(Department of Agriculture, Cooperation & Farmers Welfare,
Government of India)

DEPARTMENT OF AGRICULTURE
Bihar

District Irrigation Plan

District: PURNEA (Bihar)

2016

पंकज कुमार पाल, भा०प्र०से०
जिला पदाधिकारी एवं समाहर्त्ता
पूर्णियाँ (बिहार)

बिहार सरकार

Pankaj Kumar Pal, I.A.S
District Magistrate & Collector
Purnea, Bihar (India)

दूरभाष 06454–242501 / 242503 / 242522 फैक्स 06454–242599 / 242505 ई०मेल dm-purnea.bih@nic.in/ dm.conf.pur@gmail.co

PREFACE

DATE-20-12-2016

The submission of "District Irrigation Plan (DIP)" is really a matter of immense pleasure. This comprehensive plan has been prepared by all the line departments of the district to fulfill the four main objectives – (a) Accelerated Irrigation Benefit Programme (AIBP) (b) Har Khet Ko Pani (c) Per Drop More Crop and (d) watershed scheme, under Pradhanmantri Krishi Sichai Yojna (PMKSY) for five year (2015 to 2020) .

Based on the primary and secondary data sources collected from all the concerned departments, the water budget has been calculated that reveals the water gap of the District. The comprehensive Annual action plan has been prepared in this plan for the present water demand and for the next 5 years i.e. up to 2020.

For the preparation of DIP the rigorous exercises have been done by all the concerned departments. For that, I express my sincere gratitude to Project Director, ATMA, Purnea along with other officers and staffs, District Agriculture departments, Irrigation Departments, MGNREGS, KADA and other Departments.

The help, co- ordination and guidelines by Deputy Development commissioner, Purnea and other Technical teams of KVK/ BPSAC, Purnea in preparation of DIP is also thankfully acknowledged.

Pankaj Kumar Pal, I.A.S.
District Magistrate cum Chairman
Pradhanmantri Krishi Sichai Yojna (PMKSY)
District- Purnea

INDEX

Sl. no.	*Content*	*Page no.*
1.	**Executive Summary**	**1 - 14**
	Introduction	
	Background	
	Vision	
	Objective	
	Strategic Approach	
	i. Components and Responsible Ministers/Departments ii. District Irrigation Plan iii. Strategy & Focus Areas	
	Methodology	
2.	**Chapter – I : General Information of the District**	**15 - 28**
	Purnea District at a Glance	
	1.1 : District Profile	
	1.2 : Demography	
	1.3 : Biomass and Livestock	
	1.4 : Agro-Ecology, Climate, Hydrology and Topography	
	1.5 : Soil Profile	
	1.6 : Soil Erosion and Runoff	
	1.7 : Land Use Pattern	
3.	**Chapter – II : District Water Profile**	**29 - 33**
	2.1 : Area wise Crop wise Irrigation Status	
	2.2 : Production & Productivity of Major Crops	
	2.3 : Irrigation Based Classification	**34 - 40**
4.	**Chapter – III : Availability of Water**	
	3.1 : Status of Water Availability	
	3.2 : Status of Ground Water Availability	
	3.3 : Status of Command Area	
	3.4 : Existing Type of Irrigation	
5.	**Chapter – IV : Water Requirement / Demand**	**41 - 46**
	4.1 : Domestic Water Demand	
	4.2 : Crop Water Demand	
	4.3 : Livestock Water Demand	
	4.4 : Industrial Water Demand	
	4.5 : Water Demand for Power Generation	
	4.6 : Total Water Demand of the District for Various Sectors	
	4.7 : Water Budget	
6.	**Chapter – V : Strategic Action Plan for Irrigation in District under PMKSY**	**47 - 57**
	Strategy	
	Methodology adopted for the purpose	
	Prioritization of Blocks and Activities for Strategic Planning	
7.	**Conclusion**	**58 - 59**
	Recommendation	

Sl. No.	***Content***	***Page no.***
1.	**Tables**	**i - vii**
	1.1 : District Profile	
	1.2 : Demography	
	1.3 : Biomass and Livestock	
	1.4 : Agro-Ecology, Climate, Hydrology and Topography	
	1.5 : Soil Profile	
	1.7 : Land Use Pattern	
2.	2.1 : Area wise Crop wise Irrigation Status	**viii - xvi**
	2.2 : Production & Productivity of Major Crops	
	2.3 : Irrigation Based Classification	
3.	3.1 : Status of Water Availability	**xvii - xxviii**
	3.2 : Status of Ground Water Availability	
	3.3 : Status of Command Area	
	3.4 : Existing Type of Irrigation	
4.	4.1 : Domestic Water Demand	**xxix - xl**
	4.2 : Crop Water Demand	
	4.3 : Livestock Water Demand	
	4.4 : Industrial Water Demand	
	4.5 : Water Demand for Power Generation	
	4.6 : Total Water Demand of the District for Various Sectors	
	4.7 : Water Budget	
5.	5.0 : Block Wise Strategic Action Plan - Purnea	**xl – lxxv**
7.	**MAPS**	**A - FFFFF**

INTRODUCTION

Growth in agriculture sector on sustained basis is closely linked with judicious utilization of land and water resources for sustaining production and productivity of agricultural and horticulture crops. Presently, a number of departments/Ministries are involved in implementation of various programmes for addressing the issues relating to development of land and water resources. Out of about 142 million hectare of cultivable land in the country, only 65 million hectare (45%) is currently covered under irrigation. Substantial dependence on rainfall makes cultivation in remaining areas a high risk and less productive profession. Empirical evidences suggest that assured/protective irrigation/in-situ moisture conservation encourages farmers to invest more in farming technology and inputs leading to productivity enhancement and increased farm income.

Accordingly, the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was announced and the same is to be implemented during the ongoing XII Five Year Plan and beyond the XII year plan by amalgamating ongoing schemes viz. Accelerated Irrigation Benefit Programme (AIBP) and PMKSY (WR) of M/o Water Resources, River Development & Ganga Rejuvenation; Integrated Watershed Management Programme (IWMP) of D/o Land Resources under Ministry of Rural Development (MoRD) and the Minor Irrigation component of On Farm Water Management (OFWM) of National Mission on Sustainable Agriculture (NMSA), being implemented by Department of Agriculture & Cooperation under Ministry of Agriculture and Farmers Welfare.

The Pradhan Mantri Krishi Sinchai Yojana has been recommended with an indicative outlay of Rs. 50,000 crore over a period of five years from 2015-16 to 2019-20. As mentioned in the Union Budget 2015-16 the PMKSY will have four components: AIBP, Watershed Development, Har Khet ko Pani and Per Drop More Crop.

Sub-scheme wise outlay (Central Share) for PMKSY scheme for five years (2015 -16 to 2019-20) is as follow:

(Rs. In Crore)

Sl.no.	***Year/Min./Deptt.***	***2015 - 16***	***2016 - 17***	***2017-18***	***2018 - 19***	***2019 - 2020***	***Total***
1.	DAC	1800	2340	3050	3960	5150	16300
2.	DoLR	1500	1950	2540	3300	4300	13590
3.	M/o Water Resources, RD&GR						
	a) AIBP	1000	1400	1980	2780	3900	11060
	b) PMKSY	1000	1300	1690	2200	2860	9050
	Subtotal MoWR	2000	2700	3670	4980	6760	20110
	Grand Total	**5300**	**6990**	**9260**	**12240**	**16210**	**50000**

To implement the program Rs. 5300 crore has been allocated in the budget of 2015-16.

The overarching vision of Pradhan Mantri Krishi Sinchai Yojana (PMKSY) is to ensure access to the means of irrigation to all agricultural farms in the country to produce 'per drop more crop', thus bringing much desired rural prosperity. The programme will focus at ensuring access to water to every agricultural farm (Har Khet Ko Pani) and increasing agricultural production and productivity through it. Under the programme, States will be allowed to have flexibility and autonomy in the process of planning and executing programmes for ensuring water to every farm by following a holistic approach by way of preparation of comprehensive District and State Irrigation Development Plans based on agro-climatic conditions and sources of availability of water. Besides, there will be equal emphasis on promoting extension activities related to on-farm water management and crop alignment for farmers and grass root level field functionaries.

BACKGROUND

Hon'ble President in his address to the joint Session of the Parliament of 16th Lok sabha indicated that "Each drop of water is precious. Government is committed to give priority to water security. It will complete the long pending irrigation projects on priority to water security. It will complete the long pending irrigation projects on priority and launch the 'Pradhan Mantri Krishi Sinchayee Yojna' with the motto of 'Her Khet Ko Pani'. There is a need for seriously considering all options including linking of rivers, where feasible; for insuring optimal use of our water resources to prevent the recurrence of floods and drought. By harnessing rain water through 'Jal Sanchay' and 'Jal Sinchan', we will nature water conservation and ground water recharge. Micro irrigation will be popularized to ensure 'Per drop – More crop'.

The overreaching vision of Pradhan Mantri Krishi Sinchayee Yojna (PMKSY) will be to ensure access to some means of protective irrigation to all agricultural farms in the country, to produce 'Per drop – More crop', thus bringing much desired rural prosperity.

- In the last one year, the Government of India has taken several farmer friendly initiatives. These, amongst other things, include the following:
- A new scheme has been introduced to issue a Soil Health Card to every farmer. Soil Health Management in the country is being promoted through setting up of soil and fertilizer testing laboratories. 34 lakh soil samples have been collected and analysis is continuing.
- A new scheme for promoting organic farming "Pramparagat Krishi Vikas Yojana" has been launched to promote organic farming.
- A dedicated Kisan Channel has been started by Doordarshan to address various issues concerning farmers.
- Government is also encouraging formation of Farmer Producer organizations.
- Assistance to farmers, as input subsidy, has been increased by 50 percent in case of natural calamities.
- Norms have been relaxed to provide assistance from previous norm of crop loss of more than 50 percent to 33 percent to farmers afflicted by natural calamities.
- Minimum Support Price (MSP) for various Kharif crops has been increased. Bonus of Rs.200 per quintal has been announced for pulses. Area coverage under pulses has increased over the last year.

Taking it further, today the Cabinet Committee on Economic Affairs, chaired by the Prime Minister has given its approval to two new schemes in agriculture sector. These are the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) and Promotion of National Agriculture Market (PNAM)

VISION

- Main vision is to bring ministries, departments, agencies, financial institutions under a common platform.- engaged in creation, use and recycling of water.
- Holistic view of the entire 'water cycle' is taken into account and proper water budgeting is done for all sectors - households, agriculture and industries.
- To develop rain water structures, check dams and contour bunding under the watershed management programme.
- Ongoing projects under the accelerated irrigation benefit programme and also for construction of field channels.
- Increasing awareness of farmer is also one of the objectives. Importance of this scheme is it will be better implemented as it will be executed in a project mode with monitoring at District, State, and National levels. The

district administration draws up its own irrigation plan with the help of district forest officers, a lead bank officer and other departments. The state irrigation plan will be an amalgamation of all district plans. This will lead to better and holistic development. This will help in future if we can bring canals for water rich regions to the water deficit regions.

- To use the available water resources in the district to the maximum potential in an efficient way catering to the basic needs of every living being and enhancing the livelihoods of rural population to the maximum extent thus alleviating poverty in a sustainable way without compromising the interests of future generations.
- Creation of new water sources through Minor Irrigation (both surface and ground water).
- Repair, restoration and renovation of water bodies; strengthening carrying capacity of traditional water sources, construction rain water harvesting structures (Jal Sanchay).
- Command area development, strengthening and creation of distribution network from source to the farm.
- Ground water development in the areas where it is abundant, so that sink is created to store runoff / flood water during peak rainy season.
- Improvement in water management and distribution system for water bodies to take advantage of the available source which is not tapped to its fullest capacity (deriving benefits from low hanging fruits). At least 10% of the command area to be covered under micro/precision irrigation.
- Diversion of water from source of different location where it is plenty to nearby water scarce areas, lift irrigation from water bodies/rivers at lower elevation to supplement requirements beyond IWMP and MGNREGS irrespective of irrigation command.
- Creating and rejuvenating traditional water storage systems like Jal Mandir (Gujarat); Khatri, Kuhl (H.P.); Zabo (Nagaland); Eri, Ooranis (T.N.); Dongs (Assam); Katas, Bandhas (Odisha and M.P.) etc. at feasible locations.

OBJECTIVES

The major objective of the PMKSY is to achieve convergence of investments in irrigation at the field level, expand cultivable area under assured irrigation (Har Khet Ko Pani), improve on-farm water use efficiency to reduce wastage of water, enhance

the adoption of precision-irrigation and other water saving technologies (More crop per drop), enhance recharge of aquifers and introduce sustainable water conservation practices by exploring the feasibility of reusing treated municipal based water for peri urban agriculture and attract greater private investment in precision irrigation system. The scheme also aims at bringing concerned Ministries / Departments / Agencies / Research and Financial Institutions engaged in creation/use/recycling/potential recycling of water, brought under a common platform, so that a comprehensive and holistic view of the entire "water cycle" is taken into account and proper water budgeting is done for all sectors namely, household, agriculture and industries.

The programme architecture of PMKSY aims at a 'decentralized State level planning and execution' structure, in order to allow States to draw up a District Irrigation Plan (DIP) and a State Irrigation Plan (SIP). DIP will have holistic developmental perspective of the district outlining medium to long term developmental plans integrating three components namely, water sources, distribution network and water use application of the district to be prepared at two levels - the block and the district. All structures created under the schemes will be geotagged.

The programme will be supervised and monitored at the national level by an Inter-Ministerial National Steering Committee (NSC) under the Chairmanship of the Prime Minister with Union Ministers of all concerned Ministries. A National Executive Committee (NEC) is to be constituted under the Chairmanship of the Vice Chairman, NITI Aayog to oversee programme implementation, allocation of resources, inter ministerial coordination, monitoring and performance assessment, addressing administrative issues etc. At the state level the scheme is to be administered by a State Level Sanctioning Committee (SLSC) to be chaired by the Chief Secretary of the respective States. The committee will have all authority to sanction the project and also monitor the progress of the scheme. At the district level their shall be a district level implementation committee for ensuring last mile coordination the field level.

It is expected that PMKSY will provide convergence to existing schemes of water management, thus bringing efficiency to the use of water.

The broad objectives of PMKSY will be:

a) Achieve convergence of investments in irrigation at the field level (preparation of district level and, if required, sub district level water use plans).

b) Enhance the physical access of water on the farm and expand cultivable area under assured irrigation (Har Khet Ko Pani),

c) Integration of water source, distribution and its efficient use, to make best use of water through appropriate technologies and practices.

d) Improve on-farm water use efficiency to reduce wastage and increase availability both in duration and extent,

e) Enhance the adoption of precision-irrigation and other water saving technologies (More crop - Per drop).

f) Enhance recharge of aquifers and introduce sustainable water conservation practices

g) Ensure the integrated development of rain fed areas using the watershed approach towards soil and water conservation, regeneration of ground water, arresting runoff, providing livelihood options and other NRM activities.

h) Promote extension activities relating to water harvesting, water management and crop alignment for farmers and grass root level field functionaries.

i) Explore the feasibility of reusing treated municipal waste water for peri urban agriculture, and

j) Attract greater private investments in irrigation.

This will in turn increase agricultural production and productivity and enhance farm income.

COMPONENTS AND RESPONSIBLE MINISTERS / DEPARTMENTS

Sl. No.	Components	Illustrative Activities
1.	AIBP by MoWR, RD &GR	• To focus on faster completion of ongoing Major and Medium Irrigation including National Projects.
2.	PMKSY **(Har Khet ko Pani)** by MoWR, RD &GR	• Creation of new water sources through Minor Irrigation (both surface and ground water) • Repair, restoration and renovation of water bodies; strengthening carrying capacity of traditional water sources, construction rain water harvesting structures (Jal Sanchay); • Command area development, strengthening and creation of distribution network from source to the farm;

		• Improvement in water management and distribution system for water bodies to take advantage of the available source which is not tapped to its fullest capacity (deriving benefits from low hanging fruits). At least 10% of the command area to be covered under micro/precision irrigation. • Diversion of water from source of different location where it is plenty to nearby water scarce areas, lift irrigation from water bodies/rivers at lower elevation to supplement requirements beyond IWMP and MGNREGS irrespective of irrigation command. • Creation and rejuvenation of traditional water storage systems like Jal Mandir (Gujarat); Khatri, Kuhl (H.P.); Zabo (Nagaland); Eri, Ooranis (T.N.); Dongs (Assam); Katas, Bandhas (Odisha and M.P.) etc. at feasible locations.
3.	PMKSY (Watershed) by Dept. of Land Resources, MoRD	• Water harvesting structures such as check dams, nala bund, farm ponds, tanks etc. • Capacity building, entry point activities, ridge area treatment, drainage line treatment, soil and moisture conservation, nursery raising, afforestation, horticulture, pasture development, livelihood activities for the asset-less persons and production system & micro enterprises for small and marginal farmers etc. • Effective rainfall management like field bunding, contour bunding/trenching, staggered trenching, land leveling, mulching etc.
4.	PMKSY	• Programme management, preparation of

	(Per drop more crop) by Dept. of Agriculture & Cooperation, MoA	State/District Irrigation Plan, approval of annual action plan, Monitoring etc. • Promoting efficient water conveyance and precision water application devices like drips, sprinklers, pivots, rain-guns in the farm (Jal Sinchan); • Topping up of input cost particularly under civil construction beyond permissible limit (40%), under MGNREGS for activities like lining inlet, outlet, silt traps, distribution system etc. • Construction of micro irrigation structures to supplement source creation activities including tube wells and dug wells (in areas where ground water is available and not under semi critical /critical /over exploited category of development) which are not supported under PMKSY (WR), PMKSY (Watershed) and MGNREGS. • Secondary storage structures at tail end of canal system to store water when available in abundance (rainy season) or from perennial sources like streams for use during dry periods through effective on-farm water management; • Water lifting devices like diesel/ electric/ solar pump sets including water carriage pipes. • Extension activities for promotion of scientific moisture conservation and agronomic measures including cropping alignment to maximise use of available water including rainfall and minimise irrigation requirement (Jal sarankchan); • Capacity building, training for encouraging

		potential use water source through technological, agronomic and management practices including community irrigation. • Awareness campaign on water saving technologies, practices, programmes etc., organisation of workshops, conferences, publication of booklets, pamphlets, success stories, documentary, advertisements etc. • Improved/innovative distribution system like pipe and box outlet system with controlled outlet and other activities of enhancing water use efficiency.

DISTRICT IRRIGATION PLANS (DIPs)

District Irrigation Plans (DIPs) shall be the cornerstone for planning and implementation of PMKSY. DIPs will identify the gaps in irrigation infrastructure after taking into consideration the District Agriculture Plans (DAPs) already prepared for Rashtriya Krishi Vikas Yojana (RKVY) vis-à-vis irrigation infrastructure currently available and resources that would be added during XII Plan from other ongoing schemes (both State and Central), like Mahatma Gandhi National Rural Employment Guarantee Scheme(MGNREGS), Rashtriya Krishi Vikash Yojana (RKVY), Rural Infrastructure Development Fund (RIDF), Member of Parliament Local Area Development (MPLAD) Scheme, Member of Legislative Assembly Local Area Development (MLALAD) Scheme, Local body funds etc. The gaps indentified under Strategic Research & Extension Plan (SREGP) will be made use in preparation of DIP.

DIPs will present holistic irrigation development perspective of the district outlining medium to long term development plans integrating three components viz. water sources, distribution network and water use applications incorporating all usage of water like drinking & domestic use, irrigation and industry. Preparation of DIP will be taken up as joint exercise of all participating departments. DIP will form the compendium of all existing and proposed water resource network system in the district.

The DIPs may be prepared at two levels, the block and the district. Keeping in view the convenience of map preparation and data collection,

the work would be primarily done at block level. Block wise irrigation plan is to be prepared depending on the available and potential water resources and water requirement for agriculture sector prioritising the activities based on socio-economic and location specific requirement. In case of planning is made based on basin/sub basin level, the comprehensive irrigation plan may cover more than one district. The activities identified in the basin/sub-basin plan can be further segregated into district/block level action plans. Use of satellite imagery, topo sheets and available database may be appropriately utilised for developing irrigation plans at least on pilot basis to begin with and subsequently may be extended to all projects. DPRs of watershed projects should be taken into account while preparation of DIPs. These plans need to be developed following intensive participatory consultation process including Panchayati Raj Institutions. Agriculture Universities in the State May also be closely involved with the formulation and implementation of the Detailed Project Report and the District Level Plans. Technical, financial and human resources available for this sector with departments of rural development, urban development, drinking water, environment & forest, science & technology, Industrial policy etc. to be leveraged for comprehensive development of water sector. Creating access to water source either assured or protective to each farm will require a demand and supply assessment of crop water requirement, effective rainfall and potential source of existing & new water sources considering geo hydrological and agro ecological scenario of the block. The master plan will include information on all sources of available water, distribution network, defunct water bodies, new potential water sources both surface and sub- surface systems, application & conveyance provisions, crops and cropping system aligned to available/designed quantity of water and suitable to local agro ecology. All activities pertaining water harvesting, water augmentation from surface/sub surface sources, distribution and application of water including repair renovation and restoration of water bodies, major medium and minor irrigation works, command area development etc. are to be taken up within the frame work of this master plan. Emphasis is to be given for deriving potential benefit from low hanging fruits like extending the reach/coverage of water source through effective distribution and application mechanism, reducing the gap between potential created and utilized through more focus on command area development and precision irrigation. Proper integration of creation of source like dams and water harvesting structures, distribution system like canals and command area development works and precision farming to be made for deriving best possible use of water resources. Steps

may also be taken for use of urban treated waste water for irrigation purpose. For respective cities a command area may be identified for this purpose in and around the adjoining agricultural land of urban habitation. SIP will not only consolidate the DIPs and correlate with State Agriculture Plan (SAP), already available for RKVY, but also prioritize resources and outline definite annual action plan with a medium to long term horizon. The plan would also enumerate on extension & ICT related activities to be undertaken under supervision of Agriculture Technology Management Agency (ATMA). DIPs and SIP will provide requisite emphasis on convergence by eliminating overlap of resources & efforts and ensuring optimal utilization of funds available through various Centrally Sponsored/State Plan Schemes. Each District will be provided one time financial support to prepare District Irrigation Plan. DIPs and SIP are to be finalised within a period of three months from launching of PMKSY. National Rain fed Area Authority (NRAA) will be associated in preparation of SIP and providing advisories to State Governments for comprehensive irrigation development. While formulating District Irrigation Plans (DIPs), suggestions of Hon'ble Member's of Parliament and Member's of Legislative Assembly of that is to be invited and will be included in DIPs after due technical consideration. Highest priority is to be given on valuable suggestions/recommendations of Member of Parliament of that particular district subject to technical / financial viability.

STRATEGY & FOCUS AREAS

National Steering Committee of PMKSY under the Chairmanship of Hon'ble Prime Minister will provide policy direction to programme framework. The National Executive Committee under the Chairmanship of Vice Chairman, NITI Ayog will oversee the overall implementation of the scheme at National Level. It will also provide strategic directions for implementing the scheme and also decide inter-state allocation of funds.

State Level Sanctioning Committee (SLSC), already constituted under RKVY and chaired by the Chief Secretary of the State, will be strengthened by including representatives from department of Land Resources, Department of Water Resources/Irrigation and Department of Rural Development. It will be vested with the authority to sanction specific projects included in District Irrigation Plans. It is important to promote efficient methods of irrigation so that water resources created is used judiciously. With diversification of crops, increase in area under horticulture crops, cereal crops, apart from crops like sugarcane, cotton, maize etc., there is need for accelerated development of precision irrigation in the country. EFC has recommended

that one time subsidy support may be given to the farmers for installing precision irrigation system and the prevailing pattern of subsidy under OFWM component of NMSA may be suitably modified, wherever necessary. The Budget Allocation of funds under PMKSY for programmes of DAC during 2015- 16 is Rs.1800.00 crore. The proposed breakup of the same is as given below:-

(Rs. In Crore)

a.	Micro Irrigation	Rs. 1000.00
b.	Treatment of Dark Zone Area	Rs. 410.00
c.	Preparation of District Irrigation Plan	Rs. 30.00
d.	ATMA (District level extension/Services)	Rs. 100.00
e.	ICT including focused publicity and awareness Campaign through multimedia plus (SMS Services Rs. 25.00 crore)	Rs. 85.00
f.	Material Component for watershed & NREGA	Rs. 175.00

Treatment of Dark-Zone areas across the country Rs. 410.00 crore is to be utilized for recharging of ground level water in dark zone area, especially for Deep water aquifer recharge. Accordingly, this allocation of Rs. 410.00 crore will be allocated to the States having dark zone areas for tackling water scarcity and drinking water problems and the distribution could be based on number of dark zones blocks existing in States. These dark-Zones blocks may be treated at par with DPAP and DDP areas for tackling water scarcity both for Agriculture and Drinking water.

As per Report (July, 2014) of Central Ground Water Board (CGWB) under the M/O Water Resources, River Development and Ganga Rejuvenation the country (out of the total number of assessed 6607 blocks) has 1071 blocks (16%) categorized as over exploited, 217 blocks (3%) as critical, 697 blocks (10.5%) as semi critical and 92 blocks (1%) as saline blocks as per recent assessment of Dynamic Ground Water Resources of India (as on 31st March, 2011). Ground water is catering to 75% rural and 50% of urban domestic water supply, besides meeting up to 60% irrigation demand. The ground water resources are of two types i.e. (a) Dynamic: the resource in the unconfined aquifer between pre-and post-monsoon water levels (b) Static: below the zone seasonal fluctuation of water level. Dynamic resource- is used for irrigation and drinking supply.

The methods for rain water harvesting in Rural area consist of the following:-

(i) Gully Plug (ii) Contour Bund (iii) Gabion Structure (iv) Percolation Tank (v) Check Dam Cement Plug Nala Bung (vi) Recharge Shaft and Dug Well recharge. Some of the non-conventional techniques for the treatment of Deep water aquifer include the following:-

(i) Fracture seal cementation (ii) Jacket wall

(iii) Bore blast technique (iv) Stream blasting

(v) Hydro-fracturing (vi) Artificial recharge of open wells and bore well

METHODOLOGY

This programme focuses on block and district as implementation unit and therefore emphasis has been made to prepare District Irrigation Plan (DIPs). The preparation of District Irrigation Plan is an integration of geospatial technology, Space application technologies and spatial and non-spatial data.

1. Transformation of available thematic information (district provided data) on the village level and geo-referenced village map data.
2. Integration of thematic layers with socio-economic data for classification of area into specific composite land units on village level.
3. Preparation of appropriate action plan based on potential of composite land units and developmental needs of study area is on the basis available data.
4. Field visits to validate the recommended measures with respect to the ground situation and requirement of the local people.
5. Finalisation of development plans based on field observation.

Available thematic information for preparation for water resource and land resource development plan.

- Land use / land cover map.
- Ground water potential map.
- Soil map – depth, texture, erosion, and land capability
- Slope map.
- High resolution satellite image.
- Lithology.
- Hydro geomorphology.

Area for development of water resources structure geospatial technology has been used in this process first identify the area of crop land based on high resolution satellite data and then identify the irrigated area by different source of irrigation methods. To identify the unirrigated area and overly method is used. District Irrigation Plan (DIP) covers the following planning component of the district in sustainable development approach:

- ≈ Increase of vegetation / biomass in the district.
- ≈ More number of surface water bodies in district.
- ≈ Shift from annual crop to perennial crop.
- ≈ Increase in the extent of crop area.

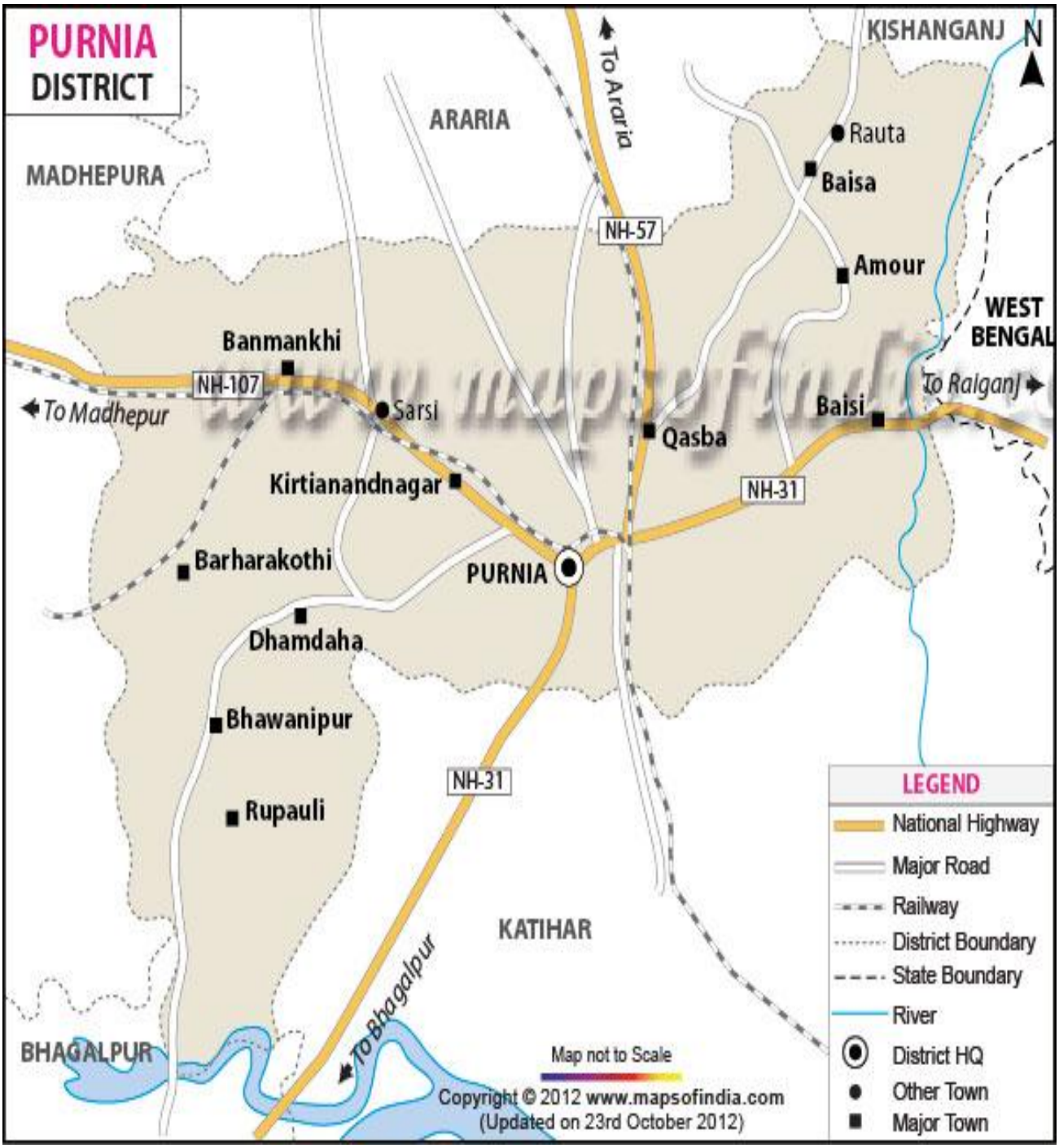
- ≈ Improvement in the soil moisture availability.
- ≈ Reclamation of water land.
- ≈ Convergence of investments in irrigation at the field level.
- ≈ Enhance the physical access of water on the farm and expand cultivable area under assured irrigation (Har Khet Ko Pani).
- ≈ Best use of water through appropriate technologies and practices.
- ≈ Improve on-farm water use efficiency.
- ≈ Enhance the adoption of précised-irrigation and other water saving technologies.
- ≈ Enhance recharge of aquifers and introduce sustainable water conservation practices.
- ≈ Ensure the irrigated development of rain fed areas.
- ≈ Promote extension activities relating to water harvesting, water management and crop alignment for farmers and grass root level functionaries.
- ≈ Explore the feasibility of reusing treated municipal waste water for peri-urban agriculture.
- ≈ Attract greater private investments in irrigation.

LIMITATION

The District Irrigation Plan (DIP) is based on the primary and secondary data from the district provided by the officials concerned from blocks and district level. There is acute shortage of agriculture and allied sectors statistics at the block level.

Chapter – 1

General Information of the District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Kirtianandnagar
NH-31
Barharakothi
PURNIA
Dhamdaha
Bhawanipur
NH-31
Rupauli
KATIHAR
To Bhagalpur
BHAGALPUR
Map not to Scale
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(Updated on 23rd October 2012)
LEGEND
National Highway
Major Road
Railway
District Boundary
State Boundary
River
District HQ
Other Town
Major Town

PURNEA DISTRICT AT A GLANCE

Sl.no.	***Particulars***	***Statistics***
1.	**GENERAL INFORMATION**	
	District Code	1009
	Latitude	25°-13'-80" ~ 27°-07'-59" N
	Longitude	86°-59'-06" ~ 87°-52'-35" E
	Rural Area	2800.10 sq. km
	Urban Area	400.21 sq. km
	Total Area	3202.31 sq. km
	Height above Sea-Level	171.2 Feet
	Average Annual Rainfall	754.01 mm
	Avg. Number of Rainy Days	40 Days in a Year
	Average Temperature	25.28°C
	- Maximum	41.3°C
	- Minimum	6.03°C
2.	**ADMINISTRATIVE INFORMATION**	
	Administrative Divisions	4
	Number of Block	14
	No. of Panchayats & Rev. Villages	251/1281
3.	**KEY STATISTICS**	
	Population (As per 2011 Census)	Rural: 2921614 Urban: 343005
	Percentage	Rural: 89.49% Urban: 10.51%
	Decadal Population Growth	28.33%
	Schedule Caste Population	11.98%
	Schedule Tribe Population	4.27%
	Total Workers	37.76%
	- Main Workers	81.44%
	- Marginal Workers	18.56%
	Density of Population	794.49 per sq km
	- Highest Density	1246 Per sq km
	- Lowest Density	410.42 Per sq. km
	Sex Ratio (Females/Thousand Males)	921
	Sex Ratio (0-6 Years)	967
4.	**GEOMORPHOLOGY**	
	Major Physiographic Units	Gangetic Alluvium
	Major Drainages	Ganga, Kosi, Panar, Mahananda, Kaska
5.	**LAND USE**	
	a) Forest Area	313 ha
	b) Net Area Sown	208504.35 ha
	c) Total Cropped Area	300841.72 ha
6.	**MAJOR SOIL TYPES**	Alluvial soil (fine loamy, sandy to coarse loamy soil)
7.	**PRINCIPAL CROPS**	Paddy, Jute, Wheat, Maize,

		Millet etc.

8.	**IRRIGATED AREA (Area in hectares)**	
	Net Irrigated Area	112,247.82 ha
	Gross Irrigated Area	204,317.31 ha
9.	**NUMBER OF GROUND WATER MONITERING WELLS OF CGWB (2011)**	
	Dug wells	07
10.	**PREDOMINANT GEOLOGICAL FORMATIONS**	Quaternary alluvium
11.	**HYDROGEOLOGY**	
	Major water bearing formations	Alluvium
	Pre-monsoon Depth to water level during 2011	3.7 - 5.4 m bgl
	Post-monsoon Depth to water level during 2011	1.74 – 3.42m bgl
	Long term water level trend in last 10 yrs(2002 –2011) in m/yr	No significant decline
12.	**GROUND WATER QUALITY**	Good for drinking and irrigation
	Type of Water	Potable
13.	**DYNAMIC GROUND WATER RESOURCES (as on 31st March 2009) In MCM**	
	Annual Replenishible Ground Water Resources	900.66
	Net Annual Ground Water Draft	392.07
	Projected Demand for Domestic and Industrial Uses up to 2025	85.28
	Stage of Ground Water Development	43.5%

General Information of the District

1.1 District Profile

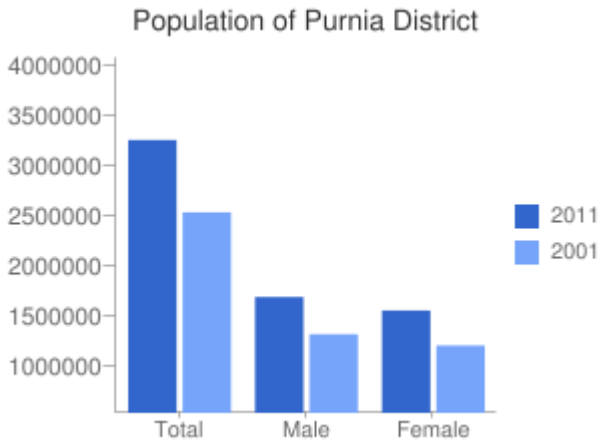
Purnea District has an area of 3,202 square km. It is a level, depressed tract of country, consisting for the most part of a rich, loamy soil of alluvial formation. It is traversed by several rivers flowing from the Himalayas, which afford great advantages of irrigation and water-carriage. Its major rivers are the Kosi, the Mahananda, the Suwara Kali and the Koli. In the west the soil is thickly covered with sand deposited by changes in the course of the Kosi. Among other rivers are the Mahananda and the Panar.

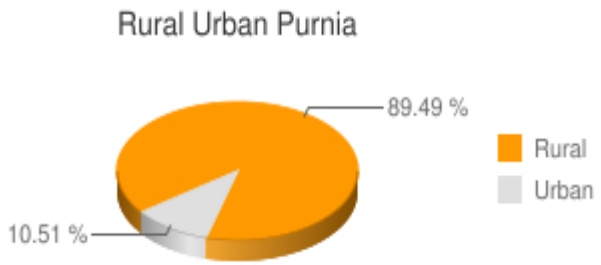
Table: 1.1, District Profile

Name of State : BIHAR		Source- Gazetteer, Census Report, District Agriculture Office, ibhugole.nic.in		
Sl.No.	Name of District	District code	Latitude	Longitude
1.	Purnea	1009	25°-13'-80" ~ 27°-07'-59" N	86°-59'-06" ~ 87°-52'-35" E

It is bordered by Araria district in north, Katihar and Bhagalpur district in South, Madhepura and Saharsa district in the west and West Dinajpur district of West Bengal and Kishanganj district of Bihar in east. It lies between 25 degree 13 minutes 80 seconds and 27 degree 7 minutes 59 seconds north latitude and between 86 degree 59 minutes 6 seconds and 87 degree 52 minutes 35 seconds east longitude.

It has a total population of 3,264,619 of which 2,921,614 are rural and 343,005 urban. In terms of male, female population there are 1,699,370 males against 1,565,249 women. According to census data compiled in District Census Handbook, Purnea 2011, the district population in the age group of 0 to 6 years is 566,510. The literacy rate of the district is 51.08%.





Purnea district has four (04) subdivisions: Purnea, Baisee, Banmankhi and Dhamdaha and they are further composed of fourteen (14) blocks namely East Purnea, Krityanand Nagar, Banmankhi, Kaswa, Amaur, Baisee, Baisa, Dhamdaha, Barhara Kothi, Rupauli, Bhawanipur, Dagarua, Jalalgarh and Srinagar. The district is also divided into 251 Gram Panchayats, and 1281Revenue villages. The river Kosi, Mahananda and their tributaries irrigate different parts of the district.

Since agriculture is the principal occupation of the people of Purnea. Crops grown in this region are paddy, Jute, Wheat, Maize, Moong, Masoor, Mustard, linseed, Sugarcane and Potato. Jute is the major cash crop of Purnea district. Fruit plants like coconut, Banana, Mango, Guava, Lemon, Jack Fruit and Pineapple are also grown here. Rearing of livestock like goat, cow and pig is very popular in Purnea. It produces the maximum number of poultry and eggs in Bihar.

The district has a substantial minority (Muslim) population, most of whom are either cultivators or agricultural labourers. The literacy rate of the Muslim population in the district is 25.9 per cent, which is further lower in the case of the female population (15.6 per cent only). The overall work participation rate of the district is 38.89 per cent, which is comparatively higher than the state average of 34.7 per cent. The distribution of workers in occupation indicates that agriculture dominates the labour force and around 66.3 per cent of them are agricultural labourers, which is higher than the state average of 51 per cent.

There is a skewed distribution of land in the district. Nearly 70 per cent of the households are landless, while another 24.42 per cent are marginal farmers. In both categories, there is a slight variation in the distribution of land, with a larger number of Muslims being landless (70.33 per cent) and marginal farmers (25.58 per cent) when compared to Hindus. The percentage of large farmers is 1.98, with about 3.57 per cent, and 1.23 per cent of Hindu and Muslim households respectively, being large farmers. As far as small and medium landholdings are concerned, the Hindu households seem to hold a better position than their Muslim counterparts.

The asset base of both the Hindu and Muslim households has a slight variation. Except for consumer and financial assets, Hindu households showed a better position than Muslim households in all other respects. The livestock asset of the Hindu household is 26.72 per cent, while that of the Muslim household is 32.36 per cent. The

agricultural asset and transportation asset of the Hindus is 13.93 per cent and 13.14 per cent, while the corresponding figure for the Muslim household is 6.66 per cent and 10.18 per cent respectively. In case of non-agricultural asset, both the Hindu and Muslim households are more or less in the same position. The consumer asset of the Hindus is 12.37, while the corresponding figure for the Muslim household is reported to be 14.36 per cent. Financial assets are 33.16 per cent for Hindus and 35.79 per cent for Muslims. Thus the major components of the Hindu assets are financial, livestock and agricultural assets, while that of the Muslims are financial, livestock and consumer assets.

1.2 Demography

An official Census 2011 detail of Purnea, Bihar has been released by Directorate of Census Operations in Bihar. In 2011, Purnea had population of 3,264,619 of which male and female were 1,699,370 and 1,565,249 respectively. In 2001 census, Purnea had a population of 2,543,942 of which males were 1,328,417 and remaining 1,215,525 were females. Purnea District population constituted 3.14 percent of total Maharashtra population. In 2001 census, this figure for Purnea District was at 3.07 percent of Maharashtra population. There was change of 28.33 percent in the population compared to population as per 2001. In the previous census of India 2001, Purnea District recorded increase of 35.23 percent to its population compared to 1991. The district has 11.98 percent of scheduled caste population where as scheduled tribes population is only 4.27 percent. Purnea lags much behind in terms of state development indicators. The literacy rate of Bihar is 61.8 percent – 71.2 per cent for males and 51.5 percent for females, whereas for Purnea the overall literacy rate is 51.08 percent, (males 59.06 percent and females 42.34 percent), which is lower than the state average. The sex ratio of Bihar is 918 females per thousand males and that of Purnea is slightly higher at 921. The average size of a household in the district is 5.10, which is comparatively lower than the state average of 6. The work participation rate of the rural population of Purnea is 38.89 per cent, which is comparatively higher than the state average of 34.7 percent. The distribution of workers in occupation indicates that around 65.16 per cent of them are agricultural labourers, which is higher than the state average of 52.83 percent. The proportion of cultivators in the district is as low as 23.98 per cent, when compared to the state average of 31.4 per cent. The proportion of the population engaged in household industries is quite negligible. Thus the distribution of workers across occupations indicates that most of them are wage

earning labourers even though the majority of the population is dependent on agriculture for their livelihood.

(**Table no. 1.2**: Demography / District – Purnea)

1.3 Biomass and Livestock

The district farming system is characterized by large number of livestock. In the present era of fast rising population and progressive decrease in holding size, Animal Husbandry has a special role to play for economic sustainability of the majority of the people. Livestock plays a subsidiary role in the farm as far as food production is concerned, though their role in absorbing the huge quantities of crop residues, coarse grains, cereals by-products and farm left-over and returning valuable manure to the soil to sustain their fertility for generations is significant. Livestock in general and dairying in particular is emerging as a driving force in the growth of agricultural sector in Bihar.

Water plays an important role in livestock productivity. Livestock productivity in pastoral areas depends greatly on the availability of water. There are several factors, which determine water balance, water turnover and functions of the animals. Assessment of livestock and water requirement is helpful in modeling water and livestock relationship. Dairy development schemes provide subsidiary income to the farmers and generate employment. Poultry farming is also an important part of agricultural activities in this district. Sheep, Goat, Piggery are traditional activities in the district, which is mainly financed under SGSY. The demand for meat, dairy products, and eggs rises faster than the demand for crops; thus both scenario call for livestock production to increase relatively more rapidly than crops.

Purnea is very rich in Cattle wealth, indigenous cows, hybrid cows, buffalos, goats, pigs, and poultry. The population of Cows is 4.33 lakh with 46.5 thousand as hybrid and rest are indigenous. The total population of buffalo is 16.76 lakh; all are of in descriptive breed. Similarly the population of goats, sheep and pigs are 5.15 lakh, 472 hundred and 18.5 thousand respectively. In case of poultry and ducks it is 1.41 lakh out of which 1.21 lakh is poultry and rest 13.92 thousand approximately is ducks.

(**Table no. 1.3**: Biomass and Livestock / District – Purnea)

1.4 Agro – Ecology, Climate, Hydrology and Topography

Agro – Ecology

Agro-ecology is the study of ecological process that operates in agricultural production system. Bringing ecological principles to bear in agro-ecosystems can suggest novel management approaches that would not otherwise be considered. Bihar with a geographical area of about 94.2 thousand square km is divided by river Ganges into two parts, the north Bihar with an area of 53.3 thousand square km and the south Bihar having an area of 40.9 thousand square km. Based on soil characterization, rainfall, temperature and terrain, four main agro-climatic zones in Bihar have been identified. These are: Zone-I, North Alluvial Plain, Zone-II, north East Alluvial Plain, Zone-III A, South East Alluvial Plain and Zone-III B, South West Alluvial Plain, each with its own unique prospects.

Purnea lies in Agro-climatic zone-II. This zone, the alluvial plains of Kosi, Mahananda and its tributes is slightly undulating to rolling landscape mixed with long stretches of nearly flat landscape with pockets of areas having sub – normal relief. The area is full of streams with abandoned dead channels of Kosi River, which becomes notorious for its frequent and sudden change of courses forming small lakes and shallow marshes. In the south, in between the natural levees of Ganga, on the one hand and Kosi and Mahananda on the other, there are vast areas which remain waterlogged for a considerable part of the year. The general slope of the land is towards south east and the rivers on reaching Ganga moves eastward for a long distance before they meet river Ganga.

Unlike the rivers Gandak and Ghaghra, Kosi and Mahananda originate and have catchments in Himalayan region, which are not calcareous but rich in acidic minerals. As a result, the soils of this zone are non calcareous, accumulation of sodium salts and sodium adsorption has taken place in areas where the drainage is poor. Salinity and alkalinity are, however, on an increase in Saharsa, Katihar and western part of Purnea districts. As both Kosi and Mahananda carry a tremendous load of sediments, the soil is mostly light textured except in backwaters of river Ganga and Kosi.

Climate

Purnea is known for its moderate climate; it has earned its name as 'Poor man's Darjeeling' due to its favourable climate. The weather is humid temperature with an average of 28 °C. Purnea, with the highest rainfall in Bihar state, has a largely humid climate, with humidity rising to above 70%. A cold season, from November to February, is followed by a hot season from March to June. The monsoon season

begins in early June and lasts until September; 82% of its total annual rainfall falls during the monsoon season.

January, the coldest month, has a mean daily minimum temperature of 5 to 10 °C and a mean daily maximum of 19.51 °C. Wind is typically light in the non-monsoon seasons but during the monsoon, storms and depressions originating in the Bay of Bengal cause heavy rain and strong winds. The temperature is highest in May – June when mercury shoots up to 41.3°C.

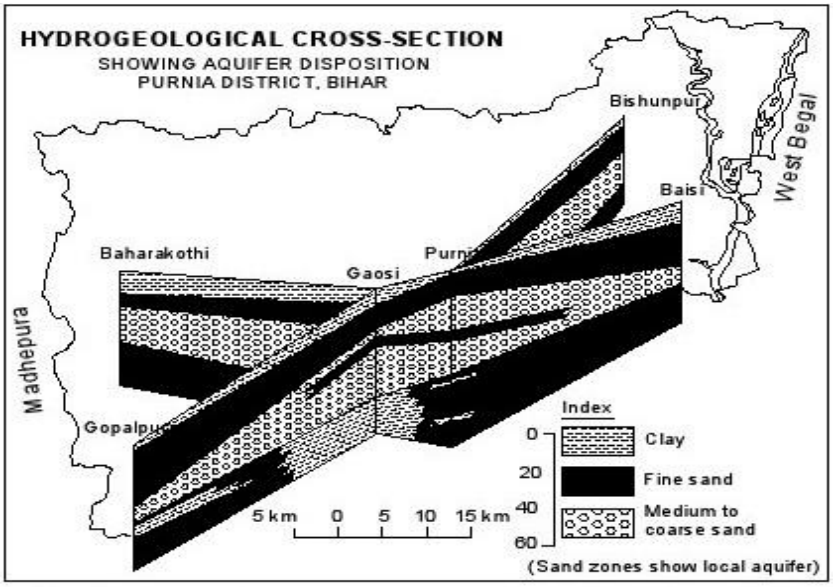
Hydrology

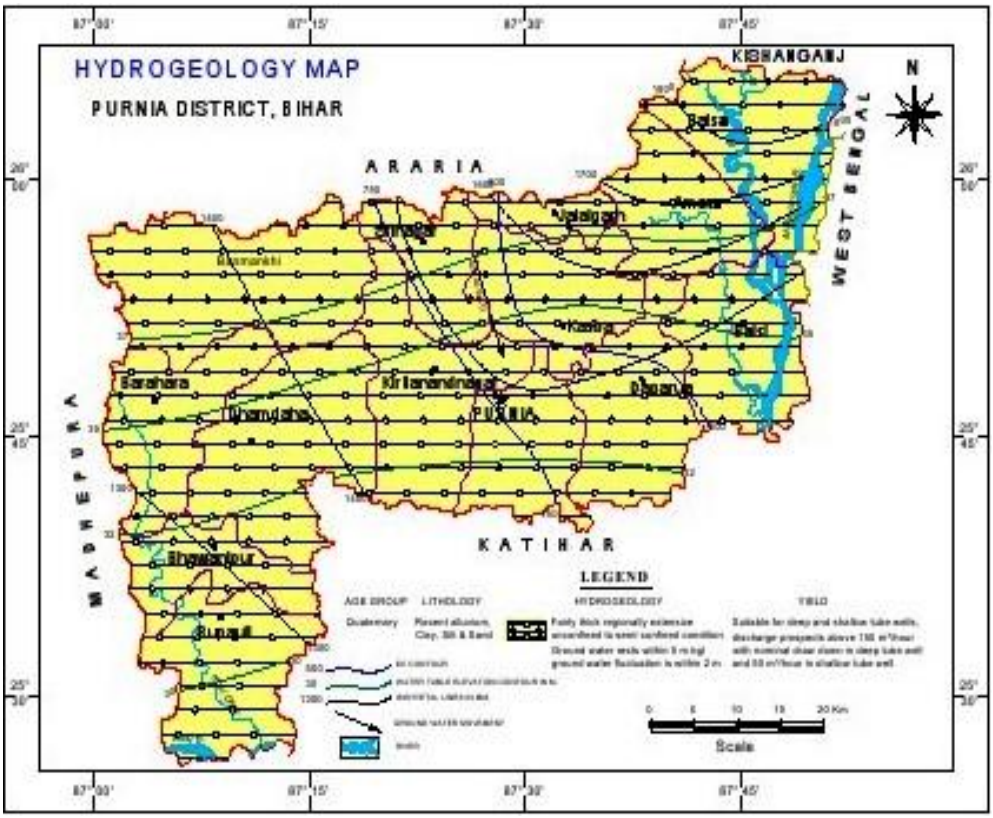
Hydro geologically, the various litho-units of the State can be grouped as unconsolidated / alluvial formation, semi-consolidated formations and consolidated/fissured formations. The main alluvial tract covers entire north Bihar and a sizeable area south of the Ganga River. These alluvial formations constitute prolific aquifers where the tube well can yield between 120-247 m3/hr.

Purnea district lies in the Gangatic alluvial plain. The older alluvium is found in the north of Purnea consisting of coarse gravel and surface kankar and the newer alluvium composed of silts, clays occurring south of Purnea. The entire district is occupied by thick quaternary alluvial deposits. These alluvial deposits are carried by the river system originating from the Himalayas. The alluvial deposit ranges from clay, silt to sand of various sizes, gravel pebble and boulders. These alluvial deposits contain one of the most prolific aquifer systems in the Gangatic alluvium of North Bihar plain.

The district contains of one of the most excellent aquifer system in the Gangatic alluvium of North Bihar plain. Quaternary sediments in the area comprise sand; gravel and pebble constitute the potential aquifer. The frequent lateral fascias change in the area is common phenomenon. So the nature of the granular material may change within short distance. However due to dominance of granular material over fine clastics in alluvial sediments, the aquifer are continuous and regionally extensive. It is found to occur continuously down to the depth of exploration of 80- 90 meter, at places capped by thin clay capping.

Hydrogeological cross section in parts of Purnea district





Hydrological map of Purnea District

Topography

The area of Purnea district is flat and lies in the eastern part of the alluvial north – Bihar plain. The general slope of the land is towards south east and the rivers on reaching Ganga moves eastward for a long distance before they meet river Ganga. It is covered by non-calcareous and non-saline soil of recent alluvial formation. Within

the district exist two broad natural divisions. The first consists of comprising the area to the west of Purnea town. The river Kosi and Mahananda and their tributaries cross different parts of the districts. The tributaries are Parman, Kankai, Soura, Faryani etc. These Himalayan originated rivers and tributaries sub-merge with river Ganga.

(**Table no. 1.4**: Agro – Ecology, Climate, Hydrology and Topography / District – Purnea)

1.5 Soil Profile

Soil has many important functions. Perhaps the best appreciated is the function to support the growth of agricultural and horticultural crops. Soil is the mainstay of agriculture and horticulture, forming as it does the medium in which growth and ultimately the yield of the food producing crops occurs. Farmers and gardeners have worked with their soils over many centuries to produce increasing amount of food to keep pace with the needs of a burgeoning world population. The soil's natural cycles go a long way in ensuring that the soil can provide an adequate physical, chemical and biological medium for crop growth. The farmer and horticulturalist have also become skilled in managing soil so that these natural cycles can be added to as necessary to facilitate adequate soil support and increasing yield to enhance production.

Purnea lies in Agro – climatic zone – II, where the alluvial plains of Kosi, Mahananda and its tributes is slightly undulating to rolling landscape mixed with long stretches of nearly flat landscape with pockets of areas having sub – normal relief. The area is full of streams with abandoned dead channels of Kosi River, which becomes notorious for its frequent and sudden change of courses forming small lakes and shallow marshes. In the south, in between the natural levees of Ganga, on the one hand and Kosi and Mahananda on the other, there are vast areas which remain waterlogged for a considerable part of the year.

The general slope of the land is towards south east and the rivers on reaching Ganga moves eastward for a long distance before they meet river Ganga. Unlike the rivers Gandak and Ghaghra, Kosi and Mahananda originate and have catchments in Himalayan region, which are not calcareous but rich in acidic minerals. As a result, the soils of this zone are non calcareous, accumulation of sodium salts and sodium adsorption has taken place in areas where the drainage is poor. Salinity and alkalinity are, however, on an increase in Saharsa and western part of Purnea and Katihar

districts. As both Kosi and Mahananda carry a tremendous load of sediments, the soil is mostly light textured.

