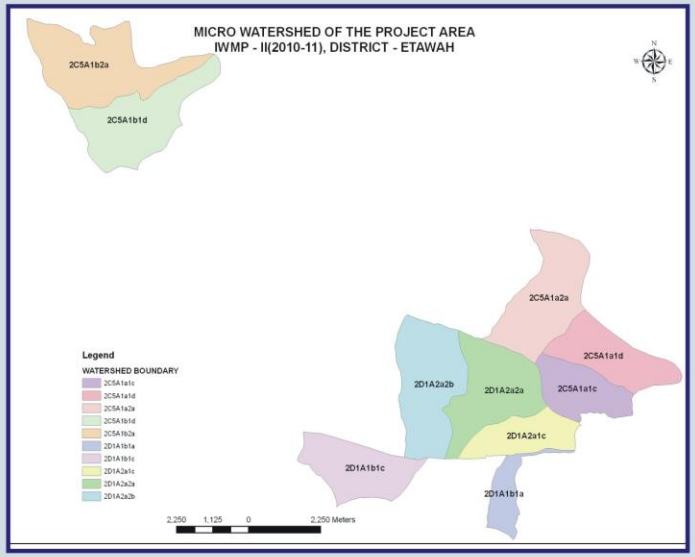
DETAILED PROJECT REPORT

OF INTEGRATED WATERSHED MANAGEMENT PROGRAMME-II

ETAWAH



Prepared by :
Bhoomi Sanrakshan Adhikari
L.D.W.R., ETAWAH

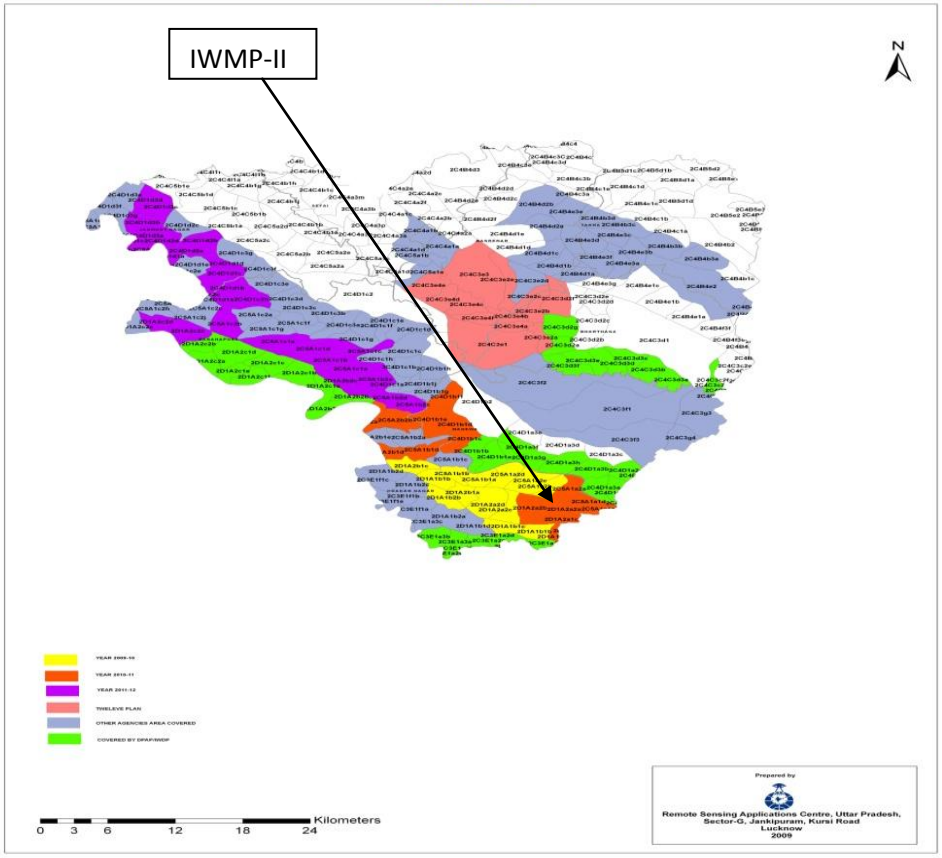
Submitted to :
Dept. of Land Development &
Water Resources, LUCKNOW

TABLE OF CONTENTS

IWMP-II (2010-11) DISTRICT – ETAWAH

Name of the project	Weigh-tage	No.of MWS	Geographial Area (ha)	Rainfed Area (ha)	Treatable area (ha)
I.W.M.P.-II	**95**	**10**	6223.57	4987.00	**4745.00**

MICRO WATERSHED MAP OF ETAWAH DISTRICT, UTTAR PRADESH
PLAN MAP



PROJECT AT A GLANCE

1.	**Name of Block**	Chakarnagar
2.	**No. of Gram Panchayats**	11
3.	**Four reasons for selection of Watershed**	1- Land is degraded 2- Less productivity 3- Drinking water problem 4- Lower rate of wages
4.	**Date of approval of watershed Development Plan by DRDA/DPC**	-
5.	**Area proposed to be treated (ha.)**	4745.00
6.	**Date of sanction of PPR & Date of release of Ist Instalment**	-
7.	**Project duration**	**2010-2011 to 2014-2015**
8.	**Project Cost (in lac.)**	569.40
9.	**Proposed mandays**	237000

EXECUTIVE SUMMARY

1. Brief about area

The Yamuna & Chambal River watershed comprises of ten villages namely Palighar, Kundol, Chibaouli, Kandesighar I, Kandesighar II, Bansari, Piprauli griya, Kaainchi, Gara Kashda, Naugawn Block-Chakar nagar of Etawah district of Utter Pradesh. This watershed has been identified by the state department under NWDPRA scheme by proper prioritization of different parameters for watershed selection criteria. The watershed is located in the east-south of Etawah district. It lies between 26^0 30' to 26^0 38'latitude and 79^0 5' to 79^0 15' longitude having micro-watershed code no. 2D1A2a2a, 2D1A2a2b, 2D1A2a1c, 2C5A1b2a, 2C5A1b1d, 2D1A1b1a, 2D1A1b1c, 2C5A1a1d, 2C5A1a1c, 2C5A1a2a. Its altitude on average ranges from 140 to145 m above the mean sea level (MSL). The total area of watershed is 6223.57 ha.in Chakar Nagar Block.

The climate of the region is characterized as arid to semi- arid with average annual rainfall less 919.92 mm annually with an average of 52 rainly days. Out of which about 85 percent is received during the monsoon season from July to September. The area receives very less rainfall in the winter season. Temperature range from as high as 48^0 C in the May-June to as low as 4^0C during December-January. The trend of rainfall is highly erratic and maximum 45 % water goes as runoff.

Agriculture is the main occupation of the dwellers of the watershed. The main crops raised are wheat, bajra, mustard, gram, tur, sesame, and pearl millet. Most of the land are kept fallow during the *Kharif* season. Mustard and wheat are the most preferred crops grown during the *Rabi* season. About 37 % area under agriculture is cropped during *Kharif* season in the watershed. Among various crops bajra shares maximum area (20%), followed by sesame (10%), jower (5%), and pulses i.e. black gram and green gram(2%).

Natural vegetation of the watershed area is very poor. The forest vegetation is predominant with Vilayati Babul (Prosopis juliflora) followed by Babul (Acacia nilotica). There are occasional occurrence of Neem plants (Azadirachta indica), Papdi (Holopteila integrifolia), Shisham (Dalbergia sissoo), Karanj (Pongamia glabra) and Chonkra (Prosopis cineraria). There is no grass land in the watershed. Grass patches are seen only on the bunds, road sides and other such places. The principal grasses are Anjna grass, Moonj, Gandher & Aswagandha.

The problem of erosion of the watershed is ti 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. In agricultural land will treated with buding along with minor leveling. Waste land will be treated with the engineering measures like staggered trenches and a forestation 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, Etawah for integrated watershed management programme (IWMP) starting from the year 2010-11. The project will be completed by 2014-15.

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.

Table – 2 Watershed Development works including proposed engineering structures

Component	Total (Lakhs) Amount	% of the bugdet
(a) Construction of bunds (Field Bund,Contour Bund, Submergence Bund, Marginal Bund, Gully Plug and Peripheral Bund)	177.28	50%
(b) New and renovation of Existing Water Harvesting bunds/Ponds/Check dam	84.08	
(c) Afforestation, Agro-forestry and Horticulture	23.34	
Total	**284.70**	**50%**

Livelihood Activities (community Based)

Component	Total (Lakhs) Amount	% of the bugdet
Income generating activities through SHGs for landless and marginal farmers and livestrocks development works	56.94	10%
Total	**56.94**	10%

Table – 3: YEAR WISE PHASING (PHYSICAL & FINANCIAL) OF I.W.M.P.-II, ETAWAH (U.P.)

S. No.	Item	Physical Year wise (area in ha.)						Financial Year wise (area in ha.)					
		2010-11	2011-12	2012-13	2013-14	2014-15	Total	2010-11	2011-12	2012-13	2013-14	2014-15	Total
1.	Administrative	-	-	-	-	-	-	3.416	13.381	13.381	13.381	13.381	56.94
2.	D.P.R. Preparation	-	-	-	-	-	-	5.69	-	-	-	-	5.69
3.	Monitoring & Evaluation	-	-	-	-	-	-	2.282	2.274	2.274	2.275	2.275	11.38
4.	Entry Point Activity	-	-	-	-	-	-	22.776	-	-	-	-	22.776
5.	Institutional and Capacity building	-	-	-	-	-	-	-	11.388	11.388	5.694	-	28.47
6.	Watershed works	-	1898	1898	949	-	4745	-	113.88	113.88	56.94	-	284.70
7.	Livelihood & Income Generating	-	-	-	-	-	-	-	14.235	14.235	14.235	14.235	56.94
8.	Production System development	-	-	-	-	-	-	-	30.00	30.00	14.034	-	74.034
9.	Consolidation Phase	-	-	-	-	-	-	-	-	-	-	28.47	28.47
	Total	-	1898	1898	949	-	4745	34.164	185.158	185.158	106.559	58.361	569.40

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

S. No.	Budget Component	Total (Lakhs) IWMP II
A	1. Administrative	56.94
	2. Monitoring	5.69
	3. Evaluation	5.69
B	Preparatory Phases	56.94
C	**Watershed Works**	284.70
(i)	Livelihood Programm	56.94
(ii)	Production System and microenterprises	74.03
D	**Consolidation Phase**	28.47
	GRAND TOTAL	**569.40**

1. Watershed Area 6223.57 ha.
2. Treatable Area 4745 ha.
3. Total expenditure on project 564.40 Lakhs

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 Mala 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.	Watershed Code	Total Area (ha)
1	2D1A2a2a	745.32
2	2D1A2a2b	822.44
3	2D1A2a1c	415.69
4	2C5A1b2a	806.71
5	2C5A1b1d	878.75
6	2D1A1b1a	197.50
7	2D1A1b1c	604.27
8	2C5A1a1d	585.63
9	2C5A1a1c	489.45
10	2C5A1a2a	677.81
	Total	**6223.57**

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

Land Capability Classes (LCC)	Areas (ha)	Land Use
II	933.57	Agriculture land
III	3299	Agriculture land
IV	1115	Gullide land
VII	876	Forest land & Others
Total	**6223.57**	

7. Action plan at a glance

The preparation of detailed project report (DPR) 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 lavel 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 approval 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 10 (Ten) micro- watershed, with code No. 2D1A2a2a, 2D1A2a2b, 2D1A2a1c, 2C5A1b2a, 2C5A1b1d, 2D1A1b1a, 2D1A1b1c, 2C5A1a1d, 2C5A1a1c, 2C5A1a2a having area **6223.57** ha located in South- East part of Etawah district of Utter Pradesh has been taken up by Bhoomi Sanrakshan Adhikari, RamGanga command Project, Etawah (UP) for development under I.W.M.P. for Rain-fed Areas (NWDPRA) scheme funded by Ministry of Rural Development, Government of India. The watershed has been also taken up programme

implementation comprising of development and management plan during next five years (2010-11 to 14-15). The project will be completed by 2014-15.

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.The area in the watershed is relatively flat plain with shallow river-valleys. The soils are mainly sandy, loamy and clayey.

Table 1.1 : Basic Project Information

S. No.	Name of the Project	Villages	Block	District	Total area of The Project	Area proposed to be treated	Total Project cost (Rs. in Lacs)	PIA
1.	**I.W.M.P. -II**	Palighar, Kundol, Chibaouli, Kandesighar I, Kandesighar II, Bansari, Piprauli griya, Kaainchi, Gara Kashda, Naugawn	Chakar Nagar	Etawah	6223.57	4745.00	569.40	Bhoomi Sanrakshan Adhikari, RamGanga command Project, Etawah (UP) for development under I.W.M.P. for Rain-fed Areas (NWDPRA) scheme funded by Ministry of Rural Development, Government of India.

2. NEED AND SCOPE FOR WATERSHED DEVELOPMENT

The main objectives are:

(a) Conservation, development and sustainable management of natural resources including their uses.

(b) Enhancement of agricultural production and productivity in a sustainable manner.

(c) Restoration of ecological balance in the degraded and fragile rain-fed ecosystem.

(d) Reduction in regional disparity between rain-fed and irrigated areas.

(e) Creation of sustainable employment opportunities for the rural community for livelihood.

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 Yamuna 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. Vegtation 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 population 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 Yamuna river. 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 undulating topography, steep unstable slopes, excessive channel gradient and hence highly prone to soil erosion. Effctive soil depth in limited and spatially highly variable hampering good crop growth. Problems identified and prioritized during the transact walk and PRA exercises in all three villages viz Nawada Khurd kala, Bhadurpur ghar, Bilahti were pooled and a list of nine problems representing the whole watershed was prepared. Problems were ranked as per their total weight age in the three villages, lack of irrigation water was the greatest problem experienced by the people followed by low production of field crops lack of fodder availably and low animal productivity.

Problem identification and prioritization for watershed

S. No.	Problem	Rank
1	Low production of field crops	5
2	Lack of drinking water	3
3	Lack of irrigation water	1
4	Lack of fodder availability and low annual productivity	8
5	Non- availability of Suffient school	7
6	Lack inputs like quality seeds, fertilizer, pesticides etc.	4
7	Lack of market facility	9
8	Lack of medical, educational and transportation facilities	2
9	Medical and health care facilities for milching animals and low productivity	6

Strength, Weakness, Opportunity and Threat (Swot) Analysis Is a Useful Decision Support Tool

A SWOT analysis of watershed 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 9- Shallow soil depth and with high percentage of gravel
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.

Table 1.2: Weightage of the project

District	Name of the Project	No. of micro-watersheds proposed to be covered	Proposed project area (ha)	Proposed cost (Rs. in lakh)	Weightage													
Etawah	IWMP-II	10	4745	569.40	i	ii	iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii	xiv
					7.5	5	5	5	0	0	15	7.5	15	10	10	15	0	95

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**

Table – 1.4 : WATERSHED INFORMATION

Name of the Project	No. of water sheds to be treated	Watershed Code	Watershed regime/type/order
IWMP-Etawah II	10	**2D1A2a2a, 2D1A2a2b, 2D1A2a1c, 2C5A1b2a, 2C5A1b1d, 2D1A1b1a, 2D1A1b1c, 2C5A1a1d, 2C5A1a1c, 2C5A1a2a**	Micro Watershed

4. 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.

CHAPTER – 2

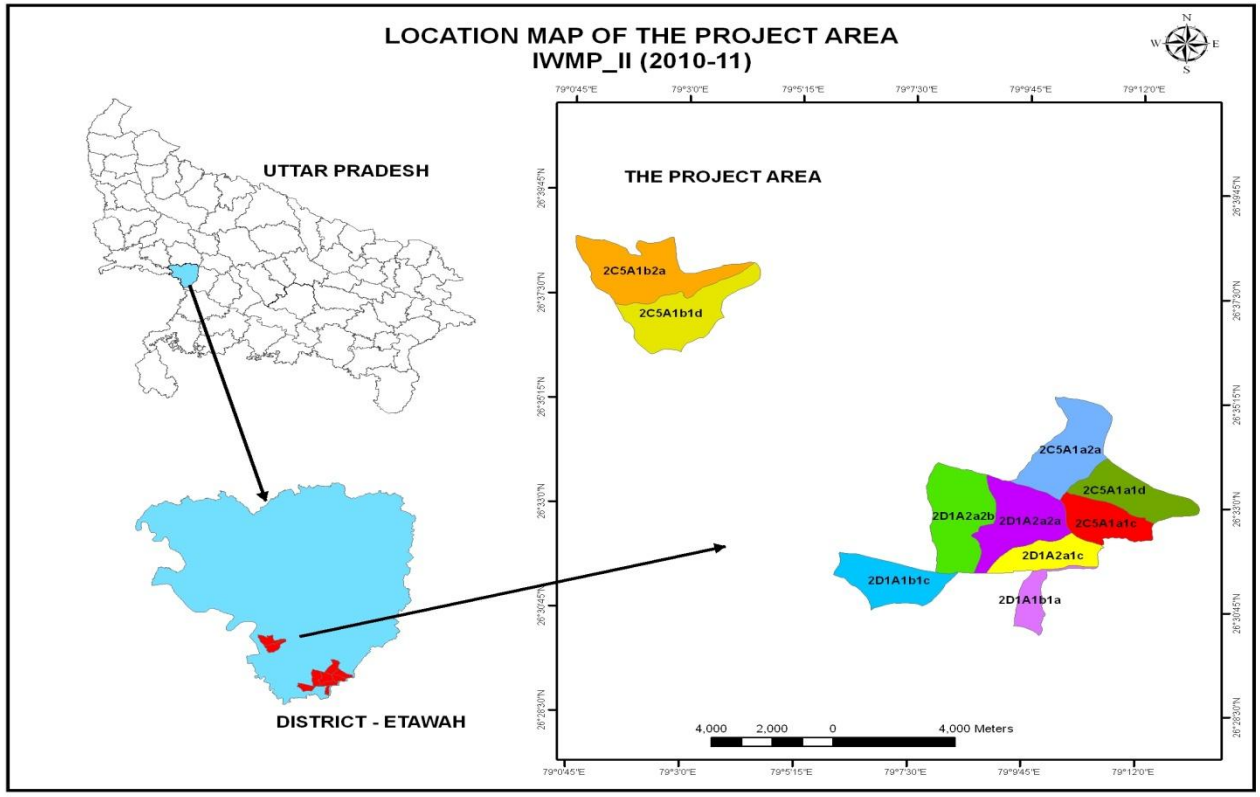
GENERAL DESCRIPTION OF PROJECT AREA

1. LOCATION

The Yamuna & Chambal River watershed in Chakar nagar block of Etawah district Uttar Pradesh is located on Bakewar to Bhind Road 38 Km from Etawah and 7 Km from Chakar nagar Block between 26^0 30’ to 36^0 30’latitude and 79^0 5’ to 79^0 15’ longitude.

Total area of the watershed is 6223.57 ha. (treatable area 4745 ha.). Elevation ranges from 140 to 145 m above the mean sea level. Altogether ten villages name Palighar, Kundol, Chibaouli, Kandesighar I, Kandesighar II, Bansari, Piprauli griya, Kaainchi, Gara Kashda, Naugawn block- Chakar nagar are located in the watershed.

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	Land under agricultural use (ha)	Wasteland (ha)	Fallow Land (ha)
1	Etawah-II	10	10	6223.57	4987.00	0.0	564.60	1121.31	164.17

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 Etawah district is briefly describe below.

Table- 2.2 : DETAILS OF AGRO-CLIMATE CONDITIONS

S. No.	Name of the District	Name of the Project	Name of the Agro-climatic zone covers project area	Area in ha	No. of the villages	Major soil types		Topo-graphy#	Average rainfall in mm (preceding 5 years average)	Major crops	
						a)Type	b) Area in ha			a) Name	b) Area in ha
1.	Etawah	I.W.M.P-II	CENTRAL PLANE	6223.57	10	SANDY	1782	Undulation	919.922	Wheat, Mustard	2127
						SANDY LOAM	2650	Moderate	919.922	Bajra, Arhar	2667
						Total	4432	-	-	-	4794

4. PHYSIOGRAPHY

The watershed is in the mid of the Yamuna & Chambal River steep having mortared slopes and drains in to river Yamuna & Chambal River 1 % and 40 % area has slopes from 3 to 8 %. A number of streams join the main perennial stream of Yamuna. Total 76 numbers of streams (24 Yamuna & 52 Chambal River) of different order are found in watershed, with total length 71880 meters. Stream characteristics of the watershed are present in the Table.

Table-2.3 (a): Stream characteristics of selected watershed

Stream Order	Stream Number	Mean Stream Length (M)
1st order	37	37259
2nd order	15	14745
3rd order	7	5701
4th order	3	3305
Total	62	61010

Table- 2.3(b): ELEVATION RANGE, LONGITUDE LATITUDE, RELIEF HEIGHT DIFFERENCE ETC.

S. No.	Watershed Code	Location		Elevation of watershed from Mean Sea level		
		Latitude (N)	Longitude (E)	Highest in Meters	Lowest in Meters	Relief Height Difference
1	2D1A2a2a	26^0 33′ 10″ to 26^0 35′ 21″	79^0 9′ 27″ to 79^0 11′ 27″	143	113	30
2	2D1A2a2b	26^0 31′ 32″ to 26^0 33′ 54″	79^0 8′ 01″ to 79^0 9′ 11″	148	108	40
3	2D1A2a1c	26^0 32′ 19″ to 26^0 33′ 19″	79^0 10′ 37″ to 79^0 12′ 19″	143	128	15
4	2C5A1b2a	26^0 32′ 19″ to 26^0 37′ 25″	79^0 0′ 49″ to 79^0 04′ 16″	148	118	30
5	2C5A1b1d	26^0 36′ 16″ to 26^0 37′ 28″	79^0 01′ 32″ to 79^0 04′ 32″	133	123	10
6	2D1A1b1a	26^0 30′ 15″ to 26^0 31′ 38″	79^0 9′ 36″ to 79^0 11′ 13″	148	143	05
7	2D1A1b1c	26^0 30′ 45″ to 26^0 31′ 55″	79^0 6′ 1″ to 79^0 8′ 25″	143	113	30
8	2C5A1a1d	26^0 32′ 53″ to 26^0 34′ 01″	79^0 10′ 35″ to 79^0 13′ 7″	143	113	30
9	2C5A1a1c	26^0 32′ 20″ to 26^0 33′ 17″	79^0 10′ 39″ to 79^0 11′ 41″	128	98	30
10	2C5A1a2a	26^0 31′ 24″ to 26^0 33′ 37″	79^0 8′ 45″ to 79^0 10′ 20″	138	98	40

5. CLIMATE

The watershed falls under the semi-arid region of tropical climate. The average annual precipitation is 912.92 mm spreading over 52 rainy days. Most of the rainfall (about 85 %) 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 48^0 C in the month of May-June to as low as 4^0 C in December-January.

