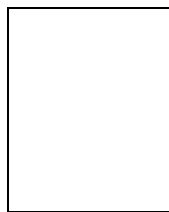


District Agriculture Plan

HAZARIBAG DISTRICT

2008-09 to 2001-12



**NABARD CONSULTANCY SERVICES
JHARKHAND REGIONAL OFFICE,
RANCHI**

MAP OF HAZARIBAG DISTRICT



FOREWORD

Jharkhand, the 28th State of the Indian Union is best known for its rich mineral resources. However, 78% of the total population of 2.69 crore live in rural areas, largely dependent only on agriculture and allied activities. The total cultivable land in the State compares well at 52% of the total geographical area with 55% in the country. But, unfortunately while 76% of the total cultivable area is under net sown area in the country, only 43% is cultivated in Jharkhand. The state suffers from several critical gaps in the agricultural and allied sectors. It is against this back drop that the Agricultural Development plan for 21 districts of the State have been prepared by NABCONS on the basis of the assignment given by the Government of Jharkhand.

The proposed plan envisages a holistic revamp of the entire agriculture and allied sectors. The full implementation of the proposals is expected to significantly increase the cropping intensity, the net and gross cropped area and finally result in vastly improved nutrient availability to the rural population. The investments in allied sectors and integrated approach to farming are important to boost the household incomes and to mitigate the risks in agriculture dependent almost entirely on the vagaries of nature with only 10% of cultivated land under irrigation against the national average of 40%.

It is a great privilege and simultaneously a big challenge for NABCONS, the consultancy subsidiary of NABARD, to have been assigned the task of preparing the State wise and district (in respect of 21 districts) wise comprehensive Agriculture Plan (SAP & DAP) by the Jharkhand state govt. for the period 2008-11. I, in the dual role as the Principal Representative of NABCONS and Regional Chief of NABARD for Jharkhand state feel very happy to submit the comprehensive Agriculture Development Plan to the Govt. of Jharkhand.

I gratefully acknowledge the support received from Shri. A K Basu IAS, Chief Secretary, Shri. S K Chaudhury IAS, Development Commissioner, Shri. A K Sarkar IAS, Principal Secretary Agriculture and Deputy Commissioners of all districts. The plan was prepared based on grass root level consultations at village, block and district level and research agencies.

I am confident that this plan would be a harbinger of great opportunities in accelerating overall growth of the state and improve the well-being of millions strong farming community in the state. We from NABARD, as the apex Agriculture and Rural Bank of the country, feel proud to commit ourselves as one of the very important stakeholders in our mission for integrated development of agriculture and allied sector and bringing pride of place for the state it deserves.

(K.C.Shashidhar)
Principal Representative, NABCONS &
CGM, NABARD, Jharkhand

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Consultative Process

The entire Plan has been prepared in a consultative approach with active participation of all the stakeholders. **Specific Projects** have been prepared based on inputs from

- Line Depts. i.e. Agriculture Dept., Animal Husbandry, Dairy, Fisheries and Horticulture
- Strategic Research Extension Plan (SREP) prepared by ATMA under the guidance of SAMETI
- Potential-linked Credit Plans (PLP) prepared by NABARD for the district
- Farmers in select areas
- Select NGOs
- Discussions with District Authorities and the district line departments
- Birsa Agricultural University
- Research Institutions such as ICAR (HARP) and IINRG (erstwhile ILRI)
- RRBs and Commercial banks

(a) Consultative Workshop at village, district and state levels

NABCONS convened a series of workshops of the all the stakeholders at the district levels for obtaining their expectations and suggestions. The line department officials of the districts were provided with the copy of the plan prepared for the concerned district. The district wise discussions on the plan was taken up and district officials, NGOs and farmers made suggestions for incorporating in the plan. Following are the important suggestions made. Some of the suggestions that emanated from the stakeholders in the district level meets are briefly outlined as under :

- I. Grain godowns need to be setup in the district
- II. Vegetable export zone to be set up
- III. Production of HYV vegetable seeds developed by HARP to be taken up
- IV. Fencing of Govt. seed farms required to protect the farm
- V. Free grazing is to be banned for development of agriculture in the district
- VI. Potential for vegetable in Ichak block - Tomato, Potato and coriander leaves seed to be made available
- VII. Processing facilities potato need to be setup
- VIII. In Barkagaon there is good production of Tomato processing plant required
- IX. Marketing facilities for coriander leaves required
- X. Short duration Maize variety developed by BAU to be included in seed production
- XI. Bajra and Jowar could be promoted under rain-fed condition
- XII. Distribution of small implements such as tiller to be included

(b) Interaction with Project Directors**of ATMA and SAMETI**

NABCONS had interaction with the ATMA and the SAMETI to obtain their valuable feedback on the expectations and perceptions and suggestions for developing agriculture in the state. Some of the suggestions made by them have been collated as under :

- Seed processing unit to be setup
- Floriculture to be promoted
- Low cost poly house to be set up for off season vegetables
- Sprinkler irrigation need to be promoted
- Backyard Poultry hatchery to be setup
- Goat and pig breed improvement programme to be taken up
- Potential of Sugar cane to be exploited

Village Level Assessment of Agriculture and Allied Requirements - based on field visits

Sl No	Block	Village / Panchayat	Name of SHG / Farmer clubs	Activity of SHG /FC members	Requirement
1	Bishnugarh	Khambawa	Ujjwal Mahila Mandal	Agriculture + Dairy Units	Enhanced Milk procurement price
2	-do-	-do-	Kiran mm	-do-	-do- / supply of good seeds
3	-do-	-do-	Jyoti mm	-do-	Supply of Beetel variety Goat
4	Ichak	Jharpo	Gayatri mm	-do-	Quality cattle supply
5	-do-	-do-	Daya mm	-do-	Quality seeds
6	Sadar	Daru	Santoshi mm	-do-	Irrigation source
7	-do-	-do-	Saraswati mm	-do-	Seed supply at low rate
8	-do-	-do-	Laxmi mm	-do-	Low cost Agriculture Inputs
9	-do-	-do-	Mirdha mm	Tokri making For storage	Quality Bamboo/ Bamboo regeneration
10	Bishnugarha	Darbhangra	Sahayog FC	Veg / Paddy/ wheat cultivation	Irrigation / Quality low cost inputs
11	-do-	Wandi, Khambawa	Navodaya FC	-do-	Facility for agro processing & procurement
12	Ichak	Bharajo	Jharkhand KK	-do-	Fodder cultivation

					Tech guidance
13	Sadar	Mahesara	Vikash FC	-do-	Activation of defunct Cold storage
14	-do-	Meru	Pragati KK	-do-	Organised marketing
15	Churchu	Jerba	Chand mm	Agriculture	Irrigation facility
16	-do-	Kurra	Aradhana mm	-do-	Quality seed/ fertiliser
17	-do-	Dasokhab/ Jerba	Dinesh KK	-do-	Marketing facility / Uninterrupted power supply
18	-do-	Chanaro	Patel KK	-do-	Tech support for cash crops
19	-do-	Hendgarha	Nehru KK	-do-	Agro processing/ procurement support/ Transport facility
20	-do-	Chainpur	Adarsha-Birsa kk	-do-	Technology for Horticulture
21	Katkam sandi	Pabra	Sanjivani mm	-do-	Good price for vegetables
22	-do-	Kusumbha	Azad mm	-do-	-do- / Irrigation facility
23	-do-	Gadokhar	Guleichi mm	DD + Veg cultivation	Veg processing & marketing
24	-do-	Pabra	Asha mm	-do-	Vegetable marketing at high price
25	-do-	Gadokhar	Jyoti	Dairy	Quality milch animal
26	Padma	Kultipisi / Nawadihi	Kultipisi mm	Vegetable cultivation	Irrigation source
27	-do-	Jihu	Jihu mm	-do- / Animals	Quality Sheep/ goat
28	-do-	Behari	Behari mm	Goatery	-do-
29	Ichak	Devkuli	Devkuli mm	Vegetable cultivation	Marketing facility-improvement
30	-do-	Punai	Punai mm	-do-	-do-
31	Keredari	Patrakund	Gautam SHG	Agriculture	SRI in Paddy cultivation
32	-do-	-do-	Adarsh mm	-do-	Timely bank loan for agriculture



33	Badkagaon	Badkagaon	Badkagaon KK	-do-	Agroprocessing, procurement
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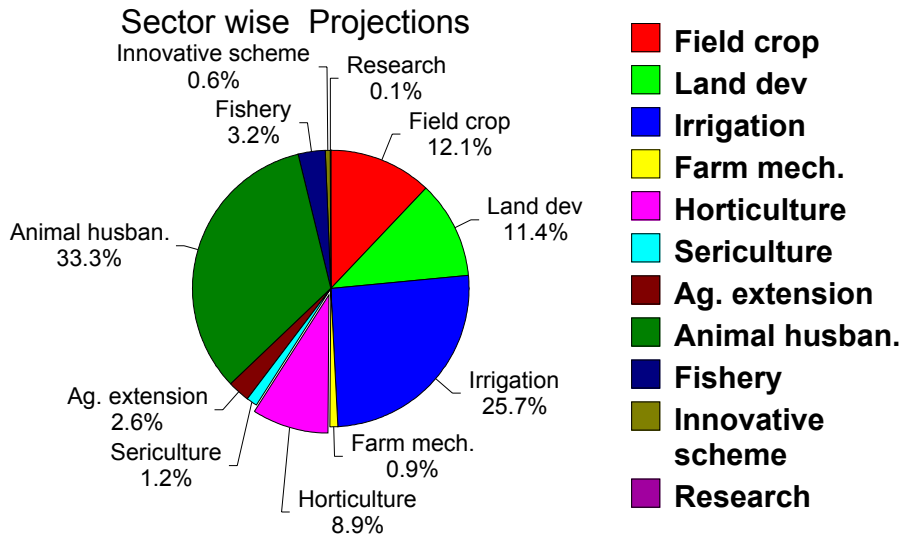
EXECUTIVE SUMMARY

Agricultural production in Hazaribag district is characterized by mono cropping practices with only 14.5% of the net sown area being irrigated. 61% of the agricultural land holding belongs to small and marginal farmers which have contributed to poor level of mechanized farm operations in the district. Agriculture is mainly rainfed, the major crops cultivated are Paddy, Wheat, Maize and Vegetables. The climate is favourable to Horticultural crops.

2. The agriculture plan has been prepared to address the issues faced by agriculture in the district. The programmes proposed in the plan aim at increasing productivity of crops and live stock through soil health improvement, arranging quality inputs including 100% seed replacement, double the area under irrigation, increase area under cultivation, treating major portion of Wasteland and other fallow land to be brought under agro forestry, fodder and horticulture crops, promoting sericulture, strengthen extension services, demonstrate new and innovative technologies. The Plan outlay envisages investment of Rs 136.37 crore. The sector wise plan has been estimated on the basis of suggested unit cost by different Line Departments and technical personnel of the state Government.

The Broad Sector wise allocations for the period 2008-09 to 2011-12 has been projected as given below:

Sr	Broad Components	Projection of the plan (Rs.lakh)	% to Total
1	Land Development Programme - Moisture Conservation & Soil Health Improvement	1557.66	11.4
2	Subsidy for Irrigation	3503.10	25.7
3	Programme for field crops	1646.17	12.1
4	Farm Mechanisation	128.20	0.9
5	Horticulture Development	1012.10	7.4
6	Sericulture Development	170.00	1.2
7	Strengthening Market Infrastructure	208.00	1.5
8	Extension and Capacity Building Programme	351.65	2.6
9	Animal Husbandry	4543.30	33.3
10	Fisheries	431.21	3.2
11	Innovative schemes	75.89	0.6
12	Research & Development	10.00	0.1
	Total	13637.29	



4. Above programme when implemented over the four year period is expected to improve not only the cropping intensity in the district but will also lead to improvement in agricultural productivity and higher employment and income

generation through agriculture and allied activities. Further, the demand for milk, fish, meat and vegetables will be adequately met from within the district.

Chapter I

Introduction

Hazaribag district is situated in the north-eastern part of North Chhotanagpur Division of Jharkhand; It is surrounded by districts of Gaya (Bihar) and Koderma in the north, Giridih and Bokaro in the east, Ranchi in the south and Latehar and Chatra in the west. The district is rich in flora and fauna. The district has 2 subdivisions and 11 blocks. The District of Ramgarh was carved out of Hazaribag on 12 September 2007 as the 24th District of the state with one subdivision and 4 blocks. The estimated population of Hazaribag district prior to this division (ie in the 3 divisions and 15 blocks) was 2277475 (provisional figures, 2005).

The characteristic features of the un-divided district are presented below -

- Main economic activities are agriculture and mining.
- Agriculture is mostly rainfed, the major crops cultivated being Paddy, Wheat and Maize
- 3.86% of the total geographical area and 14.5% of the net cropped area is irrigated.
- The climate is highly conducive for growing a variety of vegetables, which is presently being cultivated in an unorganised way in 7 blocks
- One block is covered under **AEZ** for vegetables
- The agro-climatic conditions also favour cultivation of fruit crops like mango, guava, jackfruit, custard apple, sweet lime, etc.
- 61% of the agricultural land holding belongs to small and marginal farmers which has contributed to poor level of mechanised farm operations.
- Agri-Horticulture is being encouraged and developed as a viable agricultural proposition through **National Horticulture Mission** Schemes being taken up in the district.
- About 43.94 % of land is under forest cover which can be used for cultivation of **Medicinal and Aromatic plants and forest based units.**
- A significant percentage of population depends upon **forest produce** for livelihood.
- Under the **National Food Security Mission** 22 villages (2 villages per block) have been identified for intensive Paddy cultivation. Besides, the District Authorities with the help of all prominent NGOs of the District is also popularising **SRI method** of Paddy cultivation.
- About 8500 **SHGs** have already been formed, of which about 6000 SHGs have been credit linked to various banks, with credit disbursement of about Rs.1785.09 lakhs. Repayment of loans to banks by SHGs is reported to be about **90-95%**. Effort is on to convert matured SHGs into Micro- enterprises.
- Under DPAP Batches - X, XI, XII and IWDP 47 watershed projects are under implementation in the district.

The Govt of Jharkhand, after its creation is focussing on development of road network , provision of Quality power, provision of drinking water and irrigation facilities etc. Effort is on to restore the derelict irrigation facilities.

The district has large number of water bodies. The Tilaiya Reservoir and Konar Reservoir provide major irrigation support. 227 Rural infrastructure projects (3 Irrigation reservoirs 53 Micro lift irrigation schemes, 4 projects on Series of Check Dams @ 22 Check Dams, 15 Forest Development schemes, repair of 108 primary schools, 36 Rural Roads and 6 Rural Bridges) have been sanctioned under various RIDF tranches which would create additional irrigable command of 3084 Ha and also provide connectivity to a number of villages and market centres. RIDF has been a major source of funding for the State Govt for creation of new infrastructure as well as strengthening of existing infrastructures in specified sectors viz irrigation, Roads & Bridges, Forestry, Agriculture - infrastructures - fishing ponds, market yards, storage godowns etc.

The credit linked initiatives of the district are accompanied by development of forward and backward linkages particularly in the field of agriculture marketing and storage. Major needs for development of these activities, in addition to capacity building are :

- ❖ Infrastructure development relating to roads and electricity ;
- ❖ Construction of Storage Godowns;
- ❖ Construction of Water Harvesting Structures;
- ❖ Provision of Extension Services;
- ❖ Development of Rural Haats;
- ❖ Development of Non- farm sector, particularly sub-sectors of Agro-processing, Bamboo craft, Handloom, Brass and Dhokra etc.;
- ❖ Development of Plantation & Horticulture and Medicinal & Aromatic Crops;
- ❖ Systematic development of forest based units.

Chapter II

DISTRICT PROFILE OF HAZARIBAG AT A GLANCE

- (1) **Geographical Area** - 6048.97 sq. kms.
- a) No. of blocks / talukas - 15
No of Gram Panchayats - 400
No of Municipalities - 02
No of towns - 02
- b) Total villages - 2032
No. of villages (inhabited) - 1574
Villages(unhabited) - 458
- c) No. of villages electrified - 411
- d) No. of villages connected by all weather roads - 350
- (2) **Rain fall (mm)**
- | Average | Actual | | |
|---------|-------------|-------------|-------------|
| | <u>2004</u> | <u>2005</u> | <u>2006</u> |
| 1344 | 1106.00 | 1083.30 | 1225.40 |
- (3) **Agro-climatic Region & Zone** : Eastern Plateau Region
- (4) **Population (2001 Census)**
- a) Male - 1167793
b) Female - 1109682
c) Total - 2277475
d) Population density/sq.km. - 376.51
e) Population below poverty line - 197712 (1997-2002 survey)
- (5) **Classification of Workers**
- a) Cultivators - 363130
b) Of (a) small and marginal farmers- 212291
c) Agricultural Labourers - 125274
d) Artisans - 11905
e) Household Cottage Industries - 23043
f) Allied agro activities - 21396
g) Other workers - 246314
- (6) **Land Utilisation (ha)**
- a) Geographical area - 604897 ha.
b) Net sown area - 160936 ha.

- c) Forest - 265816 ha.
d) Fallow land - 77722 ha.
e) Land not available for cultivation - 100423 ha.
f) Cropping Intensity - 117%
g) Area brought under HYV seeds - 8000 ha. (Certified Seed)

(7) Size of holdings:

Srl. No.	Particulars	No.	Percentage	Area (ha.)	Percentage
A	Less than 1 ha.	186647	81.05	65906	40.95
B	Between 1 & 2 ha.	25644	11.14	32284	20.06
C	Above 2 ha.	17989	7.81	62746	38.99
	Total	230280		160936	

(8) Irrigation

- a) Net Irrigated Area - 23344.33 ha.
b) By channels - 1262.35 ha.
c) By wells - 8051.47 ha.
d) By Ponds - 2253.52 ha.
e) By Tube Wells - 2873.03 ha.
f) By lift irrigation - 612.95 ha.
g) Surface Water viz. check dams
water harvesting structures, etc. - 8291.01 ha.

(9) Consumption of organic & chemical fertilizers and pesticides (per ha)

Urea 68.75 kgs.
DAP 39.95 kgs.
Potash 0.74 kg.
SSP 1.44 kgs.

(10) Agriculture support facilities

- Seed/fertilizers/pesticides depots - 1 (Seed Processing Unit)
Rural Markets/Mandis - 2
Rural Haats / Bazars - 112
Rural Godowns - NA
Cold Storages - 14 No.

(11) ANIMAL HUSBANDRY (2001 census)

- | | | | | | |
|--------------------|---|----------|-------------------------------|---|----|
| a) Plough Animals | - | 4,08,832 | 1. District Level Dispensary | - | 2 |
| b) Dairy Animals | | | 2. Sub-Divisional Dispensary | - | 3 |
| i) Cows | - | 3,40,597 | 3. Block Level Dispensary | - | 15 |
| ii) Crossbred Cows | - | 2,824 | 4. Regional Cattle Dispensary | - | 74 |
| iii) Buffaloes | - | 1,65,882 | 5. Model Village Centres | - | 7 |
| c) Sheep | - | 19,368 | 6. Frozen Semen Centres | - | 17 |
| d) Goat | - | 5,09,305 | 7. AI Centre | - | 7 |
| e) Pigs | - | 63,451 | 8. AI Sub-Centres | - | 42 |

f)	Poultry	-	15,06,036
g)	Horse	-	662

(12) Predominant economic activities of the district :

(i) Agriculture is the predominant economic activity in the district. Vegetables particularly potato, tomato, cabbage, cauliflower, etc. are grown in large tracts in Keredari, Barkagaon, Sadar, Ichak, Chauparan, Katkamsandi and Padma blocks. There are quite a few large and medium industries in the district processing and exploiting mineral resources. The district is one of the richest in the country in mineral resources. Goods transport activity is also growing at a very fast pace.

(ii) Major food / commercial and plantation / horticulture crops:

Paddy is the main crop of the district followed by wheat, pulses and vegetables. Potato, Tomato and some other vegetables including coriander leaves are major commercial crops of the district. Except for a few orchards of mango and guava and some beehives, horticulture has not been adopted as a commercial activity and no plantation crop is being taken up in the district. Of late Plantation & Horticulture Department is assigning greater importance to orchard development and has taken up activities like hybrid seed production, nursery development, Multitier orchard development, vegetables and tuber crop cultivation. Each block is planned to have an orchard of mango, guava and jackfruit. Orchard development is gaining popularity among the tree lovers. Few progressive farmers have also adopted Integrated horticulture based on mixed vegetable cropping, afforestation, Dairy , Gobar Gas plants , application of Vermicompost in the fields with the Agriculture units covered with bamboo plantation/fencing.

(iii) Other Developments :

Three hatcheries under private sector have been commissioned in the district which are supplying DOCs to broiler units in the district.

Under the leadership of the District administration, a **poultry Broiler scheme** was launched in Barhi, Padma, Chauparan blocks under the RSVY. 637 women beneficiaries of the SHGs promoted by PRADAN are to set up units.

A new Fish hatchery has been commissioned by FFDA in the district. The Department is conducting training, distributing fries/fingerlings, subsidising excavation of private ponds. The sector is poised to take off as a commercial proposition.

(13) Existing Banking System :

The Credit needs of the people of Hazaribag district are met by 85 branches of various banks. Out of these, 16 commercial Banks have 60 branches, Jharkhand Gramin Bank has 13 branches, HDCCB has 6 branches, BSLDB has 2 branches and Pvt Sector Banks have 4 branches.

14) Other factors affecting the _____ district rural economy and development of various sectors viz. flood, drought, pest attack, hailstorms, etc.

Agriculture in the district is mainly rain fed. Below normal rainfall coupled with concentration of rain in a limited period of the Kharif season has affected production and productivity adversely. Due to onset of normal monsoon from 2006 onwards the agriculture climate has improved. Although, some Reservoir Schemes have higher storage capacity, their utilisation is 50 % only. Exploitation of water resources of the district through micro-irrigation and minor / medium irrigation schemes would boost the agriculture sector. Poor supply of power is affecting the growth of small scale, cottage and village industries especially in the food processing sector.

• **Infrastructure Index :**

Sl. No.	Infrastructure Components	District	State	Category
1	Agriculture and forest coverage			
	Percentage of NSA to Total geographic area	26.61	22.68	A+
	Percentage of Forest area to Total geographic area	43.94	29.74	A+
2	Electricity			
	Percentage of Villages electrified (as per 2003-04 definition)	26.11	31.1	C
	Percentage of total consumers to Total households	9.15		
	Per capita electricity consumption 2002 (KWH)	NA	158.00	
3	Transport			
	Road Density per 1000 sq. km.	NA	110	
	% of village connected with pucca road	NA	26	
4	Irrigation			
	Irrigated Area to net cropped area(%)	14.5	11.63	A+
	% of area irrigated through ground water	12.31	42.78	D
	% of area irrigated through surface water	87.69	57.22	A+
	No. of tube wells per 100 ha cropped area	NA	NA	
5	Telecommunication and Post office			
	No. of telephone lines per 100 population (31/12/07)	1.264	3.41	D
	Population served per post office	11219	9343	A+
	Average area served per post office (sq. km)	29.80	27.6	A+
6	Education			
	Literacy rate (2001)	47.50	54.13	A
	Literacy rate - Male	59.20	67.94	A
	Literacy rate - Female	35.30	39.38	A
	No of Schools elementary education upto std 8th) per 1 lakh population	42.33	77.10	C
	No of Secondary Schools per 1 lakh population (2003-04)	3.25	4.05	B
	No of degree & prof. colleges per 1 lakh population	0.57	0.74	B
	Teacher pupil ratio upto Class V	NA	1:101	
	Teacher pupil ratio from Class VI to VII	NA	1:32	
7	Health			
	Birth rate (per 1000 persons) (2002)	NA	26.40	

	Death rate (per 1000 persons) (2002)	NA	7.90	
	Infant Mortality Rate (IMR) per 1 lakh live births	NA	69	
	Sub centres / primary health centres / community health centres per 1 lakh population	12.51	16.63	B
	No. of Dispensaries and Hospitals per 1 lakh population	0.09	0.25	D
	No. of beds in hospitals per 1 lakh population	12.47	NA	
	Doctors (modern i.e. allopathic system) per 1 lakh population	5.88	NA	
8	Water Supply			
	% of village with drinking water supply(fully or partially)	NA	42.6	
9	Agriculture Markets (2004)			
	No of agriculture markets per 100 sq. km	0.84	0.27	A+
10	Poverty			
	% of rural population below Poverty line(1997-2002 survey)	43.00	46.3	A+
11	Agriculture Marketing			
	No of regulated markets per 100 sq. Km (APMC)	2	0.27	A+
12	Productivity of major Agri. Crops in kg/ha (2005-06)			
	Rice	1231.51	1150.0	A+
	Maize	1157.64	1315.0	A
	Wheat	1753.12	1340.0	A+

Category

Where district indicator is 100% or more than State level	A+
Where it is between 85% to 99 %	A
Where it is between 70% to 84 %	B
Where it is between 50% to 69 %	C
Where it is less than 50%	D

Soil

Reliable information on the location, extent and quality of soil and land resources is the first requirement in planning for the sustainable management of land resources. The components of land i.e., soils, climate, water, nutrient and biota are organised into eco-system which provide a variety of services that are essential to the maintenance of the life support system and the productive capacity of the environment. Our land mass is fixed, but the competition among different kinds of uses for this land is increasing because of rapidly rising population. Therefore, integrated land resource planning and management are required to resolve these conflicts and soil resource survey seems to be a viable means in this process and knowledge of soil fertility status and problems of soils like soil acidity/alkalinity become essential for sustainable land use plan.

