4	1.00	0.10	2.32
3.	C.C.W. 1:4:8	1	3.14 x 7.4	1.00	0.15	3.48
4.	Brick Work 1:4	1	3.14 x 7.4 3.14 x 7.4 3.14 x 7.4 3.14 x 3.4	0.80 0.60 0.40 0.40	0.40 0.40 0.90 0.20	7.43 5.57 8.36 0.85
						22.21
5.	Filling of earth work	1	3.14 x 5.4	1.60	0.75	20.34
6.	C.C.W. 1:4:8	1	3.14 x 5.4	1.60	0.15	4.06
7.	C.C.W. 1:2:4	1	{(3.14 x 7.8 x 7.8)/4 – (3.14 x 3.8 x 3.8)/4} x 0.05			1.821
8.	Raised pointing	1	3.14 x 7.8	-	0.90	22.04

CONSUMPTION OF MATERIALS

S. No.	Description of Work	Quantity	Cement Bags	Coarse Sand (cum)	Brick (cum)	G.S.B. 25-40 mm (cum)	Grit 10-20 mm (cum)
1.	Sand Laying	2.32 cum	-	2.320	-	-	-
2.	C.C.W. 1:4:8 (4.06 + 3.48)	7.54 cum	25.63	3.393	-	7.012	-
3.	Brick Work 1:4	22.21 cum	53.30	7.551	22.21	-	-
4.	C.E.W. 1:2:4	1.821 cum	11.10	0.764	-	-	1.547
5.	Raised Pointing	22.04 m^2	1.01	0.103	-	-	-
Total			**91.04**	**14.131**	**22.21**	**7.012**	**1.547**
Say			**91 bags**	**14.13 cum**	**22.20**	**7.01**	**1.55**

COST OF MATERIALS

S.No.	Particulars	Quantity	Rate	Amount
1.	Cement	91 Bags	285.00/bag	25935.00
2.	Coarse Sand	14.13 cum	2500.00/cum	35325.00
3.	Coarse	20.20 cum	950.00/cum	19190.00
4.	Brick Ballast 25-40 mm	7.01 cum	855/cum	5993.55
Total				**Rs. 86443.00**

LABOUR CHARGES

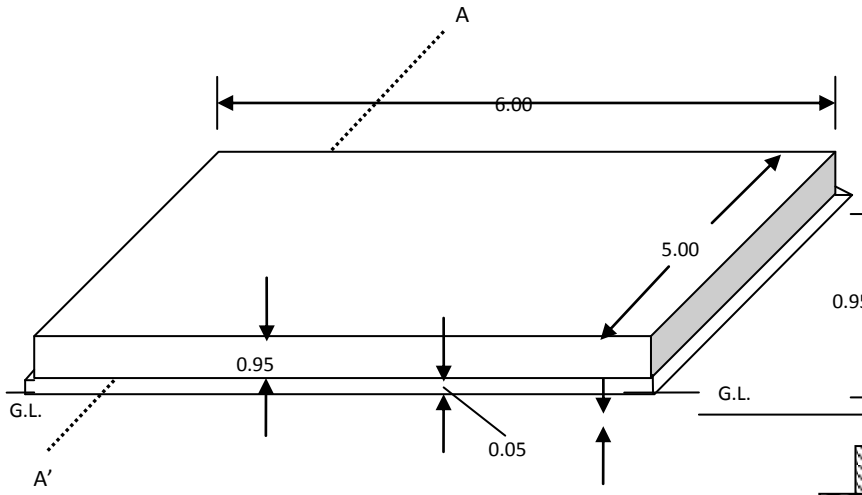
S.No.	Particulars	Quantity	Rate	Amount
1.	Earth Work	48.22 cum	36.66/cum	1769.01
2.	Sand Laying	2.32 cum	33.33/cum	77.32
3.	C.C.W. 1:4:8	7.54 cum	492.00/cum	3709.68
4.	C.C.W. 1:2:4	1.821 cum	492.00/cum	894.11
5.	Brick Work	22.210 cum	370.00/cum	8217.70
6.	Raised Pointing	22.04 m^2	51.61/m^2	7.48
7.	Curing 22.21	22.210 cum	25.00/cum	555.25
8.	Chowkidar	13 Man days	100.00/man day	1300.00
9.	Head load & transportation charges 10% of cost of materials			6674.90
Total				**Rs. 24,335.45**

TOTAL EXPENDITURE	
1. Cost of materials	65,914.00
2. Labour charges & transportation	24,335.45
Total	**Rs. 90,249.45**
	Say Rs. 90,250.00 only

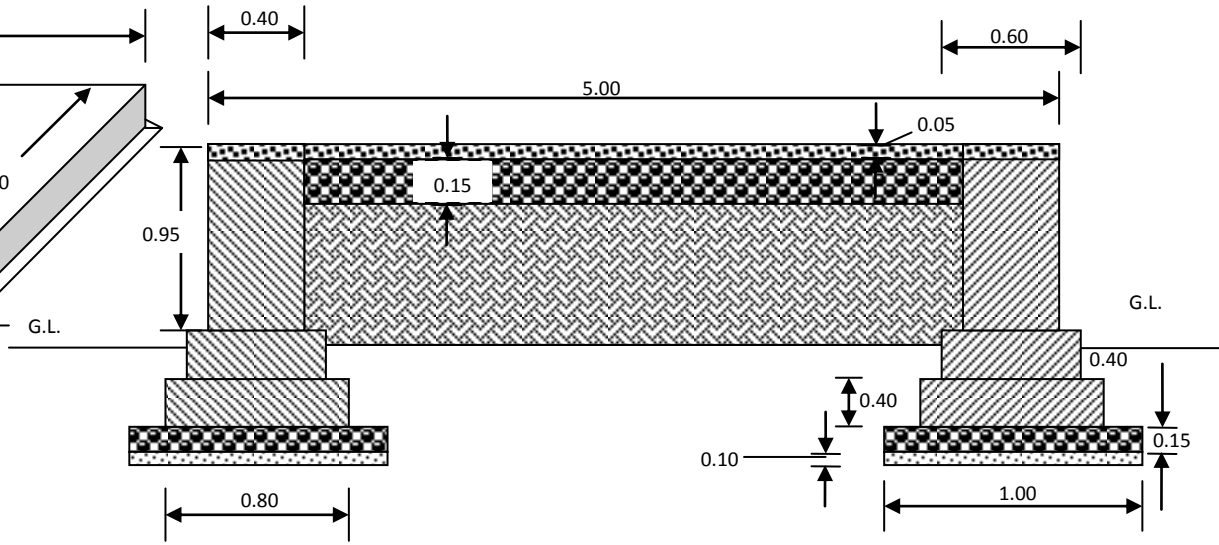
DETAIL ESTIMATE OF INDIA MARK-II HAND PUMP FOR WATER SHED AREA, DISTRICT - LALITPURU.P.

S.No.	Description of work	Unit	Quantity	Rate	Amount
1	Transportation of rig machine, hand Pump material, P.V.C. Pipe, strainer and cement from store to work site.	work	1	3000.00	3000.00
2	Supply of material to install Hand Pump i- Lowering and installation of India mark-II Hand Pump with G.I. Pipe & connecting rods. ii- 140 mm P.V.C. Pipe 8kg/cm2. iii- medium G.I.Pipe of the 32 mm Ø.	No. metre metre	1 20 30	5380.00 240.00 202.90	5380.00 4800.00 6087.00
3	Boring work by D.T.H. Rig machine and lowering of P.V.C. assembling	meter	50	396.00	19800.00
4	Development of Hand Pump after installation	work	1	100.00	100.00
5	work after development with material	work	1	50.00	50.00
6	construction of Platform of 1.86 m Ø with all material and cement	work	1	2525.00	2525.00
7	construction of channel with all material and labour	meter	3	125.00	375.00
8	Embossing work	work	1	50.00	50.00
9	Water testing work	work	1	400.00	400.00
				Total	**Rs. 42,567.00**
				Says	**Rs. 42,600.00**

DRAWING OF PANCHAYATI CHABUTARA



ISOMETRIC VIEW OF PLATFORM (CHABUTRA)



SECTION AT A-A'

DESCRIPTION

1. C.C.W. - 1:4:8.
2. Brick Work - 1:4
3. Plastering- 1:4
4. Raised Pointing- 1:3.

DETAIL ESTIMATE OF WATERSHED VILLAGE CHABUTARA

S.No.	Description of Work	No.	L.	B.	D/H	Quantity
1.	Earth work in foundation					
	Long Wall	2	8.00	1.20	1.15 1.15	22.08
	Short Wall	2	4.00	1.20		11.04
	Total					**33.12 cum**
2.	Laying of Sand					
	Long Wall	2	6.60	1.00	0.10	1.32
	Short Wall	2	3.60	1.00	0.10	0.72
	Total					**2.04 cum**
3.	C.C.W. 1:4:8					
	Long Wall	2	6.60	1.00	0.15	1.98
	Short Wall	2	3.60	1.00	0.15	1.08
	Total					**3.06 cum**
4.	Brick masonary work 1:4 in foundation & super structure					
	1st Footing.					
	Long Wall	2	6.40	0.80	0.40	4.096
	Short Wall	2	3.80	0.80	0.40	2.432
	2nd Footing					
	Long Wall	2	6.20	0.60	0.40	2.976
	Short Wall	2	4.00	0.60	0.40	1.920
	Super Structure					

	Long Wall	2	6.00	0.40	0.90	4.320
	Short Wall	2	4.20	0.40	0.90	3.024
Total						**18.768 cum**
5.	Earth work in filling	1	5.20	4.20	0.75	16.38 cum
6.	C.C.W. 1:4:8	1	5.20	4.20	0.15	3.276 cum
7.	C.C.W. 1:2:4	1	6.00	5.00	0.05	1.500 cum
8.	Raised Pointing 1:3					
	Long Wall	2	6.00	-	0.90	10.80
	Short Wall	2	5.00	-	0.90	9.00
Total						**19.80 m^2**

ABSTRACT OF WORK

1.	Earth Work	33.12 + 16.38	49.50 cum
2.	Sand Laying		2.040 cum
3.	C.C.W. 1:4:8	3.060 + 3.276	6.336 cum
4.	Brick Work 1:4		18.568 cum
5.	C.C.W. 1:2:4		1.500 cum
6.	Raised Pointing 1:3		19.80 m^2

CONSUMPTION OF MATERIALS

S.No.	Particulars	Quantity	Cement (cum)	Coarse Sand (cum)	Brick (cum)	G.S.B. 25-40 mm (cum)	Brick Grit 10-20 mm (cum)
1.	Sand Laying	2.040 cum	-	2.040	-	-	-
2.	C.C.W 1:4:8	6.336 cum	21.54	2.851	-	5.892	-
3.	Brick Work	18.768 cum	45.04	6.381	18.768	-	-
4.	C.C.W. 1:2:4	1.500 cum	9.15	0.630	-	-	1.275
5.	Raised Pointing	19.800 m^2	0.91	0.093	-	-	-
Total			**76.64**	**11.995**	**18.768**	**5.892**	**1.275**
Say			**77 Bags**	**12.000**	**18.768**	**5.900**	**1.280**

COST OF MATERIALS

S.No.	Particulars	Quantity	Rate	Amount
1.	Cement	77 Bags	285/Bag	21945.00
2.	Coarse Sand	12.00 cum	910.00/cum	10920.00
3.	Coarse	11.04 cum	950.00/cum	10490.40
4.	G.S.B. 25-40 mm	5.900 cum	855.00/cum	5044.00
5.	G.S. Grit 10-20 mm	1.280 cum	1250.00/cum	1600.00
Total				**Rs. 50000.00**