DISTRICT RAINFALL (MM.) FOR LAST FIVE YEARS

Note: (1) The District Rainfall (mm.) (R/F) shown below are the arithmetic averages of Rainfall of Stations under the District.
(2) % Dep. are the Departures of rainfall from the long period averages of rainfall for the District.
(3) Blank Spaces show non-availability of Data.

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.
2006	0.0 -100	0.0 -100	2.6 -73	0.0 -100	2.0 -82	26.9 -56	228.7 -3	31.5 -90	*32.6 -79*	0.0 -100	0.0 -100	0.0 -100
2007	0.0 -100	44.2 235	16.0 68	0.0 -100	0.0 -100	54.6 -10	42.3 -82	76.1 -75	25.9 -84	0.0 -100	------	0.0 -100
2008	0.0 -100	0.0 -100	0.0 -100	12.6 186	16.0 45	101.2 67	293.9 25	256.8 -15	74.3 -53	0.0 -100	0.0 -100	0.0 -100
2009	0.0 -100	0.0 -100	-	-	2.1 -81	0.0 -100	96.0 -59	133.2 -56	106.0 -33	42.6 6	3.0 -3	18.0 233
2010	0.0 -100	0.0 -100	0.0 -100	0.0 -100	3.0 -73	6.0 -90	162.1 -31	155.1 -49	201.1 28	37.8 1119	37.8 1119	2.3 -57

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 -II, Etawah) is more or less elongated in shape. The direction of the slope in the project area is north-west to south- east. The maximum length and width of IWMP -II watersheds, are 9623m and 6623 m, respectively with the length: width ratio 1.45:1

Table- 2.4: SHAPE AND SIZE OF WATERSHED

S. No.	Micro watershed Code	Area (ha)	Shape	Approximate size in meter	
				Length	Width
1	2D1A2a2a	745.32	Mushroom	3850	2773
2	2D1A2a2b	822.44	Elongate	4103	1974
3	2D1A2a1c	415.69	Cone	3300	1070
4	2C5A1b2a	806.71	Rectangle	4159	2584
5	2C5A1b1d	878.75	Elongate	4796	2003
6	2D1A1b1a	197.50	Elongate	2361	787
7	2D1A1b1c	604.27	Elongate	3502	1881
8	2C5A1a1d	585.63	Elongate	3807	1220
9	2C5A1a1c	489.45	Elongate	3305	1720
10	2C5A1a2a	677.81	Elongate	3906	1889

8. GEOMORPHOLOGY

The watershed is located South- East corner of the Etawah district. The entire watershed is topographically divided into three major landforms. Accordingly, the soils of watershed can be grouped into three major categories, Such as

- Plain land
- Moderate land
- Ravinous land

Table- 2.5: DETAIL OF SOIL EROSION (I.W.M.P-II), ETAWAH

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 - II	992.57	3768.00	1463.00	6223.57.00	552	20.00	N.A.

9. SOILS

In the watershed area mainly two types of soil named Sandy loam, Sandy which is the main soil type in Etawah district. Main crops are pulses who need more phosphorous. Therefore deficiency of phosphorous is in this area.

10. DRAINAGE

Due to prevalence of the mild to steep slopes and presence of a number of drainage lines in the watershed, the drainage system is adequate. The watershed forms part of Yamuna basin.

11. VEGETATION

11.1 Natural Vegetation-

Natural vegetation of the watershed is very poor. The forest vegetation is predominant with Vilayati Babul ((Prosopis juliflora) followed by Babul (Acacia nilotica). There are occasional occurrence of Neem plants (Azadirachta indica), Papdi (Holopteila integrifolia), Shisham (Dalbergia sissoo), Karanj (Pongamia glabra) and Chonkra (Prosopis cineraria). There is no grass land in the watershed. Grass patches are seen only on the bunds, road sides and other such places. The principal grasses are Anjna grass, Moonj, Gandher & Aswagandha.

11.2 Horticulture

There is no pack yard Horticulture or commercial Horticulture plantation in the villages expect few scattered fruit plants.

11.3 Agroforestry

The agriculture fields of the villages do not have any forest or Horticulture plantation. At places, some isolated trees of Acecia nilotica can be seen, whose frequency is less then one tree per running length of 85 m.

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

SOCIO-ECONOMIC ANALYSIS OF THE PROJECT

In the proposed watershed management plan of proper blending of bio- engineering measures will be applied. Based on the results of studies conducted in this region, it is estimated that more than 50 % of the watershed area will be treated and consequently the soil loss and runoff from the area is expected to be reduced by 70 % and 65 % respectively. The proposed land use plan will improve the land utilization index and crop diversification index significantly as compared to the existing one. It will help in maintaining ecosystem integrity on sustained basis along with improving the livelihood security of the farming community.

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 (rainfed and irrigated), pure horticulture, agro-horticulture and silvi pastoral (Silvi-Pastoral + sericulture). Net present value (NPV), Benefit Cost Ratio (BCR) , Payback 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

Total population of ten villages under the watershed is **41039** out of which **11166** are male and **7960** are females.

Table- 3.1 : HUMAN POPULATION IN THE WATERSHED

S. N.	Name of Project	Population				Percentage			Total Family no.	SC Family no.
		Male	Female	Children	Total	Male	Female	Children		
1	Piprauli graiya	1205	1033	729	2967	40.61	34.81	24.57	474	55
2	Nauwgan	945	665	1390	3000	31.50	22.16	46.33	523	190
3	Kachchi	250	192	211	653	38.28	29.40	32.31	130	-
4	Kadesighar I	336	315	598	1249	26.69	25.22	47.87	211	4
5	Kadesighar II	472	457	395	1324	35.64	34.51	29.83	645	11
6	Grda kashda	1165	885	1500	3550	32.81	24.92	42.25	591	97
7	Palighar	2077	864	4330	8271	25.11	22.53	52.35	1778	300
8	Kaundol	1800	1200	700	3700	48.64	32.43	18.91	616	102
9	Chibrauli	730	500	1775	3005	24.29	16.63	59.06	429	150
10	Bansari	2186	1849	1285	5320	41.09	34.75	24.15	781	89
	Total	**11166**	**7960**	**21913**	**41039**				**5704**	

Livestock Population

Total livestock Population of the watershed is 16245. 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 3.2 LIVESTOCK POPULATION IN WATERSHED

S. N.	Name of Project	Livestock Resolution					
		Buffaloes	**Cows**	**Bullocks**	**Goat**	**Other**	**Total**
1	Piprauli graiya	300	200	150	300	165	1115
2	Nauwgan	195	200	50	1500	277	2222
3	Kachchi	50	40	20	250	-	360
4	Kadesighar I	535	110	80	900	106	1731
5	Kadesighar II	600	125	75	1000	100	1900
6	Grda kashda	410	110	30	1050	78	1678
7	Palighar	500	300	80	1100	185	2165
8	Kaundol	110	150	40	300	230	830
9	Chibrauli	100	5	20	1000	200	1325
10	Bansari	600	400	10	1000	400	2410
	Total	**3400**	**1649**	**555**	**8400**	**2241**	**16245**

SOURCE OF INCOME

S. No	Name of Village	Income sources/ no. of family						
		Agriculture	Labour	Pri.Sector Service	Gov.Sector Service	Shop	Landless labour	Other
1	**Piprauli graiya**	980	25	10	15	05	10	-
2	**Nawgan**	140	15	10	15	02	06	-
3	**Kachchi**	300	20	21	41	04	05	-
4	**Kadesighar I**	275	40	16	30	07	18	-
5	**Kadesighar II**	175	41	20	27	12	19	-
6	**Grda kashda**	1200	21	06	12	04	05	-
7	**Palighar**	85	10	15	40	02	10	-
8	**Kaundol**	150	160	160	110	07	61	-
9	**Chibrauli**	356	40	16	38	08	12	-
10	**Bansari**	410	20	15	18	02	03	-
	Total	5036	382	274	206	53	149	-

EMPLOYMENT GENERATION

Labor 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.

DETAILS OF EMPLOYMENT GENERATION

S. No.	Name Of District	No. of the villages	Wage employment										Self employment				
			No. of mandays					No. of beneficiaries					No. of beneficiaries				
			SC	ST	Others	Women	Total	SC	ST	Others	Wo-men	Total	SC	ST	Others	Women	Total
1-	Etawah	10	1.45	-	0.811	0.109	2.370	1614	-	723	117	2454	126	-	68	54	248

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-II) ETAWAH

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	10	339	120	Better Employment In The Town/City	180

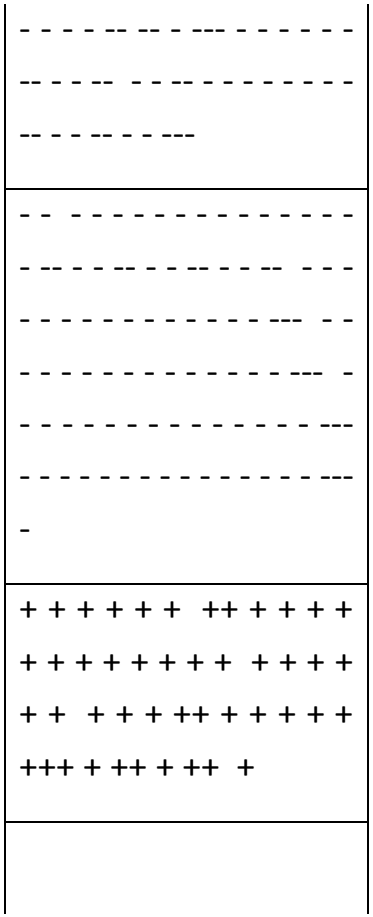
SOIL AND LAND CAPABILITY CLASSIFICATION-

Soil morphology-

The watershed is located East-South corner of the Etawah district. The entire watershed is topographically divided into three major landforms. Accordingly, the soil of watershed have been grouped in three major categories.

- Plain land
- Moderate land
- Ravinous land

Soil profile- A representative soil profile



1-1.5 m (Heavy texture soil- Yellow &black in colour)

5-6

(Locally called “Potni soil”- Clay mixed with CaCo3)

Parent material/Regolith/Red Sandy

Morphology of a typical soil profile of the watrrshed (dominant soil)-

Horizon	Dpth (cm)	Morphology
A	0-150	Yellow & Black in clolur, clay content 28 % , with free CaCO3, sticky when moist, hard when dry, high elasticity, fissures and cracks, occasional occurrence of free calcium carbonate granules pH 8.0-8.5
B	150-600	Whitish-Yellow in colour, high effervescence with dilute HCl, very fine mixed with free CaCO3 and granules, very hard when dry, compact & indurate hard pan, restricting development of root and downward water transmission (locally called as Point soil)
C	> 600	Red and white sand

Soil characteristics and fertility status-

Soil characteristics pertaining to soil fertility of various classes occurring around different villages are given in Table below.

Soil characteristics and fertility status

Soil proterties	LCC II	LCC IV	LCC VII/VIII
Sand (%)	47.04	75.04	73.04
Silt (%)	24.6	18.6	20.3
Clay (%)	28.36	6.36	6.66

Texture	Sandy clay loan	Loamy sand	Loamy sand
pH (1:2)	8.41	8.67	6.85
EC (ds m-1)	0.47	0.12	0.16
Organic carbon (%)	0.37	0.12	0.19
Available N (kg ha-1)	316	173	224
Available P (kg ha-1)	29	15	5-8
Available K (kg ha-1)	189	325	230

Values correspond to soil fraction <2mm

Land Capability Classification (LCC)-

Land Capability Classification was done to classify the soils in different groups based upon the limitations and to emphasize the hazards prevailing in the watershed under different kinds of soils. Initially reconnaissance survey was carried out for entire watershed in order to find out the different topo-sequences, landforms, soil depth and erosion hazards. This was followed by the detailed investigation of selected landforms to bring out the LCC classes of the watershed. Three classes of land capability namely II, IV and VII were demarcated in the watershed. The areas under different classes are sown in table belo and Annexure map.

Areas under different land Capability Classes under watershed-IWMP II

Land Capability Classes	IWMP II Areas (ha)	
II	Agriculture land	933.57
III	Agriculture land	3299
IV	Gullide land	1115
VII	Forest land & Others	876
Total	**6223.57**	

Land Capability Classes II (Orange)-

This group is one of the most extensive LCC classes of the watershed. This group of soil is occupying around 933 ha IWMP II of the watershed area. The soils are clay loam of silty clay loam in texture. The land under this class is nearly level to mild slopping (1-5 %). The soils are deep and erosion hazard is slight. Most of the productive agriculture land comes under class II. A considerable area of watershed is seasonally waterlogged comes under this LCC class, primarily found near the earthen check. These areas are subject to water logging in most part of the year. The lands are almost flat, silty clay or clay loam in texture, deep and very mild slopping. These lands have no major limitation other than occasional water logging. During rabi seasons, the water is drained out and cultivation is carried out. These lands potentially very productive but due to water logging during the rainly season, it could not be brought out under cultivation during the kharif season. The mapping unit for this classis given as under:-

Land capablitiy class IIe = scl-d5/B-e1

Land capability class III (Blue)-

It is noted that area of 3299 ha. IWMP II is occupied class III in the watershed area. Almost enter area under this class occurring over lower, moderate and higher slopes has been converted in to terrace for agriculture. Erosion hazard is moderate, since the terrace are nearly level and well bonded in general. At Several points water from natural springs is diverted to the terrace for irrigation. Annexure map LCC.

Land capability class IV (Green)-

A considerable area of watershed i.e. 1115 ha. IWMP II is under class IV. This class is found in lower portion i.e. near the outlet of watershed. The soils are coarser in texture (loamy sand/sand), deep, susceptible to erosion hazard and undulating in topographay. Rill and initiation of gullycan be seen near the outlet of the watershed.

Land capability class VII (Brenzil)-

These lands are occupying an area of 876 ha. IWMP II of the watershed. This class of land is mostly found in hilly terrain of watershed. The soils are very shallow underlying steep slope (> 30 %) and coarser in texture.

Conclusions-

The land capability classification of the watershed provides reasonable good information with regard to capability of soil, that could be used for agriculture, agri-horticulture, silviculture and pasture development. The majority of land from is coming under class II, which give an inside of good agriculture production potential of this watershed. The productivity of thses lands could be further enhanced by adoption of simple soil & water conservation measures like mild leveling, bunding, diversion drain and in-situ moisture conservation practices. The reasonable area in under class VII indicating greater potential of this watershed for forestry and pasture development.

PRESENT AND PROPOSED LAND USE IN THE WATERSHED

Watershed management plan for the watershed prepared with specific objectives of food sufficiency and income and employment generation with environment security. In plan preparation due importance was given

to topographic, land suitability, irrigation potentially prevailing farming systems, microfarming situation, farming, farmer preferences and priorities along with economic and environment securities. Crop and tree selection and area distribution was done as per famers priorities revealed through PRA exercise.

Technological options were blended with the ITK based on the latest available research experiment findings for this reason. Due action was given to the resource of the farmers and adjustment were made in capital intensive high resource demanding technological outputs while making them adoptable to the resource poor farmers. Imphasis was given on maximum use of farm yard manure. The proposed land use plan of the watershed is shown in Table below.

Table 3.3 Present and proposed land use plan of the watershed

S. N.	Name of watershed / Code no.	Name of Concern villages	Land Use					
			Agriculture	Wasteland type	Build-up	Forest	Water Bodies	Total
1	Palighar-2D1A2a2a	**Palighar, Gopalpur, Chibrauli**	446.54	80.05	10.92	177.93	29.88	745.32
2	Kundol-2D1A2a2b	**Kaundol**	457.34	107.86	17.06	150.95	89.23	822.44
3	Chhibarauli -2D1A2a1c	**Palighar, Gopalpur**	219.18	79.47	7.49	7.36	102.19	415.69
4	Kandesighar -2C5A1b2a	**Kadesi**	175.07	128.31	13.66	448.44	41.23	806.71
5	Kandesighar -2C5A1b1d	**Miholi, Kadesighar**	353.86	104.66	7.62	394.66	17.95	878.75
6	Bansari -2D1A1b1a	**Ravini**	76.40	15.30	0.70	90.06	15.04	197.50

7	Piprauli Garhiya - 2D1A1b1c	**Piprauli**	169.84	38.01	2.59	349.72	44.11	604.27
8	Kainchhi - 2C5A1a1d	**Naugawn**	133.65	-	10.37	401.58	40.03	585.63
9	Garhakasda 2C5A1a1c	**Ganiyawar, Chibrauli, Kachchi, Naugawn**	227.	50.59	1.06	210.80	-	489.45
10	Naugawan 2C5A1a2a	**Naugawn, Gopalpur, Khiriti**	379.41	42.60	14.19	205.44	36.17	677.81
		Total	**2638.29**	**646.85**	**85.66**	**2436.94**	**415.83**	**6223.57**

Present Landuse/Landcover of the project area

S.No.	Landuse	Area (ha)	%
1	Built-up land	**85.66**	1.37
2	Waste Land	**646.85**	10.39
3	Agricultural Land	**2638.29**	42.39
4	Forest	**2436.94**	39.15
5	Water Bodies/Rivers	**415.83**	6.70
Total		**6223.57**	**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 this category is 85.66 Hectare which is 1.37% of 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 646.85 Hectare which is 10.39 % 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 415.83
Hectare which is 6.70 % 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 irrigation. It 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 2638.29 Hectare which is 42.39 % of the total mapped area.

AGRICULTURE

The agriculture Land use constitutes about 58 % of the total watershed area. Both rain-fed and irrigated agriculture are practiced in the watershed. Mono cropping is dominant in the rain-fed production system while double cropping is limited to the irrigated lands which constitute about 5 % of the total area under agriculture. Rain-fed agriculture mostly mono cropping with invariably low productivity. These ares constitute about 70 % of total agriculture area. The food and livelihood security is primarily driven by the natural weather factors of rain and its distribution specifically across the cropping season. Only about 37 % area under agriculture is cropped during *Kharif* season in the watershed. Among various crops bajra shares maximum area (20 %), followed by sesam (10 %), jowar (5 %) and pulses i.e. black gram and green gram (2 %). Farmers uses high yielding varieties of bajra (JK, Pioneer,Ariti, Boss, PAC 9444, Mahyco Bajra) and sesame (Nitya) which are mostly truthfully lebelled seed from private seed companies. The productivity of khrif crops is low and fluctuates depending upon rainfall pattern, use of fertilizer and incidence of diseases and insect pets. Low yielding local varieties of jowar are grown without fertilization for grain and fodder production.

The local jowar varieties are one of the various constraints in fodder production in the watershed. The green fodder production through various source like crops, grasses and limited forest trees is clearly inadequate for maintaining proper health of existing animals. Also no use of manure and fertilizer in sesame, no seed treatment with Rhizobium culture in pulses are the other salient production constraints in the watershed. Watershed has good scope for lowland and semi deep water rice cultivation in seasonally submerged area, which remain unutilized during Kharif season. Almost in all thirteen villages of watershed, no compost pits exists and fresh to semi decomposed farm yard manure is applied directly to the agriculture fields. The green manures like dhaincha, sun-hemp, neel have good potential in the watershed however the

practice of green manure is meager and unpopular in the watershed, in spite of the fact then organic matter status as well as fertility of the agriculture soils are poor to fairly good. The cultivated fallow land dominate in the watershed which contributes to accelerate soil erosion as well as runoff yields in the watershed.

Among rabi crops, mustard occupies the largest area under agriculture (65 to 70 %) followed by the wheat (10 %) and pulses like gram and lentil(10 %). Farmers are using high yielding varieties of rabi crops like Karan, Krishna, Kranti, Sharda, Moti, Chambal, Nath, Sona, Raj Luxmi, Pioneer, T-59, Rohini, AK-47 in mustard and UP343, UP 2329, UP 2338, HD 2009 and even very old varieties like Loke-1 in wheat crop. Beside this, desi varieties of gram and lentil are also used by the farmers. Imbalanced fertilizer use in the rabi crops both under rain-fed and irrigated areas, absence of S containing fertilizer and inadequate pest control measures with respect to aphid and white blister in mustard and poor borer in gram are some of the reason of low productivity of these crops.

The majority of farmers of the watershed are facing considerable problem of fire wood, fodder due to meager or almost negligible forest area, lack of traditional agro-forestry practices and pastures. Cow dung, stover of mustard, sesame and dhaincha and scattered trees of Prosopis juliflora are mean sources of five wood specifically to small, marginal and landless farmers in the watershed. The organized orchards as well as forest area are widely lacking in the watershed. The watershed has a good potential of fruit and forest tree species like ber, bail, aonla, papaya, guava, citrus species, lasoda, karonda, ramda, chhokra, shisam, gular, tamarind, neem, popular, Acacia, Palash, Prosopis, juliflora as agro-forestry systems both under rain-fed and irrigated production system on leveled to sloping agriculture lands as well as on degraded lands provided proper planting techniques involving appropriate termite control measures are used.

The multipurpose trees have also very good potential for supplementing fuel and fodder demands in the watershed and may be included in appropriate land use options. Sole forestry plantation of Prosopis juliflora on degraded and marginal lands also have good potential in the watershed to cater the need of firewood demand.

The main source of green fodder for animals is limited to jowar, berseem and grasses in the watershed. Though the vegetables have good potential in the watershed however, their cultivation is limited mostly to kitchen gardens. Almost all tropical/sub tropical vegetable may be successfully grown in the watershed. The vegetables grown in the watershed are cucurbits, okra, radish, tomato, cauliflower, cabbage, garlic, onion, brinjal and chilly.

Various agricultural land uses in the watershed are extended to diversified land capabilities starting from small to marginal lands. The watershed distinctly has three types of lands i.e. leveled, sloping and some undulating. The agriculture is practiced on all these soil types though the productivity consideraDiy varies. The water (both irrigated and drinking) is most scarce natural resource in the watershed. The operation of tube weiis for irrigation of agricultural crops frequently leads to the drinking water. 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 wateshed have diversified texture i.e. loam sand, silty loam and mixed textures which are located in patches throughout the watershed. Tie irrigation water is conveyed in earthen channels and surface irrigation methods following mainry 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 multipurpose 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

Rainfed Agricuture

Single cropping

Fallow-mustard/wheat/gram/lentil/winter vegetables, bajra/jowar/sesame/black gram/green gram-fallow.

Double cropping

Bajra/jowar/sesame/ black gram/green gram-mustard/wheat/ winter vegetables.