Soil fertility is an aspect of the soil-plant relationship. Fertility status of the soils is primarily and importantly dependent upon both the macro and micro nutrient reserve of that soil. Continued removal of nutrients by crops, with little or no

replacement will increase the nutrient stress in plants and ultimately lowers the productivity. The fertility status of the soils mainly depends on the nature of vegetation, climate, topography, texture of soil and decomposition rate of organic matter. Optimum productivity of any cropping systems depends on adequate supply of plant nutrients. GIS is a versatile tool used for integration of soil database and production of a variety of users specific and user-friendly interpretative maps. This further leads to accurately and scientifically interpret and plan some of the aspects like conservation of organic matter, soil reaction (pH) control and fertilization.

The soils occurring in different landforms have been characterised during soil resource mapping of the state on 1:250,000 scale (Haldar *et al.* 1996) and three soil orders namely Entisols, Inceptisols and Alfisols were observed in Hazaribag district (Table 1). Alfisols were the dominant soils covering 71.9 percent of TGA followed by Entisols (18.1 %) and Inceptisols (7.8%).

Table 1 : Soils of the district and their extent

Taxonomy	Area('00ha)	% of TGA
Loamy-skeletal, mixed, hyperthermic Lithic Ustorthents	319	6.32
Fine loamy, mixed, hyperthermic Ultic Haplustalfs		
Fine, mixed, hyperthermic Typic Haplustalfs	280	5.55
Loamy, mixed, hyperthermic Lithic Ustorthents		
Loamy, mixed, hyperthermic Lithic Ustorthents	175	3.47
Fine, mixed, hyperthermic Typic Rhodustalfs		
Fine-loamy, mixed, hyperthermic Typic Haplustepts	176	3.49
Fine-loamy, mixed, hyperthermic Typic Haplustalfs		
Fine, mixed, hyperthermic Typic Paleustalfs	39	0.77
Fine, mixed, hyperthermic Rhodic Paleustalfs		
Fine, mixed, hyperthermic Typic Haplustalfs	171	3.39
Fine, mixed, hyperthermic Typic Paleustalfs		
Fine, mixed, hyperthermic Typic Paleustalfs	466	9.23
Fine, mixed, hyperthermic Typic Rhodustalfs		
Fine loamy, mixed, hyperthermic Typic Paleustalfs	670	13.27
Fine-loamy, mixed, hyperthermic Typic Rhodustalfs		
Loamy-skeletal, mixed, hyperthermic Lithic Ustorthents	185	3.66
Fine-loamy, mixed, hyperthermic Typic Haplustalfs		
Fine, mixed, hyperthermic Typic Paleustalfs	993	19.67
Fine loamy, mixed, hyperthermic Typic Rhodustalfs		
Fine loamy, mixed, hyperthermic Typic Paleustalfs	52	1.03
Fine loamy, mixed, hyperthermic Typic Haplustepts		
Fine loamy, mixed, hyperthermic Typic Haplustepts	290	5.74
Fine loamy, mixed, hyperthermic Typic Haplustalfs		
Coarse loamy, mixed, hyperthermic Typic Ustorthents	182	3.60
Fine loamy, mixed, hyperthermic Typic Paleustalfs		
Fine, mixed, hyperthermic Aeric Endoaquepts	85	1.68
Fine, mixed, hyperthermic Typic Haplustepts		
Fine loamy, mixed, hyperthermic Typic Haplustepts	12	0.24
Loamy, mixed, hyperthermic Lithic Ustorthents		
Fine loamy, mixed, hyperthermic Typic Rhodustalfs	36	0.71
Loamy, mixed, hyperthermic Lithic Ustorthents		
Fine, mixed, hyperthermic Typic Paleustalfs	18	0.36
Fine loamy, mixed, hyperthermic Ultic Haplustalfs		
Fine, mixed, hyperthermic Typic Haplustalfs	90	1.78
Fine, mixed, hyperthermic Ultic Paleustalfs		
Fine loamy, mixed, hyperthermic Typic Haplustalfs	216	4.28
Loamy, mixed, hyperthermic Lithic Ustorthents		

Fine, mixed, hyperthermic Typic Rhodustalfs Loamy, mixed, hyperthermic Lithic Ustorthents	410	8.12
Fine-loamy, mixed, hyperthermic Typic Haplustalfs Fine, mixed, hyperthermic Typic Paleustalfs	33	0.65
Fine, mixed, hyperthermic Typic Rhodustalfs Coarse loamy, mixed, hyperthermic Typic Ustorthents	36	0.71
Fine silty, mixed, hyperthermic Typic Haplustepts Fine loamy, mixed, hyperthermic Aeric Endoaquepts	3	0.06
Miscellaneous	112	2.22
Total	5049	100.00

The maps for the above mentioned parameters have been prepared using Geographic Information System (GIS) from data generated by analysis of grid soil samples.

SOIL ACIDITY AND FERTILITY STATUS

Soil Reaction

Soil pH is an important soil property, which affects the availability of several plant nutrients. It is a measure of acidity and alkalinity and reflects the status of base saturation. The soils of the district have been grouped under six soil reaction classes according to Soil Survey Manual (IARI, 1970).

The soil pH ranges from 4.5 to 7.8. The soil reaction classes with area are given in table 2. Majority of soils (88.2 % of TGA) of the area are acidic in reaction. Neutral soils cover 8.7 % area of the district and slightly acidic soils cover 0.9 percent of the district.

Table 2: Soils under different reaction classes

Soil reaction	Area ('00 ha)	% of the TGA
Very strongly acidic (pH 4.5 to 5.0)	911	18.0
Strongly acidic (pH 5.1 to 5.5)	1753	34.7
Moderately acidic (pH 5.6 to 6.0)	1134	22.5
Slightly acidic (pH 6.1 to 6.5)	654	13.0
Neutral (pH 6.6-7.3)	439	8.7
Slightly alkaline (pH 7.4-7.8)	46	0.9
Miscellaneous	112	2.2
Total	5049	100.0

Organic Carbon

The effect of soil organic matter on soil properties is well recognized. Soil organic matter plays a vital role in supplying plant nutrients, cation exchange capacity, improving soil aggregation and hence water retention and soil biological activity.

The organic carbon content in the district ranges from 0.08 to 5.54 percent. They are mapped into three classes i.e., low (below 0.5 %), medium (0.5-0.75 %) and

high (above 0.75 %). The details are given in table 3. From table 3 it is seen that 64.5 percent area have high surface organic carbon content. Medium and low organic carbon content constitute 17.4 and 15.9 percent area respectively.

Table 3: Organic carbon status

Organic carbon (%)	Area ('00 ha)	% of the TGA
Low (below 0.50 %)	803	15.9
Medium (0.50-0.75 %)	878	17.4
High (above 0.75 %)	3256	64.5
Miscellaneous	112	2.2
Total	5049	100.0

Macro nutrients

Nutrients like nitrogen (N), phosphorus (P) and potassium (K) are considered as primary nutrients and sulphur (S) as secondary nutrient. These nutrients help in proper growth, development and yield differentiation of plants and are generally required by plants in large quantity.

Available Nitrogen

Nitrogen is an integral component of many compounds including chlorophyll and enzyme essential for plant growth. It is an essential constituent for amino acids which is building blocks for plant tissue, cell nuclei and protoplasm. It encourage aboveground vegetative growth and deep green colour to leaves. Deficiency of nitrogen decreases rate and extent of protein synthesis and result into stunted growth and develop chlorosis.

Available nitrogen content in the surface soils of the Hazaribag district ranges between 68 and 710 kg/ha and details are given in table 4. Soils of majority area (69.4 % of TGA) of the district have medium availability status of available nitrogen (280-560 kg ha⁻¹) and 17.9 percent area have low available nitrogen content (<280 kg ha⁻¹).

Table 4 : Available nitrogen status in the surface soils

Available nitrogen (kg/ha)	Area ('00 ha)	% of the TGA
Low (below 280)	904	17.9
Medium (280-560)	3502	69.4
High (above 560)	531	10.5
Miscellaneous	112	2.2
Total	5049	100.0

Available Phosphorus

Phosphorus is important component of adenosine di-phosphate (ADP) and adenosine tri-phosphate (ATP), which involves in energy transformation in plant. It is essential component of deoxyribonucleic acid (DNA), the seat of genetic inheritance in plant and animal. Phosphorous take part in important functions like photosynthesis, nitrogen fixation, crop maturation, root development, strengthening straw in cereal crops etc. The availability of phosphorous is restricted under acidic and alkaline soil reaction mainly due to P-fixation. In acidic condition it get fixed with aluminum and iron and in alkaline condition with calcium.

Available phosphorus content in these soils ranges between 0.5 and 27.2 kg/ha and area and distribution is given in table 5. Data reveals that soils of the 57.8 percent area are low (below 10 kg ha⁻¹) in available phosphorous content, whereas 38.5 and 1.5 % area have medium (10-25 kg ha⁻¹) and high (above 25 kg ha⁻¹) available phosphorous content respectively.

Table 5: Available phosphorous status in the surface soils

Available phosphorous (kg/ha)	Area ('00 ha)	% of the TGA
Low (below 10)	2919	57.8
Medium (10-25)	1942	38.5
High (above 25)	76	1.5
Miscellaneous	112	2.2
Total	5049	100.0

Available Potassium

Potassium is an activator of various enzymes responsible for plant processes like energy metabolism, starch synthesis, nitrate reduction and sugar degradation. It is extremely mobile in plant and help to regulate opening and closing of stomata in the leaves and uptake of water by root cells. It is important in grain formation and tuber development and encourages crop resistance for certain fungal and bacterial diseases.

Available potassium content in these soils ranges between 65 and 952 kg/ha and details about area and distribution is given in table 6. The data reveals that most of the soils (48.2 % of TGA) have medium available potassium content (108-280 kg ha⁻¹). Soils of 38.0 percent area are high (above 280 kg ha⁻¹) and 11.6 percent area are low in available potassium content.

Table 6: Available potassium status in the surface soils

Available potassium(kg/ha)	Area ('00 ha)	% of the TGA
Low (below 108)	587	11.6
Medium (108-280)	2431	48.2
High (above 280)	1919	38.0
Miscellaneous	112	2.2
Total	5049	100.0

Available Sulphur

Sulphur is essential in synthesis of sulphur containing amino acids (cystine, cysteine and methionine), chlorophyll and metabolites including co-enzyme A, biotin, thiamine, or vitamin B1 and glutathione. It activates many proteolytic enzymes, increase root growth and nodule formation and stimulate seed formation.

The available sulphur content in the soils ranges from 0.54 to 106.50 mg kg⁻¹ and details about area and distribution is given in table 7. Soils of 33.8 percent of the area are deficient (<10 mg kg⁻¹) whereas soils of 30.4 and 33.6 percent area are medium (10-20 mg kg⁻¹) and high (>20 mg kg⁻¹) in available sulphur content respectively.

Table 7: Available sulphur status in the surface soils

Available Sulphur (mg kg ⁻¹)	Area ('00 ha)	% of the TGA
Low (<10)	1709	33.8
Medium (10-20)	1533	30.4
High (>20)	1695	33.6
Miscellaneous	112	2.2
Total	5049	100.0

Micro nutrients

Proper understanding of micro nutrients availability in soils and extent of their deficiencies is the pre-requisite for efficient management of micro nutrient fertilizer to sustain crop productivity. Therefore, it is essential to know the micro nutrients status of soil before introducing any type of land use.

Available Iron

Iron is constituent of cytochromes, haems and nonhaem enzymes. It is capable of acting as electron carrier in many enzyme systems that bring about oxidation-reduction reactions in plants. It promotes starch formation and seed maturation.

The available iron content in the surface soils is ranges between 6.9 and 76.0 mg kg⁻¹. As per the critical limit of available iron (> 4.5 mg kg⁻¹), all the soils are sufficient in available iron. They are grouped and mapped into four classes. Majority of the soils (50.4 % of TGA) have available iron content between the ranges of 25 to 50 mg kg⁻¹. The details of area and distribution is presented below in Table 8:

Table 8: Available Iron status in the surface soils

Available iron (mg kg ⁻¹)	Area ('00 ha)	% of the TGA	Rating
<15	413	8.2	Sufficient
15-25	672	13.3	
25-50	2544	50.4	
50-100	1308	25.9	
Miscellaneous	112	2.2	
Total	5049	100.0	

Available Manganese

Manganese is essential in photosynthesis and nitrogen transformations in plants. It activates decarboxylase, dehydrogenase, and oxidase enzymes.

The available manganese content in surface soils ranges between 9.3 and 53.6 mg kg⁻¹. As per the critical limit of available manganese (> 2 mg kg⁻¹), all the soils are sufficient in available manganese. They are grouped and mapped into four classes. Soils of 72.2 % area of district have available Mn content between 50 and 100 mg kg⁻¹. The details of area and distribution are presented in table 9.

Table 9: Available manganese status in the surface soils

Available manganese (mg kg ⁻¹)	Area ('00 ha)	% of the TGA	Rating
<10	37	0.7	Sufficient
10-25	817	16.2	
25-50	3643	72.2	
50-100	440	8.7	
Miscellaneous	112	2.2	
Total	5049	100.0	

Available Zinc

Zinc plays role in protein synthesis, reproductive process of certain plants and in the formation starch and some growth hormones. It promotes seed maturation and production.

The available zinc in surface soils ranges between 0.10 and 9.40 mg kg⁻¹. They are grouped and mapped into six classes. Majority of soils (93.6 % of TGA) are sufficient (>0.5 mg kg⁻¹) whereas soils of 4.2 percent area are deficient (<0.5 mg kg⁻¹) in available zinc. The details of area and distribution are presented in table 10.

Table 10: Available zinc status in the surface soils

Available zinc(mg kg ⁻¹)	Area ('00 ha)	% of the TGA	Rating
<0.5	213	4.2	Deficient
0.5-1.0	402	8.0	Sufficient
1.0-2.0	1941	38.4	
2.0-3.0	1207	23.9	
3.0-5.0	858	17.0	
5.0-10.0	316	6.3	
Miscellaneous	112	2.2	
Total	5049	100.0	

Available Copper

Copper involves in photosynthesis, respiration, protein and carbohydrate metabolism and in the use of iron. It stimulates lignifications of all the plant cell wall and is capable of acting as electron carrier in many enzyme systems that bring about oxidation-reduction reactions in plants.

The available copper status in surface soils ranges between 0.12 and 5.26 mg kg⁻¹. They are grouped and mapped into six classes. Majority of soils (92.3 % of TGA) have sufficient amount of available copper (>0.2 mg kg⁻¹) and soils of 5.5 % area are deficient in available copper (<0.2 mg kg⁻¹). The details of area and distribution are presented in table 11.

Table 11: Available copper status in the surface soils

Available copper (mg kg ⁻¹)	Area ('00 ha)	% of the TGA	Rating
<0.2	276	5.5	Deficient
0.2-0.5	318	6.3	Sufficient
0.5-1.0	741	14.7	
1.0-2.0	1674	33.1	
2.0-4.0	1667	33.0	
4.0-6.0	261	5.2	
Miscellaneous	112	2.2	
Total	5049	100.0	

Available Boron

Boron increases solubility and mobility of calcium in the plant and it act as regulator of K/Ca ratio in the plant. It is required for development of new meristematic tissue and also necessary for proper pollination, fruit and seed setting and translocation of

sugar, starch and phosphorous etc. It has role in synthesis of amino acid and protein and regulates carbohydrate metabolism.

The available boron content in the soils ranges from 0.03 to 7.87 mg kg⁻¹ and details about area and distribution is given in table 12. The critical limit for deficiency of the available boron is <0.5. Soils of 38.9 percent area of district are deficient (<0.50 mgkg⁻¹) whereas 58.9 percent area are sufficient (>0.50 mg kg⁻¹) in available boron content.

Table 12 : Available boron status in the surface soils

Available boron (mg kg ⁻¹)	Area ('00 ha)	% of the TGA	Rating
<0.25	1055	20.9	Deficient
0.25-0.50	909	18.0	
0.50-0.75	901	17.9	Sufficient
>0.75	2072	41.0	
Miscellaneous	112	2.2	
Total	5049	100.0	

SUMMARY

The soil pH ranges from 4.5 to 7.8. Majority of soils (88.2 % of TGA) of the area are acidic in reaction. The organic carbon content in the soils ranges from 0.08 to 5.54 percent. Soils of 64.5 percent area have high surface organic carbon content. Medium and low organic carbon content constitute 17.4 and 15.9 percent area respectively. Available nitrogen content in the surface soils of the district ranges between 68 and 710 kg/ha. Soils of majority area (69.4 % of TGA) of the district have medium availability status of available nitrogen (280-560 kg ha⁻¹) and 17.9 percent area have low available nitrogen content (<280 kg ha⁻¹). Available phosphorus content in these soils ranges between 0.5 and 27.2 kg/ha. Soils of the 57.8 percent area are low (below 10 kg ha⁻¹) in available phosphorous content. Available potassium content in these soils ranges between 65 and 952 kg/ha. Most of the soils (48.2 % of TGA) have medium (108-280 kg ha⁻¹) available potassium content. Soils of 38.0 percent area are high (above 280 kg ha⁻¹) and 11.6 percent area are low in available potassium content. The available sulphur content in the soils ranges from 0.54 to 106.5 mg kg⁻¹. Soils of 33.8 percent of the area are low (<10 mg kg⁻¹) whereas soils of 30.4 and 33.6 percent area are medium (10-20 mg kg⁻¹) and high (>20 mg kg⁻¹) in available sulphur content respectively.

Soils are analysed for available (DTPA extractable) micro nutrients and seen that all the soils are sufficient in available iron and manganese whereas soils of 4.2 and 5.5 percent area are deficient in available zinc and copper respectively. Soils of 38.9 percent area of district are deficient (<0.50 mgkg⁻¹) whereas 58.9 percent area are sufficient (>0.50 mg kg⁻¹) in available boron content.

Chapter 3

Agriculture and Allied Potentials

3.1 FIELD CROPS

Introduction :

Hazaribag falls under Chhotanagpur plateau. It has a rolling topography dotted with small villages. Area available for cultivation is less. Out of total geographical area of 467295 ha. of Hazaribag, 53.3 % is forest land; current and other fallow land is 178145 ha having a 29.45 % share. Net sown area is 160936 ha i.e. 26.61 % of total geographical area. The district falls in tropical monsoon climatic zone resulting in moderately extreme cold in winter and moderate heat in summer. The undulating hilly tracts with soil having red laterite content make this area more suitable for vegetable cultivation in comparison to cultivation of cereals. A wide range of crops are grown in the district. The major crops are paddy, wheat, maize, oilseeds, pulses, potato, tomato and other vegetables. More than 62% of arable area is under small and marginal holdings up to 2 ha.

Availability and gaps in Infrastructure and support services:

- Presently about 14.5% of the net sown area is under assured irrigation.
- Under RIDF , 3084 Ha of command shall be created.
- In the recently concluded scheme of "On-Farm Water Management for Increasing Crop Production in Eastern India" emphasis was given to finance irrigation activities particularly Lift Irrigation schemes by way of group financing under SGSY programme.
- Supply of fertiliser, insecticides and pesticides is adequate. During Kharif 2006, about 65000 MT of chemical fertilisers were consumed. During the year 2007-08 7466.54 MT chemical fertiliser was consumed.
- HYV seeds are being supplied by NSC and Rajya Beej Nigam. Apart from this, there are 11 seed Multiplication Farms in the district having approximately 40Ha of land. During Kharif 2006, District Agriculture Office distributes certified improved variety paddy seed, Maize , pulses and oil seeds under Seed Exchange Programme. Barkagaon has been adopted as "Seed Village". Suryavanshi Seed Processing Unit with assistance of the State Govt, established at Barkagaon has a processing capacity of 1000 - 1500 kg. per hour. It has processed 190 MT paddy seed and 30 MT wheat seed during 2004-05 and during 2005-06 it has processed 260 MT paddy seed and 40 MT wheat seed. During 2006 - 07 it has a production / processing target of 600 MT paddy seed and 100 MT wheat seed. During 2007-

08 with the help of its 15 acre land, it supplied 5500 Q of Paddy seeds (IR-64 and Lalat etc) to the State Govt against a target of 6000Q. The Birsa Agriculture University has opened a Seed Research Centre at Gauriakarma. The centre has commenced its operations .

- Central Rainfed Upland Rice Research Station at Hazaribagh is engaged in research on paddy crop suitable for upland areas. Eight new types of genetically developed varieties of paddy seeds were bred by the research wing of the institution . The institution is also distributing seeds to farmers. The HCKVK also supplies Certified seeds in crop varieties of Paddy, Rai, Wheat, Gram, Moong, Turmeric, Cotton etc.
- Six Government Demonstration Farms having an area of 8.31 ha. are engaged in producing certified seeds from foundation seeds.
- Rastriya Krishi Bima Yojana (RKBY) / National Agricultural Insurance Scheme is being implemented through Agriculture Insurance Company of India Ltd. to provide insurance coverage to Aghani Paddy and Bhadai Maize (Kharif 2008). Under KCC Personal Accident Insurance Scheme (PAIS) has been made available for benefit of the insured account holders.
- Under National Food Security Mision 22 villages have been selected (@ 2 villages per block) for intensive paddy cultivation. Besides, the District Administration with the help of prominent NGOs is also popularising SRI method of Paddy cultivation.
- KCC scheme has become very popular in the district. About 71000 cards have been distributed by various banks till March 2008.
- 47 Watershed Schemes with an area of 500 Ha each are under implementation in the district under X-XII batches of DPAP and IWDP. Four blocks (Barhi, Sadar, Barkagaon and Keredari) have been selected for Watershed Development Programme under Non-DPAP.
- There are 127 farmer's clubs operating in the district managed by NGOs and banks. Farmer Clubs are acting as vehicles for transfer of technology from lab to land, adoption of new cropping pattern like SRI and commercial agriculture. NABARD, District Agriculture Dept and ATMA have been organising field exposure visits for farmer clubs. Most of the banks are gearing up to form at least one club per branch / service area village.
- Under recently concluded GOI programme of Rashtriya Sam Vikas Yojana (RSVY) crops viz elephant's foot, ginger, turmeric, capsicum, chilli etc were popularised.
- The District Agriculture Department plans a target of covering 92,000 ha under paddy during current Kharif. Targets for Maize, Pulses and wheat during 2008-09 have been fixed at 14,400 ha, 6,500 ha and 8,000 respectively. Hybrid oilseed is being tried in Keredari, Barkagaon and Katkamsandi. The target for NPK consumption during kharif 2008 is fixed at 1399.7 MT, 637.22 MT and 46.79 MT

respectively. This target is revalidated for the year 2008-09 .

The following infrastructure is planned for the current year:

- (i) Thrust on financing of dug wells, pump sets and WHS under various Govt. Sponsored programmes.
- (ii) Treatment of acidic land.
- (iii) Bio-fertiliser is being encouraged; Govt. Departments, NGOs and Farmers Clubs are imparting training on managing vermicompost units.
- (iv) 60% outlay on irrigation schemes is covered under NREGS. Major thrust to irrigation under Backward Region Grant Fund (BRGF) is envisaged
- (v) The Water Resources Department, Government of Jharkhand has prepared an elaborate plan for construction of Ahars/Ponds/Checkdams in all panchayats of the State. Further, there are plans for revival of defunct Lift Irrigation Schemes, renovations of ponds, etc. Stabilisation of existing units is needed. All these once implemented will bring a large area under assured irrigation which may lead to a change in cropping pattern.
- (vi) A few rural godowns are to be financed in the district under Centrally Sponsored Rural Godown Scheme; SBI is taking a lead role in identification of new borrowers for financing them ; all the banks in the district are gearing up to finance construction of more Rural Godowns during the year.

Assessment of Infrastructure gap :

- (i) The district has mainly mono-cropped area. Most of the cultivable area in the district lacks irrigation facility. Most of the facilities created earlier viz. Lift Irrigation Schemes by various agencies like JHALCO, MI Department are non functional for various reasons.
- (ii) Adequate and timely supply of certified seeds is a problem. Farmers often fall in trap of unscrupulous sellers and often get spurious seeds.
- (iii) The District Central Cooperative Bank, which is the primary agency for financing of crop loans is weak and has failed to adhere to the provisions of Section 11 of BR Act, 1949 (AACCS). This has hampered the growth of flow of crop loan to farmers to desired extent
- (iv) A soil Testing laboratory is established in the HCKVK; this is not adequate.
- (v) Getting Land Possession Certificate (LPC) from Circle Offices is a big problem. This hampers financing under various land based activities.
- (vi) The consumption of chemical fertilizers is much less than required level. Further, use of organic and biochemical fertilizers is not very popular.

Suggested Action Points :

- i. Creation of adequate irrigation facilities. Revival of defunct projects of LIS and other schemes.
- ii. Private investment under Minor Irrigation to be encouraged.

- iii. Regular power supply to existing lift irrigation projects.
- iv. Adequate and timely supply of diesel, Kerosene, HYV / improved seeds, fertilizers etc.
- v. Demonstration farms in each block may be set up for improved farm practices.
- vi. Expeditious availability of Land Possession Certificate.

Other Issues :

i. The Govt of Jharkhand is assessing the infrastructure requirements under RKVY. Provisions of additional facilities / training etc under various sectors would boost Agriculture production.

ii. The On Farm Water Management scheme for Eastern India came to a close during 2005-06. There is a growing demand from farmers for introduction of a similar scheme. Introduction of a similar scheme shall be very helpful.

3.2 WATER RESOURCES

Introduction :

The Hazaribag district is benefitted by Tilaiya Major reservoir scheme, Konar Medium Irrigation scheme and a large number of minor irrigation schemes. This chapter lays thrust on Minor irrigation schemes.

Minor Irrigation Projects are irrigation projects with command area upto 2000 ha. Minor irrigation can be categorized into two groups depending on the source of water

- Ground water exploitation by constructing Minor Irrigation (MI) structures
- Surface water irrigation by Lift Irrigation Scheme (LIS).