LABOUR CHARGES

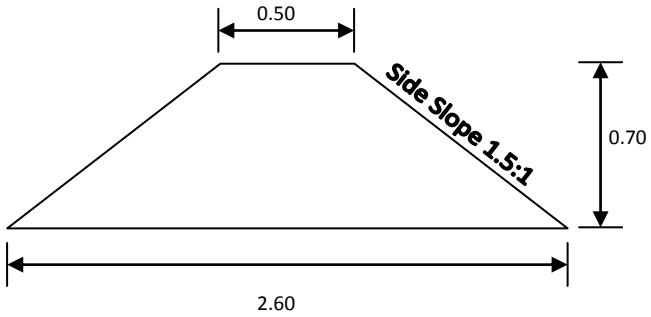
S.No.	Particulars	Quantity	Rate	Amount
1.	Earth Work	49.50 cum	36.66/cum	1814.67
2.	Sand Laying	2.060 cum	33.33/cum	68.65
3.	C.C.W. 1:4:8	6.336 cum	494.00/cum	3129.98
4.	C.C.W. 1:2:4	1.500 cum	494.00/cum	741.00
5.	Brick Work 1:4	18.768 cum	370.00/cum	6944.16
6.	Raised Pointing 1:3	19.800 m^2	51.61/cum	1021.87
7.	Curing Charges	18.768 cum	25.00/cum	469.20
8.	Chowkidar	6 Man Days	100.00/Man Day	600.00
Total				**Rs. 14,789.53**

Total Expenditure	
1. Cost of Materials	57,338.60
2. Labour Charges	14,789.53
Total	**Rs. 72,128.13**
Say	**Rs. 72,130 only**

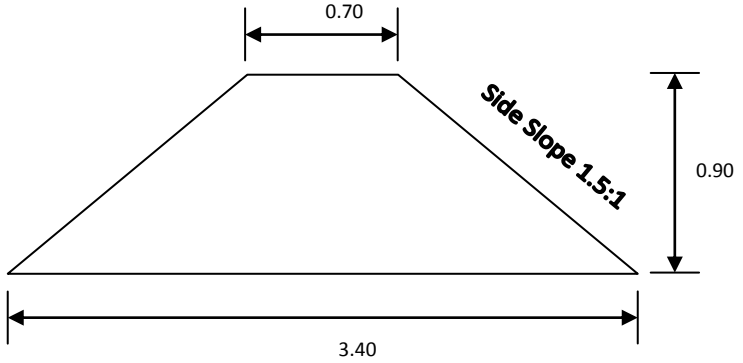
DETAILS ESTIMATE OF WATERSHED DEVELOPMENT WORK PHASE

DRAWING OF C.B., S.B., P.B., AND M.B.

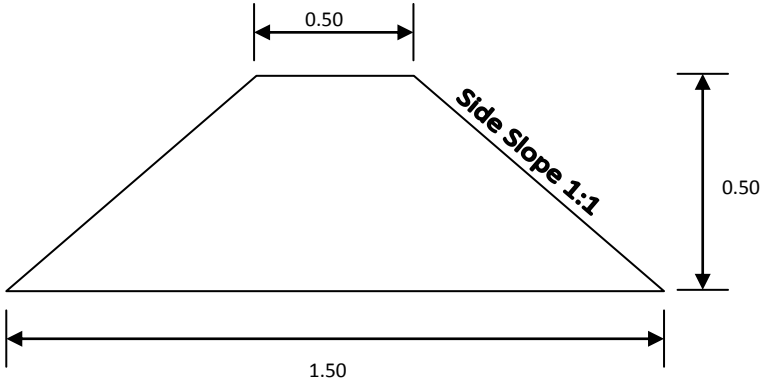
(Not to Scale)



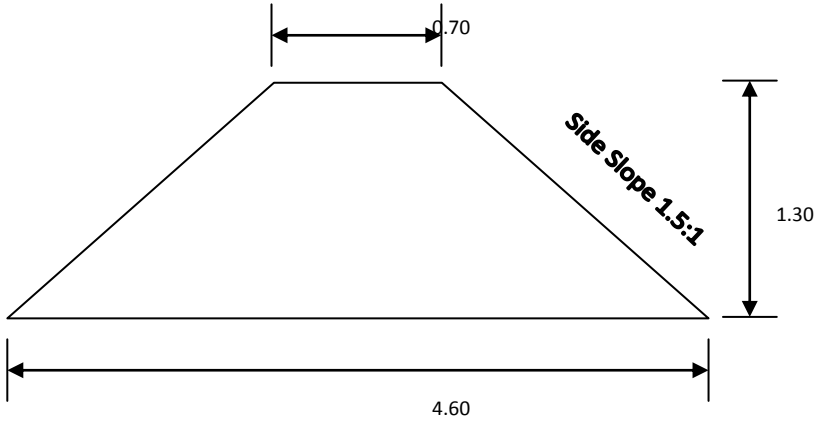
(C.B., Cross-Section – 1.085 m^2)



(S.B., Cross-Section – 1.845m^2)



(Field Bund, Cross-Section – 0.50 m^2)

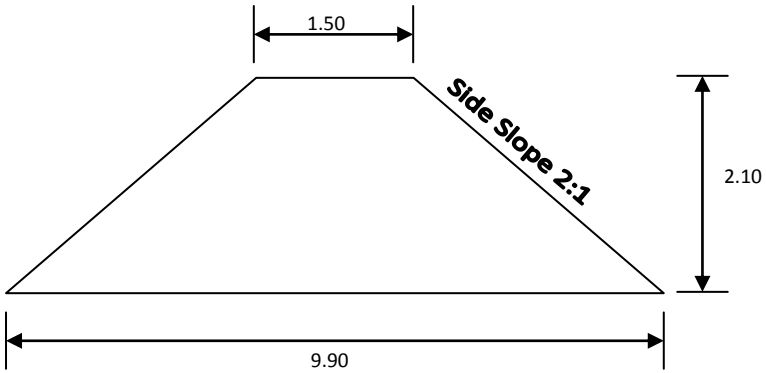


(S.B. /P.B. /M.B., Cross-Section – 3.445 m^2)

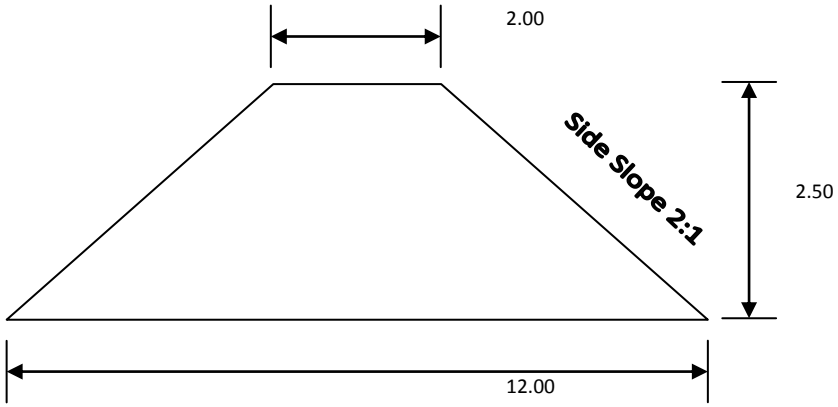
(All dimensions in Metre)

DRAWING OF EARTHEN CHEKDAM / GULLY PLUG

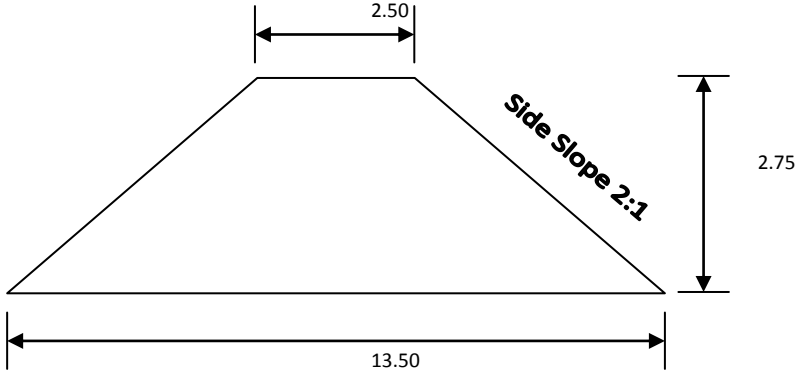
(Not to Scale)



(C.D. /G.P., Cross-Section – 11.97 m^2)



(C.D. /G.P., Cross-Section – 17.50 m^2)



(W.H.B., Cross-Section – 22.00 m^2)

(All dimensions in Metre)

DESIGN OF CONTOUR BUND

Type of Soil	-Loam,Sandy Loam
Rain fall	-24 hr in cm -25 cm
Field Stop -1%	
Vertical Interval (VI)	= [s/3+2] x 0.3
	= [1/3+2] x 0.3
	= 0.70 m
Horizontal Interval (HI)	= 100 x V.I/s
	= 100 x 0.7/1
Height of bund h	$= \sqrt{(\text{Re x VI})/50}$ Re=maximum rainfall in cm
	$= \sqrt{(25 \text{ x } 0.7)/50}$
	$= \sqrt{0.35}$
	= 0.59
	Say 0.60 m
Free board	=15% of height minimum -10 cm
Height	= 0.60 + 0.10
	= 0.70 m

Taking top width of bund 0.50 m and side slope 1.5:1

Then base of Bund	= 0.50 + (1.50 d) x 2
	= 2.60 m
Cross-Section of bund	= (0.50 + 2.60) x 0.70 / 2
	= 1 .085 m^2
Length of bund	= 100 s / V.I.
	= 100 x 1 / 0.70
	=142.85 m/ha
	Say 150 m/ha
Earth work/ha	= 150x1.085
	= 162.75 cum
Cost Rs. / ha	= 162.75 x 39.16 = 6373.29
	Say 6375.00

DESIGN OF SUBMERGENCE BUND

Types of soil – -Loam,Sandy Loam — Rainfall intensity for 24 hrs – 25cm

Field slope 3% — V.I.=[s/3+2]x0.30

=0.90 m

Horizontal Interval = (100xV.I.)/s — = (100x0.90)/3

=30 m

Height of bund $h=\sqrt{(\mathrm{Re}\ \mathrm{x}\ \mathrm{V.I.})/50}$ — $=\sqrt{(25\ \mathrm{x}\ 0.90)/50}$ $=\sqrt{0.45}$ = 0.67 m. **Say 0.70m**

Free board 20% of height minimum 20cm
Total Height =0.90m
Taking top width of bund 0.70m and side slope 1.5:1

Bottom of bund = 0.70+2 x 1.5d
= 0.70+2.70
= 3.40

Cross Section of Submergence Bund = (0.70+3.40) x 0.90 / 2
= 1.845 m^2

Length of bund = 100 s / V.I.
= (100 x 3) /0.90
= 333 m

Feasible length 100 + 25 + 25
= 150 m

Earth work/ha =150 x 1.845
=276.75

Cost per ha =276.75 x 39.16
=10,837.53
Say 10,850=00

TYPICAL SECTION OF FIELD BUND

Top width	= 0.50 m
Side slope	= 1:1
Height of bound	= 0.50 m
Bottom Width	= 1.50 m
Cross section	= (0.50+1.50)x0.50/2 = 0.50 m^2
Length per hectare	= 200 m
Earthwork	= 200 x 0.50 = 100 cum
Cost 39.16/cum	= Rs. 3916.00
Cost per hectare	= Rs. 3916.00

TYPICAL SECTION OF P.B., M.B., S.B.