Irrigated agriculture

One year rotation

Bajra/jowar/sesame/black gram/green gram-mustard/water/winter vegetables

Crop productivity

The agricultural productivity is primarily driven by the amount and distribution if rain water specifically during two cropping seasons i.e. rabi and kharif. Productivity of kharif crops is also affected by the late onset or early withdrawal of monsoon as well as intermittent droughts of variable duration and intensity. The farmers also do not have suitable cropping systems to deal aberrant weather. Weeds impose considerable constraint in productivity of both

Kharif and rabi crops under irrigated as well as rain-fed production system. Farmers undertake normally one manual weeding in mustard and other valuable crops however, practice is energy and time consuming. Use of weedicide is rare in the watershed.

The mixed cropping is in practice in limited area with Kharif cropslike bajra and jowar but is not only irrigated but also unscientific and beset with low productivity. Subsequent rabi crops in general and mustard crop in particular are raised on residual soil moisture under rain-fed production system during post mansoon

season. Imbalanced use of fertilizers is common is not only kharif and rabi crops but also in rain-fed and irrigated production system. The recommended deep plowing for enhanced in situ residual soil moisture conservation and higher production is also not followed in the watershed. The shallow plowing tractor drawn tillage implement are available with the farmers in the watershed but deep plowing implements yet need to be introduced.

The soil fertility/health restoration practices like green manuring, crop rotations and intercropping specifically with legumes, use of FYM/compost, Vermicompost, 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 measure created by the state Goovt. agencies. Conservation agronomical measure like seeding and plowing across the slope, weed mulching, agro-forestry, vegetative barriers etc also completely lack in the watershed.

MAJOR CROPS GROWN AND THEIR PRODUCTIVITY IN THE PROJECT AREA

S. No.	Name of the Crop	Current status		Expected post project status	
		Area (ha)	Productivity (kg/ ha)	Area (ha)	Productivity (kg/ ha)
	Kharif Jowar	1020.00	1100.00	1230.00	1400.00
	Arhar	1538.00	600.00	1621.00	900.00
	Rabi Masoor	915.00	525.00	1500.00	700.00
	Mustard	1405.00	550.00	2100.00	600.00

INDIGENOUS TECHNOLOGICAL KNOWLEDGE (ITK)

The agriculture is an old traditional practice of farmers in the watershed who have improved themselves with passage of the time according to their domestic need and technological reforms in the nearby areas. The villagers have their traditional village ponds, practice of field bunding which typically constitute agriculture related ITKs in the watershed. The mustard being a cash/fire wood crop of the watershed is being cultivated in self designed manner by the farmers. However, limited fertilizer application specifically the DAP came in to practice since about 20 years.

FOREST AND OTHER VEGETATION

FORESTS

The watershed has vast tract of denuded boulder and rock in the watershed. These wastelands do not have any tree vegetation. It typically falls under "Northern tropical thron forest" according to Champion and Seth classification of forest type of India.

AGRO FORESTRY

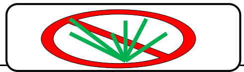
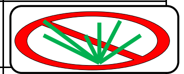
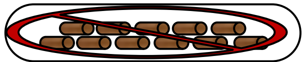
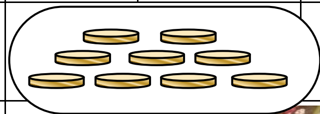
The agro-forestry practices are highly lacking in the watershed though it has good potential under existing this dispositions and may play a vital role particularly with respect to minimization of cropping risk, build up soil fertility and productivity, soil conservation, partly meeting out the fire wood demand of rural community and moreover, optimizing the economical return from system as a whole under typical semi arid climate in the watershed. The other agro-forestry systems like agri-silvi, silvi-pastroal, bund and boundary plantation also have good potential to cater the fire wood and fodder demands of the rural community in the watershed. The existing area under agro-forestry is all most negligible. The agro-forestry interventions comprising of ber, bail, aonla, guava, popular etc may be applied for benefit of the farmers under rain-fed to irrigated production systems on leveled to slopping and marginal agricultural using proper planning 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 land.

HORTICULTURE

The subtropical fruits and vegetables have very good potential in the watershed. The fruit trees are in limited in number like guava, papaya, lemon, lime, ber, aonla as well as vegetables like cucuribts, okra, radish, tomato, cauliflower, cabbage, garlic, onion, brinjal, chilly but they are found surviving well in the watershed villages. 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 farmers are in the category of marginal (< 1 ha) and small (1-2 ha) with average land holding of about 2.4 ha. These small land holding are further scattered at different places, which makes cultivation very difficult. Distribution of fram families according to the size of the land holdings are given in the Table below.

Table- 3.4: LAND HOLDING POSITION

S. N.	Name & Code no. of microwatershed	Name of Concern village	Land holding classification						No. Total Farmes	Total Area
			Marginal		Small		Others			
			No.	Ha.	No.	Ha.	No.	Ha.		
1	Piprauli graiya	Piprauli	700		20		50		770	677.32
2	Naugawn	Naugawn, Gopalpur, Khiriti	195	215	30	85	15	135	240	503.69
3	Kachchi	Naugawn	20	55.0	35	45.0	15	40.0	70	484.00
4	Kadesighar I	Kadesi	271	383.4	153	174.3	29	72.3	453	805.00
5	Kadesighar II	Miholi, Kadesighar	261	289.6	146	164.37	26	61.03	433	678.78
6	Grda kashda	Ganiyawar, Chibrauli, Kachchi, Naugawn	243	250.46	177	145.37	23	63.17	443	387.75
7	Palighar	Palighar, Gopalpur, Chibrauli	171	130.32	121	122.17	16	37.51	308	645.05

8	**Kaundol**	**Kaundol, Palighar, Bachchdi**	**200**	**40.0**	**150**	**30.0**	**50**	**20.0**	**400**	**729.37**
9	**Chibrauli**	**Palighar, Gopalpur**	**102**	**100**	**50**	**60**	**31**	**71**	**183**	**704.71**
10	**Bansari**	**Ravini**	**400**	**200.2**	**100**	**500.169**	**50**	**357.315**	**550**	**607.31**
	Total	-	**5614**	**2709.98**	**2272**	**2174.379**	**968**	**1679.325**	**8934**	**6223.57**

LIVELIHOOD ACTIVITIES

Out of the total population of 41039 in the watershed, a majority i.e. more then 80 % has farming as their major source of Livelihood followed by 80 % laborers and 2 % service + business class.

SUMMARY OF LIVELIHOOD

S. No.	Names of the villages	Existing livelihood activities	Possible livelihood interventions under the project	Current status of migration (No. of people)	Main reasons for migration
1-	10	1-Dairy 2-Agriculture	1-Horticulutre 2-Vegitable Production 3- Fishries 4- Vermi Culture 5- Poultry 6- Food Processing	339	For Better Livelihood

INFRASTRUCTURE SOCIAL FEATURES

The watershed has moderate communication facilities and all thirteen villages Concer majra are approachable through moderate road. Literacy rate in the watershed is Satisfactry because all villages are having education upto Primary School. Mostly villages are electrified and have TV & telephonic connection. Nearest small market is at Lakhana about 0-10 km and nearest big market Etawah is about 25 km from the watershed. Religious and ritual features are almost common as in other part of the U.P. Small land holding (average less then 2 ha.) with large family size () and more then 45 % of the labour force of the total population living blow 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 villages community participates in the individual works. Map of the watershed villages drawn by villagers themselves, depicting various village features is shown in Table as below.

Table – 3.6 : Details of infrastructure in the Project Area

S. N	Name of village	Pakka Road	Electricity	Primary School	Jun. High School Km	Inter college Km.	Post Off. Km.	P.H.C. Km.	Bank Km.	Vetnary hospital Km.	Co-op Society Km.	Market Km.	Agri. Servic centre Km.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Piprauli graiya	Yes	No	Yes	3	3	3	3	3	3	3	3	3
2	Nawgan	Yes	Yes	Yes	Yes	2	2	2	5	2	5	5	5
3	Kachchi	Yes	Yes	Yes	4	2	3	2	4	-	5	4	4

4	**Kadesighar I**	**Yes**	**Yes**	**Yes**	**1**	**10km**	**1**	**10km**	**10km**	**10km**	**10km**	**10km**	**10km**
5	**Kadesighar II**	**Yes**	**Yes**	**Yes**	**1**	**10km**	**1**	**10km**	**10km**	**10km**	**10km**	**10km**	**10km**
6	**Grda kashda**	**Yes**	**Yes**	**Yes**	**2**	**10km**	**Yes**	**15km**	**15km**	**15km**	**15km**	**15km**	**15km**
7	**Palighar**	**Yes**	**Yes**	**Yes**	**2**	**4 km**	**4 km**	**5 km**	**7 km**	**7 km**	**7 km**	**7 km**	**7 km**
8	**Kaundol**	**Yes**	**Yes**	**Yes**	**Yes**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**3**
9	**Chibrauli**	**Yes**	**Yes**	**Yes**	**1**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**4**
10	**Bansari**	**Yes**	**Yes**	**Yes**	**Yes**	**7**	**7**	**7**	**7**	**7**	**7**	**6**	**6**

HISTORICAL TIMELINE

An historical timeline is the chronological record of important events in the history of the village which is useful in understanding its background in the context of the watershed. historical timeline depicting important events in respect of different villages of the watershed was prepared through PRA. historical timeline for village Dhakra is given in Table below.

HISTORICAL TIMELINE FOR VILLAGES

S.No.	Activities Kundol	Year
1	Established	1700
2	Opening up Primary school	1992
3	Tractor	1994
4	Establishment of P.H.C.	-
5	First Cycle	-
6	First motorcycle	-
7	T.v. and d.v.d. player	-
8	Elect city in the village	-
9	Bitumen road	-
10	Plough	-
11	Hand Pump	-
12	Telephone	-
13	Post Office	-
14	Vetenary Hospital	-
15	Junior High School	2004

S.No.	Activities PaliGhar	Year
1	Junior High School	2004
2	Opening up Primary school	1985
3	Tractor	1970
4	Establishment of P.H.C.	1995
5	First Cycle	1940
6	First motorcycle	1975
7	T.v. and d.v.d. player	1994
8	Elect city in the village	2004
9	Bitumen road	2006
10	Plough	1970
11	Hand Pump	1985
12	Telephone	1995
13	Post Office	1960
14	Vetenary Hospital	1965

S.No.	Activities Piprauli Garhiya	Year
1	Junior High School	1955
2	Opening up Primary school	1950

3	Tractor	1986
4	Establishment of P.H.C.	2005
5	First Cycle	1952
6	First motorcycle	1987
7	T.v. and d.v.d. player	1985
8	Elect city in the village	2001
9	Bitumen road	1990
10	Plough	1986
11	Hand Pump	1991
12	Telephone	1997
13	Post Office	-
14	Vetenary Hospital	-

S.No.	Activities Kandesighar I	Year
1	Junior High School	1975
2	Opening up Primary school	1950
3	Tractor	1984
4	Establishment of P.H.C.	-
5	First Cycle	1938

6	First motorcycle	1980
7	T.v. and d.v.d. player	1976
8	Elect city in the village	1999
9	Bitumen road	1996
10	Plough	1984
11	Hand Pump	1988
12	Telephone	1995
13	Post Office	1958
14	Vetenary Hospital	-
15	Mobile Phone	2004
16	Radio	1960

S.No.	**Activities Kandesighar II**	**Year**
1	Junior High School	1980
2	Opening up Primary school	1950
3	Tractor	1986
4	Establishment of P.H.C.	-
5	First Cycle	1942
6	First motorcycle	1985

7	T.v. and d.v.d. player	1978
8	Elect city in the village	2000
9	Bitumen road	1996
10	Plough	1986
11	Hand Pump	1990
12	Telephone	1996
13	Post Office	-
14	Vetenary Hospital	-
15	Mobile Phone	2005
16	Radio	1965

S.No.	Activities GarhaKasda	Year
1	Jonior High School	2005
2	Opening up Primary school	1960
3	Tractor	1986
4	Establishment of P.H.C.	2008
5	First Cycle	1650
6	First motorcycle	-

7	T.v. and d.v.d. player	1980
8	Elect city in the village	1982
9	Bitumen road	2005
10	Plough	1980
11	Hand Pump	1985
12	Telephone	-
13	Post Office	1960
14	Vetenary Hospital	-
15	Mobile	1995
16	Radio	1965

S.No.	Activities Naugawan	Year
1	Established	-
2	Opening up Primary school	1975
3	Tractor	1986
4	Establishment of P.H.C.	-
5	First Cycle	1951
6	First motorcycle	1985

7	T.v. and d.v.d. player	1987
8	Elect city in the village	2003
9	Bitumen road	1995
10	Plough	1951
11	Hand Pump	1992
12	Telephone	-
13	Post Office	-
14	Vetenary Hospital	-
15	Jonior High School	1976
16	Radio	1965
17	Mobile	2006

S.No.	**Activities Kainchhi**	**Year**
1	Established	1700
2	Opening up Primary school	1992
3	Tractor	1990
4	Establishment of P.H.C.	-
5	First Cycle	-
6	First motorcycle	1993

7	T.v. and d.v.d. player	-
8	Elect city in the village	2001
9	Bitumen road	1991
10	Plough	-
11	Hand Pump	-
12	Telephone	-
13	Post Office	-
14	Vetenary Hospital	-
15	Mobile	-
16	Radio	-
17	Jonior High School	2004

S.No.	Activities Chhibarauli	Year
1	Established	1650
2	Opening up Primary school	1980
3	Tractor	1998
4	Establishment of P.H.C.	-
5	First Cycle	-
6	First motorcycle	1978

7	T.v. and d.v.d. player	-
8	Elect city in the village	2001
9	Bitumen road	1990
10	Plough	-
11	Hand Pump	-
12	Telephone	-
13	Post Office	-
14	Vetenary Hospital	-
15	Jonior High School	1992
16	Radio	-
17	Mobile	-

S.No.	Activities Bansari	Year
1	Established	1650
2	Opening up Primary school	1980
3	Tractor	1998
4	Establishment of P.H.C.	-
5	First Cycle	-
6	First motorcycle	1978

7	T.v. and d.v.d. player	-
8	Elect city in the village	2001
9	Bitumen road	1990
10	Plough	-
11	Hand Pump	-
12	Telephone	-
13	Post Office	-
14	Vetenary Hospital	-
15	Jonior High School	1992
16	Radio	-
17	Mobile	-

MEANS OF COMMUNICATION

The watershed can approached either from Chakar Nagar (0-20 km) or from Bakewar-Lakhana road (10 km). All villages are also interconnected by village Pakka road. One side of the watershed is having MP state boundary.

NATURAL RESOURCE BASE

Out of total area 6223 ha IWMP II area of watershed, an area of 4987 ha.(89.65 %) is under rain-fed agriculture and 20.58 ha (0.35 %) under waste land occupying forest area 183 ha.in Mahewa And pasture land nill and village land and road etc. is 912.30 ha Chakar Nagar Main sources of irrigation are the seasonal water

bodies for pre sowing irrigation only. Transact of the watershed showed typical land use profile consisting of plan agriculture land and ravenous lower ridge.

FARMERS PREFERENCES

Agriculture-Mustard and bajra are the most preferred agricultural crop in the watershed followed by wheat.

Fruit trees- Ber, Aonla, Bael, Lasoda, Guava.

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 crops having potential in the watershed, socio-economical factors etc. were found to be most important factors deciding the preferences of farmers pertaining to selection and cultivation of agricultural crops, fruits, MPTS or other fodder trees in the watershed.

DEPENDENCY ON FOREST FOR FUEL WOOD AND FODDER

(a) Fuel wood

Villagers in the village do not use LPG to meet their cooking energy requirements. The main source of fuel is from cow dung cake, wood stem of Arhar crop and mustard. About 60 to 65 present of the domestic energy requirements is met from the agro-by product and cow dung cake. Rest is met out from the forest outside the village and watershed boundary. Most preferred fuel wood is Arhar Fuel wood is obtained from yhe forest of the prosopis Arhar standing along the river Yamuna & Chambal River situated outside the watershed boundary.

(b) Fodder:

Villagers do not have any significant dependency on forest based fodder as these resources are not available in the forests.

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.

LACK OF FINANCES FOR FARMERS

In the project area most of the farmers are marginal and small. They do not have enough money to buy good quality seeds, machinery and other inputs.

LACK OF GOOD QUALITY SEEDS AND FERTILIZERS

Good quality seed, fertilizer and pesticide are important factor in agriculture productivity. The use of good quality leads to higher land productivity. In watershed, however, there are two limitations in the use of fertilizer. First these fertilizers are most useful in irrigated condition. But in watershed 100 per cent of land depend on rainfall. mostly farmers use nitrogenous fertilizers especially urea. This has resulted in disproportionate use of fertilizer depleting the quality of land.

LACK OF OTHER FACILITIES SUCH AS STORAGE AND MARKETING

5-10% of agriculture product damage after harvesting due to scarcity of proper storage and proper market for sale. So he sells to local traders at the low prices. Farmers mainly face proper means of transportation and roads. And second problem is farmers don't have proper storage facilities.

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:

1. Climatic Factors

A. Rainfall : its intensity,duration & distribution.

B. Snow

C. Evapo-transpiration

2. 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.

3. 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 Yamuna & Chambal 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.

The details of PRA exercise in the Project Area

The details of PRA exercise in the Project Area

CHAPTER - 4

INSTITUTION BUILDING & PROJECT MANAGEMENT

1. BRIEF DESCRIPTION ABOUT PIA:

PROJECT MANAGEMENT AGENCY (PIA):

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.

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.

STAFF AT PROJECT IMPLEMENTING AGENCY (PIA)

U.P. Government, Land Development And Water Resources Department section -1 Lucknow has nominates as PIA to Bhoomi Sanrakshan Unit, Land development and water resources Department Etawah-Ist for IWMP-II.

Table 4.1: Details Staffing Pattern of PIA

S. No.	Name	Desingnation	Qualification
	2	3	4
1.	Sri Dinesh Yadav	B.S.A.	P.G.
2.	,, R. G. Singh	Jr. Engg.	Intermediate Diploma in Ag. Engg.
3.	,, N.B. Gupta	Accountant	B.Com.
4.	,, Jagat Narayan	Sr. Clerk	M.Com.
5.	,, Ram Sankar	Draft Man	B.A.
6.	,, P.P. Singh	,,	High School
7.	,, Harikesh Chandra	A.S.C.I.	MSc.
8.	,, Ram Ashray Katiyar	,, ,,	BSc.
9.	,, Jiladar Singh	Work Incharge	B.A.
10.	,, Ashok Kumar	,, ,,	B.A.
11.	,, Ram Shankar	,, ,,	B.A.
12.	,, Kamlesh Kumar	,, ,,	Intermediate
13.	,, Ram prakash Tripathi	,, ,,	High School
14.	,, Brijendra Singh Kushwaha	,, ,,	Intermediate
15.	,, Rajendra Babu Arya	,, ,,	,, ,,
17.	,, Shishupal Singh	,, ,,	,, ,,
18.	,, Brijendra Singh	,, ,,	B.A.

19.	,, Suresh Babu Sharma	Munsi	M.A.
20.	,, Rajneesh Kumar	,,	Intermediate
21.	,, Seela Devi	,,	,,
22.	,, Ram Narayan	,,	High School
23.	,, Shushma Devi	,,	5th class
24.	,, Ajay Babu	,,	8th class
25.	,, Ram Chandra	,,	8th class
26.	,, Chandra Bhan Singh	,,	8th class
27.	,, Abhay Kumar Tiwari	Munsi	MCom.

WATERSHED DEVELOPMENT TEAM

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 point 40 P. I. A. has been constituted Watershed Development Team as given below.

आदेश

भारत सरकार ग्रामीण विकास मंत्रालय नयी दिल्ली द्वारा जारी वाटर शेड विकास परियोजनाओं के लिए समान मार्गदर्शी सिद्धान्त–2008 के पैरा 5–3 के अनुसार जनपद इटावा में स्वीकृत परियोजना आई0डब्लू0एम0पी0 इटावा प्रथम के समान मार्गदर्शी सिद्धान्त के अनुसार क्रियान्वयन हेतु निम्न प्रकार से जल संग्रहण विकास दल (W.D.T.) का गठन किया जाता है एवं आदेशित किया जाता है कि समान मार्गदर्शी सिद्धान्त के पैरा 5–4 के अनुसार कार्यवाही सुनिश्चित करें।

क्र0 सं0	सदस्य का नाम	पद नाम	योग्यता	व्यावहारिक अनुभव	सम्बन्धित कार्यक्षेत्र
1	2	3	4	5	6
1	श्री राम गोपाल सिंह	अवर अभियन्ता	Ag. Engg. Dip.	जल संग्रहण परियोजनाओं के क्रियान्वयन में 20 वर्षों का अनुभव	भुमि एवं जल प्रबन्धन
2	श्री हरिकेश चन्द्र	स0भू0सं0नि0	M.Sc.	जल संग्रहण परियोजनाओं के संचालन में 8 वर्ष का अनुभव	–
3	श्रीमती करिश्मा शर्मा	समाजिक कार्यकत्री	B.A.	सामाजिक क्षेत्र में 1 वर्ष का अनुभव	

भूमि संरक्षण अधिकारी

भूमि विकास एवं जल संसाधन विभाग,

(P.I.A.) इटावा।

कार्यालय– भूमि संरक्षण अधिकारी, भूमि विकास एवं जल संसाधन विभाग, इटावा।

पत्रांक : भू0स0अ0 / /प्रा0 अनु0 / आई0डब्लू0एम0पी0 / 10–11 / दिनांक 2011

प्रतिलिपि–निम्नलिखित को उपरोक्तानुसार आवश्यक कार्यवाही हेतु।

1. वाटरशेड विकास दल (W.D.T.) के समस्त सदस्यों को।
2. उप निदेशक (भू0सं0), भूमि विकास एवं जल संसाधन विभाग (रामगंगा कमाण्ड परियोजना), कानपुर की सेवा में सूचनार्थ प्रेषित।
3. परियोजना निदेशक, जिला ग्राम्य विकास अभिकरण, इटावा।
4. मुख्य विकास अधिकारी, इटावा।
5. जिलाधिकारी, इटावा।
6. अध्यक्ष एवं प्रशासक, रामगंगा कमाण्ड परियोजना, कानपुर।
7. विशेष सचिव, भूमि विकास एवं जल संसाधन विभाग, उ0प्र0 शासन लखनऊ।

भूमि संरक्षण अधिकारी

भूमि विकास एवं जल संसाधन विभाग,

(P.I.A.) इटावा।

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 committee that is constituted by Gram Sabha to implement the watershed with technical support of WDT in the village. This committee is registered under society Registration Act 1860. The Gram Sabha of the village select the chairman of the watershed committee with the secretary who will be a paid functionary. A watershed committee was formed accordingly in I.W.M.P-III, Etawah . The watershed include 03 villages has 03 separate micro-watershed committee was formed 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: DETAILS OF WATERSHED COMMITTEE, I.W.M.P-II, ETAWAH

S. N.	Name Of President	Name Of Secretary	Member Of User Group	Member Of SHG	Female Member	Member SC	Work Incharge	Total WDT Member
1	Sh.Rajendra Singh	Sh.Ramasare Katiyar	Sh. Narayan Singh	Sh. Gaya Prasad	Smt. Siya Devi	Sh. Lochan Singh	Sh.Ramasare Katiyar	15
2	Sh. Akhilesh Singh Singh	Sh. Ziledar Singh	Sh. Vidhwan Singh	Smt. Saroj Singh	Smt. Shanti Devi	Smt. Bina Devi	Sh. Ziledar Singh	15
3	Sh. Badshah Singh	Sh. Ashok Singh	Sh. Ramautar	Smt. Shashikanti Singh	Smt. Sarala Kumari	Smt.Pinki Devi	Sh. Ashok Singh	15
4	Sh. Ramnath	Sh. Shishupal Singh	Smt. Giraja Devi	Sh. Ravindra Singh	Smt. Anita Singh	Smt. Girja Devi	Sh. Shishupal Singh	15
5	Sh. Fundi Lal	Sh. Brijendra Pal Singh	Sh.Ashok Singh	Sh. Anawat singh	Smt. Sone Kuwanr	Smt. Basanti Devi	Sh. Brijendra Pal Singh	15
6	Sh. Ramlakhan	Sh. Kamlesh kumar	Sh. Rajbahadur	Sh. Ramvir	Smt. Guddi devi	Smt. Anar	Sh. Kamlesh Kumar	15
7	Sh. Mahendra Singh	Sh. Harikesh Chandra	Sh. Ranvir Singh	Sh. Jagpal Singh	Smt. Kamla Devi	Smt. Kamla Devi	Sh. Harikesh Chandra	11
8	Sh. Rajababu	Sh. Ramprakash	Sh. Abhilakh	Sh. Shyam Singh	Smt. Shyam Kunwar	Smt. Shyam Kunwar	Sh. Ramprakash	15

		Tripathi					Tripathi	
9	Sh. Dhani Ram	Sh. Kamlesh Kumar	Sh. Prem Singh	Sh. Ganga Singh	Smt. Kushma Devi	Smt. Shweta Devi	Sh. Kamlesh Kumar	15
10	Sh.Surendra	Sh.Ramshankar	Sh.Jaswant Singh	Sh.Munam Singh	Smt. Chameli Devi	Smt. Chameli Devi	Sh.Ramshankar	12
11	Sh.Ram Pratap	Sh. Naresh Chand	Sh. Nirmal Kumar	Sh.Rajendra Pratap	Smt.Suman Devi	Smt.Suman Devi	Sh. Naresh Chand	13
12	Sh.Rajkaran	Sh.Rajendra Babu	Sh.Anil kumar	Sh. Manish Kumar	Smt.Santosh kumari	Smt. Anita Devi	Sh.Rajendra Babu	14
13	Sh.Gyan Singh	Sh. Harikesh Singh	Sh.Ramdev Singh	Sh. Surjan Singh	Smt. Munni Devi	Smt. Munni Devi	Sh. Harikesh Singh	11

SELF HELP GROUP

Self Help Groups are motivated, small homogenous groups organized together through credit and thrift activities. Self help group initiative especially for women, help 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.