The soils of the district are very light to medium textured. Even the heavy textured soils under the influence of Kosi and Mahananda have sandy substratum below 40 to 100 cm depths. The soils are mostly moderately acidic to neutral. Very acidic soils are found in northeast parts with heavy rainfall and high permeability. The soils are excessively drained to poorly drain mainly depending on local physiographic and depth of water table. With the introduction of irrigation without providing adequate drainage ways, the water table is rising and water logged areas and saline patches are increasing. The soils are very poor to poor in nitrogen especially with the very light textured soils, very poor to medium in available phosphorus and potash. Deficiencies of zinc and boron and toxicity of manganese have been recognized in these areas.

The soil of the district is sandy but its fertility has been increased considerably because of the embankment of Kosi. The second natural division of the district consists of the fertile plains to the east of the old bed of Kosi River and includes the alluvial plains along the Ganga towards the south of the district and the Mahananda in the east. The soils of the district area can be grouped under soil of active alluvial plain, recent alluvial plain and alluvial cone of river Kosi. The soil of active alluvial plain group is sandy to coarse loamy in nature. Soils of recent alluvial plain are fine loamy, sandy to coarse loamy soil. (**Table no. 1.5**: Soil Profile / District – Purnea)

1.6 Soil Erosion and Runoff Status

Soil erosion is the physical removal of the top soil layer or soil particles by mobile agents and by human activities. Running water, rainfall and wind are the primary mobile agents, which cause soil erosion in the absence of vegetative cover, and moisture and it is further helped by gravity and ruggedness of topography. Soil erosion is influenced by its physical, chemical, hydrological, and mineralogical properties and its soil profile characteristics. Physical and hydrological properties of soil affect the resistance of soil to erosion, which includes texture, structure, water holding capacity and transmission properties of any soil. Important soil erosion components of the hydrological cycle are: Infiltration, surface detention, velocity of overland flow, and flow of subsurface water. The various types of flow and their velocities may be turbulent or laminar, steady or unsteady, uniform or non-uniform and influence the extent of erosion Water balance evaporate - transpiration, temperature and relative humidity have an indirect effect on soil erosion. Indirect factors affect

rainfall by altering the proportion of rainfall and soil moisture regime. Major soil erosion is caused by water. Water erosion is caused by the kinetic energy of rain falling on the soil surface and by the mechanical force of runoff.

Data regarding soil erosion and runoff status of the district is not available. There is no sedimentary monitoring station in district.

1.7 Land use Pattern

Land is a scarce resource, whose supply is fixed for all practical purposes. At the same time, the demand for land for various competing purposes is continuously increasing with the increase in human population and economic growth. Land use pattern at any given time is determined by several factors including size of human and livestock population, the demand pattern, the technology in use, the cultural traditions, the location and capability of land, institutional factors like ownership pattern and rights and state regulation. The land use pattern besides having economic implications has also important ecological dimensions, which if ignored can have disastrous consequences. The available land is classified into two parts on the basis of its use, viz. (i) Agricultural land and (ii) Non-agricultural land.

The land use pattern of Purnea district shows that Gross cropped area is about 94.03% of the total geographical area where as net sawn area is 65%. About 30.69% of cultivable land is double cropped area. Area under forest is almost negligible with 353.36 ha. (0.11%) land of total geographical area. More than 24817 Ha. of land which constitutes about 7.76% of total geographical area is found to be cultivable waste land. Current fallow land is about 10%. The net area sown can be increased by bringing part of land under current fallow by introducing some solution of the problem compelling to keep the land fallow. The cropping intensity of the district is estimated at 150%.

(**Table no. 1.7**: Land use Pattern / District – Purnea)

1.1 District Profile						
Name of State : Bihar			**Source - Gazetter, Census Report, District Agriculture Office, ibhugol.nic.in**			
S. No.	**Name of District**	**District code**	**Latitude**	**Longitude**		
1	Purnea	1009	25`13'80"N-27`07'59"N	86`59'06"E-87`52'55"E		
		Source - A Hand Book of Purnea District (Year) - 2012				

1.2 Demography

Name of state : BIHAR — **Source - Census Data**

Name of District :

s.no	Block	No. Of Panchayat	No. Of Villages	Population				SC		ST		General		Total	
				M	F	CH* (P-06)	Total (5+6+7)	No. of household	No. of Mem.	No. of household	No. of Mem.	No. of household	No. of Mem.	No. of household (9+11+13)	No. of Mem. (10+12+14)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Purnea East	19	91	193015	175056	77255	445326	4640	24698	2571	13867	23877	124117	31088	162682
2	Kasba	13	61	76835	71064	40442	188341	2389	11717	2139	10571	26652	135630	31180	157918
3	Jalagadh	10	47	46567	43195	23189	112951	2960	20423	297	2059	19741	112960	22998	135442
4	Srinagar	9	26	45027	41639	23392	110058	4025	17600	1392	5460	21403	92940	26820	116000
5	K.nagar	18	85	95728	88308	46468	230504	8778	43891	2567	12837	34755	173776	46100	230504
6	Banmankhi	27	107	147721	134007	69687	351415	15989	63997	4542	18191	58411	238911	78942	321099
7	Dhamdaha	26	81	122293	110974	54817	288084	8220	42639	4990	25756	42838	219689	56048	288084
8	B.Kothi	19	62	87932	79310	41758	209000	8388	41942	3256	16280	30274	151373	41918	209595
9	Rupauli	20	55	97546	88003	49137	234686	2217	11088	324	1623	44388	264507	46929	277218
10	Bhawanipur	14	88	66890	60980	33850	161720	290	16402	90	3415	19253	161720	19633	181537
11	Baisi	17	130	92443	85954	49309	227706	2267	12469	217	1201	42804	214036	45288	227706
12	Dagarua	18	154	91073	82904	47165	221142	4043	19625	1382	6710	40142	194807	45567	221142
13	Amour	25	162	119966	109180	61413	290559	1170	7022	253	1520	45538	282017	46961	290559
14	Baisa	16	132	80379	74120	38628	193127	2016	12803	303	1930	28075	178394	30394	193127
	Total	251	1281	1363415	1244694	656510	3264619	67392	346316	24323	121420	478151	2544877	569866	3012613

Source : Census data 2011 BDO office Year 2011

Note: No. of Gram Panchayats – 246
No. of Nagar Panchayats – 05

1.3 Biomass and Livestock

Name of state : BIHAR | **Source - Live stock census/AHD**

Name of District :

s.no	Block	Small Animals					Large Animals				Any other Milch or Meat Animal (Nos.)	Draft Animal (Buffalo/Yak/bulls any other(Nos.)
		Poultry (No)	Ducks No.	Pigs No.	Goats No.	sheeps No.	Indigenous cow(No.)	Hybrid cow(No.)	In descriptive Buffalalo (No.)	Hybrid Buffalalo (No.)		
1	P.East	79356	359	2152	48067	0	14230	52594	47133	0	0	153
2	K.nagar	28418	725	1844	40057	85	43082	658	12012	0	0	104
3	Sri nagar	11396	0	472	16829	237	16080	0	5546	0	0	0
4	Dhamdaha	15925	0	2542	43761	0	58217	2374	22276	0	0	108
5	B.Kothi	9608	0	2719	30734	150	35853	83	17790	0	0	404
6	Bhawanipur	19390	400	1362	33500	0	23201	136	12259	0	0	101
7	Baisi	117347	1190	729	52719	0	37205	368	2194	0	0	0
8	Dagarua	42721	19	2123	37482	0	28009	0	3716	0	0	0
9	Baisa	42333	0	255	27466	0	37102	0	1215	0	0	0
10	Amour	75076	474	794	55487	0	28631	4784	2312	0	0	0
11	Rupauli	10290	10656	882	49035	0	21801	421	15644	0	0	21
12	Kasba	44566	50	817	31636	0	35221	145	2144	0	0	4
13	Jalalgarh	19410	247	174	18645	0	19838	614	2169	0	0	3
14	Banmankhi	26768	17	3491	44847	0	50230	537	26739	0	0	28
	Total	542604	14137	20356	530265	472	448700	62714	173149	0	0	926

Source -A.H.Deptt.

Year- 2015

1.4 Agro Ecology,Climate,Hydrology and Topography

Name of the State: Bihar

Source - IMD/ Regional ICAR Centre/ KVKs/ District Statistical Office/ Block Office/ Dynamic ground water resources of Bihar

Purnea

S.No.	Name of the Block	Agro Ecological zone Type	Type of Terrain	Block Area (ha)	Normal annual Rainfall (m.m)	Average Monthly Rainfall (m.m)	No of rainy days (No.)	Maximum Rainfall Intensity (mm)			Average Weekly Temperature (*C)									Elevation		
											Period											
								Up to 15Min	Beyond 15 but up to 30 Min	Beyond 30 but up to 60 Min	Summer (April-May)			Winter (Oct.- Mar)			Rainy (June -Sep)			Min	Max	Mean
											Min	Max	Mean	Min	Max	Mean	Min	Max	Mean			
1	2	3	4	5	6	7	8	9	10	11	12			13			14			15		
1	Purnea.East	Zone2	Plain	25747.07	1374	114.5	48				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
2	Kasba	Zone2	Plain	16550.73	419.5	34.95	41				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
3	K.Nagar	Zone2	Plain	30710.34	874.9	72.9	41				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
4	Jalagarh	Zone2	Plain	11239.14	641	53.41	37				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
5	Srinagar	Zone2	Plain	14069	474.1	39.25	44				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
6	Baisi	Zone2	Plain	20475.06	978.1	81.5	38				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
7	Dagarwa	Zone2	Plain	19982.99	445.1	37.09	37				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
8	Amour	Zone2	Plain	24800.82	827.4	68.95	40				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
9	Baisa	Zone2	Plain	20161.53	977.6	81.46	35				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
10	Banmankhi	Zone2	Plain	37241.59	579	48.25	38				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
11	Dhamdaha	Zone2	Plain	36196.52	1122.2	93.51	39				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
12	B.kothi	Zone2	Plain	22832.38	55.1	46.25	37				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
13	Bhawanipur	Zone2	Plain	37241.59	900.8	75.06	45				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31
14	Rupouli	Zone2	Plain	23995.95	888.2	74.01	40				13.1	41.3	27.2	6.03	32.93	19.51	20.4	37.35	29.12			31

Source:-Metrological Deptt.,Air Force Chunapur

1.5 Soil Profile

Name of the State : Bihar

Source : National Bureau of Land Use Planning, University/KVK/BIRSAC/BAU/RAU

Name of District :Purnea

Sl. No.	Name of Block	Soil Type		Land Slope			
		Major Soil Classes	Area (ha)	0-3% (ha)	3-8% (ha)	8-25% (ha)	>25% (ha)
1	Purnea East	Sandy Loam	20300	20300	N/A	N/A	N/A
2	Kasba	Sandy Loam	11305	11305	N/A	N/A	N/A
3	Jalalgarh	Sandy Loam	9030.16	9030.16	N/A	N/A	N/A
4	Srinagar	Sandy Loam	12150	12150	N/A	N/A	N/A
5	K.nagar	Sandy Loam	25100	25100	N/A	N/A	N/A
6	Banmankhi	Sandy Loam	28600	28600	N/A	N/A	N/A
7	Dhamdaha	Sandy Loam	29253	29253	N/A	N/A	N/A
8	B.Kothi	Clay Loam	11971	11971	N/A	N/A	N/A
9	Rupouli	Sandy Loam	18400	18400	N/A	N/A	N/A
10	Bhawanipur	Sandy Loam	10064.35	10064.35	N/A	N/A	N/A
11	Baisi	Clay Loam	14000	14000	N/A	N/A	N/A
12	Dagarua	Sandy Loam	11035.07	11035.07	N/A	N/A	N/A
13	Amour	Sandy Loam	15505.37	15505.37	N/A	N/A	N/A
14	Baisa	Sandy Loam	13000	13000	N/A	N/A	N/A

Source - DAO Purnea (Year) - 2015

1.7 Land Use Pattern

Name of state : BIHAR | **Source : DAP, PPR, District Statistical Office/lus.dacnet.nic.in**

Name of District : Purnia

Area in ha

S. no	Name of the Block	No. Of Gram Panchayat	No. Of Villages Covered	Total Geographical Area	Area under Aguriculture				Area under Forest	Area under Wasteland	Area under other uses
					Gross cropped Area (1)	Net Sown Area (2)	Area Sown more than once (1-2)	Cropping Intensity (%)			
1	2	3	4	5	6	7	8	9	10	11	12
1	Purnea East	19	91	25747.07	16379.83	12655.01	3724.82	129	37.02	2453.58	8582.49
2	Kasba	13	61	16550.73	18110.7	11005.75	7104.95	164	0	2040.02	1997.1
3	Jalagadh	10	47	11239.64	14061.57	7950.63	6110.94	176	7.48	1416.41	1138.22
4	Srinagar	9	26	14071	12463.92	10948.08	1515.84	113	180	281	1773.5
5	K.nagar	18	85	30710.84	25878.89	16444.8	9434.09	157	54.11	4186.58	7627.72
6	Banmankhi	27	107	37241.59	36576.4	28150.69	8425.71	130	0.09	2454.62	6391.84
7	Dhamdaha	26	81	37196.52	34897.18	25158.38	9738.8	138	0	848.97	8346.54
8	B.Kothi	19	62	22832.88	24225.24	17473.72	6751.52	138	74.66	1417	2597.07
9	Rupauli	20	55	23995.95	20253.9	16739.49	3514.41	120	0	656.92	5148.82
10	Bhawanipur	14	88	15927.95	16308.58	11380.43	4928.15	143	0	801.84	3093.33
11	Baisi	17	130	20475.56	20814.59	11279.4	9535.19	184	0	1643.52	6018.3
12	Dagarua	18	154	18982.99	16121.3	15093.19	1028.11	106	0	1635.48	2779.05
13	Amour	25	162	24900.82	26027.29	12679.61	13347.68	205	0	4766.58	4350.88
14	Baisa	16	132	20361.53	18722.33	11545.17	7177.16	162	0	214.86	3016.18
	Total	251	1281	320235.07	300841.72	208504.35	92337.37	150	353.36	24817.38	62861.04

Source - District Agr.Office.Purnea(Year) - 2015

A Handbook of purnea

Spatial Aspect of Drain / Canal
Amour Block, Purnia District, Bihar

Geographical Location -

25°53'14.984"N- 26°4'53.714"N
87°35'2.131"E - 87°49'40.118"E

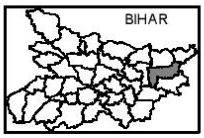
Prepared by: Bihar Remote Sensing Application Center, Patna

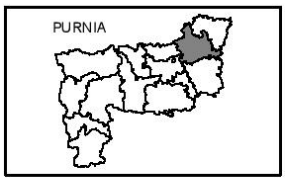
Spatial Aspect of Lakes / Ponds
Amour Block, Purnia District, Bihar

Geographical Location -

25°53'14.984"N- 26°4'53.714"N
87°35'2.131"E - 87°49'40.118"E

Kilometers
1.5 0.75 0 1.5 3 4.5



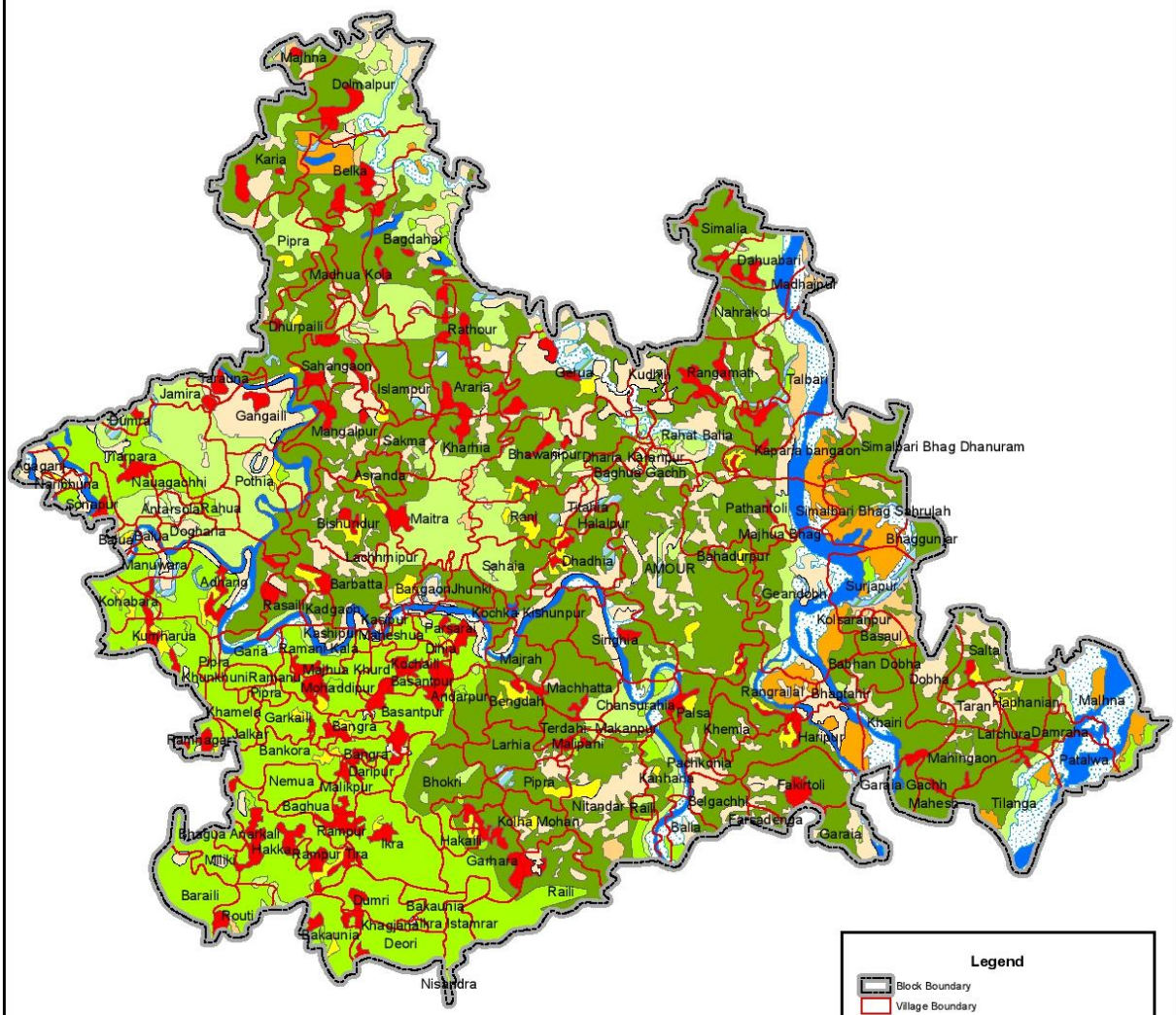


Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Amour Block, Purnia District, Bihar



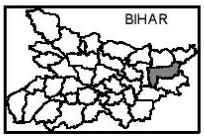
Legend

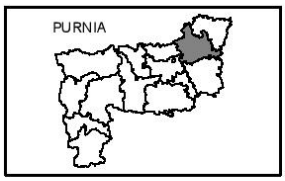
- Block Boundary
- Village Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- Agricultural Land-PlantatioN-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural -Built Up area (Ru*
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Geographical Location -

25°53'14.984"N- 26°4'53.714"N
87°35'2.131"E - 87°49'40.118"E

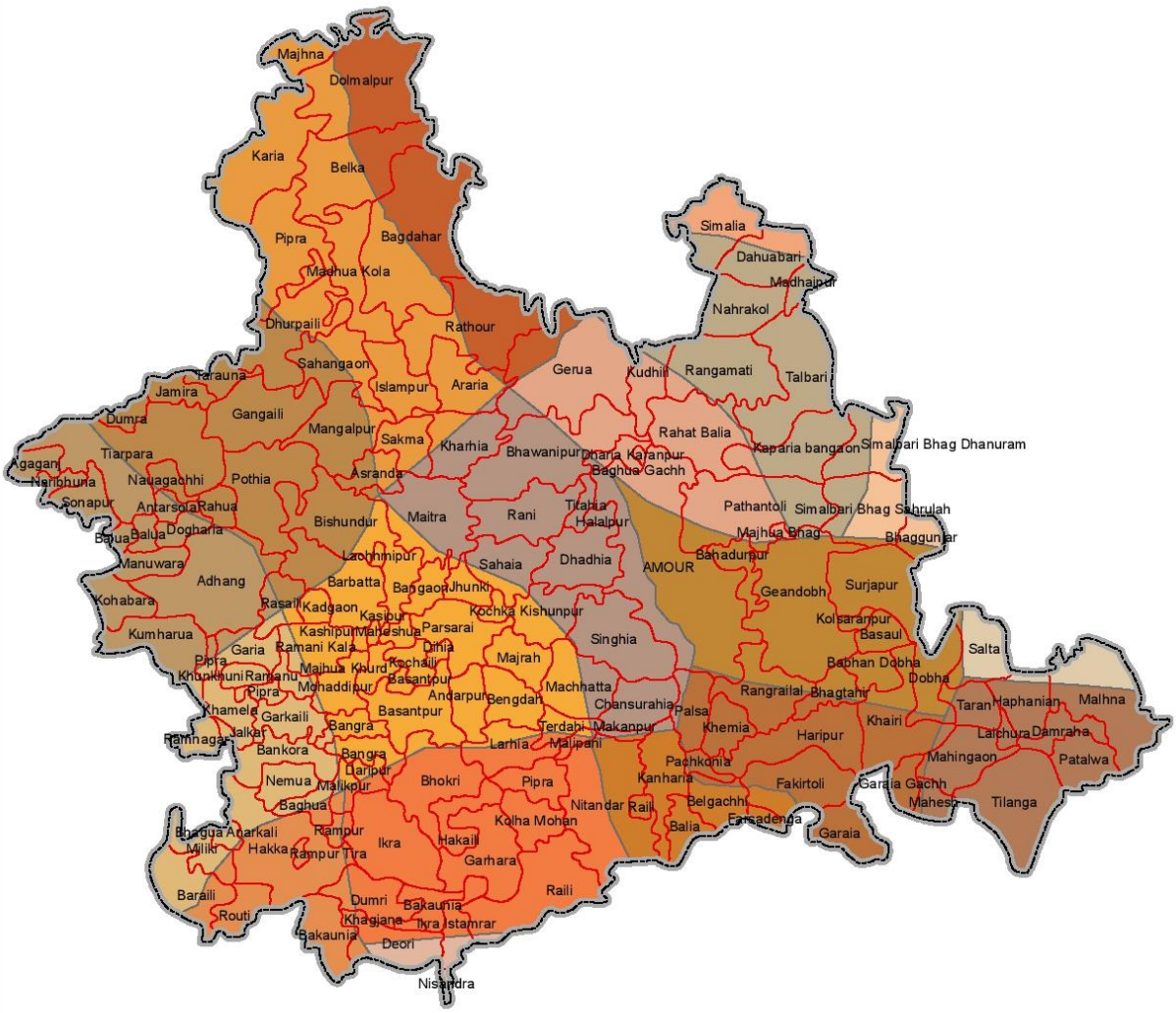
Kilometers
1.5 0.75 0 1.5 3 4.5





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Amour Block, Purnia District, Bihar



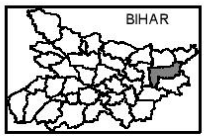
Legend

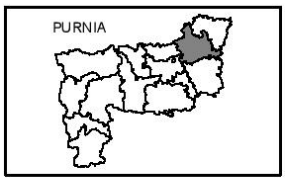
- Block Boundary
- Village Boundary
- 2A5F3Ab3
- 2A5F3Ab4
- 2A5F3Ab5
- 2A5F3Ab7
- 2A5F3Ac1
- 2A5F3Ac2
- 2A5F3Ac3
- 2A5F3Ac4
- 2A5F3Ac5
- 2A5F3Ac6
- 2A5F4Aa2
- 2A5F4Aa3
- 2A5F4Aa4
- 2A5F4Aa5
- 2A5F4Aa6
- 2A5F4Ab1
- 2A5F4Ac1
- 2A5F4Ac2
- 2A5F5Ab1
- 2A5F5Ab2
- 2A5F5Ac1

Geographical Location -

25°53'14.984"N- 26°4'53.714"N
87°35'2.131"E - 87°49'40.118"E

Kilometers
1.5 0.75 0 1.5 3 4.5





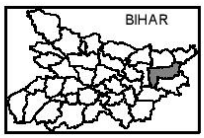
Prepared by: Bihar Remote Sensing Application Center, Patna

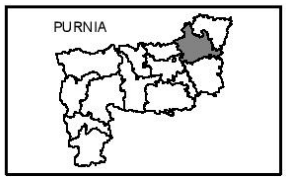
Spatial Aspect of Orchards
Amour Block, Purnia District, Bihar

Geographical Location -

25°53'14.984"N- 26°4'53.714"N
87°35'2.131"E - 87°49'40.118"E

Kilometers
1.5 0.75 0 1.5 3 4.5

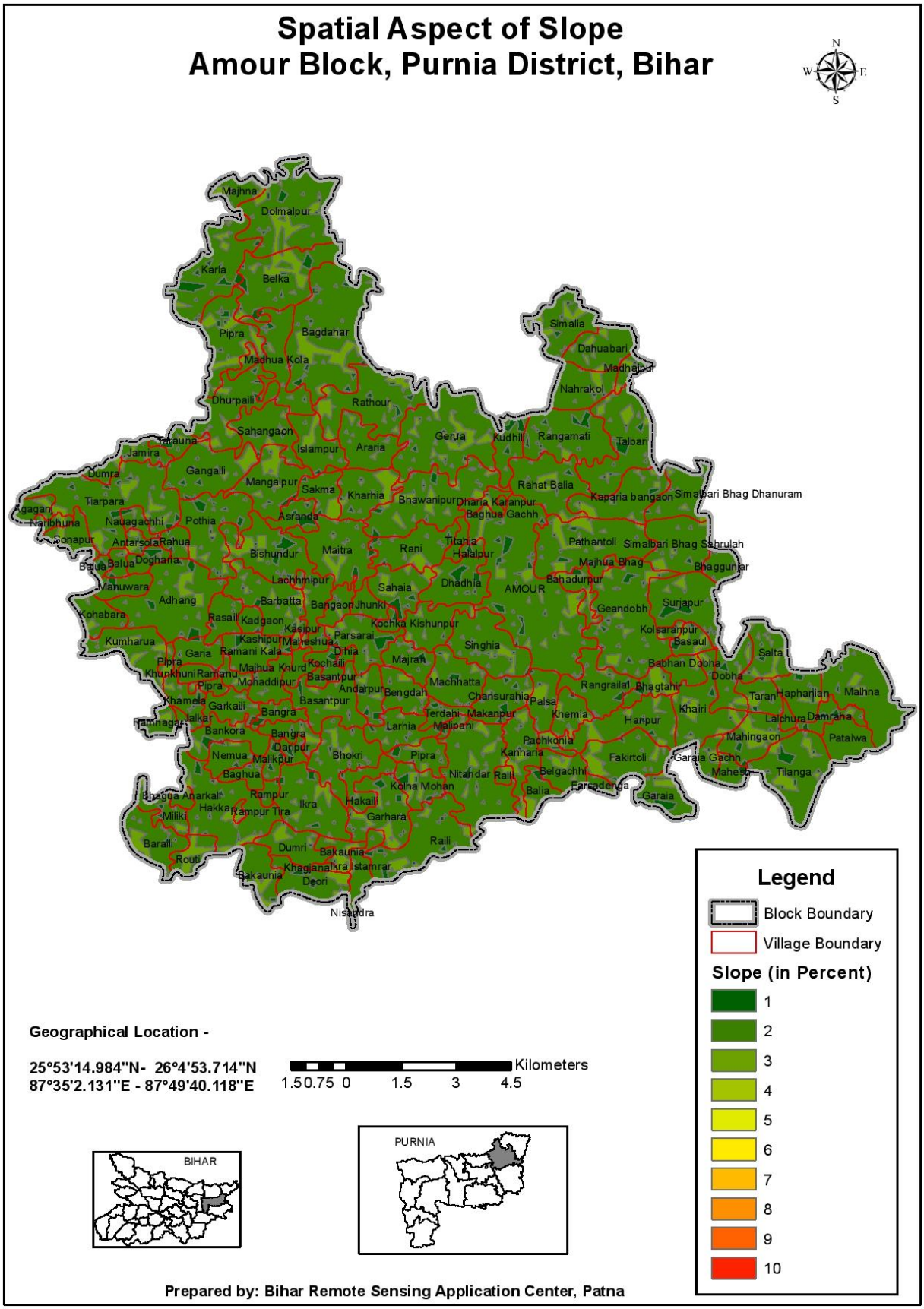


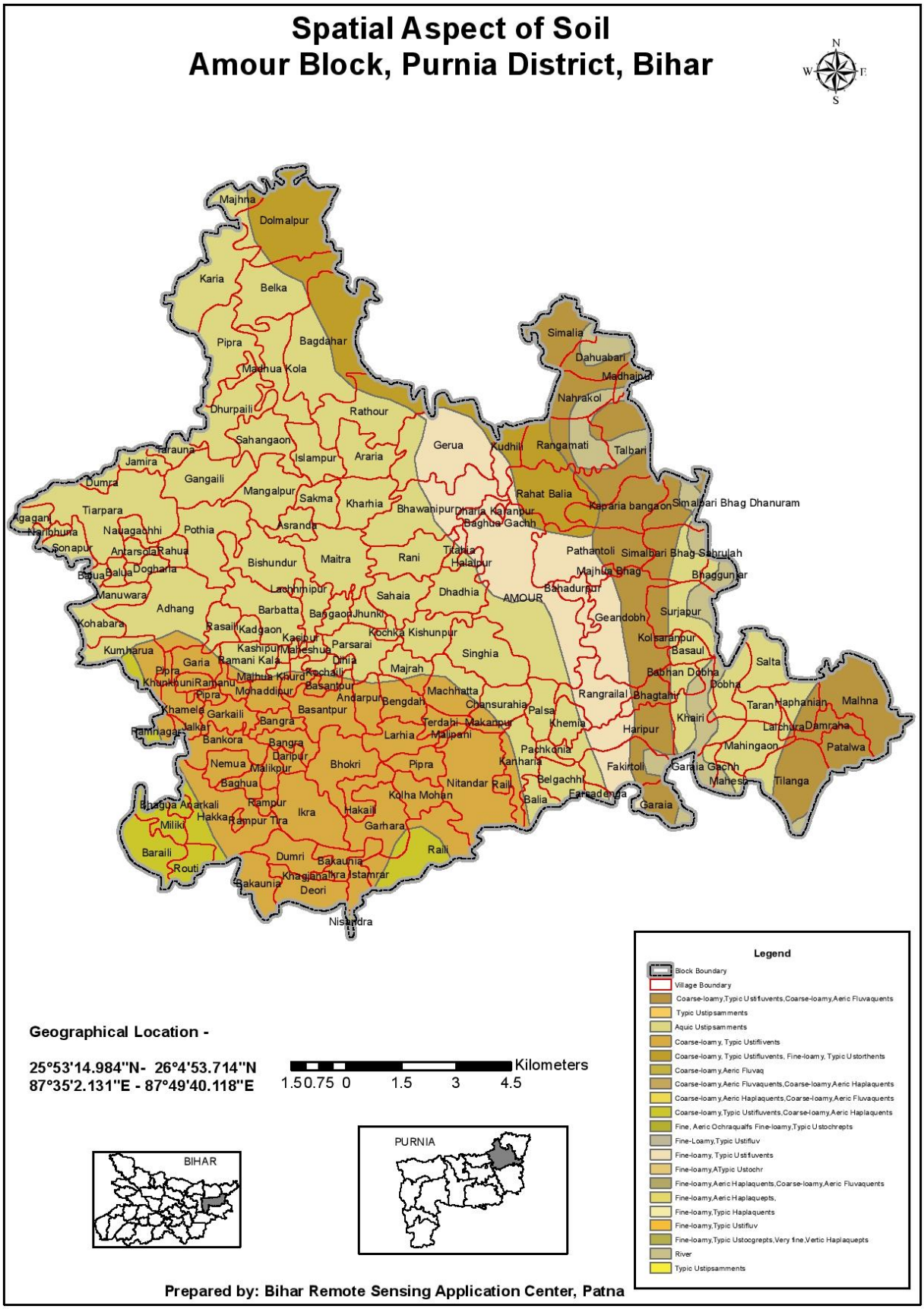


Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Slope
Amour Block, Purnia District, Bihar
N
S
W
E
Majhna
Dolmalpur
Karia
Belka
Pipra
Bagdahar
Madhua Kola
Dhurpaili
Rathour
Simalia
Dahuabari
Madhaipur
Nahrakol
Sahangaon
Tetrauna
Jamira
Islampur
Araria
Gerua
Kudhili
Rangamati
Talbari
Dumra
Gangalli
Mangalpur
Sakma
Kharhia
Bhawanipur
Dharia Karanpur
Baghua Gachh
Rahat Balia
Kaparia bangaon
Simalbari Bhag Dhanuram
Tiarpara
Agagani
Naibhuna
Nauagachhi
Pothia
Asranda
Sonapur
Antarsola
Rahua
Bishundur
Maitra
Rani
Titahia
Halalpur
Pathantoli
Simalbari Bhag Sahrulah
Balua
Dogharia
Majhua Bhag
Bhaggunjar
Mahuwara
Lachhmipur
Sahaia
Dhadhla
AMOUR
Bahadurpur
Adhang
Barbatta
Bangaon
Jhunki
Geandobh
Surjapur
Kohabara
Rasaili
Kadgaon
Kochka
Kishunpur
Kasipur
Parsarai
Kolsaranpur
Kumharua
Kashipur
Maheshua
Basauli
Garia
Ramani Kala
Dihia
Singhia
Salta
Pipra
Khunkhuni
Ramanu
Majhua
Khurd
Kochaili
Majrah
Babhan Dobha
Dobha
Pipra
Mohaddipur
Basantpur
Andarpur
Bengdah
Machhatta
Rangrailal
Bhagtahi
Taran
Hapharjian
Malhna
Khamela
Garkaili
Basantpur
Charsurahia
Palsa
Khemia
Khairi
Jalkar
Bangra
Terdahi
Makanpur
Haripur
Lalchura
Damraha
Hathinagar
Bankora
Larhia
Malipani
Mahingaon
Bangra
Pachkonia
Patalwa
Darpur
Kanharia
Nemua
Malikpur
Bhokri
Pipra
Fakirtoli
Garaia Gachh
Baghua
Nitahdar
Raili
Belgachhi
Mahesh
Tilanga
Kolha Mohan
Balia
Farsadenga
Bhagua
Anarkali
Hakkar
Rampur
Rampur Tira
Ikra
Hakaili
Garaia
Miliki
Garhara
Raili
Baraili
Dumri
Bakaunia
Routi
Khagjana
Ikra
Istamrar
Bakaunia
Deori
Nisandra
Legend
Block Boundary
Village Boundary
Slope (in Percent)
1
2
3
4
5
6
7
8
9
10
Geographical Location -
25°53'14.984"N- 26°4'53.714"N
87°35'2.131"E - 87°49'40.118"E
Kilometers
1.5 0.75 0 1.5 3 4.5
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna

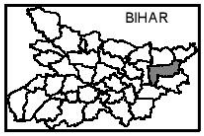

Spatial Aspect of Soil
Amour Block, Purnia District, Bihar
N
W
E
S
Majhna
Dolmalpur
Karia
Belka
Pipra
Bagdahar
Madhua Kola
Dhurpaili
Rathour
Sahangaon
Tarauna
Jamira
Islampur
Araria
Gerua
Kudhili
Rangamati
Talbari
Simalia
Dahuabari
Madhajpur
Nahrakol
Dumra
Gangaili
Mangalpur
Sakma
Kharhia
Bhawanipur
Dhara
Kalanpur
Baghua Gachh
Rahat Balia
Kaparia bangaon
Simalbari Bhag Dhanuram
Tiarpara
Agagani
Nanbhuna
Nauagachhi
Pothia
Asranda
Sonapur
Antarsola
Rahua
Bisnudur
Maitra
Rani
Titalia
Halalpur
Pathantoli
Simalbari Bhag Sahrulah
Baua
Balua
Dogharia
Majhua Bhag
Bhaggunar
Manuwara
Lachhmipur
Sahaia
Dhadhia
AMOUR
Bahadurpur
Adhang
Barbatta
Bangaon
Jhunki
Geandobh
Surjapur
Kohabara
Rasaili
Kadgaon
Kasibur
Kochka
Kishunpur
Kolsaranpur
Kumharua
Kashipur
Maheshua
Parsarai
Singhia
Basaul
Garia
Ramani Kala
Dihra
Majrah
Salta
Pipra
Khunkhuni
Ramanu
Mathua Khurd
Kochaili
Babhan Dobha
Pipra
Mohaddinpur
Basantpur
Andarpur
Bengdah
Machhatta
Chansurahia
Rangrailal
Bhagtahi
Dobha
Khamela
Garkaili
Basantpur
Bangra
Palsa
Khemia
Taran
Haphanian
Malhna
Ramnagar
Jalkal
Terdahi
Makanpur
Larhia
Malipahi
Haripur
Khairi
Lachhura
Damraha
Bankora
Bangra
Daripur
Pachkonia
Mahingaon
Patalwa
Nemua
Malikpur
Bhokri
Pipra
Kanharia
Fakirtoli
Garaia Gachh
Baghua
Nitandar
Raili
Belgachhi
Mahesh
Tilanga
Bhagua
Anarkali
Rampur
Kolha Mohan
Farsadenga
Hakka
Rampur Tira
Ikra
Hakaili
Balia
Garaia
Miliki
Garhara
Baraili
Raili
Dumri
Bakaunia
Routi
Khagjanakra
Istamrar
Sakaunia
Deori
Nishandra
Legend
Block Boundary
Village Boundary
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
Typic Ustipsamments
Aquic Ustipsamments
Coarse-loamy, Typic Ustifluvents
Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
Coarse-loamy,Aeric Fluvaq
Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
Fine-Loamy,Typic Ustifluv
Fine-loamy, Typic Ustifluvents
Fine-loamy,ATypic Ustochr
Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Fine-loamy,Aeric Haplaquepts,
Fine-loamy,Typic Haplaquents
Fine-loamy,Typic Ustifluv
Fine-loamy,Typic Ustocrepts,Very fine,Vertic Haplaquepts
River
Typic Ustipsamments
Geographical Location -
25°53'14.984"N- 26°4'53.714"N
87°35'2.131"E - 87°49'40.118"E
Kilometers
1.5 0.75 0 1.5 3 4.5
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna

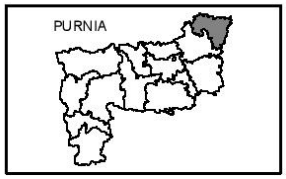
Spatial Aspect of Drain / Canal
Baisa Block, Purnia District, Bihar

Geographical Location -

25°57'0.949"N - 26°7'7.674"N
87°40'11.323"E -87°52'25.258"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main Canal
- Branch Canal
- Distributary Canal

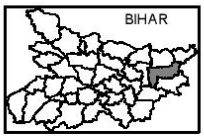
Prepared by: Bihar Remote Sensing Application Center, Patna

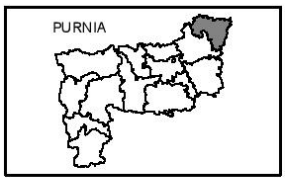
Spatial Aspect of Lakes / Ponds
Baisa Block, Purnia District, Bihar

Geographical Location -

25°57'0.949"N - 26°7'7.674"N
87°40'11.323"E -87°52'25.258"E

Kilometers
1.5 0.75 0 1.5 3 4.5



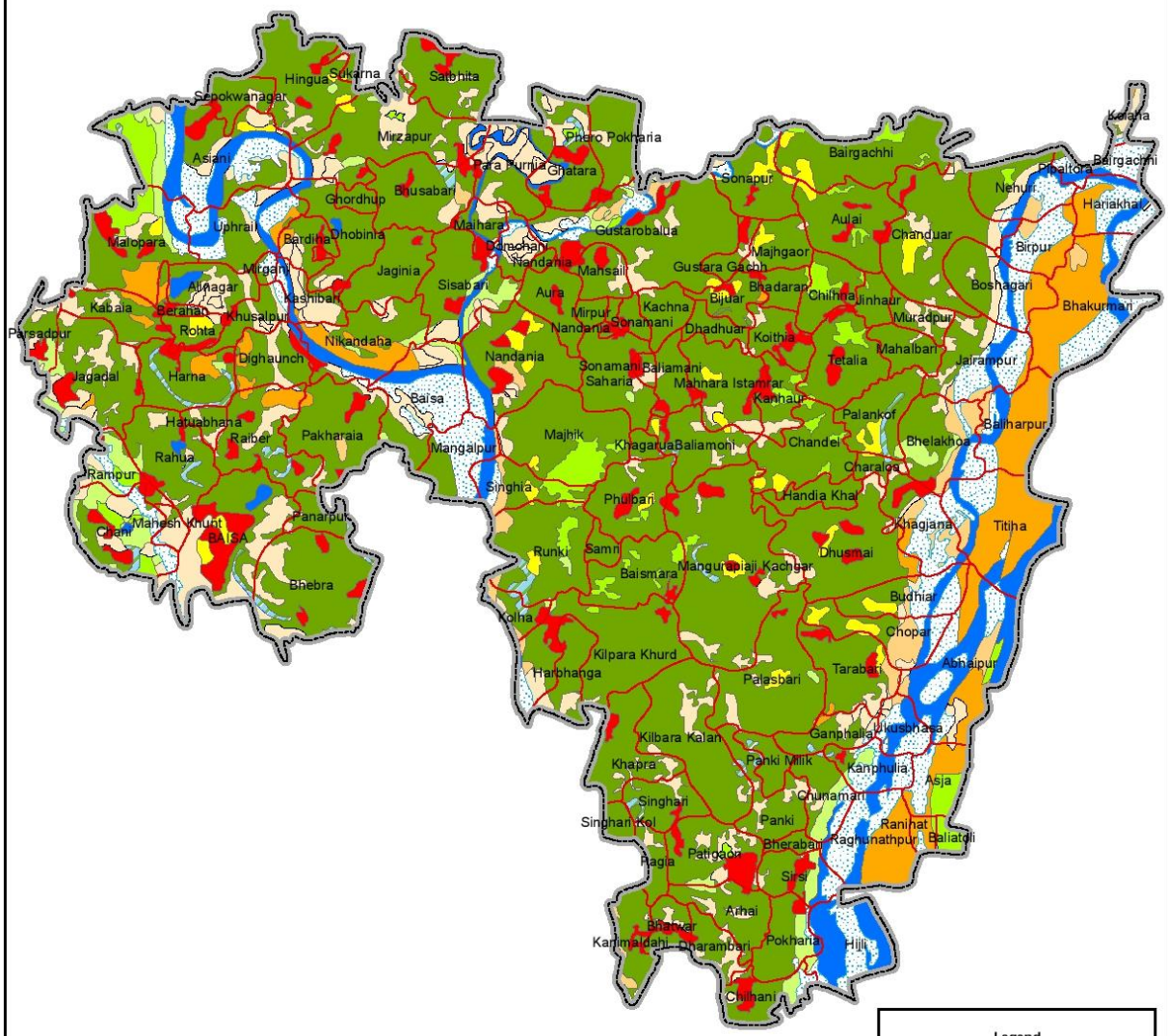


Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

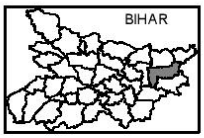
Landuse / Land Cover Map
Baisa Block, Purnia District, Bihar

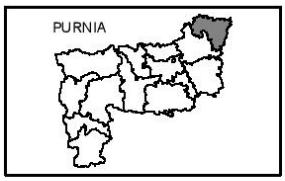


Geographical Location -

25°57'0.949"N - 26°7'7.674"N
87°40'11.323"E -87°52'25.258"E

Kilometers
1 0.5 0 1 2 3





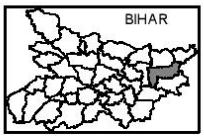
Prepared by: Bihar Remote Sensing Application Center, Patna

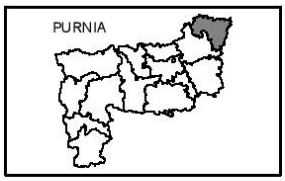
Spatial Aspect of Micro-Watershed
Baisa Block, Purnia District, Bihar

Geographical Location -

25°57'0.949"N - 26°7'7.674"N
87°40'11.323"E -87°52'25.258"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- 2A5F4Aa3
- 2A5F4Aa4
- 2A5F4Aa5
- 2A5F4Aa6
- 2A5F4Ab1
- 2A5F4Ab2
- 2A5F4Ab3
- 2A5F4Ac1
- 2A5F4Ac2
- 2A5F4Ac3
- 2A5F4Ac4
- 2A5F5Ac1
- 2A5F5Ac2
- 2A5F5Ac3
- 2A5F5Ac4

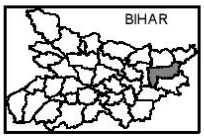
Prepared by: Bihar Remote Sensing Application Center, Patna

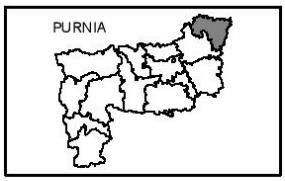
Spatial Aspect of Orchards
Baisa Block, Purnia District, Bihar

Geographical Location -

25°57'0.949"N - 26°7'7.674"N
87°40'11.323"E -87°52'25.258"E

Kilometers
1.5 0.75 0 1.5 3 4.5



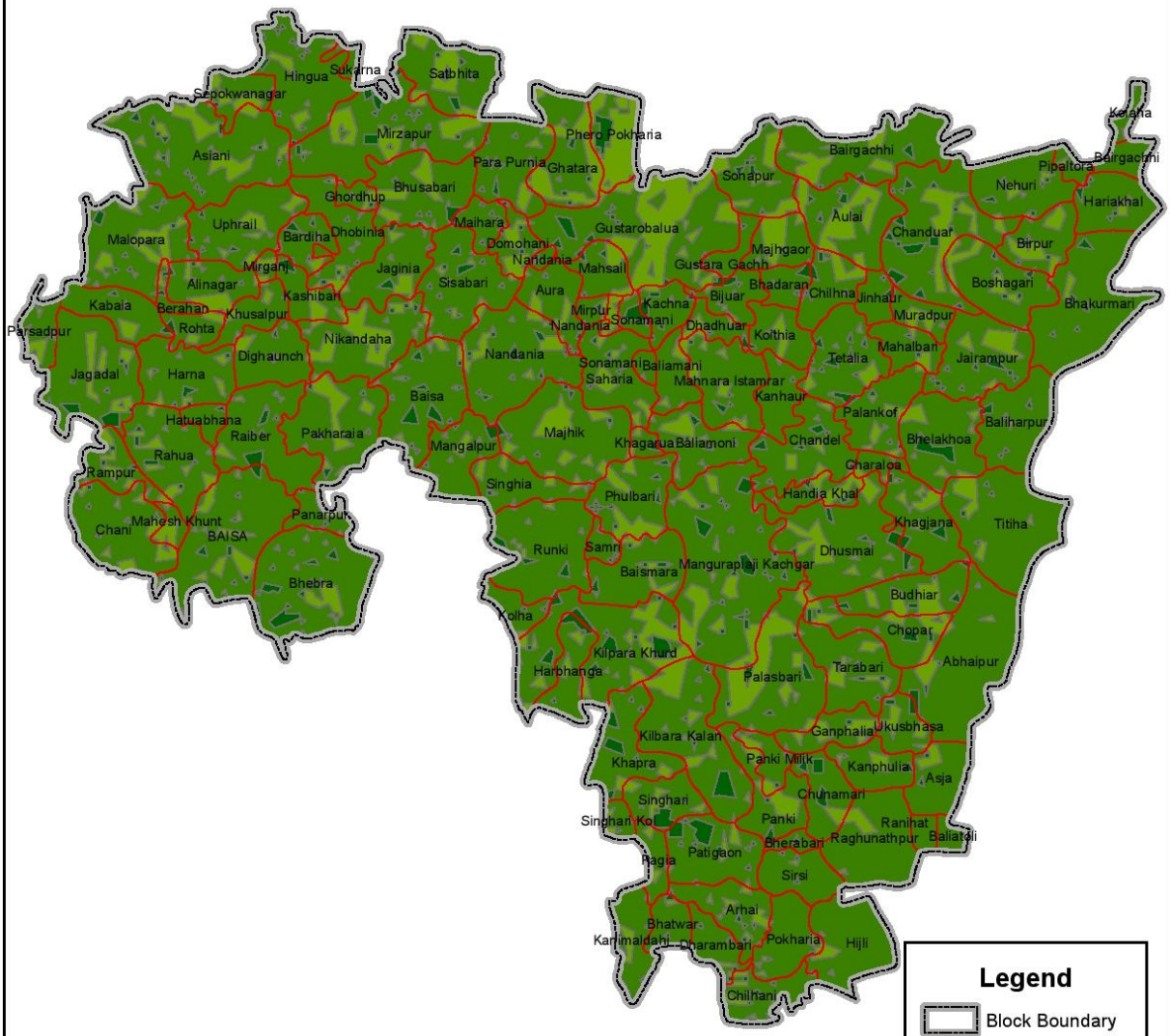


Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Slope
Baisa Block, Purnia District, Bihar

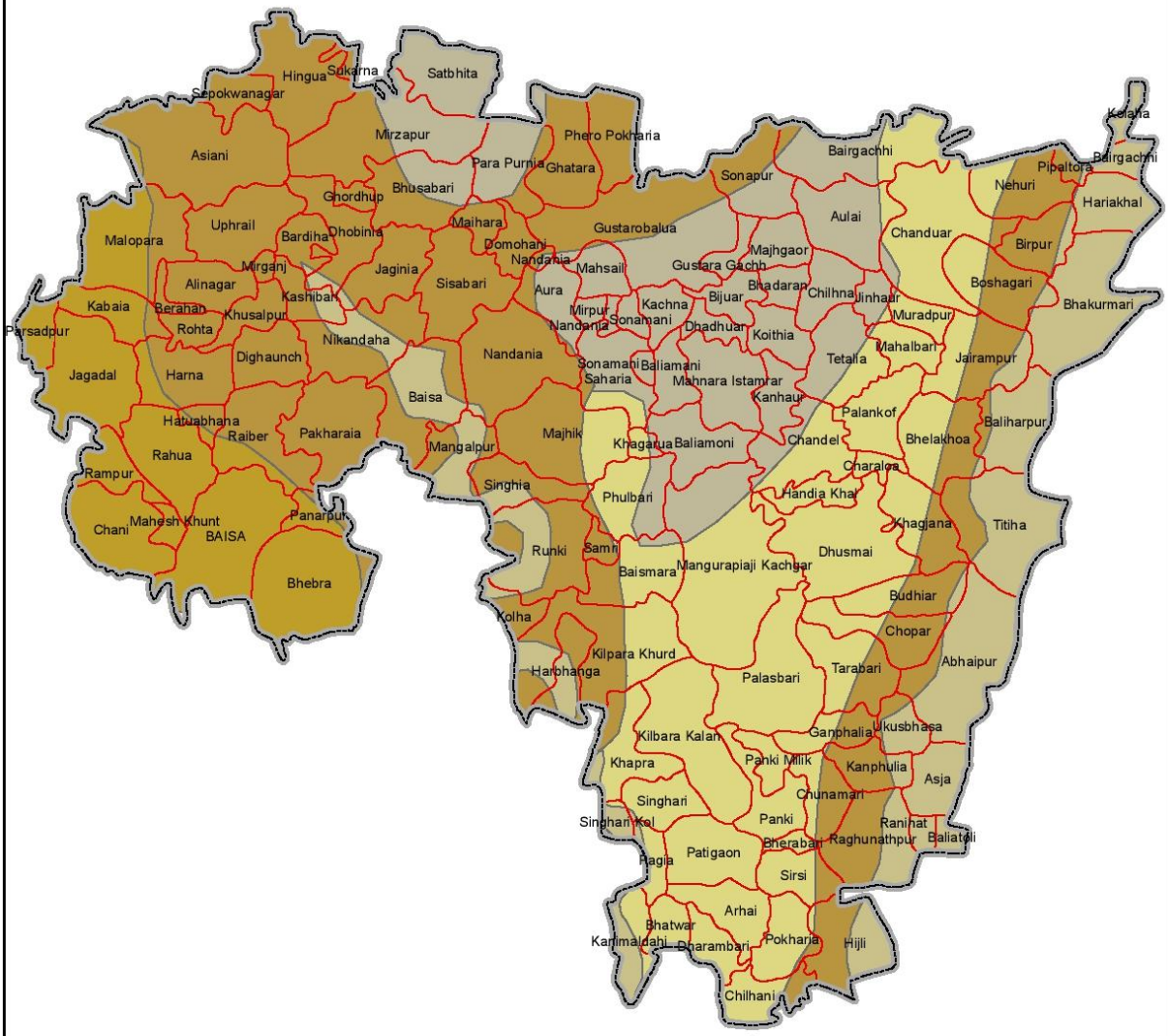


Geographical Location -

25°57'0.949"N - 26°7'7.674"N
87°40'11.323"E -87°52'25.258"E

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Soil
Baisa Block, Purnia District, Bihar



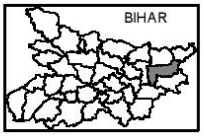
Legend

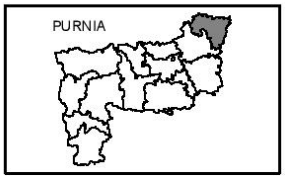
- Block Boundary
- Village Boundary
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
- Typic Ustipsamments
- Aquic Ustipsamments
- Coarse-loamy, Typic Ustifivents
- Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
- Coarse-loamy,Aeric Fluvaq
- Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
- Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
- Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
- Fine-Loamy,Typic Ustifluv
- Fine-loamy, Typic Ustifluvents
- Fine-loamy,ATypic Ustochr
- Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Fine-loamy,Aeric Haplaquepts,
- Fine-loamy,Typic Haplaquents
- Fine-loamy,Typic Ustifluv
- Fine-loamy,Typic Ustocrepts,Very fine,Vertic Haplaquepts
- River
- Typic Ustipsamments

Geographical Location -

25°57'0.949"N - 26°7'7.674"N
87°40'11.323"E -87°52'25.258"E

Kilometers
1 0.5 0 1 2 3





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Drain / Canal
Baisi Block, Purnia District, Bihar

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Drain / Canal
Baisi Block, Purnia District, Bihar

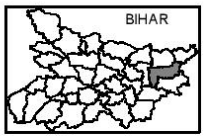
Prepared by: Bihar Remote Sensing Application Center, Patna

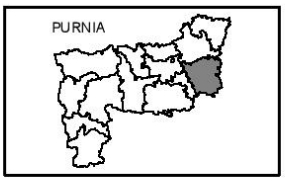
Spatial Aspect of Lakes / Ponds
Baisi Block, Purnia District, Bihar