Besides, efficient irrigation systems like drip and sprinkler as also water saving devices like lining of channels, underground pipelines have also been included under Minor Irrigation as they help in increasing the area under irrigation.

Availability and gaps in Infrastructure and support services:

a. As per the latest ground water survey report , ground water is available to irrigate 62442 Ha area of the district . As per the GEC 1997 all the blocks of the district are in the safe category.

b. The district has immense potential for surface water scheme. With the total available surface water resources available to irrigate 18,83,100 ha. of land, only about 23,344.33 ha. of land is actually being irrigated at present. The percentage of present utilization vis-à-vis potential for surface water existing in the district comes to 0.88%. Therefore, it may be observed that almost all surface water resources is presently unutilised / underutilised. To tap the available resources, medium/minor – surface flow irrigation projects will have to be considered. However, considerable

percentage can be tapped by Water Harvesting Tanks, Check Dams and Lift Irrigation Schemes.

c. The block-wise availability of surface water is given below :

Surface Water Exploitation

Sl. No.	Name of the Block	Irrigation Possible from available source of surface water (Ha.)	Existing Irrigation from Lift Irrigation (Ha.)	Other Minor Irrigation Scheme (Ha.)	Other Sources Ahar, Pines (Ha.)	Water Ways (Ha.)	Total in Hectare (Ha.)	Percentage
1.	2.	3.	4.	5	6	7	8	9
1.	Barhi (Incl. Padma)	10422.00	44.05	34.00	340.00	1805.00	2223.05	21.33
2	Ichak	36069.00	29.00	22.00	220.00	0.00	271.00	0.75
3	Katkamsandi	24652.56	32.00	15.00	150.00	675.00	872.00	3.54
4	Hazaribag	74366.43	58.09	20.00	200.00	0.00	278.09	0.37
5	Churchu	121723.00	7.00	20.00	227.00	0.00	227.00	0.19
6	Bishnugarh	114290.00	8.00	130.00	300.00	810.00	1248.00	1.09
7	Barkagaon	93242.00	49.60	39.00	390.00	350.00	828.60	0.89
8	Keredari	86084.00	14.00	213.00	230.09	1800.00	2257.09	2.62
9	Barkatha	91620.00	3.60	31.00	310.00	0.00	344.60	0.38
10	Chouparan	125188.80	22.60	90.00	324.09	665.00	1101.69	0.88

d. MI Structures installed with assistance under “On-Farm Water Management for Increasing Crop Production in Eastern India” (which came to a close during 2005-06) are being utilized for irrigation purposes.

e. All agencies, whose involvement is required for implementation of MI Projects, are operating from Hazaribag. Adequate expertise are available for executing LI schemes, Dug wells, etc. Sufficient numbers of dealers are there for supplying all makes of pump sets.

f. Few NGOs like TSRDS, Holy Cross Social Service Centre, PRADAN, Jan Jagaran Kendra, SUPPORT have expertise in LI projects.

g. Adequate facilities are also available for repairing of pump sets and generators at various block headquarters and market places.

h. There is lot of stress on financing minor irrigation projects under various government sponsored schemes with adequate availability of subsidy. Under SGSY group financing, irrigation schemes are not getting priority.

I.The RIDF -Irrigation projects on completion shall bring additional 7084 Ha of additional command into the fold of irrigation.

j. There is no information of creation of any infrastructure during previous year except of completion of some **RIDF** -III & V projects. There are 12 on going MI schemes launched by MI Department with total Kharif command area of about 1000 ha. and 350 ha. Rabi command area. 208 irrigation schemes under **RSVY** with a total financial outlay of Rs.16.16 crore were completed. Irrigation sector was given special thrust in Rastriya Sam Vikas Yojana with allocation of 49.98 % of the total outlay to this sector. Construction / Renovation of 68 Birsa Check Dams with Micro Lift, Construction / Renovation of 75 Birsa Ponds and Birsa Ahars, Setting up of 105 Micro Lift Schemes and Excavation/ renovation of 14630 mtrs. of irrigation channels was taken up under RSVY. Irrigation potential of 600 Ha has been created under NHM through construction of ponds, WHSs etc. The Welfare Dept of the State Govt is also engaged in construction of ponds, microlifts, wells etc since year 2000. Under NREGS special thrust is given to development of water sources.

k. JHALCO is recommissioning the existing defunct LI projects. DRDA has taken up a programme of digging up community ponds in each Panchayat. One Micro Lift Irrigation scheme is to be implemented by MI department with a project cost of Rs.2.00 lakhs in each block. Further, the deptt. is to construct two dug wells of 10' diameter and one dug well of 20' diameter in each block during the year. Ponds renovation work is to be taken up @ one in each block with unit cost of Rs.4.00 lakhs. Dept of Soil Conservation is presently digging of 62 wells of size 20 ft dia and 40ft depth. The site selection is in progress. Welfare Dept of the State Govt and DRDA are engaged in construction of ponds, wells, microlifts etc from the State Govt's budgetary allocations and also from out of the MPLAD and MLALAD funds. Under NHM irrigation facilities for additional 250 ha is envisaged. NREGS also aims at enhancing irrigation potential by 30%.

(l) Renovation of around 56 old Lift Irrigation Schemes are to be taken up in the district with unit cost of Rs.1.00 to 1.50 lakhs per Lift Irrigation. Construction / Renovation of 68 Birsa Check Dams with Micro Lift, Construction / Renovation of 75 Birsa Ponds and Birsa Ahars, Setting up of 105 Micro Lift Schemes and Excavation / re-excavation of 14630 mtrs. of irrigation channels have been envisaged under RSVY. The programme may spillover to the next year. The Government of Jharkhand has decided to prepare an elaborate plan for construction of Ahars/ponds/Checkdams in all panchayats of the state. For this purpose, selection of feasible sites has already been done by organizing Gram Sabhas. With the introduction of Backward Region Grant Fund (BRGF) wef 01 April 2007 identification of suitable projects is in progress. Gram Bhagirathi Yojana has listed / located probable irrigation unit sites.

Assessment of Infrastructure gap :

Most of the 79 LI schemes executed by MI department and 96 LI schemes executed by BHALCO are non- functional. There is lack of priority of energisation of pump sets

by Govt. Several lift irrigation schemes could not become operational due to this problem.

Suggested Action Points :

- ☞ Improvement in power supply.
- ☞ Improvement in recovery position.
- ☞ Orientation of farmers as well as bankers to go in for non-subsidised projects too.
- ☞ Extension support from MI and other Govt. Extension departments to farmers.
- ☞ Farmers to be made aware of the benefits of sprinkler and drip irrigation.
- ☞ DRDA to create adequate no. of check dams.
- ☞ Stress of MI projects under SGSY particularly for financing of LI schemes in groups. Linking of incomplete LI schemes of DRDA/MI Deptt. with SGSY financing.
- ☞ Awareness building among the farmers may be attempted for change in cropping pattern having market orientation and adopting agriculture as a commercial proposition.
- ☞ All out efforts may be made to convince the farmers about the benefits of Rain Water Harvesting Tanks to ensure life saving irrigation to standing crops exposed to dry spells.

Other Issues :

- (i) Extensive awareness programmes may be conducted by District Agriculture Office and Krishi Vigyan Kendra on adoption of better farming practices and commercial agriculture. Created irrigation facilities better be used for higher income through commercial agriculture rather than subsistence farming.
- (ii) Water Users' Associations may be entrusted with the responsibilities of maintenance of irrigation facilities created by Govt. Departments.

3.3 SOIL & MOISTURE CONSERVATION

Introduction :

Land Development is a broad spectrum of activities like Land Levelling, On Farm Development, Reclamation and soil improvement, Integrated farm development, Water management, Soil and Water Conservation, Watershed management and Organic manures like NADEP/ Vermi composting. Net Sown Area is 160936 ha and Net Irrigated Area is 23344.33 ha. The land pattern of the district suggests that activities like On farm Water Management, Dry Land Farming, Water harvesting Tanks and Nadep Compost making are feasible.

The soil pH ranges from 4.5 to 7.8. Majority of soils (88.2 % of TGA) of the area are acidic in reaction. The organic carbon content in the soils ranges from 0.08 to 5.54 percent. Soils of 64.5 percent area have high surface organic carbon content.

Medium and low organic carbon content constitute 17.4 and 15.9 percent area respectively.

Available nitrogen content in the surface soils of the district ranges between 68 and 710 kg/ha. Soils of majority area (69.4 % of TGA) of the district have medium availability status of available nitrogen (280-560 kg ha⁻¹) and 17.9 percent area have low available nitrogen content (<280 kg ha⁻¹). Available phosphorus content in these soils ranges between 0.5 and 27.2 kg/ha. Soils of the 57.8 percent area are low (below 10 kg ha⁻¹) in available phosphorous content. Available potassium content in these soils ranges between 65 and 952 kg/ha. Most of the soils (48.2 % of TGA) have medium (108-280 kg ha⁻¹) available potassium content. Soils of 38.0 percent area are high (above 280 kg ha⁻¹) and 11.6 percent area are low in available potassium content. The available sulphur content in the soils ranges from 0.54 to 106.5 mg kg⁻¹. Soils of 33.8 percent of the area are low (<10 mg kg⁻¹) whereas soils of 30.4 and 33.6 percent area are medium (10-20 mg kg⁻¹) and high (>20 mg kg⁻¹) in available sulphur content respectively.

Soils are analysed for available (DTPA extractable) micro nutrients and seen that all the soils are sufficient in available iron and manganese whereas soils of 4.2 and 5.5 percent area are deficient in available zinc and copper respectively. Soils of 38.9 percent area of district are deficient (<0.50 mgkg⁻¹) whereas 58.9 percent area are sufficient (>0.50 mg kg⁻¹) in available boron content.

Availability and gaps in Infrastructure and support services:

- I. 47 Watershed Schemes with an area of 500 ha. each are under implementation.
- iii. DVC undertakes land development work in the catchment area of their different dams. PRADAN is implementing 2 Watershed projects aided by DVC in 32 villages of Barhi & Chauparan blocks of the district alongwith Jayanagar block of Koderma district. The project would create additional command of 3000Ha (Cost of the project (@ Rs 22000 per Ha) and it also components of Health, Sanitation etc.
- iv. Under NWDPR, Soil conservation Department, Govt. of Jharkhand is also implementing watershed projects in the district.
- v. Central Rainfed Upland Rice Research Station is located in Hazaribag. The institute is carrying out research and propagating the concept of dry land agriculture in the district. They also have their demonstration farm and distribute seeds to the farmers.
- vi. The National Horticulture Mission is in operation since 2005. Holy Cross Social Service Centre is the lead NGO. The programme lays thrust on land development activities which create demand for bank loan. The NHM is also popularising vermicomposting activity in the district.

vii. Holy Cross Krishi Vigyan Kendra, Hazaribag organises training programmes on various aspects of land development initiatives viz improved agricultural & horticultural practices, vermicompost making etc. The KVK has a soil testing laboratory.

ix. Agriculture Technology and Management Agencies (ATMA) is operating in the district as an autonomous organisation. ATMA is a registered society for dissemination of technology at the district level. It is envisaged to have linkage with all the Line Departments, research organisations, NGOs and other agencies associated with agricultural development in the district.

x. Soil conservation department and Agriculture department have its offices and demonstration farms at Hazaribag to provide extension support to farmers. Under Hariyali scheme, the Soil conservation Dept is implementing 8 watersheds. The Soil Conservation Dept. is constructing 2 Water Harvesting Structures and 2 DOBHAS (5% model) in each block.

Under IWDP, four non-DPAP blocks (Barkagaon, Sadar, Barhi and Keredari) are to be covered for integrated watershed development programme. Under Rastriya Sam Vikas Yojana, 10 Soil & Water Management units, 3 Watershed Parks and 4 Poly Houses were constructed for demonstration purpose were completed. Production of organic inputs is being encouraged; Govt. Departments, NGOs and Farmers Clubs are imparting training on managing vermicompost units. The watersheds consists of activities viz. mechanical and social interventions, Dry Land Horticulture, Afforestation, Contour Bunding, Continuous Contour Trenching, Staggered Contour Trenching, Water Absorption Trenches are some of the mechanical treatments practised in the watersheds which has resulted in better land use pattern, cropping pattern, higher ground water table, arresting soil erosion. Watershed Parks, Soil and Water Management units and Poly Houses envisaged in RSVY will be used as demonstration units where farmers can be exposed to better and scientific land and water use, cropping pattern, etc.

Assessment of Infrastructure gap :

- i. Adequate extension support in terms of demonstrations for Water Harvesting Tanks, Vermicompost Tanks and Dry Land Agriculture is lacking.
- ii. Adequate availability of High Yielding Variety (HYV) seeds for dry land agriculture is not there.
- iii. Earthworms for vermi compost are also not available in adequate quantity.

Suggested Action Points :

- ⇒ Strengthening and reorienting extension services for technology transfer and awareness creation by district and block level officials particularly Soil Conservation Officer, Agriculture Officers, VLWs, NGOs and KVK Officials.
- ⇒ DRDA to implement its watershed development programmes expeditiously.
- ⇒ Induction of NGOs / VAs in land development programmes.
- ⇒ Popularisation of the benefits of Compost Making Tanks.
- ⇒ Series of Check Dams be constructed on every perennial sources and desiltation of tanks be taken up.

Other Issues

(i) Financing Dryland Agriculture- Thrust area:

As most of the blocks are in the rain shadow area, they receive low rainfall. The crop productivity is low in the absence of assured irrigation facilities. Agriculture development in these areas needs more attention because of its potential for providing large quantities of coarse grains as well as oilseeds. The bankers are averse to lending to dryland agriculture in view of their experience of high NPAs and low recoveries. However, as this sector cannot be ignored any longer, special programmes will have to be prepared to fulfill the demands of farmers of these areas. State Government should come forward to implement Watershed Programmes in drylands through WDF ensuring people's participation.

(ii) Popularise the DOBHA concept of PRADAN, at least one DOBHA per 2-3 plots be financed to ensure at least one crop per year.

Organic Farming - A Perspective

Organic farming is being carried out sporadically in many parts of Jharkhand by local farmers. Organic farming consists of a system of farm design and management which can achieve sustainable productivity without the use of chemical fertilizers and pesticides. Organic farming is in a nascent stage and is mainly being promoted by NGOs / individuals on very small scale in a few pockets. There is no separate institutional set up for organic farming in the district. However, certain agencies especially in the NGO sector are involved in production of organic inputs.

3.4 FARM MECHANISATION

Introduction :

The term 'Farm Mechanisation' refers to a wide range of mechanized farming activities. Tractors, power tillers and agriculture implements including thresher etc are presently considered for assessment of potential and financing. Tractors are normally financed to farmers having irrigated land holding of not less than 8Ha . Most of the farms being of small size and fragmented consolidation of land holding is

required to propagate mechanised agriculture operations. Keeping in view the amount of subsidy available for group financing under SGSY and other govt. sponsored schemes, the tractor, power tillers etc. may be financed to group of farmers who fulfill the land requirement.

Availability and gaps in Infrastructure and support services:

- Tractor population in the district is at 2800. About 550 Power Tillers are also available. There are 2600 Trailers in the district. However, the number of agricultural implements like Threshers are not available in the district.
- Progressive farmers are gradually shifting to high value crops. This may result in further demand for financing of tractors, power tillers and threshers.
- Tractors of all reputed companies are readily available in the district. Almost all the companies such as Mahindra and Mahindra, Eicher, Massey-Ferguson, Sonalika, Swaraj and HMT have either dealer or sub-dealer or branch of dealer in the district. Tractor manufacturers provide services at door step during two years guarantee period. Some companies have provision to impart training to local skilled youths on repair and maintenance of tractors free of cost at factory site. There are few authorised repairing and maintenance workshop in the district. Repair centres run by individual entrepreneurs without any link to tractor manufacturers are available in some block headquarters.
- Fuel like diesel and petrol are available in plenty in the urban areas. However in rural areas network of fuel depot is not available.
- Fragmented land holding and undulating topography is also responsible for low off take under the scheme. Therefore, legislative and physical measures to encourage consolidation of land holding and improving land condition will be complimentary to mechanisation of agriculture.
- Agriculture Dept is engaged in distribution of tractors and power tiller involving subsidy @ 75% of the cost subject to ceiling of Rs. 75000/- to SC/ST/Women, in a limited way.
- Around 80 tractors, 75 Power Tillers and a few miscellaneous FM accessories were to be financed by the banks during 2007-08 .
- Farmers have started ploughing their fields by custom hiring tractors. There is a great demand for tractors in rural areas for transportation of bricks, stones, sand, cement and rods as the people are engaged in building pucca houses, dugwells and also Indira Awas in the district.
- Creation of Water Harvesting Structures (RWHS) will further push the demand for use of tractor through custom hiring.
- Efforts made by District Admn and banks to develop the agriculture land would pave the way for farm mechanisation.

- Creation of new irrigation potential under various schemes will bring a large area under assured irrigation which may lead to a changed cash crop cultivation practice with higher degree of mechanisation.
- Rural Entrepreneurship Development Programmes are being conducted by NABARD through NGOs to encourage setting up of service units with the help of bank credit.
- SFAC and MANAGE with due support from Ministry of Agriculture - GOI are popularising establishment of Agri clinic and Agri business centres which will popularise Farm mechanisation.

Assessment of Infrastructure gap :

- Non-availability of land possession certificates and insistence of other terms and conditions by banks force farmers to avail finance from financing agencies other than banks. As per rough estimate, only about 25% tractors are being purchased with bank loan and rest are purchased from other private financing agencies.
- Consolidation of land holdings is necessary for economic exploitation of mechanisation. Adequate extension support is required to bring about changes in cropping pattern.
- There should be adequate Service Centres for repair of tractors, Power Tillers, Threshers at convenient places.

Suggested Action Points :

- ⇒ Creation of better irrigation facilities.
- ⇒ Expansion of marketing network for hybrid seeds, pesticides, fertilizers to be ensured.
- ⇒ Agriculture. Extension Workers to spread the message of benefits of farm mechanisations among farmers.
- ⇒ Ensuring availability of service centres and diesel in all the block headquarters.

3.5 PLANTATION AND HORTICULTURE

Introduction :

- ✍ The State of Jharkhand as a whole and Hazaribag district in particular are active is suitable for horticultural practices.
- ✍ Hazaribag district, which falls under the agro climatic zone of Eastern plateau region, is one of the potential districts for horticulture development. The agro climatic conditions are conducive for development of a wide range of horticulture crops in the district.

- ✍ The hilly tracts having sandy clay soil with red laterite content make the area more suitable for cultivation of vegetables in comparison to that of cereals. Vegetables are being grown in the district on a very large scale.
- ✍ Horticulture sector has played a vital role in ensuring regular income to the farmers, nutritional security to the villagers and sustainability of farming. Main fruits grown are mango, guava, Litchi, Lemon, Coconut, Banana, etc.
- ✍ The Government of India has notified Medicinal and Aromatic Plants promotion as a thrust area and set up National Medicinal Plant Board (NMPB) at National level and State Medicinal Plants Boards (SMPB) at State level. It has given importance to Medicinal and Aromatic Plants / Crops under the Agri - Export Zone. With these policy initiatives, commercial cultivation of Medicinal and Aromatic Plants is making progress in the country. The credit linked subsidy schemes are also in operation through NMPB and SMPBs in different States.
- ✍ The data pertaining to the year 1999-2000 indicates that there are enough scope for directing institutional credit to this sector for commercial and scientific exploitation:

Crop	Area (hectare)	Production (mt)	Yield Rate / Productivity - ton / ha
Mango	432	5184	12.00
Guava	418	5016	12.00
Litchi	27	324	12.00
Lemon	254	2540	10.00
Coconut	33	330	10.00
Banana	189	3780	20.00
Other Fruits	961	9610	10.00
Total	2314	26784	11.57

Availability and gaps in Infrastructure and support services:

The District Horticulture Officer and Sub-divisional Horticulture Officer at Hazaribag look after the horticulture development in the district.

- ☞ There are 9 Govt. aided nurseries in the district which need to be rejuvenated.
- ☞ The Department has identified Hybrid Seed Production, Nursery Development, Orchard Development, encouraging Cultivation of Vegetables and Tuber Crops as its thrust areas. 28 demonstration camps for cultivation of elephant's foot(Madrasi Oal) have been organised and 64 quintals of seed distributed by the Department.
- ☞ There are 15 nurseries operating in the private sector. The Damodar Valley Corporation has its nursery at Konar.
- ☞ The Central Horticulture Research Institute, Ranchi (ICAR) takes care of research, training and also extension needs.

- ☞ District Agriculture Deptt. distributed HYV vegetable seeds to 300 farmers (1556 kgs) at 75% subsidy. It also distributed mango graftings at 50% subsidy to farmers.
- ☞ The District Horticulture Department has decided to cover all the blocks with an orchard of Mango, guava and jackfruit.
- ☞ Krishi Vigyan Kendra, Hazaribag , Central Upland Rice Research Station and BMIED impart training on mushroom cultivation and also provide spawn to entrepreneurs.
- ☞ Vegetables are being grown on a very large scale. The farmers grow various kinds of vegetables viz. Potato, Tomato, Onion, Peas, Cabbage, Cauliflower, Beans and gourds.
- ☞ In Hazaribag forest and fallow land comprise 43.94 % and 12.85 % respectively of total geographic area. This vast 56.79 % of land leaves a good potential for cultivation of Medicinal and Aromatic plants. The existing forest cover generates wide variety of medicinal plants which is presently collected by the local people and marketed in an unorganised way. Medicinal & Aromatic Plants are being planted in 17 acres in Sadar Block of the district by the Agriculture Department which may have good demonstration effect. Marksman Welfare Society is in the process of setting up a Medicinal & Aromatic plant Research Centre. Under Rashtriya Sam Vikas Yojana (and its successor BRGF) MAPs have been planned to be cultivated on commercial basis which will also act as demonstration plots.
- ☞ Some NGOs are propagating cultivation of MAPs in an organised manner. These bodies also offer both backward and forward linkages particularly access to market.
- ☞ Farmers and entrepreneurs have developed an interest in cultivation of MAPs.
- ☞ Cold storages (8 nos) are already in operation in the district. There is a plan to revive 3 defunct units. A few more cold storages may come up with bank financing during the current year.
- ☞ A Progeny Orchard has been established at Dipugarh in Sadar Block of the district under Macro Management Plan of the Central Government.
- ☞ In 7 acres of Churchu, Katkamsandi and Chouparan blocks, the work of establishing Progeny Orchards have been started by Agriculture Deptt.
- ☞ Horticulture Dept has already released subsidy to 20 Commercial orchards based on multitier system (12.5 acre each). Subsidy to 47 Commercial floriculture units were also disbursed by Horticulture Dept. 15 units were also set up with multitier cropping (Mango, Papaya, Guava, Lemon).
 - ☞ In the Pvt sector a Plant Resource Centre has been set up near Hazaribag by M/s Florence Flora in the premises of the Soil Conservation Dept's Farmers Training Centre / Agro Tourism Centre

- ☞ Horticulture Dept has taken _____ steps for production of 15000 plants (Mangograft, Litchi, Guava). There is a plan to promote construction of Shednets where 50% margin will be made available to the farmers.
- ☞ Under the auspices of ATMA block level Farmers Advisory Committee and Block Technical teams shall be established. ATMA has setup 3 GP / Block level Farmer's Schools.
 - ☞ Bank branches have been impressed upon to promote Farmers Clubs for credit dissemination and commercial agriculture including horticulture.
 - ☞ Banks are in the process of encouraging NGOs who in turn could mobilise farmers to take up cultivation of vegetables, medicinal and Aromatic Plants (MAPs).
 - ☞ Awareness programmes are envisaged by some of the Commercial Banks with the help of some NGOs.
- ☞ Horticulture Dept has taken steps to set up Pine apple orchards (25 acre size) with Rs 40,000/- subsidy , 80 Protected off season vegetable units (subsidy Rs 2 lakh each).
- ☞ Under National Horticulture Mission(NHM) Rs 80 lakh has been released to Holy Cross Social Services Centre (HCSSC) by the State Govt and a massive drive is made to plant species like Mango, Guava etc in 8 blocks of the district.
- ☞ Damodar Valley Corporation (DVC) has decided to re-open 3 of its **Agriculture farms** situated at Sewal, Bundu and Urwan which remained non-functional during the last decade. The modalities are being worked out.

Assessment of Infrastructure gap :

- ☞ The condition of 13 Govt. Nurseries located at each block is not encouraging. The state nurseries do not have orchard assistants (technical staff).
- ☞ Extension work of the District Horticulture Dept. has been extremely poor.
- ☞ There is no processing plant in the district for processing of horticulture crops.
- ☞ KVIC/KVIB may promote development of apiculture.
- ☞ Awareness of farmers about agri-horticulture is lacking. Long gestation period prohibit farmers from taking up the activity. Extension Service providers may popularise agri-horticulture and mixed-horticulture
- ☞ Inadequate irrigation facility and lack of know-how for modern irrigation devices like drip irrigation, etc. is an impediment.
- ☞ The entire potential under MAP sector remains untapped. Awareness, of the potential of MAPs was lacking till recently due to lack of initiatives / awareness among the land owners, non existence of any functional extraction unit, lack of information about the market, etc.

Suggested Action Points :

❖ **Development Departments :**

- ◆ There is need for creating awareness on agri-horticulture among the progressive farmers.
- ◆ Irrigation potential required to be increased.
- ◆ The District Horticulture Department may be provided with adequate fund and technical and field staff to be in a position to provide necessary extension support.
- ◆ The production capacity in the existing nurseries may be augmented.
- ◆ Land Possession Certificates may be provided expeditiously by Circle Offices.
- ◆ Preparation and updation of MAP cultivation models for the State/ district.
- ◆ Marketing tie-up with traders / companies/ manufacturers in State/ district.
- ◆ Arrange sensitization and awareness programmes.
- ◆ Insure the availability of quality seeds/ planting material.