The details of the self help groups of the project area is given below:

Table 4.4 : Details of Self Help Group in Project Area IWMP – Etawah-II

S. No.	Name of Project (M.W.S.)	Code No. (M.W.S.)	Name of S.H.G.	Occuupation of grup leader	Name of Group leader
1	2	3	4	5	6
1.	**Kundoul**	**2D1A2a2b**	**Ambadkar**	**Dairy**	Sri Subhash
			Jay Bhawani	**,,**	Sri Ram Naresh
2.	**Bansari**	**2D1A1b1a**	**Aoom**	**Dairy**	Sri Charan Singh
			Mahakali	**,,**	Sri Pradeep
3.	**Piprouli Gariya**	**2D1A1b1c**	**Kashiram**	**Dairy**	Smt. Manju Singh
			Bhola	**,,**	Sri Rakesh Babu
4.	**Kandesighar I**	**2C5A1b2a**	**Baba Saseb**	**Dairy**	Sri Chote Singh
			Jay Beem	**,,**	Sri Gambheer
5.	**Kandesighar II**	**2C5A1b1d**	**Jay Durga Ma**	**Dairy**	Sri Sarsahaye
			Ma Sarswati	**,,**	Sri Smt. Manju
6.	**Pali Ghar**	**2D1A2a2a**	**Maa Durga**	**Dairy**	Sri Amar Singh
			Mahakali	**,,**	Sri Manoj Kumar
7.	**Garhakasda**	**2C5A1a1c**	**Jay Santosi**	**Dairy**	Smt. Manju Devi
			Aajad	**,,**	Sri Sarvesh Kumar
8.	**Chhibarauli**	**2D1A2a1c**	**Jay Bheem**	**Dairy**	Sri Pratap Singh
			Sankar	**,,**	Sri Ramesh Chandra
9.	**Kainchhi**	**2C5A11a1d**	**Aajad**	**Dairy**	Sri Keshav Singh
			Shiva jee	**,,**	Sri Rajveer Singh
10.	**Naugawan**	**2C5A1a2a**	**Rani Lakhmi Bai**	**Dairy**	Smt. Sheela Devi
			Jay Bheem	**,,**	Sir Satendra

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. The detail of the user groups of the project area is given below.

Table 4.5 : USERS GROUP DETAILS IN PROJECT AREA –IWMP, Etawah-II

S. No.	Name of Project (M.W.S.)	Code No. (M.W.S.)	Area in Hect.	Name of UGs	Name of Group leader
1.	**Kundoul**	**2D1A2a2b**	**729.3783**	**1**	Sri Bhagwat
				2	Sri Sita Ram
				3	Sri Jay Ram Singh
				4	Sri Bhekham Singh
2.	**Bansari**	**2D1A1b1a**	**607.3183**	**1**	Sri Charan Singh
				2	Sri Kishor
				3	Sri Pradeep
3.	**Piprouli Gariya**	**2D1A1b1c**	**503.6946**	**1**	Sri Pooran Singh
				2	Sri Munnu Singh
				3	Sri Jagram Singh
4.	**Kandesighar I**	**2C5A1b2a**	**805.8165**	**1**	Sri Mahesh Singh
				2	Sri Srikarishan
				3	Sri Sanju
				4	Sri Bure
				5	Sri Rakesh

5.	**Kandesighar II**	**2C5A1b1d**	**678.4818**	**1**	Sri Lavkaran Singh
				2	Sri Heera Singh
				3	Sri Ramesh Singh
				4	Sri Verendra Singh
6.	**Pali Ghar**	**2D1A2a2a**	**654.0550**	**1**	Sri Har narayan Singh
				2	Sri Bare Lal Singh
				3	Sri Dheer Singh
7.	**Garhakasda**	**2C5A1a1c**	**387.7504**	**1**	Sri Prem Babu
				2	Sri Gaya Pd
				3	Sri Rakesh Kumar
				4	Sri Ram swroop
8.	**Chhibarauli**	**2D1A2a1c**	**704.7147**	**1**	Sri Pratap Singh
				2	Sri Lala Ram
				3	Sri Vijay Singh
				4	Sri Ratan Lal
9.	**Kainchhi**	**2C5A11a1d**	**484.0425**	**1**	Sri Keshav Singh
				2	Sri Shankar Singh
				3	Sri Bharat Singh
				4	Sri Raghuweer Singh
10.	**Naugawan**	**2C5A1a2a**	**677.3212**	**1**	Sri Prayag Narayan
				2	Sri Shiv Pratap
				3	Smt. Sumitra Devi

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:

3- They should preferably have prior experience in watershed related aspects or management of watershed development projects.
4- 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

1. PROBLEM & NEED OF THE AREA:

The major crop in kharif is rice grown in the project area with productivity of 16.96 q/ Ha which is very low which is due todelay in rice transplantation, poor seed & variety replacement rate.Decreasing factor productivity in rice, wheat cropping system is a major challenge to accelerate the economy of farmer.Infestation of pod borer & poor varirty replacement rate in pulses is a major factor in low productivity of pulses & oil seeds.Broad coasting of seed & fertilizer in kharif pulses affect the yield of pulse.Most of the milch animal is local breed with low milk potential affect the milk productivity in the study area.

2. PROBLEM OF AGRICULTURAL LAND:

Low yield of rice and wheat crop,Infestation of pod borer, small size of agricultural fields, soil erosion and uneven character of serface of the land require better variety of seed,Deficiency of multy nutrient specially sulphur,iron,zink,cheking the wheat yield.Breed improvement of animal and training to the farmers of the study area are the fundamental need.

To deal with these problems A two-fold approach- physical and social,as they are complementaty to each other should be adopted because physical reclamation of land is achieved through chemical treatment of water logged soils and is 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.

Consolidation of land holdigs is one of the measures among many.

Soil erosion has become now one of the major environmental problems and a serious constraint for aricultural production. There are many physical and socialfactors which determine the extent and severity of soil erosion.the principal physical factor are erosivity of rainfall, erodibility of soil, severity of periodic floods, length and steepness of the slope. The important social factors are deforestation, over grazing, nature of land

use and mathods of cultivation.On the other hand, sheet erosion cause by rains and erosion due to winds are least visible but eqully serious as the too take a heavy toll of presious top soils.

SOIL CONSERVATION

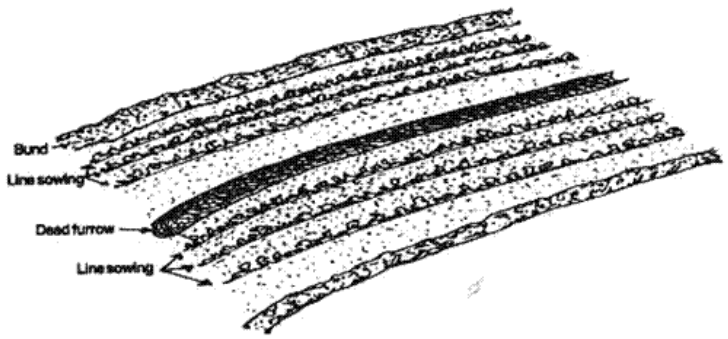
Soil and water conservation measures consist of agronomical and mechanical methods. Agronomic methods are supported with mechanical measures where land slope exceeds permissible limits and runoff gains erosive velocities.

The following boxes explain the nature of agronomic measures which are essential in inter-bunded or terraced areas. These practices enhance the utility value of all kinds of mechanical structures.

Contour Tillage

All agricultural operations such as ridging, ploughing, harrowing, sowing, trenching, etc., are recommended to be done on the contour wherever possible or at least generally across the direction of the slope where holdings are very small. Even though the operation is very simple, it plays a major role in retarding the process of soil erosion through runoff. It also conserves soil, and due to increased time of concentration, more rainwater seeps through the soil profile to recharge ground water. Summer ploughing leaves the soil highly absorbent of initial rains.

Contour cultivation in inter-bunded area



DeaFurrows

When all tillage operations are complete; it is advisable to leave a deep dead furrow at every 10 m interval. This should remain in position until the crop is harvested. Dead furrows aid in reducing the runoff velocity and they also conserve water.

Organic Matter

The study area soils are very poor in organic matter, especially in deob areas. This can be improved by leaving the crop residue in situ (on the fields).

Adding organic manures such as farmyard manure and compost every year as basal application to the soil improves the physical condition of the soil considerably. Soil – Air, Soil – Temperature, and Soil – Moisture relationships are well balanced with the presence of organic matter. Organic matter improves the activities of soil microorganisms and also provides the much needed micro plant nutrients of all kinds, besides nitrogen, phosphorus and potash.

Addition of large amounts of chemical fertilizers to study area crops should be discouraged as it damages the soil due to:

- excessive depletion of scarce soil moisture for its own transformation;
- reduction in all soil microorganism activity; and
- destruction of soil structure

Strip Cropping

Raising Erosion Permitting Crops (EPC) with Erosion Resistant Crops (ERC) having abundant adventitious root system and providing high percentage of canopy in strips in a ratio of 2:1 or 3:1 (i.e. 20 to 10 rows or 30 to 10 rows) helps in trapping soil from EPC strips to ERC strips

The increased resistance to runoff in ERC results in higher volume of water percolating through soil profile, due to increased time of (on-ground) concentration.

The close-growing ERC strips are generally legumes which fix nitrogen in the soil and enrich it.

The canopy of the ERC also protects the soil from beating action of rain drops. Strip cropping also helps in stabilizing crop production.

HORTICULTURE DEVELOPMENT

As per the current senerio of the country under the yellow revolution, 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 skillful 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 ie. 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).

Mango, 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 dug 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 dryfarrming 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.

In Vedas, Upanishad and Puran, the importance of trees is said. There are 27 Nakshatras in a year and there is one of each Nakshtra. The people should planted the tree of their Nakshtra, And they should be never destroyed.

The name of Nakshtra and their tree are as follows:

S.No.	Name of Nakshatras	Name of Tree
1.	Ashwini	Kuchila
2.	Bharini	Aamla
3.	Kritika	Goolar
4.	Rohini	Jaamun
5.	Mrigshira	Khair
6.	Aadra	Agar
7.	Punarvasu	Baans
8.	Pushya	Peepal
9.	Ashalekha	Chameli
10.	Magha	Bar (Banyan)

11.	Purvafalguni	Dhak
12.	Uttarafalguni	Pilkhen
13.	Hasta	Jaai
14.	Chitra	Bel
15.	Swati	Arjun
16.	Vishakha	Babool (Acacia)
17.	Anuradha	Naagkeshwar
18.	Jyeshtha	Shambhal
19.	Mool	Raal Vriksha (Bitumen)
20.	Purvaashadha	Bait (Cane)
21.	Uttaraashadha	Panash
22.	Shrawan	Aak
23.	Ghanishtha	Jaanthi
24.	Shatbhisha	Kandab
25.	Purvaabhadrapad	Aam (mango)
26.	Uttaraabhadrapad	Nimbu (Lemon)
27.	Revati	Mahua

PANCHVATI

"Vriksho Rakshati Rakshatah"

Moolan Brahmaa, Twachaa Vishnu:, Shakha Rudro Maheshwarah: I

Patre – Patre Tu Devanaam, Vriksha Raajo Namostute II

Panchvati: Panch means 'five' and Vati means 'tree'. The place where five types of plants are available is called PANCHVATI. These five type of plants are: Banyan, Peepal, Bel, Amla and Ashok. The importance of Panchvati is shown in Ramayana. That is, Lord Ram gained most power by living between Panchvati and defeated most powerful king *Lankadhish Raavan*.

BANYAN/ BARGAD: One drop of milk of Banyan tree has energy equal to 1 litre of common milk.

PEEPAL: There is an old tradition of worshipping the Peepal tree by womens and to tie a thread around it because this is an only tree which releases OZONE gas along with OXYGEN gas. The Ozone gas helps to enhance the power of generation of child and the new born babies are more healthier. Deficiency of Ozone gas results in increasing SKIN CANCER.

BEL: Bel helps to decrease the hotness of our stomach and other parts of our body, that is why people worship Lord Shiva with BEL PATRA.

AMLA: Amla is also called KALPVRIKSHA. It is the best source of VITAMIN C, which increases the resistance power of our body. The Vitamins of Amla are not destroyed, even though after heating it also, thus, it is used in CHYAWANPRASH.

ASHOK: Ashok is the best tree of the world. The canopy of this tree destroys all the tension and nervousness. Its canopy also cures many diseases of womens

DETAIL ESTIMATE OF PANCHVATI PLACE

S.No.	Particulars	Unit	Quantity	Cost / Unit	Total
1.	Demonstration of Panchvati Place and Horticulture with Brick Guard	nos.	6	1355.00	8130.00
2.	Cost of Plants with Earth Work, Digging and Filling with FYM	nos.	6	172.00	1032.00
3.	Construction of Krishak Vikas Manch	nos.	1	71200.00	71200.00
4.	India Mark-II Hand Pump	nos.	1	42600.00	42600.00
5.	Renovation of Jagat of Well	nos.	1	91000.00	91000.00
6.	Soaking Pit for Hand Pump or Well	nos.	1	3845.00	3845.00
	Sub Total with Hand Pump's Cost				**Rs. 1,26,807.00**
	or				**Say Rs. 1,26,800.00 only**
	Sub Total with Jagat of Well's Cost				**Rs. 1,75,307.00**
					Say Rs. 1,75.300.00 only

APPEAL TO THE PEOPLE OF I.W.M.P.-ETAWAH II

We want to give a message to the people of all the villages situated in the Project Area of I.W.M.P.- II, that, to avoid Flood & Hunger, they should plant at least one Panchvati in each village. They should plant PEEPAL tree in the EAST, BANYAN tree in the WEST, tree of BEL in the NORTH, AMLA tree in the SOUTH & the tree of ASHOK in the SOUTH-EAST. Then, in the middle of Panchvati, a Worship Place (i.e. a temple) should be made and a Hand Pump should be installed. In this hand Pump, water will be available for thousands of years. The roots of these Panchvati trees makes the existing source of water between them pure and capable to cure many diseases.

There should a house by name of each women and there, they should plant at least three plants.

1). Tree of God Vishnu- Amaltash.,

2). Tree of Goddess Lakshmi- Kachnar.,

3). Plant of Basil (Tulsi), which is able to cure all the diseases.

For purification of environment, at least one plant of NEEM should be planted in front of each house because it has efficiency of absorbing harmful gases (Carbon-mono-oxide, Hydrogen Sulphide, Sulphur-di-oxide, Nitrous Oxide, Ammonia, etc.) and releases gases which are useful for us, same as when Lord Shiva absorbed all the poison which was released during *SAMUDRAMANTHAN.*

Therefore, to live a healthy life, at least one plant of Neem should be planted near the residence.

Agro-horticulture

Marginal lands do not produce good annual crop returns even in normal season. These kinds of soils are best used for raising trees of economic value and creating permanent assets. Some of these lands are also very good for raising horticultural crops such as mango, ber, pomegranate, tamarind etc. A part of the land could be earmarked specially for planting mixed tree species known in the area for providing fuel, fodder and timber for household needs and agricultural implements. Trees provide stable and sustained income every year, especially in drought years.

Role of Vegetation

Vegetation is crucial in preserving productive soil and conserving rain water for sustaining life. Soil and water need to be preserved for crop production (both annual and plantation crops) as well as plants that give fuel, fodder, fruits, industrial raw materials, medicinal and aromatic plants and the like.

Minor vegetation such as creepers, shrubs, various kind of grasses, legumes and plants like Agave, which yield fibre have an important role when grown in gullies of various kinds and also on upstream and downstream sides of mechanical structures such as gully checks, water harvesting structures, etc. These provide reinforcement and extend the life span of the structures by binding the soil through the network of their root systems. These plants also provide fodder to animals in the area.

Seed Rates

Normal season: Sowing is done with the normal seed rate. However, if there is a drought during the plant's growth period and wilting is likely to occur, selective thinning is recommended to reduce the plant population to effectively use the scarce soil moisture among fewer plants.

Late season : Where the monsoon is moderately delayed, normal cropping with reduced seed rate is advised.

Line Sowing

Line-sowing on contours is essential. It arrests runoff and conserves soil being eroded. It helps in the use of labour-efficient implements in weeding (i.e., removal of unwanted vegetation through use of different sizes of blade harrows between the rows).

Wider Spacing

In all drought-prone areas, the most important objective is to raise a successful crop under scarce soil moisture conditions. One of the recommended practices is wider spacing between rows and between plants within the row. This reduces plant population and competition between plants for scarce soil moisture. Fewer plants have greater access to limited available soil moisture.

Weeding

Frequent weeding is an important part of dryland agriculture. Line sowing and mechanical weeding, with appropriate size of blade harrows, remove unwanted vegetation which competes with the main crop. It is not

uncommon to see the dryland farmer hitching several blade harrows to one yoke and a pair of bullocks. Weeding within rows can be done using hand hoes. Removal of unwanted vegetation helps the main crop obtain greater accessibility to soil moisture and plant nutrients for its own growth.

Mixed/Inter Cropping

Mixed cropping of different crops along with the main crops, such as millets and different legumes, is an insurance against the vagaries of the monsoon. The different root systems of mixed crop feed at different depths of the soil. Moreover, mixing cropping provides small quantities of grain of different kinds for home consumption at different times.

Mulching

Mulches are ground covers that prevent the soil from being washed away, reduce evaporation, increase infiltration, and control growth of unwanted weeds. Mulch can be organic crop residue, pebbles, or materials such as polythene sheets. Mulching prevents the formation of hard crust after each rain. Organic mulches add plant nutrients to soil upon decomposition. Use of blade harrows between rows also creates "dust mulch" by breaking the continuity of capillary tubes of soil moisture.

Contingent Planning

With every care taken to undertake timely agricultural operations, it is still possible that the whole operation becomes a gamble due to unpredictable monsoons. The main crop could fall in the early part of its life cycle. In such cases, the farmer should come up with an alternate crop that can mature in a very short time and under hard conditions to take advantage of what is left of the rainy season. Contingent planning helps

catch and make the best use of late rains. Advance planning is necessary in selecting a contingent crop. And all the requisites for its sowing should be ready within the main season itself. Credit for farmers must be made available at the right time.

Mechanical Methods

Where the slope of the soil is more than permissible, mechanical measures such as bunding, terracing and trenching are recommended in addition to agronomic methods. Agronomic methods are used in inter-bunded areas and mechanical practices complement to help boost crop yields in rainfed drylands.

Indigenous technical knowledge

Local technologies evolved by people over generations of experience should be used before any new recommendation is made.

FOOD SUFFICIENCY

Achieving self sufficiency in food production is one of the prime objectives of the project. The status of food requirement and production before and after the project is presented.

WATER RESOURCE DEVELOPMENT

Status of present water Resource utilization-

The watershed is having four seasonal water bodies on private as well as on community land. Measurement and maintenance of these water bodies is still in the hand of minor irrigation department. During good rainfall year these water bodies having full of water during the kharif season. Before sowing of rabi season crops water from these water bodies is either used for supplementary irrigation for kharif crops or irrigating fields for rabi sowing or allowed to go as waste. After releasing water from water bodies, submergence area also put under cultivation for rabi crops.

Proposed plan for Irrigation Development of existing water Resource

For efficient utilization of available water resources in the watershed, present system of irrigation and wastage of water during October-November need to be made more efficient from water management point of view by minimizing conveyance losses in the existing water courses. The up gradation of existing system if irrigation result in:-

1. Minimization of conveyance losses
2. Increase in frequency of irrigation
3. Adoption of high yielding varieties of crops and
4. Assured cultivation of cash crops
5. Drinking water problem will also solved
6. Local eco system will also improved

New water harvesting structures (Ponds)

Five new dug out type water harvesting structures (Ponds) of capacity about 3500 cum (each) have been proposed to harvest excess runoff of the watershed. Harvested water will be used for supplementary irrigation and fish rearing.