Geographical Location -

25°44'40.511"N- 25°56'11.316"N
87°37'20.838"E - 87°49'51.127"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

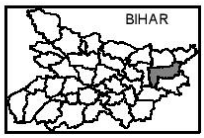
Prepared by: Bihar Remote Sensing Application Center, Patna

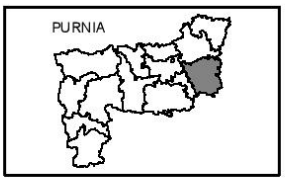
Spatial Aspect of Lakes / Ponds
Baisi Block, Purnia District, Bihar

Geographical Location -

25°44'40.511"N- 25°56'11.316"N
87°37'20.838"E - 87°49'51.127"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Baisi Block, Purnia District, Bihar

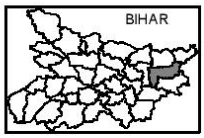
Legend

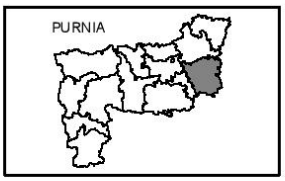
- Block Boundary
- Village Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- AgricultoN-Land-PlantatioN-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural -Built Up area (Ru*
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Geographical Location -

25°44'40.511"N- 25°56'11.316"N
87°37'20.838"E - 87°49'51.127"E

Kilometers
1.5 0.75 0 1.5 3 4.5





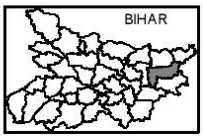
Prepared by: Bihar Remote Sensing Application Center, Patna

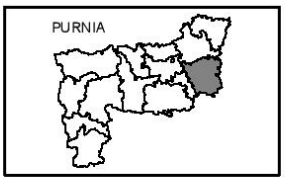
Spatial Aspect of Micro-Watershed
Baisi Block, Purnia District, Bihar

Geographical Location -

25°44'40.511"N- 25°56'11.316"N
87°37'20.838"E - 87°49'51.127"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend

Block Boundary	2A5F3Ab4
Village Boundary	2A5F3Ab5
2A5E3Ab5	2A5F3Ab6
2A5F3Aa1	2A5F3Ab7
2A5F3Aa2	2A5F3Ab8
2A5F3Aa3	2A5F4Aa1
2A5F3Aa4	2A5F4Aa2
2A5F3Aa5	2A5F5Aa1
2A5F3Aa6	2A5F5Aa2
2A5F3Aa7	2A5F5Aa3
2A5F3Ab1	2A5F5Aa4
2A5F3Ab2	2A5F5Ab1
2A5F3Ab3	2A5F5Ab2

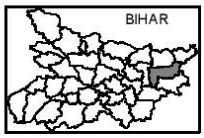
Prepared by: Bihar Remote Sensing Application Center, Patna

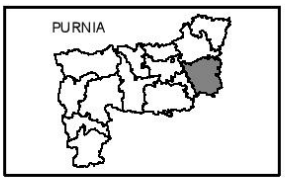
Spatial Aspect of Orchards
Baisi Block, Purnia District, Bihar

Geographical Location -

25°44'40.511"N- 25°56'11.316"N
87°37'20.838"E - 87°49'51.127"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Slope
Baisi Block, Purnia District, Bihar

Geographical Location -

25°44'40.511"N- 25°56'11.316"N
87°37'20.838"E - 87°49'51.127"E

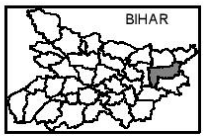
Prepared by: Bihar Remote Sensing Application Center, Patna

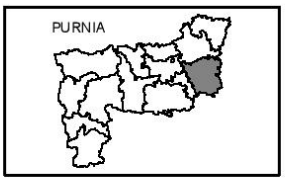
Spatial Aspect of Soil
Baisi Block, Purnia District, Bihar

Geographical Location -

25°44'40.511"N- 25°56'11.316"N
87°37'20.838"E - 87°49'51.127"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend

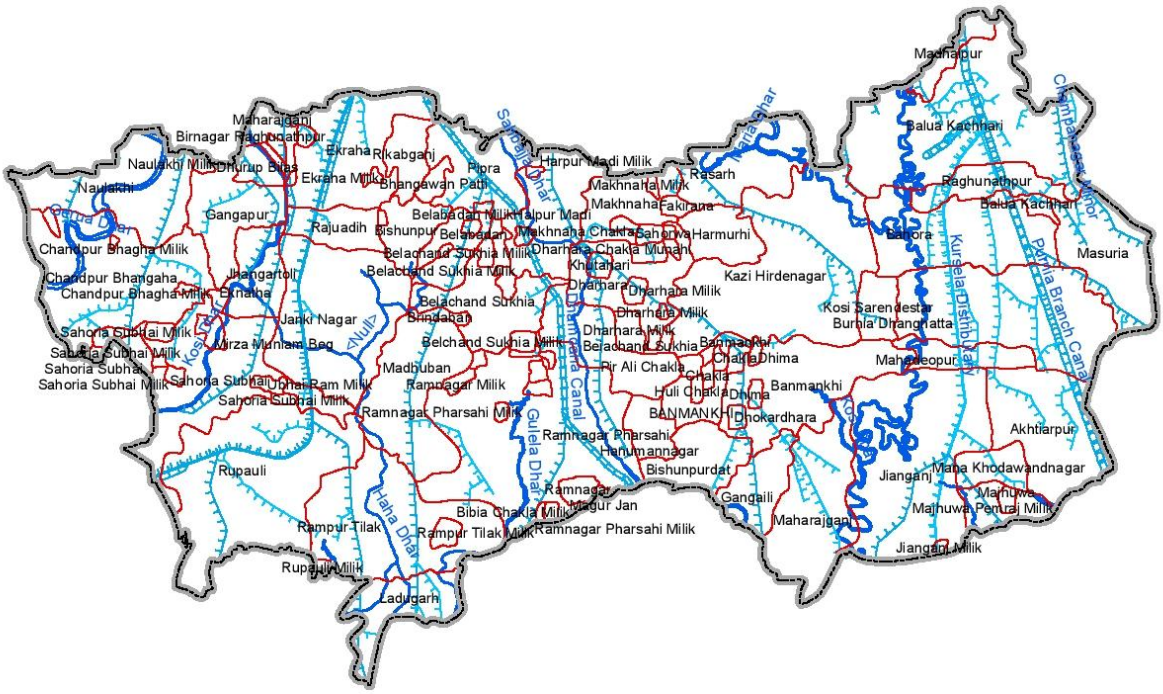
Block Boundary
Village Boundary

Soil_Taxon

- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
- Typic Ustipsamments
- Aquic Ustipsamments
- Coarse-loamy, Typic Ustifluvents
- Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
- Coarse-loamy,Aeric Fluvaq
- Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
- Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
- Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
- Fine-Loamy,Typic Ustifluv
- Fine-loamy, Typic Ustifluvents
- Fine-loamy,ATypic Ustochr
- Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Fine-loamy,Aeric Haplaquepts,
- Fine-loamy,Typic Haplaquents
- Fine-loamy,Typic Ustifluv
- Fine-loamy,Typic Ustocrepts,Very fine,Vertic Haplaquepts
- River
- Typic Ustipsamments

Prepared by: Bihar Remote Sensing Application Center, Patna

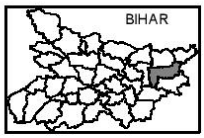
Spatial Aspect of Drain / Canal
Banmankhi Block, Purnia District, Bihar

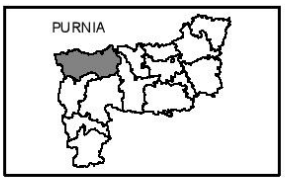


Geographical Location -

25°48'25.19"N - 25°59'17.558"N
86°59'31.922"E - 87°19'30.205"E

Kilometers
2 1 0 2 4 6





Legend

- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main Canal
- Branch Canal
- Distributary Canal

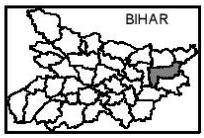
Prepared by: Bihar Remote Sensing Application Center, Patna

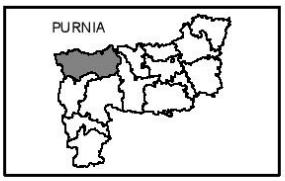
Spatial Aspect of Lakes / Ponds
Banmankhi Block, Purnia District, Bihar

Geographical Location -

25°48'25.19"N - 25°59'17.558"N
86°59'31.922"E - 87°19'30.205"E

Kilometers
2 1 0 2 4 6





Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Banmankhi Block, Purnia District, Bihar

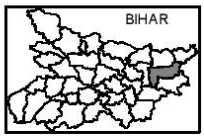
Legend

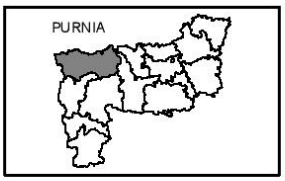
- Block Boundary
- Village Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- Agricultural Land-PlantatioN-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural -Built Up area (Ru*
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Geographical Location -

25°48'25.19"N - 25°59'17.558"N
86°59'31.922"E - 87°19'30.205"E

Kilometers
2 1 0 2 4 6





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Banmankhi Block, Purnia District, Bihar

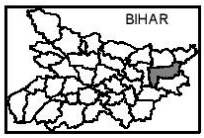
Legend

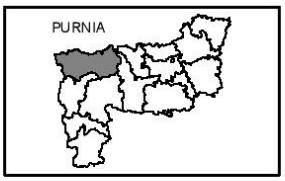
Block Boundary	2A5ABf2
Village Boundary	2A5ABf3
2A5A1Aa4	2A5ABg4
2A5A1Af2	2A5ABh1
2A5A1Af3	2A5ABh2
2A5A1Af4	2A5ABh3
2A5A1Bc2	2A5ABh4
2A5A1Bd1	2A5ABi1
2A5A1Bd2	2A5ABi2
2A5A3Af1	2A5ABi3
2A5A3Ag1	2A5ABj1
2A5ABa1	2A5ABj2
2A5ABa2	2A5ABj3
2A5ABa3	2A5E8Ab4
2A5ABa4	2A5E8Ab5
2A5ABe4	2A5E8Ac1
2A5ABf1	2A5E8Ac2

Geographical Location -

25°48'25.19"N - 25°59'17.558"N
86°59'31.922"E - 87°19'30.205"E

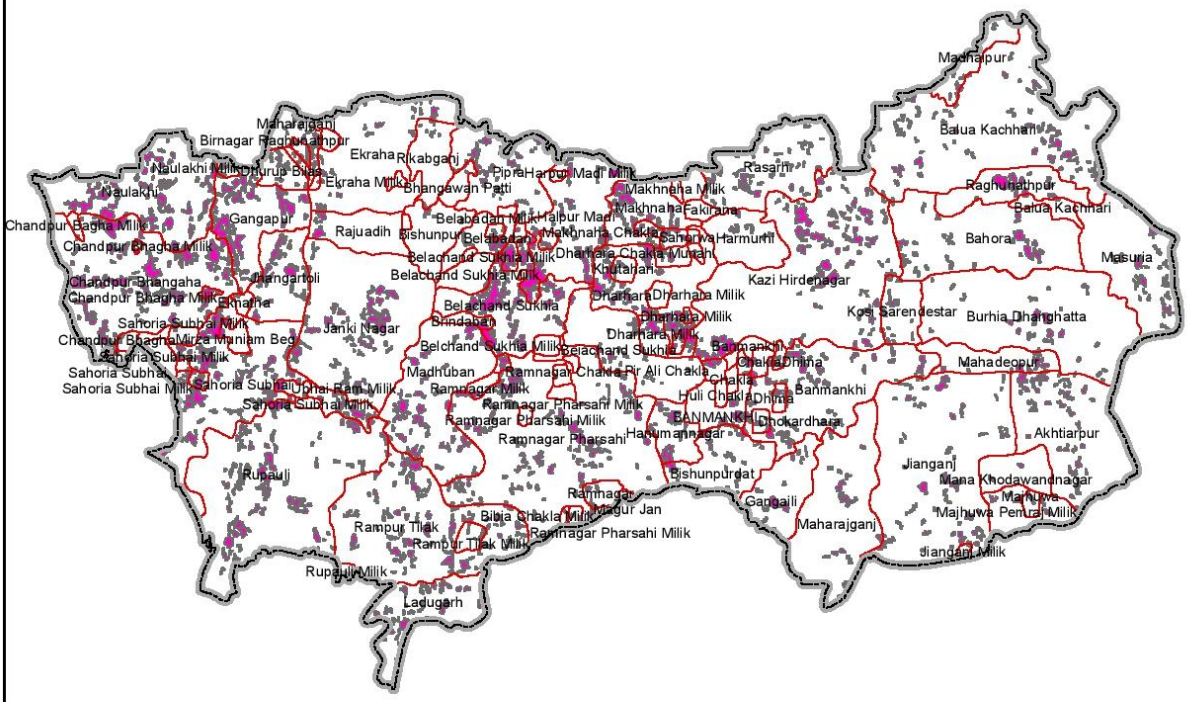
Kilometers
2 1 0 2 4 6





Prepared by: Bihar Remote Sensing Application Center, Patna

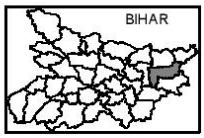
Spatial Aspect of Orchards
Banmankhi Block, Purnia District, Bihar

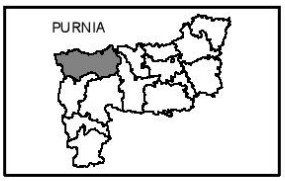


Geographical Location -

25°48'25.19"N - 25°59'17.558"N
86°59'31.922"E - 87°19'30.205"E

Kilometers
2 1 0 2 4 6





Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Slope
Banmankhi Block, Purnia District, Bihar

Legend

- Block Boundary
- Village Boundary

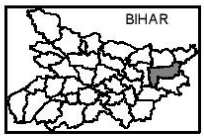
Slope (in Percent)

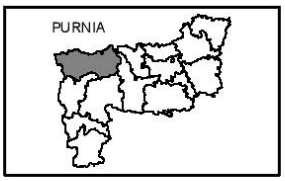
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

Geographical Location -

25°48'25.19"N - 25°59'17.558"N
86°59'31.922"E - 87°19'30.205"E

Kilometers
2 1 0 2 4 6





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Soil
Banmankhi Block, Purnia District, Bihar

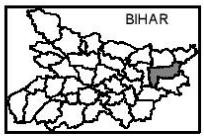
Legend

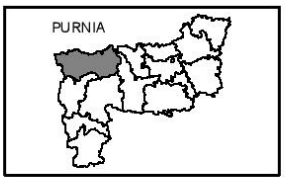
- Block Boundary
- Village Boundary
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
- Typic Ustipsamments
- Aquic Ustipsamments
- Coarse-loamy, Typic Ustifluvents
- Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
- Coarse-loamy,Aeric Fluvaq
- Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
- Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
- Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
- Fine-Loamy,Typic Ustifluv
- Fine-loamy, Typic Ustifluvents
- Fine-loamy,ATypic Ustochr
- Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Fine-loamy,Aeric Haplaquepts,
- Fine-loamy,Typic Haplaquents
- Fine-loamy,Typic Ustifluv
- Fine-loamy,Typic Ustocrepts,Very fine,Vertic Haplaquepts
- River
- Typic Ustipsamments

Geographical Location -

25°48'25.19"N - 25°59'17.558"N
86°59'31.922"E - 87°19'30.205"E

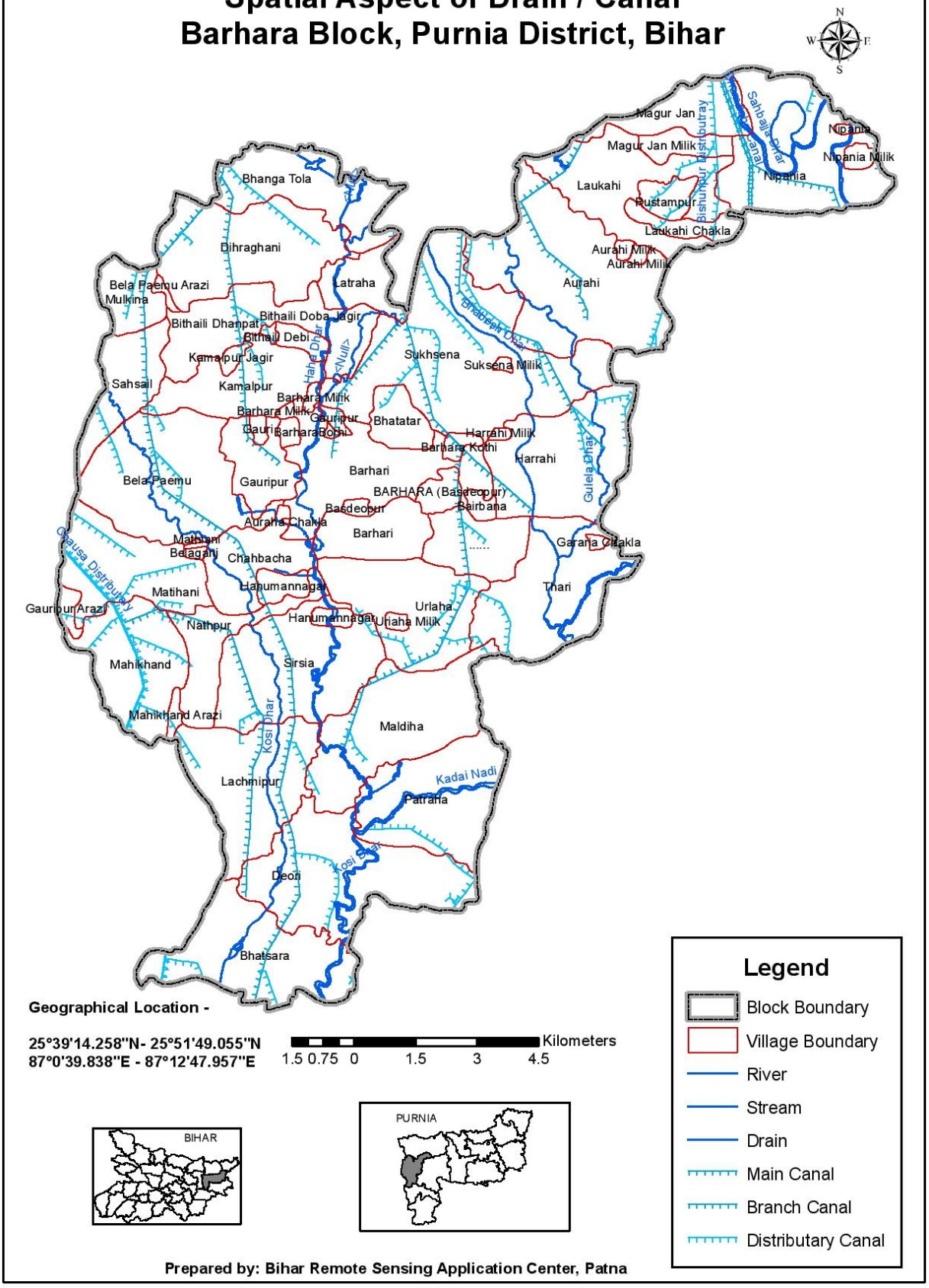
Kilometers
2 1 0 2 4 6





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Drain / Canal
Barhara Block, Purnia District, Bihar



Geographical Location -

25°39'14.258"N- 25°51'49.055"N
87°0'39.838"E - 87°12'47.957"E

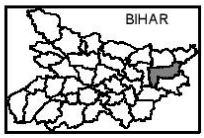
Prepared by: Bihar Remote Sensing Application Center, Patna

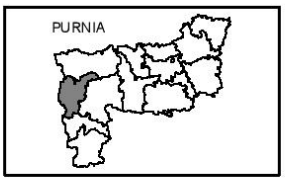
Spatial Aspect of Lakes / Ponds
Barhara Block, Purnia District, Bihar

Geographical Location -

25°39'14.258"N- 25°51'49.055"N
87°0'39.838"E - 87°12'47.957"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend
- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

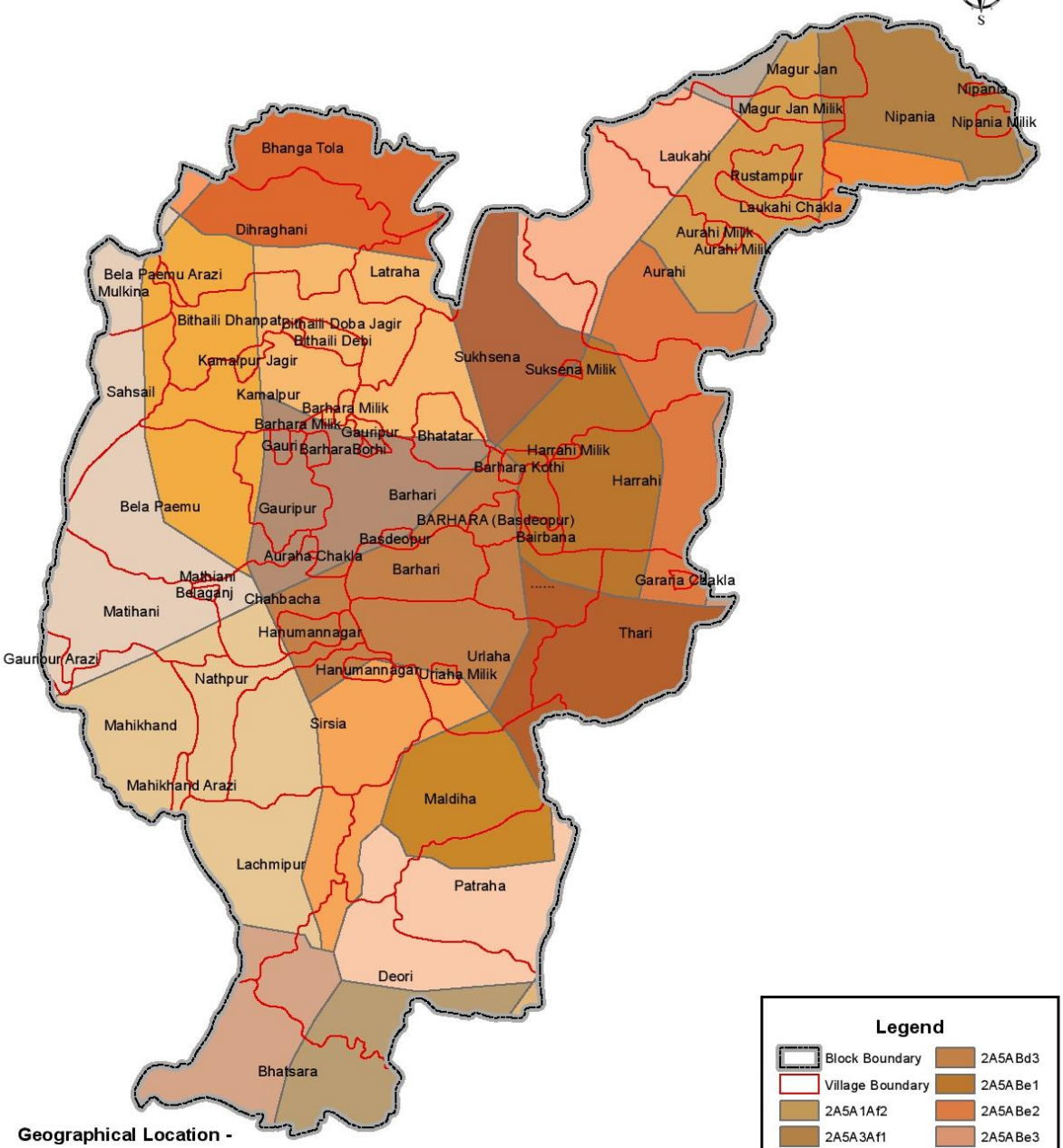
Landuse / Land Cover Map
Barhara Block, Purnia District, Bihar

Geographical Location -

25°39'14.258"N- 25°51'49.055"N
87°0'39.838"E - 87°12'47.957"E

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Barhara Block, Purnia District, Bihar

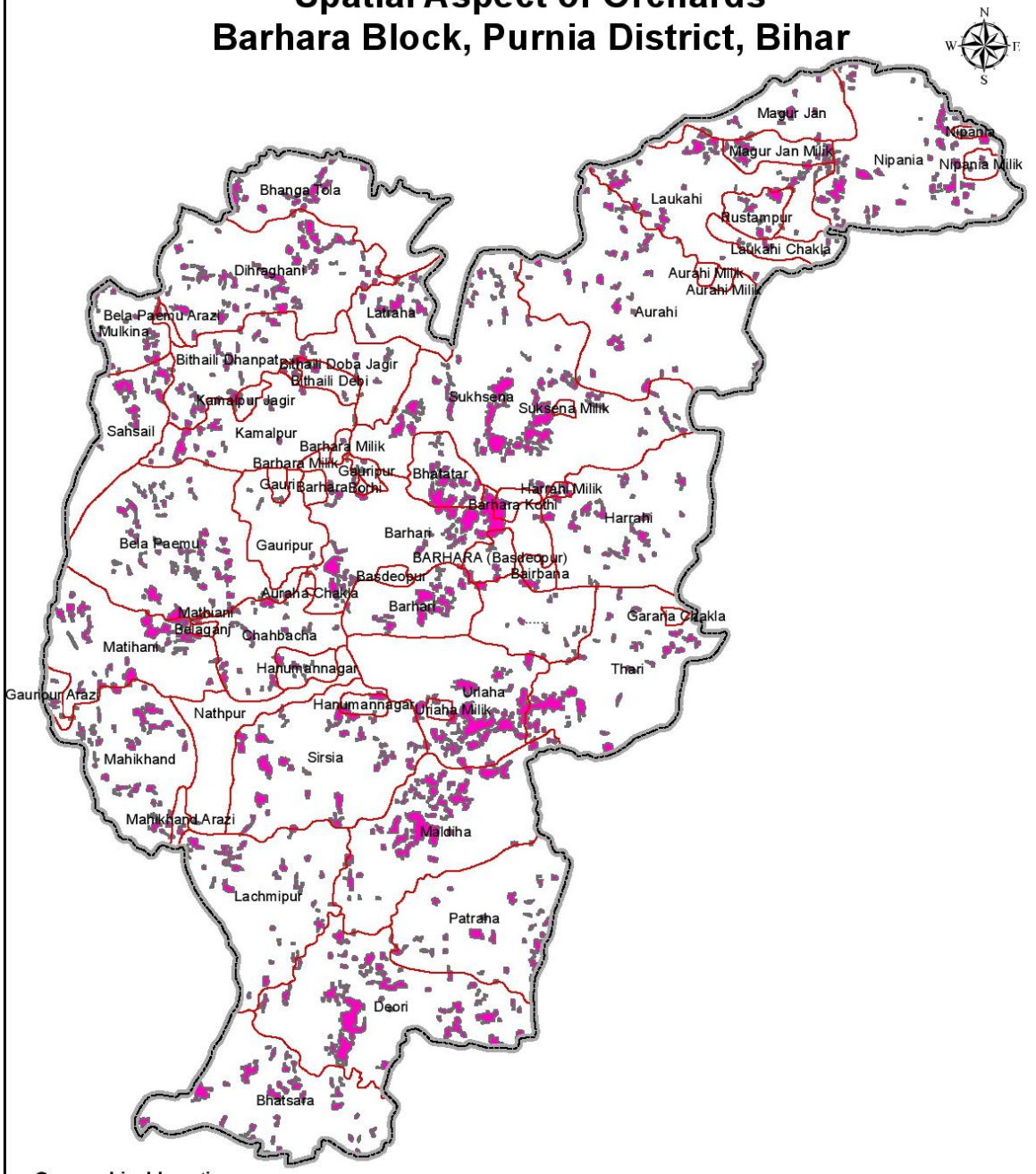


Geographical Location -

25°39'14.258"N- 25°51'49.055"N
87°0'39.838"E - 87°12'47.957"E

Prepared by: Bihar Remote Sensing Application Center, Patna

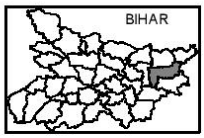
Spatial Aspect of Orchards
Barhara Block, Purnia District, Bihar

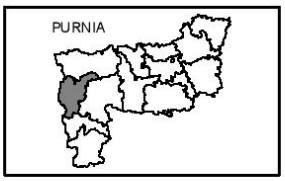


Geographical Location -

25°39'14.258"N- 25°51'49.055"N
87°0'39.838"E - 87°12'47.957"E

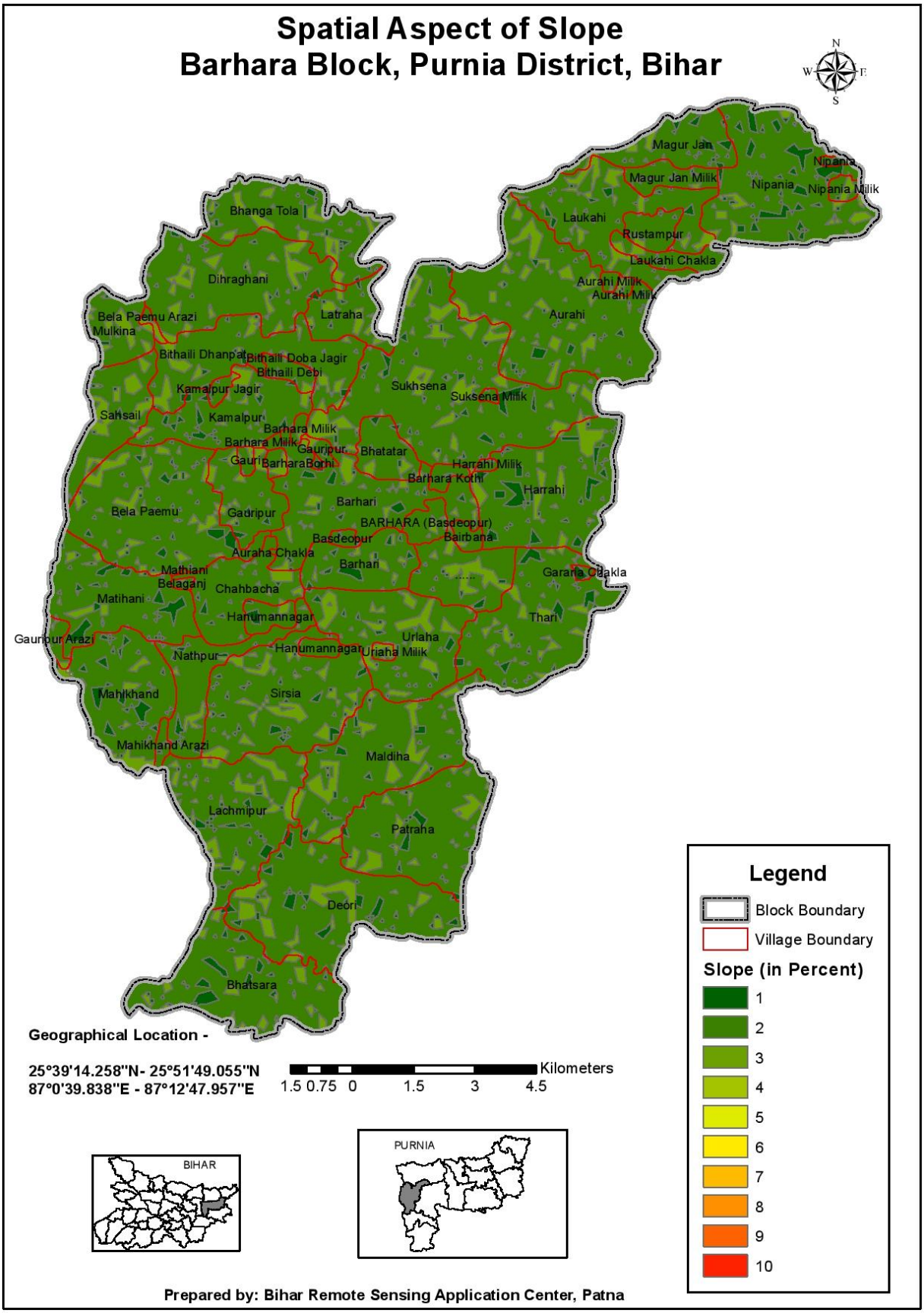
Kilometers
1.5 0.75 0 1.5 3 4.5

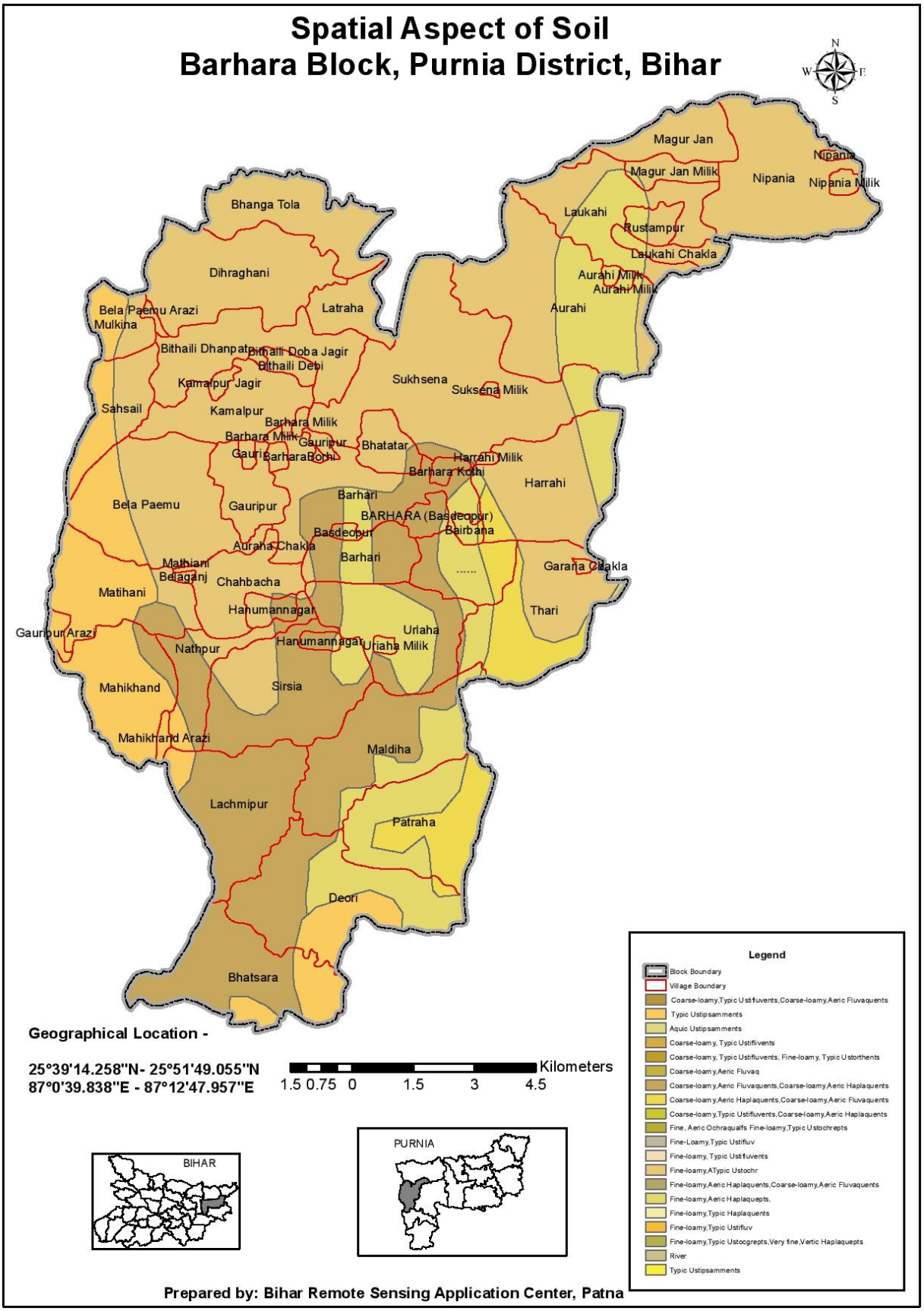




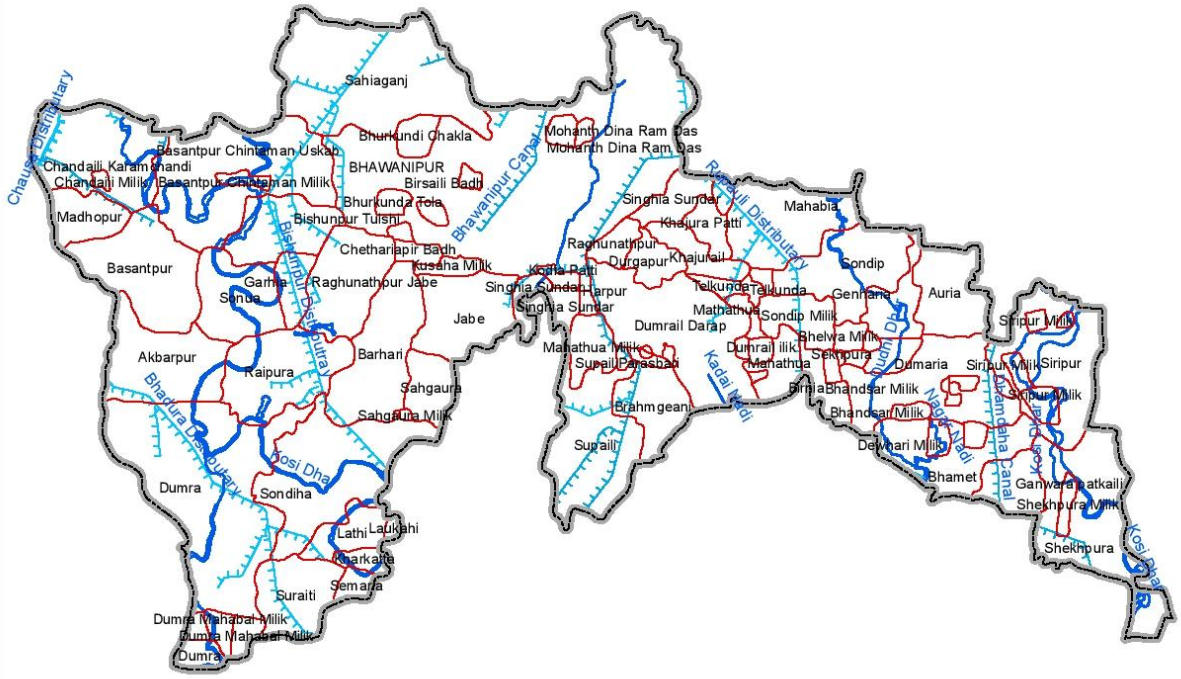
Legend
- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Slope
Barhara Block, Purnia District, Bihar
N
W
E
S
Magur Jan
Nipania
Magur Jan Milik
Nipania
Nipania Milik
Bhanga Tola
Laukahi
Rustampur
Laukahi Chakla
Dihraghani
Aurahi Milik
Aurahi Milik
Aurahi
Bela Paemu Arazi
Mulkina
Latraha
Bithaili Dhanpat
Bithaili Doba Jagir
Bithaili Debi
Kamalpur Jagir
Sukhsena
Suksena Milik
Sahsail
Kamalpur
Barhara Milik
Barhara Milik
Gauripur
Bhatatar
Gauri
Barhara Bothi
Harrahi Milik
Barhara Kothi
Harrahi
Barhari
Bela Paemu
Gauripur
BARHARA (Basdeopur)
Basdeopur
Bairbana
Auraha Chakla
Barhari
Mathiani
Belaganj
Chahbacha
Gararia Chakla
Matihani
Hanumannagar
Thari
Gauripur Arazi
Urlaha
Nathpur
Hanumannagar
Urlaha Milik
Mahikhand
Sirsia
Mahikhand Arazi
Maldiha
Lachmipur
Patraha
Deori
Bhatsara
Legend
Block Boundary
Village Boundary
Slope (in Percent)
1
2
3
4
5
6
7
8
9
10
Geographical Location -
25°39'14.258"N- 25°51'49.055"N
87°0'39.838"E - 87°12'47.957"E
Kilometers
1.5 0.75 0 1.5 3 4.5
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Soil
Barhara Block, Purnia District, Bihar
N
W
E
S
Magur Jan
Magur Jan Milik
Nipania
Nipania Milik
Nipania
Bhanga Tola
Laukahi
Rustampur
Laukahi Chakla
Dihraghani
Aurahi Milik
Aurahi Milik
Aurahi
Bela Paemu Arazi
Mulkina
Latraha
Bithaili Dhanpat
Bithaili Doba Jagir
Bithaili Debi
Kamalpur Jagir
Sukhsena
Suksena Milik
Sahsail
Kamalpur
Barhara Milik
Barhara Milik
Gauripur
Bhatatar
Gauri
Barhara Bothi
Harrahi Milik
Barhara Kothi
Harrahi
Bela Paemu
Gauripur
Barhari
BARHARA (Basdeopur)
Basdeopur
Bairbana
Auraha Chakla
Barhari
Garana Chakla
Mathiani
Belaganj
Chabbacha
Matihani
Hanumannagar
Thari
Gauripur Arazi
Urlaha
Nathpur
Hanumannagar
Urlaha Milik
Mahikhand
Sirsia
Mahikhand Arazi
Maldiha
Lachmipur
Patraha
Deori
Bhatsara
Legend
Block Boundary
Village Boundary
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
Typic Ustipsamments
Aquic Ustipsamments
Coarse-loamy, Typic Ustifilvents
Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
Coarse-loamy,Aeric Fluvaq
Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
Fine-Loamy,Typic Ustifluv
Fine-loamy, Typic Ustifluvents
Fine-loamy,ATypic Ustochr
Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Fine-loamy,Aeric Haplaquepts,
Fine-loamy,Typic Haplaquents
Fine-loamy,Typic Ustifluv
Fine-loamy,Typic Ustocgrepts,Very fine,Vertic Haplaquepts
River
Typic Ustipsamments
Geographical Location -
25°39'14.258"N- 25°51'49.055"N
87°0'39.838"E - 87°12'47.957"E
Kilometers
1.5 0.75 0 1.5 3 4.5
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna

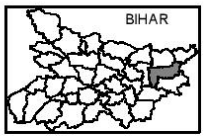
Spatial Aspect of Drain / Canal
Bhawanipur Block, Purnia District, Bihar

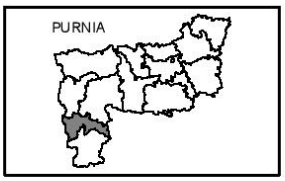


Geographical Location -

25°33'6.537"N - 25°40'54.689"N
87°1'42"E - 87°16'17.143"E

Kilometers
1.50.75 0 1.5 3 4.5



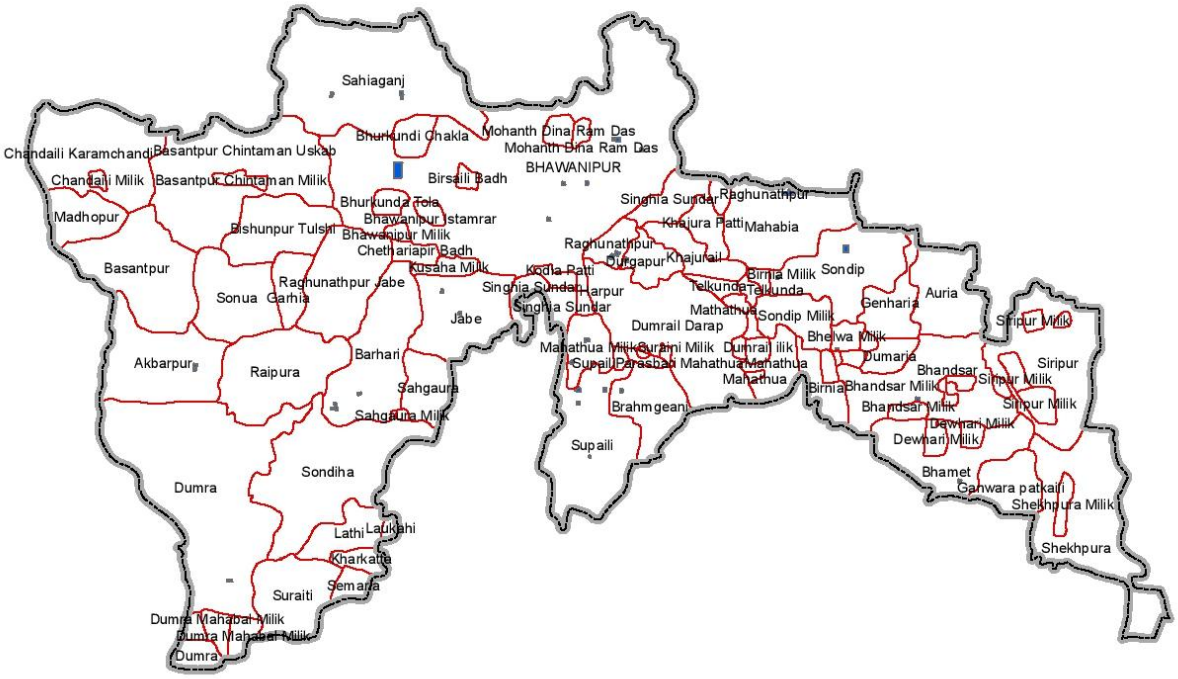


Legend

- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main Canal
- Branch Canal
- Distributary Canal

Prepared by: Bihar Remote Sensing Application Center, Patna

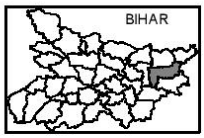
Spatial Aspect of Lakes / Ponds
Bhawanipur Block, Purnia District, Bihar

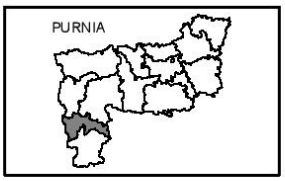


Geographical Location -

25°33'6.537"N - 25°40'54.689"N
87°1'42"E - 87°16'17.143"E

Kilometers
1.50.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Bhawanipur Block, Purnia District, Bihar

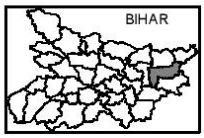
Legend

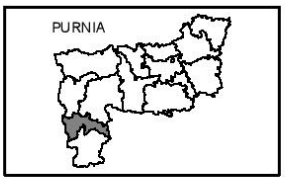
- Block Boundary
- Village Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- AgriculturalLand-PlantatioN-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural -Built Up area (Ru*
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Geographical Location -

25°33'6.537"N - 25°40'54.689"N
87°1'42"E - 87°16'17.143"E

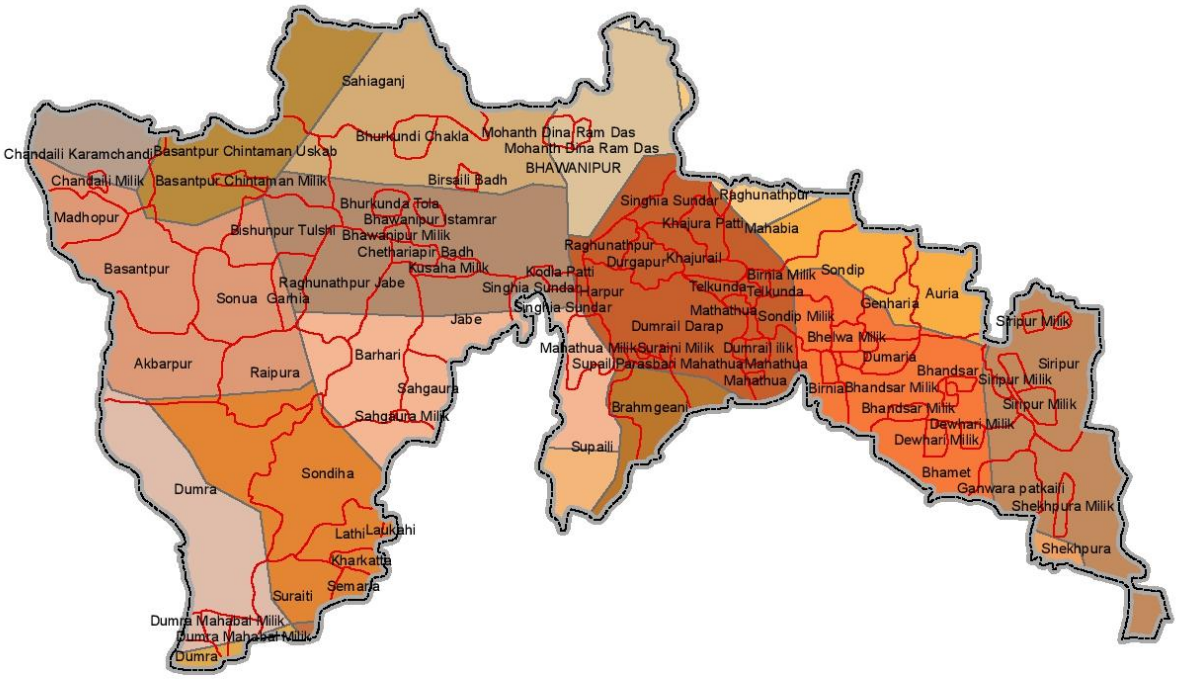
Kilometers
1.50.75 0 1.5 3 4.5





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Bhawanipur Block, Purnia District, Bihar



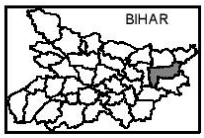
Legend

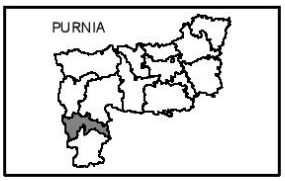
- Block Boundary
- Village Boundary
- 2A5A1Aa3
- 2A5A1Ab1
- 2A5A1Ab2
- 2A5A1Ab3
- 2A5A1Ad1
- 2A5AAa5
- 2A5AAb1
- 2A5AAb2
- 2A5AAb3
- 2A5AAc1
- 2A5AAc2
- 2A5AAc3
- 2A5AAd1
- 2A5ABb1
- 2A5ABb2
- 2A5ABb3
- 2A5ABb4
- 2A5ABb5
- 2A5ABc1
- 2A5ABc2

Geographical Location -

25°33'6.537"N - 25°40'54.689"N
87°1'42"E - 87°16'17.143"E

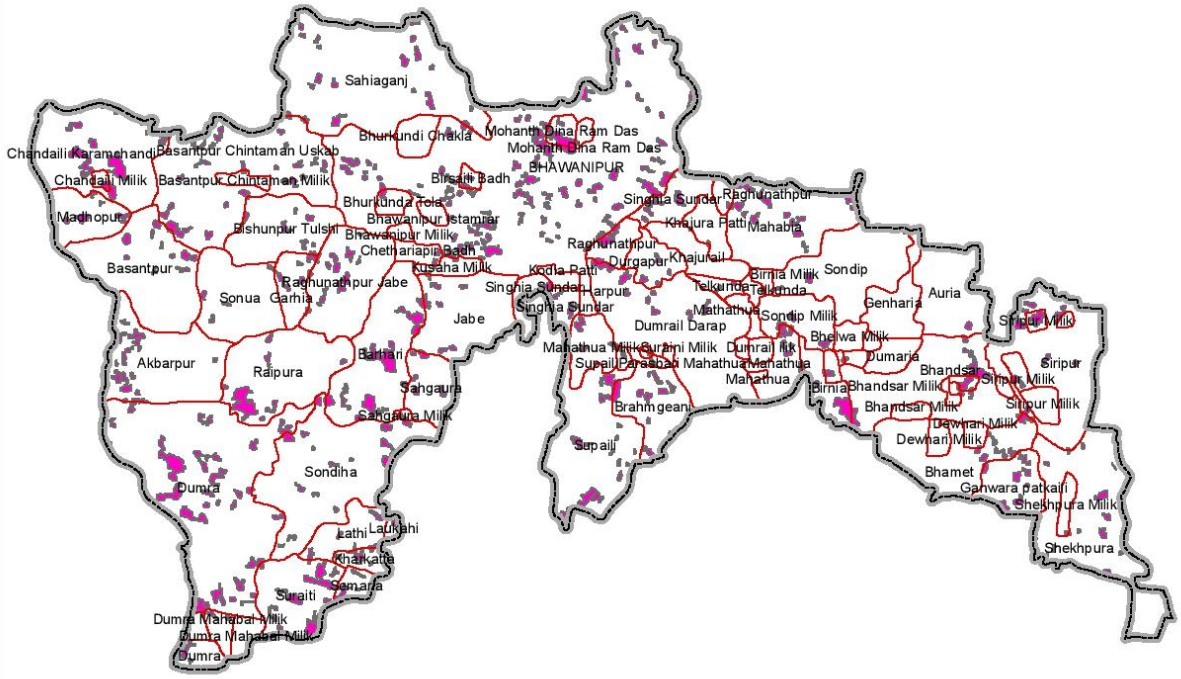
Kilometers
1.50.75 0 1.5 3 4.5





Prepared by: Bihar Remote Sensing Application Center, Patna

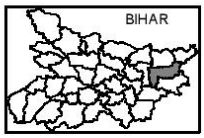
Spatial Aspect of Orchards
Bhawanipur Block, Purnia District, Bihar

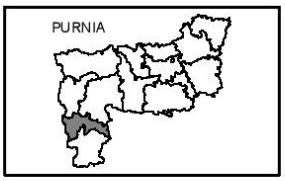


Geographical Location -

25°33'6.537"N - 25°40'54.689"N
87°1'42"E - 87°16'17.143"E

Kilometers
1.50.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Slope
Bhawanipur Block, Purnia District, Bihar

Legend

- Block Boundary
- Village Boundary

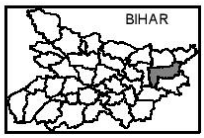
Slope (in Percent)

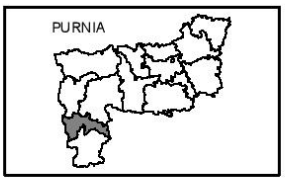
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

Geographical Location -

25°33'6.537"N - 25°40'54.689"N
87°1'42"E - 87°16'17.143"E

Kilometers
1.50.75 0 1.5 3 4.5





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Soil
Bhawanipur Block, Purnia District, Bihar

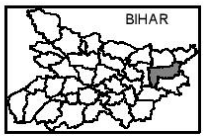
Legend

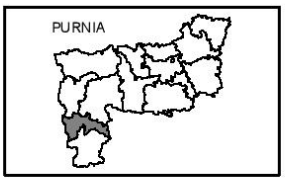
- Block Boundary
- Village Boundary
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
- Typic Ustipsamments
- Aquic Ustipsamments
- Coarse-loamy, Typic Ustifilvents
- Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
- Coarse-loamy,Aeric Fluvaq
- Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
- Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
- Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
- Fine-Loamy,Typic Ustifluv
- Fine-loamy, Typic Ustifluvents
- Fine-loamy,ATypic Ustochr
- Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Fine-loamy,Aeric Haplaquepts,
- Fine-loamy,Typic Haplaquents
- Fine-loamy,Typic Ustifluv
- Fine-loamy,Typic Ustocgrepts,Very fine,Vertic Haplaquepts
- River
- Typic Ustipsamments

Geographical Location -

25°33'6.537"N - 25°40'54.689"N
87°1'42"E - 87°16'17.143"E

Kilometers
1.50.75 0 1.5 3 4.5





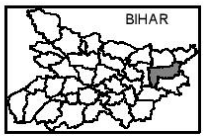
Prepared by: Bihar Remote Sensing Application Center, Patna

