1. PREFACE

The integrated and participatory management and natural resources namely soil, water, vegetation, man, animal and environment using watershed as unit is the key for sustainability of society, environment and production of food, fodder, fuel, fiber, fish, flower, forest etc. About 80 percent of the world and 60 percent of the Indian Agriculture is rain dependent, diverse, complex, under-inverted risky, distress prone and vulnerable. In district Saharanpur the selected area in the block Nakur and Gangoh for the development under I.W.M.P. Project is very major problematic area due to misuse and over exploitation of resources and droughts. Many people are under below poverty line with low production in agriculture, milk and other farming problems and migration of people for employment to other places etc are major problems in selected area. The degradation of risk prone agro-ecosystem as a result of increased graded due to network of gullies, insufficient vegetal cover, over exploitation of resources, poor production and starving farmers & animals are the limiting factors for prosperity to posterity.

A detailed project plan (DPR) is prepared for the approval of Panchayat, State Govt. and National Rain fed Authority MoA and Govt. of India for the sanction of budget. The report includes scientific and integrated management of all natural resources namely water, soil, vegetation, animal and environment for sustainable production. The descriptions of physical, financial, technical and social details are well highlighted for the development of watershed and expected benefits by mitigating the bad effects of problem area. The details have been summarized as executive summary and Project at a glance.

The DPR of each micro watershed / village Panchayat will be prepared for development with each and every minute details using detail survey and village map. Each work proposed by field works (WDT) will have all physical Financial ,Technical and social details for its administrative, technical and financial sanction by Panchayat, watershed manager and finally by PIA.

2. Acknowledgements

I am highly thankful to Miss. Chaudhari IAS, Secretary Ministry of Rural Development and Dr. J.S. Sharma CEO, NRAA Ministry of Agriculture Govt. of India for their Administrative, financial and technical inputs for the smooth running of the project. The full support and facilities given by Mr. Sanjay Aggarwal, IAS Principal Secretary, Ministry of Land Development and Water Resources Govt. of Uttar Pradesh are gratefully acknowledged.

The Guidance facilities and administrative Support provided by Shri Lal Bihari Pandey Project Administrator and Shri Sahab Singh Deputy Director Department of Land Development and Water Resources Saharanpur (U.P.) are thankfully acknowledged. The valuable and practical suggestions made by the members of WDT and Logistic support provided by field and office staff are well appreciated.

I feel proud privilege to thank Pradhan and village leader of the watershed area for their participation in PRA and RRA exercise and valuable comments on problems need and there solutions.

The contribution of Prof. Dr. S.P. Bhardwaj, Retired Principal Scientist and Head of Division, CSWCRT Instt., and Dehradun for visiting area and preparing DPR will always be gratefully remembered.

Dated-

(Janardan dubey)
BSA and Leader of PIA
I.W.M.P.Saharanpur**(**U.P.)

EXECUTIVE SUMMARY

India is very a rich and resources with low production and poverty and due to unscientific and mismanagement of resources. India Receives maximum rainfall as Compared to any country of this size, even then various draughts and floods occur alternatively or simultaneously in various parts of country. The fertile of alluvial soil has potential to feed grain to whole of Asia including China. The soil is degrading at a faster rate and first three rivers of world carrying maximum sediment are in India. The undulating and sloppy terrain having sandy soil of the project area in Saharanpur is eroding at a faster rate having network of gullies and low moisture holding Capacity. The Land development and water resources department has accepted the challenge to conserve and manage soil and water in project area. Integrated and participated development of watershed has been proved to be only solution for sustainability of society, environment and production of food. Fodder, forest fruits fuels, fiber flower etc. This fact has been realized by National Rain fed Authority of India and MoRD and they sanctioned a very comprehensive watershed development plan for overall development of India.

The sanctioned project covers development of the Saharanpur district region of U.P. The selected IWMP IInd is covering part of Block Nakur and Gangoh of district Saharanpur covering an area of 5108 ha "which is to be developed" with sanctioned budget Rs. 612.96 lakh under the watershed management programme of MoRD New Delhi.

The project area comprises of 25 villages Panchayat of aforesaid blocks. Having an area of 5108 ha under 25 watershed management. Main problem is low rainfall (868 mm) with uneven distribution, resulting to draught, undulating slopy terrain with sandy soil along with Yamuna bank. Population is not rich and grouped as marginal (59%), small (31%) large farmer > 4 ha. are only (10%). About 64% area comes under waste land, which is prioritized for treatment under watershed management programme. There are block orchard plantations in the locality which are a potential land use for draught affected area. There is

no small or big industry in the project area having unemployment and poverty. Total human population is 115157 with 59082 male and 56015 female. The livestock population of the project is 14105 cow and buffalos and 6060 sheep and goat. milch animals. The project will generate 309000 Mandays.

The Ultimate goal of project is healthy and wealthy people by achieving following targets

1. Change of 2380 ha private wasteland to 1240 ha cultivation, 1140 ha silvi pasture (MPT).
2. 890 ha common wasteland to 890 ha social forestry (MPT).
3. Increase in crop yield 20 to 30% with cropping intensity 140 to 210%.
4. Increase in milk production from 6000 to 7900 kg. per day .
5. Rise in ground water table from 12.00 to 10.50 mtr in project area.

Project is tested and analyzed for its profitability as SWOT, FOVEASS, Logical Framework analysis, NPV cost benefit Ratio (1.37:1), IRR (22.70) and also Sensitivity analysis and found highly cost effective and profitable .

The detail summary of the project in given in the next page under following heads.

a. Physical and Financial details of project
b. Physical and Financial details of proposed activities.
c. Land Use plan (in hect.)
d. Achievements and performance of water sheds.
e. Code of micro water sheds of the project.

Project At a Glance I.W.M.P. II[nd] Saharanpur

a. Physical and Financial details of project

	Name of Block	Nakur	Gangoh	Total
1	No. of Micro watersheds	14	11	25
2	No. of Gram Panachayat	14	11	25
3	Project area (hect.)	3044.00	2064.00	5108.00
4	Budget Sanctioned(Rs. lac)	365.28	247.68	612.96
5	Man days to be Generated	184000	125000	309000
6	Date of Sanction of PPR and Project duration	01.09.2010 and 2010-11 to 2014-15		
7	Release of Ist. installment	Rs. 36.7776 on dated 23.10.2010		

b. Physical (Unit) and Financial (Rs. lak) details of proposed activities

Activities	water Resource			Soil conservation Structure			Seed Packet (Demo)		Horticulture	Silive Pasture	E.P.A.*
	Pond	Drinking Water Tank	Irrigation/ Drain	Land Treatment Bund	Spillways	CD/CW etc.	Grain (q.)	Vegetable (No.)			
	No.	No.	ha.	ha.	No.	No.	No.	No.	No.	ha.	No.
Physical	0	25	245	3052.50	82	101	1710	2050	600	890	25
Financial	0	5.00	36.75	183.15	12.30	10.10	0.43	2.05	30.00	26.70	24.50

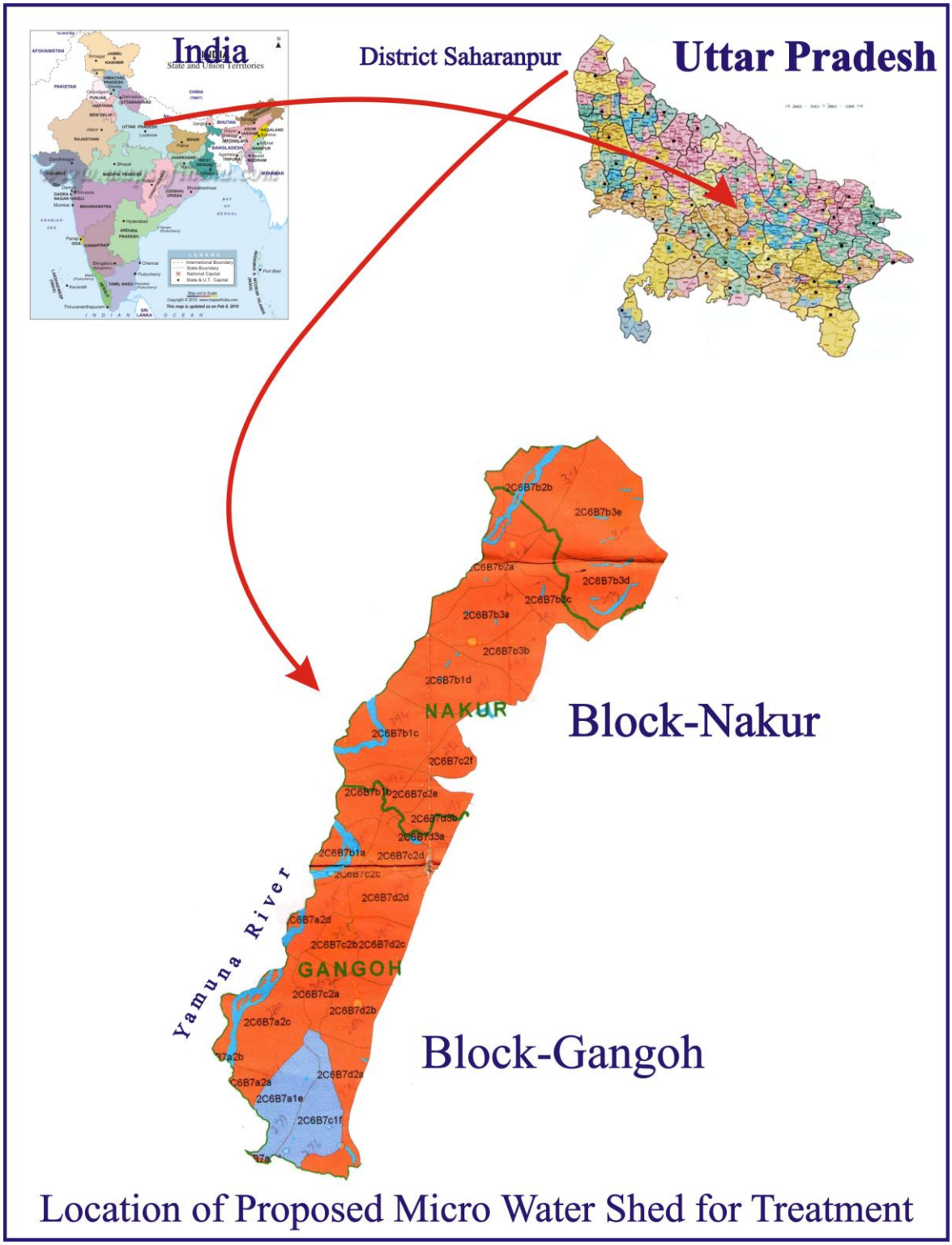
c. Land Use plan (in hect.)

S. No.	Present		Proposed	
	Land Use	Area	Land Use	Area
1	Private Land (Rainfed)		Private Land (Rainfed)	
	a. Cultivated Area	1838.00	a. Crop	840.00
	b. Waste Land	2380.00	b. Agro forestry	680.00
2	Common Land		c. Horticulture	1558.00
	a. Waste Land	883.00	d. MPT	1140.00
	b. Social Forestry	7.00	Common Land	
			a. Social Forestry (MPT)	890.00

d. Achievements and performance of water shed

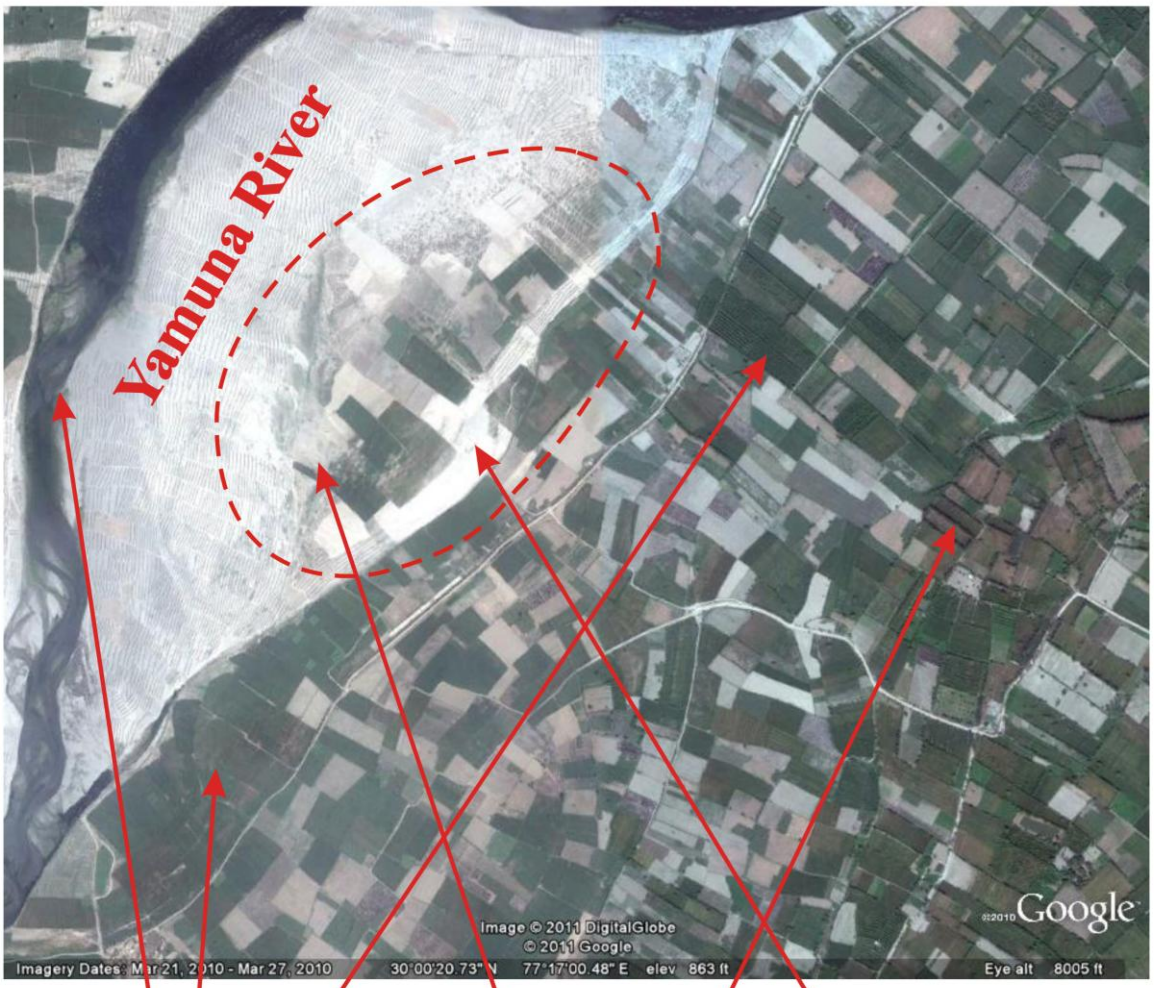
S. No.	Particulars	Present	Proposed
1	Cropping Intensity %	140	210
2	Average increase in crop yield %	100	120
3	Milk Production (Kg./day)	6000	7900
4	Quality and Purity of drinking water-will improve	improve	will improve
5	SHG and UGs	0 and 0	25 and 25
6	Water table respectively Nakur and Gangoh	12.10	10.50

Micro Watershed Codes
2C6B7b2b, 2C6B7b3e, 2C6B7b3b, 2C6B7a3c, 2C6B7b2a, 2C6B7b3a, 2C6B7b3b, 2C6B7b1d, 2C6B7b1c, 2C6B7c2f, 2C6B7b1b, 2C6B7c2e, 2C6B7c2d, 2C6B7d2d, 2C6B7a2d, 2C6B7a2c, 2C6B7d2a, 2C6B7d3b, 2C6B7d3a, 2C6B7c2c, 2C6B7b1a, 2C6B7c2b, 2C6B7d2c, 2C6B7c2a, 2C6B7d2b



Location of Proposed Micro Water Shed for Treatment

Satellite imagery of the project area near Village Mandhoor Block-Nakur showing River bank Erosion and land uses of the project



Index

Crop Cover

Cabbage Field

Water flow

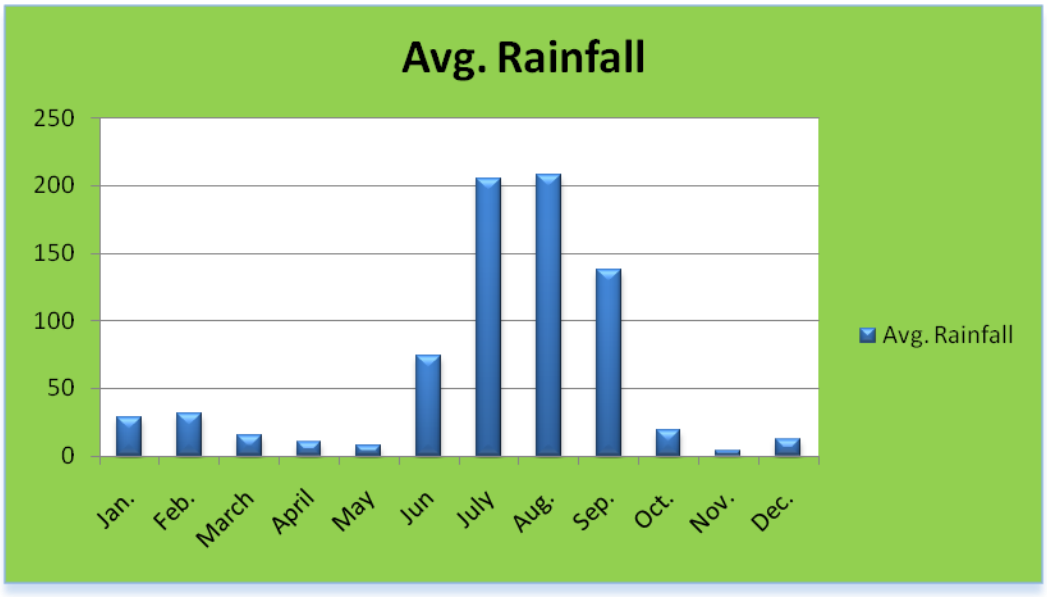
Field Eroded and Covered by River Sand

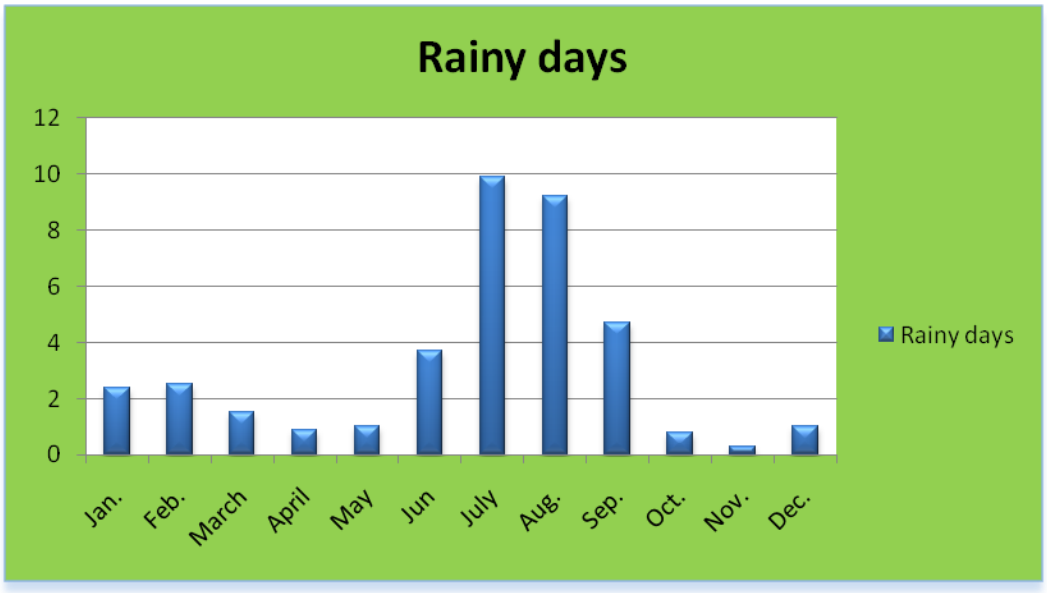
Agro-forestery (Field Boundary)

Eroded Road

Mean monthly rainfall and rainydays (fifty Years) of the project Area (Nakur Block)

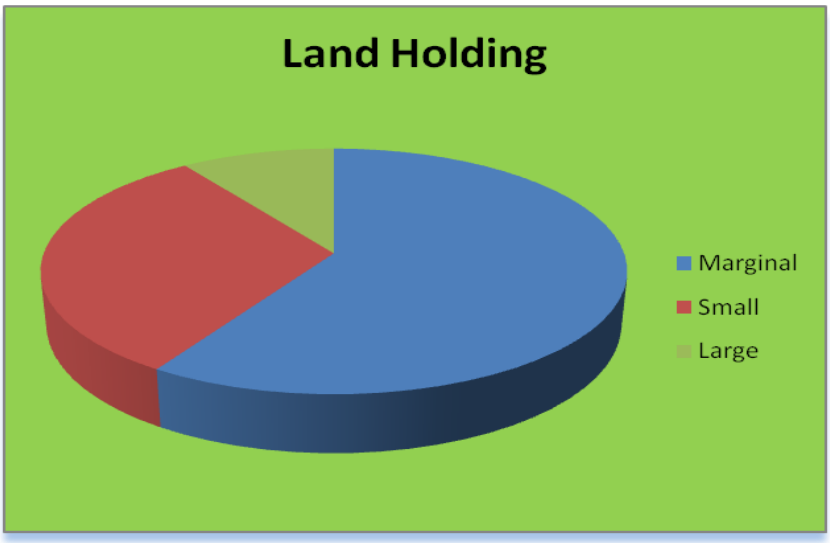
Months	Jan.	Feb.	March	April	May	Jun	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Avg. Rainfall	28.7	31.5	15.2	10.4	7.9	73.7	205.2	207.5	137.7	19.3	3.6	11.9	**752.6**
Rainy days	2.4	2.5	1.5	0.9	1	3.7	9.9	9.2	4.7	0.8	0.3	1	**37.9**





Land Holding in project Area

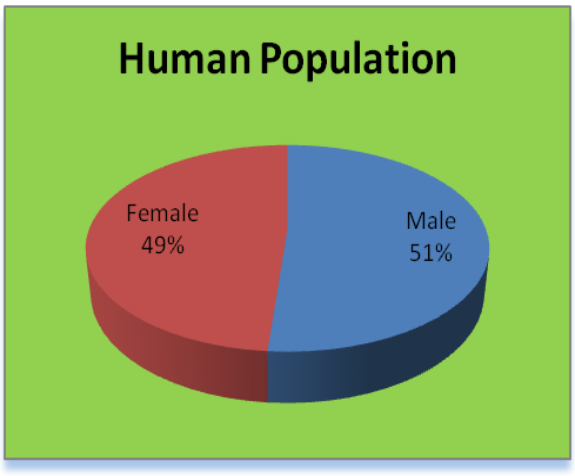
Marginal	2924
Small	1550
Large	484
Total	**4958**

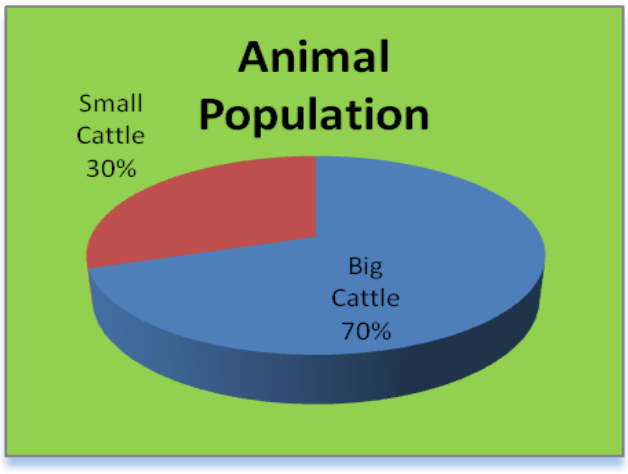


Population Data in project Area

Male	59082
Female	56075
Total	**115157**

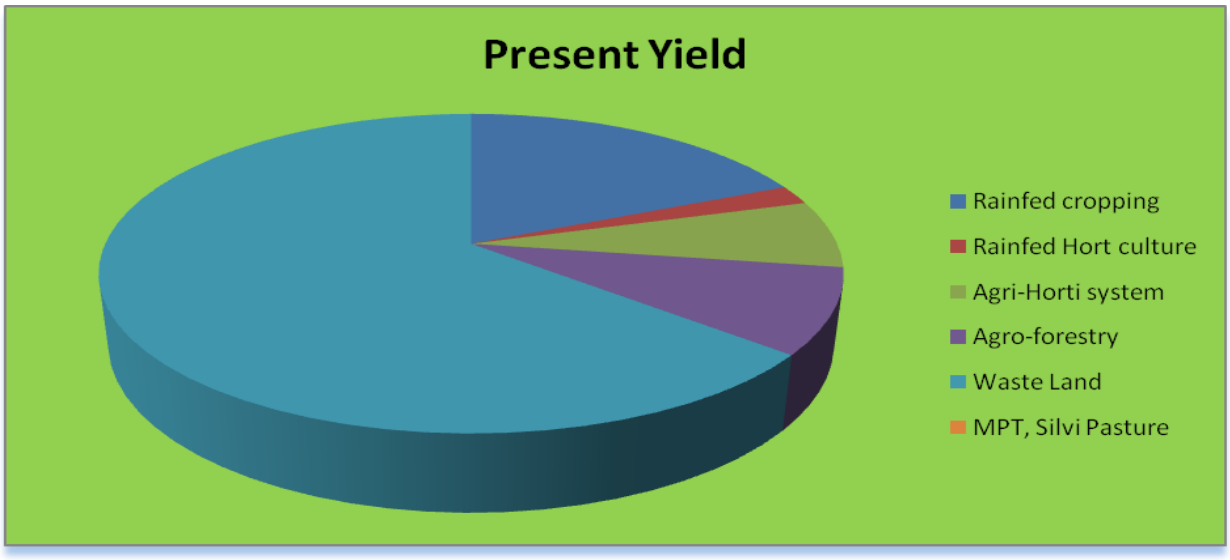
Big Cattle (Cow+Buffelo)	14105
Small Cattle (Goat+Sheep)	6060
Total	**20165**

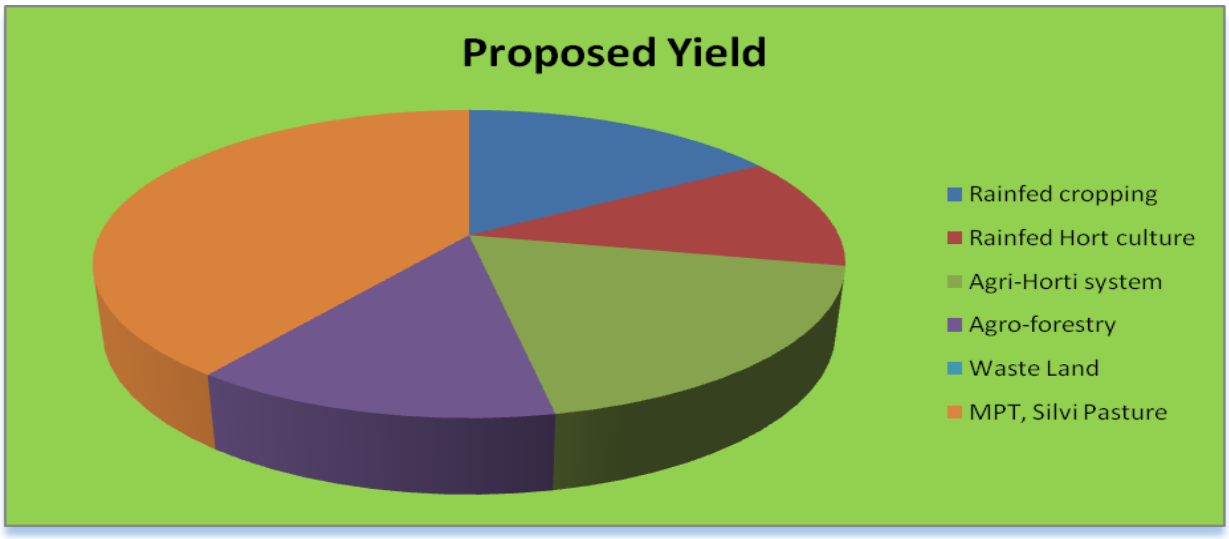




Present and proposed Land use in the project Area (in Hectare)