Top width	= 0.70 m
Side slope	= 1.5:1
Height	= 1.30 m
Bottom	= 4.60 m
Cross section	= (0.70+4.60)x1.30/2
	= 3.445 m^2
Cost/ meter	= Rs. 142.00

TYPICAL SECTION OF EARTHEN CHECK DAM / GULLY PLUG

Top width	= 1.50 m
Side slope	= 2:1
Height	= 2.10m
Bottom Width	= 9.90 m
Cross section	= (1.50 + 9.90) x 2.10 / 2
	= 11.97 m^2
Cost per meter	= Rs. 551.45

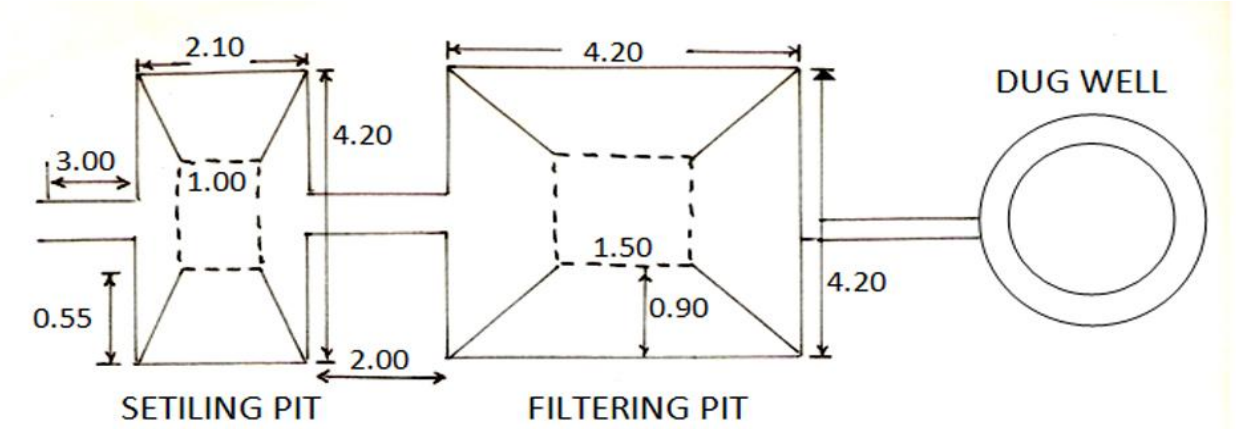
TYPICAL SECTION OF CHECK DAM / GULLY PLUG

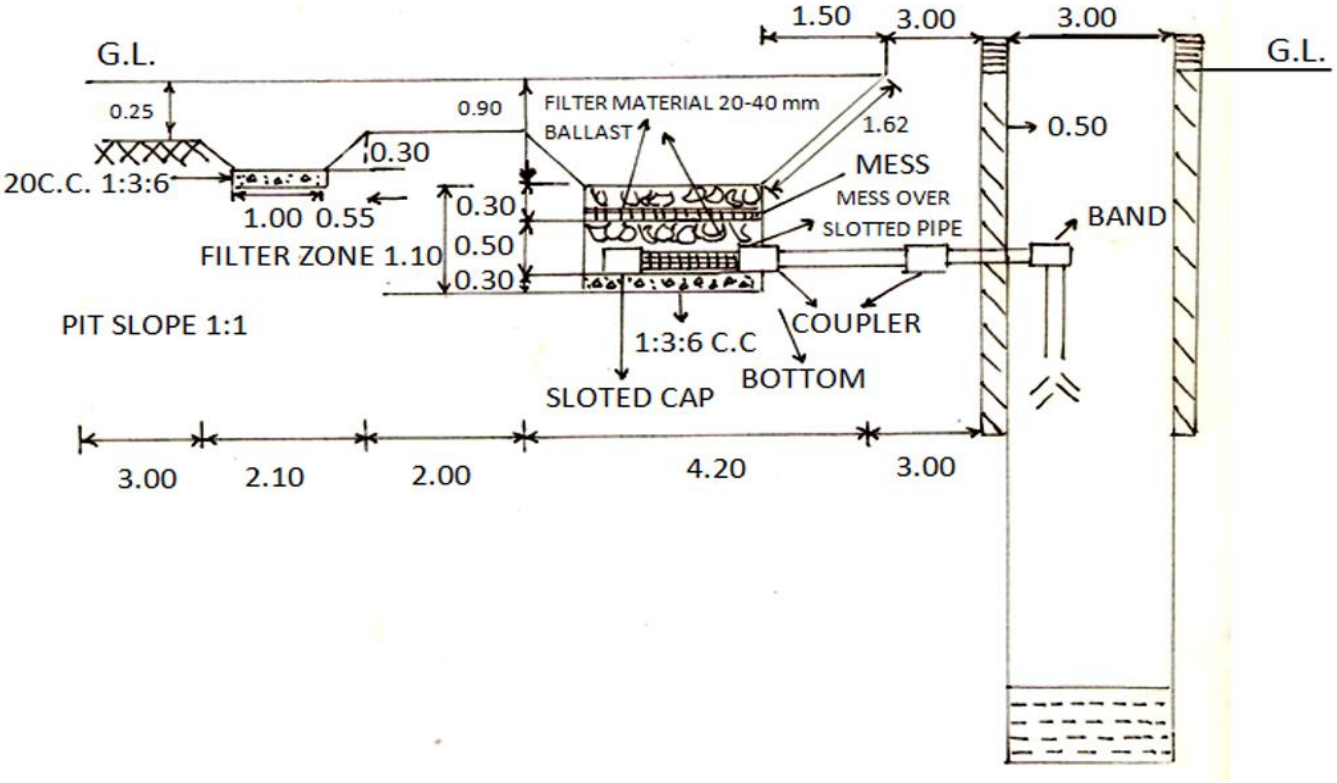
Top width	= 2.00m
Side slope	= 2:1
Height	= 2.50 m
Bottom Width	= 12.00 m
Cross Section	= (2.00 + 12.00) x 2.50 / 2
	= 17.50 m^2
Cost /meter	= Rs. 839.12

TYPICAL SECTION OF W.H.B

Top width	= 2.50 m
Side slope	= 2:1
Height	= 2.75 m
Bottom Width	= 13.50 m
Cross section	= (2.50 + 13.50) x 2.75 / 2
	= 22.00 m^2
Per meter cost	= Rs. 1085.92

DUG WELL RECHARGING STRUCTURE





ABSTRACT OF COST BRICK WORK JAGAT

S.No.	Name of Work	Quantity	Unit	Rate	Amount
1.	Earth Work	25.84	M^3	36.36	947.29
2.	C.C.W. Work in 1:3:6	1.49	M^3	2766.00	4121.34
3.	Laying Brick Supply & fixing	1.16	M^3	4000.00	4640.00
4.	Plaster work in 1:2	9.00	M^3	81.98	737.80
5.	S/F of 110 mm P.V.C. pipe	6.00	R.M	150.00	900.00
6.	Slotted Cap 110 mm P.V.C	1	No.	150.00	150.00
7.	P.V.C. bend 10 mm	1	No.	130.00	130.00
8.	P.V.C. Coupler 110 mm	2	No.	100.00	200.00
9.	Mesh ss S/F between	2	Job	100.00	200.00
10.	S/O fixing of sign board	1	Job	1850.00	1850.00
11.	Filter material 20-40 mm blast	1.8	M^3	855.00	1539.00
12.	Slotted P.V.C. pipe 110 mm	1	R.M.	250.00	250.00
Total					**Rs. 15,665.43**
Say					**Rs.15,670.00 only**

DETAILS OF MEASUREMENT (DUG WELLS RECHARGING)

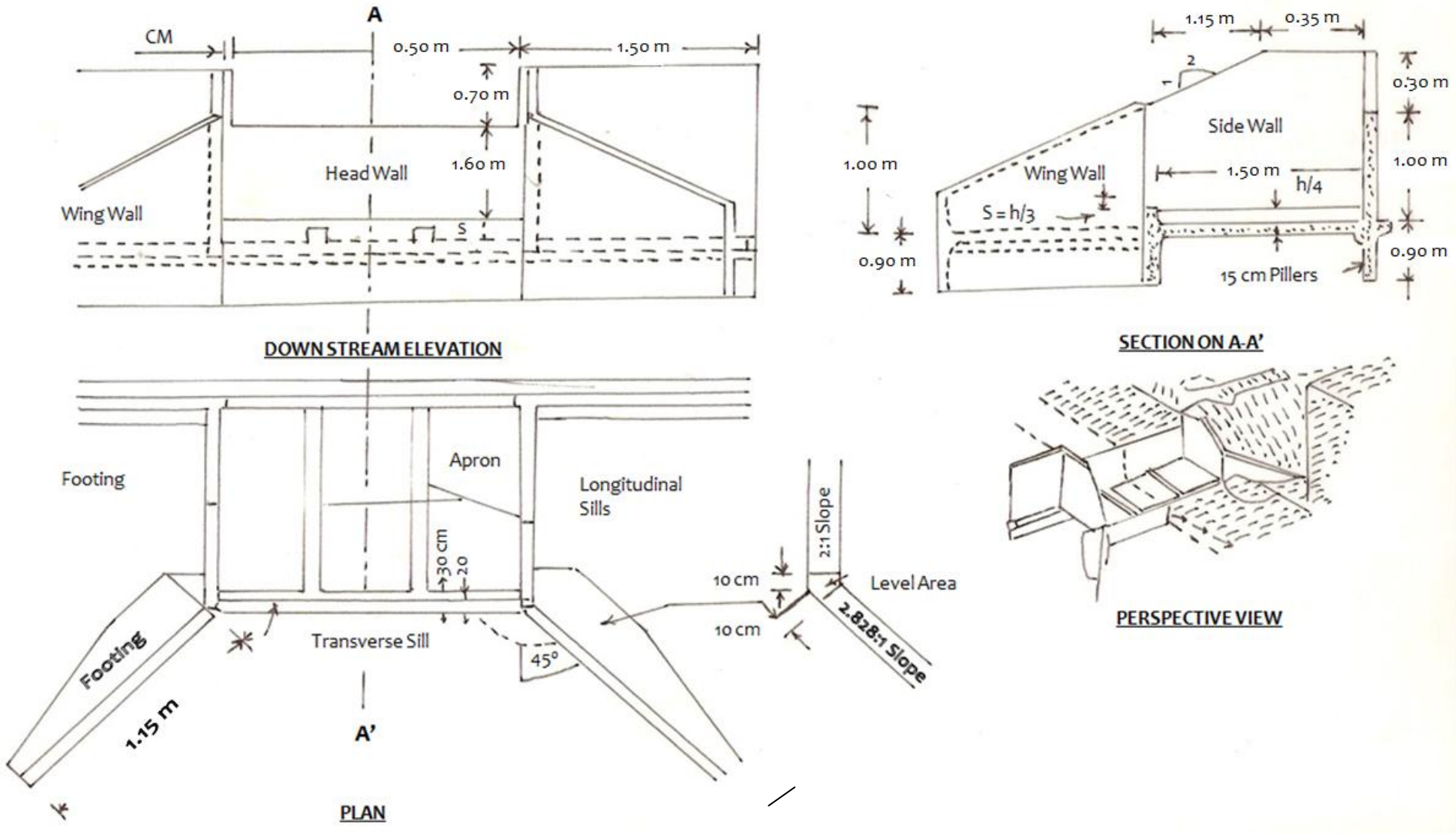
S.No.	Name of Work	No.	L B D/H	Unit	Quantity
1.	Earth work in excavation hard soil mixed with *kanker* gravel, etc. in foundation.				
a	Settling pit (i) Long Wall	4	0.65 x 1.75 x 0.10/2	M^3	0.09
		2	1.50 x 0.62 x 0.75	M^3	1.39
	(ii) Short Wall	4	0.55 x 0.75/2 x 0.10	M^3	0.08
		2	1.00 x 0.55 x 0.75	M^3	0.82
b	Filtering pit	8	1.85 x 1.00 x 1.00 x /2 x 0.10	M^3	1.19
		2	1.50 x 1.62 x 0.90	M^3	4.37
c	Drain-Filter zone	1	1.50 x 1.50 x 1.10	M^3	2.47
		1	7.10 x 0.75 x 0.25	M^3	1.86
d	Excavation for laying of P.V.C. pipe & filling after laying of P.V.C. pipe				

		1	4.35 x 2.00 x 0.80	M^3	6.96
		1	1.35 x 0.90 x 2.00/2	M^3	1.21
		1	3.00 x 2.00 x 0.90	M^3	5.40
	Total				25.84
2	C.C. in 1:3:6 settling pit	1	1.00 x 1.50 x 0.20	M^3	0.30
	Filtering pit filter zone	1	1.50 x 1.50 x 0.30	M^3	0.67
	Drain –Filter Zone	1	7.00 x 0.75 x 0.10	M^3	0.52
				M^3	1.49
3	Cut- Brick work 1:4				
a	Settling pit Long wall	4	1.05 x 0.55 x 0.10/2		0.11
		2	1.50 x 0.62 x 0.05		0.09
	Settling pit Short wall	4	0.55 x 0.55 x 0.10/2		0.06
		2	1.00 x 0.62 x 0.05		0.06
b	Filtering pit	8	1.85 x 1.62 x 0.05/2		0.60
		2	1.50 x 1.62 x 0.05		0.24
				M^3	1.16
4	Plaster work 1:2				
	Drain-Bottom	1	7.00 x 0.25	M^2	1.75
	Drain-Side	2	7.00 x 0.25	M^2	3.50
	Selting base	1	1.50 x 1.00	M^2	1.50
	Filtering base	1	1.50 x 1.50	M^2	2.25
	Total			M^2	9.00
5	Supply & Fixing of 110 mm P.V.C. Pipe	1	6.00	M	6.00
6	Slotted cap of 110 mm P.V.C.	1		No.	1.00
7	P.V.C. Bend 110 mm	1		No.	1.00
8	P.V.C. coupler 110 mm	1x2		No.	2.00
9	Mesh ss S/F between	1x2		Job	2.00
10	S/O Brick sign board	1		Job	1.00
11	Filter Material of 20-40 mm blast	1	1.50 x 1.50 x 0.80	M^3	1.80
12	Slotted pipe P.V.C. 110 mm	1	1 x 1	M	1.00

DRAWING OF SPILLWAY OF CREST LENGTH 0.5 m

All Dimensions in Metre

Not to Scale



Design of Drop Spillway for 1.00 ha Catchment Area

Design of Drop Spillway to be constructed at a place in a gully having width of 1.0 m and catchment area 1.00 ha and net drop 0.50 m Taking rainfall intensity for duration equal to time of concentration of watershed and design return period of 25 years , as 120mm/hr. The coefficient of runoff for the watershed is 0.3.