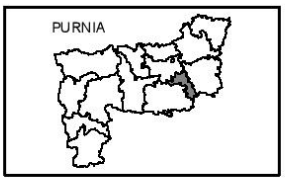
Spatial Aspect of Drain / Canal
Dagarua Block, Purnia District, Bihar

Geographical Location -

25°43'57.841"N- 25°51'55.344"N
87°33'39.574"E - 87°42'22.075"E

Kilometers
1 0.5 0 1 2 3



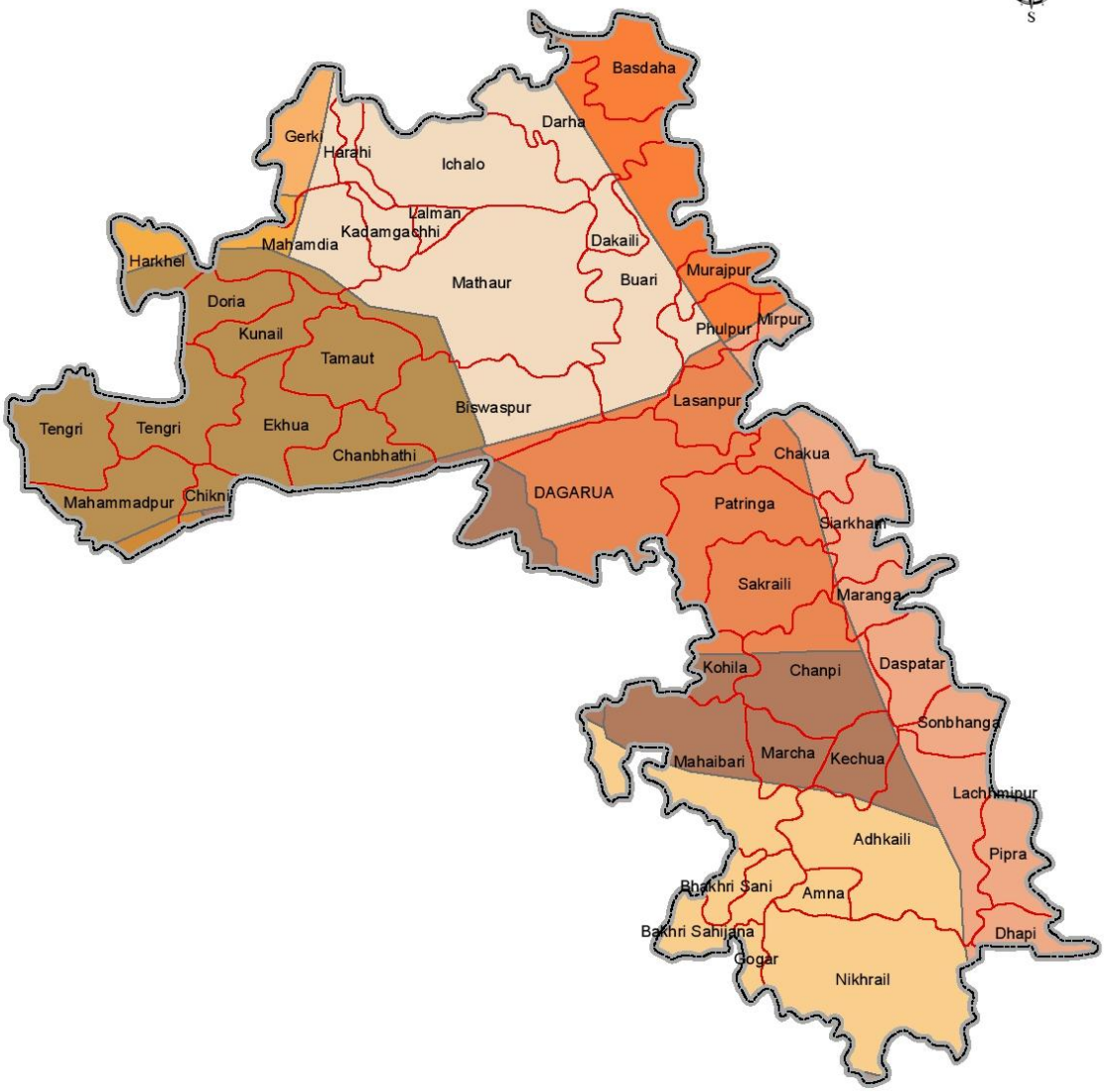


Legend

- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main canal
- Branch Canal
- Distributary Canal

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Dagarua Block, Purnia District, Bihar



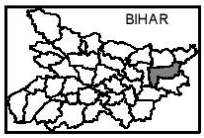
Legend

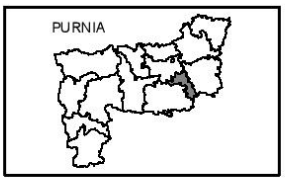
- Block Boundary
- Village Boundary
- 2A5E3Aa7
- 2A5E3Ab2
- 2A5E3Ab3
- 2A5E3Ab4
- 2A5E3Ab5
- 2A5E3Ac1
- 2A5E3Ac2
- 2A5E3Ac3
- 2A5E3Ac4
- 2A5F3Aa1
- 2A5F3Ab1
- 2A5F3Ab2

Geographical Location -

25°43'57.841"N- 25°51'55.344"N
87°33'39.574"E - 87°42'22.075"E

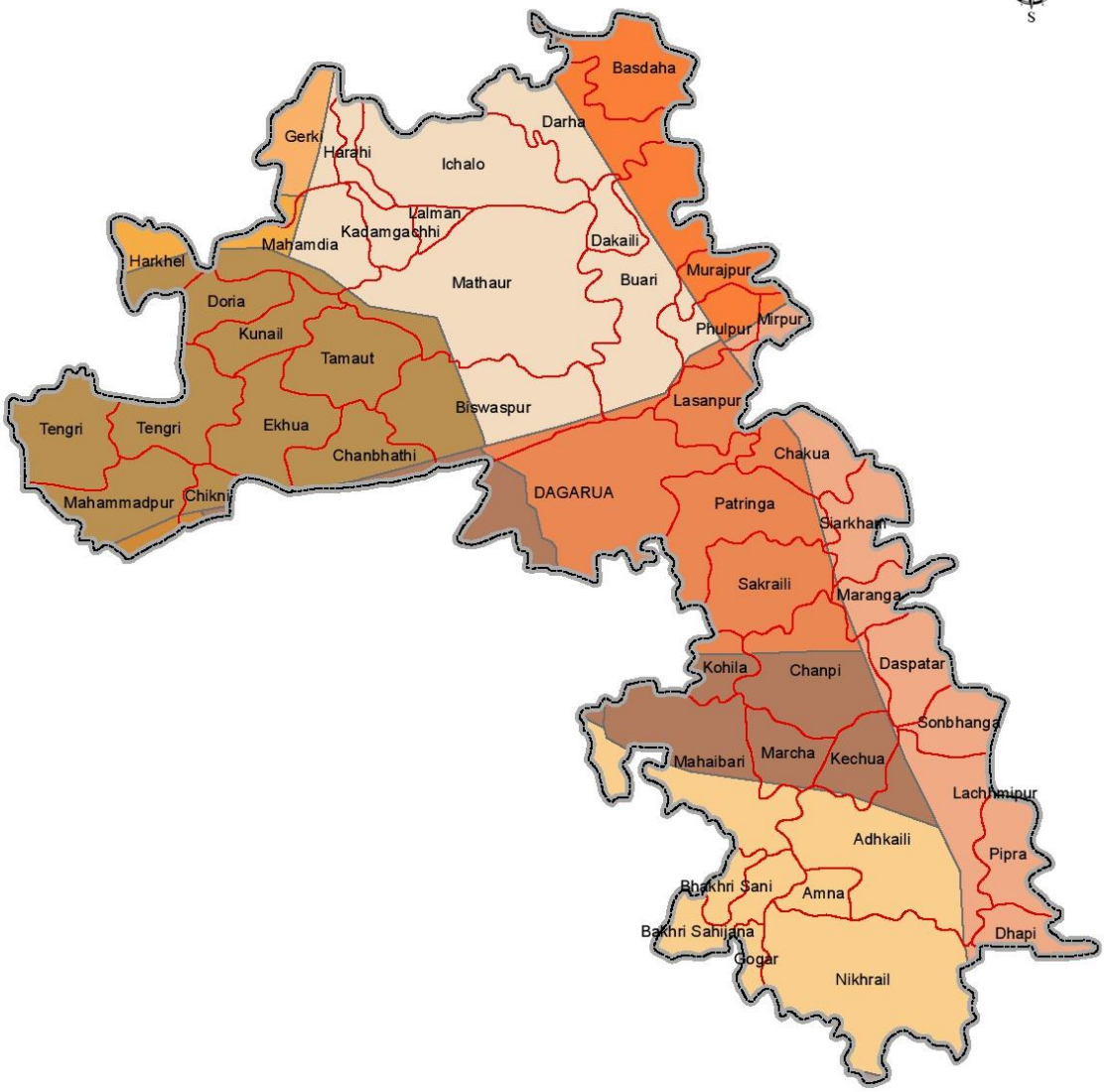
Kilometers
1 0.5 0 1 2 3





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Dagarua Block, Purnia District, Bihar



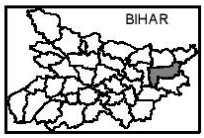
Legend

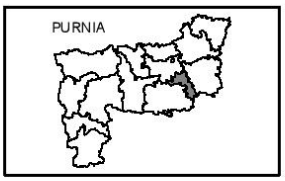
- Block Boundary
- Village Boundary
- 2A5E3Aa7
- 2A5E3Ab2
- 2A5E3Ab3
- 2A5E3Ab4
- 2A5E3Ab5
- 2A5E3Ac1
- 2A5E3Ac2
- 2A5E3Ac3
- 2A5E3Ac4
- 2A5F3Aa1
- 2A5F3Ab1
- 2A5F3Ab2

Geographical Location -

25°43'57.841"N- 25°51'55.344"N
87°33'39.574"E - 87°42'22.075"E

Kilometers
1 0.5 0 1 2 3





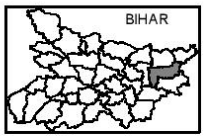
Prepared by: Bihar Remote Sensing Application Center, Patna

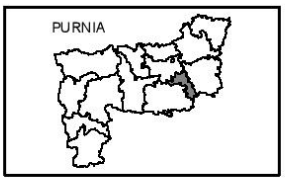
Spatial Aspect of Lakes / Ponds
Dagarua Block, Purnia District, Bihar

Geographical Location -

25°43'57.841"N- 25°51'55.344"N
87°33'39.574"E - 87°42'22.075"E

Kilometers
1 0.5 0 1 2 3



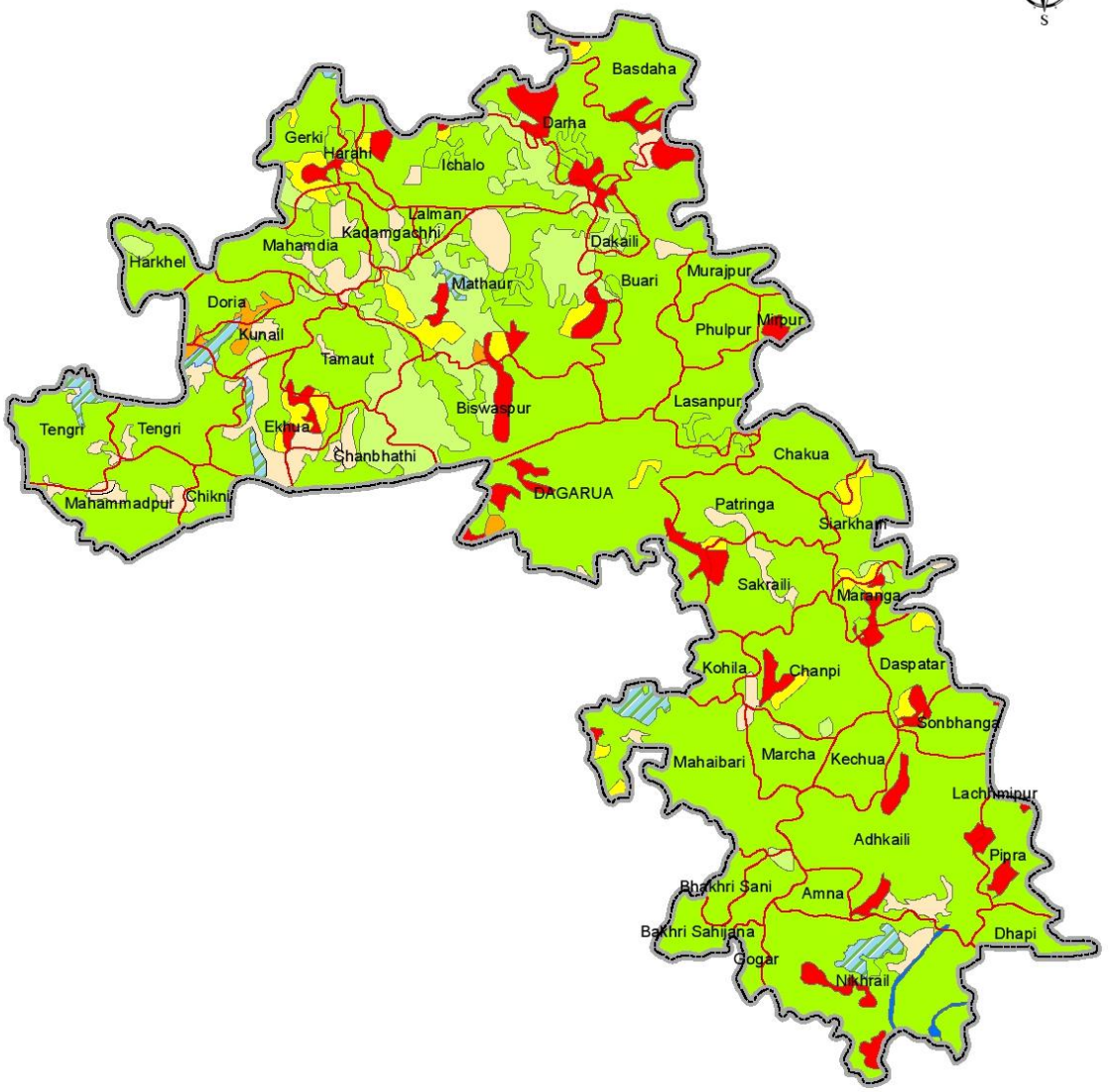


Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Dagarua Block, Purnia District, Bihar



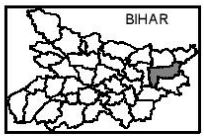
Legend

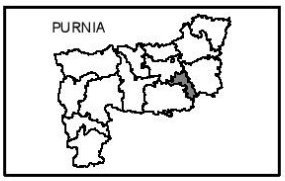
- Block Boundary
- Village Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- Agricultural Land-PlantatioN-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural -Built Up area (Ru"
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Geographical Location -

25°43'57.841"N- 25°51'55.344"N
87°33'39.574"E - 87°42'22.075"E

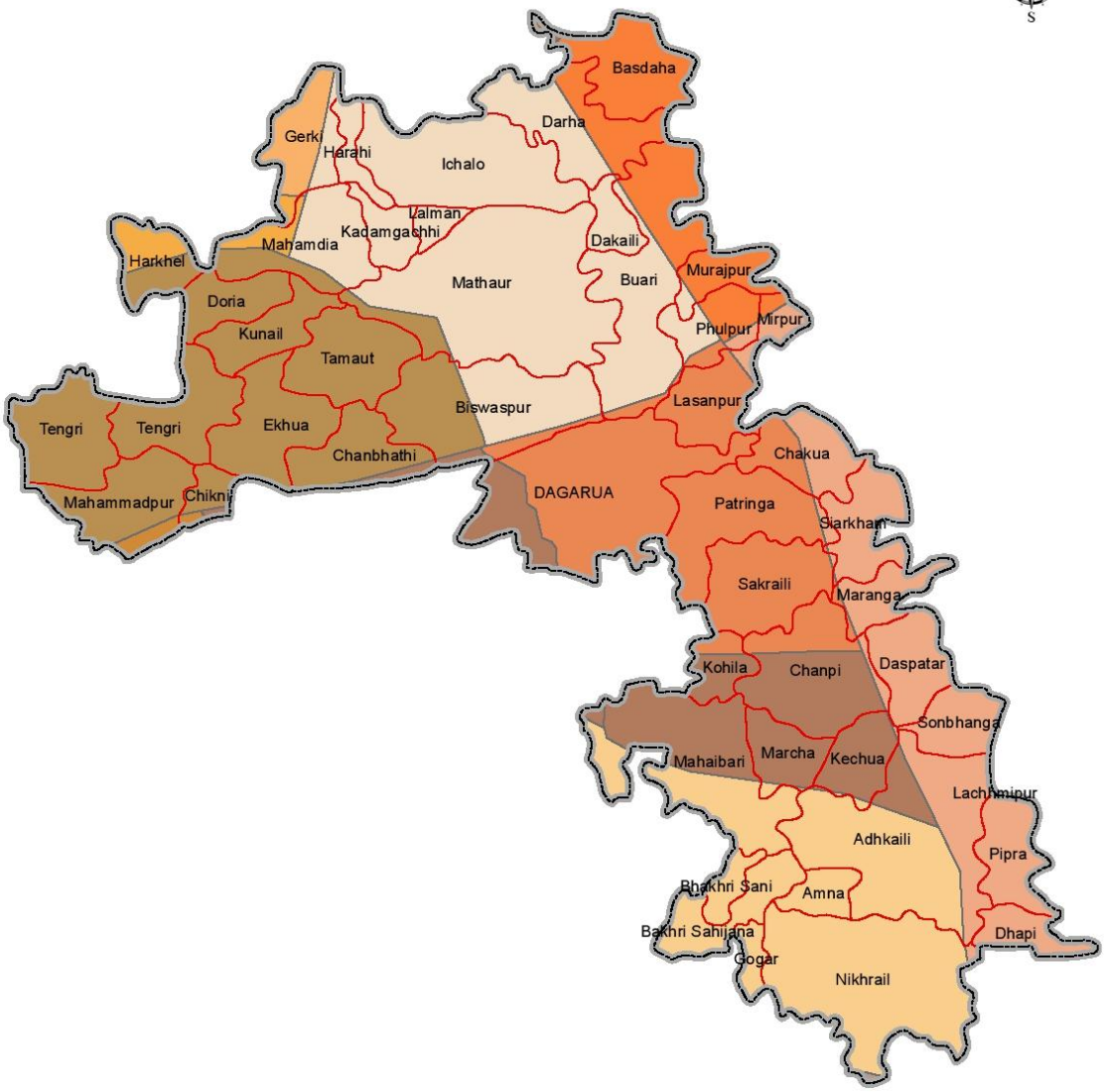
1 0.5 0 1 2 3 Kilometers





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Dagarua Block, Purnia District, Bihar



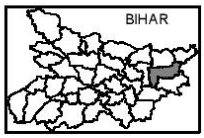
Legend

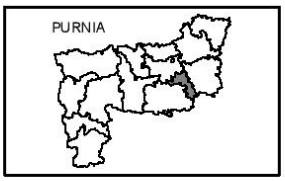
- Block Boundary
- Village Boundary
- 2A5E3Aa7
- 2A5E3Ab2
- 2A5E3Ab3
- 2A5E3Ab4
- 2A5E3Ab5
- 2A5E3Ac1
- 2A5E3Ac2
- 2A5E3Ac3
- 2A5E3Ac4
- 2A5F3Aa1
- 2A5F3Ab1
- 2A5F3Ab2

Geographical Location -

25°43'57.841"N- 25°51'55.344"N
87°33'39.574"E - 87°42'22.075"E

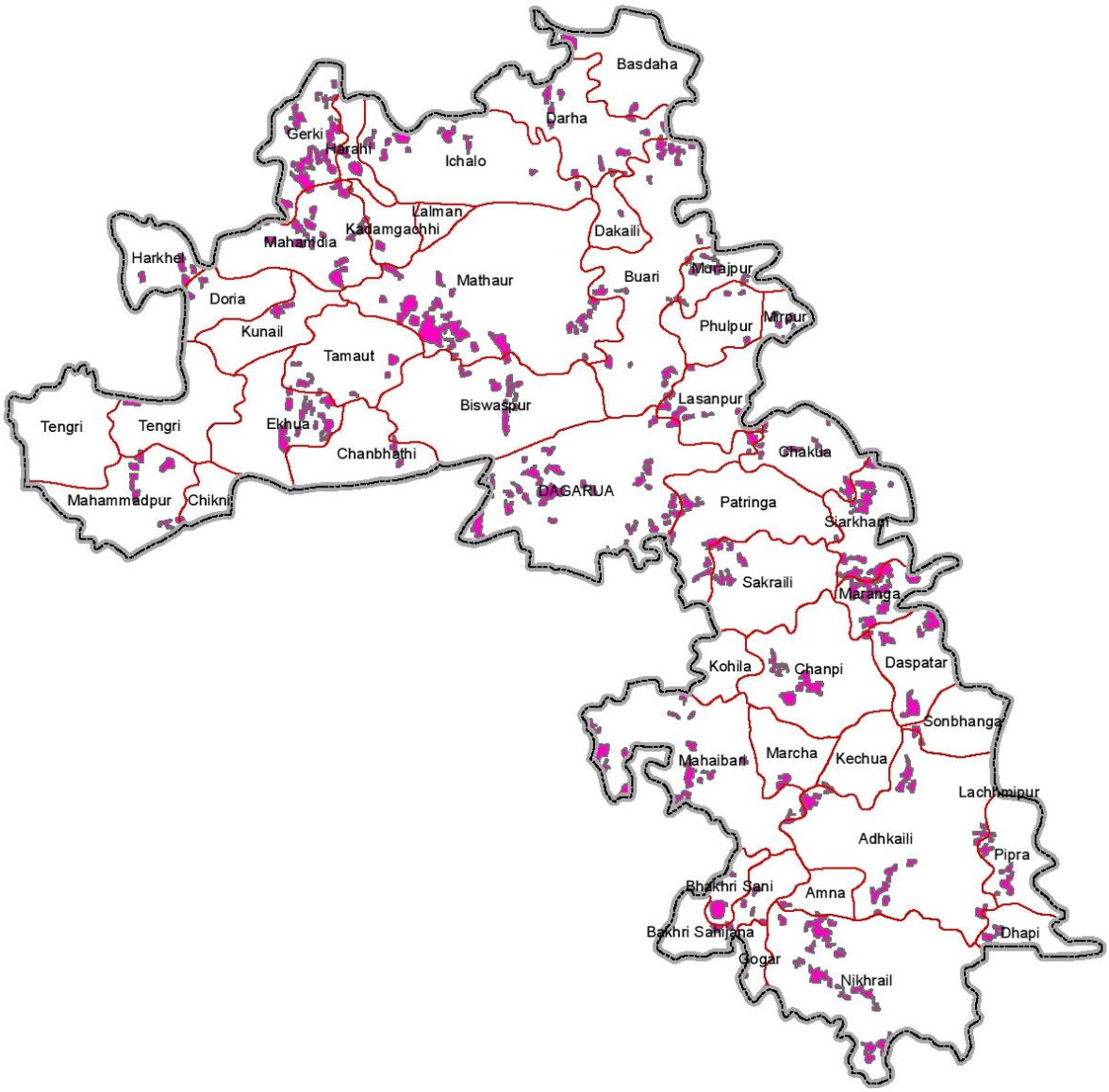
Kilometers
1 0.5 0 1 2 3





Prepared by: Bihar Remote Sensing Application Center, Patna

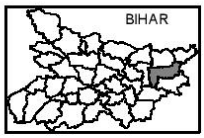
Spatial Aspect of Orchards
Dagarua Block, Purnia District, Bihar

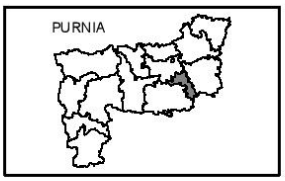


Geographical Location -

25°43'57.841"N- 25°51'55.344"N
87°33'39.574"E - 87°42'22.075"E

Kilometers
1 0.5 0 1 2 3

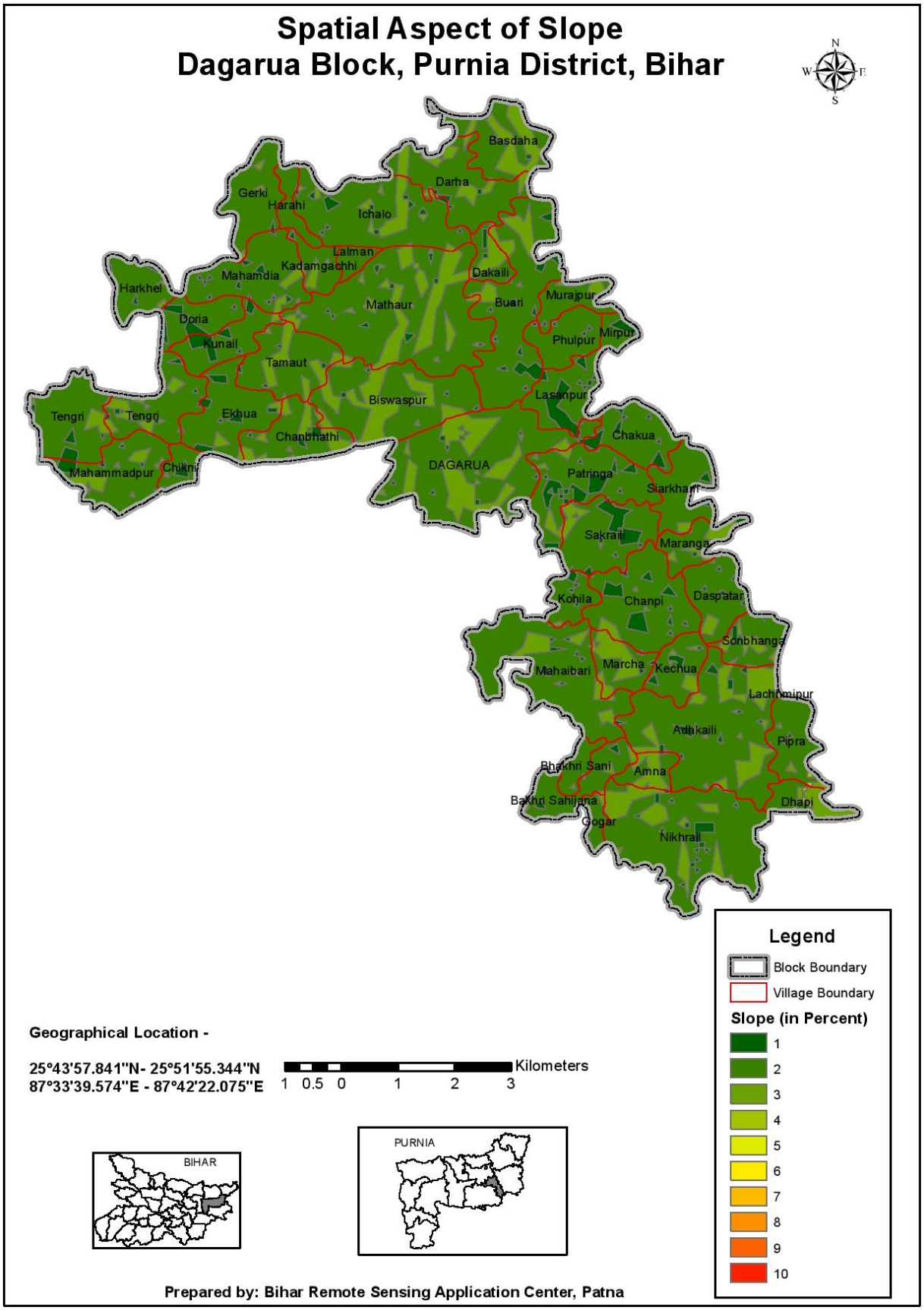




Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Slope
Dagarua Block, Purnia District, Bihar
N
W
E
S
Basdaha
Darha
Gerki
Harahi
Ichalo
Laiman
Kadamgachhi
Mahamdia
Harkhel
Dakaili
Mathaur
Buari
Murajpur
Doria
Kunail
Phulpur
Mirpur
Tamaut
Biswaspur
Lasanpur
Tengri
Tengri
Ekhua
Chanbhathi
Chakua
Mahammadpur
Chikni
DAGARUA
Patringa
Siarkham
Sakraili
Maranga
Kohila
Chanpi
Daspatar
Sonbhanga
Mahaibari
Marcha
Kechua
Lachhmipur
Adhkaili
Pipra
Bhakhri Sani
Amna
Bakhri Sahijana
Dhapi
Gogar
Nikhrail
Legend
Block Boundary
Village Boundary
Slope (in Percent)
1
2
3
4
5
6
7
8
9
10
Geographical Location -
25°43'57.841"N- 25°51'55.344"N
87°33'39.574"E - 87°42'22.075"E
Kilometers
1 0.5 0 1 2 3
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Soil
Dagarua Block, Purnia District, Bihar

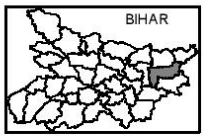
Legend

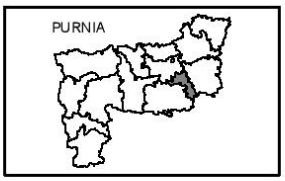
- Block Boundary
- Village Boundary
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
- Typic Ustipsamments
- Aquic Ustipsamments
- Coarse-loamy, Typic Ustifivents
- Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
- Coarse-loamy,Aeric Fluvaq
- Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
- Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
- Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
- Fine-Loamy,Typic Ustifluv
- Fine-loamy, Typic Ustifluvents
- Fine-loamy,ATypic Ustochr
- Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Fine-loamy,Aeric Haplaquepts,
- Fine-loamy,Typic Haplaquents
- Fine-loamy,Typic Ustifluv
- Fine-loamy,Typic Ustocrepts,Very fine,Vertic Haplaquepts
- River
- Typic Ustipsamments

Geographical Location -

25°43'57.841"N- 25°51'55.344"N
87°33'39.574"E - 87°42'22.075"E

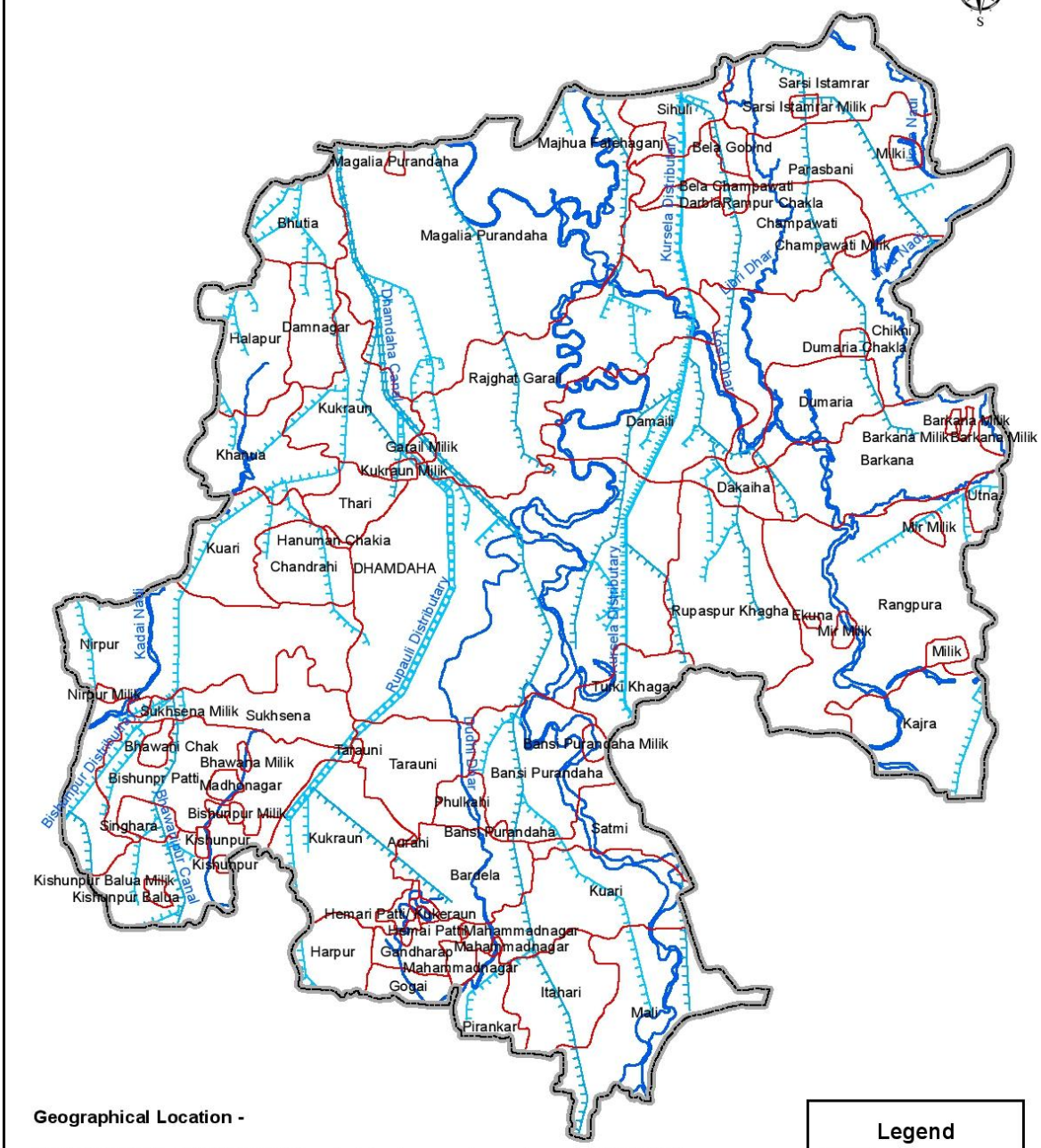
1 0.5 0 1 2 3 Kilometers





Prepared by: Bihar Remote Sensing Application Center, Patna

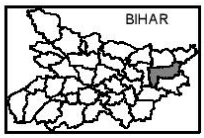
Spatial Aspect of Drain / Canal
Dhamdaha Block, Purnia District, Bihar

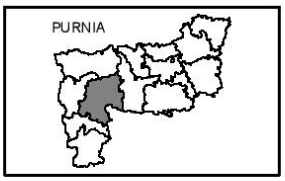


Geographical Location -

25°36'48.548"N- 25°51'32.595"N
87°6'42.915"E - 87°20'14.465"E

Kilometers
1.50.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main canal
- Branch Canal
- Distributary Canal

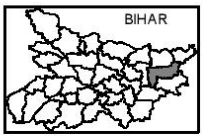
Prepared by: Bihar Remote Sensing Application Center, Patna

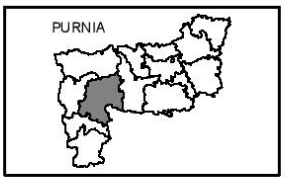
Spatial Aspect of Lakes / Ponds
Dhamdaha Block, Purnia District, Bihar

Geographical Location -

25°36'48.548"N- 25°51'32.595"N
87°6'42.915"E - 87°20'14.465"E

Kilometers
1.50.75 0 1.5 3 4.5



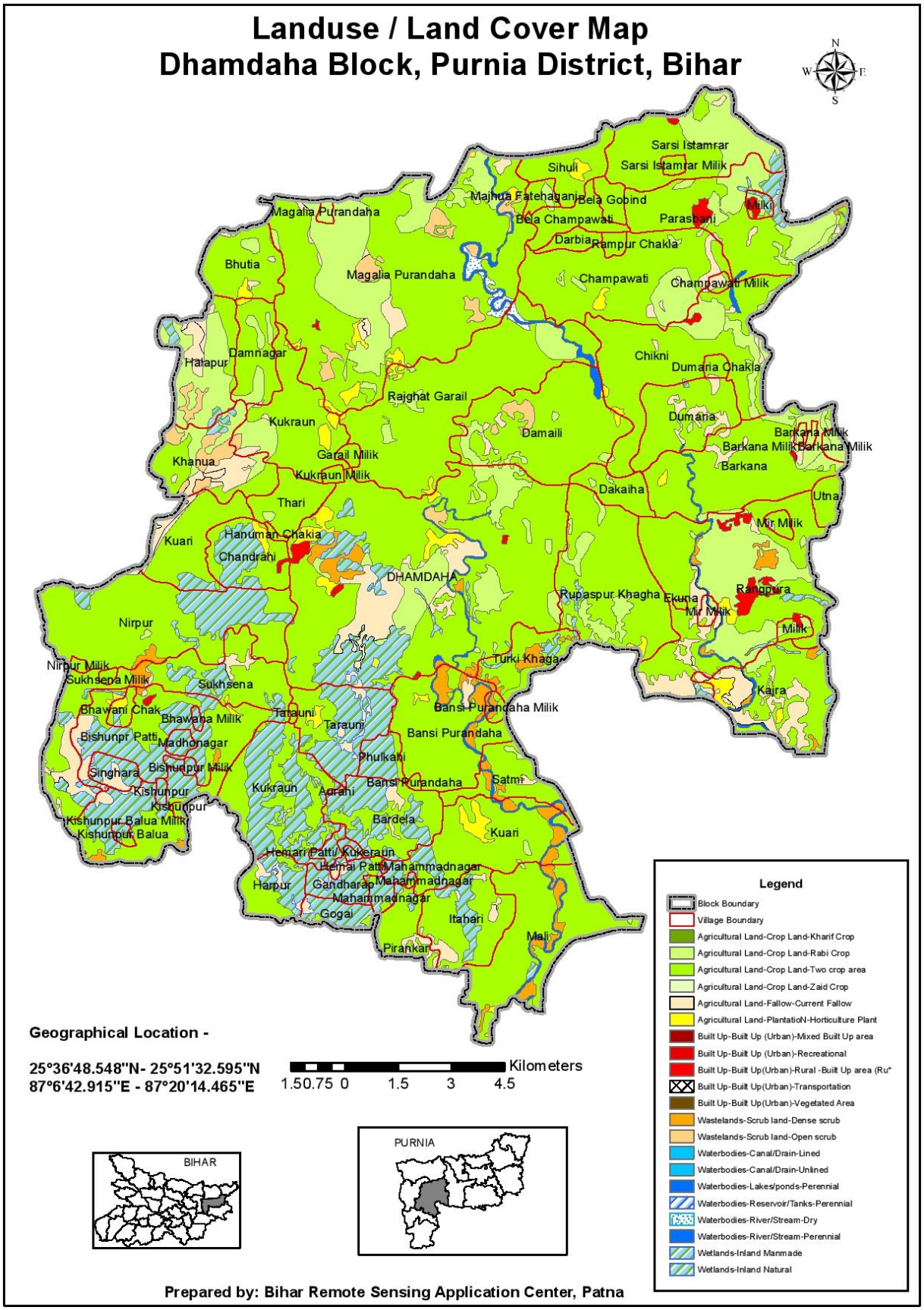


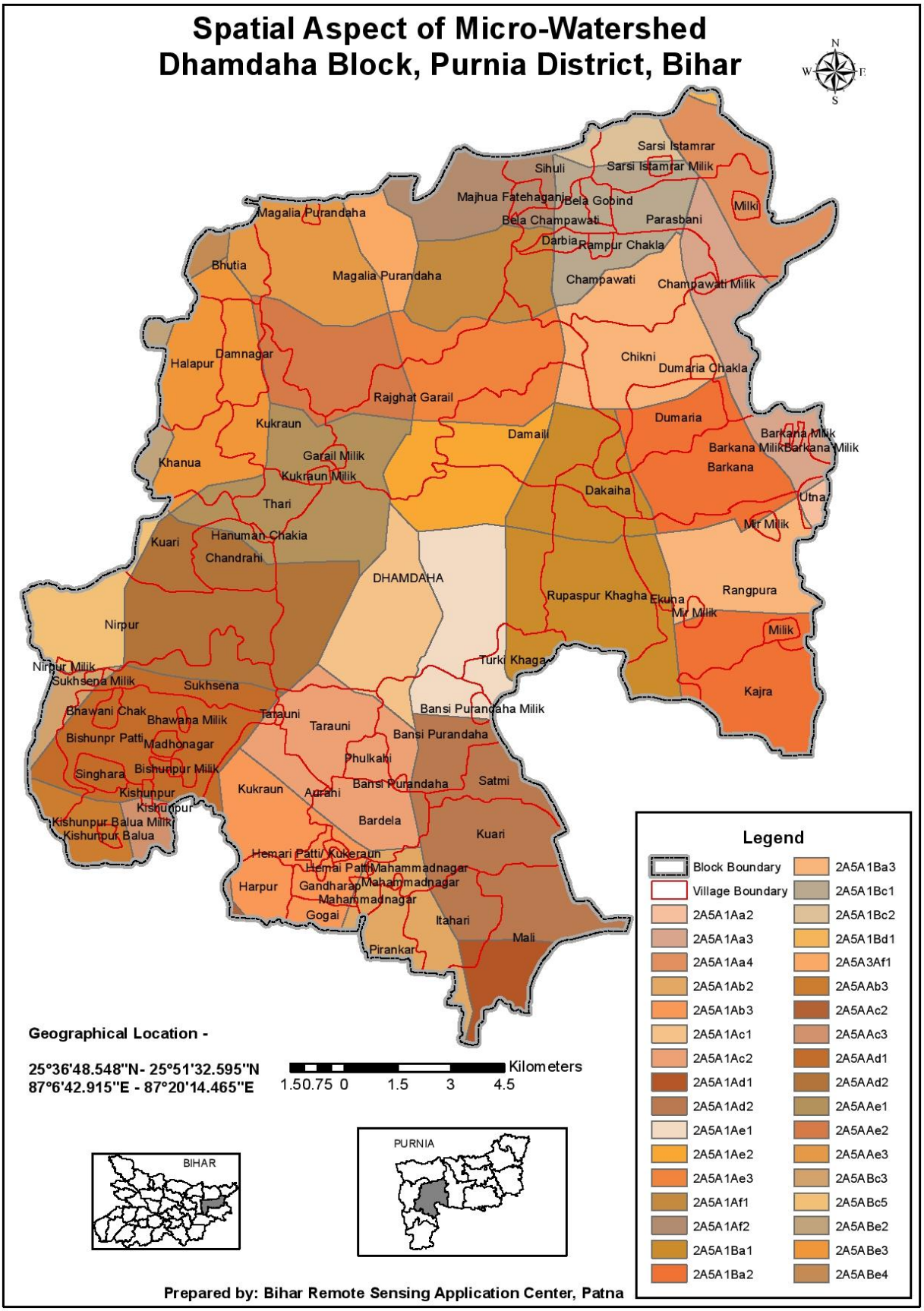
Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

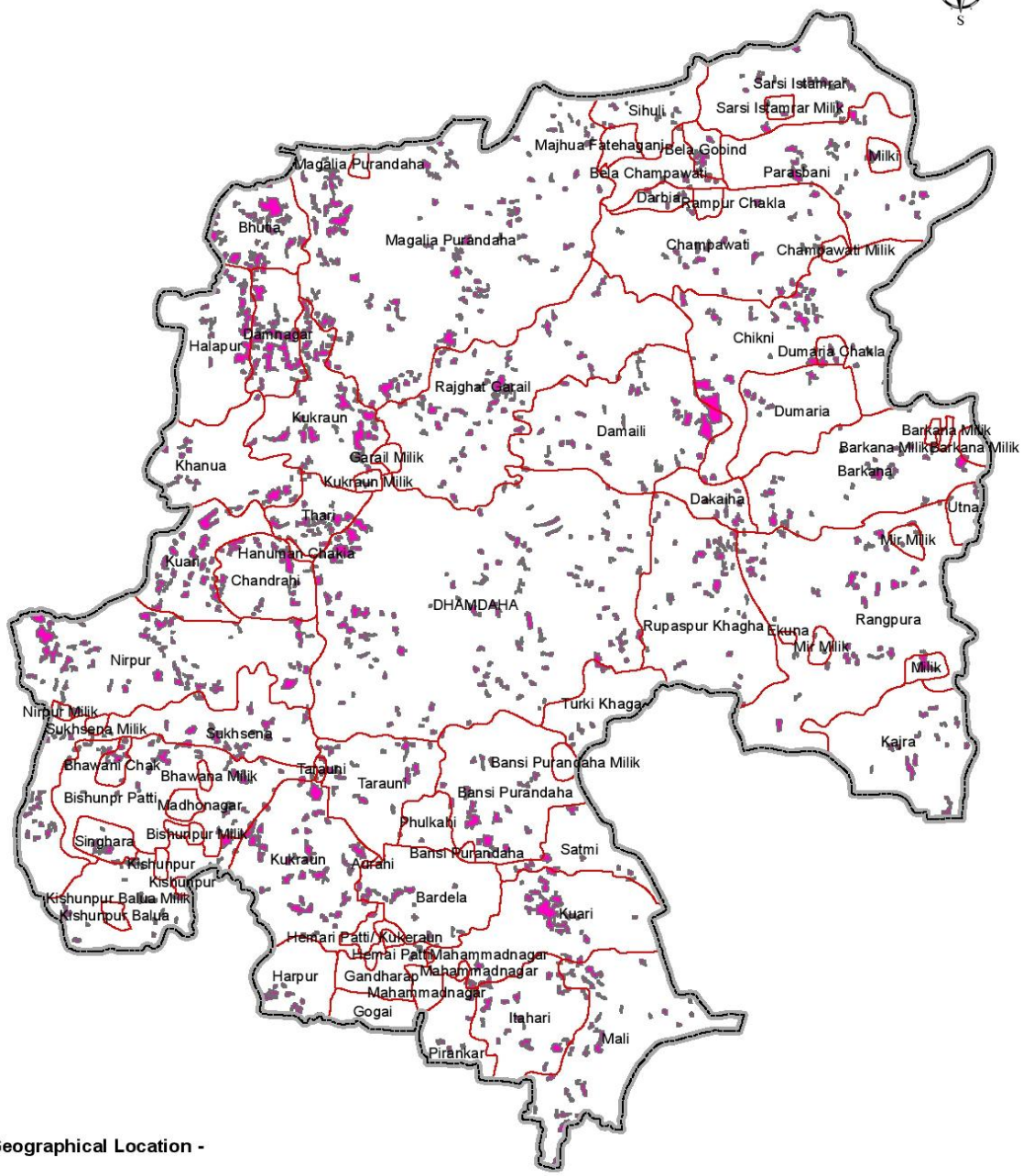
Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Dhamdaha Block, Purnia District, Bihar




Spatial Aspect of Micro-Watershed
Dhamdaha Block, Purnia District, Bihar
N
W
E
S
Sarsi Istamrar
Sarsi Istamrar Milik
Sihuli
Majhua Fatehaganj
Bela Gobind
Milki
Magalia Purandaha
Bela Champawati
Parasbani
Darbia
Rampur Chakla
Bhutia
Magalia Purandaha
Champawati
Champawati Milik
Chikni
Dumaria Chakla
Halapur
Damnagar
Rajghat Garail
Dumaria
Kukraun
Damaili
Barkana Milik
Barkana Milik
Barkana Milik
Barkana
Khanua
Garail Milik
Kukraun Milik
Dakaiha
Utna
Thari
Mir Milik
Kuari
Hanuman Chakia
Chandrahi
DHAMDAHA
Rupaspur Khagha
Ekuna
Mir Milik
Rangpura
Nirpur
Milik
Nirpur Milik
Turki Khaga
Sukhsena Milik
Sukhsena
Kajra
Bhawani Chak
Bhawana Milik
Tarauni
Tarauni
Bansi Purandaha Milik
Bansi Purandaha
Bishunpr Patti
Madhonagar
Phulkahi
Singhara
Bishunpur Milik
Bansi Purandaha
Satmi
Kishunpur
Kukraun
Aurani
Kishunpur
Kishunpur Balua Milik
Bardela
Kishunpur Balua
Kuari
Hemari Patti/ Kukeraun
Hemai Patti
Mahammadnagar
Harpur
Gandharap
Mahammadnagar
Mahammadnagar
Gogai
Itahari
Mali
Pirankar
Legend
Block Boundary
Village Boundary
2A5A1Aa2
2A5A1Aa3
2A5A1Aa4
2A5A1Ab2
2A5A1Ab3
2A5A1Ac1
2A5A1Ac2
2A5A1Ad1
2A5A1Ad2
2A5A1Ae1
2A5A1Ae2
2A5A1Ae3
2A5A1Af1
2A5A1Af2
2A5A1Ba1
2A5A1Ba2
2A5A1Ba3
2A5A1Bc1
2A5A1Bc2
2A5A1Bd1
2A5A3Af1
2A5AAb3
2A5AAc2
2A5AAc3
2A5AAd1
2A5AAd2
2A5AAe1
2A5AAe2
2A5AAe3
2A5ABc3
2A5ABc5
2A5ABe2
2A5ABe3
2A5ABe4
Geographical Location -
25°36'48.548"N- 25°51'32.595"N
87°6'42.915"E - 87°20'14.465"E
Kilometers
1.50.75 0 1.5 3 4.5
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna

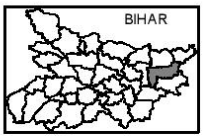
Spatial Aspect of Orchards
Dhamdaha Block, Purnia District, Bihar