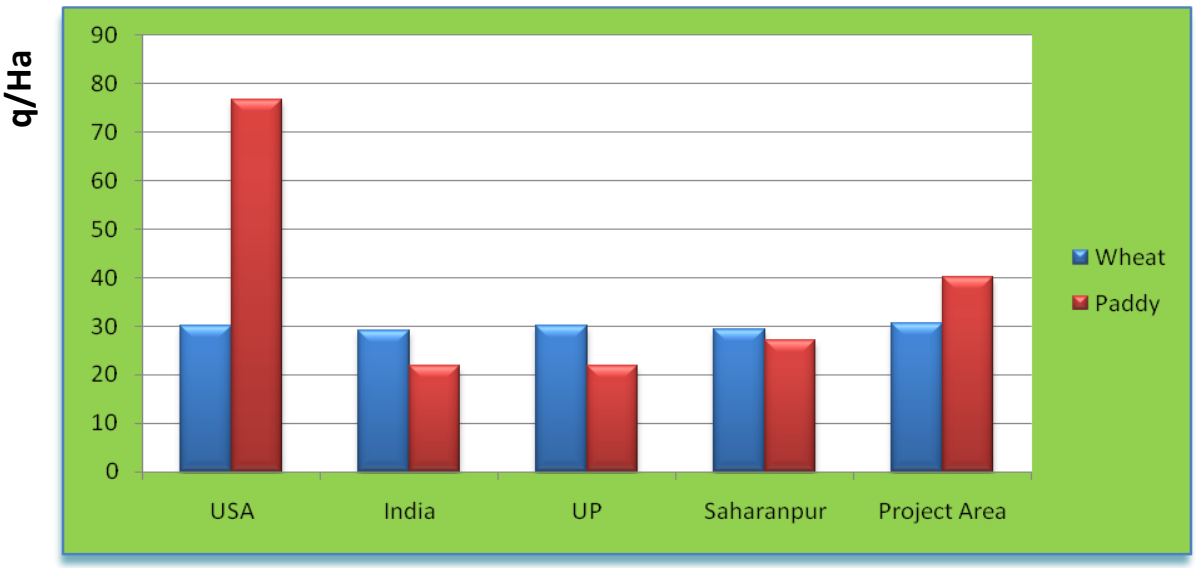
land use	Present Yield	Proposed Yield
Rainfed cropping	948	840
Rainfed Hort culture	100	600
Agri-Horti system	350	958
Agro-forestry	440	680
Waste Land	3270	0
MPT, Silvi Pasture	0	2030
Total	5108	5108



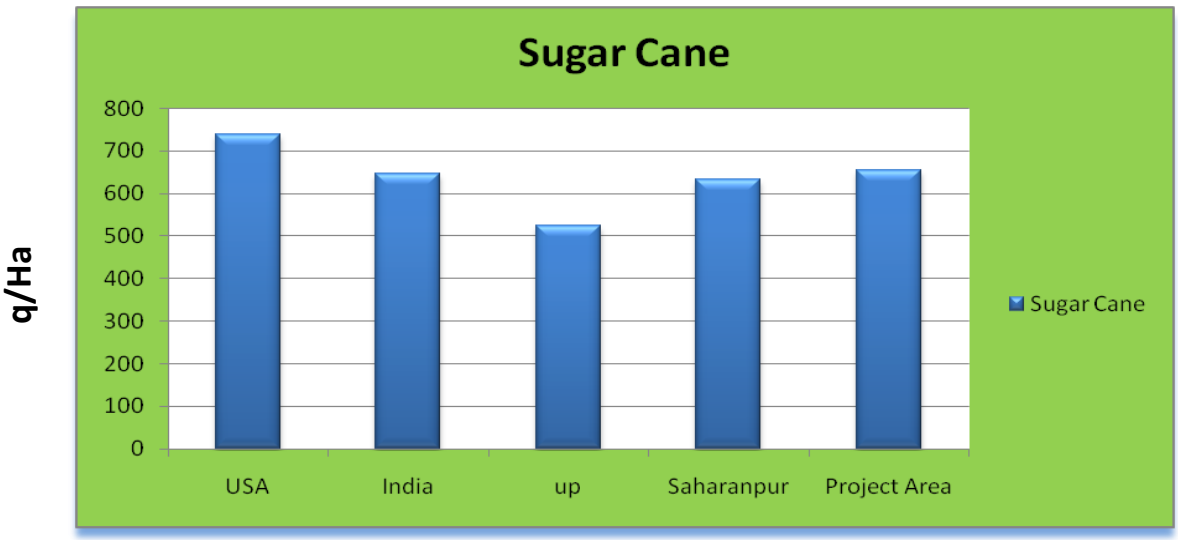


Details of present yield in different main crop (in q/ha.)

Name of Crop	USA	India	UP	Saharanpur	Project Area
Wheat	30.18	29.07	30.02	29.40	30.50
Paddy	76.72	21.78	21.71	27.20	40.10

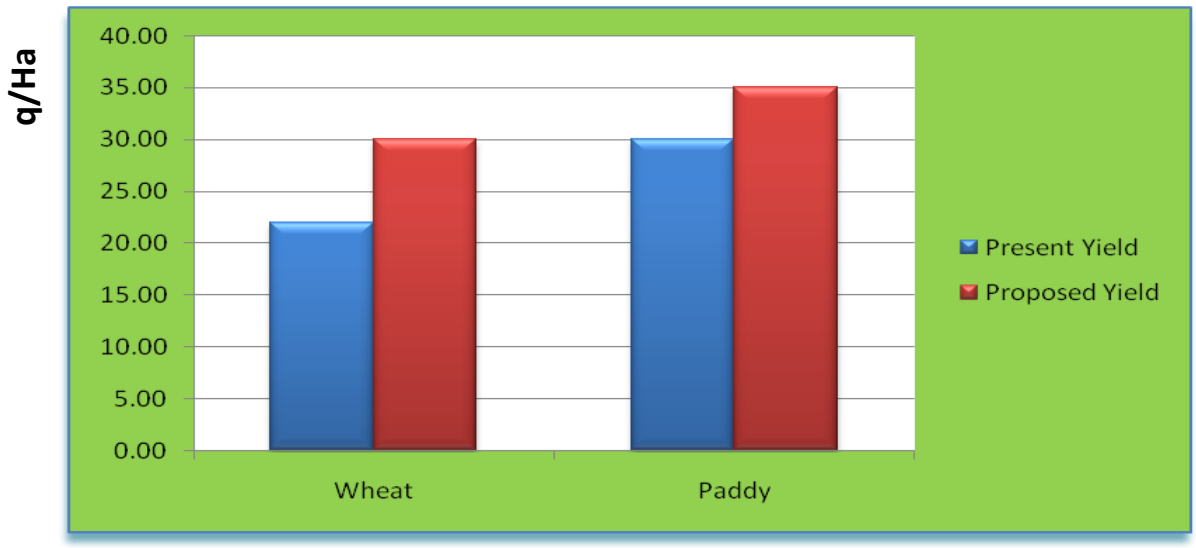


Name of Crop	USA	India	up	Saharanpur	Project Area
Sugar Cane	737.65	645.53	523.26	633.00	655.00



Present and proposed yield in the project Area

Name of Crop	Present Yield	Proposed Yield
Wheat	22.00	30.00
Paddy	30.00	35.00



Present and proposed yield in the project Area

Name of Crop	Present Yield	Proposed Yield
Suger Cane	450	600
Barseen (Fooder)	400	700

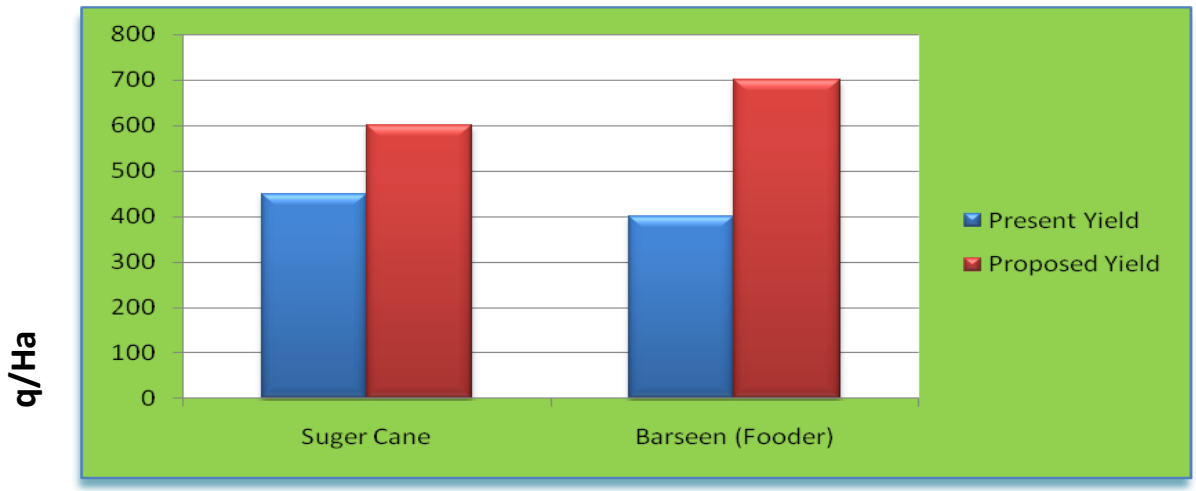


Photo-graphic Details of the project

Social Problems

Cow dung use as fodder
& no Fuel Plantation

Poor cattle & no Pasture &
fodder tree in the project area

sheep ← Over grazing → Goat

Watershed Problems

Sand Deposit **Yamuna Bank erosion** Road Erosion

Gully Erosion

Soil Conservation measures practiced and proposed

Spilway

Field Bunding for soil, water and fertility conservation

Spill way in Gully

Water Resources Development

Cattle drinking water tank is proposed at handpump

Multipurpose village pond needs development

Animal do need pond for bath and swimming

Horticulture/ Agri horti system common to be multiplied

Populer on field bund **Agro forestry** Equilyputs - intercrop

Agri-horti system (Wheat+Mango)

Irrigated Crop in project locality

Sugar Cane

Cabbage

Weed Infested Wheat

Onion

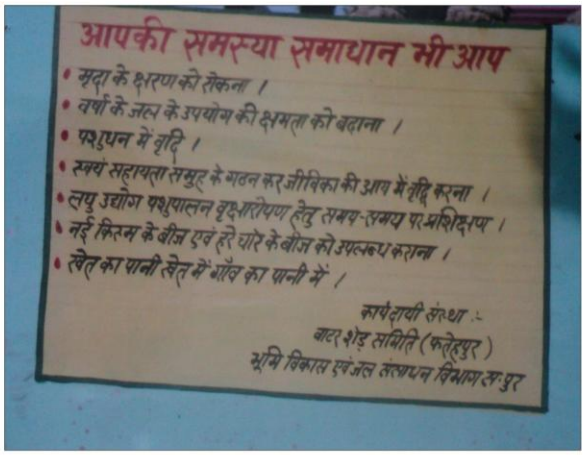
HRD, Publicity and employment-well taken by PIA

Training

Employment

Publicity

Publicity



Publicity

1.0 INTRODUCTION

In the era of globalization and phenomenal technological progress, Indian agriculture faces the twin challenges of meeting the rising demand for food of increasing population and making the best use of technologies and recourses for production. Agriculture is the backbone of Indian economy and about 75 Percent population totally depended on agriculture and our water resources are maximum as compared to any country of this size but we are facing severe drought and flood alternately and simultaneously in different parts of the country. As a result of mis-management, land resources are degrading at a fester rate resulting in low production and high poverty. Out of 329 million ha of total area of our country, about 53.5 percent (175 million ha) is in the urgent need of soil and water conservation measures. Every year we are losing about 5334 million tones of soil and 18.8 billion cubic meter water along with 10 million tones fertilizing and other nutrient elements. The century facing very low production of agriculture and problem of food and poverty to the farmers. Which are affecting prosperity to the posterity. It has been proved beyond doubt during the last 30 years that integrated and participatory watershed development especially in drought region is the only answer of social upliftment of rural folk and need to successive changes in overall development for the country.

Selected area in the Saharanpur district is facing varies problems in a very aggravated condition due to mismanagement resources and population pressure of human and animals, which are causing resource degradation at an alarming rate with low productivity and various problems of soil & water down below. The project area of 5108 ha. of I.W.M.P. under Yamuna watersheds out of total geographical area of 18151 ha. of all comprised villages in which 3270 ha. is under Wasteland.

Ministry of Rural Development Govt. of India, New Delhi realized the problem of the selected area in the block Nakur and Gangoh in the Saharanpur district to remove the problem and sanctioned the budget for Integrated Watershed management Project under Deptt. to Land Development and Water Resources Saharanpur (UP) with budgetary provision of Rs. 6.1296 crore for Saharanpur district of UP The master plan of IWMP IIND of Saharanpur watershed has been prepared by conducting detailed integrated survey, intensive exercise on Participatory Rural Appraisal (PRA), Rapid Rural Appraisal (RRA), experience gained and recommendations made by various state, national & international watershed development authorities.

2.0 OBJECTIVES

1. To promote the economic development of the village community which is directly or indirectly dependent on the watershed through?

a. Optimum utilization of the watershed's natural resources namely land, water, vegetation animal etc. that will ensure sustainability of production & society and mitigation of drought by scientific and judicious management of water resources.

b. Employment generation and development of the human especially landless and ladies and other economic resources of the village in order to promote savings and other income generation activities.

2. To encourage restoration of ecological balance in the watershed through;

a. A scientific and judicious management of natural resources so that flood and draught, land, water & nutrients can be conserved, productivity and income can be improved and other problems namely sedimentation of reservoirs, communication failures, ravine development, pollution of air and water etc. can be minimized.

b. Sustained community action for the operation and maintenance of assets created and further development of the potential of the natural resources in the watershed.

c. Simple, easy and affordable technological solutions and institutional arrangements that make use of, and build upon, local technical knowledge and available materials to improve bio-diversity, environment and sustainability in all spheres.

3. Special emphasis to improve the economic and social condition of the resource-poor and the disadvantaged sections of the watershed community such as the asset less and the women through:

a. More equitable distribution of the benefits of land and water resources development and the consequent biomass production.

b. Greater access to income generating opportunities and focus their human resource development.

4. Human resource development through working, training and visits at all levels namely administrators, technicians, field workers and beneficiaries. The project will yield a valuable and permanent system of brotherhood, love and effective cooperation amongst the villagers and watershed authorities by working with the groups and membership of various village institutions.

5. The operational projects proposed and conducted, will guide scientists to investigate the scientific basis of local technical innovations and to either give validation to the farmer's practices or improve upon their technical content without losing their comparative advantage of cost-effectiveness and simple and easy usefulness. Non-monitory input namely contour cultivation, mulch, crop geometry, tillage, INM and IPM need to be promoted.

6. Capacity building of village institutions and local bodies in implementing the responsibilities assigned to them.

3.0 COMMON PROBLEMS

The watershed is subjected to various natural & man made desertification, low productivity and imbalanced ecosystem and socio-economic condition of the villagers as described here. The users, planner's .developmental and funding agencies and administrators should make efforts to find solutions and create situations to avoid the following problems faced in the past for achieving successful project.

3.1 Natural Calamities –

1. Increase in number frequency, duration of metrological, hydrological and agriculture of droughts resulting in poor water storage and vegetal production.
2. During normal rainfall years the area receives rainfall during June to September and scanty & irregular showers during winter. Thus remaining period suffers from draught due to low water conservation power of the area as result of erodible causing high run off conditions.
3. The sandy soil along river bank and also loam in other area has low water holding capacity and fertility as well.
4. The few torrential and erosive rain storms on weak and fragile ecosystem need suitable umbrella of vegetative cover to conserve soil
5. Area also suffers from comparatively higher temperature in summer.

3.2 Resource exploitation, miss-management & degradation

1. Reduction in water storage capacity of existing structures creating loss of irrigation potential.
2. The farmers are over cultivating degraded terraces, overgrazing grasslands, illicit felling and pollarding of forest trees. Thus, disturbing ecological balance.
3. Lack of awareness and absence of soil conservation works to be adopted by the farmers and state Govt.
4. The watershed does not have the good soil for water harvesting, storage & re-cycling by way of constructing embankment, gully plugs, ponds, nala bundling etc. to face the challenge of drought by providing life saving irrigation to the crops mitigating erosion and flood on foot hills.
5. The productivity of Agriculture, Horticulture, and Animal husbandry is far below the optimum level due to following reasons.
   (I) Great dependence on monsoon:
   (II) Insufficient fertilizer per unit cropped area:
   (III) Traditional farming methods:
   (IV) Lack of adequate farm machinery:
   (V) Lack of finances for farmers:
   (VI)Lack of good quality seeds and fertilizers:

3.3 Administration-

1. The planning of watershed is a bottom up approach based on PRA & RRA. While it was suffering due to its dependence almost entirely on the top down bureaucracy with very little participation of the villagers.
2. Watershed management is a multi-disciplinary and multi-pharaohs activity which calls for active participation of the entire related state department but it is suffering from poor co-operation and superiority complex.
3. In many cases the Chief administrator felt helpless to co-ordinate the activities by involving the departments due to their busy schedule a political pressure & poor administrative hold on other departments Thus, the system of joint responsibility of sharing activities is almost paralyzed.
4. Frequent transfers of competent and experienced officers and posting of untrained and inexperienced officers with the qualification not related with the watershed development. The development by planers will yield added success.
5. The watershed development is a difficult task in the backward and remotely situated areas and the men have to settle their families in the towns far away from the watershed having house, medical and education facilities. The hardship of watershed managers is not generally considered by sanctioning project disturbance allowance and facilities which ultimately lead to suffering of the work and employees.

3.4 Facilities and finances –

1. The project implementing agency, responsible for watershed Development, does not have sufficient facilities. The machines and implements namely tractor, bulldozer, jeep, forest nursery, improved quality seed and breed of animal etc. The PIA officer does not get sufficient co-operation from the other Govt. Depts. for satisfying these needs.
2. A field laboratory for testing important parameters of soils, water, vegetation, animal etc. is generally not provided to the watershed development project.
3. In many cases watershed manager does not get sufficient funds as per actual estimate and grant is based on the standard and estimate fixed in the previous years having low rates of material and labour.
4. It is a common problem in most of the department as a whole. The funds are not provided as per work and execution schedule and made available sometimes in the last week of financial year which is affecting quality & quantity of work, misuse and misappropriation of funds.
5. Funds are very limited and as per rough estimate the rate of resource degradation and reclamation measures in our country are almost going on with the same speed.
6. There is also fear that a rapid expansion of the intellectual property regime, which is now beginning to cover scientific findings & important to food, health security and other basic life support systems, New technology may not be readily available to resource poor rural families.
7. Poverty of people availability/untimely of suitable input and technology.

3.5 Socio-economic –

1. The farmers of the area are poor because many of them are either landless or having uneconomic small holdings resulting the status of farmers below the poverty line.
2. The production of the crops of horticulture, agriculture and grass from panchayat and gazing lands is far below the optimum level.
3. The villagers don't have sufficient alternate land use and income.
4. Few unemployed youths and workless villagers are in the habit of gambling and drinking.
5. Ladies are over worked in the house as well as in the field.
6. The self interest to grasp benefits by individuals, influential persons, politicians and between sub villages

3. 6 Industrialization of watershed –

1. There is no small or big factory in the watershed for employment of the people.
2. Villagers are unaware with the term of cottage industries.
3. Alternate land use as source of additional income namely bee-keeping, mushroom production, sericulture, piggery, fishery, dairy processing etc. on commercial scale are beyond the imagination of the dwellers in most of Project areas.
4. The Operational facilities of banking for the loan at a low interest for the purchase of farm inputs are not there. The farmers are dependent on local money lenders, charging high interest rate.
5. The facilities of storage, marketing and transport of the village produce are very meager or absent.

4.0 Methodology for the preparation of DPR

I. Use of available of information

The collection of data and details from following sources

A. Statistics of state district and Panchayat
B. Achievements technology from state line departments namely agriculture, horticulture, forestry industries etc.
C. Maps
D. Visit of already developed watershed in the locality.
E. Study of available watershed proposal and estimates.

II. Records at Watershed level

A. Available Records
   1. Block Development office
   2. Village Panchayat
   3. Lekhpal (Revenue) and Supervisors of State line Department
B. Existing developmental activities
   1. Pond, irrigation tank, Channel
   2. Check Dam, Retentions wall in gully and slide spot area
   3. Drinking water structures
   4. Agriculture, horticulture, animal husbandry and village industries
   5. Forestry, Pasture and staggered trenches and common land
   6. Distribution of improved seeds of grain and vegetables
   7. SHG, UG, Van Panchayat etc.

III. Details of Estimates

1. Estimates Prepared by field worker for the project proposal, to be checked by J.E. and Soil Conservation Officer

IV. Meetings

1. Visit of the area and discussion with the formers using PRA and RRA exercises.
2. Group discussion-with office bearers of village institutions namely WDT and WC.
3. Discussions with district water advisory unit consisting of state line department.
4. Training details of PIA, WDT, and Beneficiaries

V. Steps of Report Preparation

A. Study of Maps
   1. Village map 1:16000
   2. Toposheet 1:50000
   3. Micro watershed map of about 500 ha. Prepared by NRSA Hyderabad
B. Survey
   1. Detailed intergraded basic resources/bench mark surveys and demarcating the present and proposed land uses, land treatment etc.
C. PRA
   1. The PRA was Guiding principal and this will empower the farmers in decision making by sharing responsibilities and accountabilities of activities to be carried out by focusing on economic, ecological, equity, efficiency and empowerment
D. Project Report
   1. Need Problems General descriptions of resources, present and proposed land use and treatment, budget, drawing and estimate of work etc.
E. Editing and improvement of report

The well qualified consultants of watershed survey, Planning, development, monitoring and evaluation were engaged for editing and improvement of the report.

VI. Process step from planning

The following nine process steps were applied for planning of watershed as summaries below.

STEP-1 **Secondary data collection:-** During the five days visit programme in the micro watershed project with of all available documents of village label by approaching the Gram panchayat collected secondary data.

STEP-2 **Village meeting & conducting PRA exercise:-** Community meeting conducted on fix days for the consultation with villagers for the PRA Exercise. Participatory mode of the villages was positive indicated for the success of programme. With good in testing participation has been drawn social & resource map on ground & paper & discussed unvarious topics of problematic thoughts in the micro watershed.

STEP-3 **Socio economic survey: -** The resource organization of village label volunteers identified to conduct house hold socio economic survey/states.

STEP-4 **Probe typology analysis:-**Thoroughly analyzed the data & identified problem type as soil & moisture conservation, crop rotation, crop coverage, productivity, livelihoods, social issues & capacity building gaps etc. Problems discussed with the watershed committee & came up with alternative solution.

STEP-5 **Conduct of net participatory planning (NPP):-** The planning team visited together in the planning blocks on the scheduled date along with the beneficiaries of the villages & data gathered as for the participatory net planning.

STEP-6 **Productivity & livelihood planning exercise: -** For the product livelihood exercise, group discussion on various livelihoods as Agriculture, Animal husbandry enterprise development held discussion with the villagers in the micro watershed.

STEP-7 Institutional & capacity building: - This plan is prepared based on the data available in the field and auscultations with the watershed committee.

STEP-8 Data consolidation & documentation of DPR: - After gathering all required information compiled collected data. Thoroughly discussed and finalized the expected outcomes and benefits especially in the respect of livelihood for different segments. These are the target and performers indicators for the micro watershed.

STEP-9 Conduct of Gram Sabha obtaining approvals submissions of DPR.:-After preparation of the draft DPR convened to Gram sabha and activities proposed expected outcomes benefits of implementing the programme are explained in case of any changes are proposed in the Gram sabha approval obtained by the Gram sabha and already singed of Mau paper.

STEP-9A Attachment of detail estimate, cost and design:-Estimating, Costing and design prepared technically According to plan in the micro watershed project and attached with the DPR.

STEP-9B various type of mapping: -

DPR prepared in the support of micro watershed project using various types of maps is as follows:

1. Cadastral map
2. Land use map
3. Plan map
4. Drainage/stream order map
5. Contour/slope map
6. Micro watershed map

Part-B
Bench Mark/Integrated Resource Survey

5.0 Location, area, Elevation & Road

The selected 25 watersheds in the catchment of block Nakur and Gangoh in the District Saharanpur (U.P.) in located on Saharanpur to Delhi Road about 32 Km. between 29°45' to 29°57' N latitude and 77°07' to 77°17' E longitude Location map and imagery are there in the report.

Total area of the watershed is 5108 ha. Elevation ranges from 253 to 265 meter above mean sea level. Watershed comprised of 34 villages with the geographical area of 18151 ha. Maximum length and width of the Project area of the I.W.M.P. is 40 Km North to South and 7 Km East to West respectively. Thus the ratio of length and width is 5:1. Shape of watershed is rectangular.

The Project is located on the Easter bank of river Yamuna which is meandering severely and eroding cultivated fields every year. Apart from erosion much more damage is done by the river by spreading its unfertile sand on fertile lands. This leads to high erosion due to loss of fertile lands and water holding capacity. This needs immediate measures by government to save the economic condition to the farmers.

IWMP IInd- Saharanpur (U.P.)

S.N.	No of Micro Watershed	N0of Village Panchayat	Geographical Area of Village	Land Under Agri Use	Rainfed Area	Waste Land		Treatable Area
						Cultivable Land	Un cultivable	
1	2	3	4	5	6	7	8	9
1	25	25	18151	18151	5108	2240	1030	5108

6.0 Climate

The selected watershed lies in the semi-arid region having tropical climate. The average annual precipitation is 868 mm. Most of the annual rain fall (about 90%) is received during the rainy season (July to September) accompanied with high intensity storm. The temperature rises up to 46°c during summer and fall below to 4.1°c in winter. Rainfall data are given in table below. The ground water table range from 14-20 m. All the wells were dry in May-June .The water is applied through earthen channel and quality of water is good. The Project Area has got number of Tube well and there is Fluctuation of water table to the tune of avg. 4.1 meter during the Pre ant Post Manson period of the year. The variation in the fluctuation of water table depends upon total rain falls and its distribution and pumping out of water through shallow tube walls. The average monthly rainfall giving in the following table and average monthly rainy days illustrated in the graph and weekly probability analysis of rain fall in the following table will help the farmers and extension agencies and agriculture departments to schedule the farm operations and farming systems.