1. Hydrologic design- The design peak runoff rate (m^3/s) for the watershed from Rational formula is

given as:

$$Q = \frac{C.I.A.}{360} = \frac{0.3 \times 120 \times 1.00}{360} = 36/360 = 0.10 \text{ cum/second}$$

2. Hydraulic design- The maximum discharge capacity of the rectangular weir given by

$$Q = \frac{1.711\ L\ H^{3/2}}{(1.1+0.01\ F)}$$

To find suitable value of L & H

Let us assume L = 0.50 m (since width of gulley is 1.00 m)

$$0.10 = \frac{1.711\ L\ H^{3/2}}{(1.10+0.01 \times 0.5)} = \frac{1.711\ L\ H^{3/2}}{(1.105)}$$

$$L\ H^{3/2} = \frac{1.105 \times 0.10}{1.711} = \frac{0.1105}{1.711} = 0.064$$

$$H^{3/2} = \frac{0.064}{} = 0.128$$

$$H = \frac{0.50}{(0.128)^{2/3}} = 0.25 \text{ m}$$

Test: $L / h = \frac{0.50}{0.25} = 2.0 \geq 2.0$ hence O.K.

$h / f = \frac{0.25}{0.50} = 0.50 \leq 0.5$ hence O.K.

3. Structural design –

1- Minimum headwall extension, E = (3h + 0.6) or 1.5 f whichever is greater

E = 3x0.5+0.6 or 1.5x0.50

E = 2.10 m or 0.75 m

Adopted 2.10 m

2- Length of apron basin $L_B = f (2.28\ h/f + 0.54) = 0.50 (2.20 \times \frac{0.5}{0.5} + 0.54)$

= 0.50 x 2.74 = 1.37 m says 1.40 m

3- Height of end sill , $S = \frac{h}{3} = \frac{0.50}{3} = 0.16$ m says 0.20 m

4- Height of wing wall and side wall at Junction :

$J = 2h$ or $[f + h + S – (L_B + 0.10)/2]$ whichever is greater

= 2 x 0.50 or [0.50+0.50+0.16 – (1.37+0.10)/2]

= 1.0 or [1.16 – 0.735]

= 1.0 or 0.425

adopt J = 1.00 m

5- $M = 2(f + 1.33\,h - J) = 2(0.50 + 1.33 \times 0.25 - 1.00)$

$= 2 \times (-0.167) = -0.335$ m

6- $K = (L_B + 0.1) - M = (1.37 + 0.1) - 0.335$

$= 1.47 - 0.335$

$= 1.135$ m

Toe and cut off walls

Normal scour depth (N S D) $= 0.473 \times (Q/f)^{1/3}$

$= 0.473 \times (0.1/1)^{1/3}$

$= 0.473 \times 0.464$

$= 0.219$

Maximum Scour depth (M S D) = 1.5x N S D

= 1.5 x 0.219

= 0.328 m

says 0.35 m

Depth of cutoff /Toe wall = 0.35 m

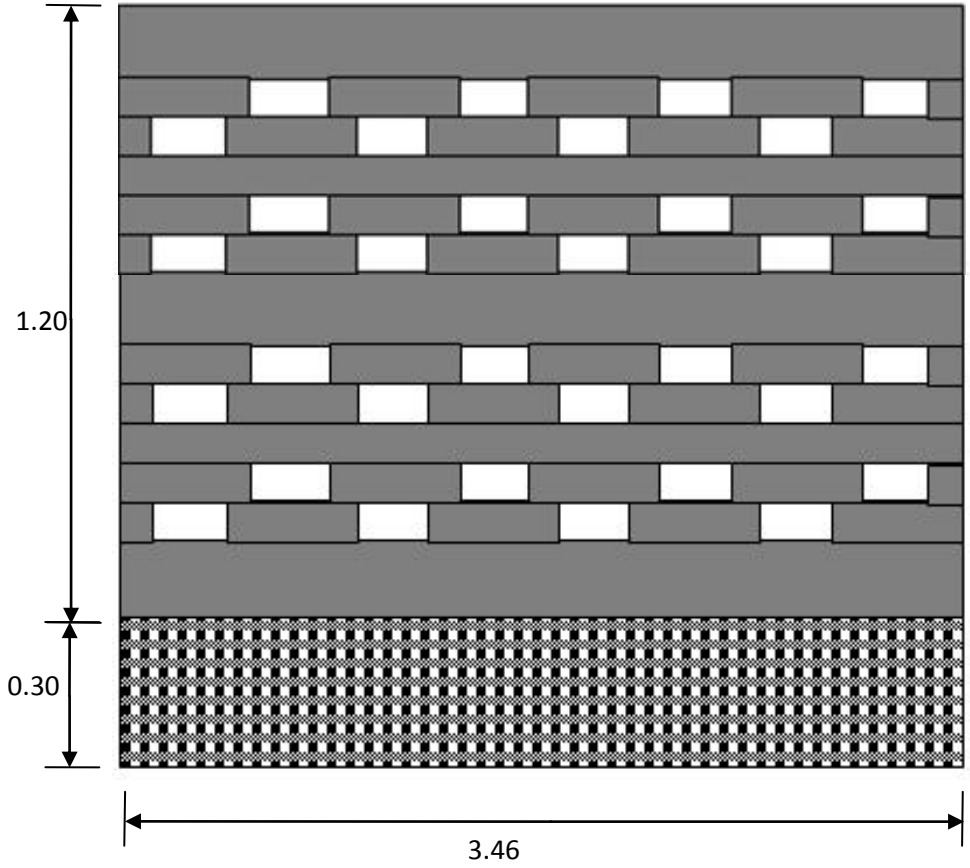
Apron thickness : For an over fall of 0.5 m. The Apron thickness in concrete construction is 0.20 m since the structure is constructed in masonry, the Apron thickness will be 0.20 x 1.50 = 0.30 m

Wall thickness: The thickness of different wall of the structure (masonry construction) is given below:

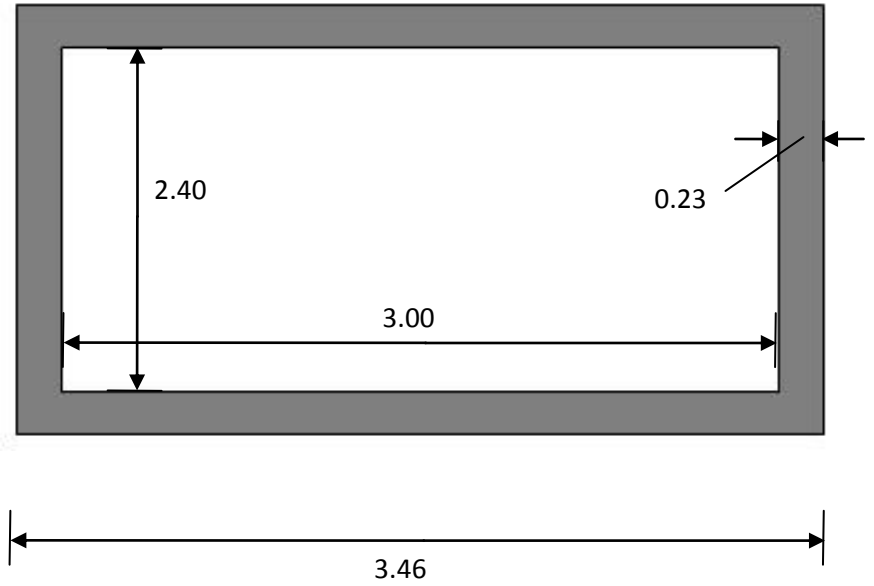
Description	Thickness of wall	
	Top width	Bottom width
Head wall	0.40	1.00
Side wall	0.30	0.80
Wing wall and head wall extension	0.30	0.60

DRAWING AND DETAIL ESTIMATE OF LIVELIHOOD PROGRAMME IN WATERSHED WORK PHASE

DRAWING OF NADEF COMPOST STRUCTURE



ELEVATION



PLAN

DESCRIPTION.

1. Brick work = 1:4.
2. Plastering = 1:4.
3. Thickness of wall = 0.23 m.
4. Total height of Structure = 1.20 + 0.30 = 1.50 m.

(Not to Scale)

PREPARATION OF COMPOST BY NADEF METHOD

Nadef is the name of inventor of this method. In this method glazed pit of brick masonry above Ground level is made as shown in the drying. In this method by using a little quantity of cow during, and crop residue, leaf of trees, straw and other organic materials. The method of filling up the pit is below.

First of all best soil of pond or field is spread in the bottom of pit as least 3" thickness and then one layer of 6" thickness and other agriculture waste is made then best soil is spread on it and on this layer the liquid made of cow dung is spread to wet the crop residue, straw etc. this method is repeated until the pit is net completely filled up. On the top layer of this material a bulk is made and then the pit is closed by earthen gara. Water is spread on the top of bulk and from glazed side weekly. This process is repeated to moist the filling material always. The decomposition in filling material started and within six month filled material becomes compost khad.

ESTIMATE OF COMPOST BY NADEF METHOD

S.No.	Description of Work	No.	L.	B.	D./H.	Quantity
1.	Earth Work					
	Long Wall	2	3.60	0.30	0.30	0.648
	Short Wall	2	2.33	0.30	0.30	0.419
	Total					**1.067 cum**
2.	Brick Work 1:4					
	Long Wall Solid	2	3.46	0.23	0.90	1.432
	Short Wall Solid	2	2.40	0.23	0.90	0.993
	Total					**2.425 cum**

	Long Wall Glazed	2	3.46	0.23	0.60	0.954
	Short Wall Glazed	2	2.40	0.23	0.60	0.662
	Total					**1.616 cum**
3.	Plastering Work					
	Long Wall	2	3.46	-	0.60	4.152
	Short Wall	2	2.40	-	0.60	2.880
	Top of Long Wall	2	3.46	0.23	-	1.591
	Top of Short Wall	2	2.40	0.23	-	1.104
	Total					**9.727 m^2**

ABSTRACT OF WORK

S.No.	Particulars	Quantity
1.	Earth Work	1.06 cum
2.	Brick Work 1:4 2.425 + 1.616/ 2	3.233 cum
3.	Plastering 1:4	9.727 m^2

CONSUMPTION OF MATERIALS

S.No.	Particulars	Quantity	Cement (Bags)	Coarse Sand (cum)	Bricks (nos.)
1.	Brick work 1:4	3.233 cum	5.82	0.873	1487
2.	Plastering 1:4	9.727 m^2	1.07	0.146	-
	Total		**6.89**	**1.019**	**1487**
	Say		**7 Bags**	**1.02 cum**	**1500 nos.**

COST OF MATERIALS

S.No.	Particulars	Quantity	Rate	Amount
1.	Cement	7 Bags	285.00/ Bag	1995.00
2.	Coarse Sand	1.02 cum	2500.00/ cum	2550.00
3.	1^{st} class Brick Work 1:4	1500 nos.	4500.00/ Thousand	6750.00
	Total			**Rs. 10795.00**