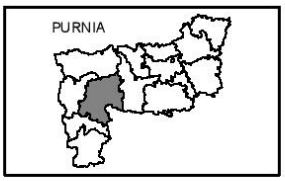


Geographical Location -

25°36'48.548"N- 25°51'32.595"N
87°6'42.915"E - 87°20'14.465"E

Kilometers
1.50.75 0 1.5 3 4.5

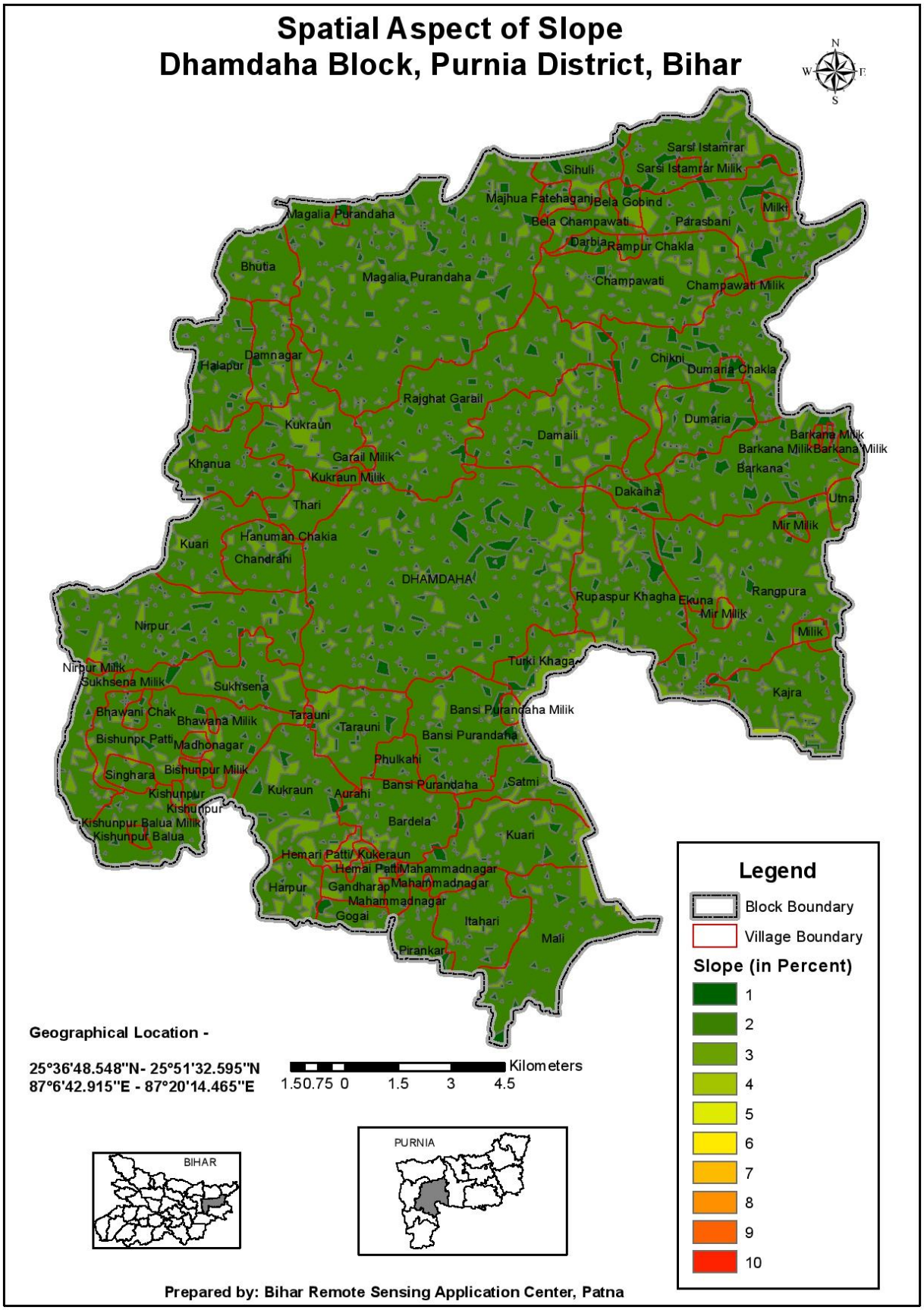


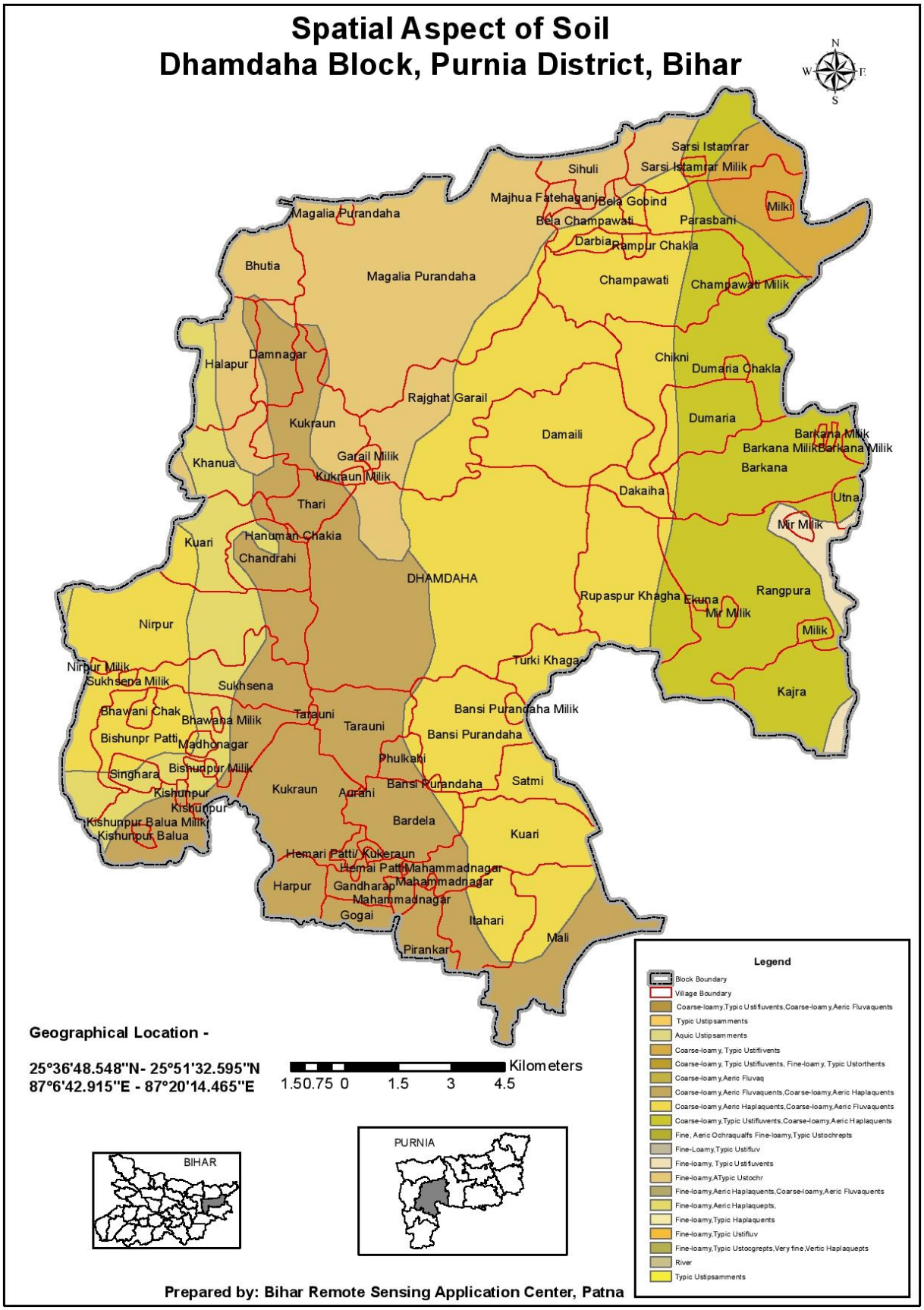


Legend

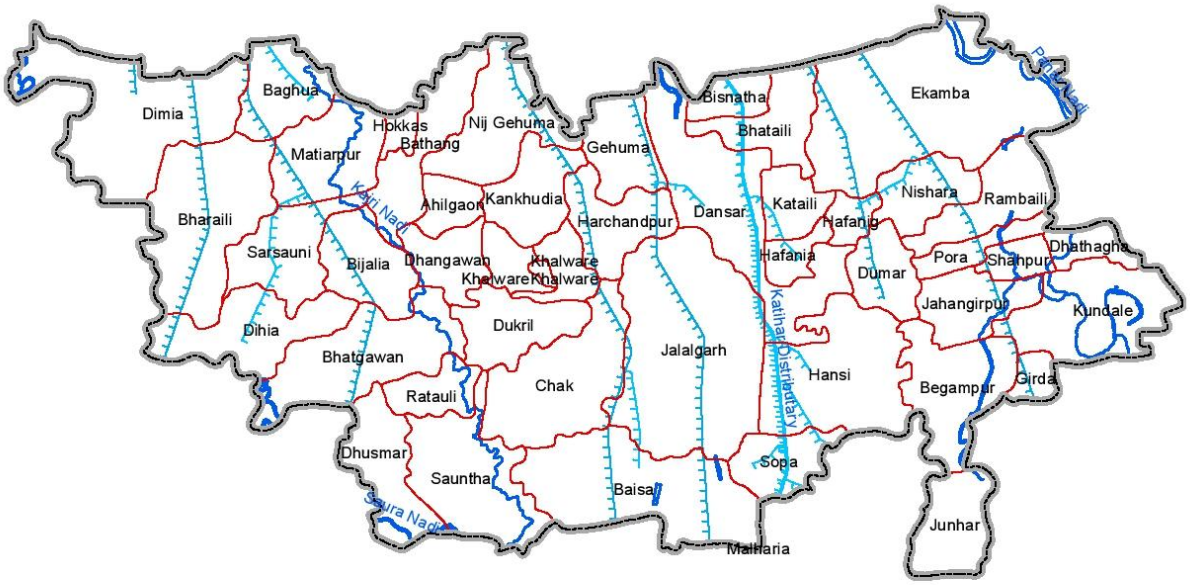
- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Slope
Dhamdaha Block, Purnia District, Bihar
N
W
E
S
Sarsi Istamrar
Sihuli
Sarsi Istamrar Milik
Majhua Fatehaganj
Bela Gobind
Milki
Magalia Purandaha
Bela Champawati
Parasbani
Darbia
Rampur Chakla
Bhutia
Magalia Purandaha
Champawati
Champawati Milik
Damnagar
Halapur
Chikni
Dumaria Chakla
Rajghat Garail
Dumaria
Kukraun
Damaili
Barkana Milik
Barkana Milik
Barkana Milik
Barkana
Khanua
Garail Milik
Kukraun Milik
Dakaiha
Utna
Thari
Mir Milik
Kuari
Hanuman Chakia
Chandrahi
DHAMDAHA
Rupaspur Khagha
Ekuna
Rangpura
Mir Milik
Nirpur
Milik
Nirpur Milik
Turki Khaga
Sukhsena Milik
Sukhsena
Kajra
Bhawani Chak
Bhawana Milik
Tarauni
Tarauni
Bansi Purandaha Milik
Bansi Purandaha
Bishunpr Patti
Madhonagar
Phulkahi
Singhara
Bishunpur Milik
Bansi Purandaha
Satmi
Kishunpur
Kukraun
Aurahi
Kishunpur
Kishunpur Balua Milik
Bardela
Kishunpur Balua
Kuari
Hemari Patti/ Kukeraun
Hemai Patti
Mahammadnagar
Harpur
Gandharap
Mahammadnagar
Mahammadnagar
Gogai
Itahari
Mali
Pirankar
Legend
Block Boundary
Village Boundary
Slope (in Percent)
1
2
3
4
5
6
7
8
9
10
Geographical Location -
25°36'48.548"N- 25°51'32.595"N
87°6'42.915"E - 87°20'14.465"E
Kilometers
1.50.75 0 1.5 3 4.5
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Soil
Dhamdaha Block, Purnia District, Bihar
N
S
W
E
Sarsi Istamrar
Sarsi Istamrar Milik
Sihuli
Majhua Fatehaganj
Bela Gobind
Milki
Magalia Purandaha
Bela Champawati
Parasbani
Darbia
Rampur Chakla
Bhutia
Magalia Purandaha
Champawati
Champawati Milik
Damnagar
Halapur
Chikni
Dumaria Chakla
Rajghat Garail
Dumaria
Kukraun
Damaili
Barkana Milik
Barkana Milik
Barkana Milik
Barkana
Khanua
Garail Milik
Kukraun Milik
Dakaiha
Utna
Thari
Mir Milik
Kuari
Hanuman Chakia
Chandrahi
DHAMDAHA
Rupaspur Khagha
Ekuna
Rangpura
Mir Milik
Nirpur
Milik
Turki Khaga
Nirpur Milik
Sukhsena Milik
Sukhsena
Kajra
Bansi Purandaha Milik
Bhawani Chak
Bhawana Milik
Tarauni
Tarauni
Bansi Purandaha
Bishunpr Patti
Madhonagar
Phulkahi
Singhara
Bishunpur Milik
Bansi Purandaha
Satmi
Kishunpur
Kishunpur
Kukraun
Aurahi
Kishunpur Balua Milik
Kishunpur Balua
Bardela
Kuari
Hemari Patti/ Kukeraun
Hemai Patti
Mahammadnagar
Harpur
Gandharap
Mahammadnagar
Mahammadnagar
Gogai
Itahari
Mali
Pirankar
Legend
Block Boundary
Village Boundary
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
Typic Ustipsamments
Aquic Ustipsamments
Coarse-loamy, Typic Ustifluvents
Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
Coarse-loamy,Aeric Fluvaq
Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
Fine-Loamy,Typic Ustifluv
Fine-loamy, Typic Ustifluvents
Fine-loamy,ATypic Ustochr
Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Fine-loamy,Aeric Haplaquepts,
Fine-loamy,Typic Haplaquents
Fine-loamy,Typic Ustifluv
Fine-loamy,Typic Ustocgrepts,Very fine,Vertic Haplaquepts
River
Typic Ustipsamments
Geographical Location -
25°36'48.548"N- 25°51'32.595"N
87°6'42.915"E - 87°20'14.465"E
Kilometers
1.50.75 0 1.5 3 4.5
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna

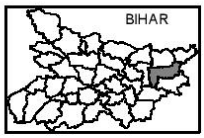
Spatial Aspect of Drain / Canal
Jalalgarh Block, Purnia District, Bihar

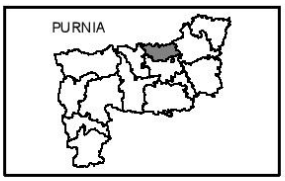


Geographical Location -

25°54'14.343"N- 25°59'37.866"N
87°25'23.798"E - 87°37'24.132"E

Kilometers
1 0.5 0 1 2 3



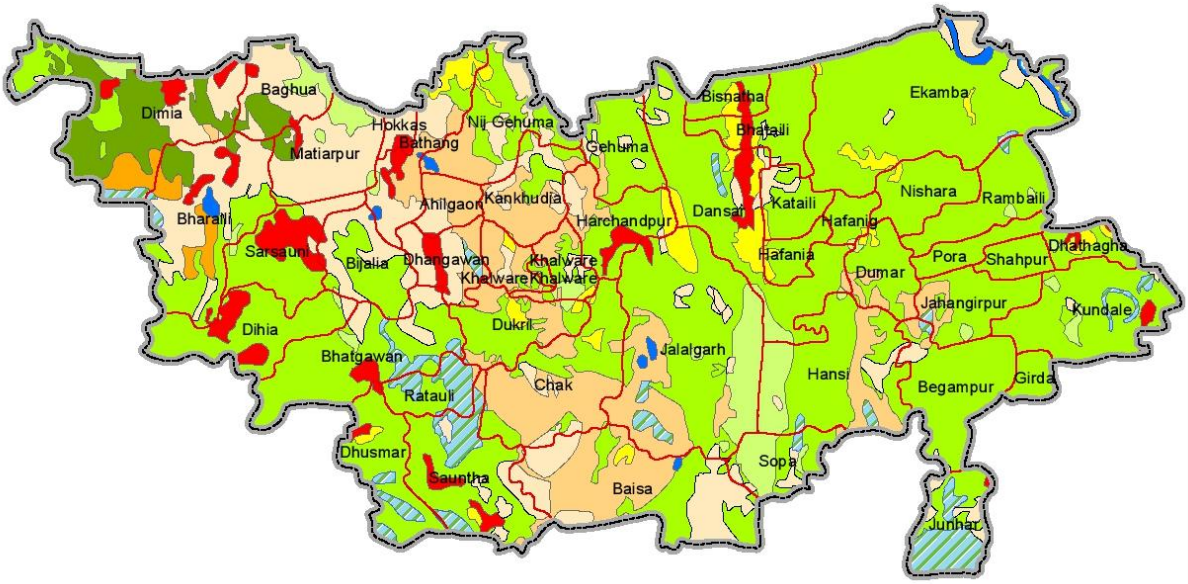


Legend

- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main Canal
- Branch Canal
- Distributary Canal

Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Jalalgarh Block, Purnia District, Bihar



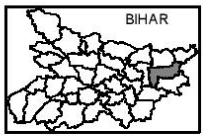
Legend

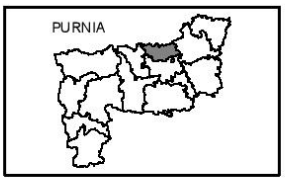
- Block Boundary
- Village Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- Agricultural Land-PlantatioN-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural -Built Up area (Ru"
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Geographical Location -

25°54'14.343"N- 25°59'37.866"N
87°25'23.798"E - 87°37'24.132"E

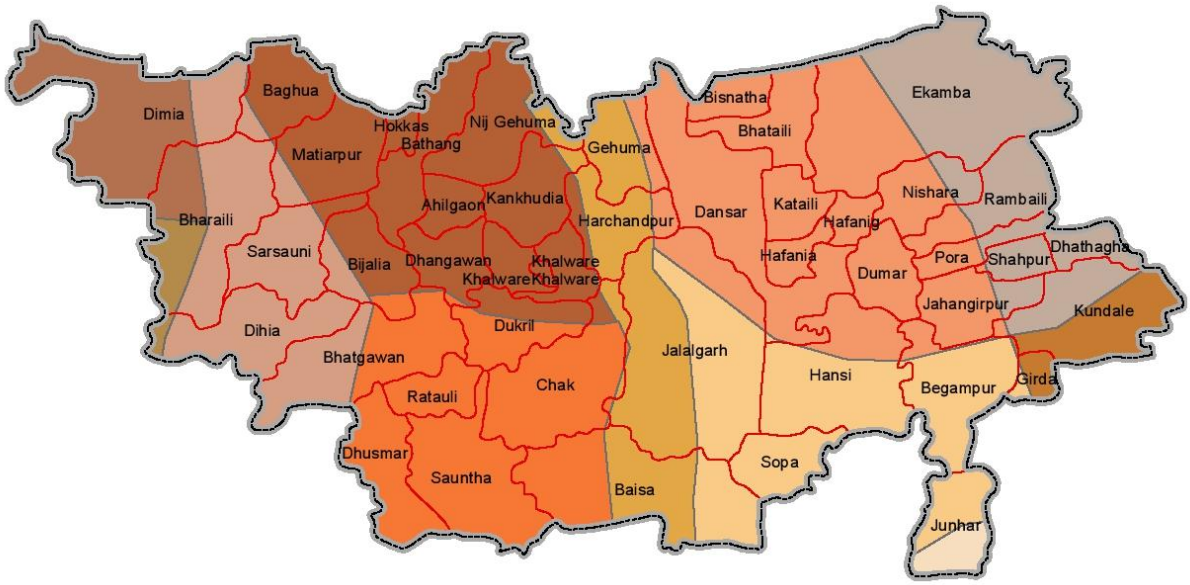
Kilometers
1 0.5 0 1 2 3





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Jalalgarh Block, Purnia District, Bihar



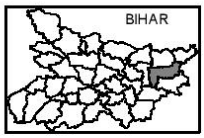
Legend

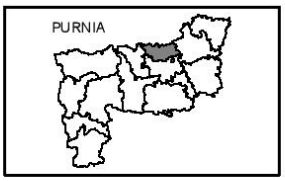
- Block Boundary
- Village Boundary
- 2A5E3Ad1
- 2A5E3Ad2
- 2A5E3Ad3
- 2A5E8Bb5
- 2A5E8Bb7
- 2A5E8Bc1
- 2A5E8Bc2
- 2A5E8Bc3
- 2A5E8Bc4
- 2A5F3Ac3
- 2A5F3Ac4

Geographical Location -

25°54'14.343"N- 25°59'37.866"N
87°25'23.798"E - 87°37'24.132"E

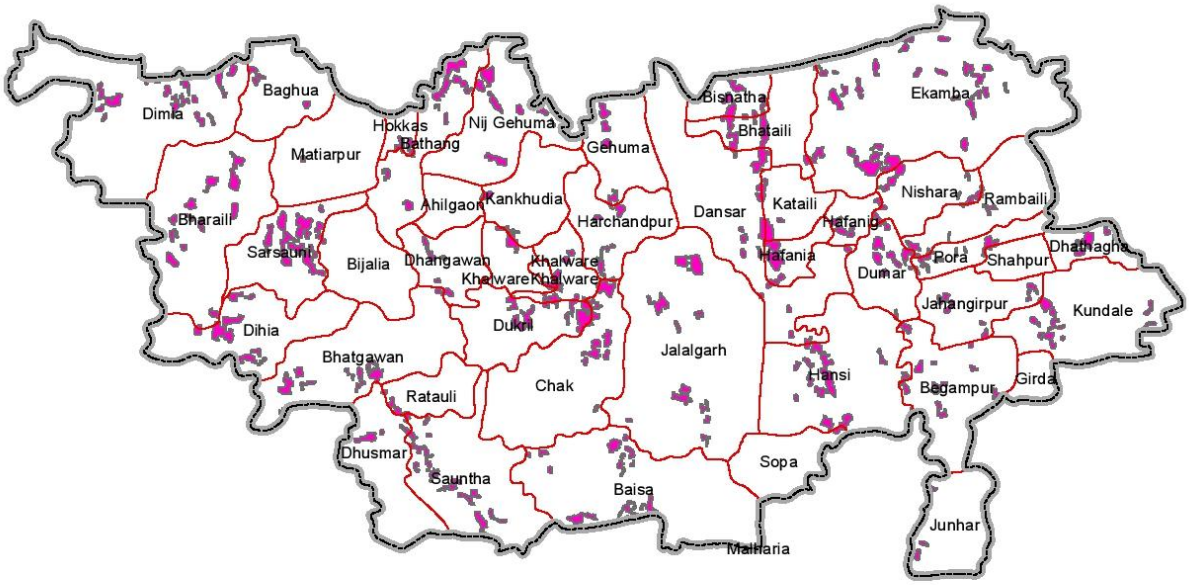
1 0.5 0 1 2 3 Kilometers





Prepared by: Bihar Remote Sensing Application Center, Patna

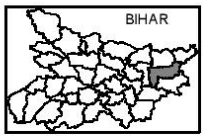
Spatial Aspect of Orchards
Jalalgarh Block, Purnia District, Bihar

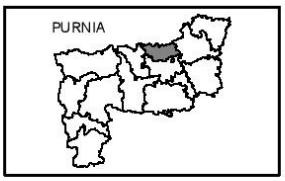


Geographical Location -

25°54'14.343"N- 25°59'37.866"N
87°25'23.798"E - 87°37'24.132"E

Kilometers
1 0.5 0 1 2 3



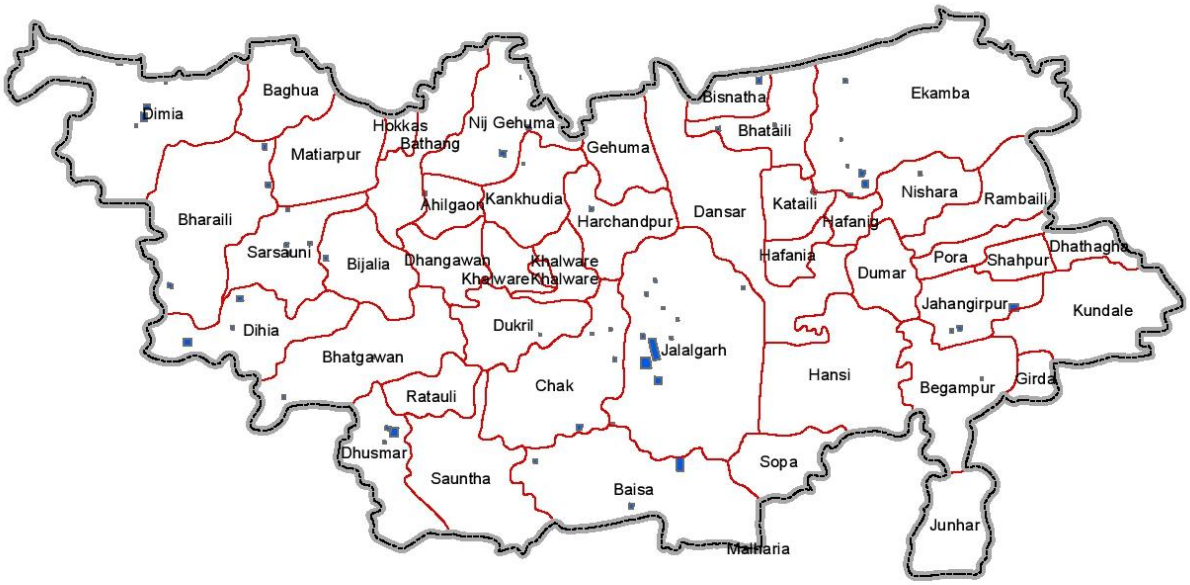


Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna

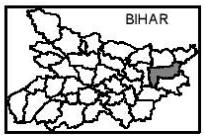
Spatial Aspect of Lakes / Ponds
Jalalgarh Block, Purnia District, Bihar

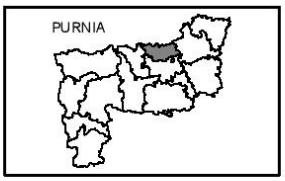


Geographical Location -

25°54'14.343"N- 25°59'37.866"N
87°25'23.798"E - 87°37'24.132"E

Kilometers
1 0.5 0 1 2 3





Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Slope
Jalalgarh Block, Purnia District, Bihar

Legend

- Block Boundary
- Village Boundary

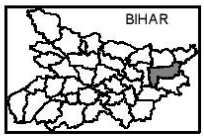
Slope (in Percent)

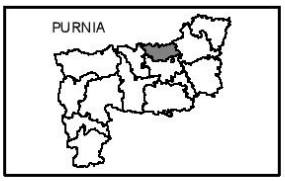
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

Geographical Location -

25°54'14.343"N- 25°59'37.866"N
87°25'23.798"E - 87°37'24.132"E

Kilometers
1 0.5 0 1 2 3





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Soil
Jalalgarh Block, Purnia District, Bihar

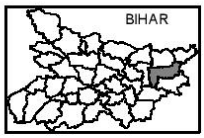
Legend

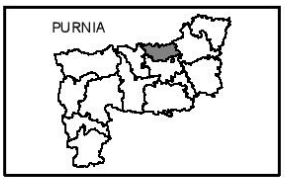
- Block Boundary
- Village Boundary
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
- Typic Ustipsamments
- Aquic Ustipsamments
- Coarse-loamy, Typic Ustifilvents
- Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
- Coarse-loamy,Aeric Fluvaq
- Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
- Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
- Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
- Fine-Loamy,Typic Ustifluv
- Fine-loamy, Typic Ustifluvents
- Fine-loamy,ATypic Ustochr
- Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Fine-loamy,Aeric Haplaquepts,
- Fine-loamy,Typic Haplaquents
- Fine-loamy,Typic Ustifluv
- Fine-loamy,Typic Ustocgrepts,Very fine,Vertic Haplaquepts
- River
- Typic Ustipsamments

Geographical Location -

25°54'14.343"N- 25°59'37.866"N
87°25'23.798"E - 87°37'24.132"E

Kilometers
1 0.5 0 1 2 3





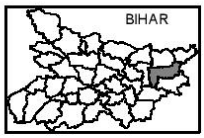
Prepared by: Bihar Remote Sensing Application Center, Patna

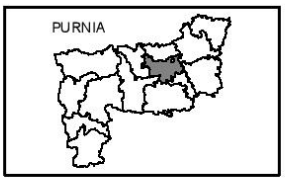
Spatial Aspect of Drain / Canal
Kasba Block, Purnia District, Bihar

Geographical Location -

25°48'19.945"N- 25°56'35.589"N
87°25'42.642"E - 87°38'24.054"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main Canal
- Branch Canal
- Distributary Canal

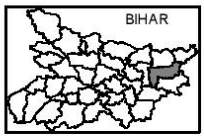
Prepared by: Bihar Remote Sensing Application Center, Patna

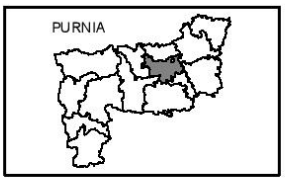
Spatial Aspect of Lakes / Ponds
Kasba Block, Purnia District, Bihar

Geographical Location -

25°48'19.945"N- 25°56'35.589"N
87°25'42.642"E - 87°38'24.054"E

Kilometers
1.5 0.75 0 1.5 3 4.5



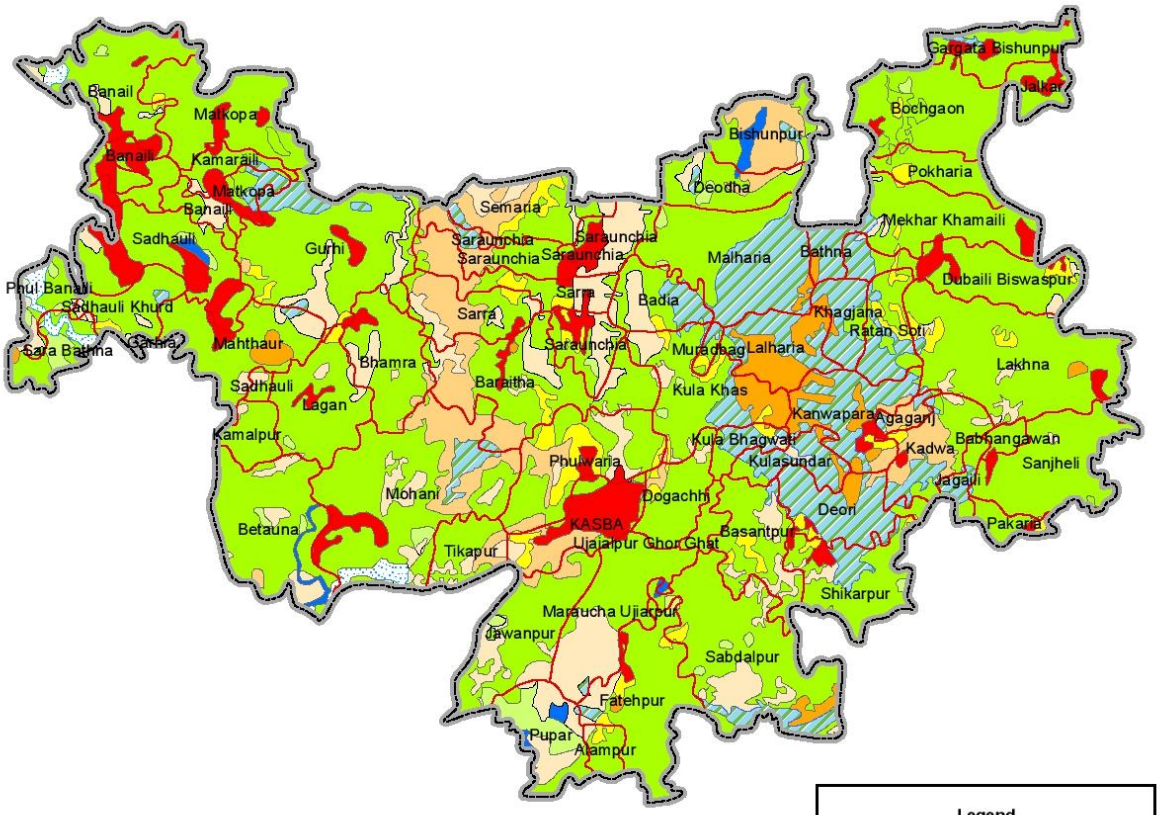


Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Kasba Block, Purnia District, Bihar



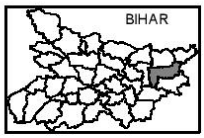
Legend

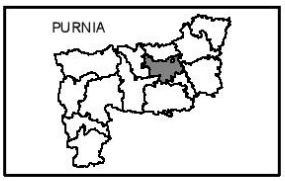
- Block Boundary
- Village Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- Agricultural Land-PlantatioN-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural -Built Up area (Ru*
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Geographical Location -

25°48'19.945"N- 25°56'35.589"N
87°25'42.642"E - 87°38'24.054"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Kasba Block, Purnia District, Bihar

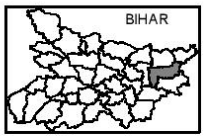
Legend

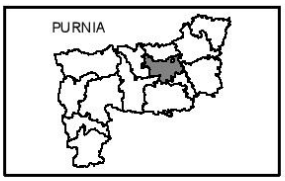
Block Boundary	2A5E8Bb3
Village Boundary	2A5E8Bb4
2A5E3Ac1	2A5E8Bb5
2A5E3Ac2	2A5E8Bc1
2A5E3Ac3	2A5E8Bc2
2A5E3Ac4	2A5E8Bc3
2A5E3Ad1	2A5E8Bc5
2A5E3Ad2	2A5E8Bc6
2A5E7Ab1	2A5E8Bc7
2A5E8Ba3	2A5F3Ab1
2A5E8Ba5	2A5F3Ab2
2A5E8Ba6	2A5F3Ab3
2A5E8Bb1	2A5F3Ac3
2A5E8Bb2	

Geographical Location -

25°48'19.945"N- 25°56'35.589"N
87°25'42.642"E - 87°38'24.054"E

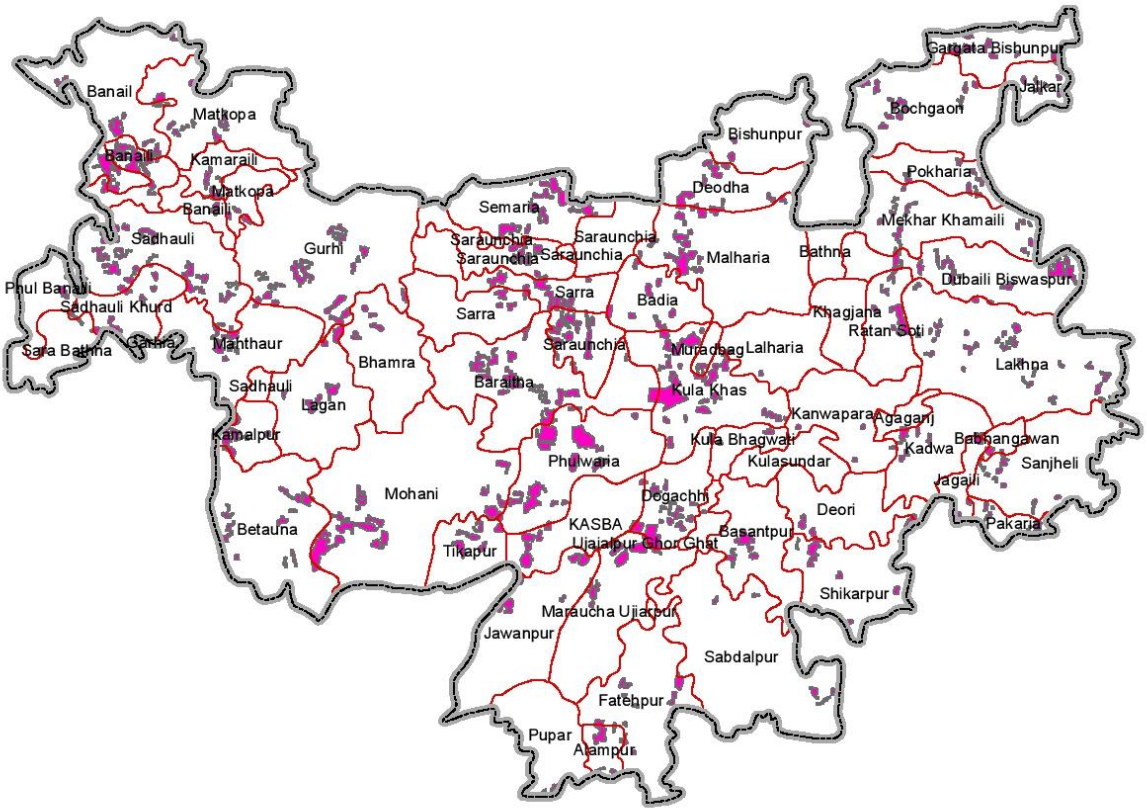
1.5 0.75 0 1.5 3 4.5 Kilometers





Prepared by: Bihar Remote Sensing Application Center, Patna

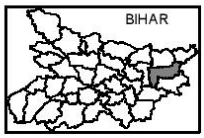
Spatial Aspect of Orchards
Kasba Block, Purnia District, Bihar

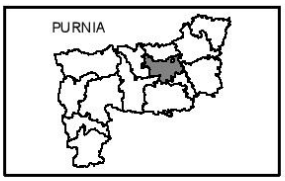


Geographical Location -

25°48'19.945"N- 25°56'35.589"N
87°25'42.642"E - 87°38'24.054"E

Kilometers
1.5 0.75 0 1.5 3 4.5



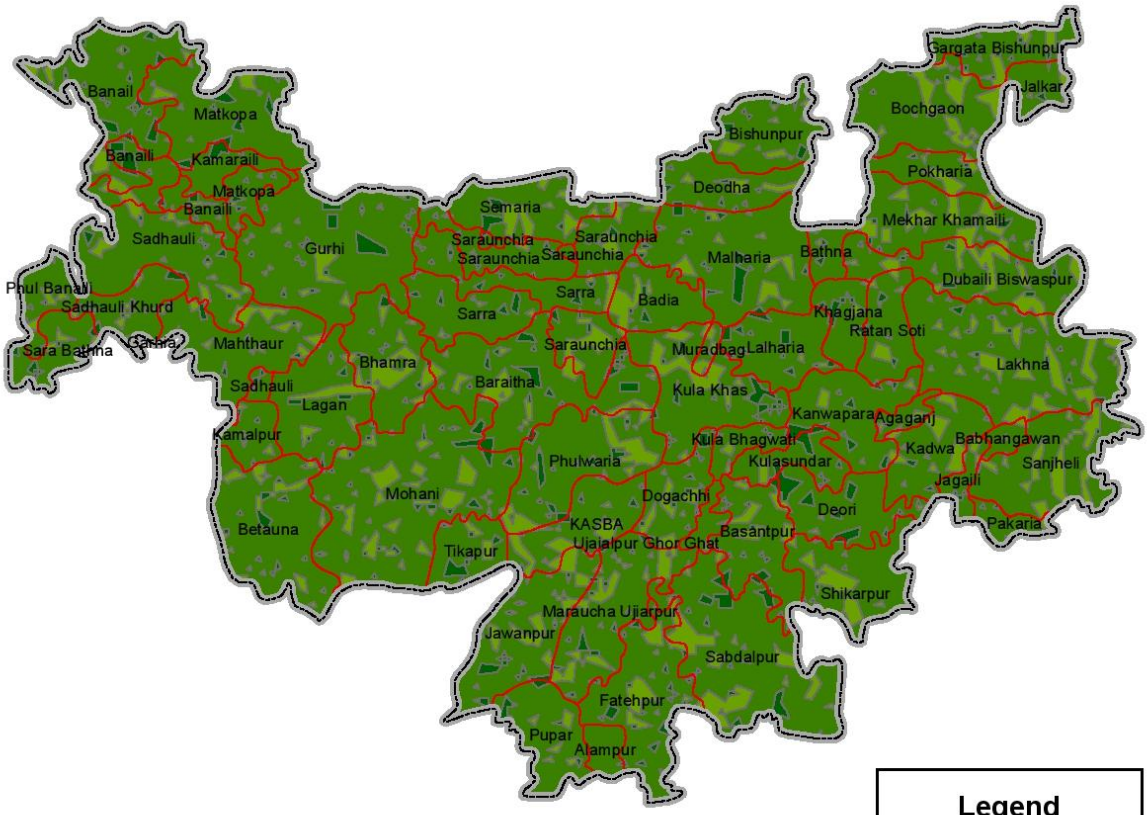


Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Slope
Kasba Block, Purnia District, Bihar



Legend

- Block Boundary
- Village Boundary

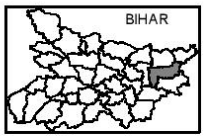
Slope (in Percent)

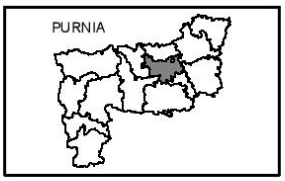
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

Geographical Location -

25°48'19.945"N- 25°56'35.589"N
87°25'42.642"E - 87°38'24.054"E

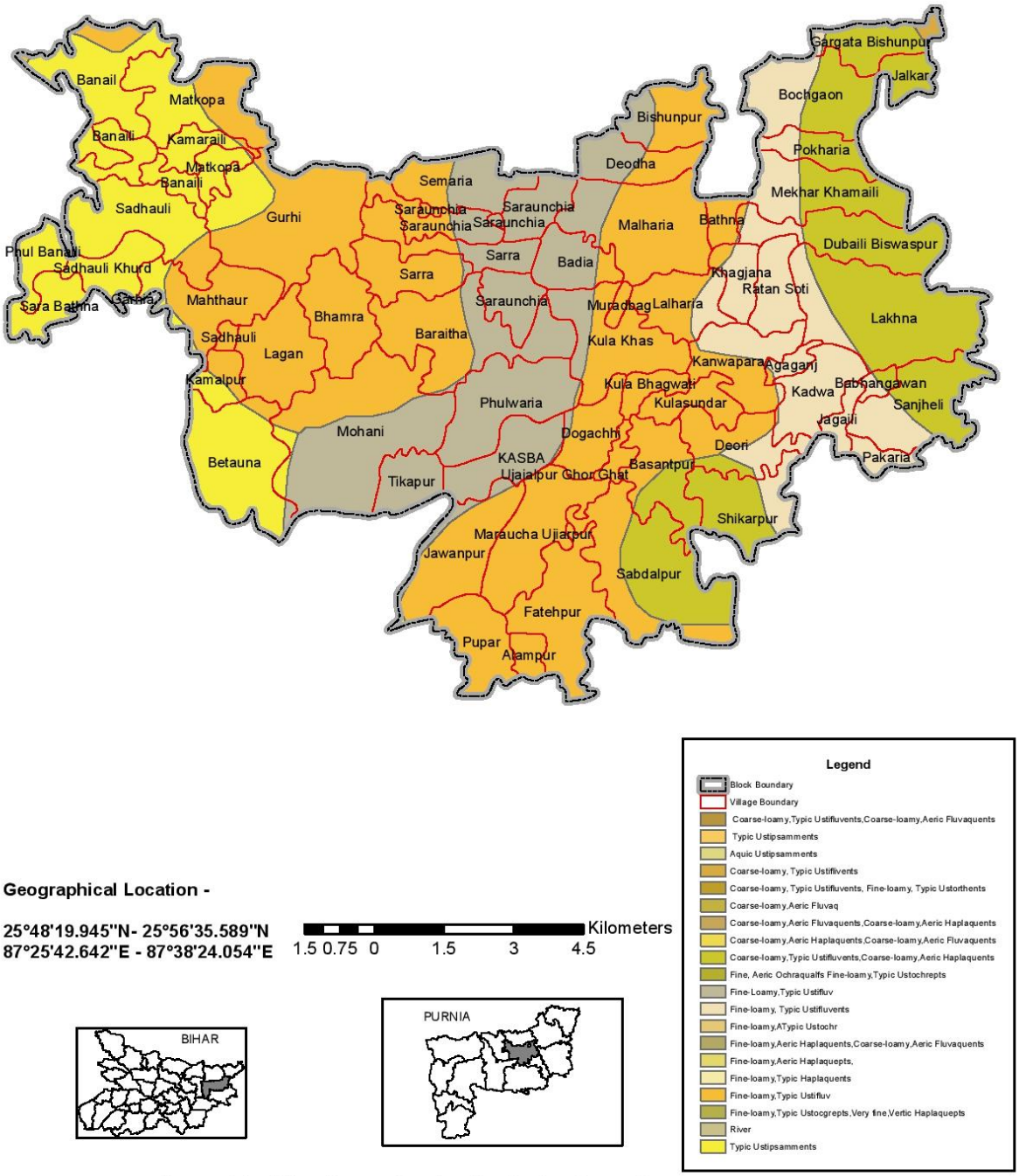
1.5 0.75 0 1.5 3 4.5 Kilometers





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Soil
Kasba Block, Purnia District, Bihar



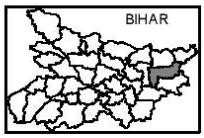
Prepared by: Bihar Remote Sensing Application Center, Patna

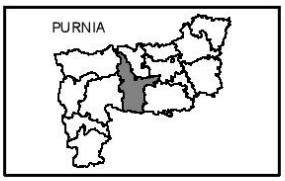
Spatial Aspect of Drain / Canal
Krityanandnagar Block, Purnia District, Bihar

Geographical Location -

25°40'24.691"N- 25°57'59.229"N
87°18'2.303"E - 87°31'16.8"E

2 1 0 2 4 6 Kilometers





Legend

- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main Canal
- Branch Canal
- Distributary Canal

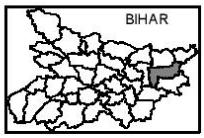
Prepared by: Bihar Remote Sensing Application Center, Patna

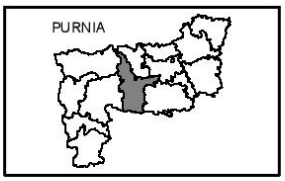
Spatial Aspect of Lakes / Ponds
Krityanandnagar Block, Purnia District, Bihar

Geographical Location -

25°40'24.691"N- 25°57'59.229"N
87°18'2.303"E - 87°31'16.8"E

Kilometers
2 1 0 2 4 6





Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

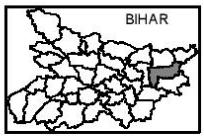
Prepared by: Bihar Remote Sensing Application Center, Patna

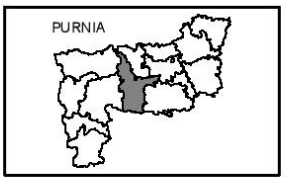
Landuse / Land Cover Map
Krityanandnagar Block, Purnia District, Bihar

Geographical Location -

25°40'24.691"N- 25°57'59.229"N
87°18'2.303"E - 87°31'16.8"E

Kilometers
2 1 0 2 4 6





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Krityanandnagar Block, Purnia District, Bihar

Geographical Location -

25°40'24.691"N- 25°57'59.229"N
87°18'2.303"E - 87°31'16.8"E

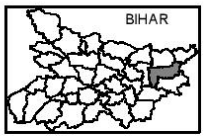
Prepared by: Bihar Remote Sensing Application Center, Patna

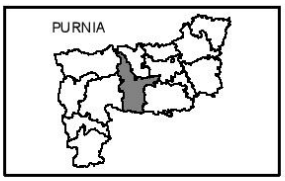
Spatial Aspect of Orchards
Krityanandnagar Block, Purnia District, Bihar

Geographical Location -

25°40'24.691"N- 25°57'59.229"N
87°18'2.303"E - 87°31'16.8"E

Kilometers
2 1 0 2 4 6



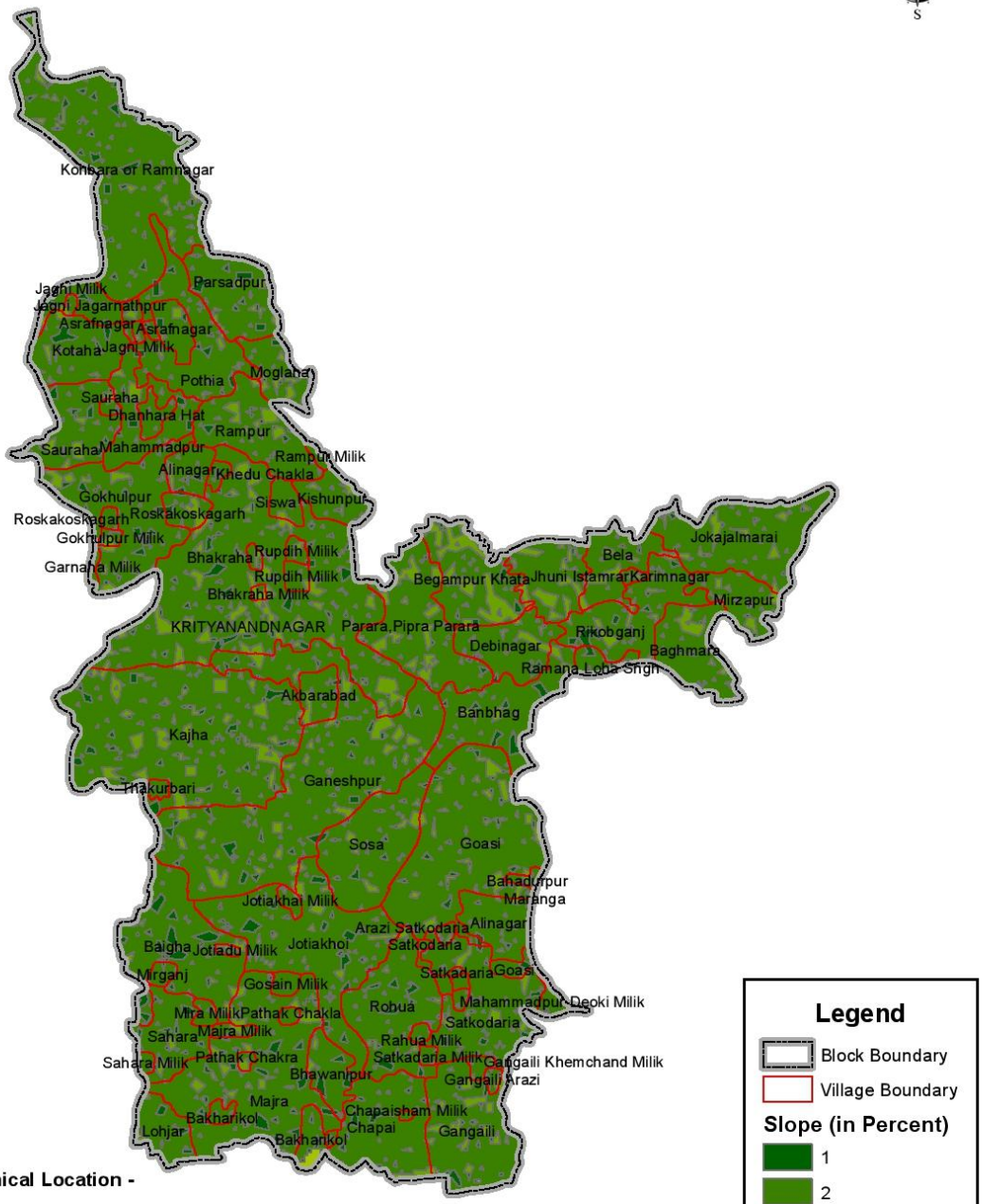


Legend

- Block Boundary
- Village Boundary
- Orchards

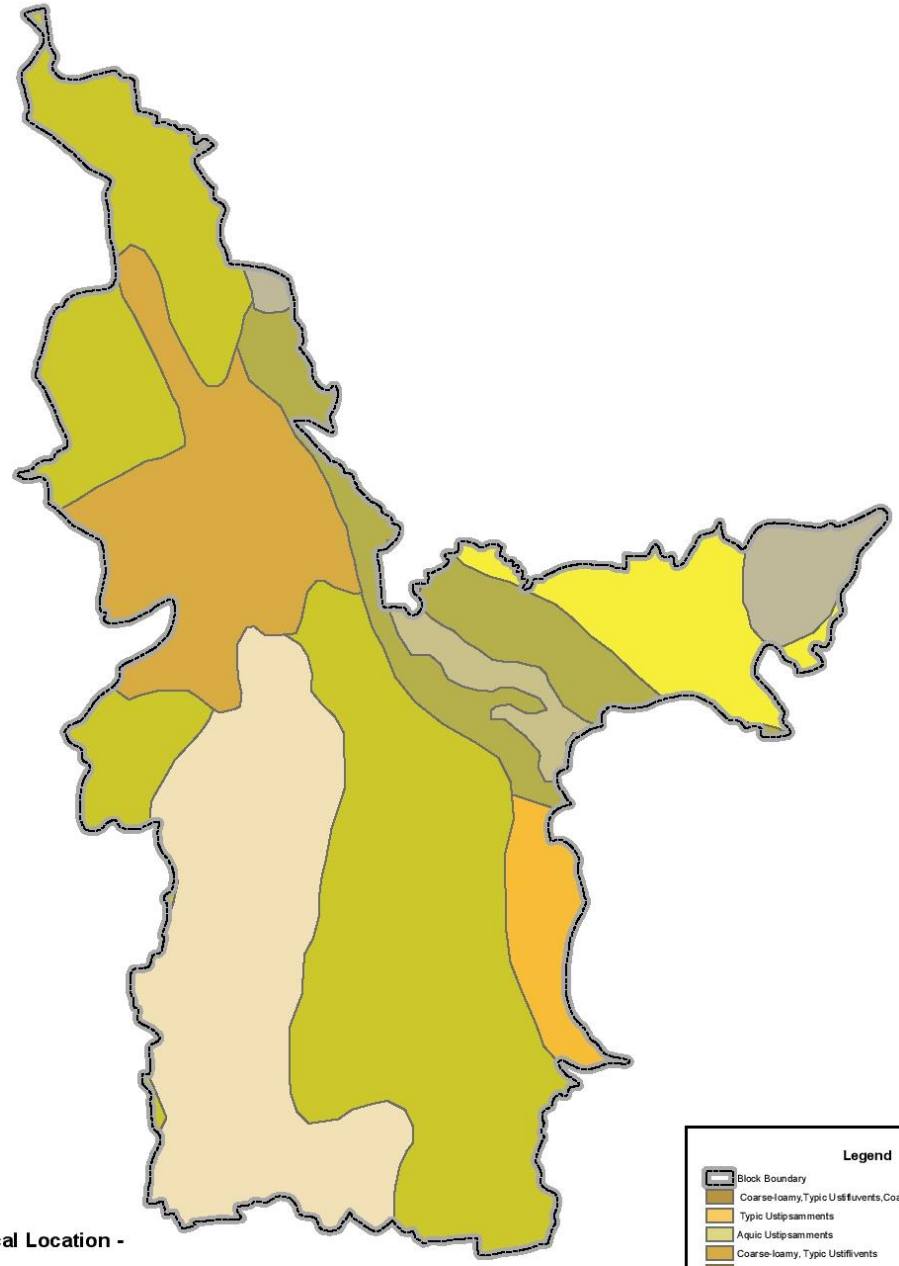
Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Slope
Krityanandnagar Block, Purnia District, Bihar



Prepared by: Bihar Remote Sensing Application Center, Patna

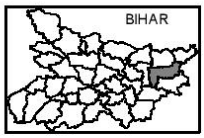
Spatial Aspect of Soil
Krityanandnagar Block, Purnia District, Bihar

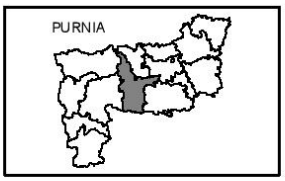


Geographical Location -

25°40'24.691"N- 25°57'59.229"N
87°18'2.303"E - 87°31'16.8"E

Kilometers
2 1 0 2 4 6



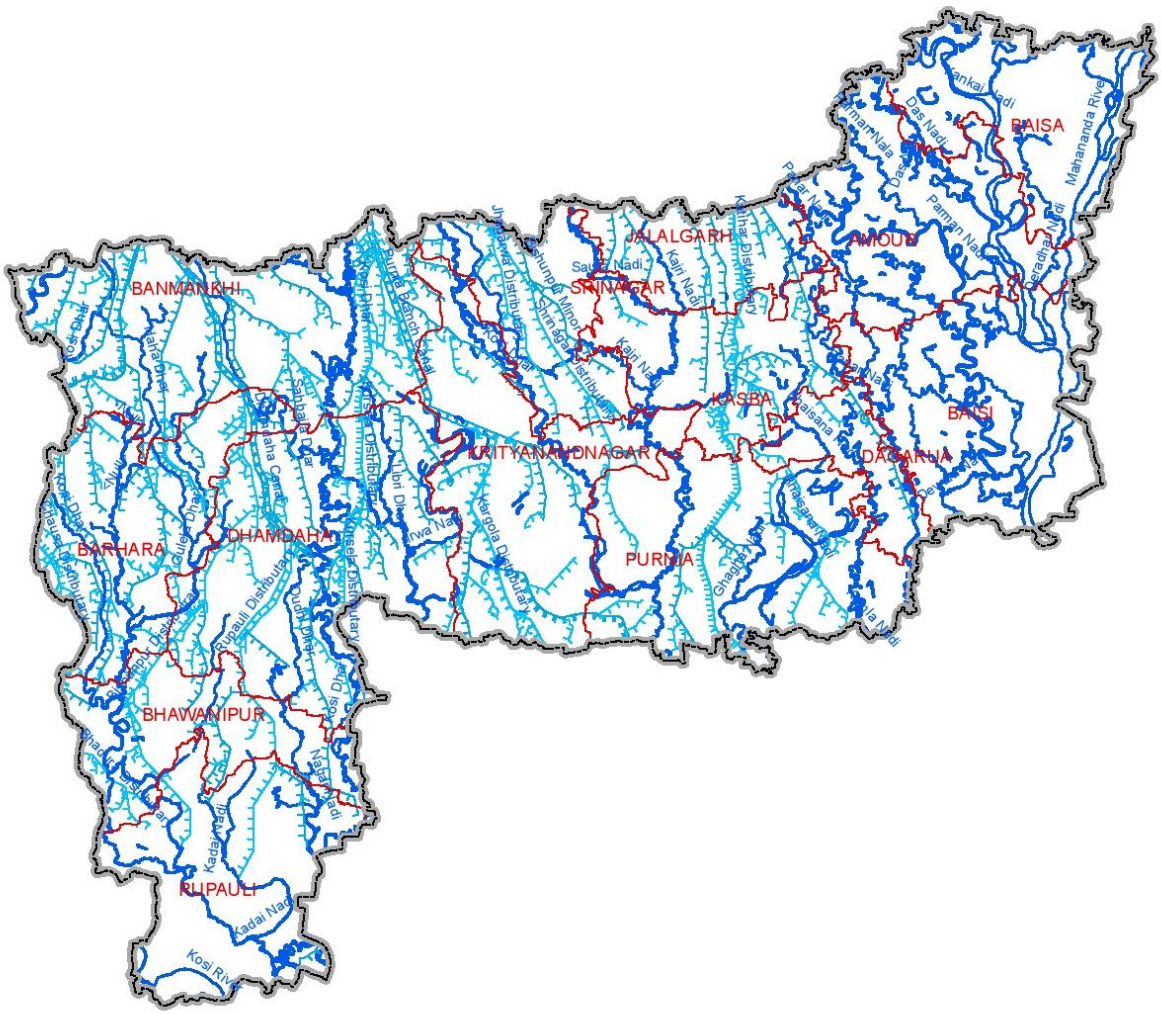


Legend

- Block Boundary
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
- Typic Ustipsamments
- Aquic Ustipsamments
- Coarse-loamy, Typic Ustifilvents
- Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
- Coarse-loamy,Aeric Fluvaq
- Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
- Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
- Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
- Fine-Loamy,Typic Ustifluv
- Fine-loamy, Typic Ustifluvents
- Fine-loamy,ATypic Ustochr
- Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Fine-loamy,Aeric Haplaquepts,
- Fine-loamy,Typic Haplaquents
- Fine-loamy,Typic Ustifluv
- Fine-loamy,Typic Ustocgrepts,Very fine,Vertic Haplaquepts
- River
- Typic Ustipsamments

Prepared by: Bihar Remote Sensing Application Center, Patna

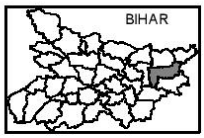
Spatial Aspect of Drain / Canal
Purnia District, Bihar