Other Issues :

AEZ is being established by the Govt. of Jharkhand in Hazaribag, in association with APEDA for promotion of export of Bitter Gourd. The State Government has entered into agreement with IDFC, New Delhi for setting up of Agro Export Zones for development of Vegetables and fruits and their marketing. Site Survey of the AEZ has been completed . The Govt. has made a provision of Rs 10 lakh during the current year. The process needs to be streamlined.

3.6 SERICULTURE

Introduction :

Three types of Sericulture i.e. Tassar, Eri and Mulberry can be practised in the district. Tassar culture, where rearing of silk worms is done on Arjun and Asan trees is practiced in unorganized sector. The host trees are available in the forest areas of the district where silk worm rearing is being carried out by the tribals. Similarly, eri culture, where rearing of silk worm is carried on castor plants, is also done in unorganized sector. Cocoon are brought from West Singhbhum district.

Availability and gaps in Infrastructure and support services:

- i. The Assistant Director of Industries (Sericulture), stationed at Giridih, looks after the sericulture activity in the North Chhotanagpur Division. At Bishnugarh Block, there is a unit to supervise Tassar culture. For sericulture, an eri development centre was set up at Chatra block(Chatra district) .
- ii. One Grainage was set up at Bishnugarh to provide tasar DFLs and another grainage was set up at Chatra to provide eri Disease Free Layings (DFLs).

iii. Holy Cross Krishi Vigyan Kendra and Holy Cross Social Service Centre, Hazaribag organise training programmes on silk worm rearing for the local farmers. The Krishi Vigyan Kendra, Hazaribag impart training to farmers on silk yarn reeling.

iv. A reeling & twisting centre (Post Cocoon Sericulture) for SHG members has been established by PRADAN (an NGO) in Barhi & Chauparan blocks with financial assistance from Central Silk Board. Women SHG members are engaged in reeling of cocoons / yarn in these centres. Ma Suta - an outfit of PRADAN is engaged in marketing finished products of yarn, sari etc manufactured by them.

v. Under the leadership of the District admn the Post - cocoon sericulture activities are popularised through PRADAN and its Women SHGs under the RSVY scheme. 500 women

SHG members of Barhi, Padma and Chauparan blocks are to be provided with Trivedi Charkha (454 nos) and Motorised Charkha (46) for spinning purpose. Rs 5.95 lakh is earmarked for a Tassar Godown. All funds (loan and grant) are released to the SHG accounts and the SHG handles the loan/grant released to the individual members. 100 beneficiaries have started commercial production and 141 Charkhas are being supplied shortly. Branches of State Bank of India, Central Bank of India, Jharkhand Gramin Bank and Bank of India are finncing the bank loan component. This sector is growing very fast in the district.

vi.As per the Jharkhand Industrial Policy 2001, the State Government has decided to strive for following objectives under the sector:

- Quantum jump in production of tassar.
- Extensive plantation of Arjun/Asan/Mulberry in the denuded forest areas, wasteland and other areas available for the purpose.
- To promote research and development to improve the production and productivity.
- The State Sericulture Deptt. has been merged with the Industries Department and it has been decided by the State Govt. to post a manager in DIC to look after Sericulture work under overall supervision of the General Manager, DIC.

Assessment of Infrastructure gap :

- ☞ The district does not have sufficient mulberry farms to provide mulberry planting materials and DFLs.
- ☞ The extension work of Sericulture Department is inadequate.
- ☞ Marketing arrangements to ensure remunerative prices to the cocoon growers are required.
- ☞ Infrastructure for Cocoon processing is inadequate.

Suggested Action Points :

- **Development Departments :**

- ☞ Creation of awareness among farmers .
- ☞ Marketing arrangement of cocoon.
- ☞ Adequate extension and training support to sericulture farmers from the department.
- ☞ Promotion of adequate post-cocoon processing units within the district to create local demand for cocoons.
- ☞ Establishment of unit of Central Silk Board at Hazaribag, the Divisional Head quarter.

3.7 Forestry and Wasteland Development

Introduction :

The district has a total forest cover of 250969 ha. GoI is planning to dovetail the waste land scheme with watershed development and other similar schemes by calling for a common strategy. The existence of vast tracts of cultivable/ uncultivable wasteland require treatment which is being tried through Watershed development under DPAP and Hariyali Programmes. The district has 77722 ha. of fallow land (other than current fallow) where wasteland development programme can be initiated so that the economy of the district could be strengthened.

Jatropha, a tropical / sub-tropical crop that can thrive well in low rainfall regions. It is a hardy and drought tolerant crop. Hitherto considered as a wild oilseed plant, it is now being credited as a most promising bio-fuel plant, very much suited for growing in the wastelands. According to Birsa Agriculture University (BAU), scope for Jatropha plantation in the district. which could create considerable livelihood opportunities and income generation for rural population. The Dept of Co-operation , Govt of Jharkhand has taken a decision to buy back Jatropha seed at Rs.10 per kg. through PACs. Indian Railways has recently decided to utilise unused railway land on either side of the railway tracks to plant Jatropha. NABARD has developed 3 models of plantations and can be developed / modified according to the condition prevailing in the States. National Oilseeds and Vegetable Oil Development Board (NOVOB), Gurgoan is providing 30% of the project cost as subsidy for taking up Jatropha plantations on large scale.

Bamboo, a fast growing, versatile woody grass is found growing abundantly in the district. It is an economic resource having immense potential for improving the quality of life of rural and urban communities with environment regeneration qualities like carbon sequestering. Bamboo provides raw material for large industries like paper and pulp as well as for cottage and handicrafts industry. It has wide application in construction activities like reinforcement work. Some bamboo species can grow one metre in a day. Bamboo shoots are used in the preparation of vegetables and various other dishes and many other horticultural uses. It is grown

like any other horticultural crop by tilling the land and is harvested annually, when grown commercially. Bamboo roots, leaves, sap and ash are being used since ancient times as a remedy for minor and major ailments, particularly in Ayurvedic health care. The GOI has launched “ **National Bamboo Mission**” for holistic development of bamboo sector in the country with an outlay of Rs 568.23 crore.

Following are the salient initiatives taken by State Government to develop and conserve the forests :

- (i) Rehabilitation of degraded forests on large scale is being undertaken
- (ii) Large - scale plantation of Bamboo has been taken up
- (iii) To increase Lac & Tasar production, plantations of Lac & Tasar host species have been taken up. Forest Department has been made the nodal Department for the development of Lac and Tasar in the state
- (iv) Establishment of research nurseries for root - trainer plants, grafts of Amla, Mango, Tamarind etc and for vegetative propagation of bamboo
- (v) Forest Resources Survey of different forest divisions and Medicinal plant survey of different districts have been undertaken
- (vi) State Medicinal Plant Board has been constituted
- (vii) To ensure the availability of superior quality planting stocks of timber and fruit tree species, 187 permanent nurseries have been established in 138 blocks of the state
- (viii) Investment opportunities in Forestry Sector. Under RIDF, a project involving Rs Total outlay of Rs 467.86 lakh was sanctioned by NABARD for rehabilitation of degraded forests of the district.

Availability and gaps in Infrastructure and support services:

- The Forest Department is manned by District Forest Officers duly assisted by Area Officers/ Range Officers and other staffs.
- The Government of Jharkhand has elaborate plans to give thrust to plantation of trees including forest and outside forest areas both through farm forestry, agro forestry and urban forestry programmes.
- Several permanent nurseries of 1 ha. area are envisaged to be developed throughout the state for better supply of good quality planting stock.
- Jatropha is a tropical and sub-tropical crop that can thrive well in low rainfall regions. It is a hardy and drought tolerant crop. Hitherto considered as a wild oilseed plant, it is now being credited as a most promising bio-fuel plant very much suited for growing in the wastelands of the country. According to Birs Agriculture University (BAU), Jharkhand has one of the best climatic conditions to grow Jatropha and there is tremendous scope for Jatropha plantation in the state. The plant is particularly suited for growth in wastelands. Around 77722 ha. of land fall under the category of fallow land in Hazaribag district along with an area of 100423 ha. not suitable for cultivation. This big chunk of


unproductive land so far unutilised can be commercially exploited which could create considerable rural employment.

- Williamson Magor, an Industrial house has started nurseries for Jatropha plantation in the neighbouring Giridih District duly supported by Bank of India and Union Bank of India and NABARD . The Industrial house shall collect seeds from the farmers and propose to set up an oil Extraction plant. This will definitely help the farmers of Hazaribag district to go for a tie-up with the Industrial house. Similar ventures can also be initiated in Hazaribag district.
- Similarly, some NGOs in collaboration with the ONGC / Ministry of Petroleum , GOI are also propagating cultivation of Jatropha in the blocks of Patratu etc.
- Forest Department has undertaken planting trees on road sides of urban areas and other main roads.
- The Co-operative Dept has initiated steps to purchase Jatropha seeds @10 per kg through their Primary Agriculture Co-operative Socs (PACs) and arrange for extraction of oil which can be sold to other outlets for refinement.
- Setting up of nurseries as decided earlier.
- A number of entrepreneurs are interested in cultivating medicinal and aromatic plants in the wasteland.
- District Administration is contemplating demonstrative Jatropha cultivation in and around Hazaribag. Demonstration Plots are envisaged in Rastriya Sam Vikas Yojana to enable people grasp the potential of Jatropha cultivation / plantation.
- State Govt. has decided to accord thrust to plantation / horticulture, commercial forestry, wasteland development in Jharkhand for which various measures/steps will be taken/ initiated in the near future.
- A project on Joint Forest Management involving Rs 88 crore is under implementation in the State . Hazaribag district has also been covered under the programme.

Assessment of Infrastructure gap :

- Absence of base nurseries/ farms in the district to supply quality saplings and planting materials
- Non existence of forest based industry in the district or nearby districts.
- The State Government is yet to take a policy initiative to promote cultivation of Jatropha that could put in place a mechanism to solve energy problems as well as provide income to the masses.
- No extraction unit is available in the vicinity.
- There are some pit falls in backward and forward linkages particularly in buy back arrangements / scope thereof.
- Awareness among the people about the potential of Jatropha cultivation is lacking.

Suggested Action Points :

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- Preparation and updation of models for the State/ district with appropriate technical know-how and standardised package of practices for commercial cultivation.
 - Arrange sensitization and awareness programmes.
 - Marketing tie-up with traders / companies/ manufacturers in State/ district.
 - Ensure the availability of quality seeds/ planting material.

Other Issues : Scope of tree patta scheme need to be explored and Government should provide long lease to farmers through village panchayats. Village Forest Management & Protection Committees may be used for promotion of waste land development schemes and Fallow land (other than current fallow)

3.8 DAIRY DEVELOPMENT

Introduction :

As per 17th quinquennial livestock census 2003, the milch cattle population in district is 6.27 lakh, comprising of 4.84 lakh cattle and 1.43 lakh buffalo, cross bred cattle formed less than 5 % of the cattle population. Average holding size of milch animals(in-milk and dry cows and buffaloes) work out to around 2 per milch animal holding household which is quite less than average holding size of male animals used for agricultural operations. The estimated per capita availability of milk is 158 g/day against the state average of 152g/day and national average of 235g/day (recommended by ICMR is 280g/day) with a marketable surplus of around 66000 lpd . In the district, livestock rearing is mainly taken as an household activity, being managed by family members particularly women members and development programmes need to keep it in view while addressing the emerging issues relating to this sector.

Availability and gaps in Infrastructure and support services:

- There are no organized cattle market in the district. However, local haat/ cattle fairs are organised from time to time with the help of State Govt./ District Administration. State Level Dairy Mela is organised at Ranchi by Dairy Development Department every year in the month of November and Livestock show by Birsa Agricultural University in their Annual Kisan Mela and Cattle Fair at Sonapur, Bakhtiyarpur and Bihiya in Bihar. There is, however, no record regarding the number of livestock transacted through these fairs. Most of the Cattle/ Buffalo are sold by traders from outside states through Khatahs available in and around Hazaribag, Ramgarh, Ranchi, Bokaro. The Government Farms at Hotwar, Gouriakarma and Saraikela for breeding and providing high quality cattle and buffalo of various indigenous breeds are in defunct condition at present. The

authorities in charge of Gariakarma farm are trying to protect the available Red Sindhi breed there. They have entered into MOU with the BAU -Seed research Centre at Gauriakarma for supply of green cattle feed in lieu of the 1500 Ha of land parted by the farm to the Research Centre.

- To cater to 6.87 lakh Adult Cattle Units there are 47 veterinary dispensaries, Artificial Insemination Centres or Frozen Semen Centre as against the requirement of 137 such veterinary dispensaries / centers and similarly to provide breeding services to 1.62 lakh breed able females there are 78 State Government run AI Centres and 3 BAIF Cattle development centres in the District as against the requirement of 162 such centers. Besides, there are 2 District level hospitals, 3 Sub-divisional hospitals, 15 block level dispensaries, 7 Model village centres. Most of these are in defunct condition.
- There is no feed plant in the district. However, the demand of feed is met through local produced material and through a number of feed brands / companies which are supplying feed in the local market.
- State Government has set up milk processing plant with a capacity of 4000 litres in the district which at present are handling less than 500 lpd of milk. However, procurement infrastructure such as milk routes, Dairy Cooperative Societies are not in very active condition. Dairy Development Department is under process of organising milk producer's co-operative societies through Hazaribag District Milk Producers Cooperative Union. At present 99 societies with total membership of 3215 have been formed/registered. Most of these are defunct.
- The training to beneficiaries are imparted at Farmers Training Centre at Ranchi.
- Dairy Activities are supported under various government programmes like SGSY and Dairy Development, GoJ. Central Government Support is also available under Venture Capital Fund being implemented through NABARD.
- District Animal Husbandry Officer (DAHO) at the district level heads the Animal Husbandry Department. Each Block has Animal Husbandry Officer (BAHO).
- "Venture Capital for Dairy and Poultry" has been announced by GOI and the "Gokul Gram Yojana "is launched by the State Govt to encourage small milk producers to come into the fold of organised sector. Besides the Govt of Jharkhand has introduced some programmes viz Distribution of Milch Cattle (with 50 % subsidy), Cattle Development programme with the help of BAIF foundation, Nandi Gram Yojana - popularising natural insemination and raising quality progeny.
- There has been a lot of emphasis for financing of dairy animals under SGSY and special component scheme for SC.
- The State Govt has introduced School Milk Programme to deliver tasty, nutritious and safe milk using aseptic technology to the school going children. This would boost milk consumption among children thereby increasing a demand for milk / dairying.

- The Chilling Plant at Hazaribag has been revived. It has a capacity of 3000 lpd. A few milk cooperative societies has been made functional. One Gramin Dugdh Sital Kendra (Rural Milk Chilling Centre) with a capacity of 1000 lt. per day capacity has been established at Hazaribag.
- Artificial Insemination & First Aid/Health Management' is in operation in collaboration with BAIF. The project period is five year.
- One Gramin Dugdh Sital Kendra (Rural Milk Chilling Centre) with a capacity of 1000 lt. per day capacity has been established .
- KGVK, an NGO formed by Usha Martin Group is implementing a Dairy scheme (2 animal units) in participation with CAPART and Oriental Bank of Commerce in 20 villages of Patratu block. The cost of the project is Rs.60 lakh. The NGO has sought for assistance from Dept of Science & Tech, GOI to set up a Chilling cum Processing plant. State Govt is likely to provide subsidy to farmers and also milk vans etc. Documentation is in progress and animals are shortly being provided to the farmers.
- The Government of Jharkhand has identified following thrust areas for development of dairy sector in the state:
 - (i)Fodder Seed Farms , (ii) Mobile AI centres (iii) Milk Chilling and Processing Plants (iv) Feed Mixing Plants (v) Calf Rearing units (vi) Bulk Milk cooling units (vii) Automatic milk collection centres

The State Govt. has decided to carry out detailed survey of 400 villages in each district for milk production and availability of marketable surplus. Based on the potential, 100 primary milk producers cooperative societies are to be strengthened. Besides, under the guidance of the District Admn an effort is being made to formulate an Area Development Scheme - Dairy for few villages .

Assessment of Infrastructure gap :

1. None of the veterinary hospital, veterinary health centre or AI Centre is functional.
2. Animal Husbandry Department/Dairy Development Department do not have adequate fund for development work.
3. The chilling plant in Hazaribag has been revived. However, because of low availability of milk capacity of the unit remains underutilised.
4. One breeding farm of AH Dept located at Gouriya Karma in Barhi Block is engaged in breeding of the rare Red Sindhi breed cows. The centre needs adequate budgetary support to provide feed and medicinal treatment to the animals.
5. Block Animal Husbandry Officers are mostly engaged in other administrative duties of block and hardly spare any time for extension work.
6. There is a preference for buffalo instead of crossbred cows. Due to non-availability of health care facilities many crossbred cows die.

7. Settlement of insurance claim even against bank financed units is delayed inordinately.
8. There is a need to encourage insurance cover for privately financed units.
9. Marketing of large quantities of milk in the district may be a big problem till adequate arrangement of chilling plant is made available in the district.
10. Majority of the dairy animals are of nondescript breed with very low yield with less than ½ lt. yield per day.
11. Crossbred cows not available locally.
12. Dairy Milk Cooperative Societies are dormant. These societies need to be reactivated.
13. A good number of milk booths need to be set up in the district.
14. Milk routes should be made motor able so that milk collection van can reach the milk collection centres.

Suggested Action Points :

- I. Distribution of seeds and saplings/slips for Green Fodder production under irrigated and unirrigated fields, demonstration of Vermi - composting units, urea treatment of straw and Silage Making by individual farmers.
- II. Setting up of Cattle Development Centres under Dairy Development Programme
- III. Development of Silvipasture on community land under Dairy Development Programme
- IV. For village clusters / Dairy Cooperatives beyond 10 km from the city
- Milk Route Development
 - Cooperative Development along with milk procurement and testing equipments @ 1 Coop / 2-3 Contiguous villages
 - Bulk Milk Cooling Units(BMCU) @ 1000 lt BMCU for marketable milk up to 2000 lt/day in a cluster , @ 2000 lt BMCU for marketable milk from 2000 to 4000 lt/day in a cluster.
 - Vans and insulated cans @ 1/BMCU
- v Setting up of Gokul Gram Yojana under Dairy Development Programme and demonstration units

Other Issues (if any)

In view of poor veterinary and extension services available in the district, there is good scope of financing for Agriclincs centres for Agricultural graduates & Veterinarians. A model scheme has been prepared by NABARD and circulated amongst all bankers for setting up of Agriclincs / Agribusiness centre viz (i) Private Veterinary Clinic (ii) Private Veterinary Clinic with retail outlet for Feed and Medicine (iii) Private Veterinary Clinic with small Dairy unit (iv) Private Artificial Insemination Centre.

Considering the scope in the district, an Area Development Scheme for Commercial Dairy may be prepared and implemented. Due to better communication, marketing facilities and availability of infrastructure, the prospects of such project will be high in Padma, Barhi and Chauparan blocks.

3.9 POULTRY FARMING

Introduction

As per latest 2003 census there are 9.19 lakh poultry birds and ducks in the district. There are few broiler units around the town which are being supported by local input suppliers. Most of the poultry units in the district are backyard in nature of which low input birds especially ducks are quite popular. The estimated annual egg and meat production in the district is 46 million of egg and 2504 MT of meat. Nearness of the district to a number of industrial townships/cities/towns leaves scope for broiler poultry. Specially developed breeds of chicken meat (broiler) are now available through the Integrators / Poultry Input Suppliers / Hatcheries. These poultry strains have the ability of quick growth and high feed conversion efficiency. Depending on the farm size, broiler farming can be a main source of family income or can provide subsidiary income and gainful employment to farmers throughout the year.

Availability and Gaps in Infrastructure and Support Services

There is no specific plan prepared by the Government for the District.

- I. There are only two hatchery units in the district at Hazaribag sadar and Dhengura - Barkagaon block. no breeding farm and hatchery unit in the district to provide disease free day old chicks (DOC) to Poultry farmers and duck rearer.
- II. There are a few feed mixing plant in the district; feed of various brands are available in the district.
- III. Units financed by banks are scattered and without any proper forward and backward linkages like regular supply of chicks, feeds, medicine and organised marketing support.
- IV. The Govt. as well as private veterinary dispensaries/clinics are not sufficient to cater to the needs of the live stock population in the district.
- V. Department of Animal Husbandry are engaged in training of farmers, distribution of day old chicks of chickens and ducks, treatment and vaccination of poultry in the district.
- VI. There is no cooperatives of poultry farmers nor integrator companies to cater to the backward and forward requirement of the poultry units in the district.
- VII. Training on Poultry and Duck rearing is provided by Poultry and Duck Breeding Farm, Hotwar. Further, training is also imparted through a number of NGO's through NABARD assisted Rural Entrepreneurship Development, Skill Development Initiative and Micro enterprises Development Programme.

VIII. Para -Veterinary training is organised by Krishi Vgyan Kendra, which includes training pertaining to farming of poultry birds.

Assessment of Infrastructure gap :

- ☞ The Animal Husbandry Department should be reactivated so as to meet the various extension needs of poultry farmers.
- ☞ Hatchery units are required to be set up to meet the demands of DOCs locally.
- ☞ Poultry birds are very prone to diseases and no veterinary aid centres in the district is functional. Further, due to lack of insurance facilities to poultry units, no security is available to them in case of large scale deaths of birds.
- ☞ Adequate arrangement for training of farmers has to be ensured.
- ☞ The existing feed plants do not meet the feed requirement locally.

Suggested Action Points :

- (i) Improve the infrastructure for supply of day old chicks and other backward linkages through creation of infrastructure under government sector, promotional scheme under private sector or cooperative sector.
- (ii) Good quality chicks, equipments, vaccines and medicines, training facilities to entrepreneurs and the veterinary assistance from the Government are required so that new entrepreneurs take up this business.
- (iii) There is need of dispensaries to make available Veterinary aid, Health care, etc.
- (iv) Promotion of poultry cooperative societies is required for promoting small village poultry units.

Other issues (if any)

- (i) Bankers to help in identification of suitable beneficiaries to take up poultry farming.
- (ii) Infrastructural support like regular power supply and good roads are essentially required.
- (iii) Area Development Project on Commercial layers/broiler unit, cage/litre system, processing/dressing unit may be prepared to explore setting up of innovative unit.
- (iv) State Government may give some kinds of incentives to promote the sector and provide job opportunities to unemployed persons.

3.10 (Sheep, Goat & Piggery Development)

Introduction

Sheep, goat and Pig rearing activities are taken up generally by landless labourers and marginal farmers and selected community/ shepherd etc. These activities give good returns to them especially during off-seasons when they do not have employment. There is good scope for financing these activities under SGSY with buy back arrangements through some marketing networks / cooperatives/ NGOs or organized market for remunerative prices. Among sheep, goat and pig, there is good

scope for Black Bengal goats and its crosses that have been developed through selective breeding and grading up with Beetal and Jamunapari goats. As per latest 2003 census there are 3.66 lakh goats and sheep and 0.71 lakh pigs in the district. To support these activities the district has 77722 ha of non agricultural land in form of fallow, wasteland and pastures. Pig farming and goat rearing under semi-intensive system in the tribal dominated villages in the districts is gaining importance in last few year.

Availability and Gaps in Infrastructure and Support Services

- I. The above activity in the district is being looked after by the Animal Husbandry Department.
- II. Extension services and awareness programme to train farmers is provided at State level from two important farms i.e. Govt. cattle farm Goriakarma - Hazaribagh and BAU. Goat breeding farms and fodder farm at Chatra also supplies good quality goats and fodder seeds. Awareness and extension programme is also provided at block level by Block Animal Husbandry Officers under the instructions of District Officer. Each Block has one Block Animal Husbandry Officer for providing training, awareness, creation and extension service.
- III. One Pig breeding farm is located at Birsa Agriculture University, Ranchi for providing piglets to rearers.
- IV. Krishi Vigyan Kendra (KVK), Hazaribag arranges para-veterinary training for progressive farmers / entrepreneurs
- V. Non-availability of hygienic and scientific slaughter house, meat processing units.
- VI. Sheep, Goat and Pig rearing is being done on traditional lines. There is almost no awareness about intensive Sheep/Goat rearing, particularly among the marginal farmers and the poor people, who undertake Sheep/Goat/Pig rearing on a mini/small scale.
- VII. The Govt. veterinary health and extension services are required further strengthening. There is good demand for pork in local markets, including CCL areas and in nearby markets viz. Kolkata.
- VIII. With no fund allocation under the sector for Hazaribag Division during the year no infrastructure was created/revived in the district. Under RKVY additional infrastructure are planned. The State Govt organised an awareness Seminar on Piggery at Hazaribag during June 2008

Assessment of Infrastructure gap :

- a. Adequate number of piglets are not available locally and suppliers charge unduly high price for supply of piglets.
- b. Extension support is not available as most of the veterinary centres/ dispensaries are defunct.

c. Veterinary Hospitals are required to be established in all the blocks with one mobile dispensary facility.

D. Feed plants, one each should be set up at Barhi, Gola and Katkamsandi

Suggested Action Points :

- The infrastructure facilities like high quality of animals, equipments, vaccines are required for popularizing this activity in the areas.
- Breeding centres for supply of good quality animals, training facilities in the district, veterinary health care, marketing support and extension services to be strengthened.
- Activation of extensive training to all/extension & support services to prospective entrepreneurs.
- Revival of existing Bacon Factory at Ranchi, sheep breeding farm at Chatra and Gorla Karma Farm at Hazaribag

3.11 Fisheries Development

Introduction :

There is good scope for development of fisheries in the district due to availability of a number of water bodies having large water spread areas. A large chunk of the population is fish eaters. There is great demand for fresh fish. At present most of the demand (85%) for fish are met by supply from Andhra Pradesh. Due to inadequate supply, the local fresh fish fetches much higher price in comparison to the price paid for fish from Andhra Pradesh.