LABOUR CHARGES

S.No.	Particulars	Quantity	Rate	Amount
1.	Earth Work	1.06 cum	36.66/ cum	30.85
2.	Brick Work	3.233 cum	370.00/ cum	1196.21
3.	Plastering	9.727 m^2	40.00/ m^2	389.08
	Total			**Rs. 1616.14**

Total Expenditure	
1. Cost of Materials	10795.00
2. Labour Charges	1616.14
Total	**Rs. 12411.14**
	Say Rs. 12411.00 only

DRAWING OF DETAIL ESTIMATE OF PRODUCTION SYSTEM AND MICRO-ENTERPRISES IN WATERSHED WORK PHASE

DEMONSTRATION OF WHEAT

1- Variety recommended for District-LALITPUR

Irrigated-RR-21

Unirrigated –HD2285, K68

2- Seed rate -100 -125 Kg/hectare

3- Requirement of fertilizers/ha N-125 Kg, P-70-75 Kg, K-70-75 Kg

ESTIMATE OF DEMONSTRATION OF WHEAT IN WATERSHED (PER ha)

S.No.	Particulars	Quantity	Rate	Amount	Remark
1	Tillage operation or preparation of field for sowing	1.0ha	1000.00/ha	1000.00	Since the project is to be operated in a participatory Mode, contribution in form of the tillage, sowing, irrigation and harvesting done by farmer is not included in the estimates
2	Cost of seed	100.00kg	18.00/kg	1800.00	
3	Sowing by seed drill	1.0ha	1000.00/ha	1000.00	
4	D.A.P. 18:46	160kg	573.00/ 50 kg	1833.60	
5	Urea	210kg	270.00/ 50 kg	1134.00	
6	Potash(M.O.P.)	150kg	300.00/50kg	900.00	
7	Irrigation(three irrigation)	1.00ha	650.00/ha	650.00	
8	Harvesting	1.00ha	2000.00/ha	2000.00	
Total				**5667.60**	
Say				**5700.00**	

Hence demonstration cost of wheat /ha is Rs. 5700.00

DEMONSTRATION OF ARHAR IN WATERSHED AREA(PER ha)

1- Variety - Malviya-13, narendra-1, Amar

2- Seed rate/ha -30 kg

3- Requirement of fertilizers/ha N-20.0 kg, P-50 kg, K-40 kg

ESTIMATE FOR DEMONSTRATION OF ARHAR (PER ha)

S.No.	Particulars	Quantity	Rate	Amount	Remark
1	Tillage operation in preparation of field and seed sowing	1.0ha	1000.00/ha	2000.00	Since the project is to be operated in participatory Mode, contribution by the farmer in the form of tillage, operation, sowing and harvesting provided by participating farmers, hence this cost is not included in the estimates.
2	Cost of seed	30.0kg	120.00/kg	3600.00	
3	Nitrogen N.P.K 16:32:16	190.0kg	470.00/50kg	1786.00	
4	Urea	-	-	-	
5	M.O.P.	-	-	-	
6	Harvesting	1.00 ha	650.00	650.00	
7	Medicine	1.00 ha	Lump sum	1000.00	
Total				**6386.00**	
Say				**Rs. 6400.00**	

Hence per hectare of demonstration –Rs. 6400.00

DEMONSTRATION OF HYBRID BAJRA IN WATERSHES (per ha)

1- Requirement of Seed / ha -10kg

2- Requirement of fertilizers/ ha N- 60.00 kg, P- 40.00 kg, K-40.00 kg

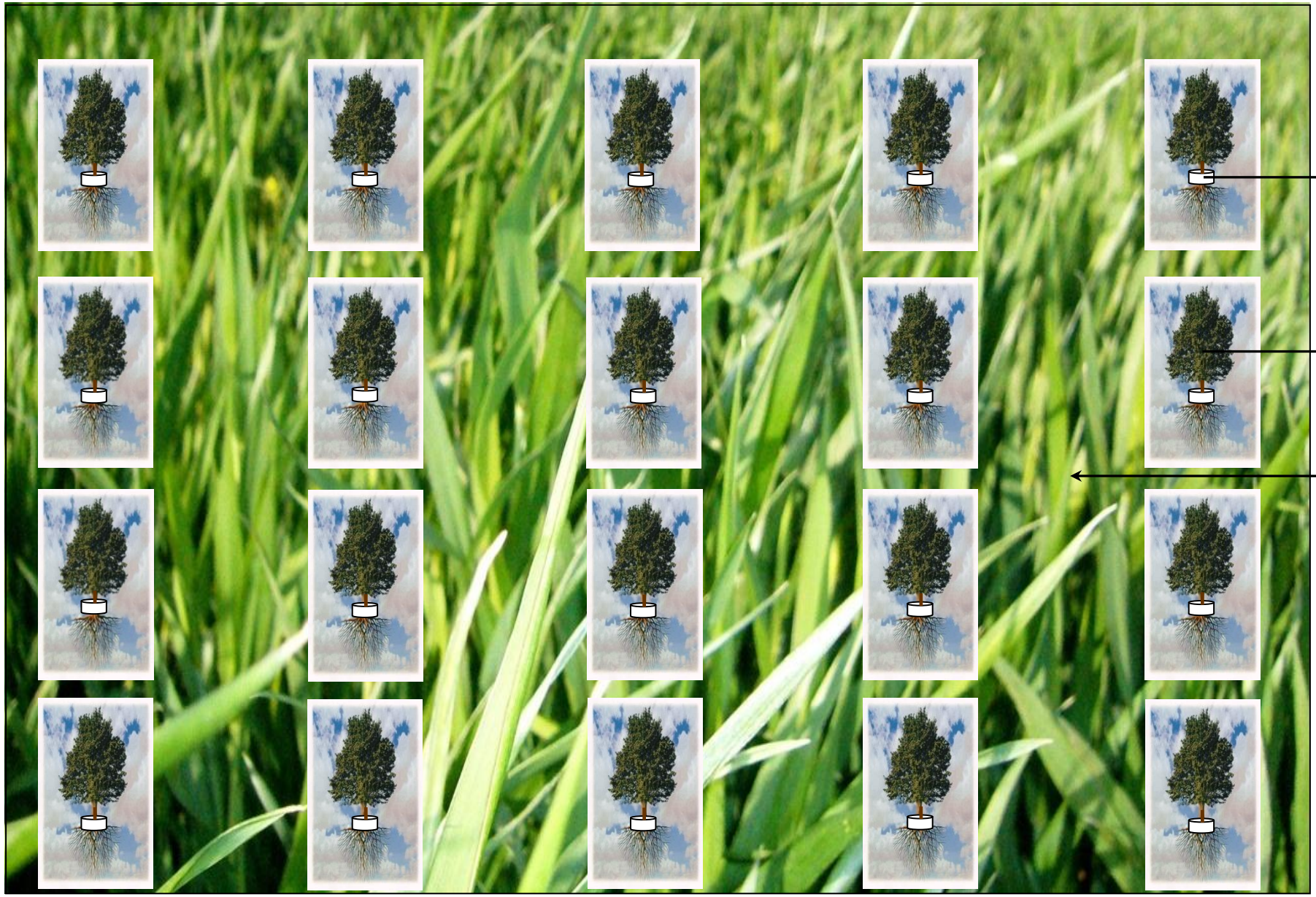
3-

ESTIMATE FOR DEMONSTRATION OF BAJRA (per ha) RAINFED

S.No.	Particulars	Quantity	Rate	Amount	Remark
1	Tillage operation in preparation of field and for sowing	1.0ha	1000.00/ha	2000.00	Since the project is to be operated in participatory Mode, contribution of tillage operation, and harvesting cost
2	Cost of seed	10.0kg	130.00/kg	1300.00	
3	Nitrogen N.P.K 16:32:16	125.0kg	470.00/50kg	1175.00	
4	Urea	90kg	270.00/50 kg	486.00	
5	M.O.P.	40kg	300.00/50kg	240.00	
6	Harvesting	1.00Ha	650.00/ha	600.00	
Total				**3201.00**	
Say				**Rs. 3200.00**	

Hence per hectare of demonstration of Bajra is Rs. 3200.00/ha

DEMONSTRATION OF AGRO-FORESTRY / HORTICULTURE



DEMONSTRATION OF AGRO-HORTICULTURE USING PLASTIC DRUM OF 2OO LITRES CAPACITY

District LALITPURis situated in Eastern U.P., where there is water problem and in summer temperature rises up to 48˚c causing upper layer of fields dry and therefore mortality rate of plants is very high. Farmers usually like to grow grain crops only. They are not interested in horticulture because of Anna Pratha and less holding. The production of crops decreases below the tree.

Therefore to promote horticulture with crops a demonstration model using plastic drums for horticulture is made. Mainly crops roots go in to the soil up to "4-5" in cereal crops and "6-9" in pulses. Using plastic drums the plants will be planted 50-60 cm below the ground level which is below the root zone of crops. Therefore trees will not able to take nutrients from upper layer of fields and there will no effect of plants on crops.

In summer season up to 1 to 1.50m depth of soil becomes dry causes more mortality rate of plants, using drums plants are planted below 50-60 from Ground level and in rainy and winter season up to February roots of plants goes below 2.10m below where moisture will be available and plants will be safe in summer also. Using barbed wire fencing the plants will be protected by Anna Pratha.

Therefore, it is hoped that farmers will adapt this procedure for Agro-forestry and will become prosperous.

DETAIL ESTIMATE OF DEMONSTRATION OF HORTICULTURE AND MIXED CROPPING

For 1.00 Hectare

S.No.	Description of Work	No.	L.	B.	D./H.	Quantity
1.	Earth work in cutting	156	3.14 x 1.20	-	1.35	793.54
	Trench	156	1.50	0.75	0.75	131.62
	Fencing Poll	133	0.20	0.20	0.20	1.064
	Total					**926.22 cum**
2.	Farm yard manure	156x10				1560 kg
3.	Filling of earth work with farm yard manure	156	3.14 x 1.00	-	1.20	587.80 cum
4.	C.C.W. 1:2:4 for fencing poll	133	0.20	0.20	0.20	1.064 cum
5.	Angle iron for poll	133	1.80	-	-	239.40 m
6.	Barbed wire	3	400	-	-	1200.00 m
7.	Plants	156	-	-	-	156 nos.
8.	Plastic drums (200 litre)	156	-	-	-	156 nos.

CONSUMPTION OF MATERIALS

S.No.	Description of Work	Quantity	Farmyard Manure (kg)	Cement Bags (nos)	Coarse Sand (cum)	G.S.Grit 10-20 mm	Angle Iron (m)	Barbed Wire (kg)	Planting Drum (nos)
1.	C.C.W. 1:2:4	1.064 cum	-	6.49	0.446	0.883	-	-	-
2.	Angle iron	239.4 m	-	-	-	-	239.40	-	-
3.	Barbed wire	1200.0 m	-	-	-	-	-	1200.0	-
4.	Farmyard manure	1560.0 kg	1560 kg	-	-	-	-	-	-
5.	Plastic drum	156 nos.	-	-	-	-	-	-	156
Total			**1560.0 kg**	**6.49**	**0.446**	**0.883**	**239.40**	**1200.0**	**156**
Say			**1560.0 kg**	**6.50 bags**	**0.450 cum**	**0.900 cum**	**239.40**	**1200.0 m**	**156**

COST OF MATERIALS

S.No.	Particulars	Quantity	Rate	Amount
1.	Farm yard manure	1560.0 kg	10.00/kg	15600.00
2.	Barbed wire	1200.0 m/120.0 kg	60.50/kg	7260.00
3.	Angle iron	239.40 m/785 kg	40.50/kg	31792.50
4.	Plastic drum	156 nos	690.00 each	107640.00
5.	Cement	6.50 bags	285.00/bag	1852.50
6.	Coarse sand	0.450 cum	2500.00/cum	1125.00
7.	G.S.Grit 10-20 mm	0.900 cum	1250.00/cum	1125.00
8.	Plants	156 nos	18.00 each	2808.00
Total				**Rs. 1,69203.50**

LABOUR CHARGES

S.No.	Particulars	Quantity	Rate	Amount
1.	Earth work	1514.02 cum	36.66/cum	55503.97
2.	C.C.W. 1:2:4	1.064 cum	492.00/cum	523.88
3.	Fixing of angle iron	10 Man Days	100/Man Day	1000.00
4.	Fixing of barbed wire	15 Man Days	100/Man Day	1500.00
Total				**Rs. 58,527.85**

Total Expenditure	
1. Cost of materials	1,69203.50
2. Labour Charges	58,527.85
Total	**Rs. 227730.35**
Say	**Rs. 2,27,730.00 only**

DEMONSTRATION OF GREEN MANURING

Green Manuring is very useful but due to sowing of Kharif season crop, lack of suitable type of seeds, and limitation of moisture, it is not widely practiced. Green Manuring brings immediate advantage because of its quick decomposition where as FYM and compost improves the soil physical condition in the long-run. Benefits of Green Manuring accrue from substitution of chemical fertilizers, enhance soil biological activities and erosion control due to vegetative cover.