Geographical Location -

25°25'25.87"N - 26°7'31.919"N
86°59'35.6"E - 87°51'53.775"E

Kilometers
6 3 0 6 12 18

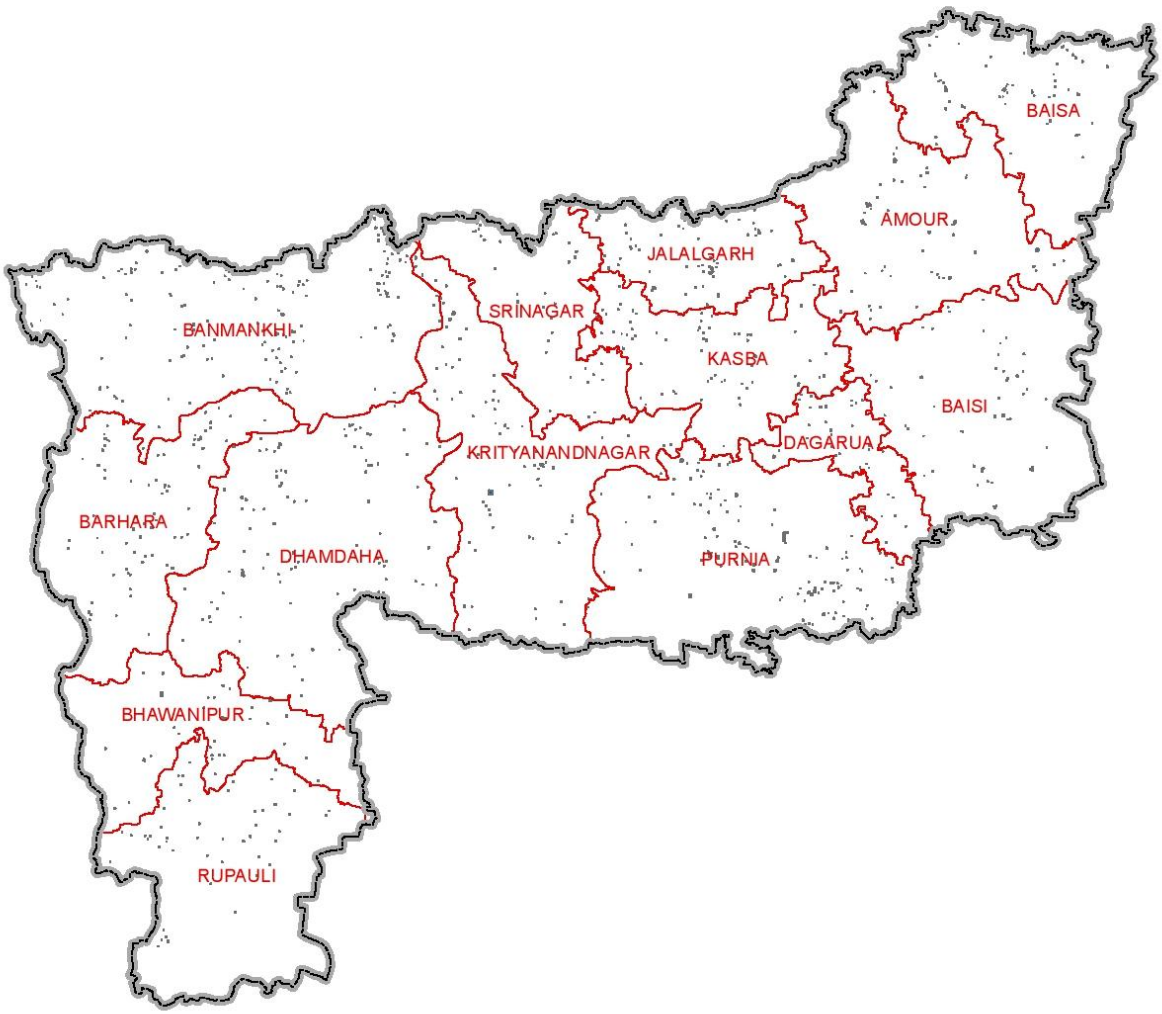


Legend

- District Boundary
- Block Boundary
- River
- Stream
- Drain
- Main Canal
- Branch Canal
- Distributary Canal

Prepared by: Bihar Remote Sensing Application Center, Patna

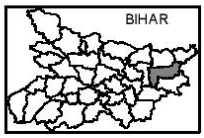
Spatial Aspect of Lakes / Ponds
Purnia District, Bihar



Geographical Location -

25°25'25.87"N - 26°7'31.919"N
86°59'35.6"E - 87°51'53.775"E

Kilometers
6 3 0 6 12 18

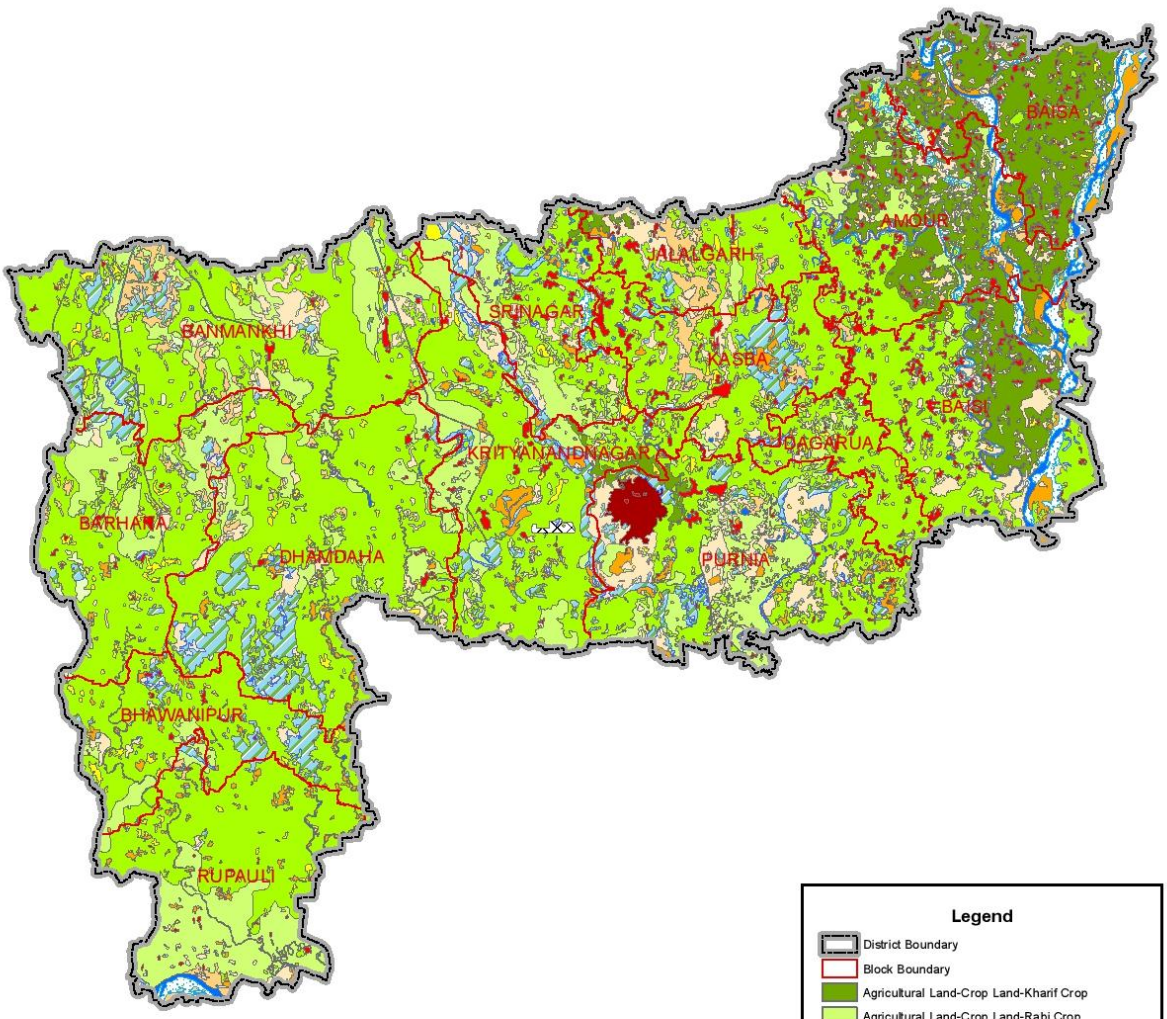


Legend

- District Boundary
- Block Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Purnia District, Bihar



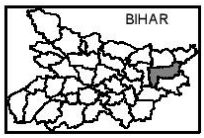
Legend

- District Boundary
- Block Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- Agricultural Land-PlantatioN-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural - Built Up area (Ru*
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Geographical Location -

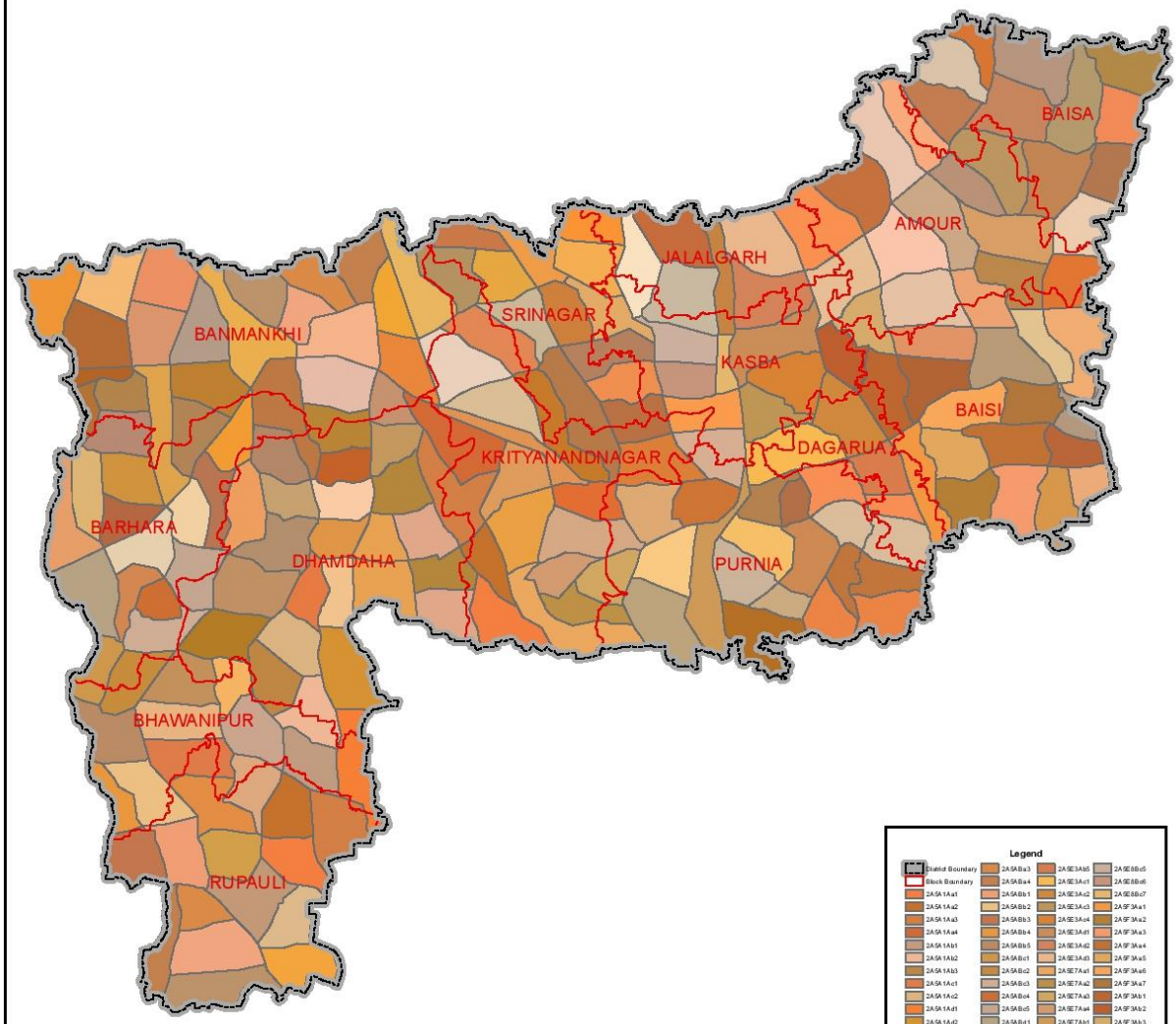
25°25'25.87"N - 26°7'31.919"N
86°59'35.6"E - 87°51'53.775"E

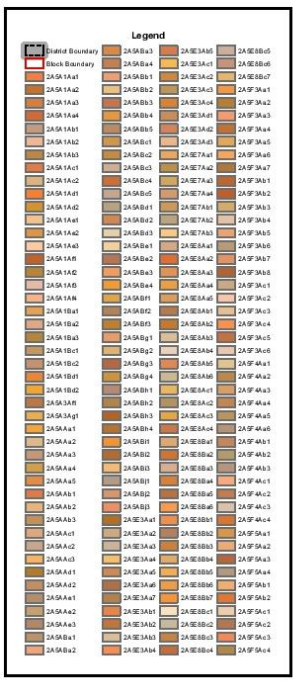
Kilometers
6 3 0 6 12 18



Prepared by: Bihar Remote Sensing Application Center, Patna

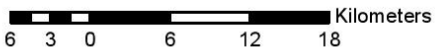
Spatial Aspect of Micro-Watershed
Purnia District, Bihar

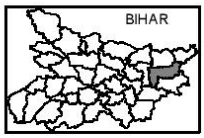




Geographical Location -

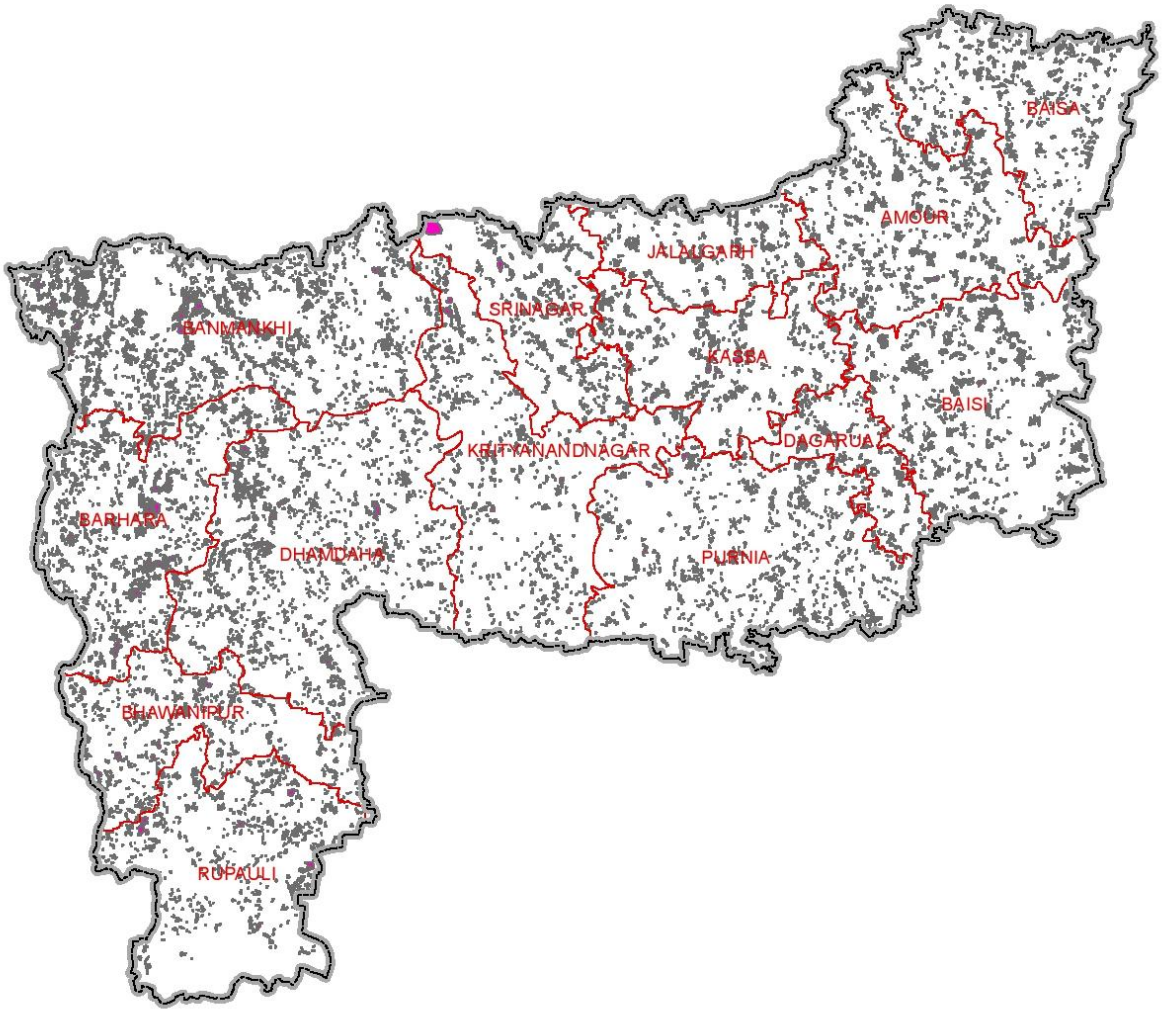
25°25'25.87"N - 26°7'31.919"N
86°59'35.6"E - 87°51'53.775"E





Prepared by: Bihar Remote Sensing Application Center, Patna

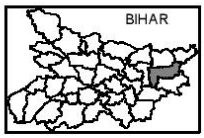
Spatial Aspect of Orchards
Purnia District, Bihar



Geographical Location -

25°25'25.87"N - 26°7'31.919"N
86°59'35.6"E - 87°51'53.775"E

Kilometers
6 3 0 6 12 18

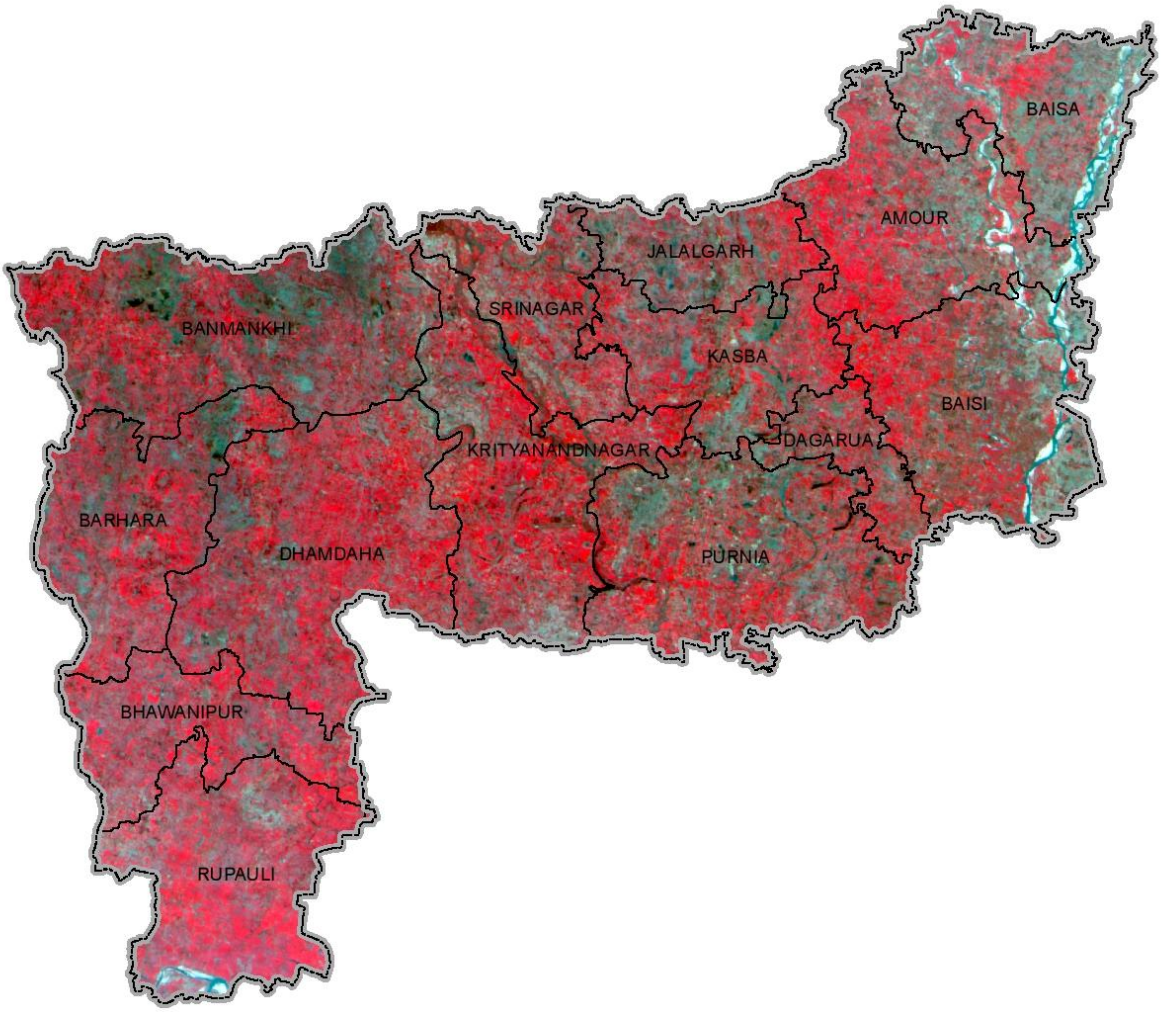


Legend

- District Boundary
- Block Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna

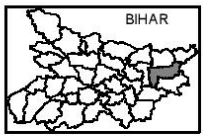
Satellite view of LISS III, 2015
Purnia District, Bihar



Geographical Location -

25°25'25.87"N - 26°7'31.919"N
86°59'35.6"E - 87°51'53.775"E

Kilometers
6 3 0 6 12 18

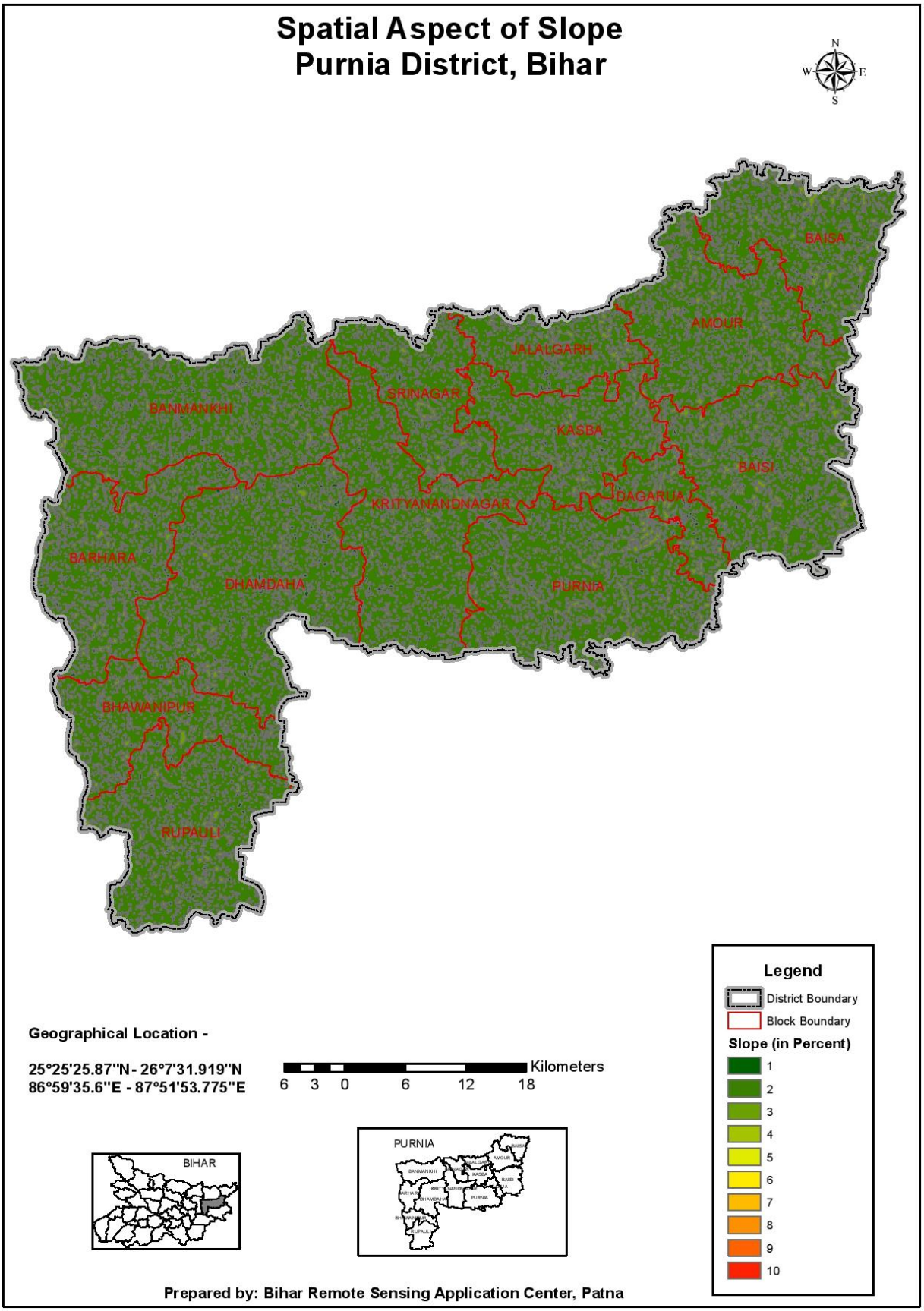


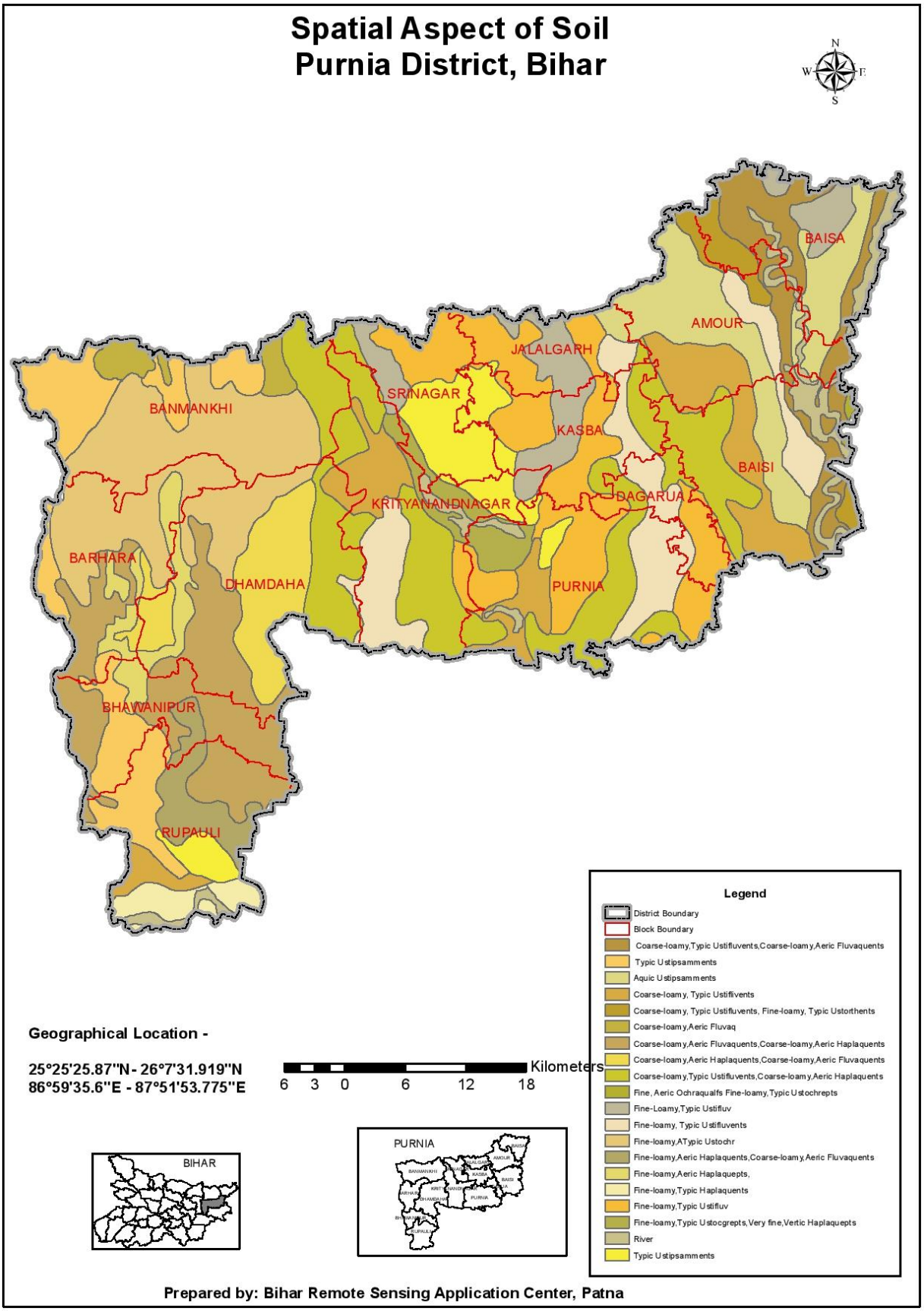
Legend

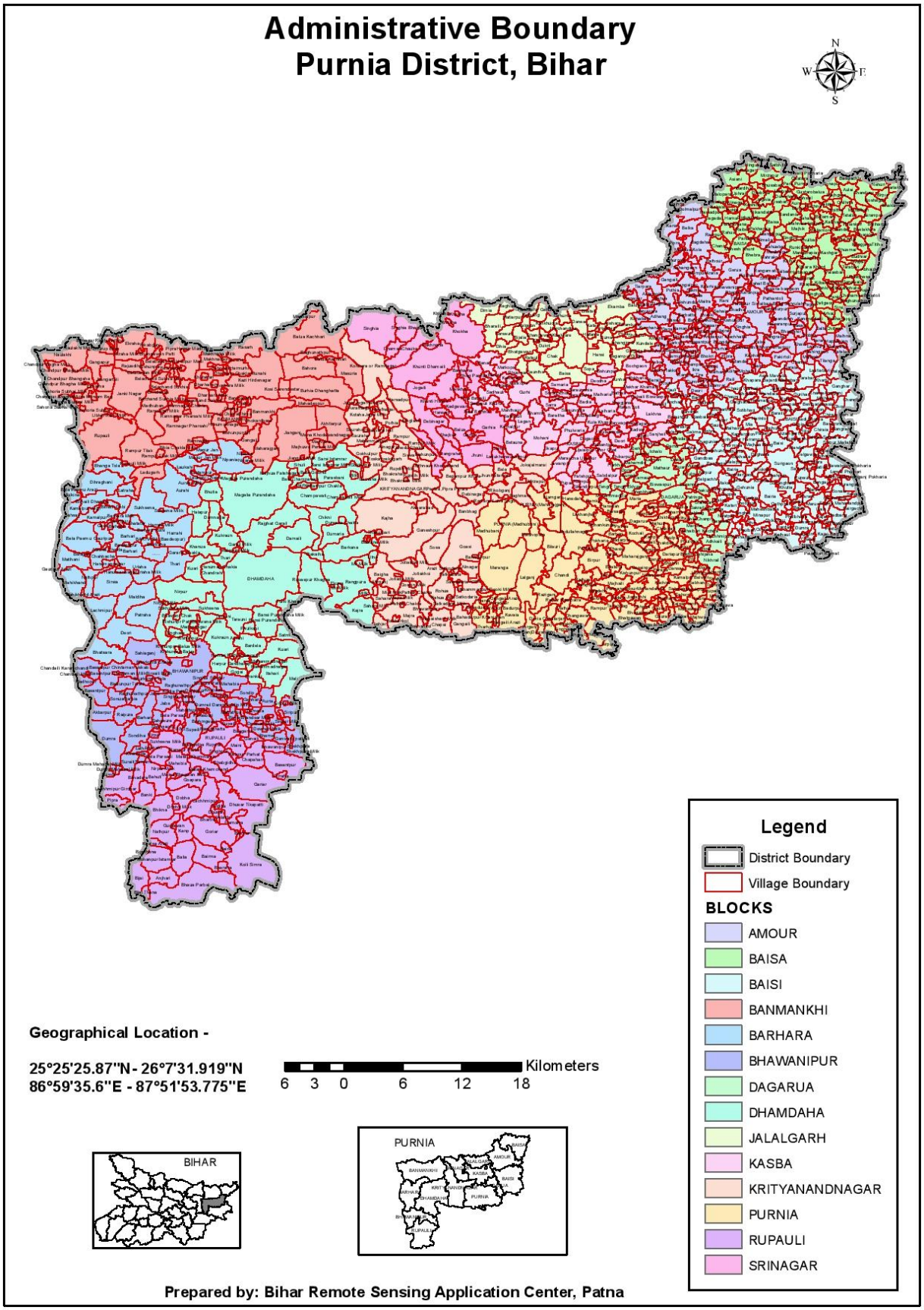
District Boundary

Block Boundary

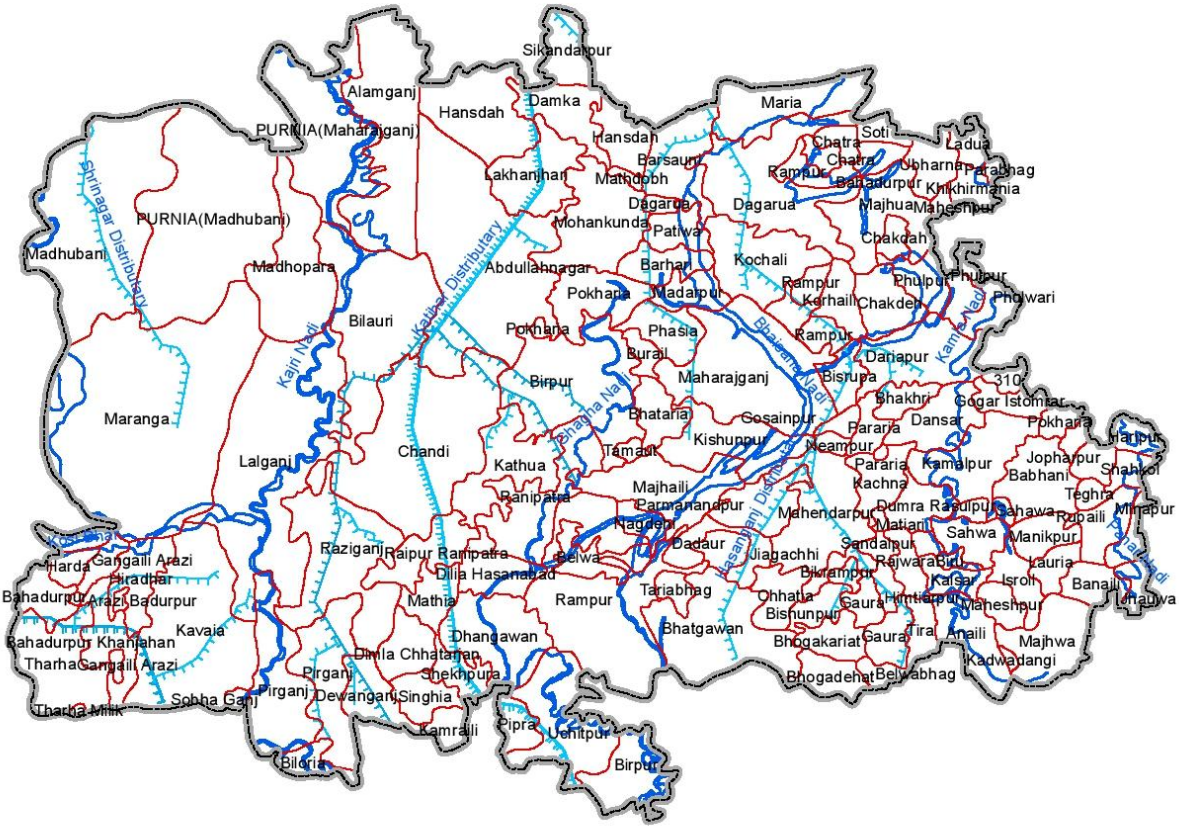
Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Slope
Purnia District, Bihar
N
W
E
S
BAISA
AMOUR
JALALGARH
SRINAGAR
BANMANKHI
KASBA
BAISI
KRITYANANDNAGAR
DAGARUA
BARHARA
DHAMDAHA
PURNIA
BHAWANIPUR
RUPAULI
Legend
District Boundary
Block Boundary
Slope (in Percent)
1
2
3
4
5
6
7
8
9
10
Geographical Location -
25°25'25.87"N - 26°7'31.919"N
86°59'35.6"E - 87°51'53.775"E
Kilometers
6 3 0 6 12 18
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Soil
Purnia District, Bihar
N
W
E
S
BAISA
AMOUR
JALALGARH
SRINAGAR
BANMANKHI
KASBA
BAISI
KRITYANANDNAGAR
DAGARUA
BARHARA
DHAMDAHA
PURNIA
BHAWANIPUR
RUPAULI
Legend
District Boundary
Block Boundary
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
Typic Ustipsamments
Aquic Ustipsamments
Coarse-loamy, Typic Ustiflivents
Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
Coarse-loamy,Aeric Fluvaq
Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
Fine-Loamy,Typic Ustifluv
Fine-loamy, Typic Ustifluvents
Fine-loamy,ATypic Ustochr
Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Fine-loamy,Aeric Haplaquepts,
Fine-loamy,Typic Haplaquents
Fine-loamy,Typic Ustifluv
Fine-loamy,Typic Ustocgrepts,Very fine,Vertic Haplaquepts
River
Typic Ustipsamments
Geographical Location -
25°25'25.87"N - 26°7'31.919"N
86°59'35.6"E - 87°51'53.775"E
Kilometers
6 3 0 6 12 18
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna


Administrative Boundary
Purnia District, Bihar
N
S
W
E
Legend
District Boundary
Village Boundary
BLOCKS
AMOUR
BAISA
BAISI
BANMANKHI
BARHARA
BHAWANIPUR
DAGARUA
DHAMDAHA
JALALGARH
KASBA
KRITYANANDNAGAR
PURNIA
RUPAULI
SRINAGAR
Geographical Location -
25°25'25.87"N - 26°7'31.919"N
86°59'35.6"E - 87°51'53.775"E
Kilometers
6 3 0 6 12 18
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna

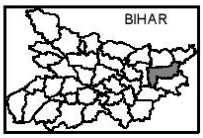
Spatial Aspect of Drain / Canal
Purnia Block, Purnia District, Bihar

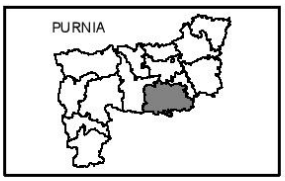


Geographical Location -

25°39'25.338"N- 25°49'28.575"N
87°25'56.667"E - 87°41'17.152"E

Kilometers
1.50.75 0 1.5 3 4.5

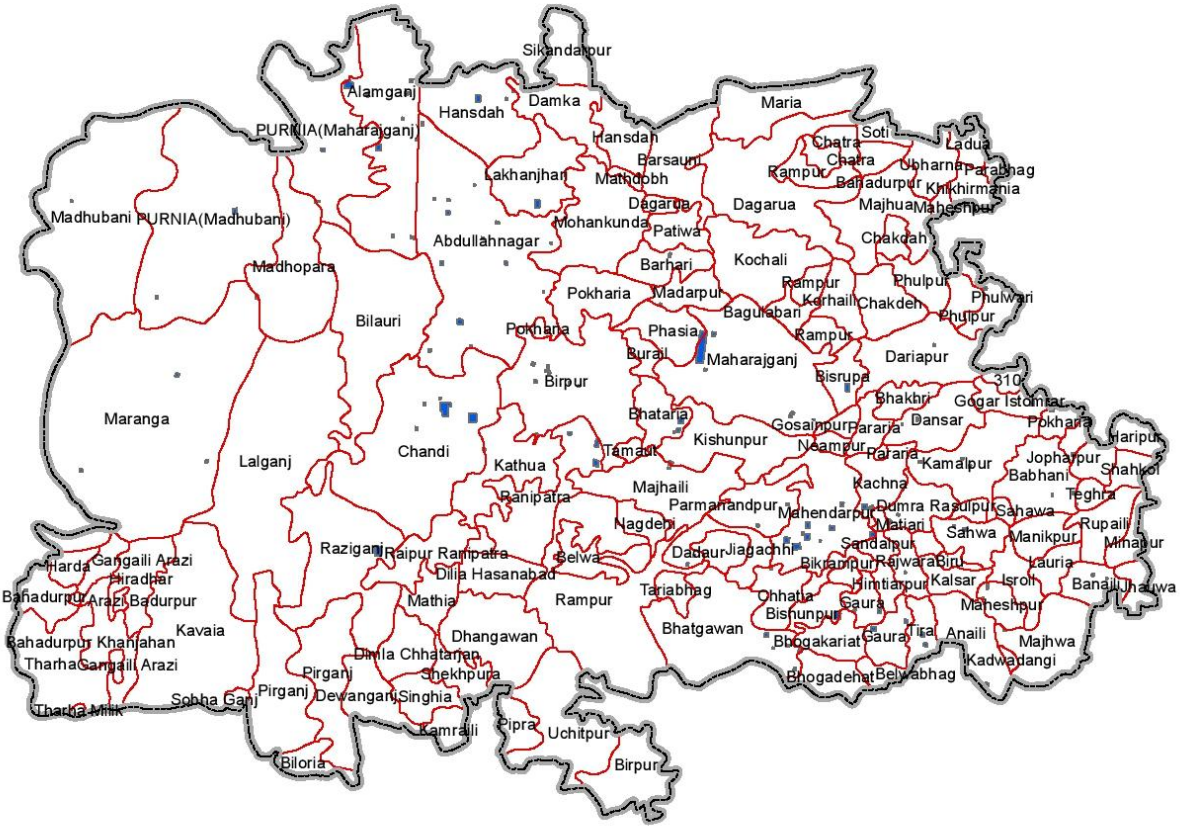




Legend
- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main Canal
- Branch Canal
- Distributary Canal

Prepared by: Bihar Remote Sensing Application Center, Patna

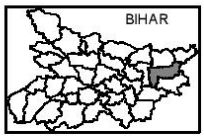
Spatial Aspect of Lakes / Ponds
Purnia Block, Purnia District, Bihar

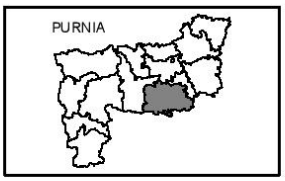


Geographical Location -

25°39'25.338"N- 25°49'28.575"N
87°25'56.667"E - 87°41'17.152"E

Kilometers
1.50.75 0 1.5 3 4.5



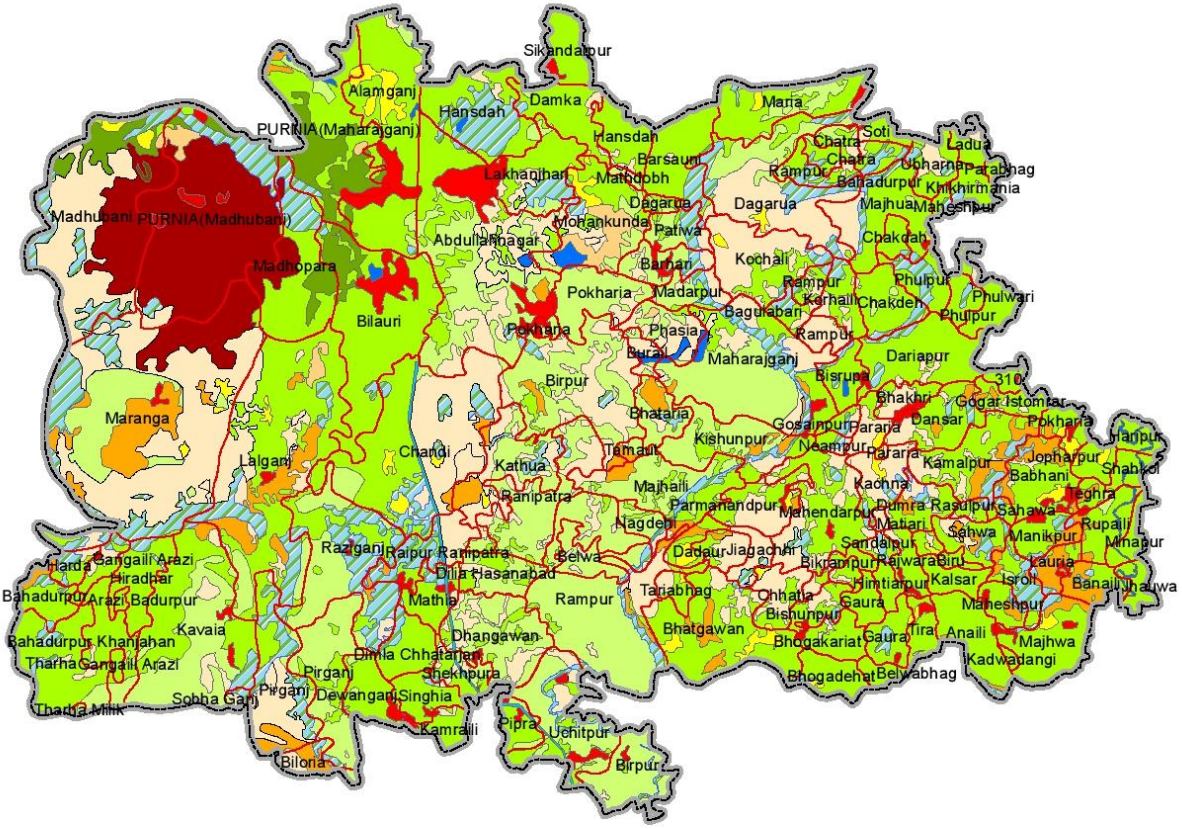


Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

Landuse / Land Cover Map
Purnia Block, Purnia District, Bihar



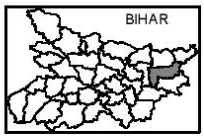
Legend

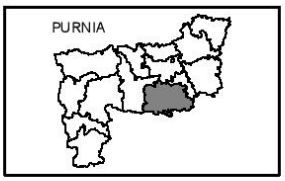
- Block Boundary
- Village Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- Agricultural Land-PlantatioN-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural -Built Up area (Ru*
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Geographical Location -

25°39'25.338"N- 25°49'28.575"N
87°25'56.667"E - 87°41'17.152"E

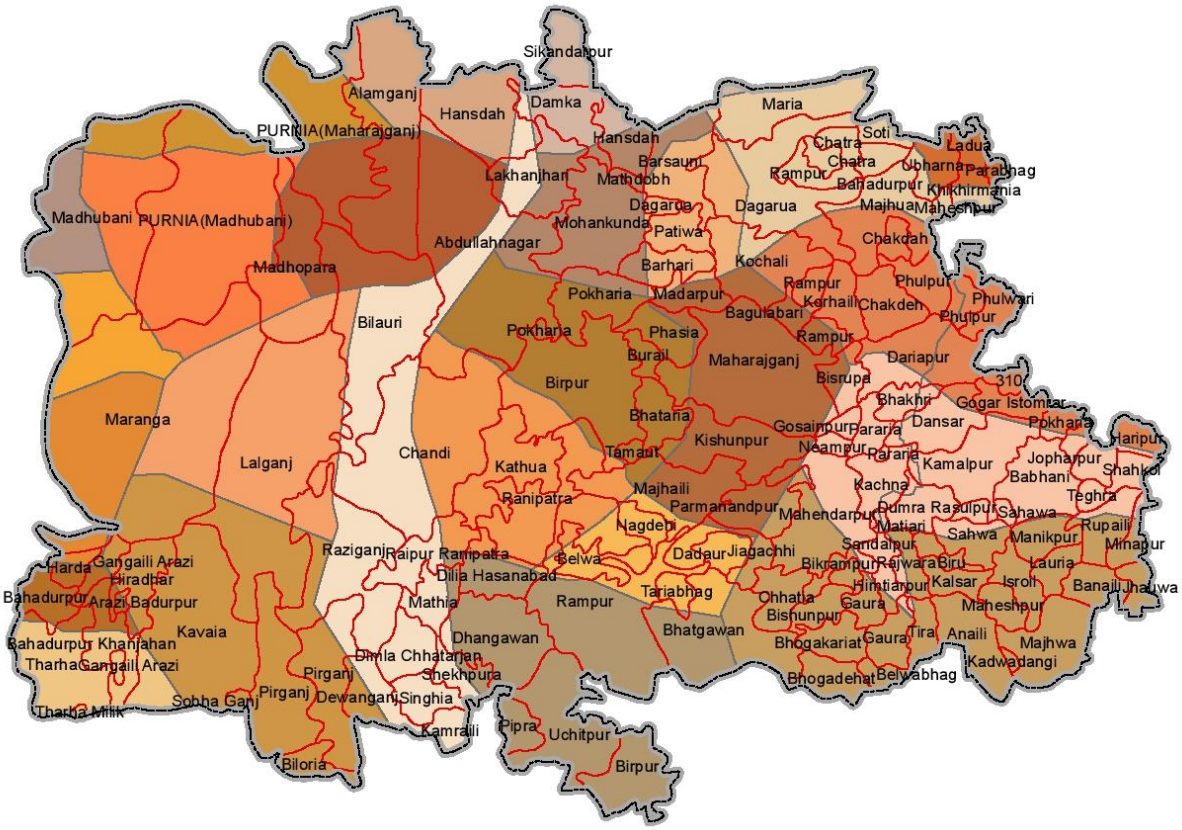
Kilometers
1.50.75 0 1.5 3 4.5





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Purnia Block, Purnia District, Bihar



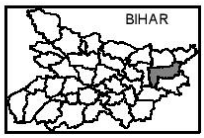
Legend

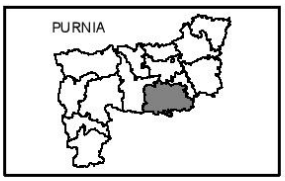
Block Boundary	2A5E3Ac1
Village Boundary	2A5E7Aa1
2A5E3Aa1	2A5E7Aa2
2A5E3Aa2	2A5E7Aa3
2A5E3Aa3	2A5E7Ab1
2A5E3Aa4	2A5E7Ab2
2A5E3Aa5	2A5E7Ab3
2A5E3Aa6	2A5E8Aa1
2A5E3Aa7	2A5E8Aa2
2A5E3Ab1	2A5E8Ab1
2A5E3Ab2	2A5E8Ba1
2A5E3Ab3	2A5E8Ba2
2A5E3Ab4	2A5E8Ba3
2A5E3Ab5	2A5E8Ba4

Geographical Location -

25°39'25.338"N- 25°49'28.575"N
87°25'56.667"E - 87°41'17.152"E

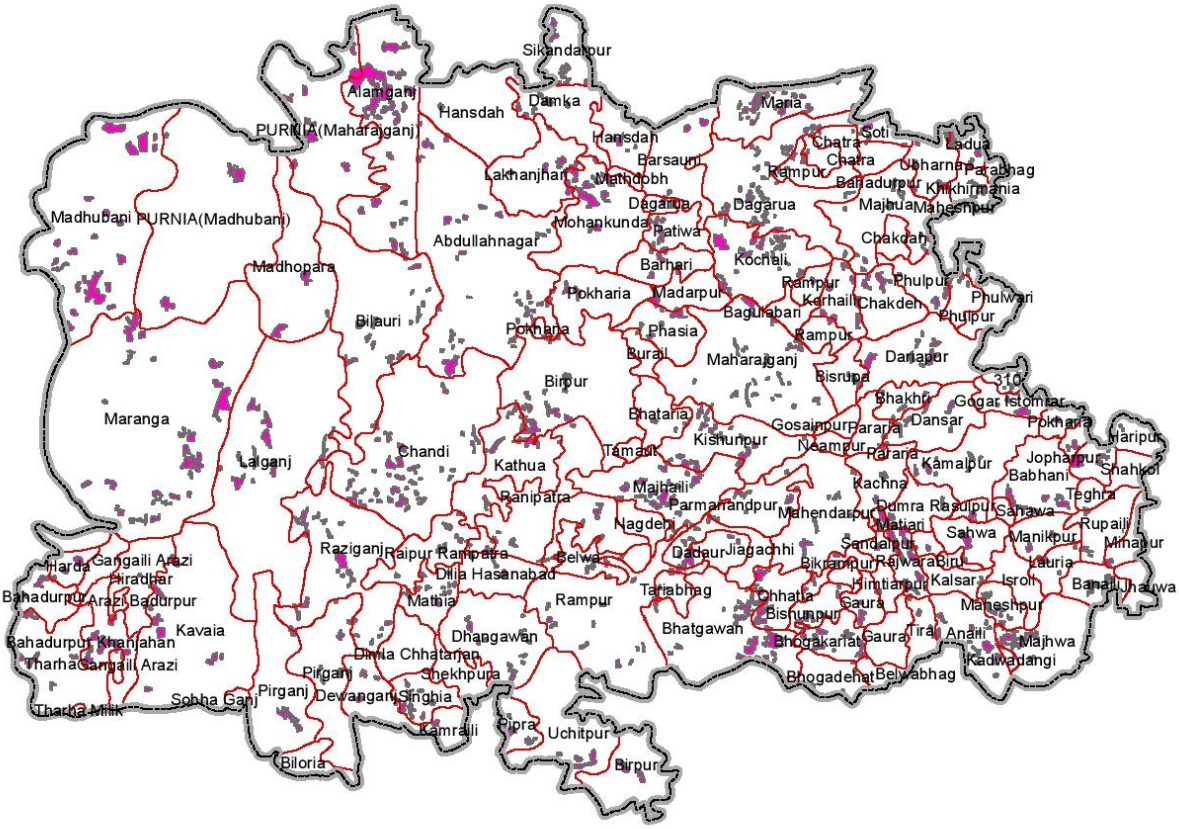
1.50.75 0 1.5 3 4.5 Kilometers





Prepared by: Bihar Remote Sensing Application Center, Patna

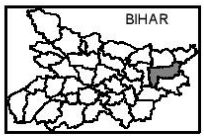
Spatial Aspect of Orchards
Purnia Block, Purnia District, Bihar

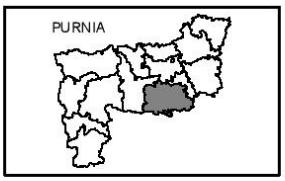


Geographical Location -

25°39'25.338"N- 25°49'28.575"N
87°25'56.667"E - 87°41'17.152"E

Kilometers
1.50.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Slope
Purnia Block, Purnia District, Bihar

Legend

- Block Boundary
- Village Boundary

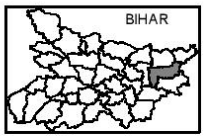
Slope (in Percent)

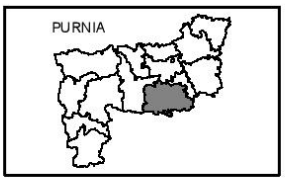
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