Rain Fall Details Of Last Six years

Month	2003	2004	2005	2006	2007	2008	Avg
Jan.	70.50	83.00	42.50	10.50	0.00	11.00	36.25
Feb.	37.50	0.00	31.50	0.00	114.50	1.00	30.75
March	0.00	0.00	79.50	58.00	53.00	0.00	31.75
April	12.50	67.00	2.00	0.50	11.60	15.00	18.10
May	7.00	19.00	1.00	136.00	35.00	26.00	37.33
Jun	81.20	70.50	46.00	129.50	258.00	400.00	164.20
July	312.00	299.50	277.00	351.80	221.00	232.00	282.22
August	209.00	168.50	102.00	61.50	134.00	292.00	161.17
Sep.	109.00	42.50	44.10	42.70	134.00	111.00	80.55
Oct.	0.00	48.50	0.00	27.00	0.00	24.00	16.58
Nov.	8.00	5.50	0.00	0.00	0.00	17.20	5.12
Dec.	12.00	0.50	0.00	10.00	4.00	0.00	4.42
Total-	**858.70**	**804.50**	**625.60**	**827.50**	**965.10**	**1129.20**	**868.43**

WEEKLY RAINFALL PROBABILITY

STATE-UTTAR PRADESH **No. OF YEARS - 65**

STATION-NAKUR **LAT- 29°56'N LONG- 77°18'E**

WEEK	LOWEST OBSD	HIGHEST OBSD	PROBABILITY LEVEL				
			70%	60%	50%	40%	30%
1	0.0	61.8	0	0	0	0	6
2	0.0	53.5	0	0	0	2	5
3	0.0	46.8	0	0	0	4	9
4	0.0	62.1	0	0	0	1	5
5	0.0	86.7	0	0	0	4	10
6	0.0	45.3	0	0	0	1	5
7	0.0	58.3	0	0	0	2	6
8	0.0	91.5	0	0	0	2	8
9	0.0	48.1	0	0	0	0	3
10	0.0	61.6	0	0	0	0	4
11	0.0	87.2	0	0	0	0	0
12	0.0	36.1	0	0	0	0	2
13	0.0	53.0	0	0	0	0	0
14	0.0	66.7	0	0	0	0	2
15	0.0	15.6	0	0	0	0	0
16	0.0	58.5	0	0	0	0	0
17	0.0	20.2	0	0	0	0	0
18	0.0	14.1	0	0	0	0	0
19	0.0	19.7	0	0	0	0	2
20	0.0	27.0	0	0	0	0	1
21	0.0	33.0	0	0	0	0	0
22	0.0	44.3	0	0	0	0	4
23	0.0	84.7	0	0	0	4	11
24	0.0	161.7	0	0	0	3	7
25	0.0	181.7	0	2	6	12	23
26	0.0	196.0	3	8	14	25	32
27	0.0	294.7	9	17	30	40	54
28	0.0	270.5	24	32	41	52	68
29	0.0	294.1	17	23	37	48	64
30	0.0	214.0	21	26	34	43	59
31	0.0	322.5	27	34	43	54	73
32	0.0	263.8	21	34	44	57	75
33	0.0	171.0	10	18	32	43	58
34	0.0	189.3	8	14	23	39	54
35	0.0	185.5	7	12	19	33	45
36	0.0	302.5	3	10	18	32	42
37	0.0	316.1	0	5	14	27	49
38	0.0	340.2	0	0	0	5	21
39	0.0	257.8	0	0	0	10	32
40	0.0	131.2	0	0	0	0	3
41	0.0	185.5	0	0	0	0	0
42	0.0	43.0	0	0	0	0	0
43	0.0	179.2	0	0	0	0	0
44	0.0	30.8	0	0	0	0	0
45	0.0	32.3	0	0	0	0	0
46	0.0	8.5	0	0	0	0	0
47	0.0	79.1	0	0	0	0	0
48	0.0	46.3	0	0	0	0	0
49	0.0	70.0	0	0	0	0	0
50	0.0	48.6	0	0	0	0	0
51	0.0	44.8	0	0	0	0	1
52	0.0	52.5	0	0	0	0	3

7.0 Geomorphology and Soils

The selected area lies in the District- Saharanpur. The soil is mainly sandy and sandy loam, which is easily transportable by rain water after detaching causing severe soil erosion. Thus the soils have high water absorbing and low water holding capacity.

In the watershed area mainly four types of soil are found named as – sandy, sandy loam, loam and in the few area clay, loam which are also the main soil of District Saharanpur. The main showing crop in the area is wheat and gram in Rabi and rice in kharif pulses are also sowing in few areas which consume more phosphorous. Therefore, serious deficiency of phosphorous is in there area.

The project area experienced very severe bank erosion to the tune of about hundred hectare land and few hundred hectares of fertile lands has been damaged by siltation/deposition of unfertile land of Yamuna river during mansoon of 2010. This year Yamuna catchment experienced a very high and record braking rain fall in Uttarakhand, Haryana and Uttar Pradesh. Many areas were inundated due to high fluid and cause grate loss to the standing crop.

The soils are very deep (more than 200 meter) and alluvial having various types of soil textured on the surface as well as in the deeper strata down below. The sallow and the deep tube wall are plane in the sandy strata having good ground water table/aquifer.

8.0 Present Land Use in the Watershed

The watershed has diversified land uses, namely Agriculture Waste land (open scrub), seasonal water bodies etc map. Major is also under agro-horty system and agro-forestry having rows of trees along the field boundaries as well as inside the crop.

THE VARIED PRESENT LAND USE AND AREA UNDER DIFFERENT CATEGORIES IN WATERSHED IS AS BELOW

(Area in Hectare)

S.No.	Name Of Project	No Of Micro Watershed	No Of Villages Panchayat	Geographical Area Of The Villages	Reserve Forest Area	Land in other use	Land under Agriculture Use	Rainfed Area	Irrigated area out side of project	Permanent pastures	Wasteland		Treatable Area
											Cultivable	Uncultivable	
1	I.W.M.P. Saharanpur	25	19	18151	1920	548	5108	5108	10568	7	2240	1030	5108

During PRA exercise, the villagers prepared land use and hydrology maps of their villages.

8.1 Agriculture

Various agriculture land uses in the watershed are extended to diversified land capabilities starting from marginal to good class IInd lands. The watershed distinctly has three types of land i.e. leveled, sloping and degraded and undulating. The agriculture is practiced on all these soil types though the productivity considerably varies. The total area in agriculture in the project is 5108 ha, excluding 10568 ha of the tube well and canal irrigated area of the villages. The water (both for irrigation and drinking) is available in the major area. The operation of tube wells for irrigation of agricultural crops frequently leads to down ward movements/deepening of the water table. Which may lower the water supply of the sallow tube wells.

Cropping System

SN.	Season	Crops
1	Kharif	Jowar+Urd, Bajra+Mung, Arhar, Paddy,Sugarcane
2	Rabi	Wheat,Barley , Gram, Potato, Lentil,Sugarcane

One Year Crop Rotation

S.N	kharif season	Rabi season
1	Paddy	Wheat/Berseem
2	Jowar(Foddar)	Gram
3	Bajra+ Arhar	Arhar
4	Sugarcane	Potato -Sugarcane
5	Green gram + Bajra	Potato
6	Blackgram+sesasmum+ Maize	Wheat
7	Maize	Wheat+Mustard

Crop Productivity

Food crop production is a major land based activity in the watershed. Traditional cultivation practices, coupled with poor quality seeds and long duration crops varieties result in low crop yields. Crops are taken under rainfed as well as irrigated conditions. The yield levels of rainfed crops are particularly very poor. The total production by Rabi and Kharif are obtained by a medium size of holding family, by which they can fulfill the requirements of food up to 7 to 9 months in a year.

The farmers also do not have suitable cropping systems to deal aberrant weather. Weeds impose considerable constraint in producing of both Kharif and rabi crops under irrigation as well as rain-fed production system. Use of weedicide is rare in the watershed. The mixed cropping is in practice in limited area with Kharif crops like bajra and jowar+Arhar. Subsequent rabi crops in general are raised on residual soil moisture under rain-fed production system during post monsoon season. Imbalanced use of fertilizers is common in Rabi as well Kharif crops. In rainfed and irrigated production system the recommended deep ploughing for enhanced in situ residual soil moisture conservation and higher production is also not followed in the watershed. The shallow ploughing tractors drawn tillage implements are available with the farmers in the watershed but deep ploughing implements yet need to be introduced.

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

8.2 Horticulture

The watershed has organized orchards; however, farmers also have fruit plants (mango, ber, bale, guava, amla, lemon etc.) near the homesteads and kitchen gardens. The climate and soil of the area is favorable for fruit growing for sub tropical fruits in the lower reaches. Organized orchards, commercial vegetable cultivation, agro horticulture, and other system of agro forestry are in practice. The total are under orchard is about 1205 ha. out of which 480 ha. Orchards have agri horti system. Mango is the common frout tree for the system. The common agriculture crops, which are grown under mango, are wheat and Oat during Ravi and fodder crops namely Jowar and Bajra during Kharif. The part of the area about 80 ha. near Behat & Nakur is used for floriculture (Merry gold). Olericulture/ vegetable cultivation is mainly practiced in Nakur area. There are no facilities for fruit storage and preservation in the project area.

8.3 Agro-Forestry

The agro forestry practices are common in the watershed and it has good potential under existing dispositions and may play a vital role particularly with respect to minimization of cropping risk, built up soil fertility and productivity soil conservation, partly meeting out the fire wood demand of rural community The agro-forestry interventions comprising of Equilyptus, Teak, Popular, Sagaun, Shisham, Neem, etc may be applied for benefit of farmers under rainfed to irrigated production systems on leveled to sloppy and marginal agricultural using proper planting techniques and termite control measures. The multipurpose trees may also help in supplementing fire wood and fodder demands of the rural community in the watershed and may be intensively planted as hedge rows on rain-fed, marginal and degraded lands. Popular and Equilyptus are grown on field boundaries and as well as intercropping. The tree produce goes to match box, ply and paper factory.

8.4 Forest and Natural Vegetation

There are some reserve forest areas in the selected watershed, in which watershed development work will be taken by Dept of Forest Saharanpur. Natural vegetation of the watershed is very poor. The forest vegetation is predominant with Sheesham and sagon. There are some places near to nala and rivers where Neem, Amla, Palash and Shisham etc. are found. There is no reserve pasture land in the watershed. Congress weed is common in forest area and waste land.

Demography of village panchyat (Micro watershed) in IWMP IIND Saharanpur

S. No	Name of Village Panchyat	Sub Villages (No.s)	Name of Block*	Area (ha.)			Size of Holding (Nos.)				Population (Nos.)			S.C. Population (Nos.)			Distance of Facilities (km.)												Buffalo and cows	Goat and Sheep
				Private	Common	Total	Marginal	Small	Other	Total	Male	Female	Total	Male	Female	Total	Road Transport	Bus Station	Medical Facilities	Veterinary Centre	Market	Bank	Post Office	Primary School	Sr. School	Ag. Service Station	Drinking Water	Elecricity	Male & Femle	Male & Femle
1	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33
1	Rasoli	5	N	196	67	263	100	80	30	210	897	745	1642	150	130	280	0	9	9	9	9	9	0	0	4	9	0	0	225	150
2	Vazidpur	9	N	177	23	200	95	60	16	171	1875	1801	3676	417	401	818	0	7	7	7	7	7	0	0	7	7	0	0	675	275
3	Bharkedhi	6	N	270	30	300	135	65	21	221	4501	4413	8914	351	317	668	0	6	6	6	6	6	0	0	6	6	0	0	570	300
4	Kazibans	2	N	163	35	198	75	55	15	145	1819	1793	3612	56	52	108	0	8	8	8	8	8	0	0	4	8	0	0	350	215
5	Mandhor	1	N	177	30	207	95	75	20	190	1240	1120	2360	360	305	665	0	8	8	8	8	8	0	0	2	8	0	0	355	245
6	Tawer	2	N	181	20	201	85	60	15	160	4284	3599	7883	1150	1050	2200	0	7	7	7	7	7	0	0	3	7	0	0	1200	725
7	Latifpur	6	N	172	33	205	177	65	13	255	3164	2853	6017	280	252	532	0	8	8	8	8	8	0	0	5	8	0	0	975	325
8	Nasrulahgar	6	N	245	55	300	165	75	23	263	4578	3929	8507	550	501	1051	0	7	7	7	7	7	0	0	9	7	0	0	1125	415
9	Bandhi	6	N	270	30	300	145	75	25	245	3009	2898	5907	719	687	1406	0	6	6	6	6	6	0	0	7	6	0	0	1500	600
10	Dala mazara	1	N	160	40	200	75	40	50	165	1182	1100	2282	437	402	839	0	6	6	6	6	6	0	0	4	6	0	0	450	225
11	SahaspurJatt	7	G	143	57	200	116	57	20	193	2015	1876	3891	296	281	577	0	10	10	10	15	15	0	0	5	15	0	0	425	125
12	TigriRamgar	3	N	93	57	150	105	75	20	200	1917	1890	3807	341	318	659	0	8	8	8	12	12	0	0	2	12	0	0	200	100
13	Sinooli	3	G	189	21	210	105	65	16	186	910	880	1790	107	100	207	0	9	9	9	14	14	0	0	8	14	0	0	475	200
14	Bhudhakhera	7	G	167	48	215	100	51	18	169	3050	2980	6030	141	133	274	0	9	9	9	14	14	0	0	7	14	0	0	300	150
15	Nagal Rajput	4	N	116	40	156	115	65	20	200	1211	1190	2401	137	129	266	0	6	6	6	14	14	0	0	5	14	0	0	350	150
16	ChapparaJatt	6	G	161	39	200	251	65	21	337	2515	2475	4990	99	91	190	0	6	6	6	11	11	0	0	5	11	0	0	1230	435
17	Khalidpur	5	G	197	13	210	105	70	20	195	715	690	1405	311	300	611	0	7	7	7	12	12	0	0	6	12	0	0	550	225
18	Sirsaka	2	N	166	34	200	117	43	15	175	2415	2390	4805	580	561	1141	0	8	8	8	12	12	0	0	4	12	0	0	225	125
19	Bishanpur	3	G	80	40	120	119	61	17	197	3517	3493	7010	271	256	527	0	7	7	7	13	13	0	0	3	13	0	0	175	75
20	Sahrajpursaiyad	5	N	160	40	200	95	45	15	155	1415	1391	2806	190	175	365	0	6	6	6	13	13	0	0	6	13	0	0	250	100
21	Halwana	4	G	163	47	210	85	65	16	166	1105	1030	2135	53	47	100	0	3	3	3	16	16	0	0	3	16	0	0	250	100
22	Rasulpur	3	G	88	20	108	119	65	16	200	7011	6980	13991	1108	1101	2209	0	6	6	6	14	14	0	0	4	14	0	0	250	100
23	Alampur	2	G	125	25	150	111	55	12	178	3011	2918	5929	291	280	571	0	8	8	8	13	13	0	0	2	13	0	0	350	125
24	Sakrurpur	5	G	185	25	210	107	55	10	172	815	766	1581	149	137	286	0	5	5	5	14	14	0	0	4	14	0	0	350	150
25	Lakhanauti	3	G	174	21	195	127	63	20	210	911	875	1786	157	142	299	0	10	10	10	16	16	0	0	12	16	0	0	1300	425
	Total			4218	890	5108	2924	1550	484	4958	59082	56075	115157	8701	8148	16849													14105	6060

***N= Nakur Block and G= Gangoh Block**

9.0 HUMAN AND LIVE STOCK POPULATION

The total geographical area of the 20 villages Panchayat is selected under the project of I.W.M.P.IInd Saharanpur. Population of 20 villages Panchayat of the watershed is 115157 with average family size of 8 persons.

Total animal population of the watershed is 20165. Buffalo is preferred as milk animal compare to Cow; Goats are kept mainly for the meat purpose. Homestead poultry rearing is common among marginal farmers.

Wild Animals

Blue Bulls, pigs, elephants and few birds are there which damaging agriculture, horticulture and vegetable production are. The hunting of blue bulls is prohibiting by the government and the farmers have to bear great losses due to the wild animals

10.0 Infrastructure & Social Facilities

The watershed has moderate to good communication facilities and 25villages are approachable through motorable road. Literacy rate in the watershed is low because except some village all villages are having education facilities up to Junior High School. One intermediate college is established in village Laknouti. Secondary education and degree collage (with few faculties of subjects) facilities are available at Block headquarter. Degree Collage and other high education are available at Saharanpur. The buildings/ Panchayat Ghar and Barat Ghar are there and used for social gathering and religious functions. Sufficient numbers of Hand pumps have replaced all old water wells.

Nearest small markets are Nakur and Gangoh and big market at district headquarter Saharanpur. Small land holdings (average less than 1.0 ha) large family size (average 6 person) and more than 7% of the labour force of the total population living below poverty line indicate poor socio-economic status of the watershed community However a strong community spirit among the village show a positive indication for the success of any programme implemented in a participatory mode. Traditionally, the entire village community participates in the individual's work needing labour such as sowing, harvesting, house construction works etc. Social maps of the watershed villages drawn by villagers themselves, depicting village's features are attached. The project is not connected with the railway facilities how ever the following national and state highways are there.

10.1 Communication System

1. Saharanpur-gangoh-kernal
2. National highway 73 saharanpur to ambala is about 7 km away from project area but well connected with the link road leading to Block area.

Sufficient numbers of private and government buses and other micro transport system are available on these roads. The nearest railway station is about 40 km away at Saharanpur city. The sufficient number of car and tractor (Large Farmer) and motorcycle (Marginal Farmer) are there.

10.2 Natural Resource Base

Out of the total 18151 ha area of the selected village panchayat, only 5108 ha are under rainfed agriculture and designated as project area. watershed under agriculture use an area of ha is under rain fed agriculture (28.00 %) and assured irrigation by means of private tube well and canal is available in 10568

ha (58.22%),'Which is not including in the project/rainfed/treatable area' . Main source of irrigation is private tube wells and seasonal water bodies for pre-sowing irrigation only. The maps having road, drain system, contour and location are available in report in capture 5.

10.3 Livelihood

More than 75% of the total population 115157 in the watershed is engaged in farming. Therefore major source of livelihood is farming and rest about 25% labours and 3% service+ business class. Dairy Farming, rope making, poultry form, Sericulture are also practiced in the project area.

10.4 Depending on forest for fuel wood and fodder

Fuel wood: Some villagers of the selected village are using LPG to meet their cooking energy requirements. The main source of fuel is cow dung cake, woody stem of Arhar crop and Mustard. About 65 to 70 percent of the domestic energy requirement is met from the Agro by-product and cow dung cake. Rest is met out from the forest outside the village and watershed boundary. Fuel wood is obtained from the fringe forest area which is situated by the side of the few villages. Cow dung cake is a common fuel specially with poor and middle class families.

Fodder: Villages do not have any significant dependency on forest based fodder as these sources are not available in the forests. The Straw wheat, jawar, black gram and pea are major source of dry fodder. Dairy is an important business and the farmers are also growing green fodder of sorghum and bajara during Kharif and barseen during ravi.

10.5 Facilities of agriculture inputs implement and funds.

Sufficient government, private and cooperative facilities are there for the supply of seed, fertilizer and other chemicals are there. Banking facilities and private money lenders are also active in the project area. The facilities of Agro Industries are only available in the neighboring big town-Saharanpur.

11.0 Land Holdings

Majority of the watershed farmers is in category of marginal (< 1 ha) and small (1-2 ha). These small land holding are further scattered in different places which makes cultivation very difficult. Which are illustrated as below? There are 2924 (59%) marginal, 1550 (31%) Small and 484 (10%) Large farmers in the project area.

LAND HOLDING VILLAGE-WISE

Block- Nakur and Gangoh

S.No.	Name of village	Marginal (up to -1 ha.)	Small (1 -2 ha.)	Large (Above 4 ha)	total
1	Rasoli	100	80	30	210
2	Vazidpur	95	60	16	171
3	Bharkedhi	135	65	21	221
4	Kazibans	75	55	15	145
5	Mandhor	95	75	20	190
6	Tawer	85	60	15	160
7	Latifpur	177	65	13	255
8	Nasrulahgar	165	75	23	263
9	Bandhi	145	75	25	245
10	Dala mazara	75	40	50	165
11	Sahaspur Jatt	116	57	20	193
12	Tigri Ramgar	105	75	20	200
13	Sinooli	105	65	16	186
14	Bhudhakhera	100	51	18	169
15	Nagal Rajput	115	65	20	200
16	Chappara Jatt	251	65	21	337
17	Khalidpur	105	70	20	195
18	Sirsaka	117	43	15	175
19	Bishanpur	119	61	17	197
20	Sahrajpur Saiyad	95	45	15	155
21	Halwana	85	65	16	166
22	Rasulpur Urf Balamazra	119	65	16	200
23	Alampur	111	55	12	178
24	Sakrurpur	107	55	10	172
25	Lakhanauti	127	63	20	210
	Total	2924	1550	484	4958

12.0 PRA Exercises, Problems and Proposal

The PRA exercises were not extensively made and only few villages were covered mainly under RRA exercises for the preparation of project plan. PRA exercises will be conducting again while planning detailed developmental plan of each village using detail of village maps. The data and details collected or available and there analysis and interpretation were made to draw the following conclusions for participatory planning.

12.1 Crop Calendar

The present crop calendar in the watershed comprises of rice-gram, rice-lentil, rice-wheat, Arhar+Jwar mixed cropping, paddy-wheat, Til-wheat, Potato, rice- sugarcan etc. rice-wheat ,rice-gram, rice-lentil, Arhar + Jwar are the most prevailing crop rotations on the agriculture lands both i.e. rainfed and irrigated land in the watershed. Organized vegetable cultivation, fruit plantation and traditional agro-forestry system are there in the watershed. The limited vegetable cultivation in the watershed is also confined either to kitchen gardens or to be irrigated conditions in a scattered manner in small area with view to meet out the domestic demand for vegetables own.

12.2 Labour Requirement

Labour requirement is fell down to be maximum during October-November, when the harvesting of Kharif and sowing of Rabi crops are done simultaneously. The other crucial period is March-April when harvesting and threshing of Rabi crop is done on large scale within short time, and July-August when sowing of Kharif crops take place. Other employment generating enterprises having potential during the remaining month should be planned to reduce the migration of labours.

12.3 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		Sugarcane , Mustard				Maize, Paddy				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												
Migration												

12.4 Problem Identification and Prioritization

Food sufficiency, economic growth and environmental security has identified as the major issues to be addressed in the watershed area. The area has moderate to steep slope hence highly prone to soil erosion. Effective soil depth is unlimited and especially useful for good crop growth. Problems identified and prioritized the transect walk and PRA exercise in all 20 villages Panachayat have pooled and list of 10 problems representing the whole watershed was prepared. Problems have ranked as per their total Weightage in the 20 villages Panachayat. Lack of irrigation water is the greatest problem experienced by the people followed by low yield of field crops, lack of fodder availability, market and low animal productivity.

Problems Identification and Prioritization for Paisuni & Ohan Watershed

S.No.	Major Problems	Reasons	Remedy	Rank
1	Low production of crops	Lack ofc/seed & fertilizer.	timely provide c/seed & fertilizer insisting by demonstration	7
2	Lack of irrigation water	Less under ground & surface water.	By planning & execution of soil conservation measures.	3
3	Lack of drinking water	Lack of the hand pump, well, & water supply .	repairing of damaged hand pump& well,	4
4	Non availability of fuel wood	Lack of the fuel trees,	By planning of agro forest &horticulture	8
5	Lack of inputs like high yield seeds, fertilizers, pesticides etc.	Lack of the input ,related knowledge & money	Encouraging to former about & generating employment work & SHG	5
6	Medical and health care facilities for milch animals consequently low milk productivity	Remote v/hospital & more animals ,Anna pratha,	First aid knowledge by training & awareness for Anna pratha.	5
7	Lack of fodder availability and low annual productivity	No interest in pasture development	Provision of pasture development	5
8	Lack of medical & engg. educational	Institute at remote place & costly education	Insisting by training & engaging in work & SHG for money problem	3
9	Transportation facilities	Un sufficient vehicle & approaching rood.	By organization of SHG	2
10	Marketing	distance	Mandi Samitti and Bazar	6

12.5 Farmers Preferences for Fruit Trees:

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

Farmers Preferance for fruit trees

Fruits trees	Botanical name	Preferance attributes			Total	Rank
		Prodoction	Market Availability	Timber-wood		
Mango	Mangifera indica	10	08	06	24	I
Guava	Psidium guajava	08	07	04	19	III
Aonla	Emblica officinalis	04	04	03	11	V
Peach	Prunus persica	09	08	03	20	II
Lemon	Citrus spp.	07	05	03	15	IV
Papaya	Carica papaya	05	04	00	09	VII
Ber	Zizifus spc.	05	04	01	10	VI

12.6 Fodder Plants

Farmers escape themselves for making any provision regarding the fodder on own level, in the watershed.

The marketing facilities, modern scientific package from G.O. or other resources, cropping potential in the watershed, socio-economical factors etc are found to be most important factors deciding the preferences of farmers pertaining to the selection and cultivation of agricultural crops, fruits, or fodder trees in the watershed. Though area has good number of agro-forestry (field bund and intercropping) having equiptulyptus and popular as cash plantation but there is not fodder tree in the local tree. How ever following tree have some liking specially in common wasteland of the village.

Farmers Preference for Fodder Trees

Fodder	**Botanical name**	**Preference attributer**				**Total**	**Re mark**
		Production	**Animals Likings**	**offseason availability**	**Increase in milk production**		
Siris	*Aibizzia lebbek*	07	06	04	03	20	IV
Kachnar	*Bauhinia purpurea*	06	07	08	05	26	I
Babool	*Acacia tortilles*	05	04	05	06	20	IV
Subabool	*L. leucocephela*	06	04	05	06	21	III
Shahtoot	*Morus alba*	06	08	06	05	25	II
Neem	*A.indica*	03	03	03	04	13	V

Part-C
Integrated and Participatory Planning & Development

The watershed management plan is primarily a land use plan, which will take following shape after development.

Present and Proposed land use plan of the selected watershed

S. No.	Land use	Present (ha)	Proposed(ha)
1	**Total area of selected 25 MWS**	28500.00	28500.00
2	**Village Panchayat (20)**	18151.00	18151.00
	2.1 Reserve forest	1920.00	1920.00
	2.2 Irrigated land (no treatment)	10568.00	10568.00
	2.3 Land under other uses	548.00	548.00
3	**Project area of village (rainfed)**	5108.00	5108.00
	3.1 Private land	4218.00	4218.00
	a. Rainfed cropping	948.00	340.00
	b. Irrigated Agri-horti system	0.00	608.00
	c. Rainfed Agri-horti system	350.00	350.00
	d. Rainfed horti culture	100.00	100.00
	e. Agro-forestry	440.00	440.00
	f. Waste Land (i) Cultivable	2240.00	0.00
	(a) Rainfed crop	0.00	500.00
	(b) Rainfed Hort.	0.00	500.00
	(c) Agro-forestry	0.00	240.00
	(d) Silvi-Pasture MPT	0.00	1000.00
	(ii) Non cultivable to MPT	140.00	140.00
	3.2 Common Waste Land	890.00	890.00
	(a) Waste land to silvi-pasture MPT	883.00	883.00
	(b) Pasture to silvi-pasture MPT	7.00	7.00
Summery			
1	Rainfed cropping	948.00	840.00 (340+500)
2	Rainfed Hort culture	100.00	600.00 (100+500)
3	Agri-Horti system	350.00	958.00 (350+608)
4	Agro-forestry	440.00	680.00 (440+240)
5	Waste Land	3270.00 (2240+140+890)	0.00
6	MPT, Silvi Pasture	0.00	2030.00 (890+1000+140)
	Total	**5108.00**	**5108.00**

13.0 Introduction and Activities for Proposed Land Use

Watershed management plan for Yamuna watershed is proposed with specific objectives of food efficiency and income and employment generation with environmental security. In plan preparation due importance is given to topology, land suitability, irrigation potentiality, prevailing forming systems, micro-farming situation, farmers preferences and priorities along with economic and environmental securities, crop and tree selection and area distribution is done as per farmers priorities revealed through PRA exercise.

In addition to improvement in the land use, there will be increase in crop yield which will satisfy the food requirement of the people in the project area.