Sesbania Species (Dhaincha) and *Crotolaria Juneea* (Sunhemper Sanai) are most common green manure crops. They accumulate about 100 kg N/ha in their biomass and 64-88% of this is derived from atmosphere. Apart from direct benefit of green Manuring as a source of nutrients and organic matter, it has the capacity to mobilize soil phosphorus and other nutrients. It also helps in reclamation of problem of soil, e.g., *Sesbania* helps in removing exchangeable sodium and reclamation of salt affected soils.

In I.W.M.P. Ist Project, efforts will be made to oblise the farmers for Green Manuring.

A typical estimate is made for Green Manuring is given below:

ESTIMATE FOR GREEN MANURING IN THE WATERSHED (PER ha)

S.No.	Particulurs	Rate	Cost	Remark
1	Seed of Sesbania (Dhaincha)25Kg/ha	25.00/Kg	625	Since the project is to be operated in a participatory mode, contribution in the form of tillage will be done by farmers is not included in the estimate.
2	Tillage operation before sowing and to plough the plants of Dhaincha after 40-45 days of sowing for Green Manuring.	1000/ha Before and after saring	2000.00	
Total			**Rs. 625.00**	

Therefore cost per hectare of Green Manuring is Rs. 625.00/ha

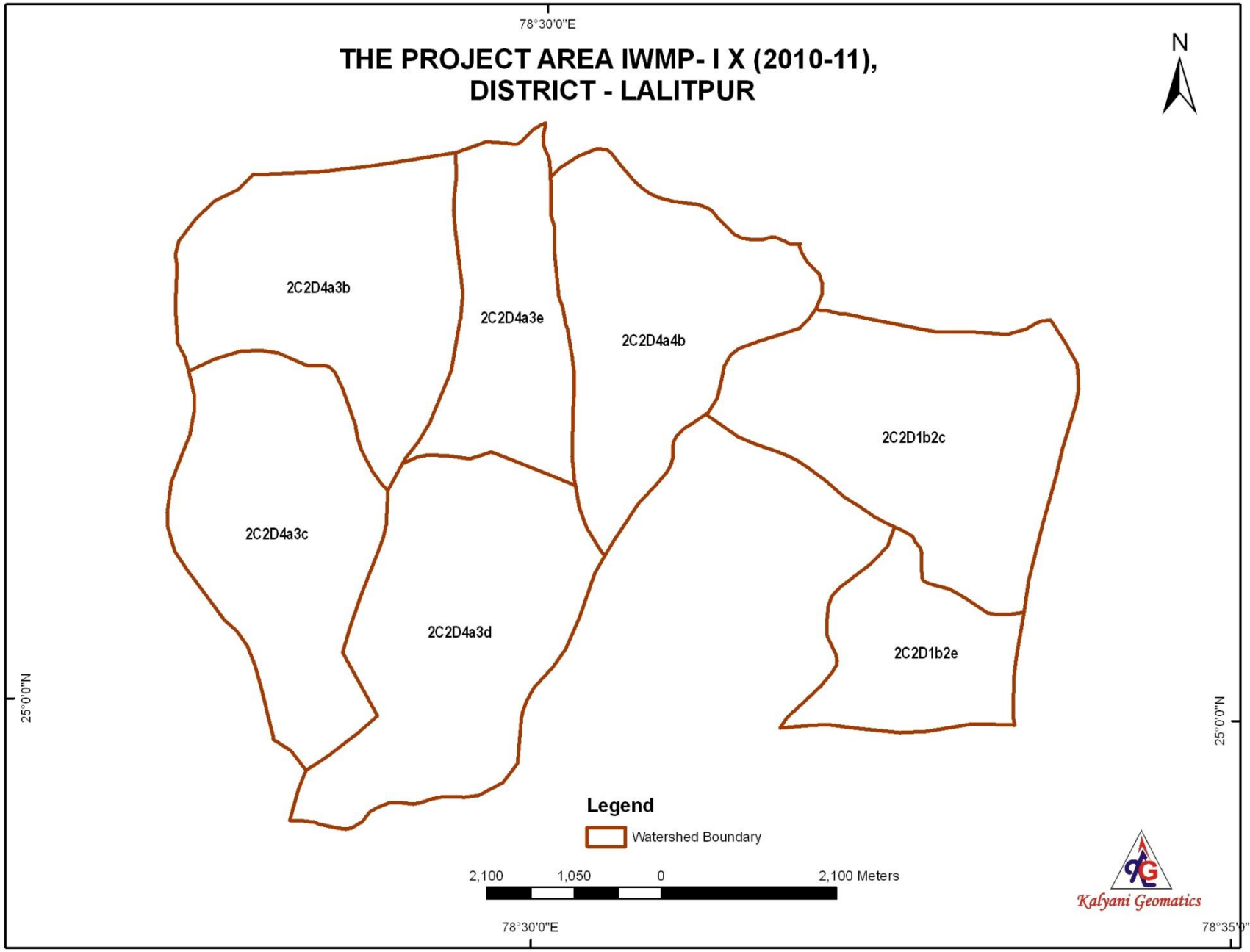
CHAPTER -12
MAPS

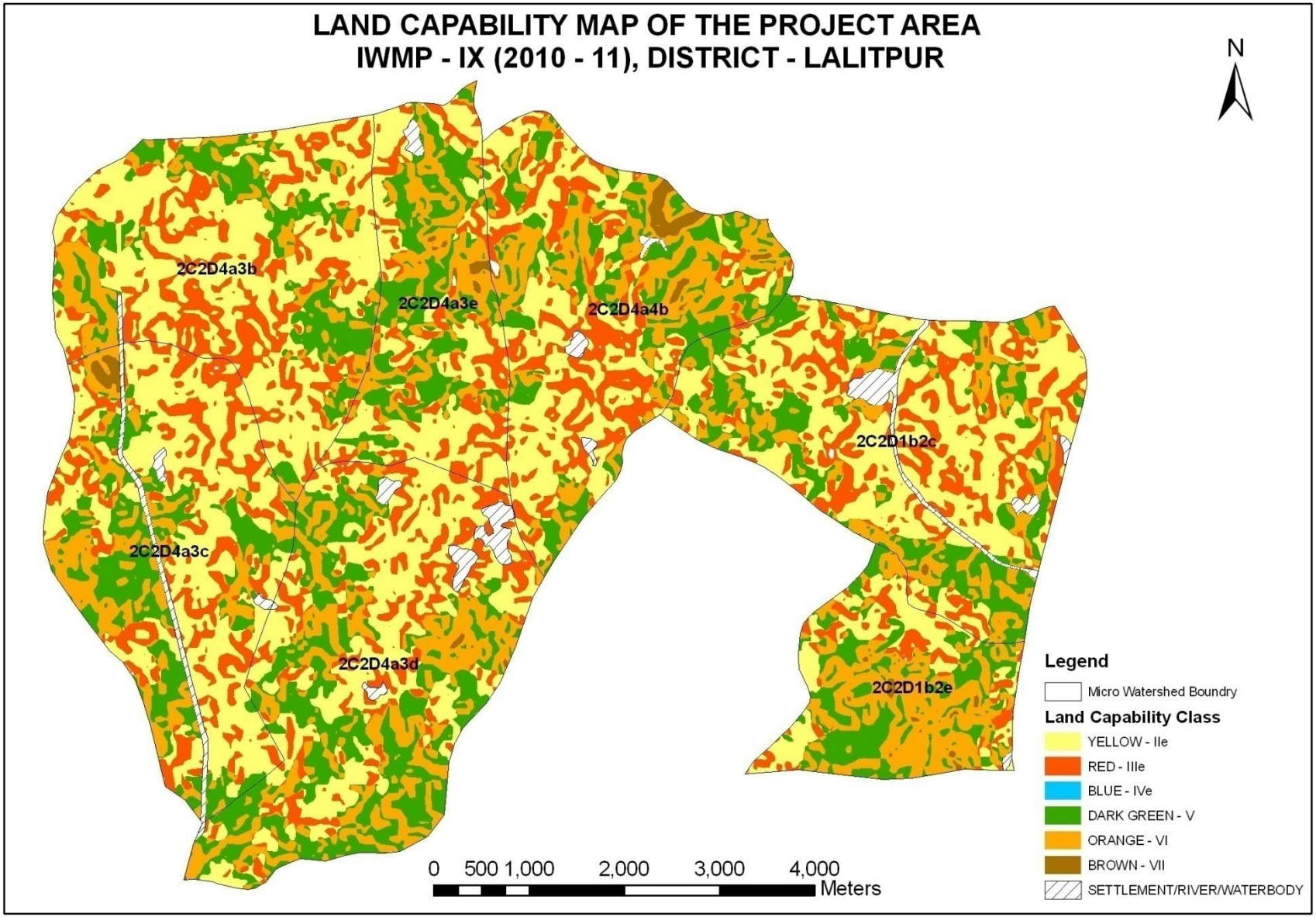
MAPS

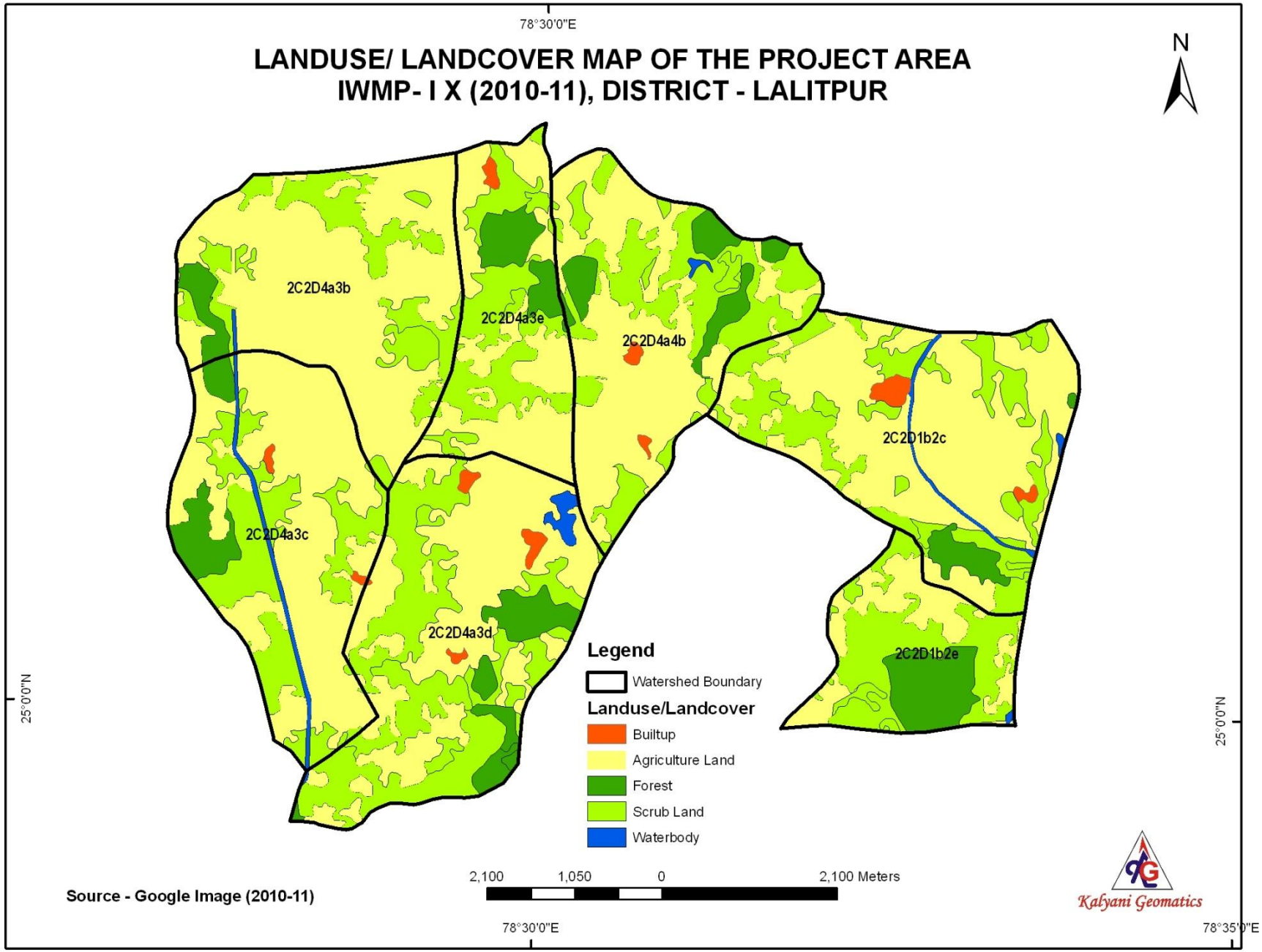
An attempt has been to map the surface details of the project area, as per the instruction of the common Guide lines-2008, All the thematic maps of the study area have been prepared through using remote sensing and geographical information system(G.I.S.) technique, following the fundamental norms of the National Map Policy-2006. The details of the thematic maps have been given below.