Ground water reacharge

In oder to augment the flow in the drainage line, it is necessary to undertake moisture conservation and water recharge measure in the watershed area. For the purpose of ground water recharge, the area of the upper side of watershed is recommended. For the ground water recharge and moisture conservation, contour staggered trenches (2m in length with cross section of 0.3 X 0.3 m and having intensity of 200 trenches/ha) may be constructed covering an area 50 ha and 10 numbers of recharge filter are proposed in the watershed.

AREA TREATMENT PLAN

Integrated watershed development program enyisage treatment of proposed area with soil & water conserversion works along with development of Horticulture, Aforestation & development of silvi pastosal system in denuded land unfit for curtivstion, following works are proposed under watershed Development works.

1. Construction of bunds (Field bund, contour bund, Marginal & peripheral).
2. Renovation of Existing Bund for in-situ moisture conservation.
3. Rain fed Horticulture with and w'thout fencing.
4. Construction of new & renovation of Existing talab and water bodies.
5. Aforestation and development o^{r} silvi- pastoral system.
6. Drainage line treatment (pucca structures, Inlet, outlet and spillway).

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 rega^{r}ding the EPA activity, It was conveyed to the WC that an amount of 22.776 Lakhs was allotted for EPA

activity, which was 4 per cent of total allocated budget. The villagers discussed various activities which they fell 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.

Table 5.1: Entry point activities (EPA) (All financial figures in lakh Rs.)

Sl.No.	Micro – Watershed Code No.	Amount Earmarked for EPA	Entry Point Acitivies Planned	Estimated Cost (Rs. in Lakh)
1.	2D1A2a2a, 2D1A2a2b, 2D1A2a1c, 2C5A1b2a, 2C5A1b1d, 2D1A1b1a, 2D1A1b1c, 2C5A1a1d, 2C5A1a1c, 2C5A1a2a	22.776	Improvement in drinking water system, school, water harvesting & approach road etc.	22.776
Total		22.776		22.776

Table 5.2 : Details of activities of preparatory phase

Name of villages	Institutional and capacity buildings	Detailed Project Report	Total estimated cost
10	9.726	1.945	11.671

Table 5.3 : Other Activities of watershed works phase - Proposed Target

Micro- Watershed code	Construction of bunds (Field bund, contour bund, Marginal bund & Peripheral Bund)		Renovation of Existing bund or un-sites soil moisture conservation		Rainfed Horticulture with fencing		Rain fed Horticulture without fencing	
	Area (ha)	Cost Rs. in Lakh	Area (ha)	Cost Rs. in Lakh	Area (ha)	Cost Rs. in Lakh	Area (ha)	Cost Rs. in Lakh
1	2	3	4	5	6	7	8	9
2D1A2a2a, 2D1A2a2b, 2D1A2a1c, 2C5A1b2a, 2C5A1b1d, 2D1A1b1a, 2D1A1b1c, 2C5A1a1d, 2C5A1a1c, 2C5A1a2a	-	60.42	-	-	-	-	-	-

New and renovation of existing water harvesting structures such as talab and water bodies etc.		Aforestation, Horticulture & Agro-forestry		Drainage Line Treatment Pucca Structure Inlet, Outlet and Spillway	
Area Ha	Cost in Lacs	Area Ha	Cost in Lacs	Area Ha	Cost in Lacs
-	26.19	-	10.65	-	-

Production System - : Vermi-compost unit for Etawah-II watershed

One of the important occupations of the villagers is animal husbandry. At present, the animal waste is not used by the villagers as agricultural input. If the farmers start realising the benefits of compost and vermicompost in particular, the productivity of their land can increase manifold. As part of direct livelihood support, the villagers (mainly land less) are going to receive cows, buffaloes and small ruminants. These animals in turn are going to produce more waste, which can be used to prepare vermicompost.

It is planned that a vermicompost unit by another SHG would be supported by the project. The SHG members, with the help of hired manpower, can collect animal-dung. They would process this dung to prepare vermicompost and sell it to the farmers in the village or outside, as per demand.

The process of composting crop residues using earthworms comprise spreading the agricultural wastes and cow dung in layers of 1.5 m wide and 0.9 m high beds of required length. Earthworms are introduced in between the layers @ 350 worms per m3 of bed volume. The beds are maintained at about 40 - 50% moisture content and a temperature of 20 - 30o C by sprinkling water over the beds. The earthworms being voracious eaters consume the biodegradable matter and give out a part of the matter as excreta or vermi-castings. The vermi-casting containing nutrients are rich manure for the plants.

About The Worms

Eisenia fetida, Eudrilus eugeniae, and Perionyx excavatius are some of the species for rearing to convert organic wastes into manure. The worms feed on any biodegradable matter ranging from coir waste to kitchen garbage and Vermicomposting units are ideally suited to locations / units with generation of considerable quantities of organic wastes. One earthworm reaching reproductive age of about six weeks lays one egg

capsule (containing 7 embryos) every 7 - 10 days. Three to seven worms emerge out of each capsule. Thus, the multiplication of worms under optimum growth conditions is very fast. The worms live for about 2 years. Fully grown worms could be separated and dried in an oven to make 'worm meal' which is a rich source of protein (70%) for use in animal feed.

Use

Vermi compost has more nutrient compare to other manures and fertilizer; so, by the use of vermin-compost we can reduce use of chemical fertilizer. Vermi-compost not only supply nutrient but also improve quantity of hormones for plant growth, improves the soil structure leading to increase in water and nutrient holding capacities of soil.

Components of a commercial unit

Sheds

Umreth-1 watershed has high temperature in summer; so, a shed structure is needed for the vermin-compost unit. It can be made by the use of concrete pillars. While designing the sheds adequate room has to be left around the beds for easy movement of the labourers attending to the filling and harvesting the beds.

Vermi-beds

Scientific bed side is 75 cm - 90 cm thick depending on the provision of filter for drainage of excess water. The whole bed area should be above the ground. The bed should have a uniform height over the entire width to the extent possible to avoid low production owing to low bed volumes. The proper bed width should not be more that 1.5 m to allow easy access to the centre of the bed.

Land

About 125 square meter of land will be required to set up a vermin compost production unit in Umreth-1 watershed. It should have at least 2-3 sheds each of about 180-200 sq.ft. It should have a good watering arrangement and other equipments as required because moisture is very essential for vermin-compost production.

Seed Stock

This is very important thing because worms multiply at the rate of 350 worms per m3 of bed space over a period of 6 month to a year.

Fencing

The entire area has to be fenced to prevent the animals and other unwanted elements. These could be estimated based on the length of the periphery of the farm.

Water Supply System

50% moisture content has to be maintained all the time. Water for the purpose would come from a well nearby.

Machinery

Farm machinery and implements are required for cutting the raw material in small pieces, conveying shredded raw material to the vermi-sheds, loading, unloading, collection of compost, loosening of beds for aeration, shifting of the compost. Costs of providing necessary implements and the machinery have to be included in the project cost.

Estimate for a vermin-compost unit:

- Requirement of nitrogen for 1 hectare sorghum fodder production=90 kg.
- 1.6% N available in vermin compost.
- 90 kg N fulfill by the use of 90/1.6*100= 5625 kg vermicompost (5.5 ton).
- Need of vermicompost to fulfill the requirement of nitrogen for 15 hectare 5.5*15 =82.5 (80 ton).
- 45 kg phosphorus required for 1 hectare sorghum fodder production.
- Requirement of phosphorus for 15 hectare fodder production 15*45=675 kg.
- Supply of phosphorus through vermin compost 0.7/100*80000=560 kg.
- Remaining requirement of phosphorus 675-560=115 kg.
- Remaining dose of phosphorus will be supplied by rock phosphate.

One compost cycle need 45 days so we need 8 cycles for 80 ton vermin compost production.

Model for a Vermi-compost Unit

S. No.	Particulars	Quantity	Rate (Rs.)	Amount (Rs.)
1	Wooden ballies (3 m long)	20	50	1000
2	Wooden (4 m long)	25	60	1500
3	Shade mats for covering the roof	125	25	3125
4	Binding wire for tying wooden ballies & mats	20 Kg	50	1000

5	Labour charges for erection of sheds	20	100	2000
6	Shovels, spades, crowbars, iron baskets,			2500
7	Weighing scale (100 kg capacity)	1	2000	2000
8	Cow dung	10 ton	800	8000
9	Worms @ 3 kg per ton	30 kg	80	2400
10	Formation of vermin bed with agro-waste, cow dung and worms	20 bed	250	5000
11	Miscellaneous			
	Total Cost			**28,525 Rs.**

Returns from vermin-composting

Benefits	
1. Sale of vermin compost of 80 tones @ Rs.3500/- per ton	80*3500=2,80,000 Rs
2. Sale of worms @ 5 kg per ton of compost and Rs. 50 per kg	400*50=20,000 Rs
Total	3,00,000 Rs/-
Net benefit	**3,00,000-28,200=2,71,800 Rs/-**

A **micro-enterprise** (or **microenterprise**) is a type of small business, often registered, having five or fewer employees and requiring seed capital of not more than 15, 00,000. The term is often used in to refer to a business with a single owner-operator, and and having up to 20 employees. fewer than 20 employees

- balance sheet total below 40000,000
- turnover below 40000,000

The term *microenterprise* connotes different entities and sectors depending on the country.

Generally speaking,

- in *developed* countries, **microenterprises** comprise the smallest end (by size) of the small business sector, whereas
- in *developing* countries, **microenterprises** comprise the vast majority of the small business sector—a result of the relative lack of formal sector jobs available for the poor. These micro entrepreneurs operate microenterprises not by choice, but out of necessity.

Microenterprises add value to a country's economy by creating jobs, enhancing income, strengthening purchasing power, lowering costs and adding business convenience.

Because microenterprises typically have little to no access to the commercial banking sector, they often rely on "micro-loans" or microcredit in order to be financed. Microfinance institutions often finance these small loans, particularly in the Third World. Those who found microenterprises are usually referred to as entrepreneurs.

The terms microenterprise and **microbusiness** have the same meaning, though traditionally when referring to a small business financed by microcredit the term microenterprise is used. Similarly when referring to a small, usually legal business that isn't financed by microcredit, the term microbusiness is used.

Overview

Concept in disability recovery

Utilized as a therapeutic tool within Person centered planning Microenterprise has become valuable to persons who for many reasons cannot efficiently participate in typically rigid work environments, i.e. 9 to 5 / 40 hours per week.

Microenterprise gives persons whom have a disability flexibility to attend doctor's appointments or treatments that normally occur in the 9–5 time frame of the day and would eventually conflict with the norm of most typical work environments.

Microenterprise presents persons with a disability, business networking avenues into the community that differ greatly from the medical or treatment mode that they may have become confined to.

Persons with a disability who own their own business often report an increased feeling of worth or an emotional equity that becomes an enhancement to their present treatment.

Micro-loans

Micro-loans are a way for organizations and entrepreneurs to make small loans to those in poverty often in third world countries. The term "micro-loans" is more commonly referred to as Microcredit.

DEMONSTRATION OF WHEAT

1- Variety recommended for District-Etawah
   Irrigated-W.H-542, PBW-343, K-88, UP-2338, K-9107
   Unirrigated –K-8027, k-9465, k-8962 (India)
   Malviya-533, k-9644
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	
9	Isoprotoron 75 %	1.00 kg.	240.00	240.00	
Total				**10317.60**	
Say				**10318.00**	

Hence demonstration cost of wheat /ha is Rs. 10318.00

DEMONSTRATION OF GRAM IN WATERSHED AREA (per ha)

1- Variety
Rainfed – J.G-315, Avrodhi, KGB-1168, Part G-114, KWR-108, K-850, Radhey
2- Late Variety – Uday, Poosa-372, Pant G- 186, Poosa-267,1003 (Kabali)
Seed rate/ha -50-55kg
2- Fertilizer requirement/ha N-25.0 kg, P-80 kg, K-30 kg

ESTIMATE FOR DEMONSTRATION OF GRAM(PER ha)

S.No.	Particulars	Quantity	Rate	Amount	Remark
1	Tillage operation in preparation of field and seed sowing	1.0ha (twice)	1000.00/ha	2000.00	Since the project is to be operated in participatory Mode, contribution by the farmer in the form of tillage, sowing operation, sowing and harvesting is not included in the estimates.
2	Cost of seed	55kg	90/kg	4950.00	
3	D.A.P	175kg	573.00/ 50 kg	2005.50	
4	M.O.P.	65kg	300.00/50kg	390.00	
5	Medicine	1.00ha	Lump sum	1250.00	
6	Harvesting	1.00ha	700.00/ha	700	
Total				**11295.50**	
Say				**Rs. 11296.00**	

Hence per hectare of demonstration –Rs. 11296.00

DEMONSTRATION OF ARHAR IN WATERSHED AREA(PER ha)

1- Variety - Malviya-13, narendra-1, Amar, Vahar, Malviya-11
Seed rate/ha -30 kg

1- 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 M0de, 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				**9036.00**	
Say				**Rs. 9036.00**	

Hence per hectare of demonstration –Rs. 9036.00

DEMONSTRATION OF HYBRID BAJRA IN WATERSHES (per ha)

1- Variety- shankul-155 (80-100 days), WCC-75, ICPP-8203, Raj-171, Shankar bajra, Poosa- 322,23 ICMH-451

Requirement of Seed / ha -10kg

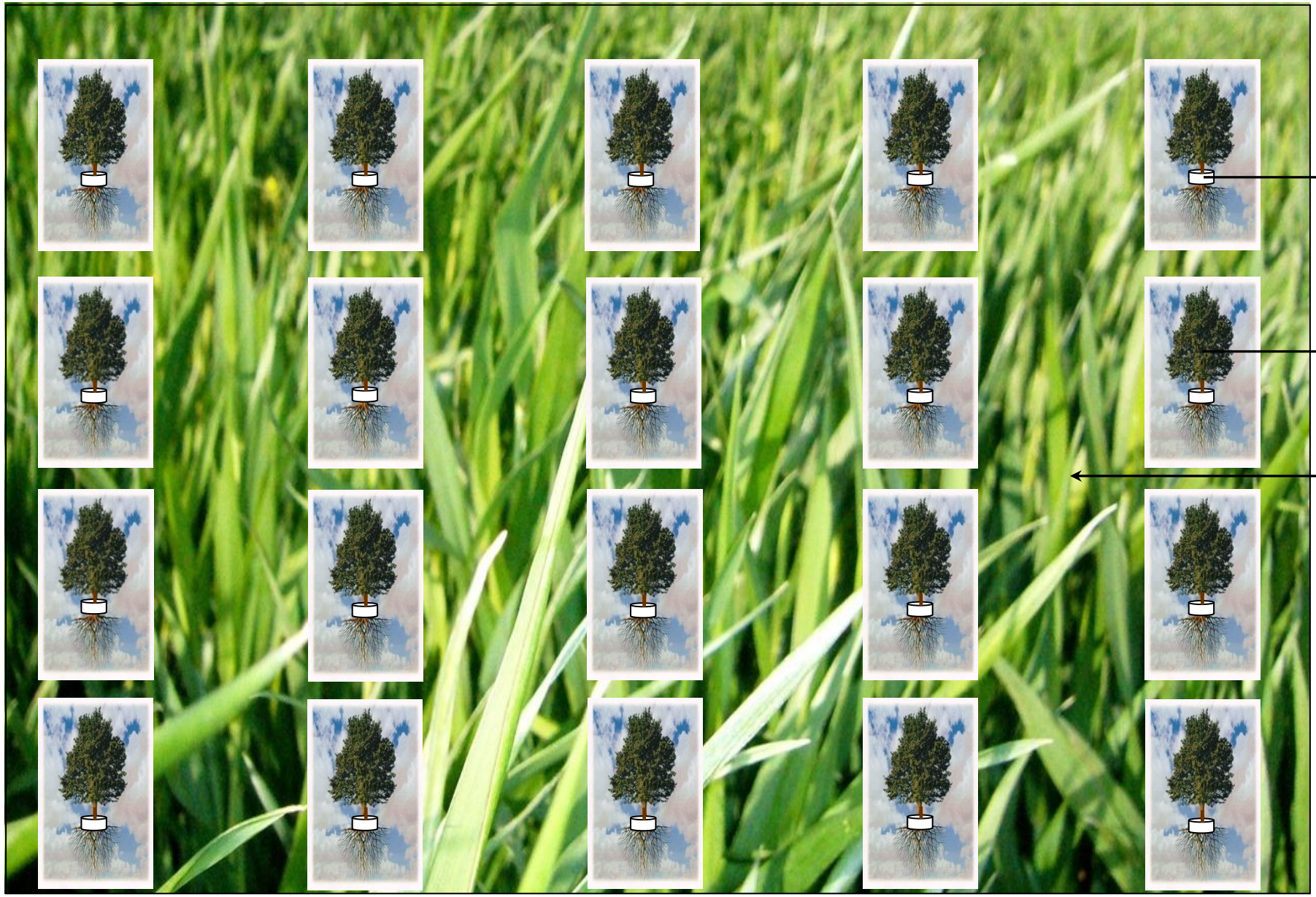
1- Requirement of fertilizers/ ha N- 60.00 kg, P- 40.00 kg, K-40.00 kg

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 M0de, 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				**5801.00**	
Say				**Rs. 5800.00**	

Hence per hectare of demonstration of Bajra is Rs. 5800.00/ha

DEMONSTRATION OF AGRO-FORESTRY / HORTICULTURE



DEMONSTRATION OF AGRO-HORTICULTURE USING PLASTIC DRUM OF 200 LITRES CAPACITY

District Etawah is situated in Mid UP where there is scarcity of water and in summer temperature rises up to 51·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 goes 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	255.00/bag	1657.50
6.	Coarse sand	0.450 cum	910.00/cum	409.50
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. 1,68,292.50**

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	1,68,292.50
2. Labour Charges	58,527.85
Total	**Rs. 2,26,819.50.00**
Say	**Rs. 2,26,820.00 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 District Etawah more fields are kept fallow and only single crop in Rabi is grown. Therefore, this area is suitable for Green Manuring. Therefore, 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

PASTURE MANAGEMENT

Introduction: The sound animal industry in any country centers 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 tons 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 either for grazing, for gay and silage making or for both.

Intensive Fodder Production: In areas where the major enterprise of the farmers centers around 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

Zone wise crop rotations	**Green fodder yield(t / ha)**
Central region	
1- Hybrid napier +Cowpea-Berseem+Japanrape	286.3
2- Maize+Cowper-Jowar-Berseem+Japanrape	197.2
3- Jawar+Cowper-Berseem+Japanrape-Jawer+Cowpea	168.6

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. Stage of maturity to feed the animals adequately during the lean period. 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.

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 enversages intregrated deve'opment of Geo-hydrological unit ie. Treatment of custer of micro -watershed The IWMP Etawah-II Project consist 10 micro watershed namely 2D1A2a2a, 2D1A2a2b, 2D1A2a1c, 2C5A1b2a, 2C5A1b1d, 2D1A1b1a, 2D1A1b1c, 2C5A1a1d, 2C5A1a1c, 2C5A1a2a

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 0.5 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 and 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) **(A) Planning**	
Cluster approach	Yes
Whether technical back-stopping for the project ha; been arranged? If yes, mention the name of the Institute	-
Baseline survey	Yes

Hydro-geological survey	Yes
Contour mapping	Yes
Participatory Net Planning (PNPj	Yes
Remote sensing data-especially soil/ crop/ run-off cover	Yes
Ridge to Valley treatment	Yes
Online IT connectivity between	Yes
(1] Project and DRDA cell/ZP	Yes
(2)DRDA and SLNA	Yes
(3) SLNA and DoLR	Yes
Availability of GIS layers	--
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
Integrated coupled analyzer/ near infrared visible spectroscopy/ medium spectroscopy for high speed soil nutrient analysis	Yes
Normalized difference vegetation index (NDVT)#	Yes
Weather Station	--
(B) Inputs	Yes
Bio-pesticides	Yes
Organic manures	Yes
Vermicompost	Yes
Bio-fertilizer	Yes
Water saving devices	Yes
Mechanized tools/ implements	Yes
Bio-fencing	Yes
Nutrient budgeting	Yes
Automatic water level recorders & sediment samp ers	Yes
Any other (please specify)	Yes

Table 7.2: PHASING OF WORKS (Financial and Physical)

Phasing of various work/ activities during different years of the project period for treatable area 4745 ha out of total area 6223.57 ha year 2011-12 to 2014-15 is presented in Table below.

S. No.	Component	Units	Unit cost (Rs.)	Ist Year	2nd Year	3rd Year	4th Year	5th Year	Total
A	ADMINISTRATIVE COSTS								
	Administrative cost- TA & DA, POL/ Hiring of vehicles/office and payment of electricity and phone bill etc. computer, stationary and office consumable and Contingency	-	-	3.416	13.381	13.381	13.381	13.381	56.94
	D.P.R. PREPRATION	-	-	5.69	-	-	-	-	5.69
	Expert for monitoring and evaluation	Nos	NA	2.282	2.274	2.274	2.275	2.275	11.38
	Sub Total	-	-	11.388	15.655	15.655	15.656	15.656	74.01
B	PREPARATORY PHSES								
	Entry Point Activities like improvement in drinking water system, school, water harvesting & approach road etc.	-	-	22.776	-	-	-	-	22.776
	Institutional and capacity building	-	-	-	11.388	11.388	5.694	-	28.47
	Sub Total	-	-	22.776	11.388	11.388	5.694	-	51.246
C	WATERSHED WORKS								
a	Soil & water conservation works	-	-	-	-	-	-	-	-
1.	Contour & field bunding	Ha.	5000.00	-	17.376	17.376	8.688	-	43.44
2.	Submergence bund	Ha.	6774.00	-	41.12	41.12	20.56	-	102.80
3.	Periferal bund	Ha.	5819.00	-	9.096	9.096	4.548	-	22.74

4.	Gully plug	Ha.	5413.00	-	3.32	3.32	1.66	-	8.30
	Sub Total	-	-	-	70.912	70.912	35.456	-	177.28
b.	**Water harvesting & water resources works**								
1.	Water harvesting bund/Earthen check dam.	Ha.	4045.00	-	18.108	18.108	9.054	-	45.27
2.	Check dam	Ha.	12736.00	-	9.112	9.112	4.556	-	22.78
3.	Ponds	Ha.	16666.00	-	6.412	6.412	3.206	-	16.03
c.	Afforestation works								
1.	Horticulture works	Ha.	10000.00	-	1.14	1.14	0.57	-	2.85
2.	Agroforestery works	Ha.	5133.00	-	8.196	8.196	4.098		20.49
	Sub Total		4745.00	-	113.88	113.88	56.94	-	284.70
	LIVELIHOOD PROGRAMME (Community based)								
	Income generating activities through SHGs for landless and marginal farmers and livestrocks development works	-	-	-	14.235	14.235	14.235	14.235	56.94
E.	**PROUDUCTION SYSTEM AND MICRO ENTERPRISES**								
	Crop production, diversification of agriculture and introduction of agro-forestry and Demonstration of improved composting system	-	-	-	30.00	30.00	14.034	-	74.034
	Sub Total	-	-		30.00	30.00	14.034	-	74.034
F.	CONSOLIDATION PHASE	-	-		-	-	-	28.47	28.47
	GRAND TOTAL	-	-	34.164	185.158	185.158	106.559	58.361	569.40

Physical Plan

Phasing of various works/activities during different years of the project period is presented in Table below.