Present and Proposed Productivity of Different crops;-

S.N.	Kharif Season			S.N.	Rabi Season		
	Crops	Present (Qtl/h)	Proposed (Qtl/h)		Crops	Present (Qtl/h)	Proposed (Qtl/h)
1	Urd	5	8	1	Wheat,	22	30
2	Mung,	4	6	2	Barly	12	15
3	Jwar (fodder)	800	1500	3	Gram	7	10
4	Toria	8	12	4	Lentil,	9	11
5	Paddy	30	35	5	Sugarcane	450	650
6	Bajra (fodder)	600	1200	6	Mustard	8	11
7	Lobiya (fodder)	150	300	7	Bar seem(fodder)	400	700

YAMUNA WATERSHED

S.No.	Item	Requirement Q / yr.	Before Project Q / yr.		Proposed	
			Availability	Deficit or Surplus	Availability	Deficit or Surplus
1.	Cereals	51525	50025	-1500	53810	+ 2285
2.	Pulses	31362	25000	- 6362	37005	+5643
3.	Oil Seeds	5200	3730	- 1470	5515	+ 315
4.	Vegetables	30000	22240	-7760	35510	+ 5510

14.0 General Comments and Recommendations for Rainfed Agriculture

The reduction in yield or failure of crops due to Agriculture draught and loam soil with low water holding capacity and growing of high water requiring crops namely Sugarcane is affecting soil productivity of the area. The improved technology of rainfed Agriculture and watershed bases is only solution of this problem. The droughts do not have much effect due to high water table and presence of progressive farmers.

14.1 Comments

1- Crop production and livestock rearing contribute 90% to the animal fodder and failure of rains caused distress.
2- Climatic variability has increased frequency of extreme weather events, risk and vulnerability.
3- Moderate to severe metrological drought due to rainfall deficit was analyzed.
4- Synergies of forest, wasteland, non-arable, arable land, rearing of animals, Micro-enterprising equity and enabling institutions may be optimized in the watershed management programme.
5- Surface water resources are least developed in the area.
6- Improving water use efficiency by upgrading the systems should be high priority.
7- Hybrids of Jowar, input intensive new varieties of pulses, oil seed, public distribution system, neglect of yanks, dug-wells and installing of tube-wells have altered traditional coping systems and increased risks, distress and vulnerability to droughts.
8- Horticulture is another important option to diversify income, employment, risks and vulnerability to rainfall uncertainties.
9- Citrus (Nimbu), Phalsa, and Jack fruit also have potentials of diversifying risks, distress and vulnerability.
10- Forest and scrublands have opportunities to improve productivity and other services of land cover.
11- Construction of water harvesting structures in forest can improve supplies of water for wild like and downstream agriculture.
12- More than 90% of all category farmers normally take produce to the market, 64% sales being in regulated market.

14.2 Recommendations

a- Medium term

1- Desilting, renovation, repairs of tanks, checkdams, deepening and recharging of dug-well may be taken up.
2- Creation of fodder and feed block banks should be immediate priority.
3- Deworming, Vaccination and other health measures are being recommended.
4- Mineral mixture should supplement the feed to prevent loss in fertility during drought.
5- There is a scope to improve efficiency of artificial insemination (AI) ervices.
6- Naturally growing Traditional drought hardy land races of citrus, Amla, Karounda and custard apple can be top worked with improved varieties detailed in the text to enhance their value.
7- Rainwater conservation in trenches, planting of indigenous fruits, fodder trees, shrubs, grasses, pasture legumes (Stylosanthes hamata) and promoting cut and carry system of grasses in place of grazing can improve functions and community service of the forest land.
8- Waving of interest, a part or whole of principal or deferred re-payment should be inbuilt into the loaning process to maintain credit eligibility of the farmers.
9- Integrated participatory management of inputs, natural resources, social capital and innovative institutions is recommended.
10- Digging of farm ponds and new open wells can also yield quick result and provide employment.
11- Extra short duration crops and varieties given in the text can reduce vulnerability to drought and arrangement of their seed bank is suggested.
12- Normal, medium, short and extra short duration crops and varieties are listed to match with the length of growing period and amount of rainfall while preparing crop contingency plans.

b- Long term

1. Long term strategy consists of professionally designed integrated participatory treatment of watershed form ridge to valley systems. Treatment of forest, non-arable and arable land should be unified into a common plan.
2. About 2-5% of net sown area of Project is irrigated with poor and erratic supplies. Ground water over utilization is predominant and open dug-wells provide much needed but non-dependable equity. Recharging of open dug-wells can yield quick result.
3. Surface and soil profile water storage may be promoted as new tub wells and dug wells are not allowed.
4. In situ conservation of rainwater, contour cultivation, sowing on ridge or raised productivity by 15-20% at reduced risk.
5. Seed multiplication and creation of seed banks of dry land crops is least priority of private sector and public sector should be geared up.
6. Seed replacement rate of pulses, oil seed and cereals with latest improved varieties may be doubled.
7. There is 20-30% yield gap and several suggestions on rotation, seed banks, marketing, intensification or diversification are made.
8. Intensification of the existing major four livestock production system has been recommended.
9. Goat rearing especially of Jamanapari and Barberi is most economical.
10. Liquidation of animal assets is a normal practice of coping with drought. Providing consumption credit at reasonable interest can avoid distress sale of animal.
11. Castration of scrub bulls to reduce population of unproductive animals should be a long term measure.
12. Marketing of milk through Private-Producer and Consumer institution can add to the value, income and employment.
13. Setting up of a modern processing plant for meat, milk and animal related by product can improve benefits tremendously.
14. Productivity of forest resources should be improved through watershed management, planting fodder trees, shrubs and grasses to support animal husbandry.
15. Early bearing grafted Tamarind, pomegranate, fig (Anjir), guava and mango are quite hardy after their initial establishment and may be planted.
16. Drought tolerant tomatoes (Arka Vikas), rainfed onion, coriander, turmeric, ginger, beetle leaves have specific niche or micro region in the district Saharanpur.

17. Credit cycle in rainfed region should automatically switch over to two or three years under specified failures of rains.
18. Livelihood in rainfed region is highly diversified and credit against total income portfolio may be devised.
19. In order to prevent diverting of crop loans for other purpose consumptions loans for other purposes consumptions loan should also be introduced.
20. Weather based insurance (Barsha Bima) may take away some drawback of existing insurance system.
21. Almost 100% of fertilizers, seed, agro-chemicals, farm implements and animal feeds were purchased form private dealers and 90% of farmers sell some produce, purchase of inputs, warehousing, sample testing service, Banks, extension and electronic display system etc. should be set up under one roof of a modern market.
22. Special institutional arrangements like that of Sujala Watershed of Karnataka have been advocated to converge different resources and capacities for implementing package.

15.0 Proposed Development Plan of Watershed Management

Watershed development by integrated resources management is the key for sustainable production and overall development of the area especially in water deficient and drought prone regions. For medium term strategy renovation, repairer, desilting, raising embankment and crest height to increase storage capacity of check dams, tanks, ponds, deepening and recharging through dug wells, cleaning of irrigation channels etc. can be taken up. These activities may be dovetailed with NREGS, BRGF, Artificial Ground Water recharging and other such scheme.

Farm Ponds

Digging trenches, constructing gully plugs, check dams, loose boulder check dams and gabions in non-arable land is the first step to improve biomass productivity. In situ conservation of rains by land shaping, contour/field bunding and many other practices consolidate the gains of interventions in the upper catchment. Digging of farm ponds especially in heavy soils to store rain water for providing irrigation at critical stages has been found very successful in similar conditions.

Forest Land

In situ conservation of rains, eroded soil, nutrients, seeds and vegetative propagates by digging staggered contour trenches on sloping land and loose boulder or gabion check dams in the nallas. Planting of fruit and fodder, shrub, seeding of grasses or pasture legumes under joint forest management is beneficial. Fodder trees like *Albizzia Lebbek, A procera, Hardwickia binnata, Leucaenia Leucocephola (K&S24), Sesbania grandifolia/aegyptica, Ficus sps and Acacia nilotica* should be included in the plantation. Grasses like *Cenchrus ciliaris, Guinea grass and legumes like stylosanthes hamata, Clitoria trenatea* should be seeded on the soil excavated from trenches and in the barren spot. The village area has 1920 ha reserve forest area and 7 ha pasture land.

Wasteland

Self-Help Groups, User Groups, Cooperatives and producer companies of landless, small and marginal farmers can be organized for effective treatment to harness full benefits. Contour or field bunding land shaping, constructing weirs in nallas (Streams) to channelize flow, storing water for recharging or irrigation and retention of silt are important interventions, community based water harvesting, check dams or other structures can be planned for sharing irrigation for critical stages. Agro-forestry, Horticulture, Animal Husbandry, Rearing

small ruminants, Cultivation of important components of the farming systems. The PPR shows 2240 ha cultivable and 1030 ha nonculturable wasteland.

Private Land

Field bunding, land shaping contour cultivation, gully plugs and contour trenches are important for conservation rainwater. Cultivation latest high yielding varieties of pulses, oilseeds and cereals tolerant to biotic and a biotic stresses. Mulching, weeding, broad beds and furrows, a ridge and furrow system of sowing especially in black, heavy clayey soils is useful. Sowing on raised beds or ridges avoids incidence of diseases in legumes, maize and mustard etc.

15.1 Water Resources Management

The additional irrigation and water conservation potential in Project area can be created by lining of the systems to prevent losses due to seepage and efficiency improvement by land leveling, sowing on the ridges, irrigating in furrows and other micro irrigation techniques. Check dams digging farm ponds and more wells and recharging through watershed management programme to improve perenniality of the surface flows and ground water structures. Saharanpur has got good potentials for improvement old and digging of new canals.

1- Rehabilitation, Renovation and Repair (RRR) scheme of MoWR and MNREGA. There appears to be no potential for further development of ground water for irrigation. Digging of new dug wells, boring of shallow tube-wells for the purpose of drinking water supply should be taken up where ever there is a possibility of storing water by individuals/communities/WUAs. Repairs and renovation of tube well scheme should be taken

2- Roof top rain water harvesting in Ferro cement tanks and farm pond, should be encouraged to increase recharge the ground water.

15.2 Agriculture Management

Crop Production and livestock rearing are the major occupation whereas usufruct rights in forest. Crop cultivation and animal rearing alone contribute more than 90% to the overall livelihood. Crop residues contribute 67% to the animal fodder. The traditional coping mechanism for mitigating vulnerability to drought has to be farming system centric. The traditional coping mechanism of cultivating diversified drought resistant coarse cereals, dual purpose varieties for grain and fodder, mixed cropping, staggering sowing over time, short duration varieties, mixed farming, share cropping, agro-forestry and enterprises etc. have been diluted by new technologies to address competitive and emerging economic and social transformation.

Dwarf hybrid varieties of sugarcane Shorghum (jowar), wheat, improved varieties of, chickpeas (gram), pigon peas, lentils and mustard have increased inputs and productivity as well as ricks and distress. Hybrids of castor, sunflower, improved varieties of safflower, mustard, ground nut etc. require one or two critical irrigation.

Chickpeas, wheat, sorghum,paddy, maize,bareey seasame, lentils, linseed, mustard, rye, peas, urd, moong, tomato,onions, other vegetables are important crops combinations with amla, guava, lemon, mango, cows, buffalo,goat and sheep are important avoiding strategies.

Medium-term strategies

i. In situ conservation of rain water by land shaping or leveling, field bunding, contour cultivation, ridge and furrow system of rising crops is quite effective. Sowing chickpeas, soyabean, pigeon pea, groundnut and mustard on ridges prevents diseases, ensures better conservation of rain water in to furrow and mitigate risks.
ii. Improved varieties of traditionally drought to lerant sesamum, lentil, linseed, ckickpeas, dual purpose Sorghum and pearl millet should be promoted.
iii. Seed replacement rate should be increased (SRR) in the main crops of pulses.
iv. Physiologically oil seed crops are highly tolerant to droughts.
v. There are some extra short duration crops and varieties with very deep and extensive root system.
vi. Rainfed sugarcane in light textured soil should be avoided.

Contingency Plan for Drought Management

In case of delayed onset of monsoon or around 40% shortfall in rain, short duration and drought tolerant Kharif crops like Bajra for foddar and sorghum (Jowar), bean, urd bean, green gram, til, and pigeon pea requiring about 200-350 mm of water should be preferred. Other crops for shallow or light soils are Gram, Chickpeas, Masoor (Lentil), Barely, Linseed, Musturd and Sunflower.

Kharif versus Rabi Sowing

Kharif crops should be preferred in place Rabi sowing a possibility in case of one crop per systems. Use of herbicides and weedicides recommended for different crops can be another alternative to remove this bottleneck. There is need of heavy machinery on custom hiring basis for sowing on ridges and furrow.

Bridging Yield Gap

Grass root level extension activities capacity building, improving seed replacement rate, providing quality inputs at right time, integrated nutrient management, plant protection, credit, marketing etc. will be required. Kharief season followed by mustard or chickpeas in Rabi have sufficient potential.

Seed production and seed Banks

Multiplication of seeds, storage and their availability for various contingencies of normal, deficit or delayed rainfall should be planned meticulously.

Intensification and diversification

Agro-forestry based planting of Amla, Ber, Lemon, Custard Apple and fodder trees can provide robustness to income and employment. Better enabling cultural practices like zero tillage, sowing on ridges or beds and irrigation in furrow, Use of weedicides, Plastic multiching, micro-irrigation system and inter cropping in good rainfall years should be promoted.

Agriculture Markets

At least one modern primary market in each district with facilities for the farmers, cleaning, grading, ware house etc ate required. Sale of the inputs like seeds of improved varieties, fertilizes, agro-chemical, farm implement and testing of seed, soil, water etc should also be linked to the market places.

A- Crop Varieties recommended for West region of UP by different ICAR Institutes and SAUs.

Crop	Variety	Seed Production Agency
Gram	Poosa-256, Kwr-108,Rsg-936,Wcg-1,Wcg-2,Poosa-372 Pant G-186	Pantnagar, Poosa
	KGD-1168, KWR-108,Pragti	Kanpur
Pea	Rachna, KPMR-522, KPMR-144-1,Pant pea-42,Aman-2009	Pantnagar, Kanpur
	Azad, UPAS-120	Kanpur
Sugarcan	Co.Sa.8436,88230,95255,96268,767,8432,88216, 97264,92423,U.P.-0097	Shahjahanpur
	Co.J.-64,Co Pant-84212	
Urd	Pant U-30,Pdu-1,Pant Urd-31	Kanpur
	Azad 1, 2 and 3, Shekhar-1and 3	
Lentil	Narendra Masoor-1,Pant masoor-4 and 5	Kanpur
	Shekhar-2 and 3	
Paddy	Pant-10 and 12,Govind, Ratna, Narendra-80,Poosa Basmati-1,Saket-4	Pantnagar
Wheat	H.U.W.-533,K-8027and 9351,U.P.-2338-2382-2425 W.H.-542,P.V.W.-343,502,550,590	Kanpur
Rai/ Mustard	Kanti. Maya. Urvashi, Ashirwad. Vardan	Kanpur
Moong	T-44,Pant moong-3 and 4, Narendra moong-1 P.D.M.-11	Kanpur

B- New Wheat Varieties of North West U.P. , Gujarat. South Rajasthan and Chattisgarh (Recommended by Indore of ICAR)

Stage of Cultivation	Time of Cultivation	N0. of Irrigation	Varieties		Productivity Qt./ha
			Chandausi/ Sharb-ati (Aestivum)	Kathia/ Malvi (Durum)	
Early	15-30 October	Rainfed (on residual moisture)	HW2004 (Amar)- Tall HI 1500 (Amirita)- Tall HI 1531 (Harshita)- Dwarf	HD 4672 (Malavrath) HI 8627 (Malavkirti)	15-20
	15 October to 10 November	1	HW 2004 (Amar) dwarf HI1500(Amtita) dwarf	HD 4672 (Malavrath) HI 8627 (Malavkirti	30-35
On time	5-25 November	3-4	HI1418(Nveen Chandausi) Hi 1479 (Swarna) Hi 1544 (Poorna) MPO 1106(Sudha)	Hi 8331 (Malavshri) HI 8498(Mahavshakti)	50-55
		4-6	GW-273 GW-322 GW-366	Shrivelled grain if last irrigation is nat given	50-55
Late	December	4	HI 1418 (Naveen Chandausi) HI 1445 (Abha) DL 788-2(Vidisha)	-	40-45
		5	GW173 MP4010 HD2932(Pusa wheat-111)		
	January	4-5	Raj -3777 DL788-2(Vidisha) HI1418 (Naveen Chandausi) HI1454 (abha)	-	30-35
On time	Saline/ alkaline	4-5	Raj 3077 JOB666 Krl 1-4 Krl19	-	40-45

C - Choice of cultivators for contingency planning Western region of Uttar Pradesh

Swing	Cowpea bean	Moth millet	Pearl	Sorghum of crops	Preference period
Upto last week of june	V585	Jwala CZM1	Pusa23 PB106 GHB577	SPH1128 CSH21 CSH18 CSV15	Sorghum
1-15 July	GC3,V240	GSM1	HHB146 7688 Pusa 415 Bundela	CSH21 CSH18 CSV15	Sorghum Pearl millet
16-31 July	CoCP7	CZM2	GHB538 HHB68 Pusa605	Csh23 Csv17	Pearl millet Moth bean
After 31 July	Rc 101	CZM 3 RMO225 FMM96	HHM67 CZP9802	Sorghum Too risky (?)	Moth bean Cowpea

D - Relative productivity (q/ha) of common crops-Paddy and wheat

Name of Crop	Productivity(q/ha)		potential (q/ha)	Present yield (q/ha)
	India	UP		
Rice	21.78	21.71	50.00	40
Wheat	29.07	30.02	41.00	30.5
Pulses	6.00	7.25	-	05
Oil seeds	10.00	8.36	-	08

List of Early Maturing Crop Varieties

Crop	Varieties	Area of Adoption
Groundnut	JGN-3	Madhya Pradesh
Chickpea	RSG 888	Haryana, Punjab, Rajasthan, Jammu, Western UP, Uttarakhand, Dehli
	RSG 963	Haryana, Punjab, Rajasthan, Jammu, Western UP, Uttarakhand, Dehli
Lathyrus	Bio L 212	Eastern UP, Bihar, Jharkhand, West Bengal, Assam
Pearl millet	HHB 94	Rajasthan, Gujarat, Haryana, U.P., M.P.
	GHB 197	Rajasthan, Gujarat, Haryana, U.P., M.P.
	GHB 732	Rajasthan, Gujarat, Haryana, U.P., M.P.
	GHB 744	Rajasthan, Gujarat, Haryana,
	GHB 757	Rajasthan, Gujarat, Haryana,
	JBV 2	Haryana, Gujarat, U.P., M.P.
Sorghum	CSV 17, CSH 23	Rajasthan, Madhya Pradesh, Uttar Pradesh, Gujarat, Maharashtra, Karnataka, Andhra Pradesh & Tamil Nadu
Finger Millet	VL-149, VR-520	All States
	KM-65	Uttar Pradesh
	VR-708	Andhra Pradesh, Uttar Pradesh, Tamil Nadu, Karnataka & Orissa
	KM-13	Uttar Pradesh, Madhya Pradesh
	PES-400	Hills of Uttar Pradesh
Foxtail Millet	PRK-1	Uttar Pradesh
Kodo Millest	GPUK-3	All States

Organic Farming System Organic Farming System will be encouraged in the following manner:

Mulching and Crop Residue Management- Sources of mulch material includes weeds, pruning from agro-forestry trees and *in situ* grown legumes and green manure crops. The concept of live mulching is based on the principle of mixed cropping whereby a fast growing legumes is established before or simultaneously along with a widely spaced seasonal grain crops such maize, and is incorporated into the soil at an appropriate stage to act on as a mulch. Application of organic mulch material 4-5 t / ha is recommended in sandy soil-recently deposited by Yamuna River.

Seed Treatment with Rhyzobium Culture: The seed of leguminous crop like black gram, soybean, pea, etc. should be treated with Rhyzobium culture before sowing.

Tillage operation: It is advisable to carry out tillage operation like ploughing by plank just after the harvest of Rabi crops. This will be helpful in conserving moisture for sowing and germinating of next crop.

Sowing Methods: Agronomical practices like contour cultivation, strip or inter-cropping, optimum time of sowing , optimum plant population by keeping proper distance from line to line and plants to plants sowing and placement of fertilizer below the seed will help enhancing the crop yields without involving monetary inputs.

Control of Insects Pest, And Diseases: Pod borer in gram is the major insect in the watershed area leading to mark able loss in crop productivity. Similarly white blister is also a common disease in the mustard crop the management strategies of these insects, pests and diseases will also be demonstrated in the watershed for benefit of the growers and trained in farming programme in such way that they will stand to checkup in primary stage.

16.0 Engineering measures for soil conversation

Engineering measures are proposed to conserve soil and Water, slope management, safe disposal of excess water reclamation of waste land etc. Biological measures and engineering measures are complimentary and supplementary to each other Biological measures, which are protective and many times productive and long lasting need support of engineering measures for their establishment in the beginning of hazardous slopes and problems. The engineering measures are needed in the bank of Yamuna River which has created lot of damage during the year 2010 record braking flood.

16.1 Improvement of fields and terraces

Tube well irrigated field are generally in good shape and need little or no treatment. The cultivated area need following treatments.

(A) Treatment of terraces

1. Leveling & bunding for mild correction.
2. Rejuvenation – leveling bunding of slopping land with sand deposit and improvement of risers.
3. Remodeling – highly deshaped, eroded and degraded fields need drastic leveling, bunding , stone/ soil risers with sodding or use area for horticulture or agri- horti system,

(B) Treatment of fields

1. Leveling and bunding of irrigated field.
2. Smoothing of sloppy fields and bunding.
3. Packing and sodding of bunds and plantation of M.P.T.
4. Spill ways for safe disposal of excess water from the field to the drain.

16.2 Gully plugs and spillways

They are designed considering water discharge and cross section of gully and elevation difference Gully plugs may be temporary, semi- permanent and permanent types. Cemented gully plugs may act as water harvesting, structure. Limited structures have been proposed in eroding gullies considering constraints of funds. Different gully plugs and spillways are constructed according to their suitability for the location as given below.

(A)Temporary gully control structure

(i) One row or single row wooden post check dam
(ii) Two row or double row wooden post check dam filled with brush wood
(iii) Two row or double row wooden post check dam filled with boulders
(iv) Woven wire – wooden post check dam
(v) Loose boulder check dam
(vi) Sand filled plastic bag check dam
(vii) Wooden plank- post check dam

(B) Semi – temporary gully control measures

(i) Loose rock check dam (ii) Log check dam (iii) Gabion check dam

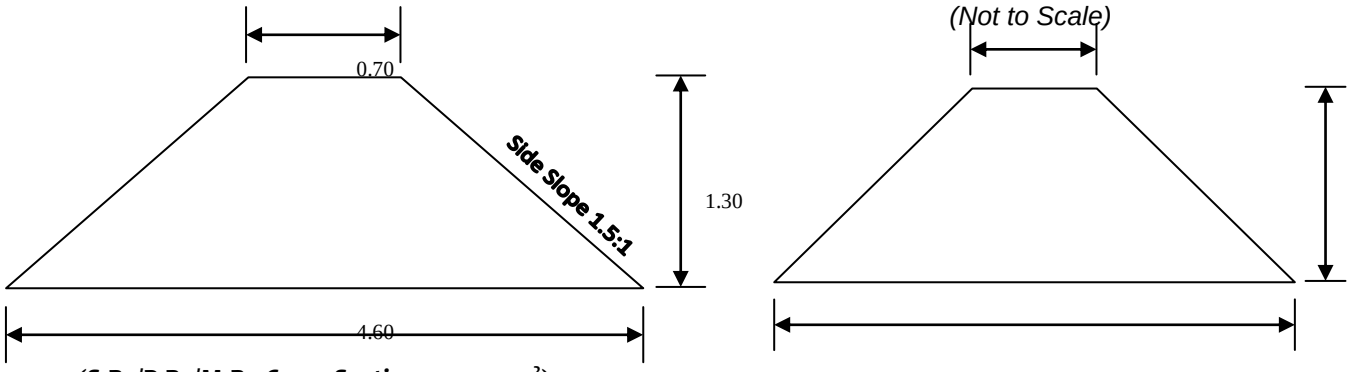
(C) **Permanent gully control structures spillway**

(i) Straight drop spillway (ii) Drop inlet spillway (iii) Chute spillway

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

Cross section:- CB=1.35 m^2, Peripheral bund = 3.12 m^2, check dam=11.0 m^2, water harvesting bund=17.5 m^2, submergible bund=4.5m^2

(Not to Scale)



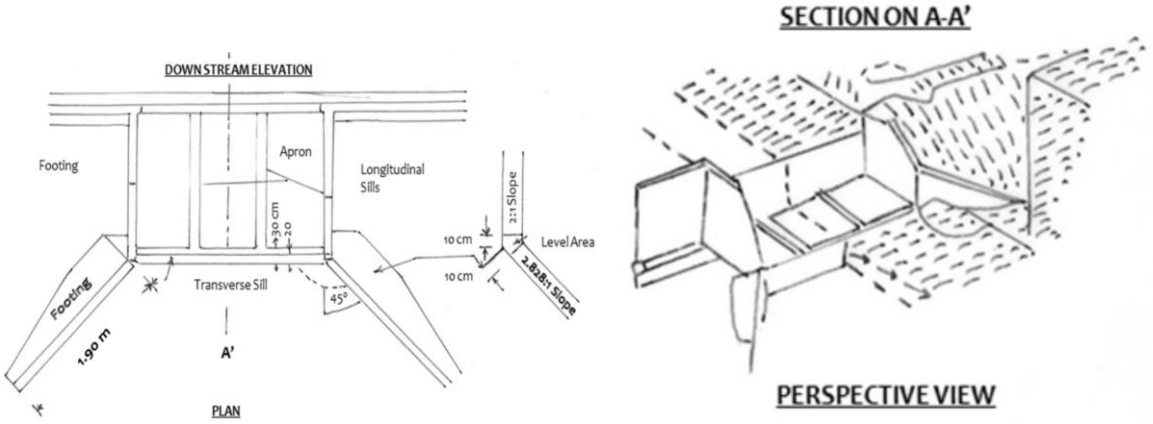
(S.B. /P.B. /M.B., Cross-Section – 3.445 m^2)

(All dimensions in Meter)

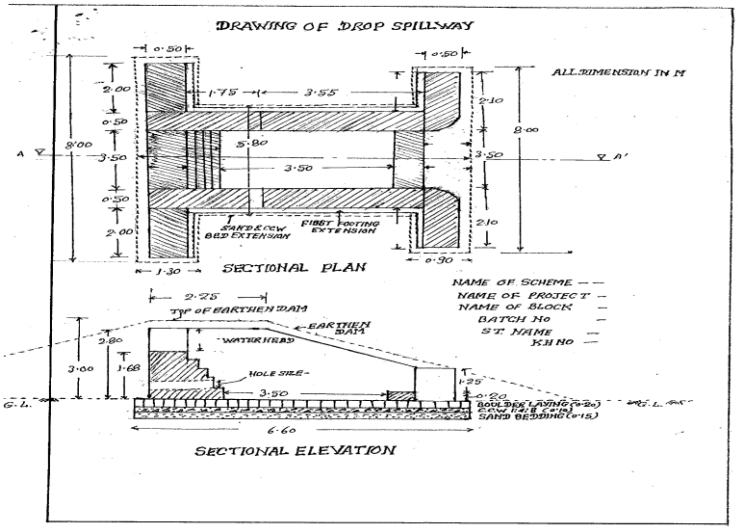
(C.D. /G.P., Cross- Section – 17.50 m^2)

DRAWING OF SPILL WAY OF CREST LENGTH 2.0 m

Shute spill way (all Dimensions in meter)



DRAWING OF DROP SPILL WAY 50M CREST



16.3 Bio-engineering measures

Staggered contour trenches are of multipurpose for erosion control, biomass production, Soil profile and ground water recharge and sedimentation of reservoirs. Graded bunds and trenches are also used diversion of flow and drainage of water logged areas.