Availability and gaps in Infrastructure and support services:

- ☞ During 2002-03, against the target supply of 220 lakhs spawn and 55 lakh fish seeds, 220 lakh spawn and 44.34 lakh fish seeds were supplied by FFDA.
- ☞ During 2005-06, Hazaribag stood first among all districts in fish production. As against a state level production of 35000 MT, Hazaribag produced 5000 MT
- ☞ There are 35 nursery ponds, 9 rearing ponds and 12 stocking ponds in the district under Govt. control. Besides, there are 4 nurseries, and 1 rearing pond in private sector.
- ☞ There is a private hatchery in Nawada Bakaspura Village of Bishnugarh Block with a capacity to provide 2 crore spawns.
- ☞ There are around 700 fishermen families and 3000 fishermen in the district. Further there are 15 Fishermen Cooperative Societies in the district of which 7 are active.

☞ There are 1274 ponds with the total water area of 1250 ha under government control. Most of these ponds are settled on short term lease basis (lease for 3 years).

☞ There are 2546 ponds with total water area of 1685 ha owned by private individuals. Further, there are 5 reservoirs and 20 Other Water Bodies under control of various agencies, for which full potential are yet to be exploited. These Water Bodies have water area of 27,451 ha.

A hatchery with the capacity of one crore fries has started functioning in Hazaribag town at the cost of Rs.12 lakhs.

☞ FFDA imparted 10 days training to farmers . This training programme is continuing on an on-going basis.

☞ Several ponds have been constructed under various other schemes viz. RSVY, MADA / Non-MADA schemes. Under Rastriya Sam Vikas Yojana , a total outlay of Rs.198.00 lakhs was earmarked for the purpose (also construction of Fish Outlets at strategic points and training for prospective growers)

☞ 87 fish seed growers were identified by the Fisheries Dept and supplied spawn free of cost to promote fish seed rearing in the district.

☞ The Fisheries Dept introduced Matsya Mitra scheme to provide intensive training to unemployed youth to work as para extension worker.

☞ DVC is also implementing fishery schemes in the Barhi, Barkatha and Chauparan blocks in Tilaiya Reservoir in particular followed with intensive training programmes.

☞ Brooder unit of FFDA with a capacity of 6 crore spawns a year.

☞ NGO participation has been ensured in imparting training and seed/fry/fingerling distribution to trainees.

☞ Three ponds in each block have been selected for demonstration of composite fish culture at the cost of beneficiaries. FFDA to provide technical know-how. Stocking in these ponds is already over.

☞ FFDA has plans to supply 300 lakh fry / fingerlings.

☞ FFDA has planned for Fresh water Prawn Culture unit/farms with breeding, Enhancing Yield through suitable technology, Fishery with Horticulture and Duckery, Ornamental Fishery, etc.

☞ The State Govt proposes to give 100% grant for ponds (10 decimal units) @ Rs 50000/- per pond.

☞ The FFDA proposes to form 6 Fish Farmer Clubs in the district.

☞ A fish market with project cost of Rs 5.00 lakh is constructed at Barhi. Further, the siltation tank at Hazaribag lake area, where hatchery is located, is proposed to be converted as siltation-cum-brooder tank with allocation of 50% area for each of the two purpose. The total cost proposed is Rs.16.00 lakhs.

Assessment of Infrastructure gap :

☞ Most of the Govt. ponds are leased out on short-term basis for 3 years to fish farmers' cooperatives. In such cases, bank finance is not available due to inadequate lease period to cover repayment. Further, absence of mortgage clause in the lease deed also prohibits banks to finance.

☞ There are inadequate nurseries in the district.

☞ There is no soil & water testing facility with the FFDA.

☞ Fish Farmers' Cooperative Societies are to be activated.

☞ Reservoir Fisheries are required to be developed scientifically at commercial scale.

Suggested Action Points :

☞ Leasing of ponds on long term basis to cover the repayment period of bank loan.

☞ Adequate extension support to farmers.

☞ Revival of fishermen societies.

☞ Mortgage clause to be included in the terms of lease.

☞ Raising the awareness level among bankers and beneficiaries by conducting workshops / training camps.

☞ Adequate extension support to farmers.

☞ Settlement of ponds in the name of SHGs.

3.12 STORAGE GODOWN / MARKET YARDS

Introduction :

A capital investment subsidy scheme for construction/expansion/modernization of cold storage and storages for horticulture produce was introduced by the Government of India wef 01 April 1999. The scheme is implemented by National Horticulture Board, Ministry of Agriculture in collaboration with NABARD/NCDC. Hazaribag is highly suitable for vegetable cultivation as far as climate is concerned. Many varieties of vegetables are grown in the district, which include potato, tomato, onion, cabbage, brinjal, radish, carrot, lady's finger, beans, cauliflower, etc. Due to lack of suitable storage facility farmers do not get remunerative price particularly for potato and onion. They normally sell it immediately after harvest to traders from other places particularly from Gaya. Presently 12 cold storages are functional in the district.

The Government of India has announced ; another scheme-CISS for Rural Godown for creation of new storage capacity of 18.50 lakh tonnes and renovation of 1.5 lakh tonnes rural storage capacity. The scheme is to be implemented by Directorate of Marketing and Inspection, Ministry of Agriculture, Government of India in collaboration with NABARD. Hazaribag district is a predominantly paddy growing

area. There is tremendous potential for setting up of rural godowns for proper scientific storage of grains.

Availability and gaps in Infrastructure and support services:

- Presently GoI/NHB sponsored capital subsidy @ 25% of the project cost or Rs.50.00 lakh whichever is less, is available through NABARD for construction of cold storages.
 - DMI/Ministry of Agriculture, GoI sponsored subsidy is available through NABARD @25% of the project cost with a ceiling of Rs.37.50 lakhs per project for construction of rural godowns.
 - Adequate quantity of fruits and vegetables including potato and onion are grown in the district which require storage facility.
 - Technical know-how is available to set up cold storage from nearby town/ cities.
 - The district is predominantly paddy growing area and surplus food grain is available for storage for lean season.
 - NABARD is extending refinance facility to banks for the sector .
 - Eight cold storages are in operation in the district.
 - DMI has conducted two workshops through HCKVK for SHG members/ villagers to create awareness about the Rural Godown scheme.
 - A few more cold storages may come up with bank financing during the current year.
- Steps are initiated to improve power situation.

Assessment of Infrastructure gap :

1. Inadequate business in terms of sufficient storage materials throughout the year.
2. Lack of adequate and uninterrupted power supply.
3. Construction of rural godowns with bank loan has not been popularised.

Suggested Action Points

- ☞ Uninterrupted power supply for cold storage units.
- ☞ Arrangement of technical know-how locally

Chapter 4

DISTRICT AGRICULTURE PLAN

National Development Council, in its meeting dated 29 May 2007, resolved that a special Additional Central Assistance Scheme be launched. The Scheme has been named as Rashtriya Krishi Vikas Yojana (RKVY). The scheme has been introduced to incentivise States to draw up plans for their agriculture sector more comprehensively, taking agro- climatic conditions, natural resource and technology into account and integrating livestock, poultry and fisheries more fully. This involves a new scheme for Additional Central Assistance to State Plans, administered by the Union Ministry of Agriculture over and above its existing Centrally Sponsored schemes, to supplement the State specific strategies including special schemes for beneficiaries of land reforms.

4.1 Soil Fertility

Status

Net cultivated area is only 33.11 % of the total land and single crop is grown on approx. 20 % of the total land in the district. Soil in the district is red sandy with shallow depth & poor soil structure. Major constraints for agriculture development in the district are soil having low organic matter, low fertility, shallow soil depth, low water retention capacity, poor soil structure, soil erosion and loss of nutrients and organic matters with run-off water. Thus, the productivity of most of the crops grown on the districts, viz. Paddy, wheat, maize, ragi(madua), arhar, gram and rape mustard, are much below the national productivity level. Single crops are grown in upland under rain fed condition and double crops in medium and low land under irrigated condition. The soil fertility status in the district is as follows :

Soil Characteristics	Low	Medium	High	Misc	Total
	Per cent of the Total Geographical Area				
Organic Carbon	15.9	17.4	64.5	2.2	100
Available Nitrogen	17.9	69.4	10.5	2.2	100
Available Phosphorus	57.8	38.5	1.5	2.2	100
Available Potash	11.6	48.2	38	2.2	100
Available Sulphur	33.8	30.4	33.6	2.2	100

Soil Health Enhancement Programme

"The activities, which can be grouped under the broad sector of development of Soil health" are the following :

- Micro Nutrient Testing - Micro nutrients play an important role in enhancing agriculture productivity. Boron, chloride, copper, iron, manganese, molybdenum, and zinc are the seven nutrients known to be needed for crop production. Micro nutrient status in the district are as follows ;

Micro Nutrient	Deficient	Sufficient	Miscellaneous	Total
Per cent of the Total Geographical Area				
Available Zinc	4.2	93.6	2.2	100
Available Copper	5.5	92.3	2.2	100
Available Boron	38.9	58.9	2.2	100
Available Iron	-	97.8	2.2	100
Available Manganese	-	97.8	2.2	100

Deficiencies have been confirmed on three micro nutrients in Hazaribag namely boron, Molybdenum and sulphur. Boron (B) deficiency is a common occurrence in many Hazaribag soils. Characteristic symptoms of the deficiency are yellowing of the upper leaves, eventually turning to a purpling color, along with stunting of the upper stems. Deficiency symptoms for B are very similar to leaf hopper damage. The difference between the two problems is that leaf hopper damage will be characterized by a V-shaped discoloration that starts at the leaf margin. Boron deficiency is often confused with drought, as it occurs when plants are under moisture stress. Testing of soil for micro nutrient level is required for finding out micro nutrient enrichment that is required in the soil. Deficiency in Molybdenum affects inflorescence. It is proposed

to treat Molybdenum, boron and sulphur alternatively. It is proposed to provide this service free of cost to 500 farmers in the district during the plan period.

- Micro nutrient enrichment - Once the deficiency in micro nutrient is identified programme for its enrichment is important. It is proposed to provide micro nutrient enriched fertilisers for 1 acre farm to 500 farmers per district.
- Soil Amelioration : The soil in the district is predominantly acidic and to increase the productivity by release of nutrients from the soil , soil amelioration is required. The soil types under different classes in the district are as follows :

Soil reaction	Area ('00 ha)	% of the TGA
Extremely acidic (pH<4.5)	-	-
Very strongly acidic (pH 4.5 to 5.0)	911	18
Strongly acidic (pH 5.1 to 5.5)	1753	34.7
Moderately acidic (pH 5.6 to 6.0)	1134	22.5
Slightly acidic (pH 6.1to 6.5)	654	13
Neutral (pH6.6 to 7.3)	439	8.7
Slightly alkalina (pH 7.4 to 7.8)	46	0.9
Miscellaneous	112	2.2
Total	5049	100

- Conventional lime still remains the major means of ameliorating soil acidity; yet most farmers find it difficult to purchase it coupled with the sub soil acidity associated with inadequate liming practice. Basically, inputs into the soil - inorganic fertilizer application and biological nitrogen fixation and acid rain have been labelled as causes of soil acidity. In like manner, soil additives capable of increasing soil pH could be exploited for correcting the twin problem of low pH and P deficiency. When rock phosphate (RP) is added to acid soils, P availability could be increased due to P supply abilities of these materials. With Ca and Mg constituent, R assumes a significant role as a potential tool for sustaining soil productivity by reducing its acidity level. With this, it is important to consider the liming abilities of Ca-containing fertilizers - RP, SSP and organic fertilizer in addition to their P supplying property. The slack from steel plant could be used as it is available free of cost, it is propose to transport the same to farmers field.
- Top Soil Preservation - The topography of the State in most part is such that during monsoon there is heavy run off and resultant soil erosion. Field bunds can reduce the velocity of run off and enhanced percolation of water into subsurface. It is proposed to cover 1920 ha during the plan period.
- Soil testing labs - Soil testing labs are inadequate in the State and this infrastructure need to be strengthened to extend the facility to the farmers. It is proposed to establish soil and water testing labs in each district and mobile labs on a selective basis. The mobile labs could also be used for awareness creation among farmers about farming techniques, new crops etc. though audio visual tools.

Physical & Financial Programme

SN	Programme	Unit Cost	Physical	Financial(Rs.)
a	Treatment of cultivable waste land	40000	1224	48960000
b	Treatment of other fallow land	10000	6400	64000000
c	Soil amelioration programme for acidic soils under Current Fallow Land, which is deficient in micro nutrients to be brought under cultivation through soil amelioration and land reclamation	10000	24	240000
d	Watershed Development	12000	2000	24000000
e	Soil Health Cards - coverage 5% of land holdings every year	450	32703	14716350
f	Micro nutrient testing (No)	200	500	100000
g	Micro nutrient enrichment (No. of farms of one acre coverage each)	1500	500	750000
h	Soil testing labs with micro nutrient testing at district level (No.)	1500000	1	1500000
i	Mobile soil and water testing lab cum mobile Agri school (No.)	1500000	1	1500000
		Total		155766350

Soil and Moisture Conservation measures

Treatment of culturable waste lands

The following are the some of the measures required to be taken up for treatment of culturable waste lands

- Land levelling, Bunding and Trenching
- Ploughing of leguminous crops
- Growing of Green manure crops and its incorporation in to the soil
- Mulching
- Application of organic manures
- Application of Red soil + FYM + sand
- Silt application
- Fertiliser application particularly Phosphorous and Potassium

Treatment of Fallow lands

The following are the some of the measures to be taken up for treatment of fallow lands-

- Growing of Green manuring and legume crops and its incorporation
- Application of compost materials - organic and inorganic
- Application of vermicompost

Land levelling

Land levelling is an important activity to arrest the land degradation. The cost of land levelling depending up on the percentage of slope and earth work rate. cost per ha is Rs.10,000/ for 1 -3% slope and Rs.16000/- for 1-5% slope.

Farm Bunding

Bonds - small earthen barriers are provided in agricultural lands with slopes ranging from 1 to 6 percent. They control the effective length of slope and thereby reduce the gain in velocity of runoff flow to avoid soil erosion. Broadly, bunds have been classified into two categories (i) Graded bunds and (ii) Contour bunds.

Graded bunds are constructed in medium to high rainfall areas and in soils having poor permeability, where as contour bunds are constructed in relatively low rainfall areas, particularly in the areas having high textured soils. The cost estimates vary depending upon the soil type, depth, vertical interval of bunds, cross section and length of bunds.

The cost of bunding depends upon the % of slope. The average cost is about Rs.6000/- per ha.

Trenching

Contour trenches are made in non-cultivable lands for providing adequate moisture conditions in order to raise tree and grass species. The main objective of trenching is to cut down the velocity of overland flow and to store rain water for the benefit of plants. Contour trenches are made in non-cultivable areas having silvi pasture, silvi horticulture or agro-horticultural programme at a spacing of 10 to 30 m.

Soil Improvement and Nutrient management

The two important sources of soil fertility are organic manures and chemical fertilizers. Manures are the organic materials derived from animal, human and plant residues which contain nutrients in organic forms. On the basis of nutrient content, the manures are classified as bulky organic manures and concentrated organic manures. Farm yard manure is prepared from a combination of cattle dung and urine, waste feeds and fodder, materials used as litter etc. The contents of N, P and K in FYM are quite variable because of variation in the quality of dung. The quantity applied should be high, when adequate moisture exists in the soil. The time of application should well ahead of sowing or of that when nutrients are needed by the crops.

Mulching and Crop Residues

Mulching is the process of covering the soil between crop rows with a layer of crop residues. Mulch reduces the impact of raindrops on the soil, it also hinders runoff flow and checks wind erosion. Mulching helps in reducing evaporation by its physical presence on the soil. Thus, more moisture is conserved in the soil profile as a result of mulching. Mulching improves soil fertility and builds up useful soil micro organisms. Crop residues act in two ways (i) reducing the wind velocity and (ii) trapping the soils which otherwise is susceptible to erosion.

Green manuring

Green, undecomposed plant material used as manure is call green manure. It is obtained by growing green manure crops or by collecting green leaf from plants grown in wastelands, field bunds and forest. Green manuring is growing in the field plants usually belonging to leguminous family and incorporating into the soil after sufficient growth. The plants that are grown for green manure are known as green manure crops. The most important green manure crops are Sunhemp, dhaincha, moong, cluster beans and *sesbenia rostrata*. The important plant species useful for green leaf manure are neem, mahua, glyricidia, karanj, calotropis, *sesbania grandiflora*, subabul and other shrubs.

Compost

Composting is a biological process in which the micro organisms of both types namely anerobic and aerobic, decompose the organic matter and lower the CN ration of the refuse. The final product of composting is well rotten manure known as compost. A mass of rotten organic matter made from farm waste like sugarcane trash, paddy straw, weeds and other plants. Farm compost is to be applied in trenches layer by layer.

Soil and moisture conservation of watershed approach : It is proposed to take up watershed development during the plan period. Details are given in Appendix I.

Silt Application for Improvement of Land

Application of silt to sandy and saline lands has been found effective for improving the fertility and texture of the soil. The silt deposited in the reservoirs and village tanks could be for the purpose.

Bio-fertilizers

Sustainable crop production depends much on good soil health. Soil health maintenance warrants optimum combination of organic and inorganic components of the soil. Repeated use of chemical fertilizers alone destroys the soil biota. In nature, there are a number of useful soil micro organisms which can help plants to absorb nutrients. Their utility can be enhanced with human intervention by selecting efficient organisms, culturing them and adding them to soils directly or through seeds. The cultured micro organisms packed in some carrier material for easy application in the field are called bio-fertilizers.

Bio-fertilizers are living microorganisms of bacterial, fungal and algal origin. The most commonly produced and marketed biofertilizers are Rhizobium, Azotobacter, Azospirillum, Phosphate Solubilizing Bacteria, Blue Green Algae, etc. Their mode of action differs and can be applied alone or in combination. Biofertilizers can add nitrogen from 20 to 200 kg/ha depending up on the optimum conditions. The yield increases usually range around 10-35%. Application of biofertilizers should not be viewed from the only angle of nutrient supply to the crops. They add life to the soil rendered sterile by the excess use of chemicals.

Integrated Nutrient management (INM)

Plant nutrients can be supplied from different sources viz., organic manures, crop residues, biofertilizers and chemical fertilizers. INM is a concept where in use of different methods put together for better utilisation of resources and produce the crops with little expenditure. In this approach all the possible sources of nutrients are applied based on the economic consideration and the balance required for the crop is supplemented with chemical fertilizers.

Integrated Pest management (IPM)

Pesticides or chemicals are meant to control harmful pests such as insects, nematodes, diseases, weeds etc. However, excessive use of pesticides not only leave residues in soil, water and air but also have adverse effects on the non target organisms such as pollinators, parasitoids, predators and wild animals. This has adversely affected the ecological balance resulting in pest resurgence, development of resistance in the pest species and environmental pollution.

In view of the several disadvantages associated with the unscientific use of pesticides in agriculture, there is an urgent need for minimising the use of chemical pesticides in the management of insect pests. Integrated Pest Management (IPM). IPM aims at suppressing the pest species by combining more than one method of pest control in a harmonious way with least emphasis on the use of insecticides. In simple terms "IPM is the right combination of cultural, biological and chemical measures which provides the most effective, environmentally sound and socially acceptable methods of managing diseases, pests and weeds". The major components of IPM are prevention, observation and intervention.

VERMICOMPOSTING

Earthworms consume plenty of Bio-wastes like straw, green leaves, grasses, rotting leaves, cattle shed wastes, kitchen wastes, animal dung, vegetable/flower wastes and excrete decomposed material called vermicompost. Earthworms convert the organic wastes into biomanure which helps in revitalizing the soil and plant growth.

Why vermicompost

- ✓ continuous use of chemical fertilizers with out adding organic manures has resulted in the deterioration of soil health and productivity, apart from the perils of chemical residues threatening human health and environment. Because of this, the yield levels are falling and soils are becoming degraded. Hence, to sustain soil fertility, there is an urgent need to promote organic manures like vermicompost.
- ✓ Cheaper alternative to inorganic fertilisers
- ✓ Easy availability of raw input material at farm level and user friendly preparation techniques
- ✓ Vermicomposting offers immense scope to small and marginal farmers in creating their own organic manure and ways to generate alternative income.

Benefits of vermicompost

- Revitalizes the soil and promotes the well balanced growth of plants
- The compost enhances the water-absorbing capacity of the soil there by need for irrigation is less.
 - Promotes the natural immunity of the plants, reducing the need for pesticides which in turn minimizes the cost of cultivation considerably.
 - It can not cause any harm to any plant whatsoever.

- Better quality of crops and taste of food (vegetables, fruits and grains). The fruits and vegetables produced by using vermicompost stays fresh and safe longer when compared to those produced using chemical fertilizers.

4.2 Irrigation

Status

As the district is hilly, most of the rain water flows as runs off. The alternative sources of irrigation available are check dams, canals, dams, ponds, ahars, and lakes besides other means of water harvesting structures. To take this water to the fields, pump sets, sprinklers etc. are required. Thus, there is importance of grounding Minor Irrigation schemes in the district. 12 MI schemes and one medium irrigation scheme was launched by MI Department with total Kharif command area of about 5000 ha. and 3600 ha. Rabi command area. Under RSVY 208 irrigation schemes, 68 Birsa Check Dams with Micro Lift, Construction / Renovation of 75 Birsa Ponds and Birsa Ahars, Setting up of 105 Micro Lift Schemes and Excavation / re-excavation of 14630 mtrs. of irrigation channels were also completed. Irrigation potential of 250 Ha has been created under NHM during the last year through construction of ponds, WHSs etc. Besides, the Welfare Dept of the State Govt is also engaged in construction of ponds, microlifts, wells etc since year 2000.

Besides, JHALCO is recommissioning the existing defunct LI projects ; DRDA has taken up a programme of digging up community ponds in each Panchayat. One Micro Lift Irrigation scheme is to be implemented by MI department in each block. Further, the deptt. is to construct two dug wells of 10' diameter and one dug well of 20' diameter in each block during the year. Ponds renovation work is to be taken up @ one in each block. Dept of Soil Conservation is presently digging of 62 wells of size 20 ft dia and 40ft depth. The site selection is in progress. Welfare Dept of the State Govt and DRDA are engaged in construction of ponds, wells, microlifts etc from the State Govt's budgetary allocations and also from out of the MPLAD and MLALAD funds.

47 Watershed Schemes with an area of 500 Ha each are under implementation in the district under VII and VIII batches of DPAP. Two watershed projects each in 10 blocks of the district are being implemented under "Hariyali" scheme. Further, 27 watersheds are likely to be sanctioned under DPAP to NGOs for implementation. There is lack of awareness among the farmers regarding the benefits of land development. Soil conservation techniques need to be propagated by soil conservation department. Water and soil testing facilities are available in the district and this facility needs to be strengthened.

Moisture Conservation

Soil conservation is the preservation of soil from deterioration and loss by using it within its capabilities, and applying the conservation practices needed for its protection and improvement. Sloping lands when put under cultivation are subjected to accelerated soil erosion. The top fertile soil is washed away with every rain and flowing water to maximum as possible from the soil depleting the soil fertility. In addition to this, the rainwater does not get sufficient active time to infiltrate into the soil profile and is lost in surface runoff. Conservation measures are therefore necessary to control soil erosion and retain maximum water so far as possible, in the soil. For the uplands therefore, it is proposed to take up soil and moisture conservation measures on watershed approach and in low lands water harvesting tanks and checkdams are proposed for moisture conservation. Dugwells and micro lift have also been proposed for irrigation purpose.

Physical & Financial Programme

IRRIGATION	Unit Cost	Physical	Financial (Rs)
Shallow tubewells	50000	600	30000000
Dug wells	102000	2400	244800000
Water Harvesting Tanks	18250	2200	40150000
Checkdam -	270000	80	21600000
Microlift Irrigation	172000	80	13760000
	Total		350310000

4.3 Integrated Development of Major Food Crops

Status of production of Major Food Crops

The pattern of agriculture practices in the district is monocrop because of rain fed farming. Out of net sown area of 160936 ha. only 23344.33 ha. (14.5%) is irrigated. Thus, the irrigated area to total cultivable area is very less. The major crops grown in the district are paddy, wheat, pulses like Gram, Peas, Arhar, Moong, Urad, Oilseeds and vegetables etc. The cultivation of these crops are heavily dependent on rainfall. The area of coverage, production and productivity of major crops are provided below in the table :

Sl. No.	Name of the Crop	2006-07		
		Area of Coverage (ha)	Production (MT)	Productivity (kg/ha)
1	Paddy	69,066	79,857	1,156
2	Maize	17,745	26,887	1,509
3	Wheat	2,547	4,824	1,894
4	Pulses	6,654	5,337	802
5	Oilseeds	2,426	1,787	736
6	Ragi	1,292	1,138	881

	(Maruwa)			
7	Vegetables	12,118	267,939	2,211
8	Spices	21	22	1,048
9	Jute&Mesta	93	685	7,000

Accelerated Seed Replacement Programme

Seed is a Important input determining the productivity of crops. The present seed replacement rate in crops is estimated to be only around 10%. It is proposed to achieve 100% seed replacement during the plan period. The major crops cultivated in the districts have been considered for certified seed production. As it would take some time to establish seed farms, it is proposed that 20 % of the seed would still be purchased from outside the State. It is proposed to be done with three different strategies:

- i) Assistance to farmers for setting up dedicated certified seed villages for production of certified seed and buy back of certified seed produced by seed villages.
- ii) Assistance to State seed farms
- iii) Establishment of Comprehensive Agriculture Seed Farm under professional farm administrator.