Activities related to	Ist Year (quantity)	2nd Year (quantity)	3rd Year (quantity)	4th Year (quantity)	5th Year (quantity)
ADMINISTRATIVE COSTS					
TA & DA, POL/ Hiring of vehicles/office and payment of electricity and phone bill etc. computer, stationary and office consumable and Contingency	Yes	Yes	Yes	Yes	Yes
Expert for monitoring and evaluation	Yes	Yes	Yes	Yes	Yes
PREPARATORY PHSES					
Entry Point Activities like improvement in drinking water system, Construction of road for community place like ponds, school, temple, Panchayat Bhavan etc.	Yes	-	-	-	-
Institutional and capacity building	Yes	Yes	Yes	Yes	Yes
WATERSHED WORKS					
Watershed development works					
Construction of community pond (Nos)	-	4	4	-	-
Construction of bunds (graded, contour and fields bunds and peripheral, marginal and Submurjenc bunds) (ha)	-	1600.00	1600.00	-	-
Renovation of the existing ponds and in situ conservation	-	60.00	60.00	-	-

Water harvesting works (W.H.B.) area in ha	-	290.00	290.00	-	-
Earthen Check dam	-	60.00	60.00	-	-
Dryland Horticulture development	-	12.00	12.00	-	
Agroforestry works	-	215.00	215.00	-	-
LIVILIHOOD PROGRAMME (Community based)					
Income generating act ivies through SHGs for landless and marginal farmers	Yes	Yes	-	-	-
Livstock development act ivies	Yes	Yes	Yes	Yes	Yes
PROUDCTION SYSTEM AND MICRO ENTERPRISES					
Demonstration and assessment of improved composting system using alternate materials (39 ermin compost) and nutrient analysis (nos)	-	8	8	-	-
Introduction of improved crop production practices					
i) For Kahrif crops (ha)	-	23	23	4	
ii) For Rabi crops (ha)	-	20	10	2	
CONSOLIDATION PHASE	-	-	-	Yes	

* Indicates that the activity will be carried out as per head in the respective year.

ESTIMATION AND COSTING OF THE PROJECT

ABSTRACT OF ESTIMATION AND COSTING OF THE WATERSHED

S. No	Component	Total (Rs. In lakhs)
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	**56.94**
2.	Expert for monitoring and evaluation, D.P.R. Preparation	**17.07**
	Sub Total	**74.01**
B.	PREPARATORY PHSES	
	Entry Point Activities like improvement in drinking water system, school, water harvesting & approach road etc.	**22.776**
	Institutional and capacity building	**28.47**
	Sub Total	**51.246**
C.	**WATERSHED WORKS**	
a.	**Watershed development works**	
1.	Construction of bunds (graded, contour and fields bunds)	**43.44**
2.	Submergence bund	**102.80**
3.	Periferal bund	**22.74**
4.	Gully plug	**8.30**
b.	**Water harvesting works & water Resources works**	

1.	Ponds	**16.03**
2.	Water harvesting bund/Earthen Check dam	**45.27**
3.	Check dam	**22.78**
c.	**Afforestation works**	
1.	Dryland	**2.85**
2.	Agroforestry works	**20.49**
	Sub Total	**284.70**
D.	**LIVILIHOOD PROGRAMME (Community based)**	
1.	Income generating act ivies through SHGs for landless and marginal farmers and livestock development act ivies	**56.94**
	Sub Total	**56.94**
E.	**PROUDCTION SYSTEM AND MICRO ENTERPRISES**	
1.	Crop production, diversification of agriculture and introduction of agro-forestry and Demonstration of improved composting system	**74.034**
	Sub Total	**74.034**
F.	**CONSOLIDATION PHASE**	**28.47**
	GRAND TOTAL	**569.40**

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

PLANS FOR MONITORING AND EVALUATION

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.

Yet another component of the Web-based GIS system is the Mobile based Monitoring & Evaluation System, which will help the ground staff alias WDTs (Watershed Development Team) to transmit information from the ground level to the central server. Also, any higher-up official in charge of the project can obtain information regarding the project area on the project area on their mobile phone by means of an SMS. The system works in the following manner. The WDT equipped with a GPS instrument marks the latitude-longitude information of various treatment areas during the DPR. The probable sites are then transferred onto the central server. During the works phase, any progress in the treatment areas is reported to the server by means of an

SMS by the WDT. Similarly, any nodal officer or higher-up official can view the progress in a project by means of summarized reports generated over frequent periods of time.

PLANS AND 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.

WATERSHED DEVELOPMENT FUND

The major source of financial assistance after post implementation period is Watershed Development Fund. The contribution of it will come 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 ENVIRONMENT SECURITY

In the proposed watershed management plan of IWMP-III watershed, proper blending of bio engineering measures will be applied on 60% of the total watershed area. Based on the results of studies conducted in this region, it is estimated that more 50% of the watershed area will be treated and consequently the soil loss and runoff from the area is expected to be reduced by 70% and 65% respectively. The proposed land use plan will

improve the land utilization index and crop diversification index significantly as compared to the existing one. It will help in maintaining ecosystem integrity on sustained basis along with improving the livelihood security of the farming community.

ECONOMIC ANALYSIS

Economic analysis of the project was carried by taking direct benefits and costs considering 25 year project life at 10 per cent discount rate. For this purpose of economic analysis, whole watershed development plan was divided into three sectors namely, agriculture, horticulture and forest/fuel wood plantation. Net present value(NPV), Benefit cost ratio (BC) ratio criteria were employed to judge the economic efficiency of each enterprise and sector.

AGRICULTURE

In rainfed agriculture the development cost can be recovered within one year as the present rainfed agriculture is being done on well maintained field, therefore, does not require much investment.

HORTICULTURE

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

FOREST/ FUEL WOOD PLANTATION

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

FOOD SUFFICIENCY

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

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

S. No.	Name Of District	No. of the villages	Wage employment										Self employment				
			No. of mandays					No. of beneficiaries					No. of beneficiaries				
			SC	ST	Others	Women	Total	SC	ST	Others	Women	Total	SC	ST	Others	Women	Total
1-	Etawah	10	1.45	-	0.811	0.109	2.370	1614	-	723	117	2454	126	-	68	54	248

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-II) ETAWAH

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	10	339	120	Better Employment In The Town/City	180

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 27 to 30 metre. Status of the drinking water is given in below.

Table 10.3: STATUS OF DRINKING WATER

S. No.	No. of the villages	Availability of drinking water (no. of months in a year)		Quality of drinking water		Comments
		Pre-project	Expected Post-project	Pre-project	Expected Post-project	
1-	10	9	12	General	Good & Soft water	

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

S. No.	No. of villages	Sources	Pre-Project level	Expected post-project level	Remarks
1-	10	Open wells	27-30	23-25	-
		Bore wells	-	-	-
		Others (specify)	-	-	-

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 Rabi -Kharif will certainly enhance, 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. No.	Name of the Crop	Current status		Expected post project status	
		Area (ha)	Productivity (kg/ ha)	Area (ha)	Productivity (kg/ ha)
	Kharif Jowar	1020.00	1100.00	1230.00	1400.00
	Arhar	1538.00	600.00	1621.00	900.00
	Rabi Masoor	915.00	525.00	1500.00	700.00
	Mustard	1405.00	550.00	2100.00	600.00

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

The watershed has vast tract of denuded boulder and rock watershed. These wastelands do not have any tree vegetation. It typically falls under "Northern tropical thron forest" according to Champion and Seth classification of forest type of India.

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 10.9 : 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	**ETAWAH-IWMP –II**	Status of Water Table	Meter	27-30	23-25	
2		Ground Water Structures repaired/rejuvenated	No.	--	70	
3		Quality of Drinking water	--	General	Soft	

4		Availability of Drinking Water	Days	09 Month	12 Month	
5		Increase in Irrigation Potential	%	--	5%	
6		Change in Corpping/land use pattern	--	--	--	
7		Area under agricultural crop	Ha.	**2638.29**	3000.00	
8		i. Area under single crop.	Ha.	1350.00	1450.00	
9		ii. Area under double crop	Ha.	1450.00	1600.00	
10		iii. Area under multiple crop	Ha.	150.00	200.00	
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.	06	15	
17		Increase in no. of livelihoods	No.	--	--	
18		Increase in income	Rs.	6230	9130	
19		Migration	No.	339	180	
20		SHG Federations formed	--	20	40	
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

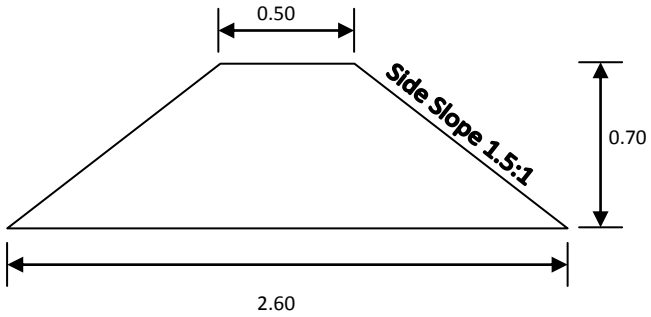
COST NORMS & DESIGN OF STRUCTURE PROPOSED

DETAIL ESTIMATE OF PANCHVATI PLACE

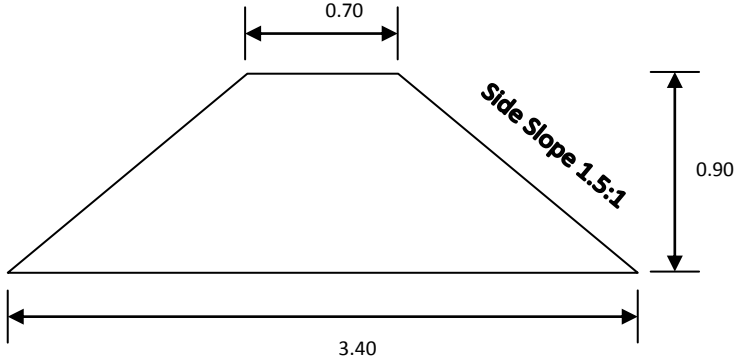
S.No.	Particulars	Unit	Quantity	Cost / Unit	Total
1.	Demonstration of Panchvati Place and Horticulture with Brick Guard	nos.	6	1355.00	8130.00
2.	Cost of Plants with Earth Work, Digging and Filling with FYM	nos.	6	172.00	1032.00
3.	Construction of Krishak Vikas Manch	nos.	1	71200.00	71200.00
4.	India Mark-II Hand Pump	nos.	1	42600.00	42600.00
5.	Renovation of Jagat of Well	nos.	1	91000.00	91000.00
6.	Soaking Pit for Hand Pump or Well	nos.	1	3845.00	3845.00
	Sub Total with Hand Pump's Cost				**Rs. 1,26,807.00**
	or				**Say Rs. 1,26,800.00 only**
	Sub Total with Jagat of Well's Cost				**Rs. 1,75,307.00**
					Say Rs. 1,75.300.00 only

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

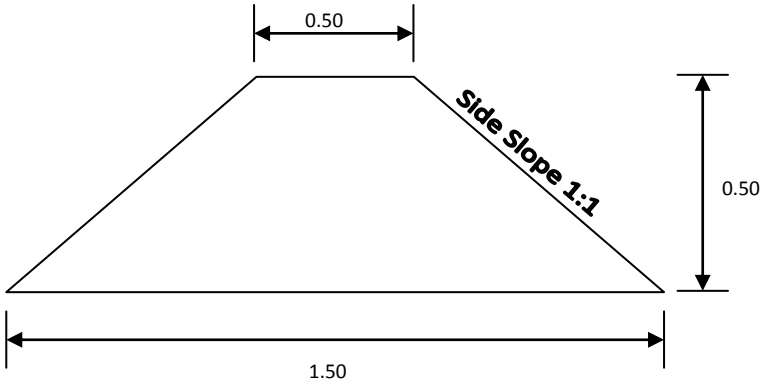
(Not to Scale)



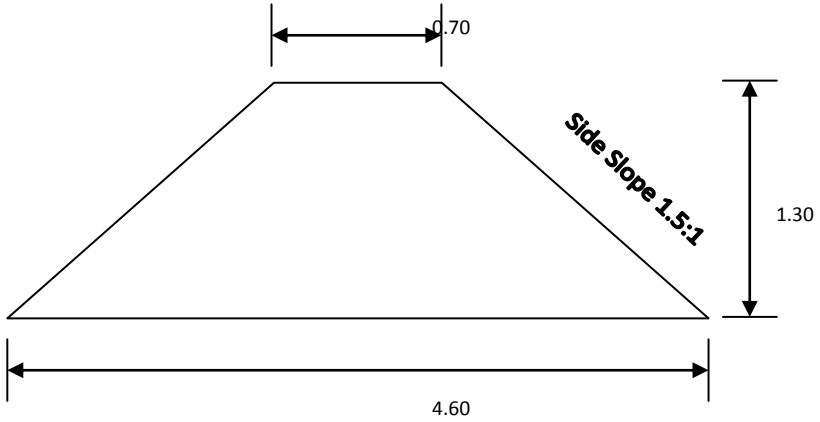
(C.B., Cross-Section – 1.085 m^2)



(S.B., Cross-Section – 1.845m^2)



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

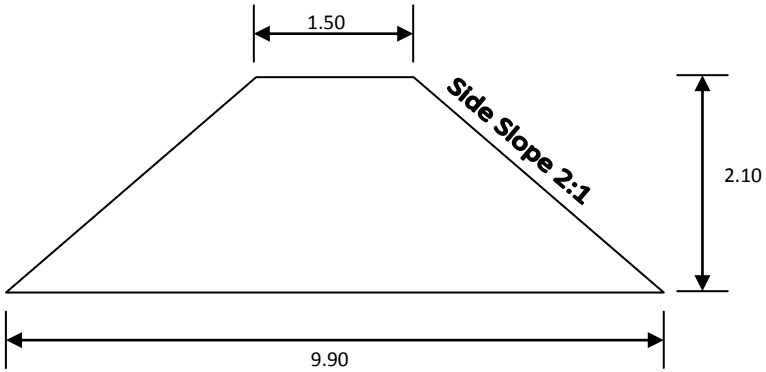


(S.B. /P.B. /M.B., Cross-Section – 3.445 m^2)

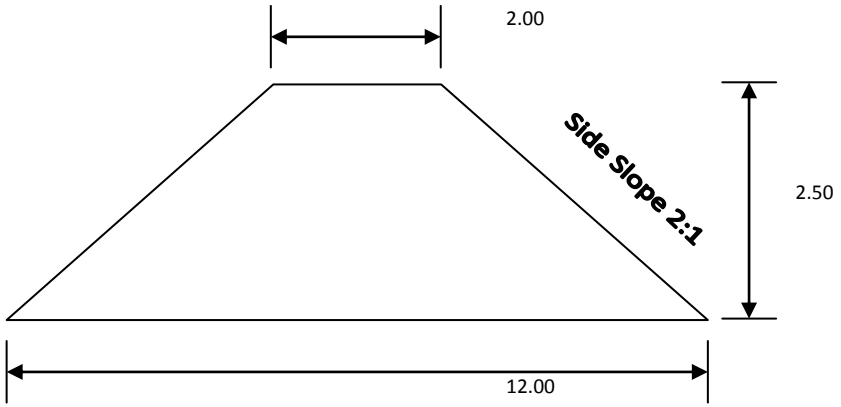
(All dimensions in Metre)

DRAWING OF EARTHEN CHEKDAM / GULLY PLUG

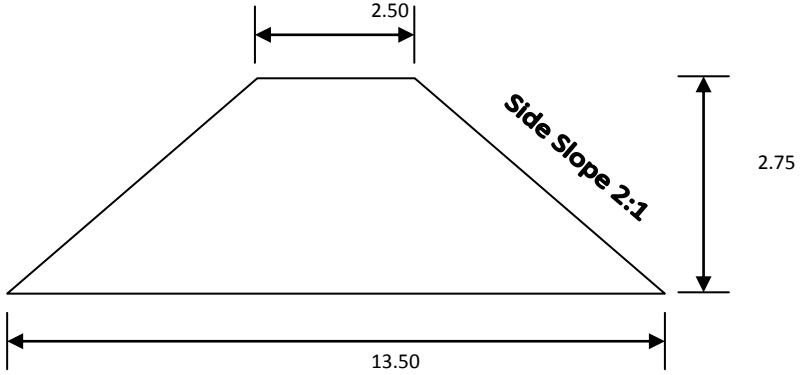
(Not to Scale)



(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

Estimate of Drop Suillway for 5 hect. Catchment

S. No.	Item	Nos.	Length	Width	Hight/Depth	Qt.
1	2	3	4	5	6	7
1	E/W in foundation Head wall Exn	2	2.00	0.35	0.70	1.540
	Side Wall	2	1.65	0.55	0.70	1.270
	Side wall Exn.	2	1.00	0.55	0.70	0.770
	Crest wall	1	1.30	0.80	0.70	0.728
	Toe wall	1	1.30	0.55	0.70	0.500
	Apron	1	1.30	1.30	0.40	0.676
					Total	**5.484**
2	Sand filling work					
	Head wall Exn.	2	2.00	0.55	0.10	0.220
	Side Wall	2	1.65	0.55	0.10	0.181
	Side Wall Exn.	2	1.00	0.55	0.10	0.110
	Crest wall	1	1.30	0.80	0.10	0.104
	Toe wall	1	1.30	0.55	0.10	0.071
					Total	**0.686**
3	C.C. work in 1:3:6					
	Head wall Exn.	2	2.00	0.55	0.15	0.330
	Side Wall	2	1.65	0.55	0.15	0.272
	Side Wall Exn.	2	1.00	0.55	0.15	0.165
	Crest wall	1	1.30	0.80	0.15	0.156
	Toe wall	1	1.30	0.55	0.15	0.107
					Total	**1.030**
	1:2:4 in Apron	1	1.30	1.30	0.20	0.338
4	Brick Mesauary (1:4)					
	Head wall Exn.	2	1.80	0.35	1.40	1.26
	Side wall upto Toe Exn. Top	2	1.55	0.35	0.65	0.70

	Side wall above ''	2	1.55+0.65 / 2	0.35	0.80	0.61
	Crest wall up to Apron	1	1.30	0.59	0.25	0.19
		1	1.30	0.35+0.59 / 2		
	Crest wall above to Apron					
	Side wall Exn.	1	0.90	0.35	0.65	0.20
	Toe wall	1	1.30	0.35	0.45	0.20
					Total	**3.640**

S. No.	Item	Nos.	Length	Width	Hight/Depth	Qt.
1	2	3	4	5	6	7
5	Plastring 1:4					
	Head Wall Exn. Top	2	1.80	0.45	-	1.620
	Crest top	1	1.30	0.45	-	0.585
	Crest U/S	1	1.30	-	0.60	0.780
	'' D/S	1	1.30	-	0.84	1.092
	Side wall top	2	(0.65+1.20)	0.45	-	1.665
	Side wall Exn.	2	0.90	0.45	-	0.810
	Toe wall top	1	1.30	0.45	-	0.585
	Toe wall in side	1	1.30	-	0.20	0.260
	Side above the toe wall	2	-	0.45	0.40	0.180
	Side above the Crest	2	-	0.45	0.40	0.360
						7.937
6	Pointing 1:3					
	Head wallU/S	1	1.30	-	0.60	0.780
	Head wall Exn. U/S	2	1.80	-	1.00	3.600
	Side wall inside (Bottam)	2	1.55	-	0.40	1.240
	Side wall inside (Top)	2	1.55+0.65 / 2	-	0.80	1.760
					Total	7.380
	Deduction for crest	2	-	0.20	0.60/2	0.12
					Net	7.26

Analysis of material-

S. No.	Item	Unit	Qty.	Cement	Sand	Brick 1st Class	Bala
1	2	3	4	5	6	7	8
1	Sand filling work	Cmt.	0.686	-	0.686	-	-
2	C.C. work 1:3:6 '' 1:2:4	Cmt.	1.03 0.338	4.64 2.06	0.486 0.143	- -	0.972 0.287
3	Brick Mesonary work 1:4	Cmt.	3.64	7.28	0.98	1674	-
4	Plastering 1:4	Sq. met.	7.937	0.873	0.199	-	-
5	Pointing 1:3	Sq. met.	7.26	0.340	0.035	-	-
	Total			**15.19**	**2.529**	**1674**	**1.259**

Say 15 Bags

Cost of Material

S. No.	Item	Qty	Rate	Amount
1	2	3	4	5
1	Cement	15	250/-	3750.00
2	Sand	2.259	950/-	2403.00
3	Brick	1674	4000/-	6696.00
4	Stone Ballast	1.26 cmt.	700/-	882.00
	Total			

Analysis of labour charges-

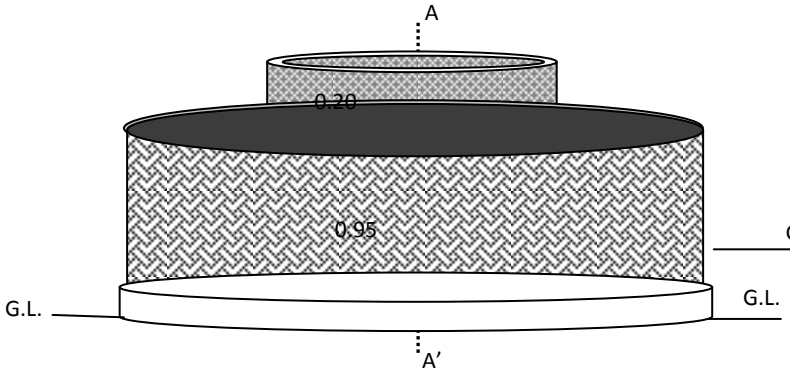
S. No.	Item	Qty	Rate	Amount
1	2	3	4	5
1	E/W in foundation	5.48 cmt.	33.33/-	182.64
2	Sand filling	0.686 cmt.	25/-	17.15
3	C.C. work	1.368 cmt.	497/-	679.89
4	Brick Mesonary	3.64 cmt.	283/-	1030.12
5	Plasterring	7.94 cmt.	41.87/-	322.44
6	Pointing	7.26 cmt.	28.50/-	206.91
7	Curing 1 Labour	7 mandays	100/-	700.00
8	Extra watering 3 % Cost of material	7	-	533.76
	Total			2989.91