Bio – engineering measures for degraded land (Land slide, drain, terraces, Gully) highly degraded and hazardous lands namely landslides, riverbed and banks and gullies need a good and suitable mix of engineering measures for such spots having various degrees and types of problems as are present in few lands slopes of the area.

16.4 Gullied land of the projects

There are few gullies and few villages along the river which are originating from erodible sandy soil deposited on the surface and reducing the water holding capacity and productivity of the land. The total area under gullied land is about 1-2% area. These gullies need an urgently the suitable bio-engineering measures in the drainage line catchment as well as command area. The catchment of reserved forest may be treated with water storage structure namely Staggered counter Trenches, ponds, conservation ditches bunds by forest department and area should be well vegetative using hardy tree, bushes and grass species for reducing run off and increasing time of concentration. Drain may be treated with gully plugs, water harvesting check dams and retention wall and spurs along the banks of the gully. These gully should also be well vegetated by growing water and erosion resistant species of multipurpose trees bushes and grasses. The water storage check dams will be a very suitable cheap and locally available irrigation source.

17.0 HORTICULTURE DEVELOPMENT FOR WATERSHED MANAGEMENT

It's a matter of proud that district Saharanpur is very famous for agro forestry (field boundary and inter cropping) and horti-agri system. There should be good examples of two to three tier of horticulture system having cultivation of citrus under mango tress. How ever the horticulture department may try three tier systems with the following trees.

1. Ginger/Turmeric-Citrus-Mango
2. Ginger/Turmeric-Citrus-Mango

} Karonda on orchard boundary as productive and protective fence

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:

17.1 Constraints in rainfed Horticulture Adoption without tube wells.

(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.

(c) Plant related constraints

1- Poorly survival zone
2- Problem of plant establishment
3- Physiological disorders

4- Fruit drop and poor productivity

5- Incidence of insects-pests.

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

17.2 Concepts and Advantages of Conservation Horticulture in wasteland

The project area has network of rainfed and irrigated orchard and agri-horty system. Conservation horticulture or horticulture land use based on soil and water conservation principle is a suitable alternative for utilization and management of land under rain fed 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 meets 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 evapo-transpiration, 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. Rainfed and eroded sand covered area needs planting of seedling at a deeper depths having soil with higher water holding capacity.

1- Selection of Suitable Fruits variety:-

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 is. Period from flowering to fruiting must also fall during maximum water availability period and the root ripening must be completed before the onset of dry summer (April-May).

Ber, Guava, Karonda, Bel, Amla, Lemon, and Mango etc. are the plants which fulfill this requirement and all these fruit plants are most suitable for West U.P. region under rainfed condition. The project area mainly mango and peach plantation with intercropping.

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, Ziziphus Mauritian, 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 tap root to provide moisture and nutrients to the scion. Amla and Bel are other examples of raising the improved cultivation the wild root stock.

4-In Situ Water Harvesting:-

Since on sandy soil, runoff water is considerably poor, 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. The tube well irrigated area has more then 20% land under mango and peach orchard.

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) material are used for mulching. Use of plastic mulch has been taken in rain fed and dry farming conditions to increase the productivity by minimizing evapo-transpiration losses.

6-Drip Irrigation:-

Drip irrigation saves water by 40 to 70 percent and two to three times more 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. The demonstration can help and multiply the system specially in sandy area as Sardar and Jatt of the progressive farmer.

7- Dry Land Horticulture:-

In the selected area about 1558 ha. land is planned for horticulture and agro horticulture. Species like amla, guava, ber, bel, lemon will be planted at suitable site in the watershed.

17.3 Horticulture Department

Traditionally Ber, Amla, Karounda, Custard Apple, Jack fruit, Mango, Bael and citrus growing on the private and common lands are very common.

In the selected watershed area in district Saharanpur cabbage is the main crop of vegetable on commercial basis.

The horticulture mission should aim at top working of the existing amla with the budwood of improved cultivars like NA6, NA7 and Chaikya (as pollinator) in situ grafting and top working of wild ber with the bud wood of improved varieties like Seb, Umran and Gola can give immediate returns. Agro-horticulture system with the improved varieties of ber amd amla can also be taken up on the private lands as initiative. Custard apple is in great demand and existing wild fruits can be top worked with the improved variety of Arka-sahan, released by Indian institute of Horticulture Research, Bangalore. Improved varieties of Bael anf Fig. (Anjir) are also drought tolerant to reduce the risks. Allahabad Safeda, L-49 and chittidar Guava could be another option of expanded opportunities.

West U.P. region also has possibility of cultivating drought tolerant tomatoes like Arka Vikas (Selection-22) and rainfed onions provided there is proper marketing and processing facilities. Moringa Mango and ginger are other possibilities.

Medicinal Plant

Many medicinal and aromatic plant are of high economic value and easy to cultivate. Many species are freely available in forest area and can be collected by ladies and poor farmers. The area has progressive farmer (Sardar and Jatt) and they can adopted this cultivation for diversified agriculture either as pure crop or under pure orchard having old and grown up trees. This can be introduce with the help of SHG groups.

Special attribute medicinal species of drought ecologies

Name of Plant	Uses
Commiphora wightii	Lowers the cholesterol level, Carmative, as fixative in perfumery
Cassia angustifolia	Laxative, vermifute, Cathartic, Purgative
Withania samnifera	Rheumatism, Tuberculosis, Aphrodisiac
Aloe barbadensis	Rheumatism, Purgative, Liver disorder
Pedalium murex	Diuretic, impotency, Gonorrhoea and Dysuria, Demulcent, User
Boerhavia diffusa	Diuretic, Jaundice
Cyperus rotundus	Anti-Peptic
Tinospora cordifolia	Fever, Tonic
Tribulus terrestris	Diuretic, Tonic
Peganum harmala	Jaundice, Asthma, Rheumatism, Gallstones, Colic pains
Calotropic procera	Cold and cough, Asthma, Fever
Capparis deciduas	Dental problems, Asthma, Boils and Swellings
Andrographis paniculata	Hepato Protective

17.4 Demonstration of Agro-Horticulture & Drought Resistant Technology

District Saharanpur is situated in West U.P. region where there is scarcity of water in pockets only and in summer temperature rises up to 45˚c causing upper layer of fields dry and therefore mortality rate of plants is very high. Farmers usually like to grow grain and sugarcane crops only. The production of crops decreases below the tree. Some important economical irrigation system is illustrated as below.

Using Plastic Drum of 20 Liters

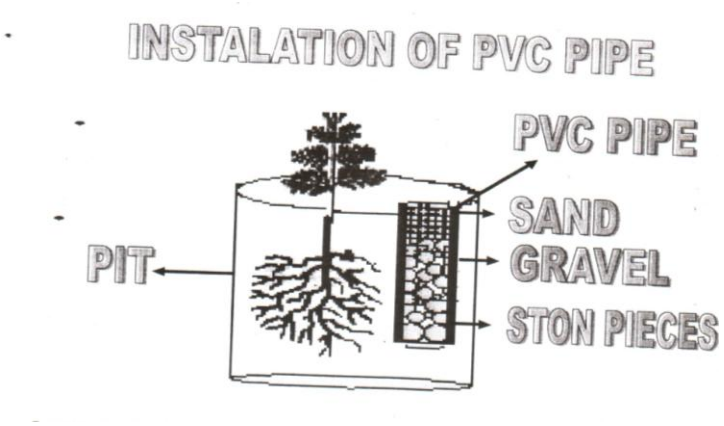
It is important to promote moisturisation in root zone of the plants. In this process plastic drums with full of water is used. Mainly crops roots go in to the soil up to 4"-5" in cereal crops and 6"-9" in pulses. Using plastic drums the plants will be planted 50-60 cm below the ground level which is below the root zone of crops. Therefore trees will not able to take nutrients from upper layer of fields and there will no effect of plants on crops.

In summer season up to 1 to 1.50m depth of soil becomes dry causes more mortality rate of plants, using drums plants are planted below 50-60 cm 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 against grazing.

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

INSTALATION OF PVC PIPE

PVC Pipe	10Cm in diameter and length 1.2 m
Filler in PVC pipe	Stone then gravel then sand
Filler in pit	Scraped top soil+FYM



Installation of PVC pipe

Famers were told to dig pits at the marked location with dimension 0.75 m x 0.75 m x 0.75 and fill with scraped soil + FYM amendment. The PVC pipes were inserted inside the pit at the adjoining of seedling/sapling before planting and the pipe was filled with stone/sand, then this pipe was removed. This hole provided sufficient moisture around root zone for proper growth and development of the plant. It also helped in reducing moisture losses from evaporation.

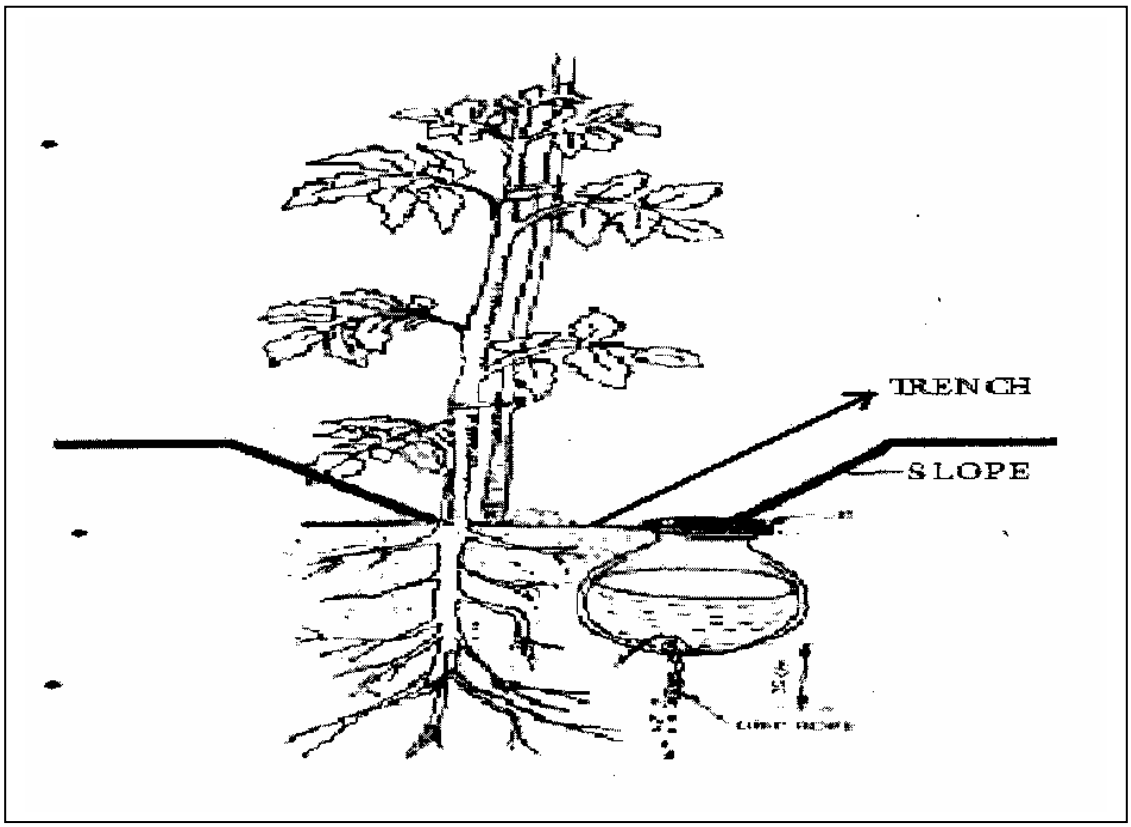
PITCHER IRRIGATION SALIENT FEATURES

A mud pitcher or desired capacity with a small hole at bottom just sufficient to accommodate a rope is taken. The rope with a knot at one end passes thought the hole so that water in very small quantities drips down and makes the soil wet. The roots of the plants draw water from the wet soil. To prevent evaporation the top of the pitcher is covered.

SPECIFICATIONS

1- A pitcher (Usually earthen) of required capacity is lowered down a pit made for the purpose at a small distance from the plant with covered top.

2- A rope (with a knot at one end inside the pitcher to keep the rope in position and control the dripping of water)of about 350mm length is used to give controlled supply of water to the soil near the plant. A small vertical hole should badge below the pitcher to accommodate the rope



Farmers told that this technique is useful but due to some operational difficulties acceptance is limited to some extent. Farmers in phasing following difficulties:

a- Very careful tillage operation is required to save Picher.
b- Lid removal is time taken process in actual field condition.
c- Some notorious people are using this pitcher for open defecation.

18.0 Live Stock Management & Dairy Development Work

18.1 Livestock Management

Four major livestock production system have been observed in the region i.e. Free Range Grazing system, mixed system, Extensive Stall fed system and intensive Stall fed system. Goats and sheep are regular grazing cattle while buffalo and cows are stallfed and grazing only in harvested field after ravi.

Daily requirement of concentrate, green and dry fodder

Animal	Daily requirement(kg)		
	Conc.	Green fodder	Dry Fodder
Milking cow producing upto 5 lit milk/day	1.5-2.0	20-25	4-5
Milking cow producing upto 8 lit milk/day	2.5-3.0	25-30	5-6
Milking cow producing upto 10 lit milk/day	3.5-4.0	30-40	5-6
Breeding Bull	3.0-3.5	25-30	5-6
Pregnant non milking cow	1.5-2.0	20-25	5-6
Pregnant heifers			
Early Pregnancy	0.5-1.0	20-25	3-4
Mid pregnancy	1.0-1.5	20-25	3-4
Late pregnancy	1.5-2.0	20-25	4-5
Young stocks	0.25-0.5	5-20	1-2

India has 15% cattle world population and area is only 2.4%: which again 63% rainfed and 33% degraded. The fodder need of India is given below:-

Year	Population India	Fodder needs (mt.)
2001	445	803
2015	600	1083

Drought relief measures followed by the Government

i. The state has initiated action for establishment of 95 cattle camps in the seven drought affected district.
ii. Provision for hand pump (2 per camp) and water troughs (2Per pump) will be made.
iii. Deworming, vaccination and treatment of animals coming to the cattle camps are also proposed ti be taken up.

iv. Natural breeding programme of buffaloes and cattle by induction of Murrah and Tharparkar/ Hariyana bulls at village level.

18.2 Fodder of Quality and Production

Tube well irrigated area will never have severe problem of drought 'how ever rainfed area with out fodder trees will certainly need following measures' of Saharanpur District has high number of cattle buffalo and Cow (14105) and goat and sheep (6060). A large number of unproductive male and female cattle are bound to suffer badly as farmers will prioritize saving their productive animals and all available resources will be deployed for their feeding.

During drought, availability of green fodder, natural and grasses and crop residues is drastically reduced. To mitigate/moderate the draught .The situation and to save the animals, following points may be considered.

i- Reduced sown area under paddy, maize, sorghum (jowar), Pearl millet and their curtailed productivity or poor growth of grasses will lead to shortage of fodder and feed.

ii- As the sowing of main Rabi fodder crops will start in October-November catch crop of maize, bajra sorghum, cowpea, bajra +cow pea, maize+cow pea and toria may be taken up after light showers during August-September.

iii- Rapeseed and mustard, Chinese cabbage, gobhi sarson and maize may be sown in September for fodder purpose where ever feasible. These crops will be harvested by November to facilitate the sowing of Rabi cereals.

iv- Under irrigated conditions, sowing of Berseem with Chinese cabbage in last week of September may be taken up for early availability of fodder. Senji and lucernmay be preferred over berseem cultivation.

v- Dual purpose crops like barley (varieties RD 2715, RD 2035, RD0200 and BH 75) may be sown in October. One cutting may be taken for fodder at 50-60 days after sowing and subsequent regenerated crop left for production.

vi- Oats may be gown in October as multi cut fodder to ensure availability of green fodder for longer period.

vii- For quick growth in cereal fodders and higher crude protein contents, application of urea as foliar spray may be taken up.

viii- Looking to scarcity of crop residues, burning of paddy straw and stubbles should not be allowed in India. Perennial grasses growing naturally can also be properly harvested, baled and fortified for animal feeding.

ix. Sugarcane tops and dry sugarcane leaves from sugarcane growing areas may be transported, enriched for crude protein content fed in scarcity areas. In regions where sugarcane crop is drying due to moisture stress, whole crop can be harvested and used as fodder.
x. If deficit is very serious, sugarcane baggage and press mud may treated and transported to deficit areas for survival feeding.
xi. Partially damaged wheat grain may be diverted for feeding to save the productive animals. How ever substandard wheat having very high aflotoxin content should be avoided as the same may result in abortion in pregnant animals.
xii. Efforts should be made to increase the production of supplement like UMMB (urea Molasses Mineral Block) like. Total Mixed ration (TMR) should be propagated.
xiii. Possibility of feeding tree leaves after lopping and grazing of grasses in forest areas may be explored.
xiv. Vegetable/fruit wastes may be collected from the market yards and factories processing such foods.
xv. Export of feed ingredients such as oil meals or de-oiled cakes etc. May be suspended temporarily and diverted for surviving the productive animals in drought affected areas.
xvi. Animal camps may be organized along nearby canals having adequate drinking water.
xvii. Progressive reduction in unproductive cattle by massive castration programme.
xviii. Induction of high yielding cross breed cows and mitigation of cross breeding.
xix. Commercial Goat forming.
xx. Establishment of produces consumers' co-operative.
xxi. Meat processing value additions & marketing facilities.
xxii. Cultivation of dual purpose coarse cereal
xxiii. Joint forest management.
xxiv. Capacity building of farmers for efficient and modern survey.

18.3 Livestock Strategy

i- Migration of the animals to higher Himalayas or other hills.
ii- Resorting to alternate day watering to Bufflao, cow, Sheep and Goats.
iii- Avoiding long distance grazing as tired animals need more and frequent watering and feeding.

iv- Since stall feeding adversely impacts the breeding efficiency in case of Sheep, therefore Sheep should always be resorted to at least partial natural grazing.

v- Periodic health checks up of all animals. For all major diseases including drought related diseases.

vi- Special care is required for productive, lactating and pregnant animals.

vii- Forest departments may be roped in to raise indigenous grasses on the fringe forest and adjoining lands under the JFM programme to provide fodder for the cattle to stall feed them.

18.4 Fodder Bank

Unlike food/grain the fodder is very difficult to transport or import during drought and deaths of cattle are inevitable. The fodder bank created for distributed of fodder during drought maintenance of village fodder farm controlled grazing of grass lands and distribution of fodder seeds is important. It is advisable to create fodder bank at block level. The sum of Rs.3.5 lakh is needed to produce 2700q fodder sufficient to feed 100 adult animal and 50 calves.

Advantages

The importance of a fodder bank can be well understood. The fodder banks will provide much needed relief and self-reliance to poor in the village especially in drought condition. The advantages are:

- It will reduce migration during drought condition.
- Farmers can purchase and sale of fodder at village, thus doing away with costs incurred by them to carry out these transactions at the city market.
- It can reduce in overall market prices of fodder during the lean Season.
- Ensure availability of fodder during the lean season at affordable and reasonable prices.
- Reduced district sale of cattle due to non-availability and/or non affordability of fodder.
- Higher income for the poor as cattle will have enough fodder even during the lean season.
- Increase employment opportunities at the village level associated with the sale, purchase and storage of fodder.

Forage Crop Varieties Suitable For Late Sown Condition

Crop	Varieties	Area of Adoption
Bajra Pearl	Poosa-23,W.C.C.-75	Uttar Pradesh
Sorghum	UP Chari-1	All India
	UP Chari-2	All India
	Pant Chari-3	All India
	Pant Chari-3	All India
	MP Chari	All India
Maize	J-1006	All India
Cowpea	G.C.-3,V-240	All India
	Ta-2,UPC-4200,UPC-5287	All India
Moong	Pant moong-2	Uttar Pradesh

18.5 Establishment of Goat Units for S.H.G.'s formed

District Saharanpur is situated in West U.P. region where the number of sheep is very less and they are small in nature. Goat population is appreciable and in fact, both are the major source of livelihood for poor people of the district.

In the state, an average 16 kg of meat is obtained from a goat, if they are dewormmed twice in the year, there would be increment of 4 kg consequently in meat on an average of the state benefiting the farmers.

Deworming and vitamins, mineral- supplement to the goats shall enhance their productivity and also improve anti-body response and protection level through vaccination, More productivity and assured health and low mortality shall result into adoption of more farmers to goat farming with the formation of more S.H.G.'s and in turn availability of goats for processing units.

Goat excreta shall be of immense help in enrichment of soil fertility.

25 Goat Units are proposed in I.W.M.P. Ist Project for S.H.G. One unit constituting 20 goats and 2 buck will be distributed to one S.H.G.

A register of S.H.G. will be maintained by Secretary of S.H.G. in the supervision of W.D.T. member. The details of beneficiaries of S.H.G. including the breed of goat reared, breeding and feeding status, deworming status, deaths, post mortem conducted claim settlement and working status of unit will be maintained in the register.

Preferences shall be given in consecutive years in purchasing the goats and bucks for new units, from old units for which database maintained shall be of use and it should be assured by buy back arrangement.

S.No.	Component	Amount
1.	Cost of 20 goats of improved breed (not less than 6 months of age) @ Rs. 3000.00 each	60000.00
2.	Cost of 2 buck of improved breed @ Rs. 5000.00	10000.00
3.	Cost of insurance @ 11.63 / unit	8140.00
4.	Feed cost for 3 months @ 250 gm/ day for goats @ Rs. 11.84/ 250 gm	5860.80
5.	Provision of deworming, mineral and vitamin supplement, treatment, vaccination @ Rs.160/ animal	3520.00
6.	The expense including monitoring expenses, register and records @ Rs. 170.00/ unit	170.00
	Total	**87690.80**
	SAY	**87700.00**

18.6 Pasture Management for Fodder

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, though we have only 2-4% 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 pasture land is only 7 ha in the village which can be put under silvi-pastoral system using MPT.

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. "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 forage 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 more specifically the term is applied to cultivated grassland used for grazing. Thus pastures are artificial grasslands with or without non-grass vegetation (such as legumes) that are created with selected high forage-yielding grass and legume species and with inputs like fertilizers and irrigation and carefully managed to exclude all other vegetation. Pastures are usually fenced and used for grazing, for hay 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)
West U.P. region-	
1- Hybrid napier +Cowpea-Berseem+Japan rape	286.3
2- Maize+Cowper-Jowar-Berseem+Japan rape	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 in country 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

The agro-forestry is highly adopted but purely restricted to only cash threes that is popular and equilyptus. There is hardly any MPT or fodder trees. The fodder needs is satisfied by fodder crop namely berseen, oat, jowar, Bajra etc. A number of fodder trees play an important role in human food security through their function as animal food sources. 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.

19.0 Management of Forest

The panchayat area has 1920 ha under reserve forest. Highly degraded and unsuitable wasteland can be put under empty+grass. The villagers are heavily dependent on forest produce. The forest department creates employment in wood collection for fuel. Plantation activities, nursery works etc. The livelihood of many people especially in Saharanpur district depends on Bamboo. Farmers make baskets, fans etc. from the Bamboo. Many traditional wooden toys of good quality are exported and provide livelihood to many people. The villagers also make'donas'from 'Palas' leaves. Thus forest play a major role in the employment generation in the region.The other major forest produce are e.g. Chironji, Honey, Ber, Bel, Khatha, Neem, Amla and medicinal plants.

The people thus living in the fringes of forests are forced to further degrade the forest by indulging in illicit felling of trees and poaching of wild animals, excessive grazing leads to vicious cycle of further degradation of forests, water availability and poverty.

19.1 Soil, Water and vegetation Conservation Measures

This will include creation of 300 staggered trenches(3MX60 cm x 45 cm) per hectare with planting/sowing of seeds of locally available multipurpose and fruit bearing trees and grasses(Amla,Ber,Bel,Behera,Neem,Albizia lebbek,Albizia procera, Acacia nilotica, Hardwickia binata, Leucaenia, leucocephala, sesbania grandiflora, Ficus Species etc. This should also include planting of local grasses like Cenchrus ciliaris, Guinea grass and legumes like Stylosanthes hamata, Clitoria ternatea for fodder production.On each trench the seeds of the trees and grasses will be planted so that 600 trees can survive after three years. The estimate for these activities for one ha would be Rs. 15000=00 for a period of three year.

This will include construction of bunds, gully plug, Checkdams, ponds lakes and water holes for the wild animals.

19.2 Role of Grassland in Soil Conservation

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

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

1- To condition the soil to make it resistant to detachment and transportation and create more absorptive surface layer.
2- To cover the soil so that it is protected from the impact of wind and rain drops.
3- To decrease the velocity of wind or runoff water.
4- To provide safe disposal outlet for surplus run off.

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

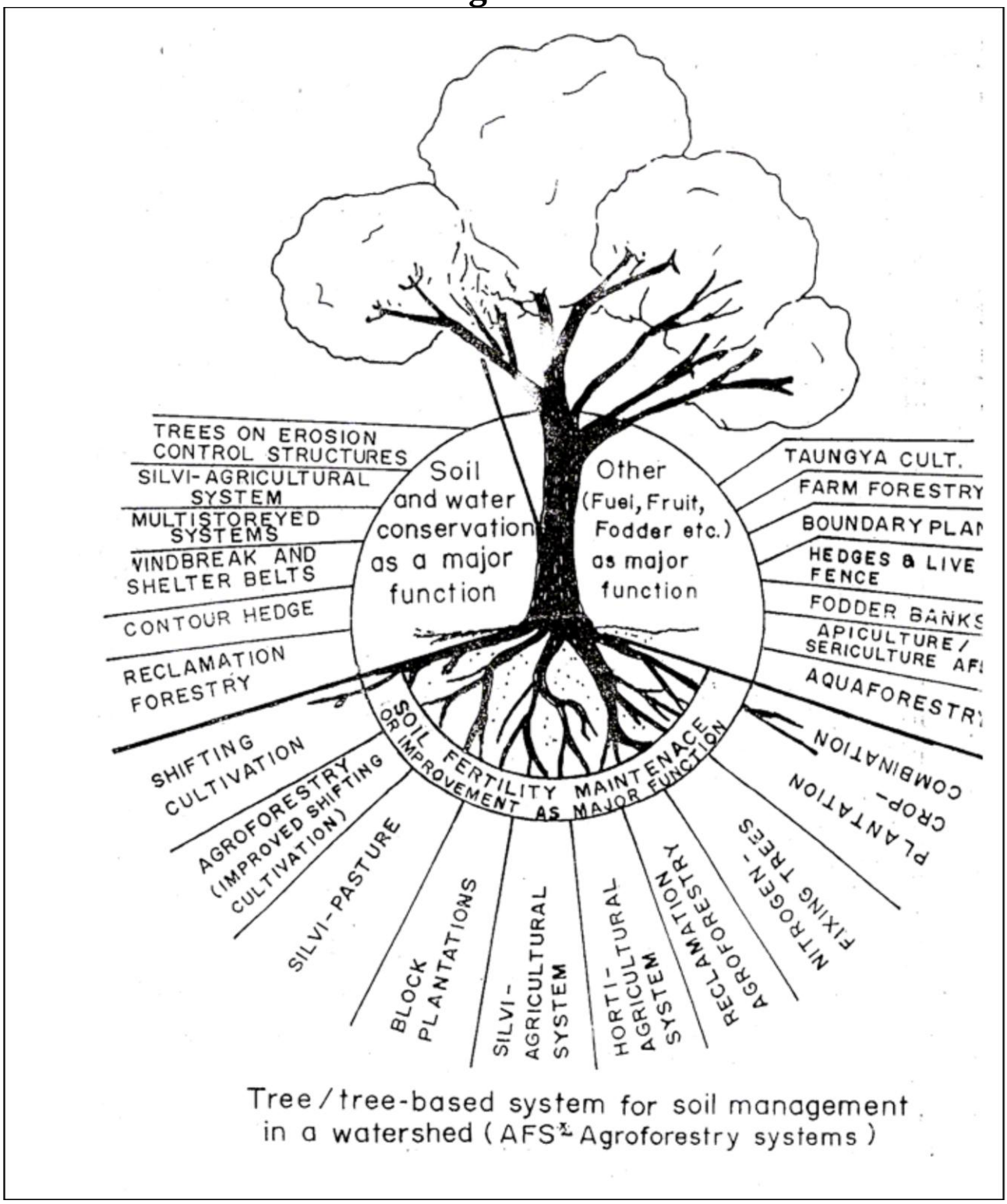
1- Strip cropping, rotational cropping or lay farming.
2- Stabilization of bunds and terraces.
3- Stabilization of gullies, diversion or drainage channels.
4- Stabilization of sand dunes.
5- Meadows and pasture on steep slopes.
6- Fertility builder for eroded soil.