Assistance to seed villages

Bulk of the farmers in the State use stored seeds for production. It is proposed that 100% of the area under major food crops be brought under seed replacement programme. Thus 156110 ha of land is expected to benefit. 1125 ha of land is estimated to be required for production of certified seeds. Out of this, 32 ha of land is expected to be utilised for the purpose from the State Seed Farms. To meet the remaining demand it is proposed that seed villages may be identified where farms of selected progressive farmers may be identified as seed farms and the farmers would be provided with the necessary inputs including foundation seeds, advise on package of practices and training.

Physical and Financial Programme

The certified seeds produced by the farmers shall be bought back for distribution. Therefore it is estimated that for an output of 47217 quintal.

Seed Production

Presently the district has 6 Seed Farms, the details of which are as follows :

S.No	Name of Govt. Seed Farm (prod./research)	Geographical Area (ha.)		
		Total area	Cultivated Land (ha.)	% Culti.

						land / Total area
			Don	Tanr	Total	
1	Barhi	9.9	5.82	1.45	7.27	73.43
2	Charhi	9.89	6.85	1.71	8.56	86.55
3	Bishnugarh	9.88	6.36	1.68	8.04	81.38
4	Badkagaon	9.81	6.41	1.6	8.01	81.65
5	Keredari	9.99	6.99	1.74	8.73	87.39
6	Katkamsandi	-	-	-	-	-

Under the comprehensive Agriculture seed farm development programme one farm with an investment of Rs 5111500, may be established.

Support to State Seed farms

Strengthening the seed farms for seed production is important for production of quality seed, which forms the most important requisite for development of agriculture. During the plan period it is proposed to provide assistance to 3 such farms for development of irrigation facility, water conservation measures, seed processing unit, godown for seed storage, machinery and fencing of the farm.

S.N.	Particulars	Rs
1	Land Development	24700
2	Water Conservation	61750
3	Irrigation facility	200000
4	Seed Processing Unit	1500000
5	Godown for seed storage	1000000
6	Farm machinery (power tiller, Winnow cum Thrasher, power sprayer, pumpset, Conoweeder, seed cum fertiliser drum etc.)	126800
7	Fencing	120000
	Total	3033250

The details of programme envisaged for accelerated seed replacement programme, Support to State seed farms, Seeding Testing Labs etc is detailed below :

S.No	Programme	Unit Cost	Physical (Nos.)	Financial (Rs.)
a	Margin money assistance to seed villages for setting up of seed processing, Assistance for seed testing equipments, tractor, other	1500000	6	9000000
b	Subsidy on foundation seeds	500	559	279500
c	Buy Back of certified seed produced by seed villages (Qtl.)			
	Paddy	1625	37819	61455875
	Maize	2300	3242	7456600
	Wheat	3600	3564	12830400

	Pulses	5000	2449	12245000
	Oilseeds	5000	143	715000
d	Purchase of certified seeds from outside agencies			
	Paddy	1790	9455	16924450
	Maize	2530	810	2049300
	Wheat	3960	891	3528360
	Pulses	5500	612	3366000
	Oilseeds	5500	36	198000
ii	Support to State Seed farms			
a	Support to Govt. seed farms (No.)	3033250	8	24266000
iii	Seed Testing Labs			
		Total		157467485

4.4 Farm mechanisation

Status

As per an estimate there are 2867 tractors, 600 power tillers, 2600 trailers etc are available in the district. The tractors are mostly used for transportation purpose during off agriculture season. People prefer 35 Hp tractor for personal use. Tractors of all reputed companies are readily available in the district. Almost all the companies such as Mahindra and Mahindra, Eicher, Massey-Fergusson, Sonalika, Swaraj and HMT have either dealer or sub-dealer or branch of dealer in the district. There are few authorised repairing and maintenance workshop in the district. Repair centres run by individual entrepreneurs without any link to tractor manufacturers are available in some block headquarters in the district. Tractor manufacturers provide services at door step during two years guarantee period. Some companies have provision to impart training to local skilled youths on repair and maintenance of tractors free of cost at factory site. Fuel like diesel and petrol are available in plenty in the urban areas. However in rural areas network of fuel depot is not available.

Farm mechanization has great significance for enabling farmers to take up timely and quality agricultural operations, reduce costs of production and improve the productivity. Various Farm Equipments / Implements are supplied to farmers at subsidized rates. Emphasis has been given on farm mechanization for different equipments, which have been proved to be worthy in different field operations.

Plan for Farm Mechanisation

The production and productivity of the Food grains is directly related to the agri. implements commonly used in the fields. Improved implements also helps in soil and water conservation to a larger extent and also helps in reducing the mandays engaged in agriculture. Taking into consideration the benefits some mechanisation equipments such as Drum seeders, weeders, winnower cum thrasher, the same are

proposed to be distributed to the progressive farmers and sprayers to farmer groups / farmers clubs under this programme.

In the case of Plastic Drum Seeders, compared with broadcasting, about 50–60% less rice seed is needed, and there are savings in labor cost, and these machines are easier to use in operations such as weed control, pest management, interrow cultivation by a push weeder, and harvesting. NABARD under its Farm Innovation promotion Fund has sanctioned a programme to the Holy Cross KVK for demonstration of Drum seeder in the field. On completion of the field trial 3 sets of drumseeders shall be handed over to 5 farmer clubs for their extension use in villages. Some of the farmers and private entrepreneurs expressed their willingness to use this plastic drum seeder in more areas in the near future. Moreover, there is a big potential for intensively using these seeders during the irrigated summer rice-growing season. It is easier to use a push weeder when rice is sown in rows using a drum seeder.

The cono weeder is ideally suited for weeding between rows of paddy crop. The cono weeder has two conical rotors mounted in tandem with opposite orientation. Smooth and serrated blades mounted alternately on the rotor uproot and burry weeds because the rotors create a back and forth movement in the top 3 cm of soil. The cono weeder can satisfactorily weed in a single forward pass without a push pull movement. It is easy to operate by a single operator. The weeder does not sink in puddled soil.

Paddy thresher cum winnower : The thresher with the newly developed concave was found more efficient even for the moist and long crops. The 8.0 hp thresher was found to handle crops of 0.30 ha per hour and delivers straw, chaff, stone and clean paddy in separate outlets. A saving of Rs. 950 per ha and 135 man-hrs per ha can be achieved compared to manual threshing.

Sprayers range in size from man-portable units (typically backpacks with spray guns) to self-propelled units similar to tractors, with boom mounts of 60-151 feet in length. The types are Backpack/knapsack, Foot, Garden, Hand compression, Power and Stirrup

Physical & Financial Programme

S. No	Programme	Unit Cost	Physical (Nos.)	Financial (Rs.)
1	Plastic Drum Seeder	3000	220	660000
2	Cono Weeder	1000	400	400000
3	Sprayer to farmer gps / farmer clubs	1600	600	960000
4	Winnower cum Thresher	15000	60	900000

5	Power Tiller (Subsidy)	75000	100	7500000
6	Paddy Paddle Thresher	4000	600	2400000
	Total			12820000

4.5 Integrated Pest Management

Indiscriminate use of chemical pesticides not only hampers the sustainability in production of food grains but also poses a great threat to the environment. Integrated Pest Management (IPM) approach has been globally accepted for ensuring sustainable development of agriculture. It has become more relevant due to a number of advantages like safety to environment, arsenic free food commodities, low input cost, use of locally available organic pesticides etc.

In order to propagate Integrated Pest Management (IPM) it is proposed to distribute integrated pest management kits to farmers and create awareness about IPM.

Integrated Pest Management	Unit Cost	Phy	Financial (Rs)
IPM kit distribution (No.)	1500	1100	1650000
Strengthening of Plant Protection Centre	500000	11	5500000
Total			7150000

4.6 Strengthening Market Infrastructure

Status

To avoid distress selling of agricultural commodities due to lack of storage facilities, storage godowns in rural areas and cold storage are very essential. Farmers can put their produce in cold storage and sell it when the prices are good. There are nine cold storages in Hazaribag district; some more entrepreneurs are interested to establish units under CISS; efforts may be made to revive the defunct units at Hazaribag, Barhi and Daru. Production of vegetables and fruits is abundant in Hazaribag district. Due to proper availability of uninterrupted supply of power the cold storages are not functioning to their full capacity. storage godowns need to be promoted. The APMC marketing centre has to facilitate processing and marketing of the perishable goods.

Plan for Agri-Marketing Centres & Cold Rooms

Supply chain is a collaborative system covering input supply, production, harvesting, storage, processing and trade channels. Credit, technology and extension complete the horizontal integration. Looking into the above aspects setting up of Agri Marketing centres, through SHG have been proposed.

To reduce the wastage of vegetables during transit it is proposed to set-up cold rooms in major vegetable growing areas. This will provide better returns to vegetable produced by farmers in the district.

Physical & Financial Programme

S.No.	Strengthening Market Infrastructure	Unit Cost	Physical	Financial
a	Pack House	250000	2	500000
b	Market Yard	1500000	2	3000000
c	Refrigerated Van	2400000	2	4800000
d	Cold rooms for vegetables (No.)	2500000	5	12500000
	Total			20800000

4.7 Strengthening Extension services

Status

The number of players in public and private sectors providing extension services to farmers for agriculture and allied activities in the district of Hazaribag are as follows :

- The agriculture extension services are imparted through District Agriculture Officer, District horticulture Officer and District Soil Conservation Officer who are assisted by Block Agriculture Officers who in turn get assistance from Village Level Workers in propagating the techniques for better cropping system. The Dept. of Agriculture (DOA) has no administrative control over the personnel of other line departments even though they are in the filed for similar work. The main extension function performed by DOA officials is the delivery of the technical messages to individual farmers or farmer groups through visits to different locations. These visits are not regular because of their preoccupation with implementation of a number of central and state sector schemes having input/ subsidy delivery.
- The Central Up Land Rice Research Sub Station (CURRS)- Hazaribag, Soil Conservation Demonstration Centre-Demotand also provide quality extension education.
- The field extension activities of ATMA , Holy Cross Krishi Vigyan Kendra, CURRS and the Soil Conservation farm is exemplary. The KVK is headed by a Directress with 3 Programme Coordinators with supporting Specialists in the field of Soil Science, Home Science, Extension Education, Plantation & Horticulture, Animal Husbandry and Crop Science. The KVK provides regular training programmes for Piggery, Goatery, Dairy farming, etc. for the farmers. The KVK disseminate information regarding HYV seeds, organic farming, timeliness of sowing and planting, judicious use of water for irrigation, minimum use of chemical fertilizers, etc through Front Line Demonstration (FLD) on farmers field itself. They are also providing services to farmers for soil testing and information on weather

condition including rainfall in the district. They guide the farmers for quality seed production, nursery development, vermi composting units, cultivation of medicinal and aromatic plants.

- The NABARD- DDM in the district is not a member of the governing body of the agency. inclusion may be considered at the highest level to bring better coordination among all the stakeholders in the district. NABARD sponsored farmer clubs (190 nos) Banks and NGO partners play a major role in extension activities. They are linked to ATMA, KVK, Banks, all research organisations. Basically, all the partners are involved in capacity building, creating awareness, transfer of technology and bring all-round development through credit. Consultancy services are also available to farmers, entrepreneurs through wholly owned subsidiary of NABARD called NABCONS. Seeing the success of these farmer clubs, Banks and KVK have also formed some clubs of their own. There is also a proposal to form 10 Fish farmer clubs in the district.
- 3 farmer training schools have been established under aegis ATMA. Birsa Munda Institute of Entrepreneur Development (BMIED) a RUDSETI institute established by Allahabad Bank also imparts education in farm sector.
- There is no Agribusiness and Agrilinic Centre in the district.
- Hazaribag has a number of NGOs operating with varying levels of capacity, implementing a wide range of programmes for rural folks. PRADAN, HCSSC, SUPPORT, NBJK, AGRAGATI, RGMT, Serve Sewa, Samadhan etc. are some of the important NGOs operating in the district. They are involved in promotion of micro credit through organisation of SHGs, integrated watershed development, vermicomposting, etc. Number of programmes for self employment are also implemented by DRDA through NGOs in the district.

The following gaps in extension services have been perceived in the district which need immediate attention of all those concerned :

- ♦ Exposure visits with initiatives from ATMA needs to be increased.
- ♦ There is limited Soil Testing facilities available in the district.
- ♦ There is no Agri-business and Agri-clinic Centre in the private sectors except for few seed shops with limited agro-services provided by them.
- ♦ Limited AI facilities and veterinary dispensaries are available in the district. AI centres of BAIF are not adequate. The backward and forward linkages are absent for promoting poultry and fisheries activities on big scale in the district.
- ♦ The Gauriakarma Animal farm be strengthened for propagation of Red Sindhi cows.
- ♦ There are only 2 agro-processing centres in the Pvt sector; agri-trading firms and more no of agro processing centres be encouraged. The existing cold storages and the agro-processing centres may be encouraged to provide extension services as part of contract farming in the district.

- ◆ There is no Village Knowledge Centres to enable the villagers to get information they need for farming or other activities

Plan for Extension Services

Tremendous amount of extension work is necessary to build capacity and confidence in farmers to make them accept and adopt to the market oriented production system. There is a need for shift in approach, from technology transfer to Capacity Building mode. The extension system need to cater to the requirements of the tenant farmers, share-croppers, farmers who have small area of land, women farmers, who form the larger chunk of the farming community. Extension has been identified as one the major bottlenecks in agriculture development in the State and therefore need to be given emphasis. Therefore, it is proposed to set up *Krishi Gyan avam Udyog Kendras* for sub district level.

The Farmers' Clubs and SHGs could work as an effective link in the extension process. Agriculture Department, Agriculture University, ATMA, KVKs, need to organise training and Extension Programmes, for progressive Farmers, members of Farmers' Clubs and SHGs on regular basis. For capacity building of farmers, skill development programmes, exposure visits, awareness creation etc have been proposed under various sectors such as crop production animal husbandry, fisheries, Floriculture, as also two new approaches included in the plan viz. Watershed and Wadi approaches. The skill development programmes would be of 10 days duration and around 30 participants could be included per programme.

Physical & Financial Programme

S.No.	Strengthening Extension	Unit Cost	Physical	Financial
I	<i>Krishi Gyan Avam Udyog Kendra</i>	8500000	1	8500000
II	<i>Agri information centre</i>	250000	15	3750000
III	<i>Farmers Capacity building programme</i>			
a	Agriculture			
i	Skill development (10 days, for 30 farmers @Rs.180/Farmers per programme) (No.)	54000	60	3240000
ii	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	15	450000
iii	Exposure visit outside State (20 farmers @ Rs 3500 per farmer) (No.)	70000	16	1120000
iv	Publicity material	10000	60	600000
v	Awareness Programme like Kisan mela	100000	15	1500000
b	Watershed			
i	Skill development (04 days, for 50 farmers @Rs.180/Farmers per programme) (No.)	36000	8	288000
ii	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	4	120000
iii	Exposure visit outside State (30 farmers @ Rs	105000	4	420000

	3500 per farmer) (No.)			
iv	Publicity material	10000	4	40000
v	Awareness Creation Programme	25000	16	400000
c	Horticulture			
i	Skill development (10 days, for 30 farmers @Rs.180/Farmers per programme) (No.)	54000	60	3240000
ii	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	15	450000
iii	Exposure visit outside State (20 farmers @ Rs 3500 per farmer) (No.)	70000	8	560000
iv	Publicity material	10000	60	600000
v	Awareness Creation Programme	25000	15	375000
d	Animal Husbandry			
i	Skill development (08 days, for 30 farmers @ Rs. 180/Farmer per day) (No.)	43200	60	2592000
ii	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	15	450000
iii	Exposure visit outside State (20 farmers @ Rs 3500 per farmer) (No.)	70000	4	280000
iv	Publicity material	10000	60	600000
v	Awareness Creation Programme	25000	15	375000
vi	Trainers training program for Gokul Mitra @ 180 per day for 60 days - coverage (No)	10800	60	648000
e	Fisheries			
i	Skill development (10 days, for 30 farmers @Rs.150/Farmers per programme) (No.) - FFDA	45000	60	2700000
ii	Skill development (05 days, for 50 farmers @Rs.150/Farmers per programme) (No.) - NFDB	22500	4	90000
iii	Skill upgradation programme for Matsya Mitra (3 days, 30 Matsya Mitra @Rs.200 per trainee per programme)	18000	4	72000
iv	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	15	450000
v	Exposure visit outside State (20 farmers @ Rs 3500 per farmer) (No.)	70000	4	280000
vi	Publicity material	10000	60	600000
vii	Awareness Creation Programme	25000	15	375000
	Total			35165000

4.8. Animal Husbandry

Status

Dairy is emerging as an important avenue for income generation and employment opportunity in rural areas in the district. Agro-climatic condition in the district is suitable to support cross bred animals. Vast majority of the rural population in the district being small and marginal farmers or ladles laborers practicing subsistence agriculture animal husbandry done in scientific way could substantially add to

economic activity of the area/ segment. In the district rural milk trade practices are not established and milk marketing network is not much developed and milk is produced mostly for household consumption and local marketing. There is scope for cooperative development and milk route development through institutional arrangements with milk processing plant. Rearing mulch animals has traditionally been specific to certain communities and groups. They generally are better informed and are aware of improved farming practices like feeding of fodder, cattle feed, bran and cereals. They purchase crossbred cows and improved breeds of buffaloes and maintain them. The tribal people are not traditional cattle keepers. They are neither habituated nor inclined to keep Mulch Cattle. The Cattle are usually kept for draught and manure. The animals are grazed on pastures and community lands. After the rainy season when grass is not available, the animals are maintained only on paddy straw. As per 17th quinquennial livestock census 2003, the milch cattle population in district is 6.27 lakh, comprising of 4.84 lakh cattle and 1.43 lakh buffalo, cross bred cattle formed less than 5 % of the cattle population. Average holding size of milch animals (in-milk and dry cows and buffaloes) work out to around 2 per milch animal holding household which is quite less than average holding size of male animals used for agricultural operations. The native cattle are of small frame, low height and weigh about 100 to 150 kg. The animals are grazed extensively. It usually produces 200 to 250 gm milk for about two months and then gets dried up. The inter calving period is as high as 24 months. Milk Production is 1.59 lpd per animal against 3 lpd per animal. The estimated per capita availability of milk is 158 g/day against the state average of 140g/day and national average of 235g/day (recommended by ICMR is 280g/day) with a marketable surplus of around 66000 lpd. In the district, livestock rearing is mainly taken as an household activity, being managed by family members particularly women members and development programmes need to keep it in view while addressing the emerging issues relating to this sector.

Plan for Animal Husbandry :

Animal husbandry activities like dairy, goat rearing etc. have good potential in the district due to larger area under pastures and fallow-land and availability of fairly good amount of fodder. At present no commercial importance is attached to these activities and only non-descript local breed of cattle with very poor milk yield are maintained mainly for manure and draught purpose. Farmers keep local breed of pig and goat for meat purpose and there was practice of keeping backyard poultry and duck. All the animal husbandry activities are done in traditional method based on grazing/browsing/scavenging etc. and no efforts are made for intensive rearing of livestock scientifically for milk and meat purpose. The animal husbandry activities have great potential to generate additional employment and income by adopting mixed farming.

For addressing the above inherent problems relating to growth of Animal Husbandry and Dairy sector following strategies have been recommended :

- A system for providing veterinary and Breeding services at the door step of farmers need to be evolved through cooperatives/NGOs, with the help of private practitioners, etc. for which it is assumed that the investment projected in the programme is to strengthen/ add on the activities of the NGOs/cooperatives/Govt Institutions/KVKs through their existing infrastructure and manpower and accordingly projections has been made to improve the only facilities/equipments/tools/two wheelers to enhance the services etc. Strengthening/new Artificial Insemination centres have been proposed to meet the requirement at the rate of one AI centre for every 1000 adult female cattle population. The additional investment for veterinary centres have been proposed to make available at the rate of one veterinary centres for every 5000 adult animal unit.
- Local cattle may also be upgraded with a milch / dual-purpose indigenous cattle breed like Sahiwal, Red Sindhi, Tharparkar or Haryana. Such upgraded cattle will meet the need for bullocks and also provide some amount of milk. Similarly, the local buffaloes may be upgraded with Mahesani or Murrah breed. In urban and peri-urban areas, crossbreeding with Holstein Friesian and Jersey cattle may be popularised.
- Development of common property resources (CPR) in collaboration with Local bodies, NGOs and AH Department should be attempted. With the help of the Department of Forest silvipasture / Horti-Sivipasture / Agro-Forestry could be popularised. The community land belonging to Panchayat could also be used for this purpose. Suitable grasses and legume mixture can be established along with forest trees.
- Extension will be the single most critical tool for the development of dairying in Jharkhand. The involvement of NGOs in entrepreneurship development and motivating the farmers to adopt dairying on commercial scale will be very important. The farmer have to be educated through discussion and demonstrations, on the relative importance of various practices and options that could be exercised in the field of animal nutrition and animal health for maximising the productivity. The resources available locally (cattle and buffalo farms belonging to NGOs or progressive farmers) would be used for demonstration / motivation of farmers. Such farms may be upgraded or new

Modern Dairy Centre may be established by Government and run by NGOs/Peoples organisation/KVKs/progressive farmers.

- In order to promote dairy farming, it is proposed to provide assistance to the tune of 80% of the cost of two CB milch cows and 50% subsidy on 5 animal mini dairy unit (CB Cows)
- Key factor towards a profitable dairy is a quality heifer rearing programme. To facilitate this a heifer rearing programme with the facilitation of an NGO has been proposed. Concentrate, fodder, vaccination etc will be provided to heifer born out of AI upto pregnancy (18 months age).
- Jharkhand dairy project is proposed to develop procurement and marketing system of milk. This is proposed through a network of Bulk Milk Coolers installed at strategic locations, automatic milk collection units, new dairy plant, cold chain, brand development etc. Construction of bypass protein plant, mineral mix plant, urea molasses block plant etc are also have been proposed.
- **Sheep / Goat** : Good quality animals preferably of the Black Bengal Breed or graded up with Black Bengal, Beetal and Barbari breeds or various combination of cross -breds available locally or from the state of Uttar-Pradesh and Punjab or from the government farm at Kanke and Chatra are suitable cross bred. Black Bengal crosses with Beetal bucks as studied by Birsa Agriculture University, however, would be the most suitable breed for milk and meat yield for this region. However, care should be taken to purchase male and females from different source to avoid inbreeding. NGO/ Peoples organisations/ KVKs/ Progressive Farmers may be provided with breeding units for regular supply of males and females among the farmers for grading up of the local population in large scale. These satellite breeding farms may be integrated with Agricultural University/ Animal Husbandry Department for regular supply of good quality buck and veterinary services and supply of quality inputs through hand holding to these firms. The Govt. goat farm need to be strengthened to meet the demand of animals and has been proposed in the plan.
- The **pig farming** constitutes the livelihood of rural poor belonging to the lowest socio-economic strata and they have no means to undertake scientific pig farming with improved foundation stock, proper housing, feeding and management. Pig farming will provide employment opportunities to seasonally employed rural farmers and supplementary income to improve their living standards. Looking at the local demand, availability of land for scavenging/grazing, availability of agricultural and kitchen wastes pig farming has great potential in all the districts. However, slow take off of the piggery scheme in the state can be attributed primarily to the lack of awareness regarding housing, feeding and breeding of pigs and skill for rearing quality animals. Apart

from these, non availability of quality piglets, inbreeding due to faulty breeding system and inadequate veterinary services further retard the exploitation of potential in the State. To promote piggery as a livelihood activities supply of quality piglets of improved breed such as TammworthXDesi (T&D) developed by Birsa Agriculture University the programme envisage for establishment of Pig Breeding cum fatner units with the help of NGO/Peoples participation for multiplication of improved pigs and supply to the farmers on regular interval. This will also help to demonstrate pig rearing practices in scientific manner to the local farmers. For making available the required number of piglets it is proposed to strengthen the Govt. Piggery farm, with necessary infrastructure.

- **Duck rearing** is prevalent among weaker sections of rural population which provides them supplementary and steady income on daily basis besides providing them nutrition duck eggs for family consumption and engaging family labour in their leisure hours to look after Duck unit thus, generates rural employment. Marshy, riverside, wet land and barren moors are excellent areas for duck farming. In areas where duck farming has potential duckery unit of 30 birds are to be distributed, to promote this activity.
- Duck cum fish farming can be integrated. If taken with fisheries and paddy as a secondary activities the productivity of primary crop is also enhanced without any additional cost on rearing of duck. Khaki Campbell is best egg producing breed in ducks. Animal Husbandry Department of Govt of Jharkhand from their Duck breeding farms at Hotwar and Divyayan Krishi Vigyan Kendra, in Ranchi district supply hybrid Khakhi Cambell ducklings in a limited manner. A bulk of supply comes from the neighbouring State of West Bengal. To improve the regular Supply of Ducks to the farmers it is proposed to establishment of 5000 duck breeding farm through KVKs/NGOs/Govt. Farm.
- Duck, pig and goat units may be given farmers taking integrated mix farming as indicated elsewhere in the report.
- **Poultry** has good potential in the district, however the poor farmers do not have the risk taking capability and not aware of the management practices to be followed for taking up broiler poultry units. In view of this back yard poultry of low input technology birds is best suited for the district, as these birds can sustain the village condition and survive by scavenging. To promote this activity, low in put technology birds of 60 birds is proposed to be given to farmers to be taken up as subsidiary occupation and a source of additional income.
- For fodder production fodder seed is proposed to be distributed to dairy farmers at the rate of 10 kg per animal.