Detail Estimate for 1.00 Hect. Afforestation work in Project Etawah

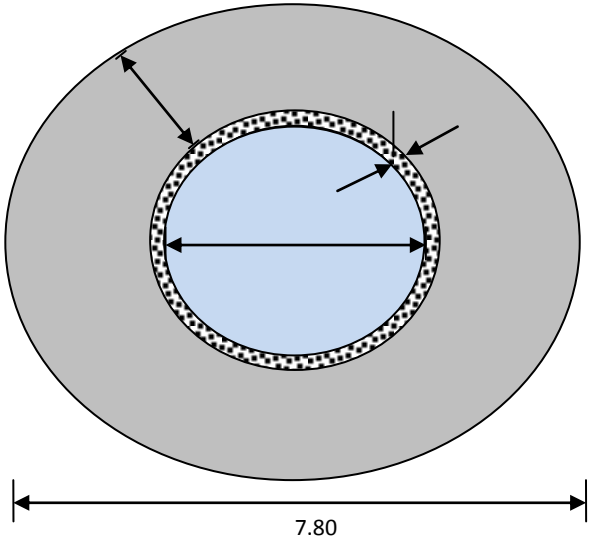
IWMP Etawah

SNo.	Detail of work	Unit	Quantity	Rate	Amount
1	2	3	4	5	6
1	Safety Traching at Border of area (1.20-1.00X0.90) 2	Running mt.	500.00	34.48	17240.00
2	Clearance of Plantation Spot area	Hect.	1.00	157.00	157.00
3	Excaration of pits (0.60X0.60X0.60) m	Nos.	1000	7.16	7160.00
4	Purchasing of Farmyard manure (0.50ct./fit)	Cu	500.00	8.50	4250.00
5	Filling of pits with mixing farmyard manure (0.60X0.60X0.60) m	Nos.	1000	0.80	8000.00
6	Cartage for Plants 3% loss	Nos.	1030	3.93	4047.90
7	Local Cartage of Plants	Nos.	1000	1.412	1412.00
8	Plantation work	Nos.	1000	4.30	4300.00
9	Irrigation of Plants (16 tunes)	Nos.	16000	2.299	36784.00
10	Multering & Trillage of Plant (4 tunes)	Nos.	4000	0.52	2080.00
11	Urea & Pesticides spray (2 tunes)	Nos.	2000	0.50	1000.00
12	Plantation labour (July to March)	Nos.	78X1	100.00	7800.00
13	Purchasing of Plants	Nos.	1000	50.00	50000.00
14	Steel Board for Idientyfication	Nos.	1	1800.00	1800.00
	Total	-	-	-	**138831.00**

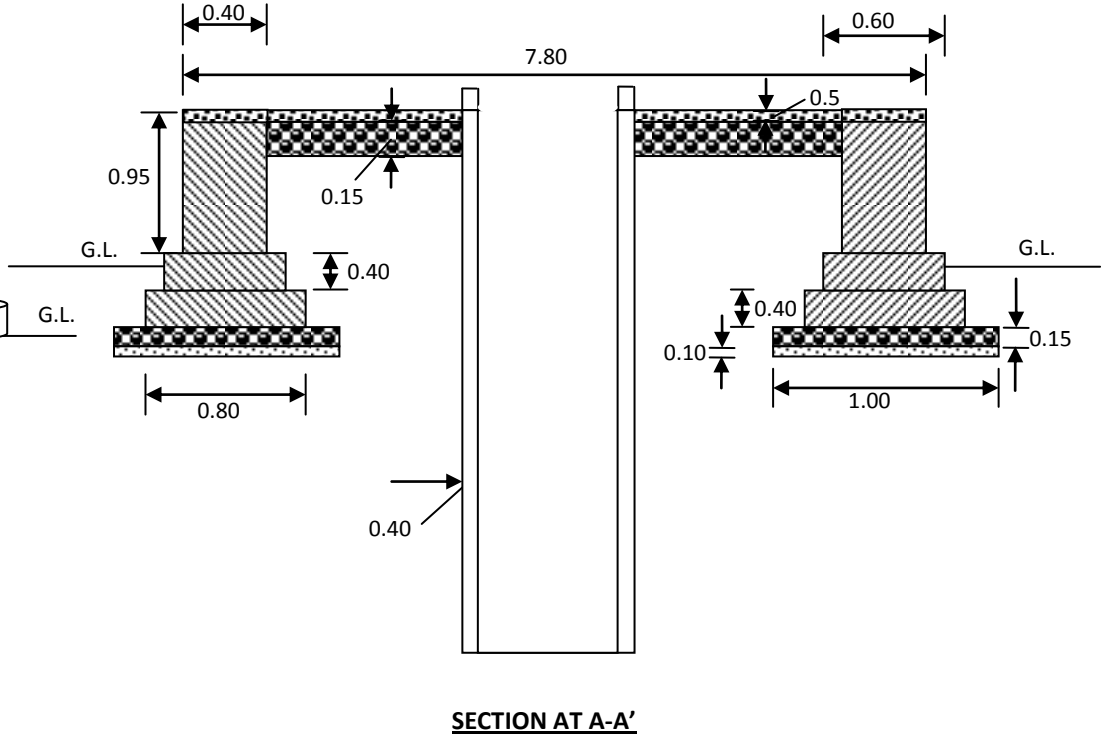
DRAWING OF WELL



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.	R/R Brick masonary 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)	Khanda (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 masonary 1:4	22.21 cum	44.42	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			**82.16**	**14.131**	**22.21**	**7.012**	**1.547**
Say			**82 bags**	**14.13 cum**	**22.20**	**7.01**	**1.55**

COST OF MATERIALS

S.No.	Particulars	Quantity	Rate	Amount
1.	Cement	82 Bags	255.00/bag	20219.00
2.	Coarse Sand	14.13 cum	910.00/cum	12858.30
3.	Khanda	20.20 cum	1025.00/cum	22755.00
4.	Granite Stone Ballast 25-40 mm	7.01 cum	855/cum	5993.55
5.	Granite Stone Grit 10-20 mm	1.55 cum	1250.00/cum	1937.50
Total				**Rs. 64,454.00**

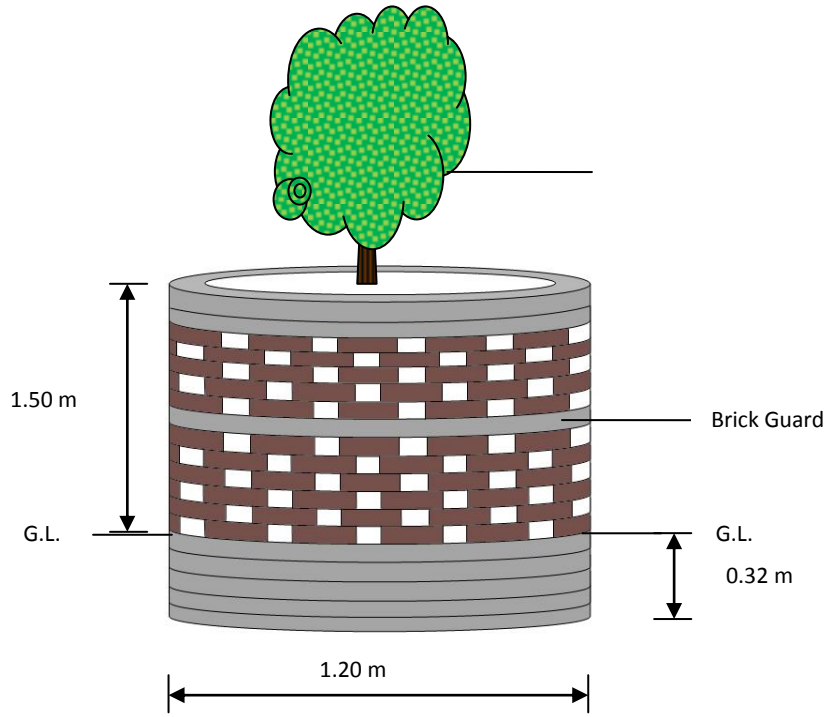
LABOUR CHARGES

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 Masonary	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	66,749.00
2. Labour charges & transportation	24,335.45
Total	**Rs. 91,084.45**
	Say Rs. 91,100.00 only

DRAWING OF BRICK GUARD



DESCRIPTION.

1. Brick work = 1:4.
2. Plastering = 1:4.
3. Thickness of wall = 0.11 m.
4. Total height of brick guard = 0.32 + 1.50 = 1.82 m.
5. Diameter = 1.2 m.

ETAIL ESTIMATE OF BRICK GUARD

S.No.	Description of work	No.	L	B	D/H	Quantity	
1.	Earthwork for tree	1	0.60	0.60	0.60	0.216	
	In foundation	1	3.14x1.09	0.20	0.30	0.205	
Total						**0.421**	
2.	Brick work 1:4					Solid	Glazed
	In foundation	1	3.14x1.09	0.11	0.40	0.151	-
	In super structure with	1	3.14x1.09	0.11	0.48	-	0.181
	glazed	1	3.14x1.09	0.11	0.08	-	0.030
	Solid	1	3.14x1.09	0.11	0.40	-	0.151
	Glazed	1	3.14x1.09	0.11	0.16	0.060	-
	Solid						
Total						**0.211**	**0.362**
3.	Plastering 1:4	1	3.14x1.20	-	0.07	0.264	
		1	3.14x1.20	-	0.15	0.565	
		1	3.14x1.09	-	0.07	0.239	
Total						**1.068 m^2**	

CONSUMPTION OF MATERIALS

S.No.	Description of work	Quantity	Brick Nos.	Cement Bags	Coarse Sand
1.	Brick work 11 cm thick 1:4 Brick work glazed	0.211 cum 0.362 cum	100 86	0.29 0.25	0.050 0.043
2.	Plastering 1:4	1.068 m^2	-	0.11	0.016
Total			**186**	**0.65**	**0.109**
Say			**190**	**0.65**	**0.110 cum**

COST OF MATERIALS

S.No.	Particulars	Quantity	Rate	Amount
1.	Brick II^{nd} class	190 nos.	3650.00	693.50
2.	Cement	0.65 Bags	255.00	165.75
3.	Coarse sand	0.110 cum	910.00	100.10
Total				**Rs. 959.35**

LABOUR CHARGES

S.No.	Particulars	Quantity	Rate	Amount
1.	Earth work	0.421 cum	39.16/cum	16.48
2.	Brick work	0.391 cum	370.00/cum	144.67
3.	Plastering	1.068 m^2	40.00/m^2	42.72
Total				**Rs. 203.87**

Head load and transportation 20% of material cost - Rs. 191.87

Total Expenditure		
1.	Material	959.35
2.	Labour	203.87
3.	Head load and transportation	191.87
Total		**Rs. 1355.09**
		Say Rs. 1355.00 only.

Detail Estimate of Drop Spillway Crest

Length 1.00 metre

1- Earth work in cutting

S. No.	Description of work	No.	L	B	D/H	Quantity
1	Side wall	2	1.70	1.00	1.15	3.91
2	Head wall	1	0.80	1.20	1.15	1.10
3	Head wall extension	2	2.20	0.80	1.15	4.04
4	Toe wall	1	0.80	0.70	0.80	0.44
5	Cut off wall	1	5.20	0.80	0.70	2.91
6	Apron	1	1.70	0.80	0.60	0.81
7	Wing wall	2	1.30	0.80	1.15	2.39
Total						15.60 cum.

2. Laying of sand in the bed & foundation

S. No.	Description of work	No.	L	B	D/H	Quantity
1	Side wall	2	1.70	1.00	0.10	0.340
2	Head wall	1	1.00	0.40	0.10	0.040
3	Head wall extension	2	2.10	0.80	0.10	0.336
4	Toe wall	1	1.00	0.80	0.10	0.080
5	Cut off wall	1	5.20	0.80	0.10	0.416
6	Apron	1	1.60	1.00	0.10	0.160
7	Wing wall	2	1.30	0.80	0.10	0.208
Total						158 cum.

3. C.C.W. 1:3:6 in foundation

S. No.	Description of work	No.	L	B	D/H	Quantity
1	Side wall	2	1.70	1.00	0.15	0.510
2	Head wall	1	1.00	0.40	0.15	0.060
3	Head wall extension	2	2.10	0.80	0.15	0.378
4	Toe wall	1	1.00	0.80	0.15	0.120
5	Cut off wall	1	5.20	0.80	0.15	0.624
6	Apron	1	1.60	1.00	0.10	0.160
7	Wing wall	2	1.30	0.80	0.15	0.312
Total						2.164cum.

4. R/R Brick masonary

S. No.	Description of work	No.	L	B	D/H	Quantity
1	Cut off wall	1	5.20	0.60	0.60	1.872
2	Head wall	1	1.00	1.00	0.90	0.900
		1	1.00	$\frac{0.40+1.00}{2}$	1.00	0.700
3	Side wall	2	1.70	1.00	0.45	1.530
		2	1.70	0.80	0.45	0.918
		2	1.70	0.80	0.60	1.020
		2	1.70	0.60	0.40	0.544
		2	$\frac{1.70+0.45}{2}$	0.40	0.50	0.430
4	Head wall extension	2	2.10	0.80	0.65	2.184
		2	2.10	0.60	0.45	1.134
		2	2.10	0.40	1.30	2.184
5	Wing wall	2	1.30	0.80	0.45	0.936
		2	1.30	0.60	0.45	0.702
		2	1.30	0.40	$\frac{1.00+0}{2}$	0.520
6	Toe wall	1	1.00	0.80	0.45	0.360
		1	1.00	0.60	0.45	0.270
7	Apron	1	1.70	1.00	0.45	0.765
8	Longitudinal sill	2	1.70	0.20	0.20	0.136
9	Transverse sill	1	1.00	0.20	0.20	0.040
Total						17.145 cum.

4- C.C. W. 1:2:4 on the wall and Apron

S. No.	Description of work	No.	L	B	D/H	Quantity
1	Head wall	1	1.00	0.40	0.025	0.010
2	Side wall	2	0.45	0.40	0.025	0.009
		2	1.35	0.40	0.025	0.027
3	Head wall extension	2	2.10	0.40	0.025	0.042
4	Wing wall	2	1.60	0.40	0.025	0.032
5	Longitudinal sill	2	1.70	0.20	0.025	0.017
6	Transverse sill	1	1.00	0.20	0.025	0.005
7	Apron	3	1.60	0.20	0.025	0.024
Total						0.166 cum.

5- Raised Pointing 1:3

S. No.	Description of work	No.	L	B	D/H	Quantity
1	Head wall	1	1.00	-	1.00	1.00
		1	1.00	-	1.16	1.16
2	Side wall	2	0.45	-	1.50	1.35
		2	1.25	-	$\frac{1.50+1.00}{2}$	3.12
3	Wing wall	2	1.30	-	$\frac{1.00+0}{2}$	1.30
4	Head wall extension	2	2.10	-	1.00	4.20
Total						12.13 m^2

CONSUMPTION OF MATERIALS

S. NO.	Particulars	Quantity	Cement (Bags)	Sand (cum)	Khanda (cum)	G.S. Grit 25-40 mm (cum)	Grit 10-20 mm (cum)
1	Sand laying	1.580 cum	-	1.580	-	-	-
2	C.C.W. 1:3:6	2.164 cum	9.95	0.973	-	1.947	-
3	R/R Brick masonary	17.145 cum	41.14	5.829	17.145	-	-
4	C.C.W. 1:2:4	0.166 cum	1.01	0.069	-	-	-
5	Raised Pointing 1:3	12.13 m^2	0.55	0.057	-	-	-
Total			52.65	8.508	17.145	1.947	0.141
Say			53 Bags	8.51 cum	17.15 cum	1.95 cum	0.14 cum

COST OF MATERIALS

S. No.	Name of materials	Quantity	Rate	Amount
1	Cement	53 Bages	255.00	13515.00
2	Course sand	8.51 cum	910.00	7744.10
3	Khanda	17.51 cum	1025.00	17578.75
4	G.S.B. 25-40 mm	1.95 cum	855.00	1667.25
5	G.S. Grit 10-20 mm	0.14 cum	1250.00	175.00
Total				Rs. 40,680.10

LABOUR CHARGE

S. NO.	Particulars	Quantity	Rate	Amount
1	Earth work	15.60 cum	36.66/ cum	571.89
2	Sand Laying	1.580 cum	33.33/ cum	52.66
3	C.C.W. 1:3:6	2.164 cum	494/ cum	1069.01
4	C.C.W. 1:2:4	0.166 cum	494/ cum	82.00
5	Brick Masonary	17.145 cum	370/ cum	6343.65
6	Raised Pointing	12.13 m^2	51.61/ m^2	626.02
7	Curing	17.145 cum	25.00/ cum	428.62
8	Cahokidar	6 Man Days	100.00/ Mandays	600.00
9	Head Load & local transportation 10% cost of materials			4068.00
Total				Rs. 13,841.85

Total Expenditure	
1. Cost of Materials	40680.00
2. Labour Charges	13841.00
Total	Rs. 54521.95
	Say Rs. 54,550.00