19.3 Off session fodder

The density of animal population is comparably high in the district and there is a great shortage of off session fodder. The plantation of following tress, Grasses and crops are recommended to satisfy the need of the area.

1. **Irrigated fodder**-Maize, green gram, Alfalfa(Rizika), Jowar, Mukchari
2. **Rain fed tree and grasses**-
   a. **Trees** (Morus, Albizia (siris), Subabool, Babool, Pakar, Umar),
   b. **Grasses** (Napier, Bhaber, Cenchrus).

Advantage of tree



Tree / tree-based system for soil management in a watershed (AFS = Agroforestry systems)

Part – D

20.0 INDUSTRIALIZATION & EQUITY MANGEMENT

INTRODUCTION TO INDUSTRIAL WATERSHED

The watershed would be given the shape of an Industry based on equity management with special preference to poor's and women. Demonstrations by project and loan from banks will be arranged to user groups. Poverty, illiteracy, hygiene & health, rural indebtedness, employments rural upliftment, gap between poor and rich imbalance of village & city; Indian economy, social evils, resource exploitation and degradation, environmental preservation, poor condition of rural and agriculture based industries etc. are few important & catastrophic problems of Indian backwardness inspite of its rich inherited resources of soil water, vegetation, man, animal and environment. Integrated common property resource (CPR) management with the joint efforts of the project planner, women and poor villagers is the only solution to overcome the aforesaid serious and long lasting problems. The areas of industry, with the effective and active co-operation of the village institutions and villagers, are;

- Animal husbandry
- Apiculture
- Nursery & Poly house
- Social-forestry
- Cottage industry
- Pottery
- Warmiculture
- Dona, Pattal
- Poultry, Rabbitry
- Mushroom, Sericulture, Fish culture
- Joint forest management
- Agro-forestry
- Processing, storage transportation & marketing of products
- Basket from Bamboo
- Fan from bamboo and palm

Industrialization of watershed would be based on the following basic principles of common property resource management.

1- To ensure preferential participation by women, landless villagers below poverty line.
2- Intensive PRA & RRA exercises.
3- Training and visits of the participants and leaders of the village institutions.
4- Subsidy by Government and loan from banks at subsidized rate.
5- Equity management.

6- Storage, processing and marketing of products by the project in the beginning (growth) stage or till multiplication of industries with the establishment of cooperative market facilities etc.

20.1 ANIMAL HUSBAANDRY

India is proud to produce maximum milk in the Whole world, but the yield per cow is far below the potential production and need concentrated efforts at all levels to maximize production on sustained basis as milk is a complete & multipurpose food during whole life cycle of man.. The constraint and problems - for low production of milk with special reference to watershed have been described in chapter-18. Integrated efforts are required in the following areas.

Improvement of animal breed and health

Proposal has been made to supply suitable high yielding animal in place small cattle and establishment of artificial insemination facilities in the watershed at Block office, this will result in regular improvement in cattle breed and finally milk production.

Promotion of fodder production

Introduction and development of cultivated fodder, fodder trees (Panchayat lands and field builds), during rainy season, improvement of grazing land and silvipastoral system have been proposed. The pastures and controlled grazing in the forest area by joint forest policy management will be tried.

The demonstration on cultivation of fodder crops namely rainfed crop and oat will be laid on farmer's field. Introduction of mustard variety — Karan which gives higher production by top cutting and the cutting received will serve nutritive fodder to be mixed with poor straw and Stover of maize for improving palatability .Promotion of scientific storage of fodder as silage and hay.

Veterinary

There are veterinary centers with compounder in the watershed and veterinary hospitals are located at Development Block. The project will have the provision for vaccination and effective liaison with the disease cattle and veterinary hospital. Artificial insemination, vaccination and first aid will be the responsibility of the compounders by providing additional facilities by the project.

Milk Collection centers, Transport & Marketing

The business man will automatically enter into area with their milk tanker and there will not be any difficulty of milk collection. In their absence, the project will form a cooperative society having facilities of milk collection, alternatively, milk can be processed to Mawa and Ghee which can be stored in farmer's house and marketed by society on convenient date with higher income and employment generation.

Wool production

Attempts will be made that efficient rearing sheep and goat may take place on place on common land. The small cattle may not cause biotic interferences on foot hills. The watershed has got collection, weaving and marketing facilities of wool by local cottage industries. The involvement of ladies will be ensured in knitting of wool garments by distributing thread making and knitting manually operated machines. A small practical training will also be arranged by the project.

SHG

The attempts will he made to constitute SHG of milk production in the area with necessary technical administrative and admissible financial help by the project. Loan of about Rs. 10000.00 (Ten thousand only) for the purchase of one high yielding cow or buffalo will be arranged for each member of group from government /cooperative bank of the locality the banks showed their consent.

20.2 VILLAGE INDUSTRRIES

Poultry

The villagers are already acquainted with the use & importance of poultry, as many villagers are having 5 to 10 birds for their own use. This village industry can be promoted in the following ways;

- Supply of high yielding birds and cock for pedigree improvement
- Introduction of poultry feed
- Preventive measures for disease Ranikhet etc., hygiene, vaccination and regular visit & checkup by Doctor
- Demonstration & maintenance of recommended house for the birds
- Formation of user groups, storage & marketing of birds and eggs as per aforesaid guidelines for animal husbandry.

Rabbitry

The rearing of Angora rabbits has been proved to be profitable business in most of hill states and they are kept for fur, meat and pet in houses. We know that there is no replacement of rabbit by any other animal to satisfy all objectives. The rabbits will be supplied to SHG after arranging T & V.

Mushroom

Mushroom cultivation is a newly adopted industry and increasing at a faster rate in India. There is also a good market at national and international level. This industry can be introduced and promoted with the help of ladies & part time work of school children by forming user groups. Processing, storage, transportation, and marketing of the produce will be arranged by the project. The demonstrations, short training and visit of the workers & the SHG will be conducted by WDT before introducing the cultivation.

Apiculture (Bee keeping)

Bee keeping is highly profitable perennial & regular production, cost effective, labour & time saving. The honey is medicinal food of nutritive value. Bees help in transportation of pollen gains and fertilization and finally increase production, specially in cross pollinated crops namely sunflower, onion, radish and mustard, Honey production in hilly areas is comparatively high due to plenty flora available in sequence, while bees kept on sugar produce poor quality & costly honey. The user group of ladies and individual families after

short training will be benefitted with this business .The project will make provision of boxes, beehives, storage and marketing of honey.

Sericulture

Silk sarees and other garments are famous but sericulture is laogging behind especially on hill in the watershed, however alluvial plain by the. Side of river is good for mulberry as agro forestry as well block plantation for sericulture. PRA exercise shared the interest of sericulture by users group of women. Mulberry as MPT can be raised on terrace risers and panchayat land as agro forestry. In case poor growth/failure of sericulture this will provide fodder and fuel and protection to riser against erosions.

Fish culture Duckery

Ponds are the multipurpose reservoirs of farmers and being maintained for 25 to 30 different uses. There are many ponds in the watershed, mainly found in villages of watersheds, situated by the side of River. Fish culture is a non monitory business and fetches good income, tasty and nutritive food. Few farmers showed their interest to dig out pond in their land with the priority of fishery. Few community ponds have water through out the year and said to be having continuous filling through under ground spring and they are ideal for CPR management and auction money would be the income of community namely Watershed commettee (Registered body) and may be spent for common interest or utilities of village. The state fishery department may utilize these ponds after de-silting by PIA for promotion of their activity and benefit to villagers & village society. Fishery and Duckery is a good combination for their food adjustment.

Nursery and Poly houses

The cultivation of crops, vegetables, fruits, flowers, and MPT is suffering due to non availability of healthy seedlings of good varieties at the right time, KVK (ICAR), can plan for raising commercial nurseries in the watershed and its research farm at. Few self help groups can raise nursery as an additional income generation source KVK has planned to procure & supply foundation seeds to the SHG. The poly houses are meant for raising nursery, vegetation, mushroom during off season and adverse weather conditions.

20.3 Silvipastoral, Social Forestry, Van Panchayat, Joint Forest Management & Medicinal Plant

This is a workable and profitable systems for landless having animals.

Medicinal plants

Medicinal plants are the best examples of multipurpose trees, bushes, and grasses. They are hardy to grow and can serve as biological fence (agro-forestry), good surface cover against erosion, high market and regular economic return. The medicinal, perfumery, soap, cosmetic, and aroma of herbal origin are preferred throughout the world. Ayurvedic medicines are getting repeated importance.

20.4 COTTAGE INDUSTRIES

The following industries can run during free time, bad weather or night hours by all class of people in the village and women can handle such activity effectively with pleasure and interest.

- Toys and house hold utensils from soil, waste paper pulp, grasses and wood especially of Oak etc.
- Weaving cotton, wool, silk cloths, and painting.
- Knitting, tailoring and embroidery.
- Fruit processing centre.
- Carpentry, tinsmithy, black smithy jointly by men & women.
- Collection of seeds of forest trees to be purchased by forest department and medicinal, grasses, shrubs and trees required by Ayurvedic factories.
- Others

20. 5 TRANSFER OF TECHNOLOGY

EXTENSION METHODS AND DEMONSTRATION

A. Agriculture

1. Farmers vs improved method of sugarcan, Maize, Paddy, Wheat and Torai etc. cultivation.
2. Field fertilizer trials on sugarcan, Paddy, Wheat, Maize and Toria based on soil test and recommendation.
3. Introduction and performance of recommended varieties.
4. Testing of different cropping systems.

B. Horticulture

1. Frontline demonstrations & adaptive trials-Pomology, Floriculture, Olericulture.
2. Agri-horti-system, and fruit trees, & medicinal grasses & herbs.
3. Rejuvenation of orchards and fruit trees-replacement, pruning, top working.

C. Forestry and grasses on common and wastelands

1. Social forestry.
2. Silvipastoral system.
3. Front line demonstration of multipurpose trees (MPT) on terrace riser and common lands.
4. Introductory trial on medicinal trees, bushes and grasses.
5. Improvement of pasture & grass lands.
6. Establishment of composite nurseries of fruits, & vegetables and MPT's.

D. Bio-engineering technology

(i) Control of torrents.
(ii) Riverbed and bank.

INDUSTRIAL WATERSHEDS

Introduction and management of industries, storage and marketing of produce of the following industries by organizing demonstrations.

A. Agriculture based industries-

1. Animal husbandry -Cows, buffalo, sheep, goat, poultry
2. Sericulture
3. Apiculture
4. Fishery
5. Mushroom cultivation
6. Medicinal plants
7. Poly houses

B. Cottage industries-

1. Spinning, weaving, stiching, painting and knitting of wool
2. Toys, utensils and decorations
3. Collection of seed of forest trees and medicinal plants
4. Preservation of fruits
5. Rope making from grass
6. Carpentry, Tin smithy, black smithy and Potry

C. Marketing

The intermediates play a vital role in grabbing the major profit of farmers produce. The steps of marketing consist of (i) Collection (ii) Storage (iii) Processing (iv) Packing (v) Transportation (vi) Sale of produces from agriculture, horticulture, animal husbandry, agriculture based industries and cottage industries.

1. Distribution of low cost utensils, implements, instemment and machineries to users groups for processing and manufacture of products, possible at village level.
2. Distribution of collection boxes and plastic containers to avoid wooden crates and save forest.
3. Establishment of centers for supply of inputs and collection of products.
4. Establishment of mini processing and packing plants and storage facilities at Block or District level.
5. Transportation-mini multipurpose truck.
6. Establishment of sale depot or supply to marketing agencies having network at state and country level.

20.6 LATEST TECHNOLOGIES AND BUSINESS OPPORTUNITIES

Technology is available today, at a price form Department of science and Technology, Technology Bhavan new Mehrauli Road, New Delhi 110016.

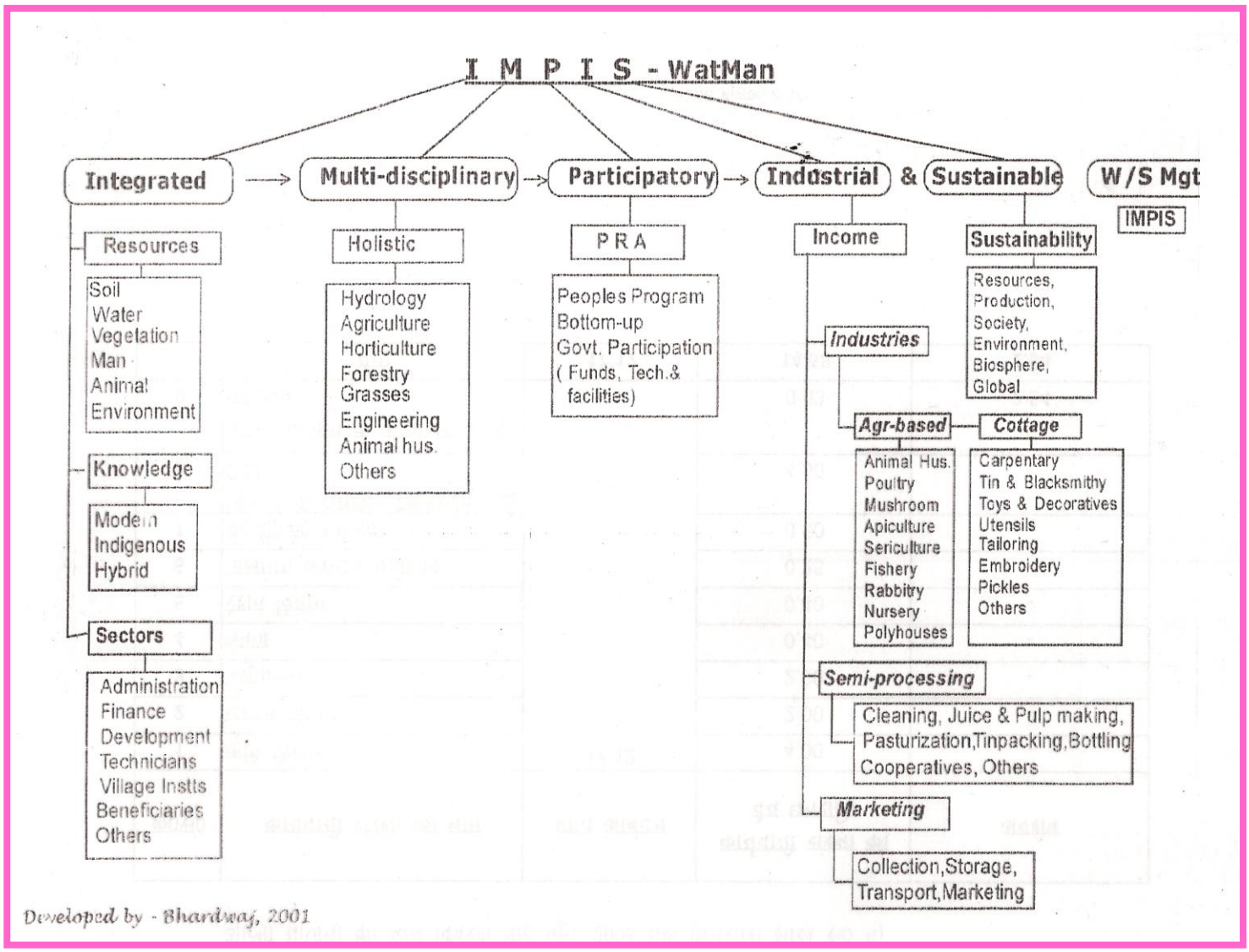
They would need help in capacity building and initiation into the field of business and industry are few important.

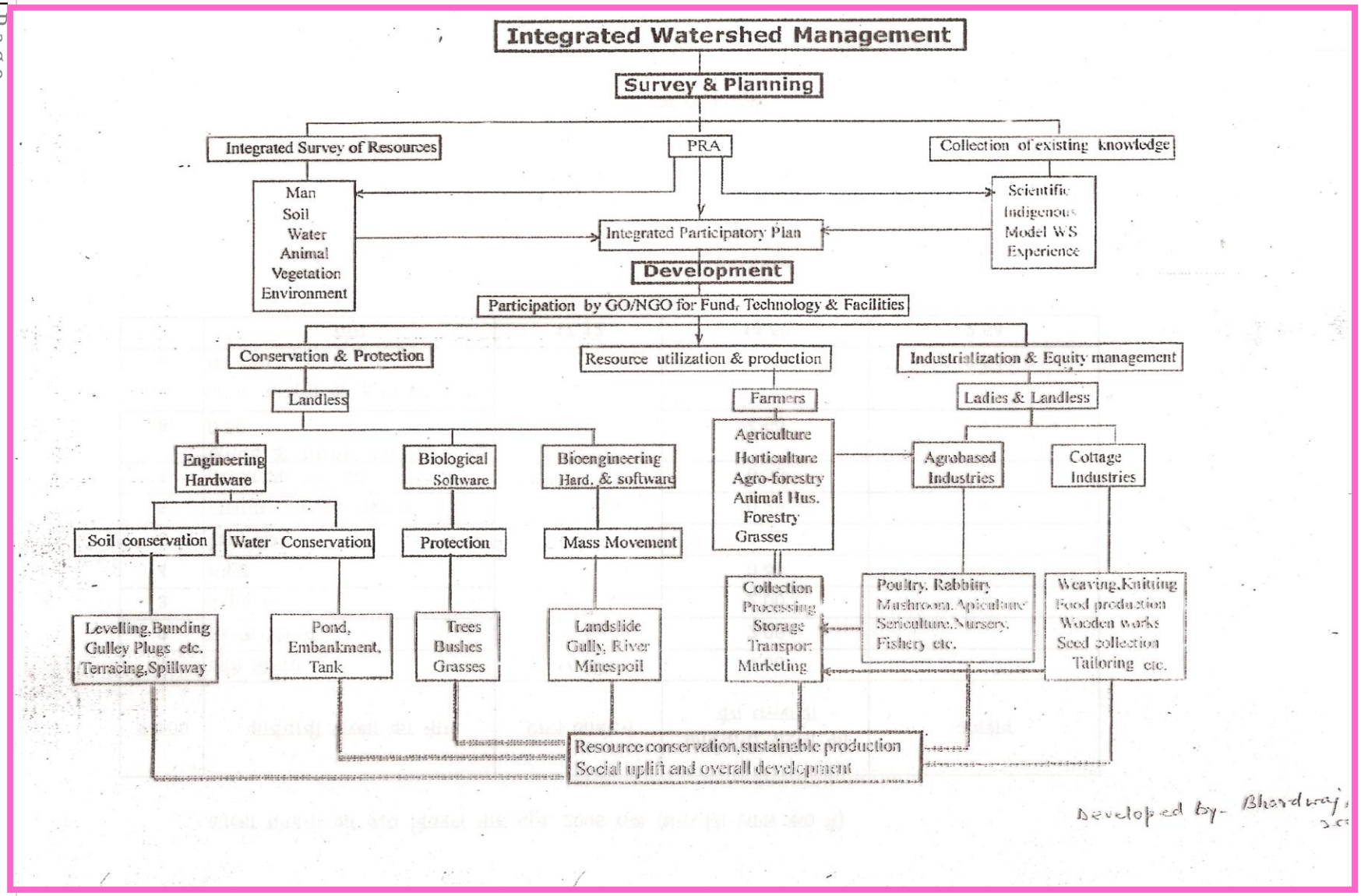
1. TMS: 130 Small scales processing of fruits and vegetables.
2. TMS: 081 Packaging of horticultural and agricultural products for export, extending shelf life to avoid waste of products during peak of the season.
3. TMS: 124 Cultivation: agricultural residues.
4. TMS: 068 Biofertilizers
5. TMS: 126 Bio technology applications in pesticides.
6. TMS: 045 Biotechnology: Tissue culture.
7. S: 062 Floriculture.
8. TMS: 090 Technologies to minimize grain storage losses.
9. TMS: 054 Technologies for potable water.
10. TMS: 071 Energy conservation in agriculture pumping stations.
11. TMS: 018 Low cost housing.
12. S: 015 Low cost infrastructures in different types of human settlements: roads.
13. S: 016 Report on low cost infrastructure: water supply, sewerage & Drainage.
14. TIFAC: V: 01: ES agro- food processing: Technology vision 2020; Executive summary: milk, cereals, fruits and vegetables.
15. TMS: 023 food processing technologies.

Part-E

Watershed Management

Watershed management is integrated, participatory, multi disciplinary technologies which can be explain with the help of following diagrams. The Post development activities are much more important and difficult to manage considering administrative social political technical and financial problems. The following two flow diagrams will explain different steps of watershed management namely integrated resource survey, compilation and tabulation of data, analysis of data, watershed planning, monitoring and evaluation.




Integrated Watershed Management
Survey & Planning
Integrated Survey of Resources
PRA
Collection of existing knowledge
Man
Soil
Water
Animal
Vegetation
Environment
Integrated Participatory Plan
Scientific
Indigenous
Model WS
Experience
Development
Participation by GO/NGO for Fund, Technology & Facilities
Conservation & Protection
Resource utilization & production
Industrialization & Equity management
Landless
Farmers
Ladies & Landless
Engineering Hardware
Biological Software
Bioengineering Hard. & softwars
Agriculture
Horticulture
Agro-forestry
Animal Hus.
Forestry
Grasses
Agrobased Industries
Cottage Industries
Soil conservation
Water Conservation
Protection
Mass Movement
Collection
Processing
Storage
Transport
Marketing
Poultry, Rabbitry
Mushroom, Apiculture
Sericulture, Nursery,
Fishery etc.
Weaving, Knitting
Food production
Wooden works
Seed collection
Tailoring etc.
Levelling, Bunding
Gulley Plugs etc.
Terracing, Spillway
Pond,
Embankment,
Tank
Trees
Bushes
Grasses
Landslide
Gully, River
Minespoil
Resource conservation, sustainable production
Social uplift and overall development
Developed by- Bhardwaj

21.0 Watershed Institutions

In addition to state level nodal agency,(SLNA) the district and project have following Committees and groups. The office bearers and committee members are given in the appendix.

21.1 State and District Level

State level nodal agency (SLA) will be constituted by State Govt.

District Watershed Development Unit (DWDU)

The district watershed advisory committee was established in the year 2009-10 under chairman ship of DM/CDO and district level officers of related state line department of the district as members. DWDU will function in close co-ordination with the District Planning Committee. There will also be a representation in DWDU from NREGA, BRGF implementing agencies at the district level

The Committee will be restructured and activated far effective functioning as per revised guide lines of water shed project. The committee will continue functioning will DWDU is established as per revised guide lines.

Government of the India will support functionally DWDU after review of available staff, infrastructure and the actual requirement.

The functions of DWDU as per revised guide lines will be as follows

a. Identify potential project implementing Agencies (PIAs) in consultation with SLNA As per the empanelment process as decided by the respective state government.
b. Take up the over all responsibility of facilitating the preparation of strategic and annual action plans for watershed development project in respective districts.

c. Providing professional technical support to project Implementing Agencies (PIAs) in planning and execution of watershed development projects.
d. Develop action plans for capacity building, with close involvement of resource Organizations to execute the capacity building action plans.
e. Carry out regular monitoring, evaluation and learning.

f. Ensure smooth flow of funds to watershed development project.
g. Ensure timely submission of required documents to SLNA/ Nodal Agency of the Department at central level
h. Facilitate co- ordination with relevant programme of agriculture, horticulture, rural development, animal husbandry, etc with watershed development project for enhancement of productivity and livelihoods.
i. Integrate watershed development project/ plans into District plans of the district planning committees. All expenditure of watershed project would be reflected in district plans.
j. Establish and maintain the District Level Data Cell and link it to the State Level and National Level Data Centre.

Project Level Institutions

Project Implementing Agency (PIA)

The SLNA would evolve appropriate mechanisms for selecting and approving the PIAs, having watershed experience that would be responsible for implementation of watershed project in different district.

Roles and Responsibilities of the PIA

The Project Implementing Agency (PIA) will Provided necessary technical guidance to the Gram Panchayat for preparation of Development plans for the watershed through Participatory Rural Appraisal (PRA) exercise, undertake community organization activities, inspect and authenticate project accounts, encourage adoption of low cost technology 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 security, 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 resources form other government programmes such as NREGA, BRGF, SGRY, National Horticulture Mission, Tribal Welfare Schemes, Artificial Ground Water Recharging, Greening India, etc.

TEAM MEMBERS of PIAs

S.No.	Name	Designation	Experience (Year)
1	Sri Janardan Dubey	B.S.A.	31
2	Sri S.P. Saraswat	Jr. Engineer	29
3	Sri S.K.Tiwari	Jr. Engineer	28
4	Sri S.P.Singh	A.Accountant	07
5	Sri Awadh Bihari	J.Clerk/cashiar	31
6	Smt. Usha Rani	Tracer	26
7	Sri Mahaveer Singh	A.S.C.I.	07
8	Sri Prakash Chand Sharma	Work Incharge	25
9	Sri Shambu	Work Incharge	25
10	Sri A.K. Sriwastav	Work Incharge	25
11	Sri Amar Singh	Work Incharge	25
12	Sri P.K.Yadav	Work Incharge	02
13	Sri D.K.Sharma	Iv Class	30
14	Sri Awadesh Kumar	Iv Class	17
15	Sri Subhash kumar	Iv Class	30
16	Smt. Basmati	Iv Class	17

21.2 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 SLNA in deserving cases keeping in new view the practical field experience of the condition. 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.

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 others, the following.

a. Assist Gram Panchayat/Gram Sabha in constitution of the Watershed Committee and their functioning.

b. Organizing and nurturing User Group and Self-Help Groups.

c. Mobilizing women to ensure that the perspectives and interests of women are adequately reflected in the watershed action plan.

d. Conducting the participatory base-line surveys, training and capacity building.

e. Preparing details 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 Details Project Report (DPR) for the consideration of Gram Sabha.

h. Under take engineering surveys, prepare engineering drawings and cost estimates for any structures to built.

i. Monitoring, checking, assessing, and undertaking physical verification and measurements of the 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 developments of the assets crated during the project period.

CONSTITUTION OF W.D.T. by P.I.A.

The private subject matter specialist as member of WDT will be engaged after getting the budget and starting of the activities. How ever specialist at S. No. 4 and 5 are already there.

Details of W.D.T

S. No.	Name of the member	Qualification	Experience year
1	Sri Janardan Dubey	B.S.A.	31
2	Sri S.P. Saraswat	Jr. Engineer	29
3	Sri S.K.Tiwari	Jr. Engineer	28
4	Mr.RajPal Gupta	Inter, Dip. In Agr.	36
5	Surabhi Battacharya	M.A., B.A. (Economics &Sociology)	05

21.3 Village Level Institutions

Watershed Committee (WC)

The Gram Sabha will constitute the Watershed Committee (WC) to implements the Watershed project with the technical support of the WDT in the village. The Watershed Committee (WC) has to be registered under the Society Registration Act, 1860. The Gram Sabha may elect/appoint any suitable person from the village as the Chairman of Watershed Committee. The secretary of the Watershed Committee (WC) will be a paid functionary of the Watershed Committee (WC). The Watershed Committee (WC) will comprise of at least 10 members, half of the members shall be representative of SHGs and user Groups, SC/ST Community, women and landless persons in the village. One Members of the WDT shall also be represented in the Watershed Committee (WC).Where the Panchayat covers more than one village that would constitute a separate sub committee for each village to manage the Watershed development project in the concerned village. Where a watershed project covers more than one Gram Panchayat, separate committees will be reconstituted for each Gram Panchayat. The Watershed Committee (WC) would be provided with an independent rented office accommodation.