1- Base map
2- Dranage map
3- Land use/ Land cover map
4- Countor map
5- Slope map.
6- Soil Depth map.
7- Soil Erosion map.
8- Village Boundry map.

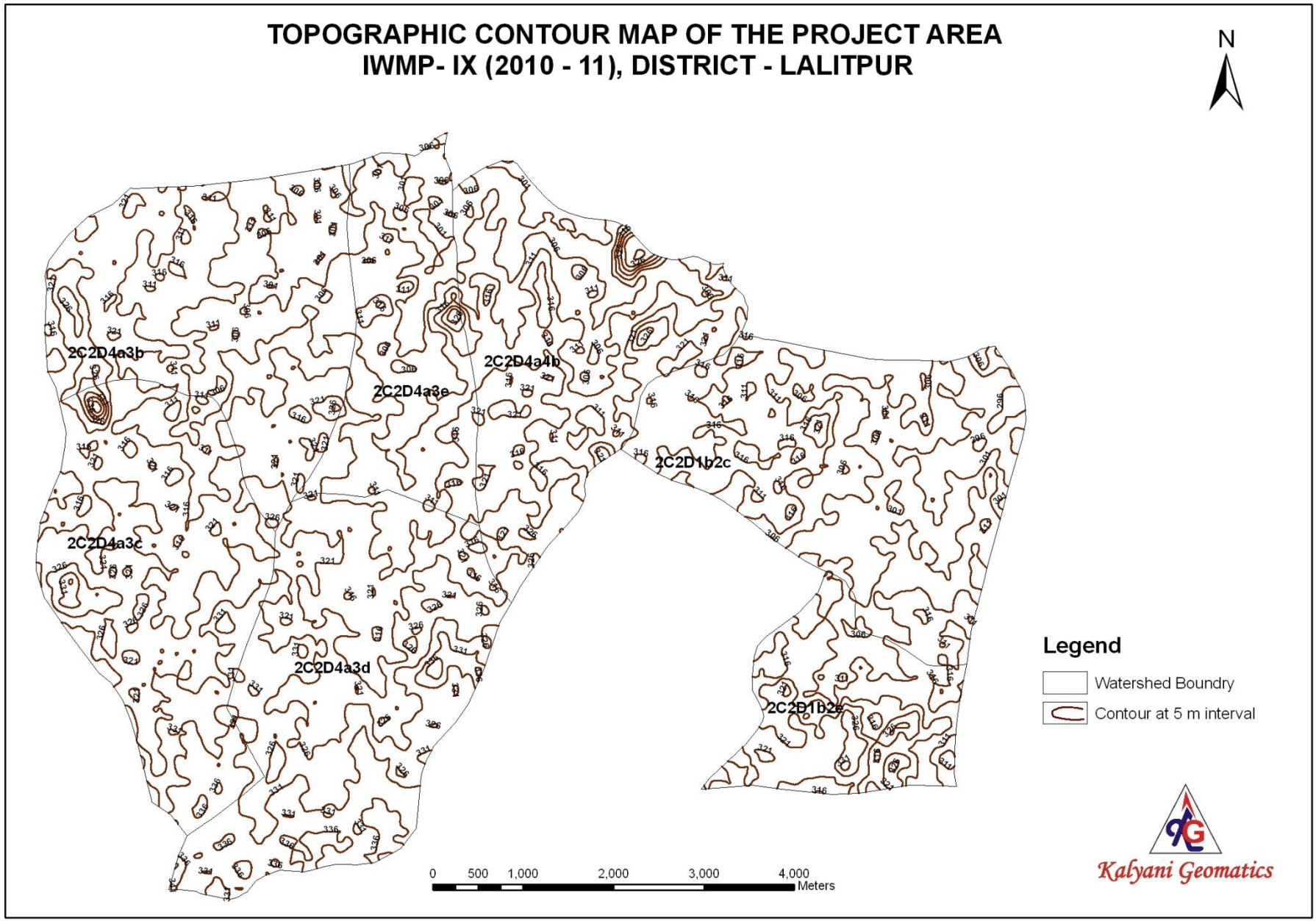
These maps were interpreted from the high resolution satellite dada freely available on internet.

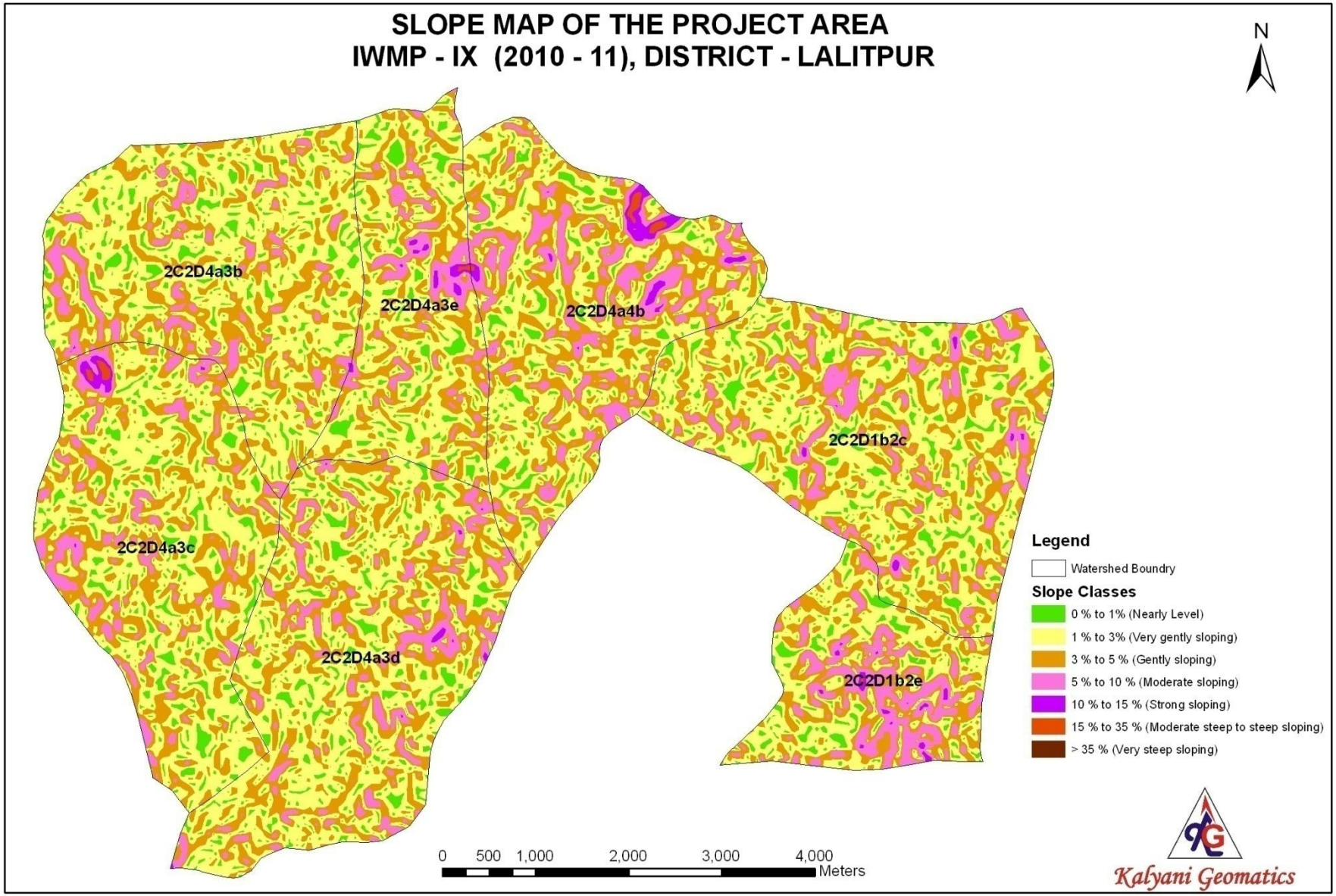

78°30'0"E
THE PROJECT AREA IWMP- I X (2010-11),
DISTRICT - LALITPUR
N
2C2D4a3b
2C2D4a3e
2C2D4a4b
2C2D1b2c
2C2D4a3c
2C2D4a3d
2C2D1b2e
25°0'0"N
25°0'0"N
Legend
Watershed Boundary
2,100 1,050 0 2,100 Meters
Kalyani Geomatics
78°30'0"E
78°35'0"E