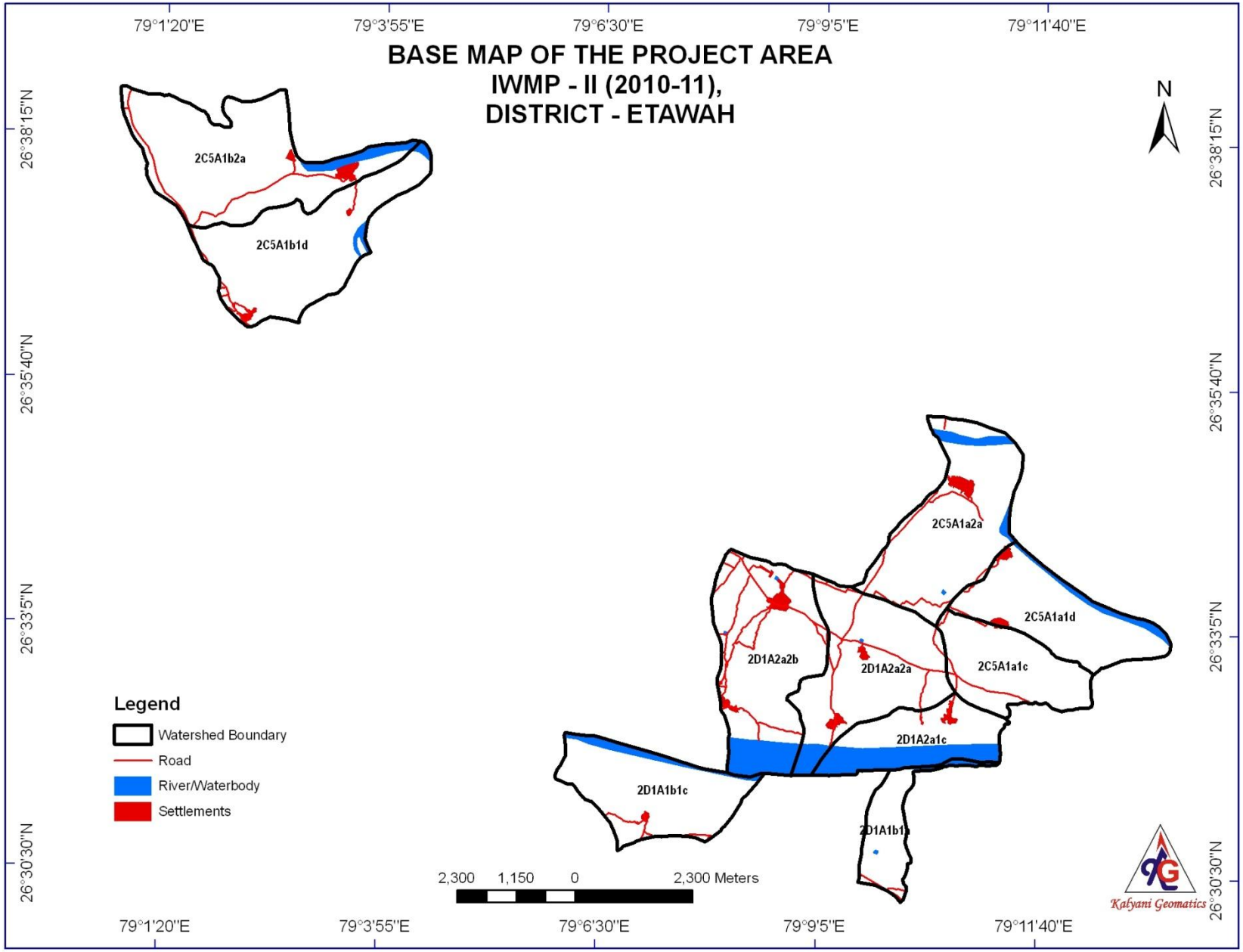
CHAPTER -12
MAPS

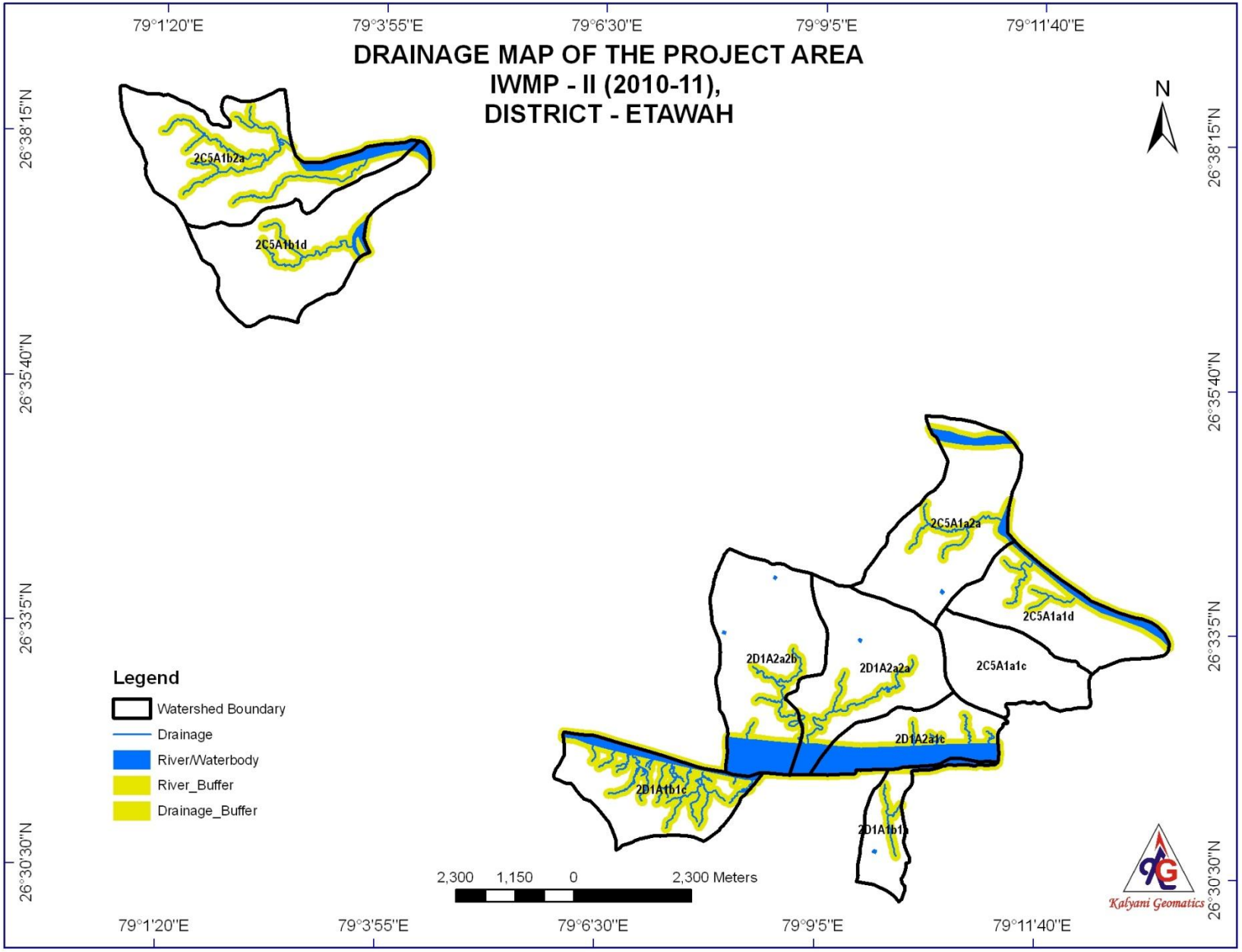
MAPS

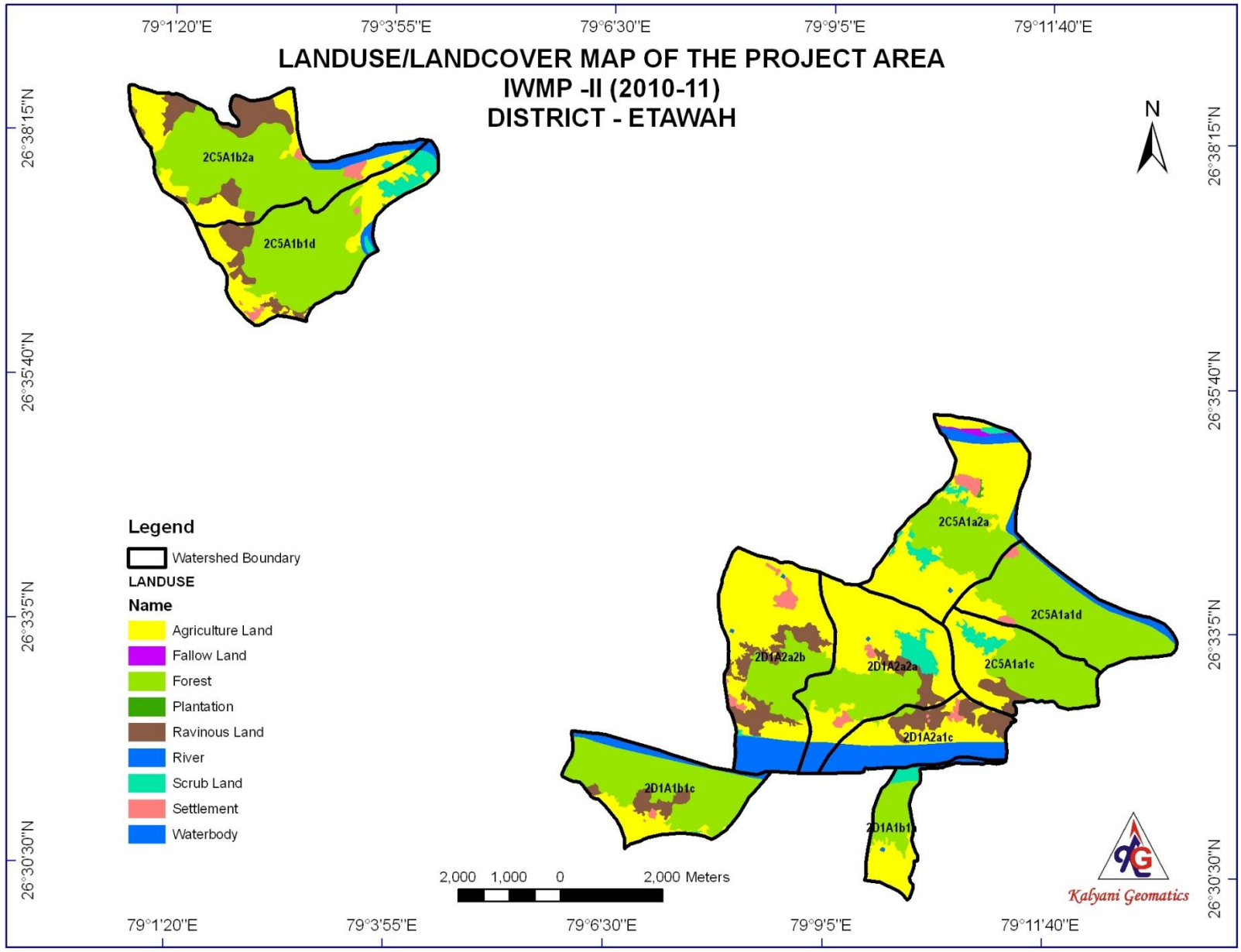
An attempt has been to map the surface details of the project area, as per the instruction of the common Guide lines-2008, All the thematic maps of the study area have been prepared through using remote sensing and geographical information system(G.I.S.) technique, following the fundamental norms of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

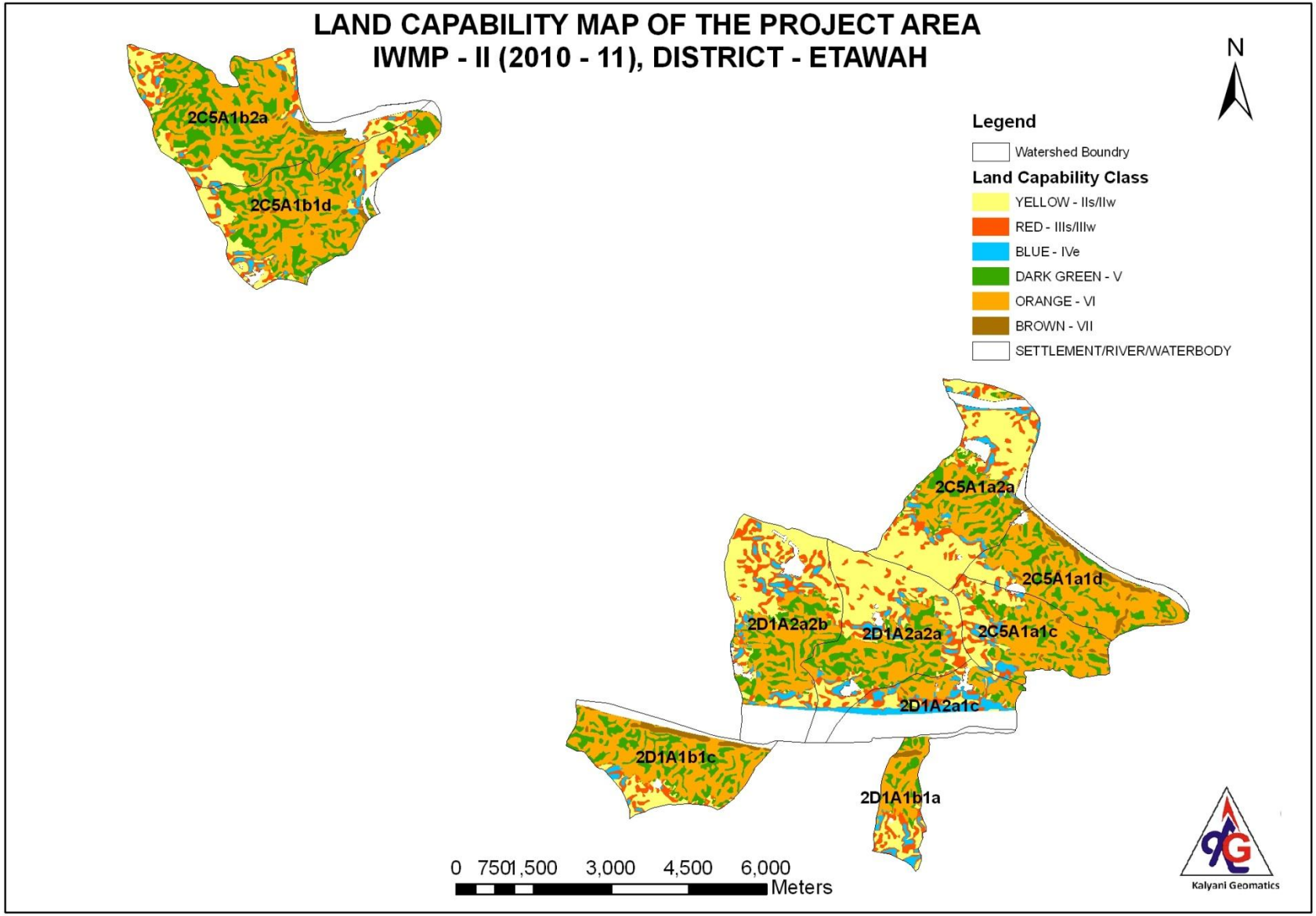
1- Base map
2- Transportation map
3- Dranage map
4- Land use/ Land cover map
5- Countor map
6- Slope map.

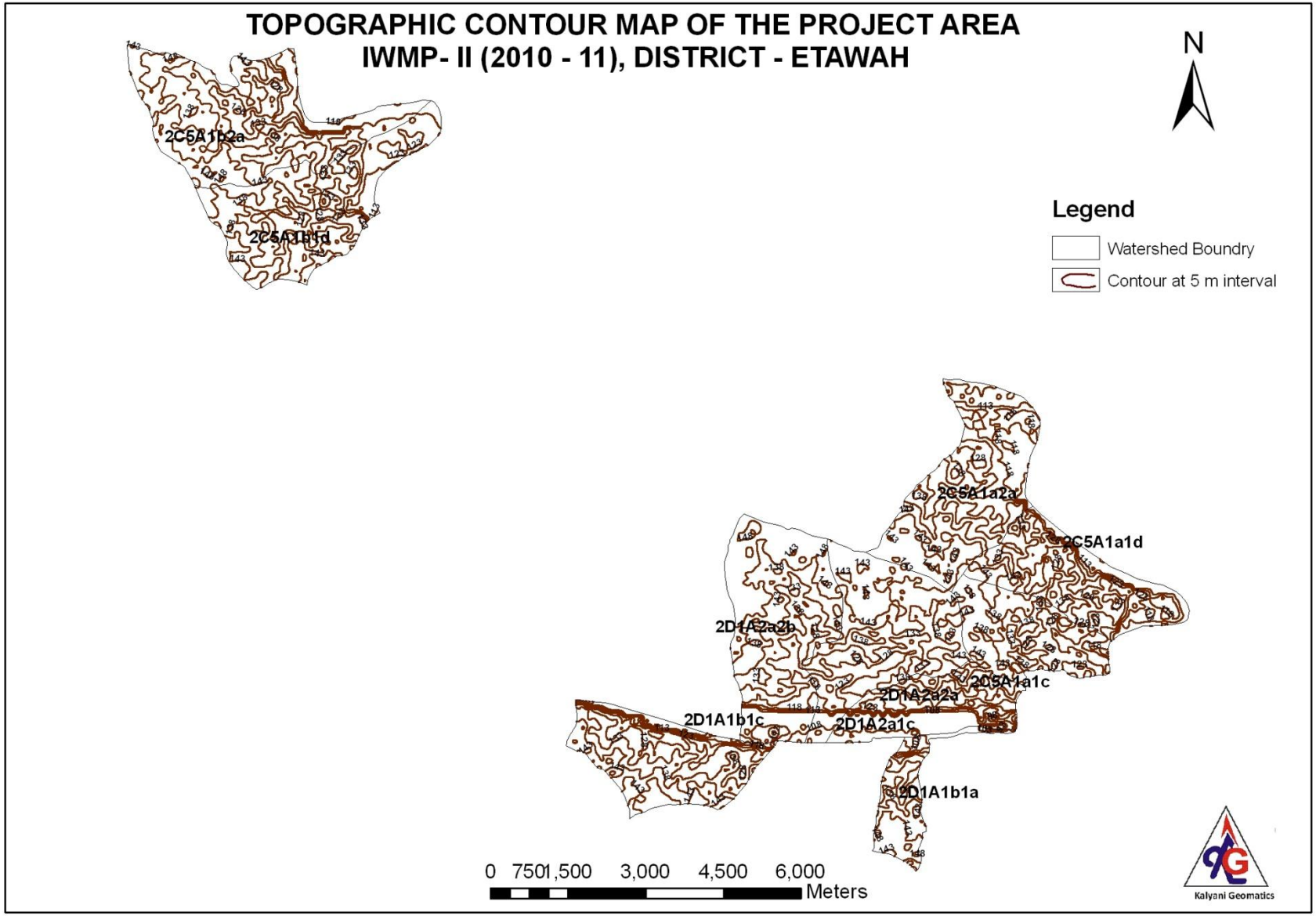
These maps were interpreted from the high resolution satellite data freely available on internet.

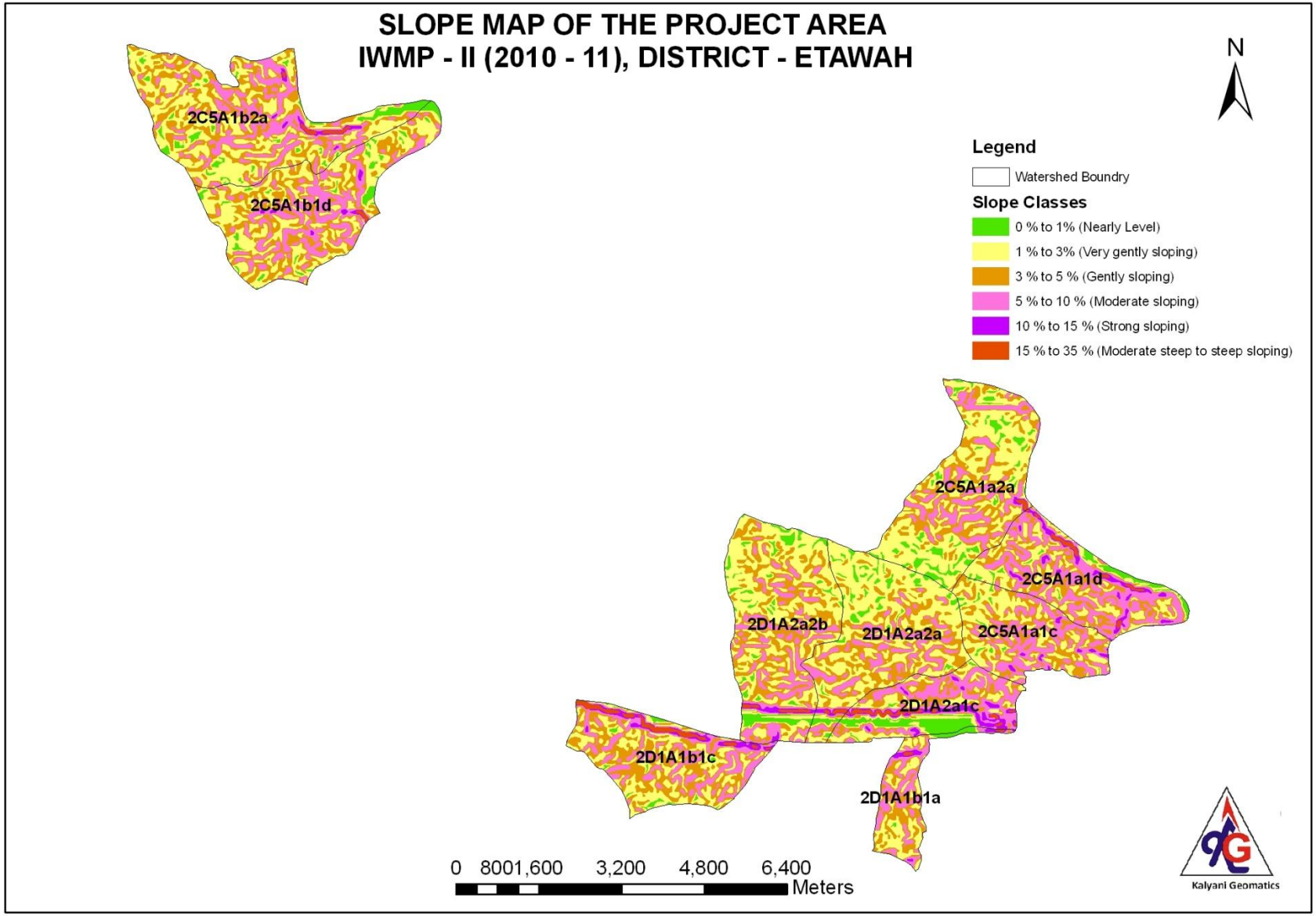

BASE MAP OF THE PROJECT AREA
IWMP - II (2010-11),
DISTRICT - ETAWAH
79°1'20"E
79°3'55"E
79°6'30"E
79°9'5"E
79°11'40"E
26°38'15"N
26°35'40"N
26°33'5"N
26°30'30"N
N
2C5A1b2a
2C5A1b1d
2C5A1a2a
2C5A1a1d
2C5A1a1c
2D1A2a2b
2D1A2a2a
2D1A2a1c
2D1A1b1c
2D1A1b1
Legend
Watershed Boundary
Road
River/Waterbody
Settlements
2,300 1,150 0 2,300 Meters
Kalyani Geomatics


DRAINAGE MAP OF THE PROJECT AREA
IWMP - II (2010-11),
DISTRICT - ETAWAH
79°1'20"E
79°3'55"E
79°6'30"E
79°9'5"E
79°11'40"E
26°38'15"N
26°35'40"N
26°33'5"N
26°30'30"N
N
2C5A1b2a
2C5A1b1d
2C5A1a2a
2C5A1a1d
2C5A1a1c
2D1A2a2b
2D1A2a2a
2D1A2a1c
2D1A1b1c
2D1A1b1
Legend
Watershed Boundary
Drainage
River/Waterbody
River_Buffer
Drainage_Buffer
2,300 1,150 0 2,300 Meters
Kalyani Geomatics


LANDUSE/LANDCOVER MAP OF THE PROJECT AREA
IWMP -II (2010-11)
DISTRICT - ETAWAH
79°1'20"E
79°3'55"E
79°6'30"E
79°9'5"E
79°11'40"E
26°38'15"N
26°35'40"N
26°33'5"N
26°30'30"N
N
2C5A1b2a
2C5A1b1d
2C5A1a2a
2C5A1a1d
2C5A1a1c
2D1A2a2b
2D1A2a2a
2D1A2a1c
2D1A1b1c
2D1A1b1
Legend
Watershed Boundary
LANDUSE
Name
Agriculture Land
Fallow Land
Forest
Plantation
Ravinous Land
River
Scrub Land
Settlement
Waterbody
2,000 1,000 0 2,000 Meters
Kalyani Geomatics


LAND CAPABILITY MAP OF THE PROJECT AREA
IWMP - II (2010 - 11), DISTRICT - ETAWAH
N
Legend
Watershed Boundry
Land Capability Class
YELLOW - IIs/IIw
RED - IIIs/IIIw
BLUE - IVe
DARK GREEN - V
ORANGE - VI
BROWN - VII
SETTLEMENT/RIVER/WATERBODY
2C5A1b2a
2C5A1b1d
2C5A1a2a
2C5A1a1d
2D1A2a2b
2D1A2a2a
2C5A1a1c
2D1A2a1c
2D1A1b1c
2D1A1b1a
0 750 1,500 3,000 4,500 6,000
Meters
Kalyani Geomatics


TOPOGRAPHIC CONTOUR MAP OF THE PROJECT AREA
IWMP- II (2010 - 11), DISTRICT - ETAWAH
N
Legend
Watershed Boundry
Contour at 5 m interval
2C5A1b2a
2C5A1b1d
2C5A1a2a
2C5A1a1d
2D1A2a2b
2C5A1a1c
2D1A2a2a
2D1A1b1c
2D1A2a1c
2D1A1b1a
0 750 1,500 3,000 4,500 6,000
Meters
Kalyani Geomatics


SLOPE MAP OF THE PROJECT AREA
IWMP - II (2010 - 11), DISTRICT - ETAWAH
N
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)
2C5A1b2a
2C5A1b1d
2C5A1a2a
2C5A1a1d
2D1A2a2b
2D1A2a2a
2C5A1a1c
2D1A2a1c
2D1A1b1c
2D1A1b1a
0 8001,600 3,200 4,800 6,400
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

Preparation of DPR

Detail Project Report of Integrated Watershed Management Programme IWMP-II 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, Etawah, 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
3	Sri S. Singh	Ex. Project Scientist
4	Sri Ashanvi Dubey	Ex. Project Scientist
5	Sr. R.K. Singh	System-In-Charge
6	Sri Dinesh Yadav	B.S.A.
7	,, R. G. Singh	Jr. Engg.
8	,, N.B. Gupta	Accountant
9	,, Jagat Narayan	Sr. Clerk
10	,, Ram Sankar	Draft Man
11	,, P.P. Singh	,,
12	,, Harikesh Chandra	A.S.C.I.
13	,, Ram Ashray Katiyar	,, ,,
14	,, Jiladar Singh	Work Incharge
15	,, Ashok Kumar	,, ,,
16	,, Ram Shankar	,, ,,
17	,, Kamlesh Kumar	,, ,,
18	,, Ram prakash Tripathi	,, ,,
19	,, Brijendra Singh Kushwaha	,, ,,

20	,, Rajendra Babu Arya	,, ,,
21	,, Shishupal Singh	,, ,,
22	,, Brijendra Singh	,, ,,
23	,, Suresh Babu Sharma	Munsi
24	,, Rajneesh Kumar	,,
25	,, Seela Devi	,,
26	,, Ram Narayan	,,
27	,, Shushma Devi	,,
28	,, Ajay Babu	,,
29	,, Ram Chandra	,,
30	,, Chandra Bhan Singh	,,
31	,, Abhay Kumar Tiwari	Munsi

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
ETAWAH

Technically Approved
Deputy Director
Dept. of Land Development & Water Resources, IWMP-II
ETAWAH

Physically & Financially Approved:

Project Director
District Rural Development Authority, District – ETAWAH

Chief Development Officer
District – ETAWAH