The Watershed Committee will open a separate bank account to receive funds for watershed project and will utilize the same for undertaking its activities. The expenses to wards the salaries of the WDT members and Secretary of Watershed Committee (WC) shall be charged from the administrative expenses under the professional support to the PIA.

Secretary of WC will be related in meeting of Gram Sabha He will help to look after financial and administrative matters.

The process of formation of W.C. has already been started and will be completed in near future. The details of the same will be communicated to the relevant offices.

Self Help Groups

The Watershed Committee shall constitute SHGs in the watershed area with the help of WDT from amongst poor, small and marginal farmer households, landless/assetless poor agricultural labourers, women, shepherds and SC/ST persons. These Groups shall be homogenous Groups having common identity and interest who are dependent on the watershed area for their livelihood. Each Self Help Group will be provided with a revolving fund of amounts to be decided by the Nodal Ministry.

User Groups

The Watershed Committee (WC) shall also constitute User Groups in the watershed area with the help or WDT. These shall be homogenous groups of persons most affected by each work/activity and shall include those having land holdings with in the watershed areas. Each User Group shall consist of those who are likely to derive direct benefits from a particular watershed work or activity. The Watershed Committee (WC) with the help of the WDT shall facilitate resource-use agreements among the User Groups based on the principles of equity and sustainability. These agreements must be worked out before the concerned work is undertaken. It must be regarded as a pre- condition for that activity. The User Groups will be responsible for the operation and maintenance of all the assets created under the projects in close collaboration with the Gram Panchayat and the Gram Sabha.

Other Institutions

Women welfare club, youth club and Van Panchayat etc.

22.0 Human Resources Development

The technology of watershed management is multi disciplinary and location specific. All the players of watershed for grass root (farmers) to top levels (Director/principal secretary) are to we well oriented/trained with theoretical as we as practical knowledge of integrated, participatory and multi disciplinary watershed management.

Institute and organization for HRD

The training instate should field visit and development of training manual/notes as per location specific problems and need of the watershed.

a. Institute and Local office of Deendyal Upadhayay Insti., Bakshi Ka Talab Lucknow.
b. Central soil & water conservation research institute at Dehradun and regional centers an Agra.
c. Indian Grassland Fodder Research institute Jhansi.
d. C.A. Agriculture Universities and technology Kanpur.
e. S.B.B. Patel Agri. & technology University Modipuram Meerut.
f. Potato Research centre Modipuram Meerut.
g. K.V.K. Baghra Muzaffernager.
h. Others as and when needed.

T & V Programme

Also very successful and awarded watershed of similar agro-ecological area may be included in visits. The visitors should have facilities to go in depth with various good works and free discussion with the farmers of the area. Few watersheds are located at-

1. Sukkhomajri Watershed at Chandigarn
2. Tejpura Wateshed Jhansi.
3. Karnataka
4. Ravinous Watershed at CSWRCRT Instt. at Kota, Washd and Agra.
5. N.G.O. works Namely Anna Hazare
6. Other popular and awarded persons

Farmers School

Success story and studies with indigenous and improved technologies on private farmers for watershed management as a whole or individual component namely crops, fruits. Vegetables, floriculture, medicinal and aerometric plan, social forestry, fishery, cottage and village industries, are there. The trainee farmers should be taken there for training, study and discussion with the progressive farmer at farmer's school. Such progressive farmers should be identified and designate as farmer professor of specific of model of practical work. The facilities (Money, input and infrastructure) should partly or completely provided by the project for arranging training in village/farm house of farmer professor. Awarded Kriasi Pandit and their farm will be considered as farmer school. They may be identified and approved. Few examples of District Saharanpur are given below.

S.No.	Name of Farmer	Address	Specialization
1	Mr. Seth Pal Singh	Nandi Firojpur, Near Tapri Railway Station	Progressive Farmer
2	Mr. Yogesh Dahiya	Sawanlpur Nawada, Near ITC Factory	Horticulture and Vermiculture
3	Mr. Aziz Ahmad	Bihari Garh, Police Station	Forest nursery, Poultry
4	Mr. Bhopal Singh	Kamalpur (Chutmalpur)	Apiculture

23.0 Linkages

Watershed survey, planning, development, monitoring and evolution include integration. Participatory, multi-pharos and multi-disciplinary activities. Therefore single persons, deportment or committee can not fulfill the requirements of watershed management. The important areas and organization of linkages are-

23.1 Technology and Training

a. Institute and Local office of Deendyal Upadhyay Insti., Bakshi Ka Talab Lucknow.
b. Central soil & water conservation research institute at Dehradun and regional centers an Agra.
c. Indian Grassland Fodder Research institute Jhansi.
d. C.A. Agriculture Universities and technology Kanpur.
e. Others as and when needed

23.2 Funding and Developmental Agencies

Watershed Development includes all types of very costly activities for resource, problem, and need management for over all development of the area. Therefore convergence is integral part of watershed. Following agencies are given potential samce of funds.

a. MNREGA
b. Micro Irrigation
c. BRGF
d. IWMP IIND
e. NESM
f. AIBP
g. Artificial Ground Water Recharge
h. RKVY
i. State line Deptt. Agriculture, Horticulture Agro Industry, Fishery

23.3 Facilities Resources and experience of State Departments

In addition to many watershed needs of various types of input facilities and techniques to satisfy the need, problems by the following department/organizations.

a. Agriculture
b. Horticulture
c. Animal Husbandry and veterinary
d. Forestry
e. Water resources
f. Marketing
g. Agro industries
h. Media and communication
i. Industry
j. Others

23.4 Extension Agencies

Skilled and experienced persons are needed to convene farmer participation, co-operation, and satisfaction, transfer of technology and multiplication of developed model of watershed.

a. Extension Agencies of central and state govt., Universities, Blok etc.
b. Media and successful N.G.O.s
c. Experience Lady Volunteers
d. Various Club and Groups Namely youth club, Women Welfare club SHG and UG etc.

23.5 Public-Private-people Partnership (P-P-P)

This is a very good and workable system in successful implementation of small, medium and big project. Following existing system may be improve introduce and multiplied with the help of SHG and revolving funds of the project.

Few Working Models of P-P-P

S.N.	Businessmen/ Government	Farmer/Agency	Businessmen/ Government	Farmer/Agency	Public
1	Input/Investment	Land and Cultivation	Produce	Gets income more than past	Benefits are shared by individual society and nation by way of increased production, facilities and employment generation. Model of beneficial multiplication
2	Input/Investment	Lease of land and Cultivation	Produce	Pre and Post Payment of lease and cultivation	
3	Dry Small and big animal	Raising of animal by landless farmer	Gets money or animal at calving	Money or animal on payment	
4	PIA (Input) from revolving fund	SHG of ladies for raising nursery	Produce	SHG gets payment	
5	Government deptt.	Cultivation and collection medicinal plant from forest	Produce	Gets payment	
6	CERTIFIED Seed and Input	Production	Purchase	Gets Payment	
7	Land/Property	Construction of Road/bridge/dam etc.	Collect money from users	Finally Govt. gets infrastructure	

24.0 Convergence of Resources and Harnessing Synergies

Requirement of resources for unforeseen natural calamities is tremendous. There are several inter-sectoral complementary of different investment portfolios to synergize and optimize for moderation and mitigation of drought risk. The availability of funds under the following on going scheme is very attractive preposition for responding to unpredictable crop failures quickly. Some of them are mentioned below for ensuring quick result.

i. RKVY: It is a Rs. 25,000 crore scheme with approval of project decentralized to the state. Subsidy for the purchase of seed of crops. Varieties, inputs, pumping sets etc. can be planned. Various relaxations have already been notified by the Ministry of Agriculture.

ii. MNAREGA: The current year budget of Rs. 39,000 crore provides vast opportunities for relatively likely high demand of employment due to drought. These resources can be used for de-silting of thanks, ponds, other water bodies, canals, repairing or construction of water conveyance systems, field bunding, contour bunding, and digging of trenches even on the field of small and marginal farmers. Digging of farm ponds even for small and marginal farmers should be the high priority of drought adaptations and proofing land shaping, leveling of field, marking ridges and furrows or beds furrows to enhance irrigation and water use efficiency are also permitted in the scheme. Labour for spreading organic manure mulching to prevent loss of stored moisture could be booked to this scheme.

iii. Micro Irrigation Scheme: Drought managers may focus on popularization sprinklers, dipper, fertigation etc. to optimize utility of scarce water resources.

iv. BRGF: It is an united fund and has been used generally for civil works of roads etc. However, it could also be considers for implementing drought contingency activities.

v. IWMP IIND: This is about Rs. 16,000 crores scheme, common guideline are available, almost all states have been sensitized in workshop organized by NRAA and its resources can be deployed for managing drought. Livestock based intervention, activities for landless, in situ conservation and harvesting of rain for supplemental irrigation to save crops, farming systems etc. are tremendous opportunities.

vi. NFSM: Alternative contingency cropping of boro rice, winter maize, wheat, etc. can be considered under these resources.

vii. Artificial ground water recharging: It is Rs. 1600 crore scheme of the Ministry of water resources. There are about 10 million dug wells in the country, about 40% have dried up and can be recharged with these resources. There are also several other ways of recharging ground water which is an important strategy of drought proofing.

viii. AIBP: Lift irrigation scheme, water harvesting by constructing weirs, cheak dams and conveyance systems may be prioritized in the implementation process to alleviate drought stress.

24.1 Institutional Credit System

The village money lenders charge high interest rate from needy farmers Crop insurance is mandatory for the Institutional Credit and some difficulties in the re-imbursement of the insurance claims were also reported. Weather based insurance or Barsha Bima of farming may take away some draw backs of the existing scheme S.H.G. of ladies can play an important role as money lenders by monthly collection of money for members and lone for Co-Operative bank at a very low interest rate .

24.2 Marketing

About 64% sales are being made in regulated markets, 13% through middle men, 11% through traders, 9% in weekly market (haat) and 3% in the villages itself. About 100% of seeds, fertilizers, agro chemicals, animals feed and specialized farm implements are purchased from the input dealers. There fore each district should have at lest one modern market comprising of covered yards, cleaning facilities, ware houses, shops of input dealers, feed suppliers, bank, tools, implements and farm machinery dealers. Sale of the produce, purchase of inputs including animal feed and facilities for testing of soil, plants and quality of agro chemicals should be available at one place or under single roof. There are many niche commodities like cumin coriander, mehndi, spices, and medicinal plants.

25.0 Strategies for Women Empowerment

The following eye opener facts will certainty dramatizes not only women community but normal males also:-

"*Freedom depends on economic conditions even more than political ones and if a woman is not economically free and self earning she will have to depend on her husband or on some one else & dependents are never free*"

: Jawaharlal Nehru

"There is no chance of welfare of the world unless the conditions of woman are improved. It is not possible for a bird to fly on one wing"

: Swami Vivekanand

"Women constitute about half the world's population, account for 75% of the working hours, contribute up to 30% of the official labour force, yet receive only ten percent of the income and own less than one percent of the world's property"

-:U.N.Report, 1981

1 FARMERS ARE MEN OR WOMEN OR BOTH IN INDIA?

- 84% engaged in Agri. & Allied activities.
- 75m women and 15m men in dairying.
- 20m women and 1.5m. Men in animal husbandry.
- Working hours / Year / ha

  Pair of bullock - 1064
  Men - 1212
  Women - 3485
- Working hours daily – 14 to 18 hrs. and 70 – 80% manual farm operations.
- 86% live in female dependency.

2 Do not have even right over their body.

- 30% marriages - 15 to 19 year age.
- 50% give child birth before 20 years (Average 18 Years).
- Forced pregnancy, abortion, deadly diseases, AIDS, etc.
- The discarded ladies of society – widows are deprived of freedom and basic right of marriage, dress, movement, and discussion with men of society and participation in religious and social functions.

25.1 Women and Agriculture in Saharanpur district

The situation of women in male dominated society especially in India is alarming also critical in Saharanpur not only in poor class but middle and few upper class families also. In the rural scenario there are hardly any agricultural activities where women are not found contributing except probably ploughing in some pockets. They also have to look after dairy animals, poultry, fuel needs, food processing and drawing and storing water. Activities within the house are classified as housework by house wife only. About 90% of rural women are unskilled and 50% are illiterate which makes them vulnerable to exploitation. Low level of nutrition and frequent pregnancies make them prone to poor health thus limiting their productivity. Few burning problems are –

Discrimination in wages:- The remuneration and division of labour are highly sex based in agriculture sector. The basic reasons of disparity in wages are unorganised nature of woman labour, poverty, illiteracy and ignorance regarding the laws.

Off season problems:-

Women in off-season have to struggle hard to find for alternative source of income.

Non-availability of loans:-

Financial institutions are hesitant to extend credit to them as they lack security. There is lack of women's groups or co-operative which may help such women in obtaining the required credit.

Child care:-

Usually the children of women in agriculture do not get the full attention of the mothers as they are away from houses for most part of the day.

Transfer of Technology:-

Man farmer plans most of agriculture development programmes even today and technologies developed, were focussed towards male farmers. There is a clear bias in research and technology in favour of males, recently agriculture, food processing composting technology, mushroom technology, medicinal plant, sericulture, poultry, aquaculture, dairy and animal rearing are the main areas in which transfer of technology into women hands can raise the level of productivity.

25.2 Measures for upliftment of woman

National Commission on farmers, ministry of agriculture govt. of India (Dec 2005) made following recommendations for upliftment of women in agriculture.

- From a gender perspective, because of women's multiple productive roles, it is necessary that agricultural policy and programmes adopt a farming systems approach that integrates agriculture, livestock, fish, forestry and water resources, instead of treating these as separate sectors as at present
- All new assets should be registered in the name of both husband and wife, applicable to all assets such as land, houses, tree, animals, equipment etc.
- The above should also apply to membership of groups/categories which are prerequisites for access to resources, e.g. water users' associations
- Banks should be asked to accept spousal ownership/membership as collateral for loans and extend Kisan Credit Card to women.
- The distribution of land mandated by Government of India in the 1980s with regard to surplus land, wasteland, and ceiling surplus land.

- Lands, particularly wastelands, vested with government should be transferred to women's groups (including SHGs) for productive use and appropriate economic activity.

- The implementation of land reforms in a gender-sensitive framework.

- Given the failure of successive attempts to ban swidden (jhum, podu) cultivation in which women are especially involved, it is necessary to develop and diversify swidden with multiple species and high value crops (medicinal, aromatic plants) to increase, yield, enhance food security and perhaps improve women's income.

- Resource support, value addition and market linkages for the traditional crafts in which farming women are involved, either full time or as supplementary activities, need special attention.

26.0 SOCIO ECONOMIC ANALYSIS OF THE PROJECT

Sustainability and Environmental Security

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

Soil and water conservation programmer on watershed basis generates four kinds of benefits i.e. economic, protective (ecological) environmental and employment generation .Evaluation are being carried out in terms of physical, Social and economic aspects. Physical and social evaluation could be categorizes in tangible and intangible achievements. For evaluation purpose most widely used technique is Benefit-Cost analysis (BCA). Apart form BCA, other criteria such as internal rate of return (IRR), NET PRESENT VALUE (NPV) and pay bock period (PBP) may also be used. Cost effectiveness and sensitivity analysis should also be carried out.

Project evaluation is both, ex-ante and ex-post. Ex-ante evolution is done before actual implementation of the projects.

1. **Net present value (NPV):** this is simply the discounted value of gross benefits minus the discounted value of costs.
2. **Internal Rate of Return (IRR):** it is the rate of discount which makes the present value of benefits equal to present value of costs.
3. **Benefit cost ratio (BCR):** It is defined as ratio of present value of gross benefits to the present value of total costs. If BCR> 1.0 accept the project, other wise reject.
4. **Sensitivity Analysis:** Benefits and costs estimates are projected for future events. They can never be forecasted.

26.1 ESTIMATION OF COST BENEFIT RATIO (CBR)

Different land uses adopted under integrated watershed management project can be grouped in four sectors, i.e. agriculture, orchard, plantation of MPT and pasture. Each sector is evaluated separately as well as after pooling them together. To access the economic viability of the programme discounted cash flow was computed considering 10 years project life and 12 to 25 % discount rate. For this, only productive benefits from each sector, such as, additional production of crops, horticulture produce, fodder, fuel and fiber due to project activities were taken into account. Environmental externalities and trade-off were not quantified and could not be included.

26.2 CONSOLIDATION OF COMPONENTS: FOR THE 25 MICRO WATERSHED PHASING

No.of village	**25**	**No.of MWS**	**25**
IWMP IIND-	**Saharanpur IInd Project**	**Total area Panchayat**	**18151.00 hect.**
Block	**Nakur and Gangoh**	**Treatable area (rainfed)**	**5108.00 hect.**
Year Wise Physical and Financial Outlays		**Project Duration**	**(Year – 2010-11 to 2014-15)**

c	Components	Ist year		IInd year		IIIrd year		IVth year		Vth year		Total	
		Physical	Financial	Physical	Financial	Physical	Financial	Physical	Financial	Physical	Financial	Physical	Financial
1	2	3	4	5	6	7	8	9	10	11	12	13	14
A-1	Management Cost 10%	-	12.25920	-	12.25920	-	12.25920	-	12.25920	-	12.25920	-	61.2960
A-2	Monitoring 1%	-	1.22592	-	122.59200	-	1.22592	-	1.22592	-	1.22592	-	6.12960
B	Evaluation 1%	-	1.83888	-	1.07268	-	1.07268	-	1.07268	-	1.07268	-	6.12960
B-1	EPA For Improvement 4%	-	24.51840	-	0	-	-	-	-	-	-	-	24.5184
B-2	Institutional Building 5%	-	18.38880	-	4.08640	-	4.08640	-	4.08640	-	-	-	30.6480
B-3	DPR Preparation 1%	-	6.12960	-	-	-	-	-	-	-	-	-	6.1296
C-1	Watershed development 50%	766.20	45.97200	1277.00	76.62000	1277.00	76.62000	1277.00	76.62000	510.80	30.64800	5108.00	306.4800
C-2	Livelihood Program(comity base) 10%	-	6.12960	-	13.79160	-	13.79160	-	13.79160	-	13.79160	-	61.2960
C-3	Production system & Micro enterprises 13%	-	6.12960	-	18.38880	-	18.38880	-	18.38880	-	18.38880	-	79.6848
D	Consolidation Phase 5%	-	-	-	-	-	-	-	-	-	30.64800	-	30.6480
	Total- 100%	766.20	122.59200	1277.00	127.44460	1277.00	127.44460	1277.00	127.44460	510.80	108.0342	5108.00	612.9600

26.3 Physical Details of the village Proposed developmental activities

Village Panchayat	Micro watershed Code	water Resource			Soil conservation Structure			Seed Packet (Demo)		Horticulture	Silive Pasture	E.P.A.*
		Pond	Drinking Water Tank	Irrigation/ Drain	Land Treatment Bund	Spillways	CD/CW etc.	Grain (q.)	Vegetable (No.)			
		No.	No.	ha.	ha.	No.	No.	No.	No.	No.	ha.	No.
1	2	3	4	5	6	7	8	9	10	11	12	13
Rasoli	2C6B7b2b	0	1	15	200	4	3	50	100	25	67	1P
Vazidpur	2C6B7b3e	0	1	10	120	4	5	55	100	23	23	1P
Bharkedhi	2C6B7b3b	0	1	8	180	4	4	60	100	28	30	1P
Kazibans	2C6B7a3c	0	1	13	110	3	3	45	50	20	35	1P
Mandhor	2C6B7b2a	0	1	12	180	4	5	55	100	24	30	1P
Tawer	2C6B7b3a	0	1	5	178	4	7	65	100	24	20	1P
Latifpur	2C6B7b3b	0	1	10	123	4	2	60	100	20	33	1P
Nasrulahgar	2C6B7b1d	0	1	18	200	5	9	45	100	28	55	1P
Bandhi	2C6B7b1c	0	1	14	200	5	6	55	100	25	30	1P
Dala mazara	2C6B7c2f	0	1	7	150	4	3	65	100	25	40	1P
Sahaspur Jatt	2C6B7b1b	0	1	10	150	4	4	70	100	25	57	1P
Tigri Ramgar	2C6B7c2e	0	1	8	120	3	6	55	50	18	57	1P
Sinooli	2C6B7c2d	0	1	10	126	4	7	65	100	24	21	1P
Bhudhakhera	2C6B7d2d	0	1	12	150	4	9	50	100	23	48	1P
Nagal Rajput	2C6B7a2d	0	1	7	94	3	3	40	50	20	40	1P
Chappara Jatt	2C6B7a2c	0	1	10	120	4	5	70	100	22	39	1P
Khalidpur	2C6B7d2a	0	1	11	126	4	5	65	100	26	13	1P
Sirsaka	2C6B7d3b	0	1	5	100	2	1	110	75	25	34	1P
Bishanpur	2C6B7d3a	0	1	5	92	2	1	110	75	25	40	1P
Sahrajpur Saiyad	2C6B7c2c	0	1	12	123	3	3	120	75	25	40	1P
Halwana	2C6B7b1a	0	1	13	123	2	3	120	75	25	47	1P
Rasulpur Urf Balamazra	2C6B7c2b	0	1	7	60	1	1	70	50	25	20	1P
Alampur	2C6B7d2c	0	1	7	90	2	2	70	50	25	25	1P
Sakrurpur	2C6B7c2a	0	1	8	120	1	2	70	50	25	25	1P
Lakhanauti	2C6B7d2b	0	1	8	128	2	2	70	50	25	21	1P
Total-		0	25	245	3363	82	101	1710	2050	600	890	
Total Cost (In Lakh)		0.00	5.00	36.75	183.15	12.30	10.10	0.43	2.05	30.00	26.70	24.5184

* **M**=meeting Place, **P**=Path, **S**= School Boundary, **D**= Drain Symbol and **RW**=Retainsion wall with no. Details are enclosed in the appendix. **Total cost = Work + EPA=306.48+24.5184=330.9984**

Financial Details of the village proposed developmental activities

Village Panchayat	Micro watershed	water Resource			Soil conservation Structure			Seed Packet (Demo)		Horticulture	Silive Pasture
		Pond	Drinking Water Tank	Irrigation/ Drain	Land Treatment Bund	Spillways	CD/CW etc.	Grain (q.)	Vegetable (No.)		
		No.	No.	ha.	ha.	No.	No.	No.	No.	No.	ha.
1	2	3	4	5	6	7	8	9	10	11	12
Rasoli	2C6B7b2b	0	0.20	2.25	9.00	0.60	0.30	0.01	0.10	1.25	0.98
Vazidpur	2C6B7b3e	0	0.20	1.50	7.20	0.60	0.50	0.01	0.10	1.15	0.98
Bharkedhi	2C6B7b3b	0	0.20	1.20	7.80	0.60	0.40	0.02	0.10	1.40	0.98
Kazibans	2C6B7a3c	0	0.20	1.80	6.60	0.45	0.30	0.01	0.05	1.00	0.98
Mandhor	2C6B7b2a	0	0.20	1.95	7.80	0.60	0.50	0.01	0.10	1.20	0.98
Tawer	2C6B7b3a	0	0.20	0.75	10.05	0.60	0.70	0.02	0.10	1.20	0.98
Latifpur	2C6B7b3b	0	0.20	1.50	7.38	0.60	0.20	0.02	0.10	1.00	0.98
Nasrulahgar	2C6B7b1d	0	0.20	2.70	9.00	0.75	0.90	0.01	0.10	1.40	0.98
Bandhi	2C6B7b1c	0	0.20	2.10	9.00	0.75	0.60	0.01	0.10	1.25	0.98
Dala mazara	2C6B7c2f	0	0.20	1.05	7.50	0.60	0.30	0.02	0.10	1.25	0.98
Sahaspur Jatt	2C6B7b1b	0	0.20	1.50	7.50	0.60	0.40	0.02	0.10	1.25	0.98
Tigri Ramgar	2C6B7c2e	0	0.20	1.20	7.20	0.45	0.60	0.01	0.05	0.90	0.98
Sinooli	2C6B7c2d	0	0.20	1.50	7.56	0.60	0.70	0.02	0.10	1.20	0.98
Bhudhakhera	2C6B7d2d	0	0.20	1.80	9.00	0.60	0.90	0.01	0.10	1.15	0.98
Nagal Rajput	2C6B7a2d	0	0.20	1.05	5.64	0.45	0.30	0.01	0.05	1.00	0.98
Chappara Jatt	2C6B7a2c	0	0.20	1.50	7.20	0.60	0.50	0.02	0.10	1.10	0.98
Khalidpur	2C6B7d2a	0	0.20	1.65	7.56	0.60	0.50	0.02	0.10	1.30	0.98
Sirsaka	2C6B7d3b	0	0.20	0.75	6.00	0.30	0.10	0.03	0.08	1.25	0.98
Bishanpur	2C6B7d3a	0	0.20	0.75	5.52	0.30	0.10	0.03	0.08	1.25	0.98
Sahrajpur Saiyad	2C6B7c2c	0	0.20	1.80	7.38	0.45	0.30	0.03	0.08	1.25	0.98
Halwana	2C6B7b1a	0	0.20	1.95	7.38	0.30	0.30	0.03	0.08	1.25	0.98
Rasulpur Urf Balamazra	2C6B7c2b	0	0.20	1.05	3.60	0.30	0.10	0.02	0.05	1.25	0.98
Alampur	2C6B7d2c	0	0.20	1.05	5.40	0.15	0.20	0.02	0.05	1.25	0.98
Sakrurpur	2C6B7c2a	0	0.20	1.20	7.20	0.15	0.20	0.02	0.05	1.25	0.98
Lakhanauti	2C6B7d2b	0	0.20	1.20	7.68	0.30	0.20	0.02	0.05	1.25	0.98
Total-		0	5.00	36.75	183.15	12.30	10.10	0.43	2.05	30.00	24.50

26.4 Computation of Net Present Value (NPL), Benefit Cost ratio (B: C) and Internal Rate of Return (IRR) (Rs. in lacs)

Particulars			Year										Total
			Ist	IInd	IIIrd	IVth	Vth	VIth	VIIth	VIIIth	IXth	Xth	
Construction cost		2	122.592	127.445	127.445	127.445	108.034	-	-	-	-	-	612.960
Operation and maintenance cost		3	4.900	12.000	13.260	15.110	18.420	20.630	20.630	20.630	20.630	20.630	166.840
Total cost		4 = 2+3	127.49	139.44	140.70	142.55	126.45	20.63	20.63	20.63	20.63	20.63	779.80
Total benefit (Average)		5	12.00	20.00	35.00	70.00	180.00	257.89	257.89	257.89	257.89	257.89	1606.450
Net benefit		6 = 5-4	-115.492	-119.445	-105.705	-72.555	53.546	237.260	237.260	237.260	237.260	237.260	826.650
NPV & IRR	D.R.12% NPV	7	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404	0.361	0.322	
		8 =6x7	-103.134	-95.197	-75.262	-46.145	30.360	120.291	107.242	95.853	85.651	76.398	196.056
	D.R.15% NPV	9	0.87	0.756	0.658	0.572	0.497	0.432	0.376	0.327	0.284	0.247	
		10=6x9	-100.478	-90.300	-69.554	-41.501	26.612	102.496	89.210	77.584	67.382	58.603	120.054
	D.R. 20% NPV	11	0.833	0.694	0.579	0.482	0.402	0.335	0.279	0.233	0.194	0.162	
		12=6x11	-96.205	-82.895	-61.203	-34.971	21.525	79.482	66.196	55.282	46.028	38.436	31.676
	D.R. 25% NPV	13	0.800	0.640	0.512	0.410	0.310	0.262	0.210	0.168	0.134	0.107	
		14 =6x13	-92.394	-76.445	-54.121	-29.747	16.599	62.162	49.825	39.860	31.793	25.387	-27.081
B:C at 12% D.R.	Net Present cost												
		15 =4x7	113.850	111.137	100.182	90.665	71.700	10.459	9.325	8.335	7.447	6.643	529.743
	Net Present benefit												
		16 =5x7	10.716	15.94	24.92	44.52	102.06	130.75	116.566	104.188	93.0983	83.0406	725.799

Result in conclusion:-

3. Net Present Value (NPV) at 12 % = 196.056
4. Cost Benefit Ratio (B:C) = Net Present Benefit/Net Present Cost=725.799/529.743 = 1.37
5. Internal Rate of Return = 20+{31.676/(31.676+27.081)}×(25-20) = 22.70%

26.5 Sensitivity Analysis:

S. No.	Situation	Evaluation	
		NPV (lakh Rs.)	BCR
1	Average normal situation	196.06	1.37:1
2	Cost increased by 10% and benefits remain same (Average situation)	189.25	1.22:1
3	Benefits decreased by 20 percent with Average situation cost	102.45	1.18:1
4	When situation 2 and 3 Occurred jointly	95.21	1.12:1

Result – The project is highly cost effective considering N.P.V., I.I.R and Sensitivity Analysis. The benefits will significantly be increased if developed in participatory mode.