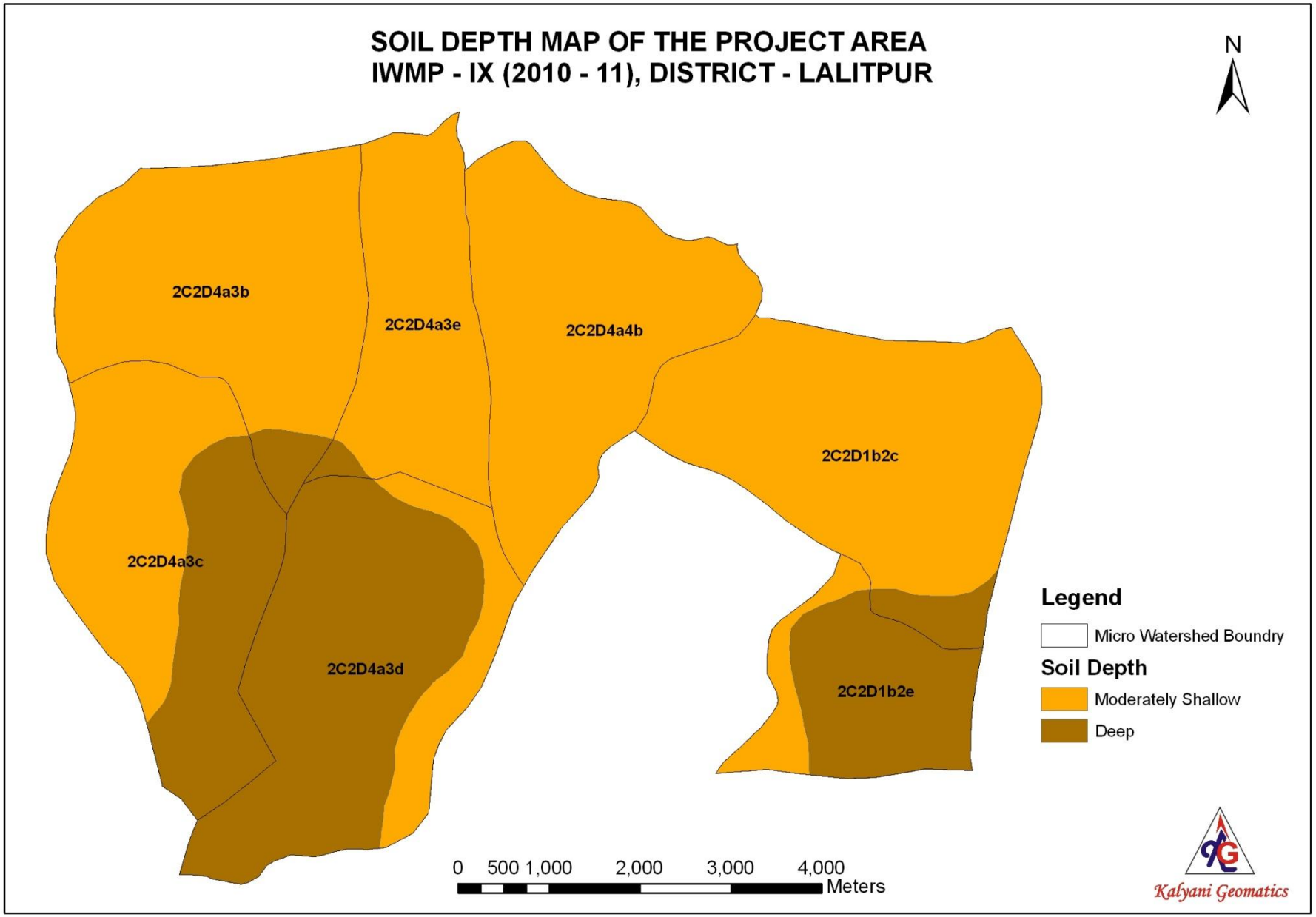

LAND CAPABILITY MAP OF THE PROJECT AREA
IWMP - IX (2010 - 11), DISTRICT - LALITPUR
N
2C2D4a3b
2C2D4a3e
2C2D4a4b
2C2D1b2c
2C2D4a3c
2C2D4a3d
2C2D1b2e
0 500 1,000 2,000 3,000 4,000
Meters
Legend
Micro Watershed Boundry
Land Capability Class
YELLOW - IIe
RED - IIIe
BLUE - IVe
DARK GREEN - V
ORANGE - VI
BROWN - VII
SETTLEMENT/RIVER/WATERBODY

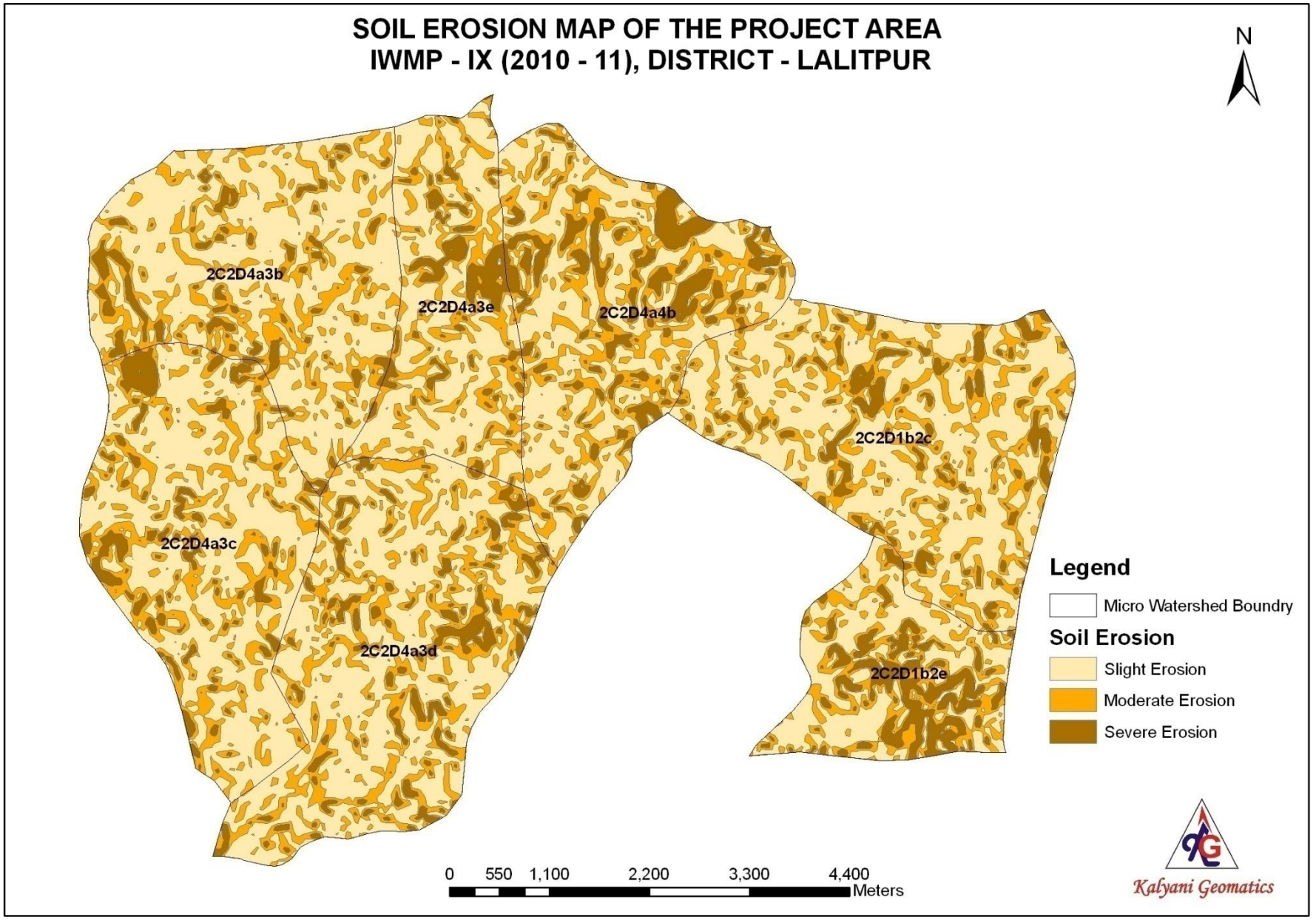

78°30'0"E
LANDUSE/ LANDCOVER MAP OF THE PROJECT AREA
IWMP- I X (2010-11), DISTRICT - LALITPUR
N
2C2D4a3b
2C2D4a3e
2C2D4a4b
2C2D1b2c
2C2D4a3c
2C2D4a3d
2C2D1b2e
Legend
Watershed Boundary
Landuse/Landcover
Builtup
Agriculture Land
Forest
Scrub Land
Waterbody
25°0'0"N
2,100 1,050 0 2,100 Meters
Source - Google Image (2010-11)
Kalyani Geomatics
78°30'0"E
78°35'0"E

TOPOGRAPHIC CONTOUR MAP OF THE PROJECT AREA
IWMP- IX (2010 - 11), DISTRICT - LALITPUR




SLOPE MAP OF THE PROJECT AREA
IWMP - IX (2010 - 11), DISTRICT - LALITPUR
N
2C2D4a3b
2C2D4a3e
2C2D4a4b
2C2D1b2c
2C2D4a3c
2C2D4a3d
2C2D1b2e
Legend
Watershed Boundry
Slope Classes
0 % to 1% (Nearly Level)
1 % to 3% (Very gently sloping)
3 % to 5 % (Gently sloping)
5 % to 10 % (Moderate sloping)
10 % to 15 % (Strong sloping)
15 % to 35 % (Moderate steep to steep sloping)
> 35 % (Very steep sloping)
0 500 1,000 2,000 3,000 4,000
Meters
Kalyani Geomatics


SOIL DEPTH MAP OF THE PROJECT AREA
IWMP - IX (2010 - 11), DISTRICT - LALITPUR
N
2C2D4a3b
2C2D4a3e
2C2D4a4b
2C2D1b2c
2C2D4a3c
2C2D4a3d
2C2D1b2e
Legend
Micro Watershed Boundry
Soil Depth
Moderately Shallow
Deep
0 500 1,000 2,000 3,000 4,000
Meters
Kalyani Geomatics


SOIL EROSION MAP OF THE PROJECT AREA
IWMP - IX (2010 - 11), DISTRICT - LALITPUR
N
2C2D4a3b
2C2D4a3e
2C2D4a4b
2C2D1b2c
2C2D4a3c
2C2D4a3d
2C2D1b2e
Legend
Micro Watershed Boundry
Soil Erosion
Slight Erosion
Moderate Erosion
Severe Erosion
0 550 1,100 2,200 3,300 4,400
Meters
Kalyani Geomatics

CHAPTER -13
ABBRIVIATIONS/REFERENCES

LIST OF ABBRIVIATIONS/REFERENCES

DOLR	Department of Land Resources
IWMP	Integrated Waterhsed Management Programme
SLNA	State Level Nodal Agency
CGL	Common Guidelines
PIA	Project Implementing Agency
BSA	Bhoomi Sangrakshan Adhikari
WDT	Watershed Development Team
WC	Watershed Committee
UC	User Group
SHG	Self Help Group
CB	Countour Bund
MB	Marginal Bund
PFB	Peripheral Bund

REFERENCES

- Common Guideline of watershed development-2008.
- Jila Sankhikiya Patrika
- Census 2001
- www.lalitpur.nic.in

Preparation of DPR

Detail Project Report of Integrated Watershed Management Programme IWMP-IX had been prepared through base line/ bench Mark survey for physiography climate, soil, land use, vegetation, and hydrology and socio economic data analysis. PRA have been exercised to collect primary data, secondary data have been collected from Revenue, Statistics department, Statistical Magazine of the district, LALITPUR, Topo sheet (1 : 50000) survey of India- Deheradoon and technical & specific input and health with preparation and drafting of detail project report.

S.No.	Name	Designation
1	Sri A.K. Srivastava	Ex. Scientist, RSAC-UP, Lucknow
2	Sri Laxman Singh	LandUse/GIS Expert
3	Km Sunita	GIS Expert
4	Km. Ashanvi Dubey	GIS Expert
5	Km Sulochna	GIS Expert
6	Sri. R.K. Singh	System In-charge
7	Sri. A. K. Awasthi	B.S.A.
8	Sri Ramji Yadav	JE
9	Sri Ajit Kumar Jain	Accountant
10	Sri. S. N. Rana	D. Man
11	Sri Praveen Kumar	ASCI
12	Sri Rakesh Kumar	ASCI
13	Miss Akriti Purohit	Social Worker
14	Technical Coordinator	
15	Accountant	
16	Computer Operator	

DPR PLAN ABSTRACT

The collection of all the relevant data of watershed area and the possible option and solution are described with the help of feedback of focused discussion and detailed perspective plan for the watershed area with year wise and activity wise summarized for the DPR plan abstract for 5 years (2010-11 to 2014-15).

The summary of the above document is verified by the following persons:

Physically & Financially Approved:

Prepared By:
Bhoomi Sanrakshan Adhikari
Dept. of Land Development & Water Resources
LALITPUR

Technically Approved
Deputy Director
Dept. of Land Development & Water Resources,
IWMP-IX
LALITPUR

CERTIFICATE

This is to certified that the proposed Watershed (IWMP-IX), Lalitpur, Uttar Pradesh has been selected for its sustainable development on watershed basis under Integrated Watershed Management Programme. The land is physically available for proposed interventions and is not overlapping with any other schemes. It will be developed as per Common Guidelines for Watershed Development Project-2008, GOI, New Delhi. The significant results will be achieved through proposed interventions on soil and water conservation, ground water recharge, availability of drinking and irrigation water, agriculture production system, livestock, fodder availability, livelihoods of asset less capacity building etc. The proposed **Detailed Project Report of IWMP-IX**, Lalitpur is approved for its implementation.

Bhoomi Sanrakshan Adhikari
IWMP - **IX**
Deptt. Of LDWR, Lalitpur-8, U.P.

Deputy Director
LDWR, Jhansi-II,
Place-Lalitpur U.P.

Project Director
DRDA, Lalitpur U.P.

Chief Development Officer
District- Lalitpur U.P.