Geographical Location -

25°39'25.338"N- 25°49'28.575"N
87°25'56.667"E - 87°41'17.152"E

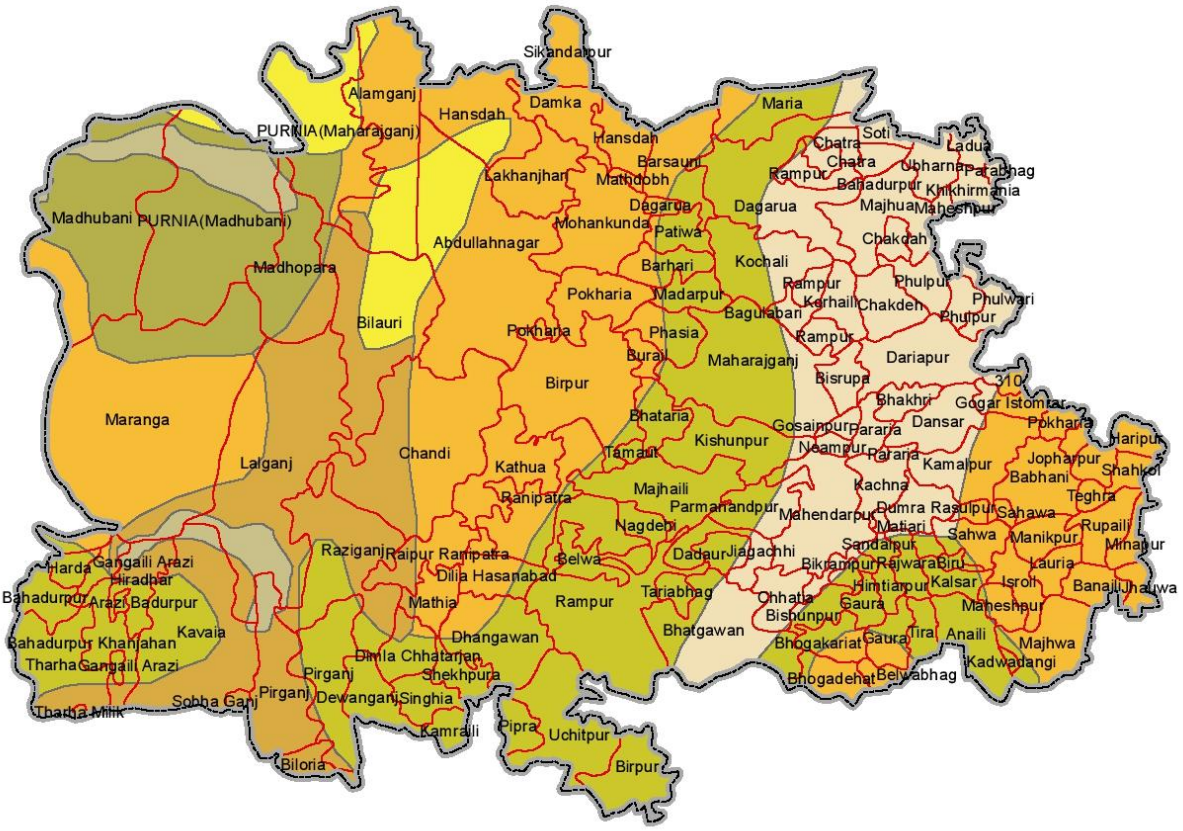
Kilometers
1.50.75 0 1.5 3 4.5





Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Soil
Purnia Block, Purnia District, Bihar



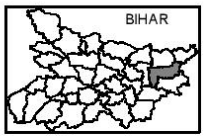
Legend

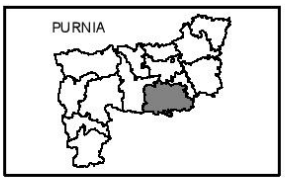
- Block Boundary
- Village Boundary
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
- Typic Ustipsamments
- Aquic Ustipsamments
- Coarse-loamy, Typic Ustiflivents
- Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustorthents
- Coarse-loamy,Aeric Fluvaq
- Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
- Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
- Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
- Fine-Loamy,Typic Ustifluv
- Fine-loamy, Typic Ustifluvents
- Fine-loamy,ATypic Ustochr
- Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
- Fine-loamy,Aeric Haplaquepts,
- Fine-loamy,Typic Haplaquents
- Fine-loamy,Typic Ustifluv
- Fine-loamy,Typic Ustocgrepts,Very fine,Vertic Haplaquepts
- River
- Typic Ustipsamments

Geographical Location -

25°39'25.338"N- 25°49'28.575"N
87°25'56.667"E - 87°41'17.152"E

Kilometers
1.50.75 0 1.5 3 4.5





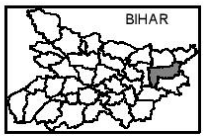
Prepared by: Bihar Remote Sensing Application Center, Patna

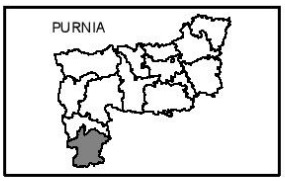
Spatial Aspect of Drain / Canal
Rupauli Block, Purnia District, Bihar

Geographical Location -

25°25'54.87"N - 25°37'36.218"N
87°3'16.31"E - 87°15'37.848"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend

- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main canal
- Branch canal
- Distributary Canal

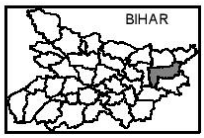
Prepared by: Bihar Remote Sensing Application Center, Patna

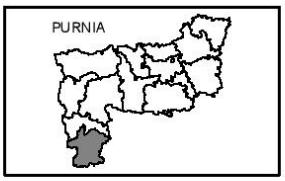
Spatial Aspect of Lakes / Ponds
Rupauli Block, Purnia District, Bihar

Geographical Location -

25°25'54.87"N - 25°37'36.218"N
87°3'16.31"E - 87°15'37.848"E

Kilometers
1.5 0.75 0 1.5 3 4.5





Legend
- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

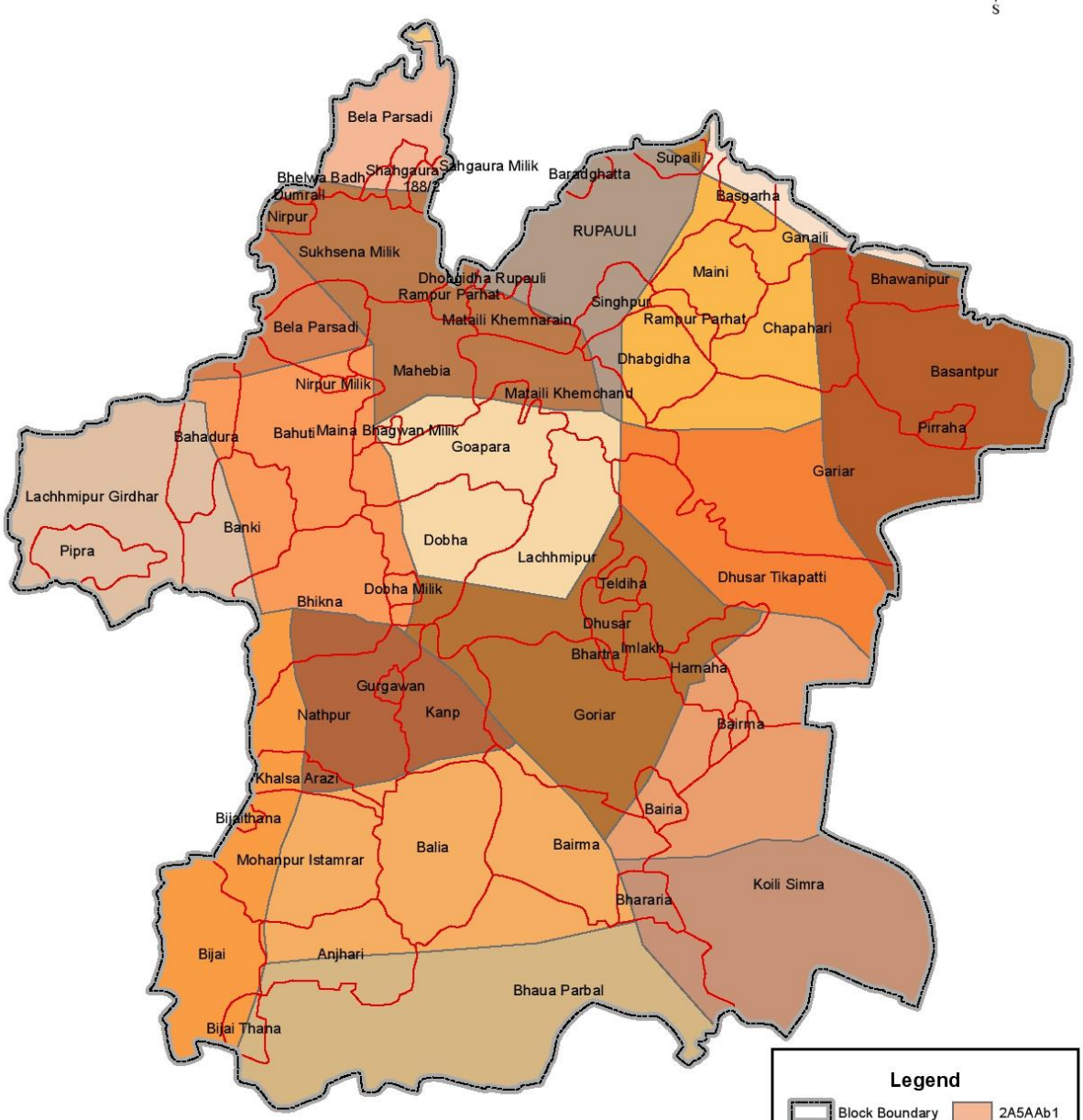
Landuse / Land Cover Map
Rupauli Block, Purnia District, Bihar

Geographical Location -

25°25'54.87"N - 25°37'36.218"N
87°3'16.31"E - 87°15'37.848"E

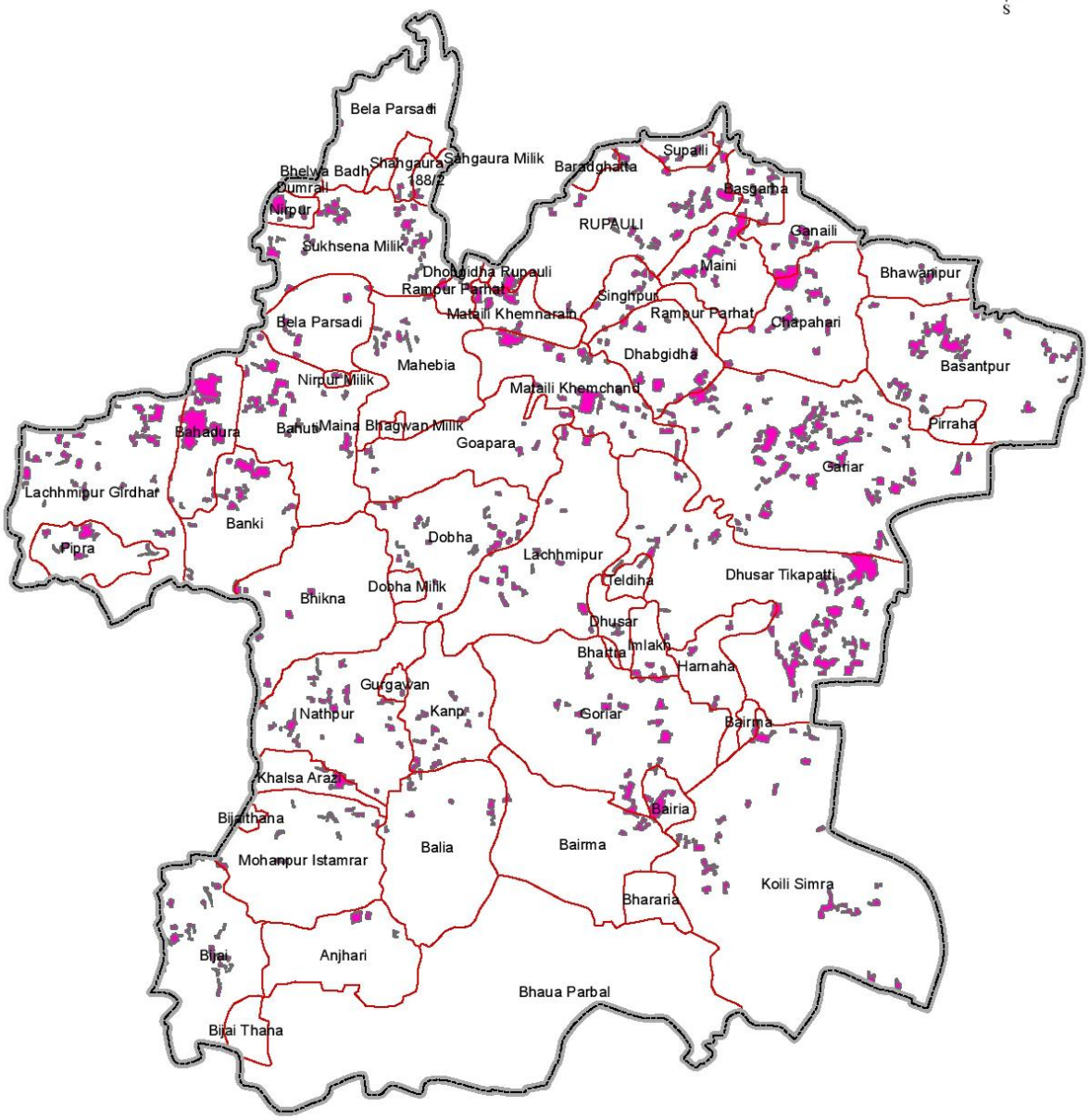
Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Micro-Watershed
Rupauli Block, Purnia District, Bihar



Prepared by: Bihar Remote Sensing Application Center, Patna

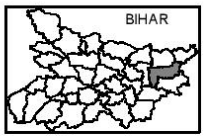
Spatial Aspect of Orchards
Rupauli Block, Purnia District, Bihar

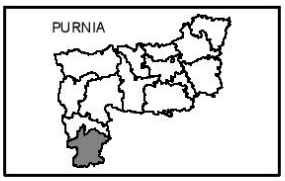


Geographical Location -

25°25'54.87"N - 25°37'36.218"N
87°3'16.31"E - 87°15'37.848"E

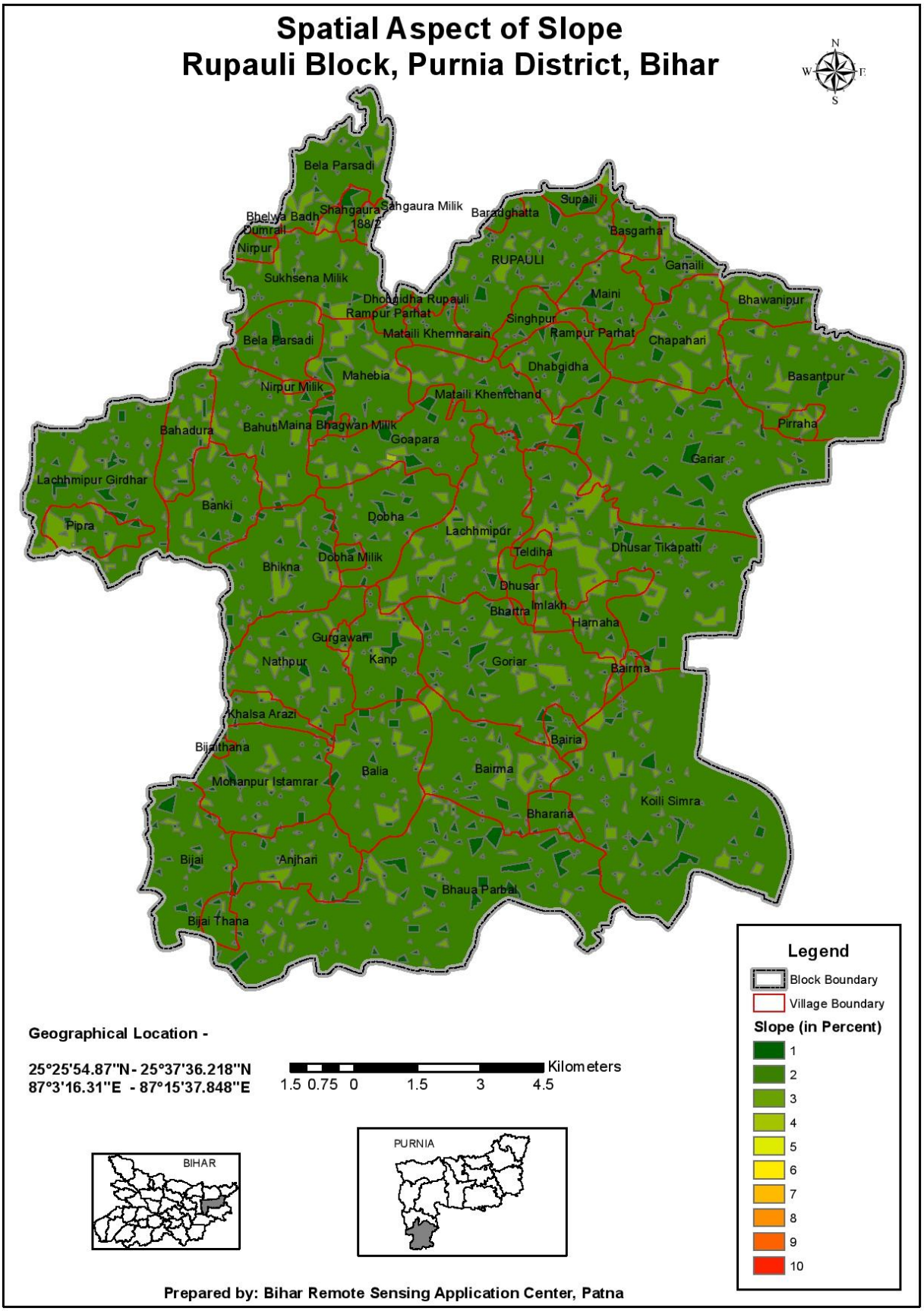
Kilometers
1.5 0.75 0 1.5 3 4.5



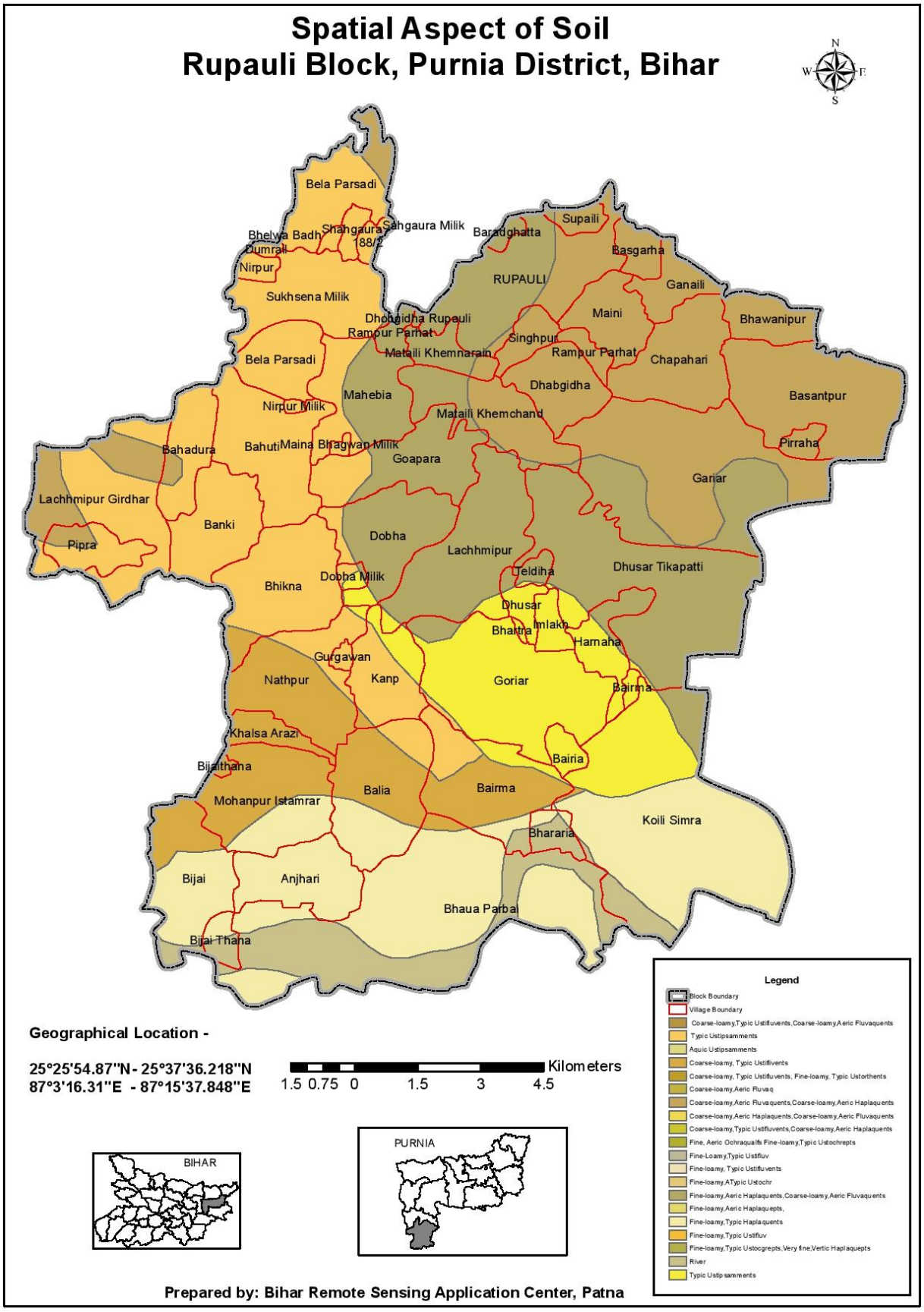


Legend
- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Slope
Rupauli Block, Purnia District, Bihar
N
W
E
S
Bela Parsadi
Bhelwa Badh
Dumrali
Shahgaura 188/2
Sahgaura Milik
Baradghatta
Supaili
Basgarha
Nirpur
RUPAULI
Ganaili
Sukhsena Milik
Dhobgidha Rupauli
Maini
Bhawanipur
Rampur Parhat
Singhpur
Mataili Khemnarain
Rampur Parhat
Chapahari
Bela Parsadi
Dhabgidha
Mahebia
Basantpur
Nirpur Milik
Mataili Khemchand
Pirraha
Bahadura
Bahuti
Maina Bhagwan Milik
Goapara
Gariar
Lachhmipur Girdhar
Banki
Dobha
Pipra
Lachhmipur
Teldiha
Dhusar Tikapatti
Dobha Milik
Bhikna
Dhusar
Imlakh
Bhartra
Harnaha
Gurgawan
Nathpur
Kanp
Goriar
Bairma
Khalsa Arazi
Bairia
Bijaithana
Balia
Bairma
Mohanpur Istamrar
Koili Simra
Bhararia
Bijai
Anjhari
Bhaua Parbal
Bijai Thana
Legend
Block Boundary
Village Boundary
Slope (in Percent)
1
2
3
4
5
6
7
8
9
10
Geographical Location -
25°25'54.87"N - 25°37'36.218"N
87°3'16.31"E - 87°15'37.848"E
Kilometers
1.5 0.75 0 1.5 3 4.5
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna

Spatial Aspect of Soil
Rupauli Block, Purnia District, Bihar

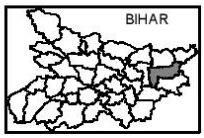


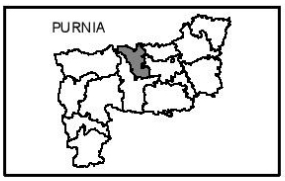
Spatial Aspect of Drain / Canal
Srinagar Block, Purnia District, Bihar

Geographical Location -

25°49'24.049"N- 25°59'31.058"N
87°18'29.2"E - 87°28'34.838"E

Kilometers
1 0.5 0 1 2 3





Legend
- Block Boundary
- Village Boundary
- River
- Stream
- Drain
- Main Canal
- Branch Canal
- Distributary Canal

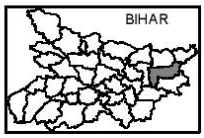
Prepared by: Bihar Remote Sensing Application Center, Patna

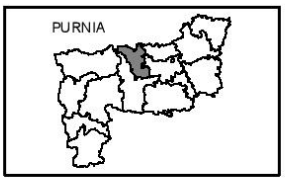
Spatial Aspect of Lakes / Ponds
Srinagar Block, Purnia District, Bihar

Geographical Location -

25°49'24.049"N- 25°59'31.058"N
87°18'29.2"E - 87°28'34.838"E

Kilometers
1 0.5 0 1 2 3



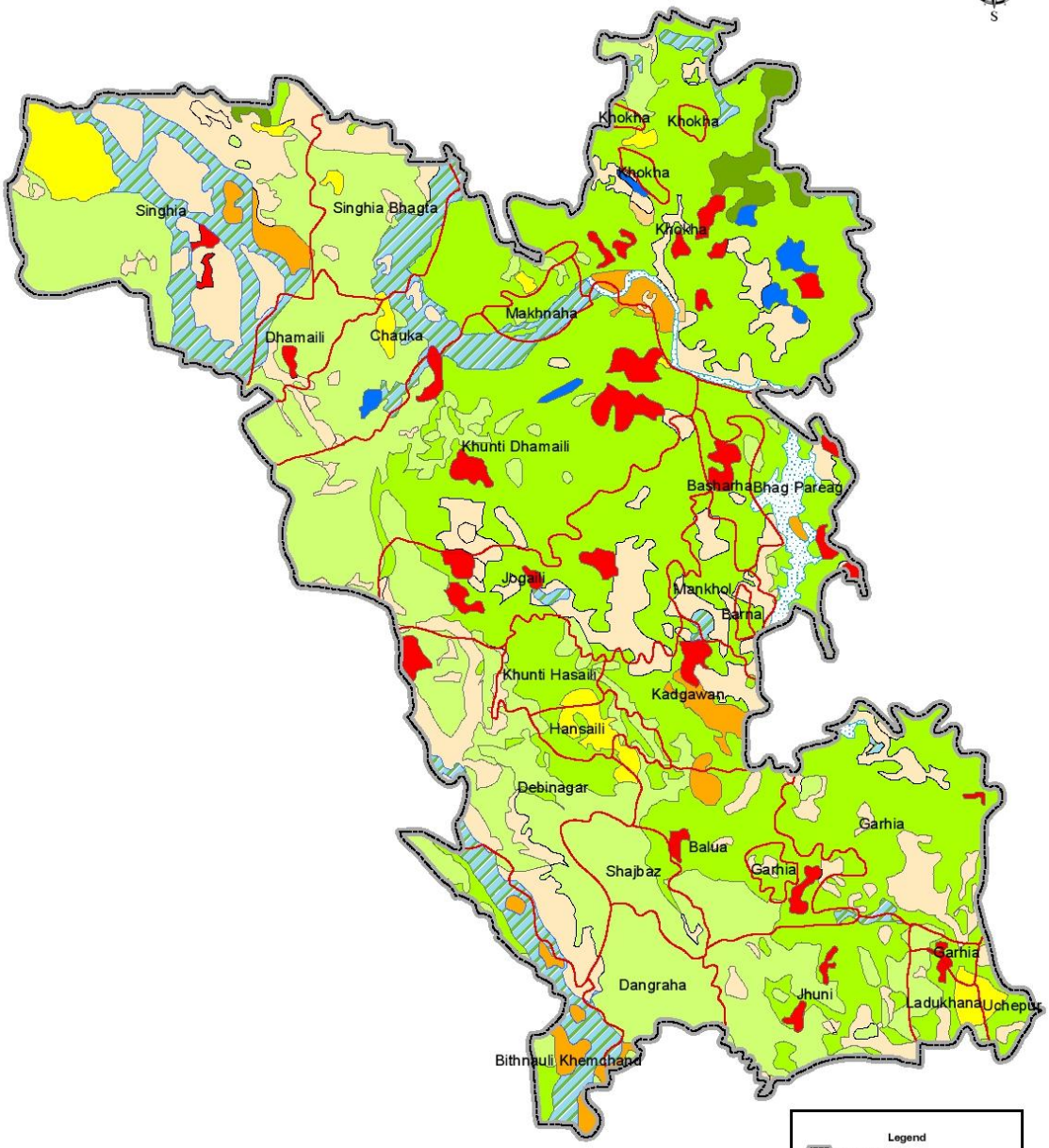


Legend

- Block Boundary
- Village Boundary
- Lakes / Ponds

Prepared by: Bihar Remote Sensing Application Center, Patna

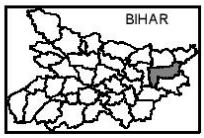
Landuse / Land Cover Map
Srinagar Block, Purnia District, Bihar

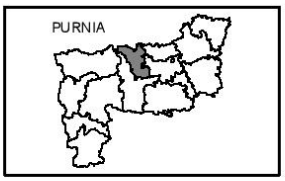


Geographical Location -

25°49'24.049"N- 25°59'31.058"N
87°18'29.2"E - 87°28'34.838"E

1 0.5 0 1 2 3 Kilometers

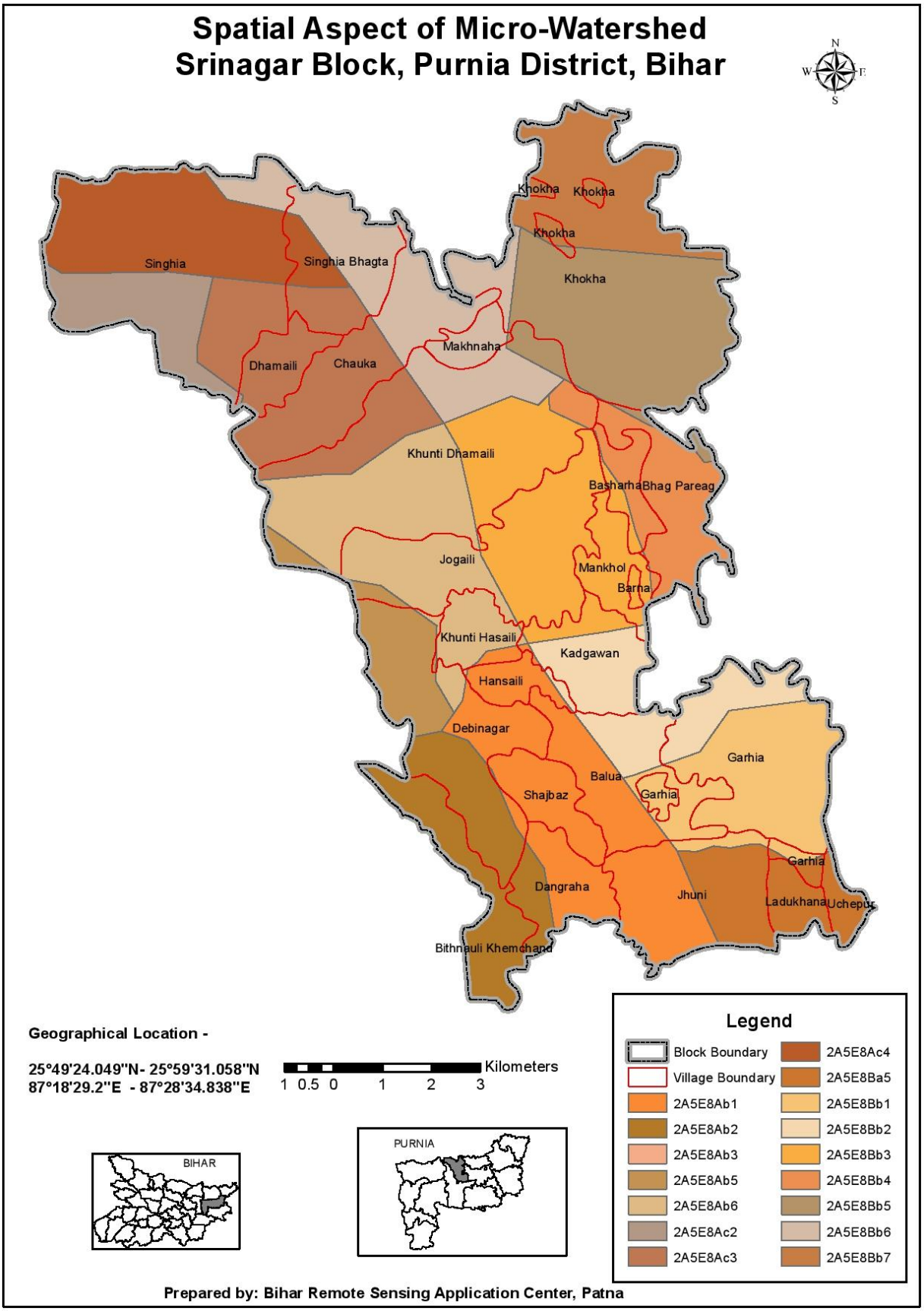




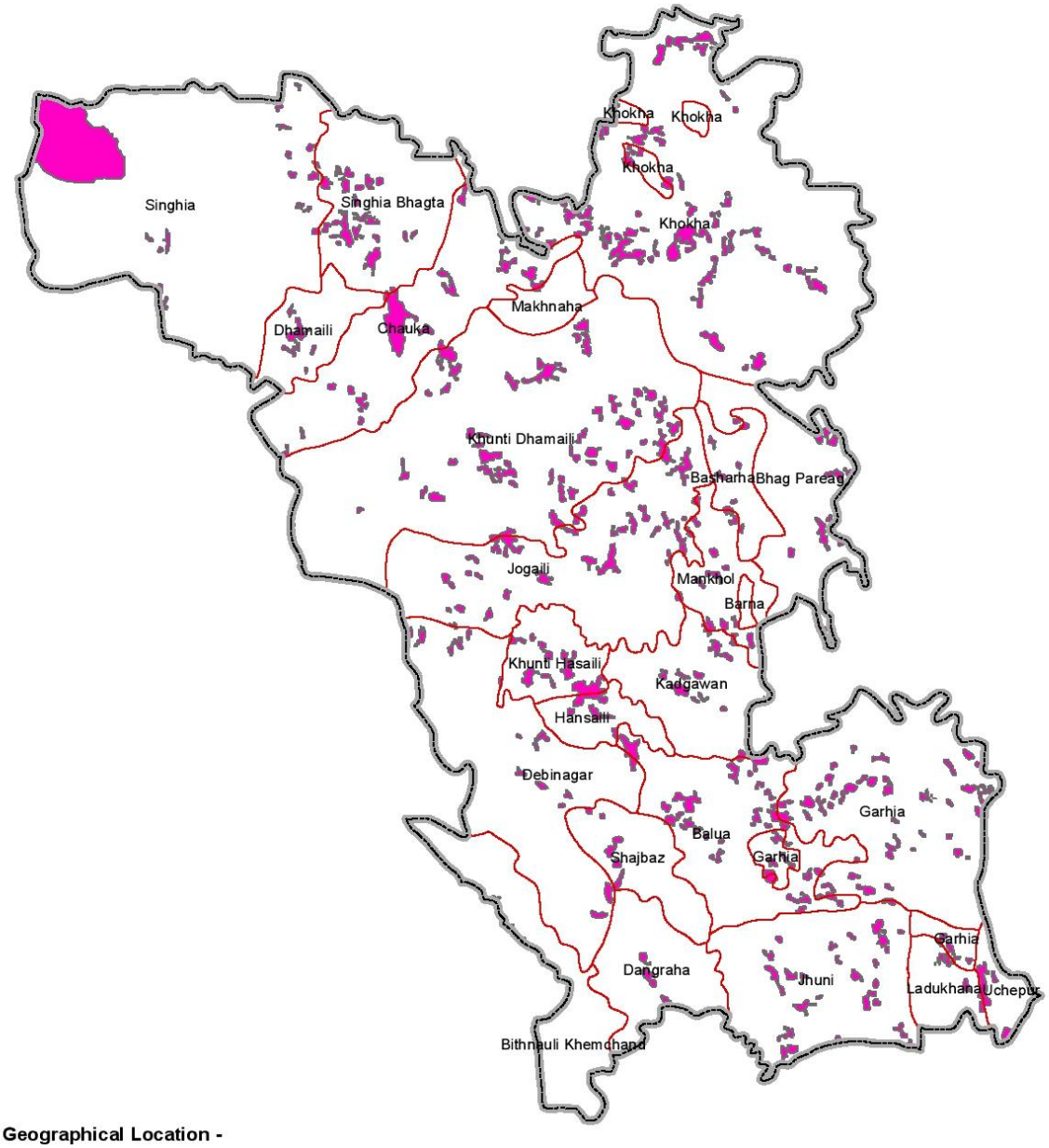
Legend

- Block Boundary
- Village Boundary
- Agricultural Land-Crop Land-Kharif Crop
- Agricultural Land-Crop Land-Rabi Crop
- Agricultural Land-Crop Land-Two crop area
- Agricultural Land-Crop Land-Zaid Crop
- Agricultural Land-Fallow-Current Fallow
- Agricultural Land-Plantation-Horticulture Plant
- Built Up-Built Up (Urban)-Mixed Built Up area
- Built Up-Built Up (Urban)-Recreational
- Built Up-Built Up(Urban)-Rural -Built Up area (Ru"
- Built Up-Built Up(Urban)-Transportation
- Built Up-Built Up(Urban)-Vegetated Area
- Wastelands-Scrub land-Dense scrub
- Wastelands-Scrub land-Open scrub
- Waterbodies-Canal/Drain-Lined
- Waterbodies-Canal/Drain-Unlined
- Waterbodies-Lakes/ponds-Perennial
- Waterbodies-Reservoir/Tanks-Perennial
- Waterbodies-River/Stream-Dry
- Waterbodies-River/Stream-Perennial
- Wetlands-Inland Manmade
- Wetlands-Inland Natural

Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Micro-Watershed
Srinagar Block, Purnia District, Bihar
N
W
E
S
Khokha
Khokha
Khokha
Khokha
Singhia
Singhia Bhagta
Makhnaha
Dhamaili
Chauka
Khunti Dhamaili
Basharha
Bhag Pareag
Jogaili
Mankhol
Barna
Khunti Hasaili
Kadgawan
Hansaili
Debinagar
Garhia
Balua
Shajbaz
Garhia
Garhia
Dangraha
Jhuni
Ladukhana
Uchepur
Bithnauli Khemchand
Geographical Location -
25°49'24.049"N- 25°59'31.058"N
87°18'29.2"E - 87°28'34.838"E
Kilometers
1 0.5 0 1 2 3
BIHAR
PURNIA
Legend
Block Boundary
Village Boundary
2A5E8Ab1
2A5E8Ab2
2A5E8Ab3
2A5E8Ab5
2A5E8Ab6
2A5E8Ac2
2A5E8Ac3
2A5E8Ac4
2A5E8Ba5
2A5E8Bb1
2A5E8Bb2
2A5E8Bb3
2A5E8Bb4
2A5E8Bb5
2A5E8Bb6
2A5E8Bb7
Prepared by: Bihar Remote Sensing Application Center, Patna

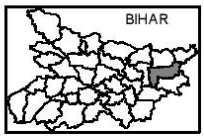
Spatial Aspect of Orchards
Srinagar Block, Purnia District, Bihar

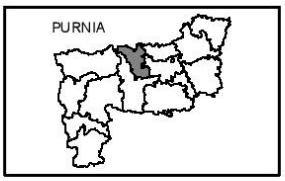


Geographical Location -

25°49'24.049"N- 25°59'31.058"N
87°18'29.2"E - 87°28'34.838"E

Kilometers
1 0.5 0 1 2 3

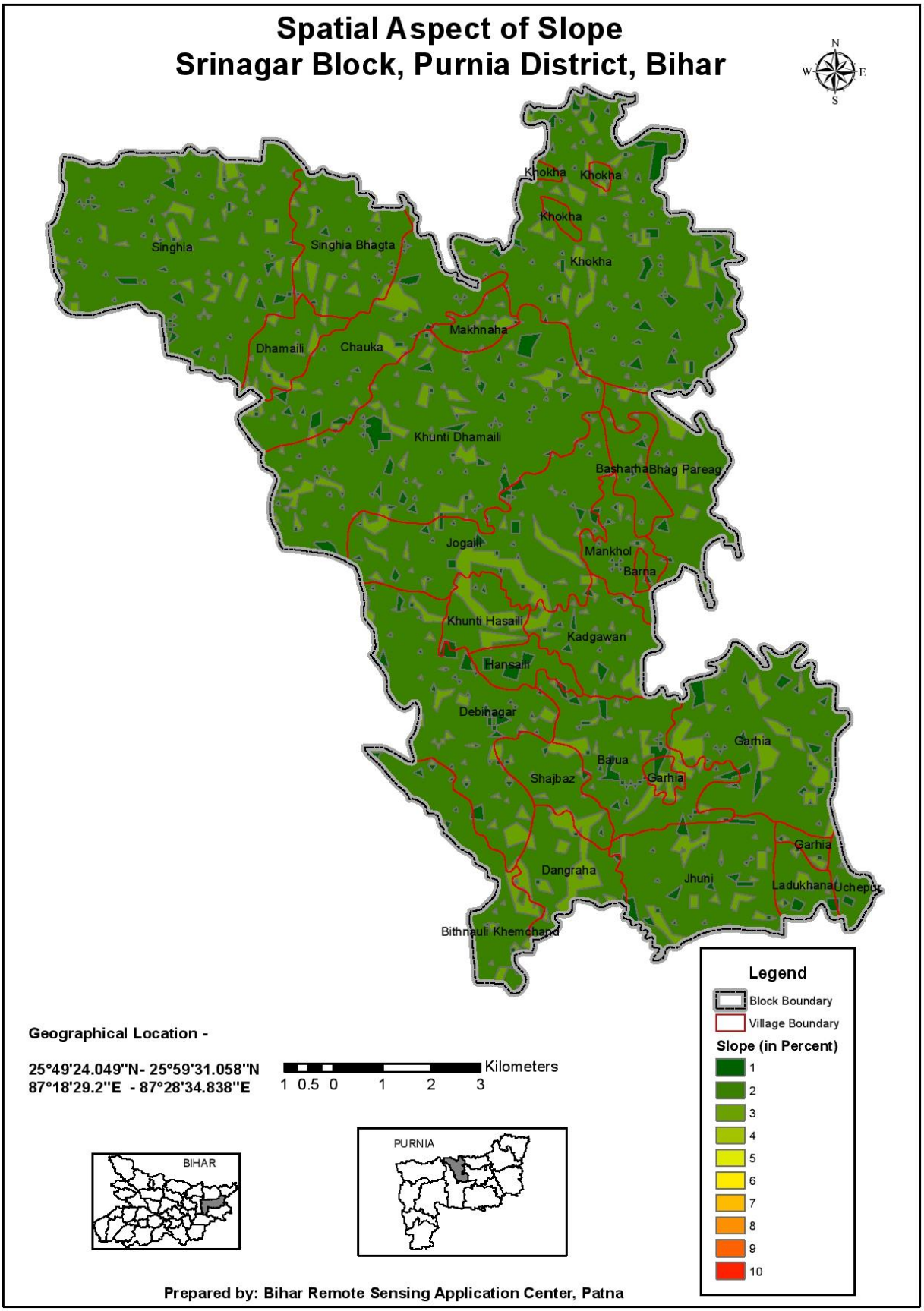


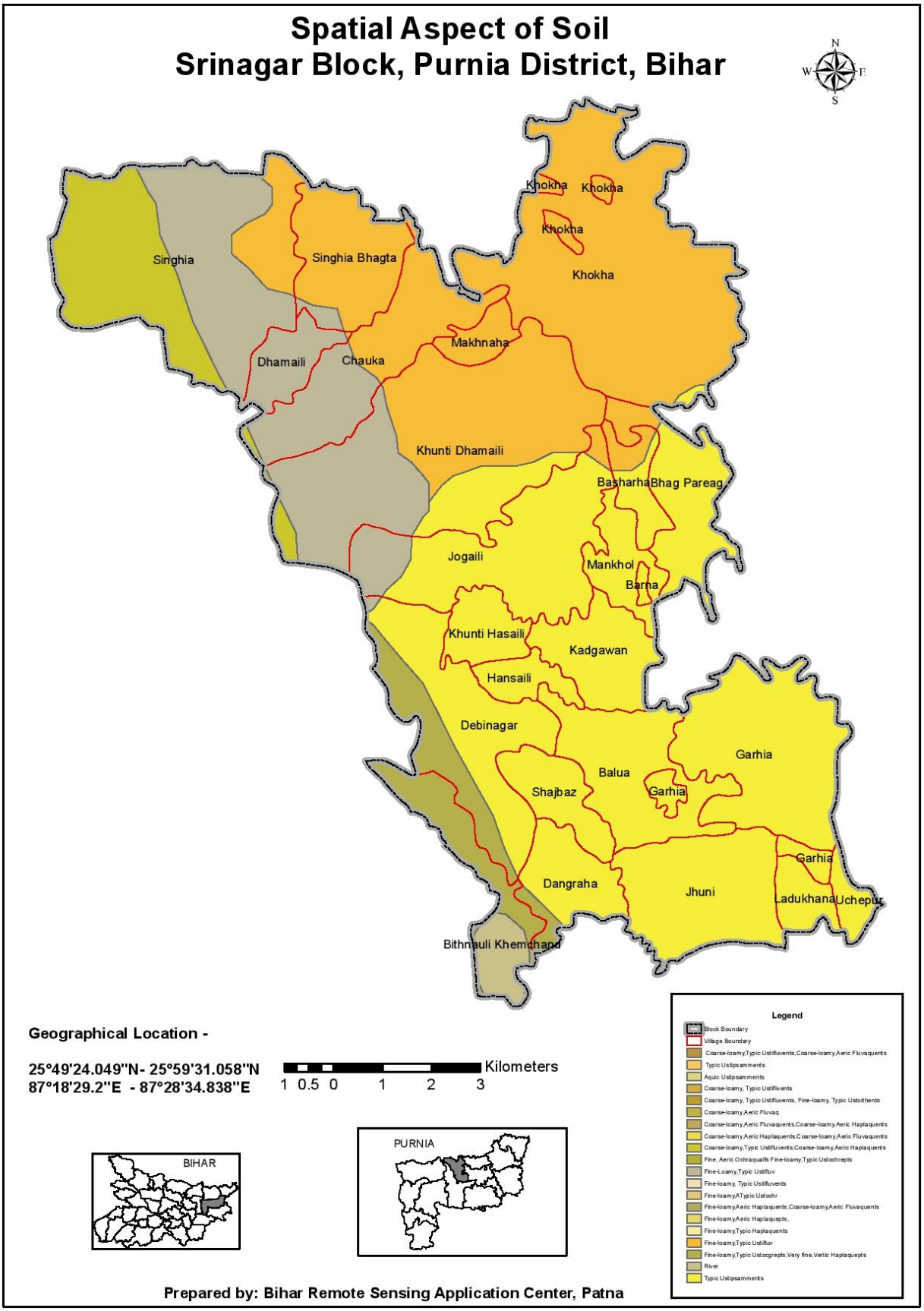


Legend

- Block Boundary
- Village Boundary
- Orchards

Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Slope
Srinagar Block, Purnia District, Bihar
N
W
E
S
Khokha
Khokha
Khokha
Khokha
Singhia
Singhia Bhagta
Makhnaha
Dhamaili
Chauka
Khunti Dhamaili
Basharha
Bhag Pareag
Jogaili
Mankhol
Barna
Khunti Hasaili
Kadgawan
Hansaili
Debihagar
Garhia
Balua
Shajbaz
Garhia
Garhia
Dangraha
Jhuni
Ladukhana
Uchepur
Bithnauli Khemchand
Legend
Block Boundary
Village Boundary
Slope (in Percent)
1
2
3
4
5
6
7
8
9
10
Geographical Location -
25°49'24.049"N- 25°59'31.058"N
87°18'29.2"E - 87°28'34.838"E
Kilometers
1 0.5 0 1 2 3
BIHAR
PURNIA
Prepared by: Bihar Remote Sensing Application Center, Patna


Spatial Aspect of Soil
Srinagar Block, Purnia District, Bihar
N
W
E
S
Khokha
Khokha
Khokha
Khokha
Singhia
Singhia Bhagta
Makhnaha
Dhamaili
Chauka
Khunti Dhamaili
Basharha
Bhag Pareag
Jogaili
Mankhol
Barna
Khunti Hasaili
Kadgawan
Hansaili
Debinagar
Garhia
Balua
Shajbaz
Garhia
Garhia
Dangraha
Jhuni
Ladukhana
Uchepur
Bithnauli Khemchand
Geographical Location -
25°49'24.049"N- 25°59'31.058"N
87°18'29.2"E - 87°28'34.838"E
Kilometers
1 0.5 0 1 2 3
BIHAR
PURNIA
Legend
Block Boundary
Village Boundary
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Fluvaquents
Typic Ustipsamments
Aquic Ustipsamments
Coarse-loamy, Typic Ustiflivents
Coarse-loamy, Typic Ustifluvents, Fine-loamy, Typic Ustothents
Coarse-loamy,Aeric Fluvaq
Coarse-loamy,Aeric Fluvaquents,Coarse-loamy,Aeric Haplaquents
Coarse-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Coarse-loamy,Typic Ustifluvents,Coarse-loamy,Aeric Haplaquents
Fine, Aeric Ochraqualfs Fine-loamy,Typic Ustochrepts
Fine-Loamy,Typic Ustifluv
Fine-loamy, Typic Ustifluvents
Fine-loamy,ATypic Ustochr
Fine-loamy,Aeric Haplaquents,Coarse-loamy,Aeric Fluvaquents
Fine-loamy,Aeric Haplaquepts,
Fine-loamy,Typic Haplaquents
Fine-loamy,Typic Ustifluv
Fine-loamy,Typic Ustocrepts,Very fine,Vertic Haplaquepts
River
Typic Ustipsamments
Prepared by: Bihar Remote Sensing Application Center, Patna

Chapter – 11

District Water Profile

District Water Profile

Water has unique characteristics that determine both its allocation and use as a resource by agriculture. Agricultural use of water for irrigation is itself contingent on land resources. In a situation of growing water scarcity and rising demands for non-agricultural (household and industrial) use of water, reassessment of sectoral allocations of water are inevitable. In developing countries, irrigated agriculture plays a vital role in contributing towards domestic food security and poverty alleviation. Therefore, achievement of these objectives is dependent on adequate allocations of water to agriculture. Justification of such allocations requires that irrigated agriculture be a cost-effective means of achieving stated political or social objectives, such as food security or poverty alleviation, and that all externalities be taken into account in the pricing mechanism. Improved allocation of irrigation water is required within the agriculture sectors of developing countries in order to achieve greater efficiency in the use of irrigation water and existing irrigation infrastructure.

Ground water resources may be termed as subsurface hydrosphere resources. It includes all waters below land surface and in the saturation zone that are in direct contact with soil or grounds .With the increasing demand of water due to population growth and resulting increase in agricultural and economic activities, groundwater extraction is increasing at a very fast pace, resulting in rapidly lowering of water table year after year. Due to this situation, infiltration and further percolation are increasing, making less contribution of base flow to the surface flow and thereby reducing the surface runoff.

Due to excessive pumped withdrawal of groundwater and corresponding negligible recharge by natural process the groundwater is steadily dropping. In these circumstances, results (Solis et al. 2011) show that groundwater banking can significantly improve water management in the basin, increasing system storage, improving water supply for users in the basin, and enhancing compliance with the treaty obligations. Since the 1970s, groundwater banking studies have considered the economic and the hydraulic feasibility of storing water in aquifers in wet periods and recovering it later in dry periods.

The development of groundwater banks requires the assessment of hydrogeology and water quality, legal and financial issue, as well as proper water planning and management.

Intensive use of groundwater resources for agricultural production is proving to be catastrophic in many arid and semiarid regions of the world, including some

developed countries like Spain, Mexico, Australia, and parts of US, and developing countries like India, China and Pakistan etc. Total (761BCM) and agricultural (688 BCM) water withdrawals in India are highest in the world. More than half of the irrigation requirements of India are met from groundwater, and number of mechanized bore wells in India has increased from 1 million in 1960 to more than 20 million in 2000.

Agriculture in Bihar is crucially dependent on monsoon. Although around 57 percent of its gross cultivated area is irrigated, irrigation itself is crucially dependent on monsoon as it largely depends on the use of surface water. Bihar is richly endowed with water resources and with a very healthy rainfall average of 1271.9 mms. Ultimate irrigation potential in the State is estimated to be around 102 lakh hectares which is far above total cultivated area in the State. However, neither rainfall nor the distribution of the water resources is uniform across the State, causing uneven irrigation potential / coverage across the State. While Zone - II receives earliest showers and highest rainfall (1450 mm) among all three agro-climatic zones in the State.

Bihar has 45.67 lakh hectares of irrigated area against its total geographical area of 93.6 lakh hectares. While created irrigation capacity of 45.67 lakh hectare means that around 49 per cent of total area is irrigated, distribution of irrigation capacity is not even across the State. The percentage of irrigated area varies greatly across different regions/districts, from a low of 16 percent (in Jamui) to around 86 percent (in Sheikhpura). In fact, both irrigation capacity and its source vary greatly across the 3 agro-climatic Zones of the state.

Nearly 63 per cent of total created irrigation capacity in the State has tube wells as its source. Canal irrigation accounts for nearly 30 per cent of total irrigated area. Thus major and medium sources of irrigation together account for 93 per cent of total created irrigation capacity in the State, with other sources (minor and micro irrigation) accounting for only about 7 percent of total irrigation. A very high dependence of irrigation on tube-wells, and operation of diesel tube-well due to lack of power infrastructure in the rural areas means a high cost and inefficient irrigation.

The variation in irrigation source has a very clear pattern across the agro climatic zones of the State. There is an almost exclusive reliance on tube-well irrigation in the northern parts, especially in Zone 2. This is rather peculiar as most of the rivers in Bihar flow through its northern plains, which therefore should have had a better canal irrigation capacity.

Minor and micro irrigation have only a limited coverage in the overall irrigation scenario of the State, accounting for only 7.53 per cent of the irrigated area. Here too,

there is a great deal of variation in its use across the State. While only 2 per cent of irrigated area of Zone 2 has minor irrigation as its source.

Ground water is a major source of irrigation for Bihar state. Even in canal command areas ground water is exploited heavily for irrigation. Irrigation in Purnea district is mainly depends on the ground water. In order to exploit ground water potential to increase the cropping intensity, it is essential to understand the prevailing Hydro-geological system.

The land use pattern cover, District Agriculture Department, Purnea data shows that net sown area in the district is 208,504.35 hectares. The area sown more than once is 92,337.37 hectares. The total cropped area in the district is 300,841.72 hectares. The area under forests is 353.36 hectares. The land put to non-agricultural uses is 24,817.38 hectares. The district forms tail-end area of Eastern Kosi Canal Command area. The gross area irrigated is 204,317.31 hectares. The net irrigated area from all the sources is 112,247.82 hevtares. Out of net irrigated area, the area irrigated from ground water is 37,270.82 hectares. The irrigation from the ground water is mainly through the shallow tube wells, open wells and bore wells. The area irrigated from canals is 73,844 hectare. 21,013 hectare area is being irrigated through ponds and canals. The present irrigation potatial of Purnea district is at present around 54 %. The irrigated crops grown in the adjoining area are mainly paddy, maize, arhar, wheat, pulses, potato and other green vegetables like peas, beans etc.