26.6 Expected/Estimated Outcomes of IWMP IIND (2010-11)

S. No.	Item	Unit	Pre-Project Status	Post-project Status
1	2	3	4	5
1	Status of water table	Mtr.	12.05	10.50
2	Drinking water tank (man & animal)			
3	Quality of drinking water		Satisfactory	Well improved
4	Availability of drinking water		Sufficient	Sufficient
5	Increase in irrigated area	hect.	0.00	608.00
Change in cropping/land use Pattern				
6	Area under agricultural crop	hect.	8183.00	9137.00
	(i) Area under single crop	hect.	4200.00	3455.00
	(ii) Area under double crop	hect.	3017.00	3762.00
	(iii) Area under multiple crop	hect.	-	1920.00
	(iv) Cropping intensity	%	140	210
7	Increase in area under vegetation (MPT) in waste land	hect.	0.00	2030.00
8	Increase in area under horticulture	hect.	450.00	1559.00
9	Area under fuel & fodder	hect.	0.00	2030.00
10	Increase in milk production	Kg. per day	6000	7900
11	No. of SHGs	No.	0	25
12	Increase in Livelihood		farming and labour work	Farming and self employment, SHG and UG activities
13	Migration	%	05	03
14	House Holding People	%	90	95
15	Credit linkage with banks	-	40	75

For estimation of crop production from crop husbandry for the remaining part of project life 10 years and average yield is taken for the subsequent years. Cost incurred in soil conservation measures, if any, and additional input used with improved crop production technology ware considered for estimation of cost of production.

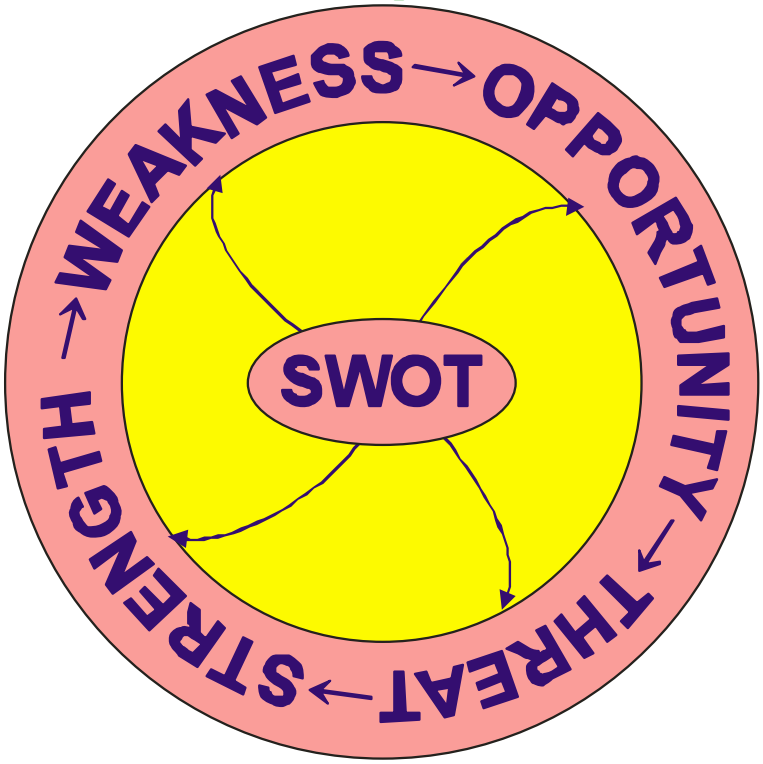
For measurement of costs and benefits from horticulture plants, all plants are grouped into three stages of development i.e. (i) non-bearing, (ii) initial bearing, and (iii) full bearing for each year till all the plants reached full bearing stage or up to the project life. To account for the problem of alternate bearing in some of horticulture plants, the yield is reduced by 30% for the off year. For the projection of future yields, the average yield of all the previous years was taken as an average yield for all the remaining years.

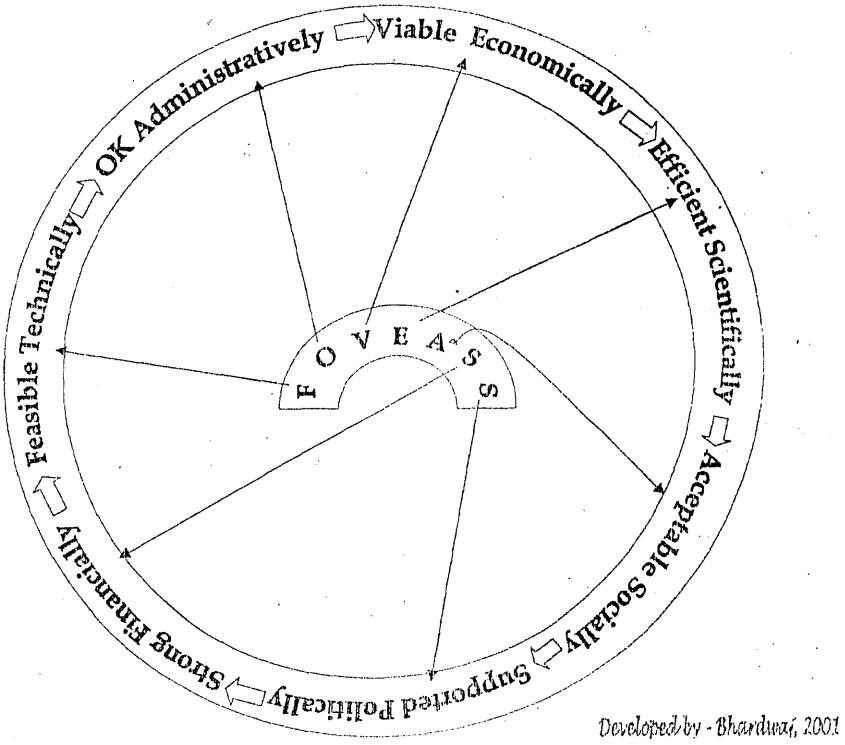
For evaluation of MPT sector, three most preferred tree species are considered. To estimate production, all trees planted are grouped into three age groups, namely; initial production age, medium production age, and mature production age. Numbers of plants in each age group in each year are worked out till all the plants reached at mature production age or upto the project life. Average yield of green fodder, twigs and fiber from each species is estimated. The estimated average yield is adopted for future projection of production. The fodder, fuel (twigs) and fiber production increased with the age of tree. Normally, fodder can be harvested from these tree species after 7 years of age. In place of net and direct cost, the total cost was computed at higher side by adding direct and indirect expenditures and added labour and input cost by the farmers.

Since desired data and details are not available, therefore rough estimates were computed for 10 years period at a discount rate of 12 to 25% for the whole project with out considering the sectors.

27.0 Analysis and Decisions Support Tools

27.1 SWOT and FOVEASS Analysis of IWMP IIND and Identification of Critical issues, Gaps and Problems





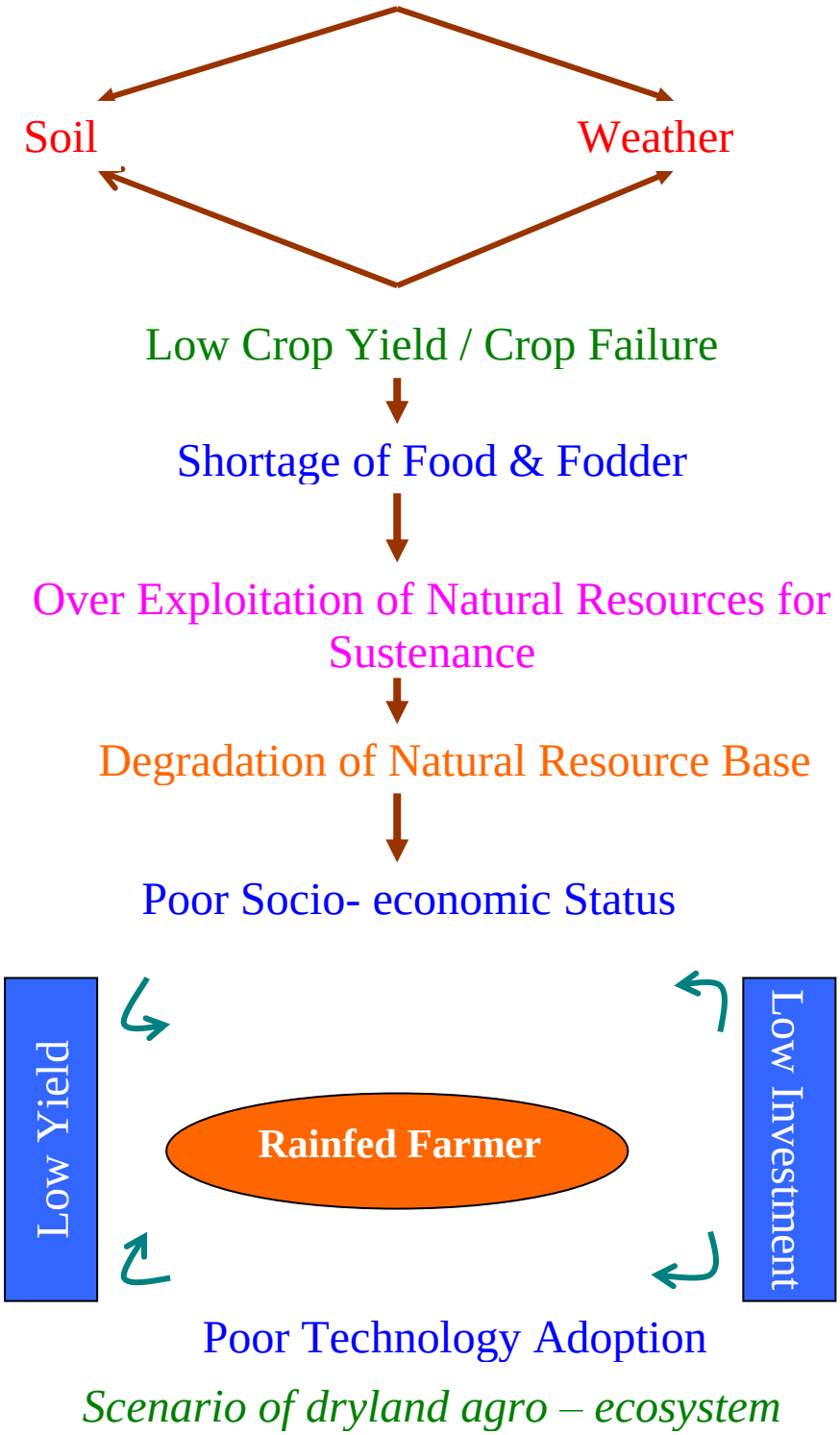
Strength (S)	Weakness(W)
1- Cooperative work culture is traditional activities 2- Close ethnic tier 3- Road at the top as well as outlet of the watershed 4- Hard working man power 5- Resource pool of crop genetic diversity 6- Awareness of farmers about watershed management program 7- Well established CPR maintaining and sharing system 8- Well maintained seasonal water bodies. 9- Social outlook of the community towards	1- Poor water management 2- Resource poor farmers 3- Out migration of youth 4- Low and erotic rain fall 5- Fragile geography 6- Fragmented land holding. 7- Heavy infestation of wild animals 8- Problem of fuel and fodder

Opportunities(O)	Threats (T)
1- Wide range of annual and personal crops 2- Scope of regular employment opportunity to check out migration 3- Strengthening of existing irrigation system 4- Conductive climate for rainfed crop diversification 5- Good scope for agro forestry and dry land horticulture. 6- Potential for collective active action and management 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.

27.2 Strengths, weaknesses, opportunities & threats (SWOT) of rainfed farming system

S. N0.	Parameter	Strengths	Weaknesses	Opportunities	Threats
1	**Climate**	Unimodal rainfall with south west monsoon and well defined period of rains.	Low and erratic/ rainfall, high evapotranspiration and terminal drought.	short duration kharif season crops and varieties to formulate intercropping systems	Long dry spells & delayed onset & early withdrawal of monsoon reduce the length of growing season.
2	**Soil**	Soils with moderate depth, good water retention and reserve of nutrients.	Low organic carbon content and poor workability	Good productivity of soils with moderate water retention	Soil crusting, poor structure and soil erosion hazards.
3	**Water**	Moderate water availability. Water harvesting structures (dams, tanks and pond) well developed	Low discharge from Spring, ineffective conveyance systems and surface water storage structures.	High potential for rain water harvesting storage and recycling Ample opportunities for soil water recharge through soil water conservation works on watershed approach.	Over use of water causing harm to soil.
4	**Plant**	Highly diverse, well adopted genotype with high yield potential.	Long duration traditional crops, Low yielding pasture lands with sparse vegetation and low carrying capacity.	Improved cropping systems, with suitable crops & varieties to match weather conditions. Cultivation practices to augment the crop yields.	Over grazing of pasture lands, deforestation, degradation & low carrying capacity of lands.
5	**Livestock**	Well adopted indigenous breeds of cattle sheep and goat. Cross breds in pockets.	Low productivity, unplanned feeding and management. Disease epidemics and fodder scarcity.	Improved breeding, feeding and health management practices. Improved cross breeds.	Loss of live stock during famine years, Starvation due to shrinkage of grazing lands.
6	**Humans**	High population and agricultural manpower, women workers contribute to a large extent of agricultural laborers.	Poverty, illiteracy and less receptivity to innovations. Manpower unutilized during lean period.	Effective HRD activities through various training programmes. Good demand for skilled labour in industries.	Under employment due to increasing population and land less labours.
7	**Research**	Good information and network of research support.	poor linkage with farmers, Financial constraints.	Updating the knowledge and skill of researchers, Strengthening the inter institutional linkages.	Low adoptability of improved technology, Scarce feed back to researchers.
8	**Develop-ment**	Network of extension agencies Deptt. of Agriculture, NGO's, KVK's etc.	Lack of effective linkage with researchers and updating the technology.	HRD through trainings, visits and incentives for working in rural areas.	Transfer of technology to fields at slow pace, Operational and institutional constraints dominate.

Fig 27.3 Dryland Agro-eco System
Poor Resource Base



Scenario of dryland agro – ecosystem

27.4 Logical Framework Analysis

Components	Activities	Outputs	Effect	Impact
Village Institution formation	Formation of watershed committee, User Group	One Watershed Committee each village Panchayat Number of user group depending on the coverage of particular intervention	Project con be implemented and managed in a democratic and Participatory way ensuring equity.	Unity and Prosperity in the village management. People's participation and positive perception to wards the programme.
Strengthening Village nstitutions	Organize training and awareness programme for village institution Capacity building workshops and exposure visits User Group and Watershed Committee. Strengthen linkages between UGs and WCs and Panchayat Institutions. Gender sensitization of UGs and WCs to increase inclusiveness of samuh decision making. Sensitize village communities to involve children and youth in development	Awareness camps to be organized. Training and exposure visit UGs and WCs to be held. Capacity building workshops to be organized. Federations of UGs and WC to be formed.	Quality of management of common resources improved. Quality fo distribution of benefits between people improved. Increased awareness amongst women about village resources Women participation enhanced in decision-making activities. Involvement of youth and children in village development increased.	

Components	Activities	Outputs	Effect	Impact
Fund Management	Improve management and utilization of UGs and WCs Prepare Communities to explore other sources of income for UGs and WCs.	UGs and WCs operating bank account and managing resources on their own	Purpose, frequency and volume of use of the fund enhanced. Volume of funds generated for UGs and WCs from other sources of income increased.	

Components	Activities	Outputs	Effect	Impact
Ecological Restoration	Protection, treatment and regeneration of common and private lands Protection, treatment and regeneration of forest lands. Plantation of fruits and forest species. Impart training, conduct meeting and organize exposure visit for communities, village volunteers and staff to effectively plan, execute and monitor activities. Identification and promotion of non timber forest produce based income generation activities.	Common and private lands to be brought under new plantations and agro horti forestry like Neem, Adusa, Prosopis, Banyan and Peepal. Forest lands to be brought under new plantation and protection. Trainings, exposure visit and meetings to be organized for communities, village volunteers and staff. Income generation intervention promoted.	Fodder availability from common and private lands increased. Accessibility to common and forest lands increased with removal of encroachments and resolution of conflicts.	Better Ecological order in the area. Increase in the proportion of households having more security of fodder. Reduction in drudgery of fodder and fuel collection, especially women.
Rainfed Area Development	Treatment of land thought improved soil and moisture conservation practices on Watershed basis. Promotion of good agricultural practices horticulture, improved crop and vegetable. Promotion of organic farming practices. Formation of fodder banks to increase	Land to be brought under improved soil moisture conservation practices. Good agricultural practices to be promoted. Organic farming to be promoted Fodder banks to	Improved productivity of treated land. Increased availability of water in wells. Increase in annual agriculture production. Farmers adopt organic farming	Increase in proportion of households having more security of food. Increase in contribution of agricultural income to the household income.

	fodder security and promote dairy development among communities. Identification and promotion of agriculture produce based income generation activities like grading, processing and packaging. Promotion of better irrigation practices like drip irrigation. Impart trainings conduct meetings and organize exposure visits of community's village volunteers and staff to effectively plan execute and monitor activities.	be established. Agriculture based livelihood income generation activities to be promoted. Water harvesting structures to be constructed. Drip irrigation facilities to be distributed among farmers. Approx 15000 person days of employment to be generated. Training, exposure visit and meetings to be organized for communities village volunteers and staff.	practices. Fodder security of farmers enhanced. Increase availability of water for 9 to 12 months. Increase availability of water for Livestock. Availability of irrigation water established. Farmers take two crop in a year. Increase in agricultural productivity of land. Availability of drinking water enhanced.	
Women's Socio-political and economic empowerment.	Formation& Strengthening of women's SHG groups Capacity building of womenfolk. Capacity building of SHG leaders and	Women's SHG groups to formed. Federation of women's SHGs to be formed Trainings to be conducted for	Enhanced capacities of leaders of women's group in taking initiatives to solve problems at different levels.	Position of women in household community society(politically, Socially and economically)as perceived by women and community at large. Performance enhancement of SHGs in terms of participation decision- making leadership and fund management.

	accountants. Linking SHGs with external financial institutions.	preparation of woolen products from sheep and goats.	Improved access to credit for livelihood purposes. Increased household income.	Equality &Equity in gender relations at home(decision making, expenditure, children's educations' health.)

28 Institutional Arrangements & Capacity Building in the Projects

- Alternative Land use Plan.
- Scientific technique of soil and Moisture conservation.
- Improved and Scientific agriculture practices.
- Fodder development and Management.
- Afforestation.
- Meteorological Information.
- Dairy development and Management.
- Rural Craft.
- Income Generation Activities.
- Stitching
- Food Processing.
- Post Harvest management practices.

HRD requirement of the Project

S. No.	Project Stake holders	Numbers of Units	Total no. of persons in unit for training	No. of persons trained so far	No. of Persons to be trained	Name & Address of Training Institute
1	District Data center	03	03	-	03	Bhoomi vikas avam Jal Sansadhan vibhag Belikala Lucknow Narendar dev Agriculture University Faizabad , UP Jal avam bhoomi Prabandh Sansthan Balmi bhawan Louckow Centrel soil consurvation inst. Agra. K.V.K. Bsghra MZN
2	PIA	01	17	03	17	
3	WDTs	01	05	-	05	
4	W.Cs	30	331	-	331	
5	GPs	30	350	-	350	
6	SHG	23	115	-	115	
7	UG	206	742	-	742	
8	Community	01	07	-	07	
9	Any others	-	850	-	850	
	Total-	265	2420	03	2420	

29. Entry Point activities I.W.M.P.II[nd] Saharanpur (10-11)

S. No.	Name of Villages	Amount earmarked of EPA	Entry Point Activities Planned	Remarks
1.	Rasoli	0.98	1 Kharanja	
2.	Vazidpur	0.98	1 Kharanja	
3.	Bharkedhi	0.98	1 Kharanja	
4.	Kazibans	0.98	1 Kharanja	
5.	Mandhor	0.98	1 Kharanja	
6.	Tawer	0.98	1 Kharanja	
7.	Latifpur	0.98	1 Kharanja	
8.	Nasrulahgar	0.98	1 Kharanja	
9.	Bandhi	0.98	1 Kharanja	
10.	Dala mazara	0.98	1 Kharanja	
11.	Sahaspur Jatt	0.98	1 Kharanja	
12.	Tigri Ramgar	0.98	1 Kharanja	
13.	Sinooli	0.98	1 Kharanja	
14.	Bhudhakhera	0.98	1 Kharanja	
15.	Nagal Rajput	0.98	1 Kharanja	
16.	Chappara Jatt	0.98	1 Kharanja	
17.	Khalidpur	0.98	1 Kharanja	
18.	Sirsaka	0.98	1 Kharanja	
19.	Bishanpur	0.98	1 Kharanja	
20.	Sahrajpur Saiyad	0.98	1 Kharanja	
21.	Halwana	0.98	1 Kharanja	
22.	Rasulpur Urf Balamazra	0.98	1 Kharanja	
23.	Alampur	0.98	1 Kharanja	
24.	Sakrurpur	0.98	1 Kharanja	
25.	Lakhanauti	0.98	1 Kharanja	
	Total-	24.50	-	-

30. Activities related to livelihood by SHGs, UGs etc. in the Project Areas I.W.M.P. Saharanpur

S. No.	Name of Villages	Name of the Activities
1.	Rasoli	Dairy Work/Bee Keeping/Poultry
2.	Vazidpur	Dairy Work/Bee Keeping/Poultry
3.	Bharkedhi	Dairy Work/Bee Keeping/Poultry
4.	Kazibans	Dairy Work/Bee Keeping/Poultry
5.	Mandhor	Dairy Work/Bee Keeping/Poultry
6.	Tawer	Dairy Work/Bee Keeping/Poultry
7.	Latifpur	Dairy Work/Bee Keeping/Poultry
8.	Nasrulahgar	Dairy Work/Bee Keeping/Poultry
9.	Bandhi	Dairy Work/Bee Keeping/Poultry
10.	Dala mazara	Dairy Work/Bee Keeping/Poultry
11.	Sahaspur Jatt	Dairy Work/Bee Keeping/Poultry
12.	Tigri Ramgar	Dairy Work/Bee Keeping/Poultry
13.	Sinooli	Dairy Work/Bee Keeping/Poultry
14.	Bhudhakhera	Dairy Work/Bee Keeping/Poultry
15.	Nagal Rajput	Dairy Work/Bee Keeping/Poultry
16.	Chappara Jatt	Dairy Work/Bee Keeping/Poultry
17.	Khalidpur	Dairy Work/Bee Keeping/Poultry
18.	Sirsaka	Dairy Work/Bee Keeping/Poultry
19.	Bishanpur	Dairy Work/Bee Keeping/Poultry
20.	Sahrajpur Saiyad	Dairy Work/Bee Keeping/Poultry
21.	Halwana	Dairy Work/Bee Keeping/Poultry
22.	Rasulpur Urf Balamazra	Dairy Work/Bee Keeping/Poultry
23.	Alampur	Dairy Work/Bee Keeping/Poultry
24.	Sakrurpur	Dairy Work/Bee Keeping/Poultry
25.	Lakhanauti	Dairy Work/Bee Keeping/Poultry
	Total-	

31. Estimates of Watershed Activities

S.n.	Activity	Unit	Average Rate/unit(rs)
1	Gabion Chekdam	5 m span	8,500
2	Gabion Chekdam	8 m span	12,000
3	Protection Well(Gabion)	9 m length 1 m length	14,500 1600
4	Bio – engineering measure for land slide/slip	1000 m2 1/ha	53,200 532000
5	Orchard development	1/ha	10000
6	Agriculture crop	1/ha	5000
7	Agri- horti System	1/h	15000
8	Irrigation channel	1m	100
9	Construction of band	Per ha.	5200
10	Renovation of existing band	,,	3500
11	Construction new chekdam	,,	11380
12	Renovation of existing Checkdam	,,	9000
13	Pucca Spillway per ha.	,,	42500
14	Recharge filter 1no./100 ha.	,,	15670
15	MPT with S.C. trenches	,,	14300
16	MPT without S.C. trenches	,,	5000
17	Brick path (2.5 mm.vide)	per Square mtr.	300

Remarks-

Since the project is being operated in participatory mode, contribution in the form of labour input for pit digging, FYM its. Application weeding and hoeing are to be provided by the participating farmers, hence the costs are not included in the estimate

32.0 Consolidation and Withdrawal Phase

In this phase the resources augmented and economic plans developed in Phase II are made the foundation to create new nature-based, sustainable livelihoods and raise productivity levels. The main objectives under this phase are:

a. Consolidation and completion of various works.
b. Building the capacity of the community based organizations to carry out the new agenda items during post project period.
c. Sustainable management of(developed) natural resources and
d. Up-scaling of successful experiences regarding farm production systems/off-farm livelihoods.

An indicative list of various activities during this phase is given below:

32.1 Consolidation of various works

a. Preparation of project completion report with details about status of each intervention;
b. Documentation of successful experiences as well as lessons learnt for future use.

32.2 Management of developed natural resources

a. Improving the sustainability of various interventions under the project;
b. formal allocation of users right over common property resources (CPRs)
c. Collection of user charges for CPRs;
d. Repair, maintenance and protection of CPRs;
e. Sustainable utilization of developed natural resources;
f. Involvement of gram panchayat/corresponding institutions (as a governance body) in addressing the above aspects.

32.3 Intensification of farm production systems/off-farm livelihoods.

a. Up scaling of successful experiences related to above aspects through revolving fund under the project as well as credit and technical support from external institutions;
b. Promotion of agro-processing, marketing arrangements of produce and similar off-farm and informal sector enterprises.
c. Farmers may also be encouraged to develop non pesticide management, low cost organic inputs, seed farms and links with wider markets to fetch competitive price.

32.4 Project management related aspects

a. Participatory planning, implementation and monitoring of activities to be carried out during consolidation phase;
b. Terminal evaluation of project as per the expected outcomes.

Federations could be formed at the level of a cluster of villages in order to support economic activities at scale. These would strengthen linkages, credit, input procurement, sale of local produce. The Watershed Committees (WCs) may use the Watershed Development Fund for repair and maintenance of structures created in Phase II.

The classification of activities in the three phases must not be understood in a rigid manner. Many of the Phase III activities may even start in many watersheds during Phase I and/or II itself.