- Disease diagnostic labs are not available for disease diagnosis, hence one centre has been proposed.
- Vaccination of livestock is important for maintaining a healthy animals, programme propose to cover 100% of the livestock population

Physical & Financial Programme

I	Animal Husbandry / Dairy	Unit cost	physical	Financial
a	New veterinary institutions/strengthening Inst under Govt. (No)	700000	60	42000000
b	New/Strengthening of AI Centres for equipments, semen bank and Liquid Nitrogen storage and 4 yrs operational cost (No.)	816000	8	6528000
c	Development of Community pasture/ Gauchar land/Silvipasture/ Grass land of 5 ha/ unit @ 1 silvipasture/50000 Adult Cattle Unit	219780	9	1978020
d	Modern Dairy Demonstration Centre/district - 50 animal unit	4000000	1	4000000
e	CB milch cow under prototype scheme - 80% subsidy	57600	549	31622400
f	Mini dairy units of 5 CB cows @ 50% subsidy	92000	28	2576000
g	Assistance for Heifer rearing	13390	502	6721780
h	Jharkhand Dairy project - for developing procurement and marketing system of Milk	39400000	1	39400000
i	Goat Breeding Unit of 10 Does +1 bucks for grading up of local population with Improved goat breeds	100000	900	90000000
j	Promotion of Improved pig breeds (T&D) 3+1 unit	105000	1800	189000000
k	Promotion of backyard poultry (60)	7000	600	4200000
l	Promotion of Hybrid Khakicampbell ducks (30)	7000	150	1050000
m	Distribution of fodder seed @ 10 kg per animal @ Rs. 20/kg	200	1518	303600
n	Disease Diagnostic Labs	8000000	1	8000000
o	Strengthening / New Govt. piggery farm	25000000	1	25000000
p	Vaccination programme	25	78016	1950400
	Total			454330200

• Fisheries Development

Fish production and productivity is very low in the district due to lack of scientific management of fish farms. The average fish production from the district is about 400 kg per ha. which is very low as compared to national average production of 2400 kg per ha. There are 2935 ha water area under ponds and tanks and 27451 ha reservoirs. Quality fish seed in adequate quantities and its timely availability is one of

the major issues affecting development of fisheries in these water bodies. Due to shortage of fish spawn, seed rearing is also not possible in large scale. In order to overcome this in the short term, it is proposed that fisheries department will purchase fish spawn from hatcheries in West Bengal or other neighbouring States and supply it to identified fish seed growers free of cost, along with fry catching net, for promoting fish seed rearing. Total seed requirement, both for fish culture and stocking in reservoirs is proposed to be met through this initiative. To meet the total spawn requirement locally, 3 No. of fish hatcheries (2-3 crore spawn production capacity annually) have been proposed in the district. In view of the shortage of staff in fisheries department, these hatcheries could be leased out to trained progressive fish farmers for spawn production.

In the Govt. fish farms, demonstration farms on integrated farming incorporating various models is proposed to be set-up. This could be used for creating awareness about integrated fish farming.

Fresh water prawn is a high value crop and before promoting fresh water prawn farming in the district, its survival and viability of fresh water prawn farming is to be standardised to local condition especially in view of cold winter in this region. A pilot project has been proposed for the same. If viability is established the farms could be used as demonstration units.

To promote fish seed rearing for stocking in the reservoirs, it is proposed that fisheries department will construct seed rearing tanks near reservoirs free of cost in the land of farmers of weaker sections.

Old Govt. tanks that has been silted need to be renovated, so that it could be leased out for taking up fish culture. 30 No of such ponds have been proposed for renovation in the district.

Fish productivity of reservoirs in the district is very low and stock enhancement and species enhancement are some of the techniques that could be adopted for increase fish productivity of reservoirs. This would provide livelihood to fishermen dependent on capture fisheries in reservoirs. Stocking fish fingerlings of Indian major carps in 24 ha of reservoirs has been proposed. Mesh regulation to prevent fishing of under sized fish need to be imposed for better management of the reservoirs.

Fishermen dependent on reservoirs need craft and net for better exploitation of the fisheries resources of reservoirs, especially when the productivity of reservoir improves as a result of management practices proposed. It is proposed to provide boat and net to members of registered fishermen co-operative societies. This would lead to livelihood enhancement of the poor fishermen.

Fish being a highly perishable commodity its transport very important, similarly fish seed need to be transported quickly to reduce mortality. Therefore, mini pickup trucks are proposed to be given to the co-operative societies and also to the fisheries department.

Construction of landing centres at select reservoirs have been proposed to facilitate landing of fish catch from the reservoirs at one place to facilitate collection and marketing by the societies.

To increase fish production, reservoir resources could also be used by utilising the fringes of reservoirs for pen culture. This would provide addition income and employment to fishermen families living near the reservoirs. As this is not a very popular activity to begin with it is proposed to be taken up in 15 reservoirs. Pens of relatively permanent nature is proposed to be built.

Fish markets in the State are not hygienically maintained, there is no proper waste disposal or reduce spoilage of fish. Hygienic markets are important for keeping quality of fish till it reaches the consumer and to achieve this fish markets with proper facilities are proposed in the major cities, where there is huge demand for fish.

Physical & Financial Programme

II	Fisheries	Unit Cost	Physical	Financial (Rs)
a	Fish seed farms by farmers - Spawn and fry net to be supplied by Fisheries Department (20 Lakh Spawn/unit) (No.)	12500	41	512500
b	Fish seed Hatchery 2 to 3 crore spawn capacity	400000	3	1200000
c	Demonstration Farm for integrated fish farming (No.)	500000	2	1000000
d	Pilot project on Fresh water Prawn farming (No.)	275000	5	1375000
e	Construction of seed rearing tanks	55000	333	18315000
f	Renovation of Govt. tanks	300000	30	9000000
g	Stocking of fish fingerlings in reservoirs @ 800 per ha (ha)	800	11773	9418400
h	Boat and gear for reservoir cooperative societies	100000	14	1400000
i	Vehicle for transporting fish seed and fish	300000	3	900000
	Total			43120900

4.9 Horticulture

Committee on Agro climatic Regional Planning has indicated that vegetables, fruits, tree plantation, water management practices etc. should be the thrust area in the district. Hazaribag has also been identified as agri export zone for vegetables by the Government of India but the project is yet to be launched and has been considerably delayed. However, the district has been included under National Horticulture Mission programme for providing incentive for taking up plantation activities. As horticulture development is being covered under National Horticulture Mission this component has not been included separately in the plan. However, support for vegetable cultivation, tassar silk composite units and brood lac at subsidised rates is envisaged. It is also envisaged that 20 Integrated farming for livelihood schemes may be

implemented in 4 blocks viz. Churchu, Bishnugarh, Badkagaon and Keredari where tribal families reside; this would help them augment their vegetable production based on wadi model.

4.9.1 Integrated Mixed Farming in Jharkhand

4.9.1.a Present Farming Situation in Jharkhand

The farming situation is based on two types of land ie land on upper slope, *Tanr* land, and the land following called *Don* land. The sub-classes of these are *Tanr I*, *Tanr II*, *Tanr III* and *Don I*, *Don II*, *Don III*. For technology generation, these are grouped again into three categories ie. Upland (*Tanr I & Tanr II*), Medium land (*Tanr III & Don III*) and Lowland (*Don I & Don II*). The uplands are characterised by red colour lateritic soil which has a low pH, poor in organic carbon and well drained. The midlands are yellow, medium textured, moderately acidic and poor in organic carbon & moderately drained. The lowlands are greyish, heavy textured, have neutral pH and poorly drained. The average rainfall is about 1200 mm per annum and no attempts are made to conserve water, protect the crops and increase the cropping intensity. Due to mono cropping system, the scope for farm employment is limited to very short period of 5 to 6 months. For rest of the period, majority of the rural population migrate to near by towns for livelihood.

Even though rainfed rice yields are low (less than 1 ton / ha.) and unstable, rice is being cultivated to meet the food demands of small and marginal farmers who possess 75% of total farm holdings. Small and marginal landholders face different types of problems than large farmers. They have to be dependent on farming for their household needs and majority of these farmers are resource constrained, economically poor and have low level of education. The benefits of technology developed in green, white or other agricultural revolutions have remained confined to large and resourceful farmers. From this small holding, it is not possible to sustain an average family size of 5 members with single crop production enterprise. Hence emphasis on crop diversification and integrated development of both farm and non farm sector is crucial for better livelihood opportunities for the rural households.

4.9.1.b Crop diversification possibilities

Technological options for rice substitution and crop diversification in rainfed uplands are rain water management, off-season ploughing, early sowing, closer spacing, early weeding, timely fertilizer application, plant protection measures, early harvesting and proper soil intercultural practices. Other relevant technologies are selection of crop varieties and cropping systems in relation to rainfall pattern and crop growth period. Some of the parameters relevant to upland farming are :

- ✓ The crops to replace rice should be of short duration, low duty and/or deep rooted which can extract soil moisture from deeper soil layers during dry spell.
- ✓ Some of the promising crops for rainfed upland rice area are maize, ragi, black gram, pigeon pea, cow pea, groundnut, sesamum, niger, cotton, mesta, sweet potato etc.
- ✓ Inclusion of legumes in the cropping system to improve soil fertility besides providing food and nutritional security.
- ✓ Pulses have inherent quality to trap the moisture from the low strata of the soil therefore, they are considerably moisture stress tolerant and fit well in rainfed conditions.
- ✓ Adopt dry land horticulture and agro-forestry systems in slopy Uplands.
- ✓ Suitable forage crops to be grown to sustain dairy industry.
- ✓ In all crops, there must be emphasis on integrated weed management, nutrient management, rainwater management, plant protection measures and post-harvest technology.

4.9.1.c Integrated Farming as an alternative

Small farmers are to be encouraged for production of food, feed, fodder, fibre, fuel, etc., on a small piece of land. Under such conditions, one alternative is to integrate more than one enterprise on the same piece of land. Suitable agricultural technologies are, therefore, required to be developed for small land holders for which concept of integrated farming may prove better than specialized or single crop farming system. This kind of farming produces more income and generates more employment than do arable farming systems which do not include animals. Integrated farming helps improve the economic conditions of resource constrained farmers and provide better opportunities for employment in the agriculture sector.

Integrated multi component farming systems, where the wastes from one operation or subsystem can be used as input for other subsystems/enterprises can reduce the risks as well as costs of production; improve soil fertility, provide balance nutrition and ensure enhanced holistic yields as well as income.

Several specific possibilities for integration of various livestock enterprises with crop production for small and marginal land holders under irrigated and dry land situations of semi-arid tropical regions are known.

The above situation clearly indicates the need for implementation of integrated farming aimed at achieving remunerative self employment to prevent migration, develop sustainable livelihood and improve the quality of life.

4.9.1.d Integrated farming for uplands known in Eastern India

A small farmer usually has a farm pond in the homestead land and possesses 0.5 to 1.0 ha. of upland around his farm pond. The farm pond is meant to collect rainwater from the watershed. This rainwater could be utilised in giving a life saving irrigation during the dry spell to various upland crops, such as vegetables, groundnut, pigeon pea, maize, cowpea, mung bean, urad bean etc. Fruit crops viz., Papaya, Banana, Pine apple etc. could be raised on pond embankments. A cow dung gas plant provides fuel (methane gas) for cooking food for the family, compost for manuring the adjacent farm land and slurry to the farm pond to encourage growth of phyto-plankton and zoo-plankton which serve as fish feed in the tank. Catla, Rohu, Mrigal and Shrimp could be cultured in layers of water body for nutritious food and income to the family, ducks could be reared on the pond/tank which not only keep water body clean by eating the aquatic weeds but also increase the fertility of the water body of the tank by providing dropping/excreta through out the tank. A poultry cottage could be erected at one corner of the farm pond and these birds kept in the cottage should preferably be layers so that the farm family can earn extra money through sale of eggs. One or two dairy cows could easily be managed by the family with the help of feed, green fodders raised from the farm. Daily monetary income is ensured from the sale of milk, milk products, eggs, fish and vegetable grown the farm.

Profitability of small and marginal farmers who have diversified their activities are well established. Vertical integration of dairy with fodder crops can increase income and employment on a sustainable basis. Structural changes in consumption pattern of vegetable, meat, egg, fish, growth of income results in diversification favour of non-food grain crops and livestock products can generate adequate employment and income for small farmers.

4.9.1.e Integrated farming for lowlands known in Eastern India

Threats of water logging and high rainfall and excessive ground water resources can be converted to poverty alleviation opportunities in many part of Eastern India. Diversification of rice monoculture into integrated farming system will be environmentally sustainable, economically viable and a risk avoiding strategy. The most popular models preferred in India and suitable for waterlogged situations are mainly (a) Pond-dyke integration, (b) Fish-rice-duck/ poultry and vegetables and (c) Fish-Cow/ Pig - Duck/Poultry and vegetable. In addition to economic return, these systems are based on multiple recycling of carbon energy and nutrients from biomass to livestock- Poultry/ Piggery/ Fishing etc. and minimize environmental loading with pollutants. The overall system is most efficient for the absorption of inputs and production of goods and services. In these systems, marginal lands and wastelands are generally brought into productive use where pond services as a focal point for direct and indirect links with other components.

4.9.1.f Integrated Farming Model

Drawing from the experience after a visit to Charichas farm in Bokaro district of Jharkhand, it would be prudent to plan for suitable integrated farming models for individual small farmers as well as for medium farmers or a group of small farmers. The viable unit sizes to be considered for such models could be 1 ha. (2.5 acres) and 5 ha. (12.5 acres). The base 1 ha. model assumes that all three land categories are available within this 2.5 acre and the proportion of each are (i) Lowland (*Don I & II*) - 0.75 acre (ii) Medium Land (*Don III*) - 0.25 acre (iii) Medium Land (*Tanr III*) - 1 acre & (iv) Upland (*Tanr I & II*) - 0.5 acre. Although there could be region specific cropping sequences, the major three variants of the 1 ha. Model envisaged are (i) Agri - Veg- Horti- Agroforestry- Dairy- Poultry- Goatery (ii) Agri - Veg -Horti -Agroforestry -Dairy- Poultry- Piggery & (iii) Agri- Veg- Horti- Agroforestry- Dairy- Poultry- Fisheries- Duckery. Adoption of these activities to a certain extent would depend on the type of land available, for ex. fisheries could be taken up depending on the viability of having a pond, hence the need for having three variants.

The 5 ha. model at this stage envisages all the activities put together, however adoption of these would depend on specific interests of farmer groups. The cropping pattern and sequences could vary depending on type of land and agro-climatic conditions.

4.9.1.g Interventions proposed for Integrated Farming

1. Food security - Considering that rainfed rice yields are low (less than 1 ton / ha.) and unstable, however rice alongwith other foodgrains and cereals are to be cultivated to meet the food demands of small and marginal farmers who constitute 75% of total farm holdings. At an average of 250 gm/person/day, the annual requirement for a family of say, six persons, would be around 6 quintals of rice OR say 1.2 tons of paddy. Going by the premise that proven high yielding varieties can yield 2 tons / acre, it would be prudent to consider rice cultivation on 1 acre of lowland (0.75 acre) & medium land (0.25 acre) during the kharif season.
2. Other Food crops & cereals for meeting needs & income generation : The 1 acre of medium land available during kharif season is proposed to be utilised for cultivation of Maize & Soyabean in 1:2 proportion (0.5 acre) and Pigeon Pea & Groundnut in 1:2 proportion (0.5 acre). During the rabi season, in the same plot of lowland (0.75 acre) where rice had been taken, it is proposed to take wheat (0.45 acre) & Berseem (0.15 acre) through zero tillage operation with the remaining 0.10 acre kept fallow.
3. Fodder crops : 0.10 acre of the upland is proposed to be utilised for raising Deenanath grass as an intercrop between horticultural plants besides cultivating berseem in 0.15 acre of lowland during rabi.

4. Additional income & risk mitigation through Vegetables as crop diversification - Potato is the most important vegetable grown in the State. Okra, Tomato, Cucumber, cauliflower and cabbage are the other vegetable crops that are grown in large areas and exported to nearby States of West Bengal & Orissa. Based on this premise, the medium land of 0.25 acres is proposed to be utilised for cultivation of Cauliflower & Cabbage in 0.125 acre each. The 1 ha. of medium land is proposed to be cultivated by Potato in 0.4 acre and Tomato, Frenchbeans & Peas in 0.2 acre each. The cultivation of these vegetables is to be done during rabi season. The same land is proposed to be utilised for taking summer crop of vegetables given that irrigation source is available. The crops proposed to be taken are Capsicum (0.45 acre), Okra (0.25 acre), Cucumber (0.15 acre) and Brinjal (0.15 acre). However, before taking these crops, the soil has to be suitably tilled and mulched so that productivity of the land is maintained. Chillies (0.10 acre) & Arhar / Linseed (0.10 acre) are proposed to be taken as intercrops in the uplands.

5. Agroforestry - Subabul comprises good forage material for cattle & goats besides its pulpwood value. Since the same will be adequately protected during the initial stages therefore Subabul tree on the periphery of these lands can be grown as an agroforestry crop, hence 200 trees have been proposed. For raising of 160 agroforestry trees on the periphery of the Upland area of 0.5 acre, Sesam (60), Melina (Gamhar) (20), Teak (20) and Glyricidia (60) known for its green manure, has been proposed.

6. Horticulture : As a part of multi-tier cropping system, Mango (20) & Guava (10) as an orchard has been proposed in the uplands

7. Support Activities

a. Fencing : Protection forms a necessity whenever horticulture, vegetables and animal husbandry activities are being proposed. Hence for fencing, use of Thorny bushes, cactus var. plants, bamboo supports have been proposed @ Rs. 50 / running metre for 1.5 acre of land.

b. Water Resource Development : Providing support irrigation for rabi crops and summer vegetables forms the critical component for having a profitable enterprise. A borewell with pumpsets etc. estimated at a cost of Rs. 1 lakh leads to a huge investment for this small enterprise. Hence, it would be prudent to have a GroupWell shared between 5 farmers at a shared cost of Rs. 30,000 per enterprise. This cost would include pumpset and pipelines. Further, Drumkit for gravity flow irrigation and sprinkler sets have also been provided in the 1 ha. model.

c. Vermicomposting : This activity has to be promoted from the beginning, if one has to give the desired thrust to organic farming. Therefore for having shed & pit alongwith procurement of worms has been included in the entire cost exercise.

8. Animal Husbandry : The demand for meat, meat products & eggs in Jharkhand is high since the consumption patterns of the tribals as well as those domiciled in the State as well as in the neighbouring States include meat. Therefore the cattle, goat, pig, poultry and ducks are the major animal products that need attention. However, animal husbandry is still to grow as per demand requirements. Integrated farming could provide the growth strategy tool which is very much needed for this sector.

a. Dairy - For a small farmer, management of Small Dairy units consisting of 2 Cross Bred Cows or Improved varieties such as Sahiwal, Red Sindhi, Rathi, or Indigenous cattle breed such as Tharparkar, Haryana etc. could provide a regular source of income to the farmer through sale of milk. Established cost norm of Rs. 50,000/unit has been taken. On a larger scale, 50 cows can be maintained in a 5 ha. Farm model. Jharkhand is a state where the milk production is in deficit, therefore there is an existing demand which needs to be met. The requirement of Green Fodder could be met through the production of Berseem & Deenanath grass as envisaged in the crop production. Thus, the integration is achieved for this activity. Further the cow dung could be utilised for preparation of vermicompost.

b. Poultry : Backyard poultry farming can be popularised by introducing BA/RIR dual purpose cocks. Shed and procurement cost of 20 chicks (Fighter / Desi breeds) have been built into this model. This is comparatively a low cost activity envisaging a cost of Rs. 2000/-.

The three variants of the 2.5 acre activity will have one of these three activities ie. Goat rearing OR Piggery OR Fisheries-cum-duckery

c. Goat rearing : Local Black Bangal breed is the most preferred. In the 1 ha. model, 10 (Does) + 1 (Buck) has been proposed. Procurement cost of these goats alongwith shed arrangements & utensils forms part of the investment cost. Feed for 30 kids & 10 goats alongwith expenditure to be incurred for medicine & injections forms part of the recurring costs. The costs are taken as recommended through BAU.

d. Piggery : Most adaptable "T&D" pigs have to be maintained for better return. The 1 ha. model considers this activity as per preference of farmers in substitution of Fisheries-cum-duckery or Goatery activity. For easier management, 3 sows + 1 Boar unit has been considered at a high investment cost of Rs. 1,00,000/-. To maintain disease free condition alongwith regular vaccinations, there is a high recurring cost of Rs. 25,000/yr associated with this activity.

e. Fisheries : For fisheries to be developed, a natural collection point of about 0.2 acre needs to be developed through construction of a Dug out pond (30m X 25m) at a cost of Rs. 50,000/-. The input costs in terms of fries,

medicines etc. has been built in the model at a cost of Rs. 25,000/yr. Catla, Rohu, Mrigal & Shrimp will be the fish varieties which can be raised.

f. Duckery : Duckery activity alongwith fisheries offers great scope for integration since ducks keep the required turbulence as well as weed free. Population of Khaki Campbell for more egg production forms the basis for expansion of this activity in the State. Therefore 200 ducks can be reared through the pond and which has the capacity to lay 240-300 eggs /year and hence provide additional source of income for the farmers.

4.9.1.h Implementation Strategy

Dissemination of information pertaining to these models to small and medium farmers will require a huge co-ordinated effort in terms of planning, preparation of guidelines, handholding in terms of financial & marketing support and above all close monitoring & feedback. Since this entire role might not be possible by the State Govt., therefore engaging of field level Voluntary Organisation having required expertise could be the way ahead. Integrated Farming also gives rise to the opportunity of organising small farmers groups into associations or producer companies which can lead to greater benefits for the farmers.

It is envisaged that at least one demonstrative model per panchayat will be implemented through financial support of Rs. 2.5 lakhs per farm. At 286 panchayats in Giridih, the financial outlay for this purpose shall be Rs 715 lakh.

Further, it is assumed that all individual beneficiary financial support for various sectors will be under the Integrated Farming Model from the second year onwards.

Physical & Financial Programme

Sl no	Horticulture Development & Sericulture	Unit Cost	Physical	Financial(Rs)
1	Support for vegetable cultivation (Certified seed, compost, plant protection, etc.) (ha)	15000	3314	49710000
2	Integrated Mixed Farming	250000	206	51500000
3	Tassar Plantation (Ha)	30000	300	9000000
4	Cocoon Bank	5000000	1	5000000
5	Common Facility Centre	1500000	2	3000000
	Total			118210000

4.10 Innovative Schemes

System of Rice Intensification (SRI) : The System of Rice Intensification (SRI) technology is a "Less Water" method of production which is suitable to poor farmers who have relatively more labour than land and capital. Under this system of rice

production synergistic interactions lead to much higher grain yield. Rice being the major crop and item of daily food intake of the population, it is proposed to take up intensive propagation of SRI technology for rice cultivation during summer. This innovative technology is proposed to be implemented in all the major rice producing districts of the State.

Demonstration of Gravity Drip System : The gravity drip system developed by HARP for 1 Ha farm can be demonstrated for adoption by progressive farmers who wish to diversify their cropping system with low cost drip system. The model developed for one ha upland include 0.25 ha for water harvesting tank (at the highest point of the land), 0.25 ha for upland paddy with facility for critical irrigation from the water harvesting tank, 0.25 ha guava or other fruit trees with drip irrigation system from the water harvesting system and 0.25 ha vegetable cultivation, with drip irrigation system. This concept has good potential since electricity availability is limited.

Tea Cultivation : Hazaribag provides scope for cultivation of tea and coffee. In fact , traces of such cultivation undertaken earlier days is to be seen. The Soil Conservation Centre - Demotand has amply proved it. The State Govt has appointed specialists from IITM to further the cause. Tea plantation is being popularised through farmer clubs in certain pockets of the district.

Demonstration of sprinkler irrigation : Sprinkler system being one of the efficient irrigation system, it need to be promoted in the State. Therefore it is proposed to demonstrate sprinkler irrigation, so that farmers can adopt for high value crops.

S.No.	Innovative Schemes	Unit Cost	Physical	Financial(Rs)
a	<i>Adoption of SRI technology in paddy Production including farm pond (Unit Area 1 acre)</i>	In major rice producing districts		
i	Farm ponds (No.)	36400	50	1820000
ii	Cono weeder (No.)	6000	50	300000
iii	Trainer's training (No.)	15000	2	300000
iv	Farmers Training (No.)	10000	5	50000
v	Seed 3 kg/acre @ Rs.15/kg (area covered)	45	50	2250
b	Tea Cultivation (acre)	100000	50	5000000
c	Demonstration of Gravity drip system - Developed by Harp (No. of units)	132000	1	132000
d	Demonstration of Sprinkler irrigation (2 Acre model) No. of units	17000	15	255000
	Total			7589250

4.11 Research & development :

Conservation of Local Gene plasm : Gene-Seed Banks is proposed to be set up to promote conservation of genetic diversity of agro biodiversity and animal breeds.

This gene pool can serve as seed sources for farmers and as genetic material carrying specific traits , that can be used by breeders to create new varieties that will be needed for a changing climate.

	Unit Cost	Physical Unit	Financial (Rs)
Gene Seed Bank & Identification and preservation of indigenous Livestock	1000000	1	1000000

Annexure I A

Consolidated District Agriculture Plan - 2008-09 to 2011-12

Sl. No.	Projects	Unit Cost (Rs.)	Hazaribag	
			Phy.	Financial (Rs)
1	Integrated Development of Major Food Crops			
i	Accelerated Seed replacement programme			
a	Margin money assistance to seed villages for setting up of seed processing, Assistance for seed testing equipments, tractor, other	1500000	6	9000000
b	Subsidy on foundation seeds	500	559	279500
c	Buy Back of certified seed produced by seed villages (Qtl.)			
	Paddy	1625	37819	61455875
	Maize	2300	3242	7456600
	Wheat	3600	3564	12830400
	Pulses	5000	2449	12245000
	Oilseeds	5000	143	715000
d	Purchase of certified seeds from outside agencies			
	Paddy	1790	9455	16924450
	Maize	2530	810	2049300
	Wheat	3960	891	3528360
	Pulses	5500	612	3366000
	Oilseeds	5500	36	198000
ii	Support to State Seed farms			
a	Comprehensive Agriculture Seed Farm Development Programme (No.)	5111500		
b	Support to Govt. seed farms (No.)	3033250	8	24266000
iii	Seed Testing Labs	3153000	1	3153000
v	Integrated Pest Management			
a	IPM kit distribution (No.)	1500	1100	1650000
b	Strengthening of plant protection centre	500000	11	5500000
2	Land Development programme - moisture conservation measures & Soil Health Improvement			
a	Treatment of cultivable waste land	40000	1224	48960000
b	Treatment of other fallow land	10000	6400	64000000
c	Soil amelioration programme for acidic soils under Current Fallow Land, which is deficient in micro nutrients to be brought under cultivation through soil amelioration and land reclamation	10000	24	240000
d	Watershed Development	12000	2000	24000000

e	Soil Health Cards - coverage 5% of land holdings every year	450	32703	14716350
f	Micro nutrient testing (No)	200	500	100000
g	Micro nutrient enrichment (No. of farms of one acre coverage each)	1500	500	750000
h	Soil testing labs with micro nutrient testing at district level (No.)	1500000	1	1500000
i	Mobile soil and water testing lab cum mobile Agri school (No.)	1500000	1	1500000
3 Subsidy assistance for Irrigation				
a	Deep tubewells	120000		
b	Shallow tubewells	50000	600	30000000
c	Dug wells	102000	2400	244800000
d	Water Harvesting Tanks	18250	2200	40150000
e	Checkdam -	270000	80	21600000
f	Microlift Irrigation	172000	80	13760000
g	Bamboo boring	2400		
4 Farm Mechanisation				
a	Plastic Drum seeder (No.)	3000	220	660000
b	Cono weeder (No.)	1000	400	400000
c	Sprayer to farmer groups/ farmers clubs (No.)	1600	600	960000
d	Winnower cum Thresher (No.)	15000	60	900000
e	Power tiller (subsidy)	75000	100	7500000
f	Paddy Paddle Thresher	4000	600	2400000
5 Horticulture Development				
i	Assistance for Plantation of horticulture crops			
a	Mango (ha)	30000		
b	Guava (ha)	30000		
c	Jack fruit & other minor fruit crops (ha)	22500		
d	Amla (ha)	26250		
e	Citrus (ha)	30000		
f	Spices (ginger, garlic, chilli & turmeric) (ha)	11250		
g	Medicinal and aromatic plants (ha)	28500		
h	Nursery - 1 ha unit (No.)	150000		
ii	IPM & INM for horticulture crops	2000		
iii	Mulching - local haystack & plastics	15000		
iv	Support for vegetable cultivation (Certified seed, compost, plant protection, etc.) (ha)	15000	3314	49710000
v	Floriculture (loose flower) (acre)	12000		
vi	Bulbulous Flowers (ha)	45000		
vii	Tropical polyhouse for off season vegetables and flower cultivation (500 sq mtr unit)	370000		
viii	Integrated Mixed Farming	250000	206	51500000

ix	Integrated farming for livelihood improvement of Tribal families (acre)	32500		
6	Promotion of sericulture			
a	Tassar Production Centre with Grainage House	14500000		
b	Tassar Plantation (Ha)	30000	300	9000000
c	Cocoon Bank	5000000	1	5000000
d	Common Facility Centre	1500000	2	3000000
7	Strengthening Market Infrastructure			
a	Pack House	250000	2	500000
b	Market Yard	1500000	2	3000000
c	Grading / Packaging	1500000		0
d	Refrigerated Van	2400000	2	4800000
e	Cold rooms for vegetables (No.)	2500000	5	12500000
10	Strengthening Extension			
I	Krishi Gyan Avam Udyog Kendra	8500000	1	8500000
II	Agri information centre	250000	15	3750000
III	Farmers Capacity building programme			
a	Agriculture			
i	Skill development (10 days, for 30 farmers @Rs.180/Farmers per programme) (No.)	54000	60	3240000
ii	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	15	450000
iii	Exposure visit outside State (20 farmers @ Rs 3500 per farmer) (No.)	70000	16	1120000
iv	Publicity material	10000	60	600000
v	Awareness Programme like Kisan mela	100000	15	1500000
b	Watershed			
i	Skill development (04 days, for 50 farmers @Rs.180/Farmers per programme) (No.)	36000	8	288000
ii	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	4	120000
iii	Exposure visit outside State (30 farmers @ Rs 3500 per farmer) (No.)	105000	4	420000
iv	Publicity material	10000	4	40000
v	Awareness Creation Programme	25000	16	400000
c	Horticulture			
i	Skill development (10 days, for 30 farmers @Rs.180/Farmers per programme) (No.)	54000	60	3240000
ii	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	15	450000
iii	Exposure visit outside State (20 farmers @ Rs 3500 per farmer) (No.)	70000	8	560000
iv	Publicity material	10000	60	600000

v	Awareness Creation Programme	25000	15	375000
d	Animal Husbandry			
i	Skill development (08 days, for 30 farmers @ Rs. 180/Farmer per day) (No.)	43200	60	2592000
ii	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	15	450000
iii	Exposure visit outside State (20 farmers @ Rs 3500 per farmer) (No.)	70000	4	280000
iv	Publicity material	10000	60	600000
v	Awareness Creation Programme	25000	15	375000
vi	Trainers training program for Gokul Mitra @ 180 per day for 60 days - coverage (No)	10800	60	648000
e	Fisheries			
i	Skill development (10 days, for 30 farmers @Rs.150/Farmers per programme) (No.) - FFDA	45000	60	2700000
ii	Skill development (05 days, for 50 farmers @Rs.150/Farmers per programme) (No.) - NFDB	22500	4	90000
iii	Skill upgradation programme for Matsya Mitra (3 days, 30 Matsya Mitra @Rs.200 per trainee per programme)	18000	4	72000
iv	Exposure visit within State (30 farmers @Rs.1000/farmer per visit) (No.)	30000	15	450000
v	Exposure visit outside State (20 farmers @ Rs 3500 per farmer) (No.)	70000	4	280000
vi	Publicity material	10000	60	600000
vii	Awareness Creation Programme	25000	15	375000
11	Animal Husbandry and Fisheries			
I	Animal Husbandry / Dairy			
a	New veterinary institutions/strengthening Inst under Govt. (No)	700000	60	42000000
b	New/Strengthening of AI Centres for equipments,semen bank and Liquid Nitrogen storage and 4 yrs operational cost (No.)	816000	8	6528000
c	Development of Community pasture/ Gauchar land/Silvipasture/ Grass land of 5 ha/ unit @ 1 silvipasture/50000 Adult Cattle Unit	219780	9	1978020
d	Modern Dairy Demonstration Centre/district - 50 animal unit	4000000	1	4000000
e	2 CB milch cow under prototype scheme - 80% subsidy	57600	549	31622400
f	Mini dairy units of 5 CB cows @ 50% subsidy	92000	28	2576000
g	Assistance for Heifer rearing	13390	502	6721780
h	Jharkhand Dairy project - for developing procurement and marketing system of Milk	39400000	1	39400000
i	Goat Breeding Unit of 10 Does +1 bucks for grading up of local population with Improved goat breeds	100000	900	90000000

j	Promotion of Improved pig breeds (T&D) 3+1 unit	105000	1800	189000000
k	Duck Breeding cum Hatchery Unit with 5000 parent ducks	3000000		
l	New Animal feed plant @ 100 MT/ unit	40000000		
m	New Poultry feed plant 100 MT unit	40000000		
n	Promotion of backyard poultry (60)	7000	600	4200000
o	Promotion of Hybrid Khakicampbell ducks (30)	7000	150	1050000
p	Distribution of fodder seed @ 10 kg per animal @ Rs. 20/kg	200	1518	303600
q	Disease Diagnostic Labs	8000000	1	8000000
r	Strengthening/new Govt. goat farm	25000000		
s	Strengthening / New Govt. piggery farm	25000000	1	25000000
t	Vaccination programme	25	78016	1950400
u	Strengthening Govt. Poultry breeding farm	20000000		
v	New Poultry breeding farm for low input technology birds	35000000		
II	Fisheries			
a	Fish seed farms by farmers - Spawn and fry net to be supplied by Fisheries Department (20 Lakh Spawn/unit) (No.)	12500	41	512500
b	Fish seed Hatchery 2 to 3 crore spawn capacity	400000	3	1200000
c	Demonstration Farm for integrated fish farming (No.)	500000	2	1000000
d	Pilot project on Fresh water Prawn farming (No.)	275000	5	1375000
e	Construction of seed rearing tanks	55000	333	18315000
f	Renovation of Govt. tanks	300000	30	9000000
g	Stocking of fish fingerlings in reservoirs @ 800 per ha (ha)	800	11773	9418400
h	Boat and gear for reservoir cooperative societies	100000	14	1400000
i	Vehicle for transporting fish seed and fish	300000	3	900000
j	Landing Centres in reservoirs (No)	500000		0
k	Pen culture in reservoirs (No.)	300000		
l	Construction of Hygienic Fish Markets	1000000		
12	Innovative Schemes			
a	<i>Adoption of SRI technology in paddy Production including farm pond (Unit Area 1 acre)</i>			
i	Farm ponds (No.)	36400	50	1820000
ii	Cono weeder (No.)	6000	50	300000
iii	Trainer's training (No.)	15000	2	30000
iv	Farmers Training (No.)	10000	5	50000
v	Seed 3 kg/acre @ Rs.15/kg (area covered)	45	50	2250
b	Tea Cultivation (acre)	100000	50	5000000
c	Demonstration of Gravity drip system - Developed by Harp (No. of units)	132000	1	132000
d	Demonstration of Sprinkler irrigation (2 Acre model) No. of units	17000	15	255000

13	Research & Development			
	Gene Seed Bank & Identification and preservation of indigenous Livestock	1000000	1	1000000
	Total			1363729 185

Appendix - 1

WATERSHED DEVELOPMENT

What is watershed development all about ?

Watershed development refers to the conservation, regeneration, and the judicious use of human and natural (like land, water, plants, animals) resources within a particular watershed. Watershed development attempts to bring about the best possible balance in the environment between natural resources on one side and man and grazing animals on the other. It requires people's participation because conservation is possible only through the whole hearted involvement of the entire community.

2. Components/sectors of Watershed Development

2.1 Watershed development involves the following components / sectors:

- i) Human resource development (community development);
- ii) Soil and land management (conservation and use);
- iii) Water management (conservation and use);
- iv) Afforestation;
- v) Pasture(Fodder) development;
- vi) Agricultural development;
- vii) Livestock management; and
- viii) Rural energy management

2.2 Watershed development involves continuous interaction and exchange between various sectors e.g. the livestock that can be maintained is dependent on the availability of fodder, which in turn is related to soil and water management. The availability of firewood and other fuel is related to the amount of livestock in the area, the extent of forest cover, and the productivity of the land. The development of all the above sectors is crucially dependent on the **development of the human population** inhabiting that watershed.

2.3 When the environment gets degraded, the quality of life of the human community within that region also deteriorates. Watershed development thus aims at the rejuvenation of the environment in an integrated and comprehensive manner.

3. Why Watershed Development ?

3.1 The consequences of environmental degradation are all too well known. Activities of man like deforestation, wrong farming techniques, livestock overgrazing and faulty land use lead to the destruction of plant and tree cover exposing the earth to the natural forces like heavy rains, direct sunshine and high winds. These in turn lead to environmental problems such as soil erosion, floods or water scarcity. Agricultural yield is lowered and this results in decline in the income levels of the community resulting in poverty and eventually leading to migration of labour from rural to urban areas in search of livelihood.

3.2 Watershed development, therefore, involves not only regeneration of the environment, but also the management of needs of the human community in such a way that their demands match the resources available like land, water and vegetation within that particular watershed. This equilibrium between need and availability of resources will lead to a better and increased resistance to drought and increased agricultural production augmenting food supply, fodder, fuel and, timber. Thus standard of living improves leading to reduction in poverty-induced migration.

4. **People's Involvement**

4.1 There is a pervading influence of the environment on the human community living within that region, as they depend on it for food, water etc. When the economic condition of a community deteriorates, it leads to over-exploitation resulting in degradation of natural resources. People, for whom agriculture is a low return and risky activity, expand their cattle herds for financial security. This leads to overgrazing and in turn to soil deterioration and erosion, especially in ecologically sensitive upper reaches of the watershed.

4.2 It is necessary for people to understand the relationship between their poverty and the degraded environment in which they live in. They must also be provided with an equally good, if not better, economic alternative. Only then they will willingly let go their claims on the environment in favour of possible benefits that will accumulate in the long run from environmental regeneration through appropriate management. Environmental regeneration is therefore possible only when the local community feels the need for it and they are fully in control of all aspects of resource mobilisation, management and conservation.

4.3 Human beings and their activities are the root cause of environmental destruction, and hence restoring of the health of the environment is their responsibility and only they can do it. There can be no sustainable natural resources management unless it involves the participation of all inhabitants of the concerned environment/area in an active manner.

4.4 The people voluntarily must come together and accept full responsibility for regenerating their environment from concept to planning, implementation, supervision, maintenance of project measures and associated practices. This would imply consensus in arriving at a common understanding regarding rules and regulations and the setting up of mechanisms for organisation of works, sharing of benefits and resolution of conflicts.

4.5 To make the project sustainable, it is necessary for all the key actors, like the Watershed Community, NGOs, Banks, Government Institutions and Technical Service Organisations, to participate actively and in close co-ordination with each other.

4.6 Participatory watershed development must be implemented on a "large enough scale" at different places to create many success stories, each of which can act as nuclei, becoming a source of inspiration and demonstration for neighbouring villages. This would provide a major impetus for the unfolding of a "people's movement" for regeneration of environment.

4.7 The relatively poorer families depend more on village commons, forest lands and on flocks of sheep and goat. Some of the measures of the project such as ban

on free grazing and felling of trees affect poorer families more than others. Such families should be provided with alternative or compensatory means of livelihood right from the beginning. Attempts may be made for introduction of rotational grazing as a regular practice by the villagers.

5. Criteria for selection of watersheds

5.1 Watersheds covering villages with the following physical and socio-economic characteristics are preferred for inclusion in the programme :

5.2 Physical characteristics

- a. Dry and drought prone villages. In any case the proportion of irrigated area may not exceed the average for the state or 30% whichever is lower.
- b. Villages with noticeable soil erosion, land degradation, resource depletion or water scarcity problems.
- c. Villages in the upper part of drainage systems.
- d. The size of a watershed project should be around 1000 ha. (but not less than 500 ha.).
- e. Well defined watersheds with the village boundaries coinciding to the greatest extent possible with the watershed boundary. As far as possible, **Watershed encompassing one village is ideal.**
- f. Villages where the general cropping sequence does not include high water demanding and long duration crops like sugarcane, banana etc. and if such crops are grown in small pockets in the watershed, the villagers should agree that the area under such crops will not be extended during implementation or after completion of the watershed development project.

5.3 Socio-economic characteristics

- a. Predominantly poor villages.
- b. High proportion of SC/ST in the total population.
- c. There should not be much difference in the size of the land holdings.
- d. Villages with a known history of coming together for common causes.
- e. Villages that have shown concern for resource conservation.
- f. Villages with alternative sources of employment must not be selected as the past experience indicates that the programme in such areas would not pick up.
- g. Villages that are willing to commit themselves to the following conditionalities :
 - (i) to ban clear felling of trees,
 - (ii) to ban free grazing and in treated areas for protecting vegetation,
 - (iii) to reduce the livestock population if in excess, and maintain the same at the carrying capacity of the watershed (number which can be supported by the watershed),

- (iv) to ban cultivation of water intensive crops like sugarcane and banana or atleast not to increase the area under such crops from the present position,
- (v) to contribute initially four days of "shramdan" on watershed treatment works by the entire village community and later, once selected for the programme to contribute by way of "shramdan" or otherwise 16% of the unskilled labour costs of the project and also to collect such contribution **EQUITABLY** (impartially and in a just manner) from the village community. The landless and poor single parent households are excluded from such a contribution,
- (vi) promote equity for women and poor through preferential allocation of usufruct rights in common lands.
- (vii) to start and contribute to a Watershed Maintenance Fund, from the second or third year onwards to maintain and upgrade the treatments and assets created under the project, at a rate of Rs.100/- per land owning families.
- (viii) to take all such steps as are necessary for achieving and maintaining a sustainable production system,
- (ix) to constitute, at the village level, a body called the Village Watershed Committee (VWC) which would have to be registered during the implementation phase within 6 months of the commencement of the work, so that it can undertake responsibility for maintenance of all the valuable assets created and generated by the project.

6. **Criteria for selection of NGOs**

6.1 The nodal agencies of the State Government may implement watershed development projects through NGOs. Even if the Project Facilitating Agency (PFA) is other than NGO the same criteria could be utilised with necessary modifications. The following shall be the criteria for selection of NGOs.

- a. Reputation and financial management capacity.
- b. Method of operation and rapport with people and local government agencies.
- c. Perspective on watershed development.
- d. Nature of projects handled in the past.
- e. Technical and managerial capability.
- f. Sensitivity towards group action /conflict resolution and equity for poor and women.
- g. Ability to motivate the community for providing 'Shramdan' in the village where they propose to work.

6.2 The NGO should have been active in the area for a significant period before proposing a watershed project for the area. NGOs and watershed communities

willing to implement a watershed project, if selected, have to go through a Proofing Stage and meet the qualifying criteria before they undertake a large scale project.

7. Importance of Nursery & Plantation

7.1 The project involves a lot of plantation work on forest lands, private lands as well as on bunds in cultivated fields. Most projects face a shortage of good planting material. It is better and economical to start a nursery for the project well in advance (as raising of good seedlings in a nursery takes from six months to a year) and stock it with enough seedlings to use during the project.

8. Trained manpower

8.1 There should also be enough trained manpower before the project starts. A core team of village youth would have to first undergo an orientation program to develop a clear idea of the project and the responsibilities of all persons involved with it. They would also need to acquire certain specific skills like surveying, staking, nursery raising, horticulture and pasture development, etc. for project preparation, implementation and maintenance.

9. Active involvement of women

9.1 Women should be actively involved in all aspects of project implementation as they not only do the bulk of farm related work but are also the transmitters of culture and values to children.

10. Ridge to Valley

10.1 The work on the project is executed with a "Ridge to Valley" perspective, that is starting from the top and coming downwards. This would mean that the treatment of the hilltops and hill slopes would be completed first. Treatment of land should start from a higher elevation and gradually lands of lower elevations would be taken up. Thus lands at the bottom of the valley would be treated at the end.

10.2 Ridge to valley treatment ensures that the soil erosion is reduced and the treatments at the lower catchment are protected. This also helps water conservation and ground water recharge. The treatment must be on area basis, both public and private lands are to be treated.

11. Check dams should be last

11.1 If the physical measures in upper reaches and in the cultivated fields are carried out well, the whole watershed basin will act as a large reservoir with recharged ground water. The need for constructing expensive check dams in the lower portion of watershed will then get reduced considerably. Therefore, check dams are constructed at the end of the watershed to impound the excess water after allowing water to seep into the aquifer through the entire course of the drainage line of the watershed.. However, one check dam could be built initially to create a water source for starting a nursery and/or for drinking water purposes, if it is felt absolutely necessary.

12. Seasonality

12.1 In most areas very little work except planting of trees and grass seeding can be taken up during the monsoons. Therefore the activities should be planned accordingly. To start a project during or just before the monsoon is not advantageous.

13. Improving farming practices

13.1 In addition to laying emphasis on physical measures equal or greater attention should be paid to agricultural programmes to help the farmers to take up improved farming practices and get maximum benefits from the infrastructure created under the project.

14. Treatment of forest land

14.1 Some of the watersheds may cover forest land and as mentioned earlier, all lands including forest lands need to be treated. As per existing law, the work on the forest land has to be planned and executed under the guidance of the Forest Department. Therefore, it is advisable to approach the local Forest Department for finalising the treatments of forest area in the watershed which could either be implemented by the VWC / NGO under the guidance of Forest Department or to be implemented by the Forest Department.

15. Implementation

15.1 The process of watershed development comprises of 2 phases. The first phase is called the "Capacity Building Phase" (CBP) or "Proofing Stage" and the second phase is called "Full Implementation Phase" (FIP).

15.2 The Capacity Building Phase (CBP) or Proofing Stage (Phase 1)

The aim of the Capacity Building Phase is to establish that village community can work together and cooperate with each other and also work with NGO to develop a small portion of the watershed, say, 50 - 100 ha. The duration of the CBP is generally for 12 months. After successful completion of CBP, NGO would assist the village community in preparing the Project Feasibility Report for launching the Full Implementation Phase. During the CBP phase the following steps are undertaken:

- a. After the selected watershed fulfills the criteria and the villagers are eager and willing to implement the project accepting the discipline, the NGO and the villagers will be permitted to take up CBP.
- b. The NGO motivates the villagers through a series of meetings and discussions. During these discussions the reasons for environmental degradation and various problems affecting the people like shortage of water, fuel and fodder, decreasing agricultural production and migration can be discussed. It should emerge during these discussions that watershed development project can help the villagers in restoring the balance of their environment.
- c. The villagers should demonstrate their commitment to take up watershed development by undertaking 4 days of shramdan. Landless and poor single

parent households could be exempted. Voluntary contribution of bullocks, tractors, can also be valued and treated as shramdan. Shramdan should be for soil and water conservation activities.

- d. After one or two days of shramdan, NGO may arrange for exposure visit of atleast one member from each family to a nearby developed watershed. After completion of 4 days of shramdan, a meeting to be called for formation of Village Watershed Committee (VWC). At this meeting before formation of VWC, an Agreement Letter which contains the conditions and procedures for the implementation of watershed development project has to be read out to the people. The villagers have to orally agree to implement the Watershed Development Project and accept the conditions of community discipline. The community discipline consists of ban on 'free grazing', 'clear felling of trees' and 'eschewing growing of water intensive crops'. After this the VWC is formed and the VWC has to get the Agreement Letter signed by both husband and wife of every family in the watershed
- e. The VWC also has to sign another Agreement Letter which details their responsibilities. The members of VWC are selected by people of the watershed and it will have representatives from different social and class groups of the village. It should be ensured that there is adequate representation of the different geographical areas within the watershed.
- f. After the formation of VWC and signing of Agreement Letters by the members of VWC and all the families, the villagers have to demonstrate the commitment to work with each other and also with the NGO in the development of the watershed by developing a micro watershed in the ridge portion. This micro watershed can be of the size of 50 to 100 ha and should include part of the ridge as well as the related valley. The criteria for selection of a micro watershed are:
 - (i) Proximity to the village so that it is easily noticed by the people.
 - (ii) Possibility of having different types of treatment like trenches, bunding, gully plugging, etc.
- g. For developing this micro watershed the villagers will have to prepare a development plan, which is known as survey numberwise planning. Under this the Planning Team has to go to each and every field where work has to be undertaken, discuss with the owner of the field the treatments to be carried out and then finalize the plan with the consent of the farmer and his wife.

15.3. The Full Implementation Phase (FIP)(Phase 2)

15.3.1 Only those NGOs and Watershed Communities who have satisfactorily proved their capability to carry out watershed development under CBP are selected to take up FIP. The NGOs will be advised to prepare a Project Feasibility Report after 5-6 months of satisfactory implementation of CBP project. The preparation of the Project

Feasibility Report is taken up concurrently with and implementation of the CBP. FIP of watershed development will be based on this Project Feasibility Report prepared by the NGO in consultation with the villagers.

15.3.2 The duration of FIP is normally 4 years.

16. **Organisations Involved:**

16.1 The following institutions/organisations would be involved in the execution of watershed projects.

a. At the Project level:

i) The Village Watershed Committee (VWC) :

The VWC consists of persons nominated by a consensus, by the Gram Sabha attended by all adult members of the village, representing all the sections in the village and also the different geographical areas. It should have due representation of women (minimum, 30%). VWC is a registered body. **This body actually "owns" the project and is responsible for the planning, implementation, monitoring and maintenance of the project.**

ii) Project Facilitating Agency (PFA)

The PFA is responsible for motivating and assisting the village community in preparing and successfully implementing the watershed project. The PFA and the VWC are jointly responsible for preparation of project feasibility report and its implementation, to receive funds and be accountable for the same.

The PFA is also expected to link with the local Government Departments / support institutions in order to avail of existing facilities and resources.

b. At the State level :

i) Linkage Building/Networking :

The soil conservation department will maintain a communication channel with different agencies and attend to problems faced by the participating NGOs and VWCs. On specific request from the NGO-VWCs, soil conservation department would be rendering help for project specific problems as well. soil conservation department will help NGOs and village communities in improving their skills for project implementation.

ii) Administrative Support :

Agriculture department will be responsible for overseeing and administering the individual projects at the ground level.

iii) Technical Support :

The soil conservation department is expected to provide the necessary technical support to the watershed communities implementing the projects. Suitably trained/qualified person(s) reporting to the Village Watershed Committee may have to be provided for.

17. **Key Principles to be adopted for Projects**

17.1 Following key principles are emphasised again and have to be adhered to in all watershed development projects .

- Community shall own and implement.
 - No project without a proofing stage - rigorous qualifying criteria for participating communities and organisations
 - Ridge to valley - treat every hectare that is required to be treated. Particular care to be taken for involvement of the forest department in treatment of forest areas on the ridge lines and implementation of joint forest management scheme with the community.
 - Survey number wise planning involving every farmer.
 - Uninterrupted flow of funds for implementation - arrangements for providing half-yearly requirements in advance and claiming subsequent requirements after exhausting 60% of the amounts released previously.
 - Financial releases based on on field monitoring and satisfactory progress.
 - Maintenance arrangements to be built in.

18. **Monitoring and Reporting Mechanism**

18.1 Apart from desk monitoring based on the prescribed reporting formats, half yearly field level monitoring will be mandatory.