Purnea district lies in Agro-climatic Zone – II, is a part of the Lower Ganga basin. This district falls in the Kosi and Mahananda sub-basin. The Kosi River and the Mahananda River with their numerous tributaries like Katua Dhar, Saura Nala, Kankai Nala and Riga Nadi. Saura is principal tributary of river Kosi flows to eastern side of Purnea District. The rivers are effluent in nature. River Mahananda flows in the eastern part of the district.

There are four cropping season in practice in Purnea district. They are Bhadai, Aghani, Rabbi and Garma. Generally, Bhadai and Aghani from Kharif season followed by Rabbi and Garma. Rice and wheat are staple food of the district. Cash crops grown in the area are Jute, Sugarcane and Banana. The total cropped area of the district is 300,841.72 Ha. and net sown area is 208,504.35 Ha. The irrigation in the district is provided both by surface are well as ground water. Surface water irrigation is mainly through net work of Eastern Kosi main canal. For, irrigation ground water is easily exploitable with the help of Bamboo boring and shallow tube wells mostly fitted with diesel pump sets. Shallow tube wells are restricted to a depth of 30 – 40 mtrs. These wells are mostly privately owned.

As we discussed before in this chapter Kharif, Rabbi and Summer (Garma) are three main cropping seasons in this district. Kharif crop include paddy, maize, arhar, moong, groundnut, till and vegetables. The Rabbi crops are wheat, maize, gram, peas, lentil, linseed, potato and other vegetables. The summer crops include sugarcane, maize, moong, till, onion and vegetables. The distribution of sown area under different major crops in the district as fallows; Kharif (168,170.5 Ha.), Rabbi (102,097 Ha.), Summer or Garma (52,927.8 Ha.) and Horticulture and plantation crops (34,258 Ha.).

Irrigation facility is available to the farmers through public and private tube wells. Out of a total geographical area of 319,931.07 Ha., the gross cropped area is 300,841.72 Ha. in the district. The net irrigated area is 112,247 Ha., which accounts about 37.31%. In Kharif season 131,711 Ha. of land is recorded as irrigated and 36,459.5 Ha. as rainfed and again in Rabbi and Summer it is recorded as 71,473.5 Ha irrigated, 30,623 Ha. rainfed and 37,738.8 Ha. irrigated, 15,189 Ha. rainfed respectively. In case of Horticulture and plantation crops net irrigated area is recorded as 26,674.8 Ha. against 7,583.7 Ha. as rainfed.

Detail data of area wise, crop wise irrigation status; production and productivity of major crops of the district along with irrigation based classification are given in **Table no. 2.1, 2.2 & 2.3**.

2.1 Area-wise, Crop-wise Irrigation Status

Name of state : BIHAR

Source:Department of Aguriculture/ Aguricuture Statistic of State/ Agristat/ Distt. Stat. Office/ Irrigation Department (Minor/Major)

Name of District : Purnea

S.no	Block	Copy Type	Kharif (Area in ha)			Rabi (Area in ha)			Summer Crop (Area in ha)			Total (Area in ha)			Horticulture & Plantation Crops (Area in ha)		
			Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated (4+7+10)	Rainfed (5+8+11)	Total	Irrigated	Rainfed	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	P.East	A) Cereals	5240.9	2246.8	7487.7	3850	1650	5500	1785	765	2550	10875.9	4661.8	15537.7	1883	807	2690
		B) Coarse Cereals	451.5	193.5	645	1970.5	844.5	2815	1746.5	748.5	2495	4168.5	1786.5	5955			0
		C) Pulses	172.9	74.1	247	327.6	140.4	468	490	210	700	990.5	424.5	1415			0
		D) Oil seeds	2.8	1.2	4	312.2	1338	1650.2			0	315	1339.2	1654.2			0
		E) Fibre	525.24	225.1	750.34	0	0	0			0	525.24	225.1	750.34			0
		F) Any otherCrops			0	8.4	3.6	12			0	8.4	3.6	12			0
2	Kasba	A) Cereals	3339	1431	4770	2313.5	991.5	3305	770	330	1100	6422.5	2752.5	9175	1218	522	1740
		B) Coarse Cereals	315	135	450	1267	543	1810	857.5	367.5	1225	2439.5	1045.5	3485			0
		C) Pulses	57.4	24.6	82	258.3	110.7	369	245	105	350	560.7	240.3	801			0
		D) Oil seeds	11.2	4.8	16	287.7	123.3	411			0	298.9	128.1	427			0
		E) Fibre	580.68	248.86	829.54			0			0	580.68	248.86	829.54			0
		F) Any otherCrops			0	2.8	1.2	4			0	2.8	1.2	4			0
3	Jalalgarh	A) Cereals	2523.5	1081.5	3605	1960	840	2800	682.5	292.5	975	5166	2214	7380	10575	682.5	11257.5
		B) Coarse Cereals	273	117	390	976.5	418.5	1395	960.4	411.6	1372	2209.9	947.1	3157			0
		C) Pulses	58.1	24.9	83	200.2	85.8	286	210	90	300	468.3	200.7	669			0
		D) Oil seeds	6.3	2.7	9	163.1	69.9	233			0	169.4	72.6	242			0
		E) Fibre	59.31	255.13	314.44			0			0	59.31	255.13	314.44			0

		F) Any otherCrops			0			0			0	0	0	0			0
4	K.Nagar	A) Cereals	4623.8	2110.2	6734	2936.5	1258.5	4195	1190	510	1700	8750.3	3878.7	12629			0
		B) Coarse Cereals	350.7	150.3	501	1935.5	829.5	2765	1225	525	1750	3511.2	1504.8	5016			0
		C) Pulses	38.5	16.5	55	364	156	520	609	261	870	1011.5	433.5	1445	1200.5	514.5	1715
		D) Oil seeds			0			0			0	0	0	0			0
		E) Fibre			0			0			0	0	0	0			0
		F) Any otherCrops			0	5.6	2.4	8			0	5.6	2.4	8			0
5	S.Nagar	A) Cereals	2462.6	1055.7	3518.3	1565.2	670.8	2236			0	4027.8	1726.5	5754.3			0
		B) Coarse Cereals	213.5	51.5	265	1501.5	643.5	2145	2345	1005	3350	4060	1700	5760			0
		C) Pulses	35.7	15.3	51	186.9	80.1	267	689.3	295.5	984.8	911.9	390.9	1302.8	948.5	406.5	1355
		D) Oil seeds			0	153.3	65.7	219			0	774.79	65.7	840.49			0
		E) Fibre	621.49	266.35	887.84			0			0	623.59	266.35	889.94			0
		F) Any otherCrops			0	2.1	0.9	3			0	2.1	0.9	3			0
6	Dhamdaha	A) Cereals	6370	2730	9100	4620	1980	6600			0	10990	4710	15700	2089.5	895.5	2985
		B) Coarse Cereals	455	135	590	2438	1072	3510	2159.5	925.5	3085	5052.5	2132.5	7185			0
		C) Pulses	85.4	36.6	122	4137	177.3	4314.3	654.4	297.6	952	4876.8	511.5	5388.3			0
		D) Oil seeds	10.5	4.5	15	436.8	187.2	624			0	447.3	191.7	639			0
		E) Fibre			0			0			0	0	0	0			0
		F) Any otherCrops			0	4.2	1.8	6			0	4.2	1.8	6			0
7	Bhawanipur	A) Cereals	3831.8	1642.2	5474	2627.1	1125.9	3753			0	6458.9	2768.1	9227			0
		B) Coarse Cereals	315	135	450	1879.5	805.5	2685	1820	780	2600	4014.5	1720.5	5735	2282	978	3260
		C) Pulses	175	7.5	182.5	271.6	116.4	388	609	261	870	1055.6	384.9	1440.5			0
		D) Oil seeds	7.7	3.3	11	236.6	101.4	338			0	244.3	104.7	349			0

		E) Fibre			0	2.1	0.9	3			0	2.1	0.9	3			0
		F) Any otherCrops			0			0			0	0	0	0			0
8	Rupouli	A) Cereals	5250	2250	7500	3123.4	1338.6	4462			0	8373.4	3588.6	11962			0
		B) Coarse Cereals	551.5	253.5	805	2453.5	1051.5	3505	1491	639	2130	4496	1944	6440	2488.5	1066.5	3555
		C) Pulses	76.3	32.7	109	338.1	144.9	483	631.4	270.6	902	1045.8	448.2	1494			0
		D) Oil seeds			0	354.9	152.1	507			0	354.9	152.1	507			0
		E) Fibre	580.68	248.86	829.54			0			0	580.68	248.86	829.54			0
		F) Any otherCrops			0	5.6	2.4	8			0	5.6	2.4	8			0
9	B.Kothi	A) Cereals	6370	2730	9100	3162.6	1355.4	4518	560	240	800	10092.6	4325.4	14418	1127	483	1610
		B) Coarse Cereals	569.8	244.2	814	2548.4	163.6	2712	1458.1	624.3	2082.4	4576.3	1032.1	5608.4			0
		C) Pulses	154	66	220	389.2	166.8	556	728	312	1040	1271.2	544.8	1816			0
		D) Oil seeds	13.3	5.7	19	305.9	131.1	437			0	319.2	136.8	456			0
		E) Fibre			0			0			0	0	0	0			0
		F) Any otherCrops			0			0			0	0	0	0			0
10	Dagarua	A) Cereals	4557	1953	6510	2481.5	1063.5	3545	1260	540	1800	8298.5	3556.5	11855	165.55	70.95	236.5
		B) Coarse Cereals	150.5	64.5	215	591.2	424.8	1016	542.5	232.5	775	1284.2	721.8	2006			0
		C) Pulses	32.2	13.8	46	368.2	157.8	526	210	90	300	610.4	261.6	872			0
		D) Oil seeds			0	301	129	430			0	301	129	430			0
		E) Fibre	2732.38	1171.02	3903.4			0			0	2732.38	1171.02	3903.4			0
		F) Any otherCrops			0			0			0	0	0	0			0
11	Banmankhi	A) Cereals	7373.8	3160.2	10534	4760	2040	6800	2345	1005	3350	14478.8	6205.2	20684			0
		B) Coarse Cereals	1260	540	1800	3097.5	1327.5	4425	689.5	295.5	985	5047	2163	7210	2282	978	3260
		C) Pulses	165.9	71.1	237	364.7	156.3	521			0	530.6	227.4	758			0
		D) Oil seeds	44.38	19.2	63.58	453.6	194.4	648			0	497.98	213.6	711.58			0

		E) Fibre	540.68	248.86	789.54			0			0	540.68	248.86	789.54			0
		F) Any otherCrops			0	10.5	4.5	15			0	10.5	4.5	15			0
12	Baisi	A) Cereals	4410.7	1890.3	6301	2266.6	971.4	3238	2240	960	3200	8917.3	2854.8	11772.1	109.2	46.8	156
		B) Coarse Cereals	56	24	80	602	258	860	255.5	109.5	365	913.5	1104.9	2018.4			0
		C) Pulses	22.4	9.6	32	336	144	480	105	45	150	463.4	312.6	776			0
		D) Oil seeds			0	272.3	166.7	439			0	272.3	144	416.3			0
		E) Fibre	2022.82	867.18	2890			0			0	2022.82	1033.88	3056.7			0
		F) Any otherCrops			0			0			0	0	0	0			0
13	Amour	A) Cereals	6310.5	2704.5	9015	1329.3	569.7	1899	2600.5	1114.5	3715	10240.3	4388.7	14629			0
		B) Coarse Cereals	56	24	80	246.4	105.6	352	283.5	121.5	405	585.9	251.1	837	106.2	46.8	153
		C) Pulses	26.6	11.4	38	31.5	135	166.5	270.9	116.1	387	329	262.5	591.5			0
		D) Oil seeds			0	329	141	470			0	2222.99	952.71	3175.7			0
		E) Fibre	1893.99	811.71	2705.7			0			0	1893.99	811.71	2705.7			0
		F) Any otherCrops			0			0			0	0	0	0			0
14	Baisa	A) Cereals	3867.5	1657.5	5525	1260	540	1800	2597	111.3	2708.3	7724.5	2308.8	10033.3	199.85	85.65	285.5
		B) Coarse Cereals	42	18	60	245	105	350	297.5	127.5	425	584.5	685.5	1270			0
		C) Pulses	19.6	8.4	28			0	125.3	53.7	179	144.9	167.1	312			0
		D) Oil seeds			0	244.3	1047	1291.3			0	244.3	1047	1291.3			0
		E) Fibre	2179.8	934.2	3114			0			0	2179.8	934.2	3114			0
		F) Any otherCrops			0			0			0	0	0	0			0
		Total	**84543.85**	**36459.57**	**121003.42**	**71473.5**	**30623.8**	**102097.3**	**37738.8**	**15188.7**	**52927.5**	**196273.73**	**83628.28**	**279902.01**	**26674.8**	**7583.7**	**34258.5**

Source - DAO Purnea, DHO Purnea (Year) - 2015

2.2 Production and Productive of major Crops

Name of state : BIHAR

Source:Department of Aguriculture/ Aguricuture Statistic of State/ Agristat/ Distt. Stat. Office

Name of District :

s.no	Block	Seasons	Crop Sown							Rainfed				Irrigated				Total			
			Cereals	Coarse Cereals	Pulses	Oil Seeds	Fibre Crops	Any Other Crops	Total Area (ha)	Production (qty/yr)	Productive or yield (qty/yr)	Cost of cultivation (Rs./ha)	Total Area (ha)	Production (qty/yr)	Productive (kgs/ha)	Cost of cultivation (Rs./ha)	Total Area (ha)	Production (qty/yr)	Productive (kgs/ha)	Cost of cultivation (Rs./ha)	Total Area (ha)
1	P.East	Kharif	7487	645	247	4	750	0	9133	54800	20	44000	2740	159825	25	44000	6393	214625	20/25	44000	9133
		Rabi	5500	2815	468	446	0	12	9229	49842	18	37500	2769	155040	24	37500	6460	204882	18/24	37500	9229
		Summer/ Garma	2550	2495	700	0	0	0	5745	25860	15	45500	1724	80440	20	45500	4022	106300	15/20	45500	5745
		Horticultural & Plantation	0	0	0	0	0	0	2690	121050	150	103000	807	470750	250	103000	1883	591800	150/250	103000	2690
		Total	**15537**		**1415**	**450**	**750**	**12**	**26797**	**251552**	**203**		**8040**	**866055**	**319**		**18758**	**1117607**	**0**		**26797**
2	Kasba	Kharif	4970	450	82	16	830	0	6348	36900	20	44000	1845	107575	25	44000	4303	144475	20/25	44000	6348
		Rabi	3305	1810	369	411	0	4	5899	31860	18	37500	1770	99096	24	37500	4129	130956	18/24	37500	5899
		Summer/ Garma	1100	1225	350	0	0	0	2675	12045	15	45500	803	36460	20	45500	1873	48505	15/20	45500	2675
		Horticultural & Plantation	0	0	0	0	0	0	1740	78300	150	103000	522	305500	250	103000	1222	383800	150/250	103000	1740
		Total	**9375**		**801**	**427**	**830**	**4**	**16662**	**159105**	**203**		**4940**	**548631**	**319**		**11527**	**707736**	**0**		**16662**
3	Jalalgarh	Kharif	3605	390	83	9	851	0	4938	29640	20	44000	1482	86400	25	44000	3456	116040	20/25	44000	4938
		Rabi	2800	1395	286	233	0	0	4714	25452	18	37500	1414	770400	24	37500	32100	795852	18/24	37500	4714
		Summer/ Garma	975	1372	300	0	0	0	2647	11925	15	45500	795	37060	20	45500	1853	48985	15/20	45500	2647
		Horticultural & Plantation	0	0	0	0	0	0	2275	102450	150	103000	683	398250	250	103000	1593	500700	150/250	103000	2275
		Total	**7380**		**669**	**242**	**851**	**0**	**14574**	**169467**	**203**		**4374**	**1E+06**	**319**		**39002**	**1461577**	**0**		**14574**

4	K.Nagar	Kharif	7034	501	55	0	0	0	7590	45540	20	**44000**	2277	132825	25	**44000**	5313	178365	20/25	**44000**	7590
		Rabi	4195	2765	520	493	0	8	7981	43092	18	**37500**	2394	134064	24	**37500**	5586	177156	18/24	**37500**	7981
		Summer/ Garma	1700	1750	870	0	0	0	4320	19440	15	**45500**	1296	60480	20	**45500**	3024	79920	15/20	**45500**	4320
		Horticultural & Plantation	0	0	0	0	0	0	1715	77250	150	**103000**	515	300250	250	**103000**	1201	377500	150/250	**103000**	1715
		Total	**12929**		**1445**	**493**	**0**	**8**	**21606**	**185322**	**203**		**6482**	**627619**	**319**		**15124**	**812941**	**0**		**21606**
5	S.Nagar	Kharif	3518	305	51	0	888	0	4762	28580	20	**44000**	1429	83350	25	**44000**	3334	111930	20/25	**44000**	4762
		Rabi	2236	2145	267	219	0	3	4870	26298	18	**37500**	1461	81816	24	**37500**	3409	108114	18/24	**37500**	4870
		Summer/ Garma	950	1140	150	0	0	0	2240	11430	15	**45500**	762	35560	20	**45500**	1778	46990	15/20	**45500**	2240
		Horticultural & Plantation	0	0	0	0	0	0	1385	62400	150	**103000**	416	242500	250	**103000**	970	304900	150/250	**103000**	1385
		Total	**6704**		**468**	**219**	**888**	**3**	**13257**	**128708**	**203**		**4068**	**443226**	**319**		**9491**	**571934**	**0**		**13257**
6	Banman khi	Kharif	10534	1800	237	64	830	0	13465	80800	20	**44000**	4040	235625	25	**44000**	9425	316425	20/25	**44000**	13465
		Rabi	6800	4425	521	648	0	15	12409	67014	18	**37500**	3723	208464	24	**37500**	8656	275478	18/24	**37500**	12409
		Summer/ Garma	0	3350	985	0	0	0	4335	19515	15	**45500**	1301	60700	20	**45500**	3035	80215	15/20	**45500**	4335
		Horticultural & Plantation	0	0	0	0	0	0	1780	80100	150	**103000**	534	310000	250	**103000**	1240	390100	150/250	**103000**	1780
		Total	**17334**		**1743**	**712**	**830**	**15**	**31989**	**247429**	**203**		**9598**	**814789**	**319**		**22356**	**1062218**	**0**		**31989**
7	Dhamda ha	Kharif	9100	650	122	15	0	0	9887	59320	20	**44000**	2966	173025	25	**44000**	6921	232345	20/25	**44000**	9887
		Rabi	6600	3480	591	624	0	6	11301	61020	18	**37500**	3390	189864	24	**37500**	7911	250884	18/24	**37500**	11301
		Summer/ Garma	0	3085	992	0	0	0	4077	12230	10	**45500**	1223	42810	15	**45500**	2854	55040	15-Oct	**45500**	4077
		Horticultural & Plantation	0	0	0	0	0	0	2985	13440	150	**103000**	896	522500	250	**103000**	2090	535940	150/250	**103000**	2985
		Total	**15700**		**1705**	**639**	**0**	**6**	**28250**	**146010**	**198**		**8475**	**928199**	**314**		**19776**	**1074209**	**0**		**28250**
8	Bhawan ipur	Kharif	5474	450	250	11	0	0	6185	37120	20	**44000**	1856	108250	25	**44000**	4330	145370	20/25	**44000**	6185
		Rabi	3753	2685	388	338	0	3	7167	38682	18	**37500**	2149	120360	24	**37500**	5015	159042	18/24	**37500**	7167
		Summer/ Garma	0	2600	870	0	0	0	3470	10410	10	**45500**	1041	36585	15	**45500**	2429	46995	15-Oct	**45500**	3470
		Horticultural & Plantation	0	0	0	0	0	0	3260	146700	150	**103000**	978	570500	250	**103000**	2282	717200	150/250	**103000**	3260
		Total	**9227**		**1508**	**349**	**0**	**3**	**20082**	**232912**	**198**		**6024**	**835695**	**314**		**14056**	**1068607**	**0**		**20082**
9	Rupouli	Kharif	7500	845	109	0	830	0	9284	55700	20	**44000**	2785	160250	25	**44000**	6410	215950	20/25	**44000**	9284

		Rabi	4462	3505	483	507	0	8	8965	48420	18	**37500**	2690	198624	24	**37500**	8276	247044	18/24	**37500**	8965
		Summer/ Garma	0	2130	902	0	0	0	3032	9100	10	**45500**	910	31845	15	**45500**	2123	40945	15-Oct	**45500**	3032
		Horticultural & Plantation	0	0	0	0	0	0	3555	160050	150	**103000**	1067	622250	250	**103000**	2489	782300	150/250	**103000**	3555
		Total	**11962**		**1494**	**507**	**830**	**8**	**24836**	**273270**	**198**		**7452**	**1012969**	**314**		**19298**	**1286239**	**0**		**24836**
10	B.Kothi	Kharif	9100	814	220	19	0	0	10153	60920	20	**44000**	3046	177675	25	**44000**	7107	238595	20/25	**44000**	10153
		Rabi	4518	4212	556	437	0	7	9730	52506	18	**37500**	2917	163344	24	**37500**	6806	215850	18/24	**37500**	9730
		Summer/ Garma	800	20	83	10	40	0	953	17685	15	**45500**	1179	55020	20	**45500**	2751	72705	15/20	**45500**	953
		Horticultural & Plantation	0	0	0	0	0	0	1610	72450	150	**103000**	483	281750	250	**103000**	1127	354200	150/250	**103000**	1610
		Total	**14418**		**859**	**466**	**40**	**7**	**22446**	**203561**	**203**		**7625**	**677789**	**319**		**17791**	**881350**	**0**		**22446**
11	Dagarua	Kharif	6510	215	46	0	3903	0	10674	64040	20	**44000**	3202	186800	25	**44000**	7472	250840	20/25	**44000**	10674
		Rabi	3545	1416	526	430	0	0	5917	31950	18	**37500**	1775	99408	24	**37500**	4142	131358	18/24	**37500**	5917
		Summer/ Garma	1800	775	300	0	0	0	2875	12945	15	**45500**	863	40260	20	**45500**	2013	53205	15/20	**45500**	2875
		Horticultural & Plantation	0	0	0	0	0	0	237	10650	150	**103000**	71	41500	250	**103000**	166	52150	150/250	**103000**	237
		Total	**11855**		**872**	**430**	**3903**	**0**	**19703**	**119585**	**203**		**5911**	**367968**	**319**		**13793**	**487553**	**0**		**19703**
12	Baisi	Kharif	6301	80	32	0	2890	0	9303	55820	20	**44000**	2791	162825	25	**44000**	6513	218645	20/25	**44000**	9303
		Rabi	3238	860	480	389	0	0	4967	26820	18	**37500**	1490	83472	24	**37500**	3478	110292	18/24	**37500**	4967
		Summer/ Garma	3200	365	150	0	0	0	3715	16725	15	**45500**	1115	52020	20	**45500**	2601	68745	15/20	**45500**	3715
		Horticultural & Plantation	0	0	0	0	0	0	156	7050	150	**103000**	47	27500	250	**103000**	110	34550	150/150	**103000**	156
		Total	**12739**		**662**	**389**	**2890**	**0**	**18141**	**106415**	**203**		**5443**	**325817**	**319**		**12702**	**432232**	**0**		**18141**
13	Amour	Kharif	9015	80	38	0	2706	0	11839	51040	20	**44000**	2552	207175	25	**44000**	8287	258215	20/25	**44000**	11839
		Rabi	1899	352	450	470	0	0	3171	17118	18	**37500**	951	53280	24	**37500**	2220	70398	18/24	**37500**	3171
		Summer/ Garma	3715	405	387	0	0	0	4507	20280	15	**45500**	1352	63100	20	**45500**	3155	83380	15/20	**45500**	4507
		Horticultural & Plantation	0	0	0	0	0	0	156	7050	150	**103000**	47	27250	250	**103000**	109	34300	150/250	**103000**	156

		Total	**14629**		**875**	**470**	**2706**	**0**	**19673**	**95488**	**203**		**4902**	**350805**	**319**		**13771**	**446293**	**0**		**19673**
14		Kharif	**5525**	**60**	**28**	**0**	**3114**	**0**	**8727**	**104360**	**20**	**44000**	**5218**	**152725**	**25**	**44000**	**6109**	**257085**	**20/25**	**44000**	**8727**
		Rabi	**1800**	**350**	**0**	**349**	**0**	**0**	**2499**	**13500**	**18**	**37500**	**750**	**42000**	**24**	**37500**	**1750**	**55500**	**18/24**	**37500**	**2499**
		Summer/ Garma	**3710**	**425**	**179**	**0**	**0**	**0**	**4314**	**19410**	**15**	**45500**	**1294**	**60400**	**20**	**45500**	**3020**	**79810**	**15/20**	**45500**	**4314**
		Horticultural & Plantation	**0**	**0**	**0**	**0**	**0**	**0**	**286**	**12900**	**150**	**103000**	**86**	**50000**	**250**	**103000**	**200**	**62900**	**150/250**	**103000**	**286**
	Baisa	**Total**	**11035**	**835**	**207**	**349**	**3114**	**0**	**15826**	**150170**	**203**	**230000**	**7348**	**305125**	**319**	**230000**	**11079**	**455295**	**0**	**230000**	**15826**
	Grand Total		**170824**	**835**	**14723**	**6142**	**17632**	**66**	**293842**	**2468994**	**2827**	**230000**	**90682**	**9396797**	**4451**	**230000**	**238524**	**11865791**	**0**	**230000**	**293842**

Source: DAO Office, Purnea

2.3 Irrigation based Classification

Name of state : BIHAR

Source: Agriculture Statistic, Irrigation Statistic of CWC, Distt. Stat. Office/Irrigation Department (Minor/Major)

Name of District : Purnea

Sl. No.	Name of Block	Irrigated (Area in ha)		Rainfed (Area in ha)	
		Gross Irrigated Area	Net Irrigated Area	Partially Irrigated /Protective Irrigation	Un- Irrigated or Totally Rainded
1	Purnea East	12503.15	4300.84	0	1473.15
2	Kasba	12873.68	7246.72	0	1647
3	Jalalgrah	7854.43	19677	0	373.68
4	Srinagar	10816.7	13220.1	0	1265.7
5	K.nagar	15259.47	19178.34	0	5819.47
6	Dhamdaha	23868.48	5984.08	0	10973
7	B.khoti	17264.04	8209.94	0	6010
8	Bhawanipur	11243.86	5399.62	0	544
9	Rupouli	16538.62	4940.84	0	786
10	Banbankhi	26824.88	17476.7	0	15647
11	Dagarua	14192.07	3086.1	0	814.5
12	Baisi	11144.04	2017.6	0	1015.1
13	Amour	12527.46	1209.94	0	1214.3
14	Baisa	11406.43	300	0	811.2
	Total	**204317.31**	**112247.82**	**0**	**48394.1**
					0.5493798837

Source - .D.A.O.PURNEA (Year) -2012-13

Chapter – III

Water Availability

Water Availability

3.1 Status of Water Availability

The ground water behavior in the Indian sub-continent is highly complicated due to the occurrence of diversified geological formations with considerable lithological and chronological variations, complex tectonic framework, climatological dissimilarities and various hydro chemical conditions.

The areas covered by alluvial sediments of river basins, coastal and deltaic tracts constitute the unconsolidated formations. These are by far the most significant ground water reservoirs for large scale and extensive development. The hydro geological environment and ground water regime in the Indo-Ganga-Brahmaputra basin indicate the existence of potential aquifers having enormous fresh ground water reserve. Bestowed with high incidence of rainfall and covered by a thick pile of porous sediments, these ground water reservoirs get replenished every year and are being used heavily. In these areas, in addition to the Annual Replenishable Ground Water Resources available in the zone of water level fluctuation (Dynamic Ground Water Resource), there exists a huge ground water reserve in the deeper passive recharge zone below the zone of fluctuation as well as in the deeper confined aquifers which remains largely unexplored as yet. Although the mode of development of ground water is primarily through dug wells, dug cum bore well and cavity wells, thousands of tube wells have been constructed during last few decades.

There are two sub basins namely Kosi river basin and Mahananda river basin in Purnea district. Drainage in parts of Kosi basin is marked by presence of dhars, which are abandoned channels of river Kosi. Some of the dhars are locally known as Katua dhar, Saura nala, Kankai nala, Riga nadi. Suara is principle tributary of river Kosi flows to eastern side of Purnea district. The rivers are effluent in nature. River Mahananda flows in the eastern part of the district.

Central Ground Water Board has covered Purnea district under systematic hydro geological survey and a major part the district has been covered under ground water management study. District hydro geological report and ground water management study report has been issued. There are seven Hydrograph Network Stations in the district, which monitored 4 times in a year to measure the water level of the prelatic aquifer.

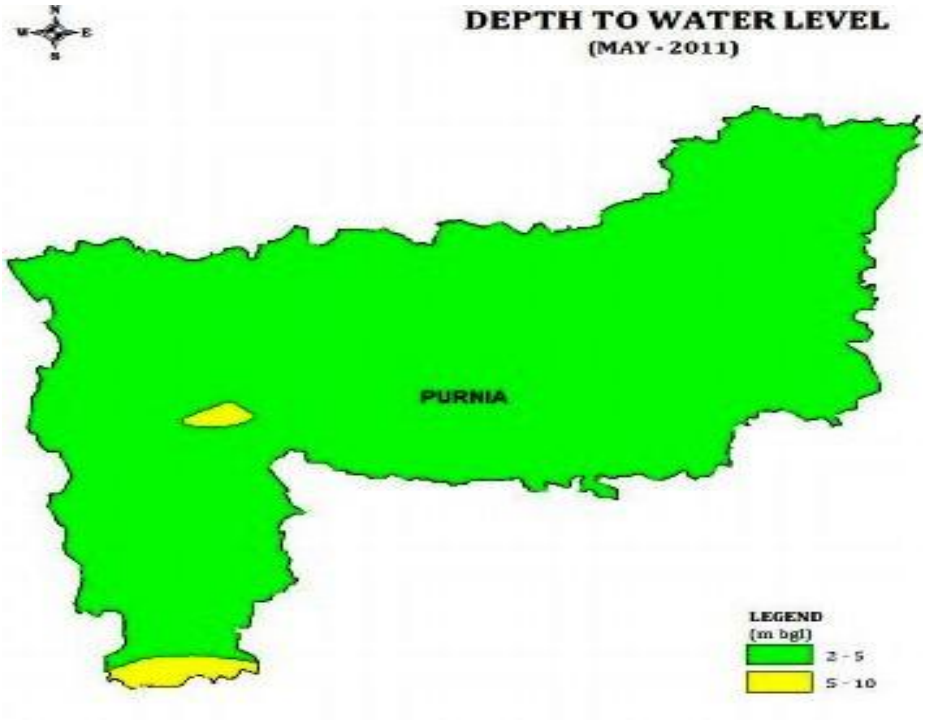
Purnea district lies in the Gangatic alluvial plain. The older alluvium is found in the north of Purnea consisting of coarse gravel and surface kankar and the newer alluvium composed of silts, clays occurring south of Purnea. The entire district is

occupied by thick quaternary alluvial deposits. These alluvial deposits are carried by the river system originating from the Himalayas. The alluvial deposit ranges from clay, silt to sand of various sizes, gravel pebble and boulders. These alluvial deposits contain one of the most prolific aquifer systems in the Gangatic alluvium of North Bihar plain.

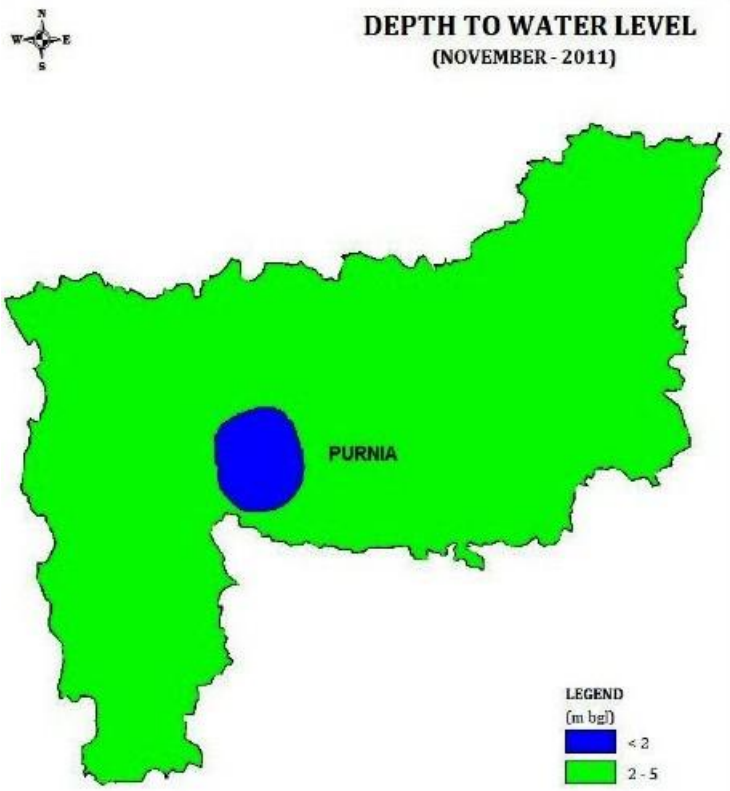
3.2 Status of Ground water Availability

The district contains of one of the most excellent aquifer system in the Gangatic alluvium of North Bihar plain. Quaternary sediments in the area comprise sand; gravel and pebble constitute the potential aquifer. The frequent lateral facies change in the area is common phenomenon. So the nature of the granular material may change within short distance. However due to dominance of granular material over fine caustics in alluvial sediments, the aquifer are continuous and regionally extensive. It is found to occur continuously down to the depth of exploration of 80- 90 meter, at places capped by thin clay capping.

The water level is measured at 7 HNS stations in the district and it has been found that that the pre-monsoon (May 2011) depth to water level generally varies from 3.7 to 11.10 mbgl. It remains within 5m (except in the southern part) in major part of the district. The post-monsoon water level generally varies from 1.7 to 3.42 m bgl. However, it remains within 4 m in major part of the district. The seasonal water level fluctuation from pre to post monsoon show rise of 0.97 to 2.51m



Pre-monsoon (May 2011) water level map of Purnea district



Post-monsoon (November 2011) water level map of Purnea district

The entire district is underlain by Quaternary unconsolidated sediments of sands, gravel, pebbles constituting prolific and regionally extensive aquifers of huge thickness. It is found to occur continuously down to the depth of exploration of 80- 90 meter, at places capped by thin clay capping. Though the aquifer system in the district are excellent no basic data is available on the aquifer parameter as no exploratory drilling is carried out by CGWB in the district and thus long duration pumping test are not available. However, The yield of heavy duty tube wells constructed by State government ranges from 150- 210 m3/hr for a drawdown less than 2.5 m and yield of shallow tube wells ranges from 50- 70 m3/hr for a drawdown of about 2m. The net annual replenish able ground water resource as on 31st March 2009 is 90066 ha.m. The gross annual draft for all uses is estimated at 39207 ha.m. Allocation of ground water for domestic and industrial use for 25 years is estimated at 8528 ha.m.

The stage of ground water development is 43.5%. The stage of ground water development is highest in Dagarua (62.1%) and lowest in Baisa (35.3%). As stages of ground water development in all the blocks are less than 70%, and there is no long-term decline in water levels. In most of the blocks of the district, the stage of ground water development is below 50% indicating ample scope of ground water development in future. All the blocks are under safe category.

In an agrarian district like Purnea, with the majority of Population directly or indirectly depend upon agriculture, the development of ground water for irrigation would help in enhancing the agriculture productivity. As the district is underlain by potential aquifers and the stage of ground water development is low (43.5%), there is an ample scope of ground water development. In the district ground water is developed by dug wells, filter point wells for domestic purposes and by shallow tube wells, bamboo boring as well as by deep tube wells for irrigation purposes. Presently, ground water for irrigation purpose is developed by 266,659 shallow tube wells. Adequate power supply for energisation of pump sets will be a key factor for ground water development. In the arsenic affected area, it is advisable to tap the deeper aquifer for drinking water supply. Bamboo borings are generally 15-20 m deep and give reasonable discharge. Shallow tube wells of 100mm dia. and having a depth of 30-40m, tapping 10m thickness of granular zones can yield as high as 50 m3/hr .The aquifer system in the district is favourable for installation of deep tube wells of 250mm dia., lowered to a depth of 80-100m and tapping 20-30 m of granular zone

All the blocks of the district fall under the safe category. The ground water level is shallow. Hydro geological condition of the district indicates no such activity is required at present.

The stage of ground water development in the district is low (43%.) and it is below 50% in most of the blocks. Ground water development may be increased to enhance the irrigation intensity. The ground water can be developed by constructing shallow tube wells of 100mm dia. and having a depth of 30-40m, tapping 10m thickness of granular zones to get yield as high as 50 m3/hr .The aquifer system in the district is favourable for installation of deep tube wells of 250mm dia., lowered to a depth of 80-100m and tapping 20-30 m of granular zone.

3.3 Status of Command Area

Every year, Bihar faces the vagaries of flood and water logging. After bifurcation of the State, Bihar has become the most flood prone area in the country. Total flood prone area of the State is 2168.80 lakh hectares which is 73.06 percent of its total geographical area and 17.2 percent of the total flood prone area in the country. Flood situation is most severe in northern plains of Bihar. This is because almost all the major rivers in the State enter Bihar from Nepal in this region. Bed slope of these rivers is very sharp in the Nepal and they usually enter the State on plain lands. Because of a sudden drop in bed slope, silt brought by the flow of these rivers gets

deposited at their base to cause recurring floods. While a long term solution to this problem can be achieved by constructing dams at upper catchment of Kosi, Gandak, Bagmati, Mahananda rivers in Nepal territory, in the short run, Bihar has to depend on construction and maintenance of embankments along the rivers. Till March 2006, 3430.47 km length of embankments have been constructed in the State which protect 29.16 lakh hectares of area, out of a total of 68.80 lakh hectare flood prone area. Thus, l39.64 lakh hectares of land area still stands exposed to the perennial problem of floods. Despite such high exposures to threat of flood, only 29 percent of the total 10th Plan allocation for flood control has been utilized. A more efficient utilization of the allocated funds would have lessened the damage capacity of floods in the State.

Beside the menace of flood, about 9.41 lakh hectare of land suffer from the problem of water logging in Bihar. It has been found by various Expert Committees that it would not be economically viable to free 2.5 lakh hectares of land from water logging due to excessive depth. Thus, against 6.91 lakh hectares of water logged area from where water can be drained out, only about 1.50 lakh hectares have been freed from water logging. The task ahead is to free the remaining 5.41 lakh hectares of land area. Against a total agreed outlay of around Rs167 crore, on 22 drainage works in the 10th Plan, there has been an actual utilisation of around 74 percent.

Gross command area is the total area which can be economically irrigated from irrigation system without considering the limitation on the quantity of available water. It includes the area which is, otherwise, uncultivable. For example, ponds and residential areas uncultivable area of gross command area. An irrigation canal system lies in a doab (i.e., area between two drainages), and can economically irrigate the doab. It is, obviously, economical to use the irrigation system to irrigate across the two drainages. Thus, the boundaries of the gross command of an irrigation canal system are fixed by the drainages on outer side of the irrigation canal system. The link canal will provide irrigation in new command areas lying in Araria, Kishanganj, Purnea and Katihar districts of Bihar.

The Canal Command irrigation in Purnea district is 154,631 Ha. All the blocks of the district fall under safe category. Artificial recharge and Rainwater harvesting technique may be adopted in the entire district is covered by the alluvial formation contour bunding and recharge ponds are most suitable structure in the rural areas of the blocks.

3.4 Existing Type of Irrigation

Bihar is richly endowed with water resources and with a very healthy rainfall average of 1271.9 mms. Ultimate irrigation potential in the State is estimated to be around 102 lakh hectares which is far above total cultivated area in the State. However, neither rainfall nor the distribution of the water resources is uniform across the State, causing uneven irrigation potential / coverage across the State. While Zone-2 receives earliest showers and highest rainfall (1450 mm) among all three agro-climatic zones in the State, Zone-3 receives an average rainfall of only 1115 mms.

Bihar's agriculture is crucially dependent on monsoon. Although around 57 percent of its gross cultivated area is irrigated, irrigation itself is crucially dependent on monsoon as it largely depends on the use of surface water. According to the soil quality and climatic conditions of the relevant areas, Bihar has been classified in 3 agro-climatic zones: North-West Alluvial Plane (Zone-1), North-East Alluvial Plane (Zone 2), and South Alluvial Plane (Zone-3), the last zone being further classified in two sub-zones 3A and 3B. Monsoon arrives earliest in the northeastern Zone-2, which also receives the highest rainfall among all three zones. Zone 3 receives monsoon showers last of all three zones and also the least amount. Total irrigated area in the State is 45.67 lakh hectares, of which nearly 30 percent is fed by canal water. This highlights the monsoon dependence of even irrigated lands as catchment areas of nearly all the major rivers in the State are outside the state.

There are mainly three cropping season is in practice in the district. They are Kharif, Rabbi and Garma. Generally Bhadai and Aghani form Kharif season followed by Rabbi and Garma. Rice and wheat are staple food of the district. Cash crops grown in the area are Jute, Sugarcane and fruits. The total cropped area of district is 300,841.72 hectare and net sown area is 208,504.35 hectare. The irrigation in the district is provided both by surface as well as ground water. Surface water irrigation is mainly through net work of Eastern Kosi main canal. Irrigation Ground water is easily exploitable with the help of Bamboo boring and shallow tube wells fitted mostly with diesel pumps. Shallow tube wells are restricted to a depth of 30- 40m. These wells are mostly privately owned.

Table no. 3.1, 3.2, 3.3 & 3.4

3.1 Status of Water Availability							
Name of state : BIHAR				**Source - CWC, CGWB, District Irrigation and Agriculture Office Records**			
Name of District :				MCM per Ha			
S. No.	**Name of Block**	**Sources**		**Kharif**	**Rabi**	**Summer**	**Total**
1	P.East	1	Surface Irrigation				0
		(i)	Canal (Major & Medium Irrigation)	0	0.004021505	0	0.004021505
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000174558	0	0	0.000174558
		(v)	Treated Effluent Recieved from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		2	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.00031394	0	0.00031394
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.002879391	0	0	0.002879391
2	Kasba	2	Surface Irrigation				0
		(i)	Canal (Major & Medium Irrigation)	0	0.005055611	0	0.005055611
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000080905	0	0	0.000080905
		(v)	Treated Effluent Recieved from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0

		3	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.00002439	0	0.00002439
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.001989092	0	0	0.001989092
3	Jalagarh	3	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0.00691645	0	0.00691645
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000023137	0	0	0.000023137
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		4	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0	0	0
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.000174257	0	0	0.000174257
4	Banmankhi	4	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0.004080933	0	0.004080933
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000035388	0	0	0.000035388
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0

		(vii)	Perennial sources of water	0	0	0	0
		5	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.000016855	0	0.000016855
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.003016822	0	0	0.003016822
5	Dhamdaha	5	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0.003275048	0	0.003275048
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000094392	0	0	0.000094392
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		6	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.000331065	0	0.000331065
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.003707579	0	0	0.003707579
6	B.Kothi	6	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0.00534904	0	0.00534904
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0	0	0	0
		(v)	Treated Effluent Received from STP	0	0	0	0

		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		7	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.0001824	0	0.0001824
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.001743968	0	0	0.001743968
7	Bhawanipur	7	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0.005068912	0	0.005068912
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000062897	0	0	0.000062897
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0.001092	0	0	0.001092
		8	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.000164355	0	0.000164355
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.001996844	0	0	0.001996844
8	Rupouli	8	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0.004041812	0	0.004041812
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000116493	0	0	0.000116493

		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		9	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.000273274	0	0.000273274
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.002926804	0	0	0.002926804
9		9	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0.006300597	0	0.006300597
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000036349	0	0	0.000036349
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		10	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.000048033	0	0.000048033
		(iii)	Medium Tube Well	0	0	0	0
	K.Nagar	(iv)	Shallow Tube Wells	0.000798572	0	0	0.000798572
10		10	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0.003869122	0	0.003869122
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
	Dagarua	(iv)	Various Water Bodies including Rain Water	0.000239792	0	0	0.000239792

			Harvesting				
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		11	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.000233074	0	0.000233074
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.002974822	0	0	0.002974822
11	S.Nagar	11	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0.001687971	0	0.001687971
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000052732	0	0	0.000052732
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		12	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.000043591	0	0.000043591
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.00539491	0	0	0.00539491
12	Baisi	12	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0	0	0
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0

		(iv)	Various Water Bodies including Rain Water Harvesting	0.000194909	0	0	0.000194909
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		13	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.000356507	0	0.000356507
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.006853737	0	0	0.006853737
13	Amour	13	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0	0	0
		(ii)	Minor Irrigation Tanks	0	0	0	0
		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.000348653	0	0	0.000348653
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		14	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0	0.000292159	0	0.000292159
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.006509186	0	0	0.006509186
14	Baisa	14	Surface Irrigation	0	0	0	0
		(i)	Canal (Major & Medium Irrigation)	0	0	0	0
		(ii)	Minor Irrigation Tanks	0	0	0	0

		(iii)	Lift Irrigation/Diversion	0	0	0	0
		(iv)	Various Water Bodies including Rain Water Harvesting	0.001334666	0	0	0.001334666
		(v)	Treated Effluent Received from STP	0	0	0	0
		(vi)	Untreated Effluent	0	0	0	0
		(vii)	Perennial sources of water	0	0	0	0
		15	Ground Water	0	0	0	0
		(i)	Open Well	0	0	0	0
		(ii)	Deep Tube Well	0.000953333	0	0	0.000953333
		(iii)	Medium Tube Well	0	0	0	0
		(iv)	Shallow Tube Wells	0.00572	0	0	0.00572
	Total			**0.051526188**	**0.051946644**	**0**	**0.103472832**
			Source - Dep. Irrigation, Minor Irrigation, Fishries Dept. Purnea (Year) - 2015				

3.2 Status of Ground Water Availability

Name of state : BIHAR — **Source - Dynamic ground water resources of Bihar, CGWB website/District Minor Irrigation Office**

Name of District : Purnea

Sl. No.	Name of Block	Status of block as per Central Ground Water Board Notification			Ground Water(MCM)		
		Critical	Semi-Critical	Safe	Draft	Recharge	Gap (6-7)
1	2	3	4	5	6	7	8
1	Amour	NIL	NIL	Safe	31.23	77.17	-45.94
2	Baisa	NIL	NIL	Safe	22.47	65.68	-43.21
3	Baisi	NIL	NIL	Safe	31.61	70.57	-38.96
4	Banmankhi	NIL	NIL	Safe	39.36	105.28	-65.92
5	B.Kothi	NIL	NIL	Safe	28.47	67.99	-39.52
6	Bhawanipur	NIL	NIL	Safe	22.57	49.45	-26.88
7	Dagarua	NIL	NIL	Safe	41.16	63.83	-22.67
8	Dhamdaha	NIL	NIL	Safe	40.74	111.19	-70.45
9	Jalagarh	NIL	NIL	Safe	14.73	34.14	-19.41
10	K.Nagar	NIL	NIL	Safe	33.5	81.91	-48.41
11	Kasba	NIL	NIL	Safe	23.19	50.7	-27.51
12	P.East	NIL	NIL	Safe	36.78	75.45	-38.67
13	Rupouli	NIL	NIL	Safe	33.39	74.2	-40.81
14	S.Nagar	NIL	NIL	Safe	18.12	42.86	-24.74
	Total				**417.32**	**970.42**	**-553.1**

Source - Dynamic Ground water resources of Bihar, Patna(Year) - 2015

3.3 Status of Command Area

Name of the State : Bihar | **Source : CADA, CGWB, District Irrigation Office**

Name of the District : Purnea

Area in Ha

S. No.	Name of the Block	No. Of Gram Panchayat	No. of the Village	Information of Canal Command			Information on the other Services			Total Area	
				Total Area	Developed Area	Undeveloped Area	Total Area	Developed Area	Undeveloped Area	Developed Command (6+9)	Undeveloped Command (7+10)
1	2	3	4	5	6	7	8	9	10	11	12
1	P.East	19	91	5186	4200	986	4409.64	4409.64	0	8609.64	986
2	Kasba	13	61	10984	8897	2087	4435.75	4435.75	0	13332.75	2087
3	Jalalgrah	10	47	41011	33219	7792	1057.54	1057.54	0	34276.54	7792
4	Srinagar	9	26	6715	5439	1276	20387.39	20387.39	0	25826.39	1276
5	K.Nagar	18	85	36227	29344	6883	5201.39	5201.39	0	34545.39	6883
6	Banmankhi	27	107	21383	17320	4063	15271.66	15271.66	0	32591.66	4063
7	Dhamdaha	26	81	5875	4759	1116	6827.77	6827.77	0	11586.77	1116
8	B.Kothi	19	62	13169	10666	2503	4445	4445	0	15111	2503
9	Rupouli	20	55	5875	4759	1116	4659.49	4659.49	0	9418.49	1116
10	Bhawanipur	14	88	8206	6647	1559	3325.22	3325.22	0	9972.22	1559
11	Baisi	17	130	0	0	0	4283.73	4283.73	0	4283.73	0
12	Dagarua	18	154	3580	2900	680	3317.36	3317.36	0	6217.36	680
13	Amour	25	162	0	0	0	2576.88	2576.88	0	2576.88	0
14	Baisa	16	132	0	0	0	652.88	652.88	0	652.88	0
	Total	**251**	**1281**	**158211**	**128150**	**30061**	**80851.7**	**80851.70**	**0**	**209001.7**	**30061**

Source - Dept. of Irrigation, Minor Irrigation, Fisheries, & Agriculture Dept. (Year) - 2015

3.4) Existing type of Irrigation

Name of the State: BIHAR — **Source - NWDA, CGG/Agriculture Office/Irrigation Office/District Fisheries Office**

Name of District : Purnea

S. No.	Name of Block	Source of Irrigation	Surface Irrigation (1)					Ground Water (2)						Other sources including traditional WHS (3)	Treated affluent discharged from STP (4)	Water extraction devices / lift			Total	
			Canal Based		Tanks I Ponds I Reservoirs/Ahars Pynes			Tube well		Open wells		Bore well				Electricity (5)	Diesel pumps (6)	Others (7)	Irrigation Sources (1+2+3+4)	Water Extracting Unit (5+6+7)
			Govt. Canal	Community /Pvt. Canal	Community ponds including small	Individual /Pvt. Ponds	Govt. reservoir / Dams	Govt.	Pvt.	Community / Govt.	Pvt.	Govt.	Pvt.							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	P.East	Number	12	0	64	82	0	7	3464	0	0	0	0	0	0	4		0	3629	4
		Command Area (ha)	2419	0	64	41	0	28.84	1732	0	0	0	0	0	0	160		0	4284.84	16
2	Kasba	Number	15	0	51	62	0	6	4032	0	0	0	0	0	0	0		0	4166	0
		Command Area (ha)	5124	0	51	31	0	24.72	2016	0	0	0	0	0	0	0		0	7246.72	0
3	Jalalgarh	Number	9	0	32	64	0	0	964	0	0	0	0	0	0	0		0	1069	0
		Command Area (ha)	19131	0	32	32	0	0	482	0	0	0	0	0	0	0		0	19677	0
4	S.Nagar	Number	3	0	42	111	0	5	19950	0	0	0	0	0	0	2		0	20111	2
		Command Area (ha)	3121	0	42	55.5	0	20.6	9975	0	0	0	0	0	0	60		0	13214.1	6
5	K.Nagar	Number	34	0	42	111	0	7	4284	0	0	0	0	0	0	2		0	4478	2
		Command Area (ha)	16900	0	42	55.5	0	28.84	2142	0	0	0	0	0	0	100		0	19168.34	10
6	Dhamdaha	Number	22	0	44	70	0	9	6206	0	0	0	0	0	0	9		0	6351	9
		Command Area (ha)	2741	0	44	35	0	37.08	3103	0	0	0	0	0	0	240		0	5960.08	24

7	B.Kothi	Number	12	0	0	0	0	12	4005	0	0	0	0	0	0	4		0	4029	4
		Command Area (ha)	6142	0	0	0	0	49.44	2002.5	0	0	0	0	0	0	160		0	8193.94	16
8	Bhawanipur	Number	3	0	25	45	0	1	3016	0	0	0	0	0	0	3		0	3090	3
		Command Area (ha)	3828	0	25	22.5	0	4.12	1508	0	0	0	0	0	0	120		0	5387.62	12
9	Rupouli	Number	3	0	54	53	0	7	4045	0	0	0	0	0	0	11		0	4162	11
		Command Area (ha)	2793	0	54	26.5	0	28.84	2022.5	0	0	0	0	0	0	160		0	4924.84	16
10	Banmankhi	Number	17	0	54	65	0	10	14748	0	0	0	0	0	0	0		0	14894	0
		Command Area (ha)	9975	0	54	32.5	0	41.2	7374	0	0	0	0	0	0	0		0	17476.7	0
11	Dagarua	Number	0	0	71	65	0	5	2568	0	0	0	0	0	0	2		0	2709	2
		Command Area (ha)	1670	0	71	32.5	0	20.6	1284	0	0	0	0	0	0	80		0	3078.1	8
12	Baisi	Number	0	0	36	38	0	5	3868	0	0	0	0	0	0	2		0	3947	2
		Command Area (ha)	0	0	36	19	0	20.6	1934	0	0	0	0	0	0	80		0	2009.6	8
13	amour	Number	0	0	28	62	0	12	2203	0	0	0	0	0	0	0		0	2305	0
		Command Area (ha)	0	0	28	31	0	49.44	1101.5	0	0	0	0	0	0	0		0	1209.94	0
14	Baisa	Number	0	0	30	52	0	0	480	0	0	0	0	0	0	1		0	562	1
		Command Area (ha)	0	0	30	26	0	0	240	0	0	0	0	0	0	40		0	296	4
	Total	Number	130	0	573	880	0	86	73833	0	0	0	0	0	0	40	0	0	75502	40
		Command Area (ha)	73844	0	573	440	0	354.32	36916.5	0	0	0	0	0	0	1200	0	0	112127.8	120

Source - Source - Dept. of Irrigation, Minor Irrigation, Fishries, Dept. (Year) - 2015

Chapter – IV

Water Requirement / Demand

Water Requirement / Demand

4.1 Domestic Water Demand

Water is life. Water has been described as the matrix and elixir of all life forms. It is so delicately inter-linked with people, Land River, forest, habitat, ecology and environment that any imbalance in equilibrium bring catastrophe to this earth. Water for domestic use is required for three reasons – consumption (drinking and cooking); hygiene (including basic needs for personal and domestic cleanliness); and production (food processing, animal keeping, small scale agriculture, etc.). This study was designed to examine water access 'domestic water demand purposes. It has been estimated that at least 87 (eighty seven) liters of water per person per day is needed to ensure all personal hygiene, laundry and consumption needs.

The term 'domestic water demand' is the amount of water required for domestic uses. Water demand forecasting is essential to water utilities, both for day to day operations and for long term planning. A number of factors like climate, culture, food habits, work and working condition, level and type of development, and physiology determine the requirement of water. As per the Bureau of Indian Standard, a minimum water supply of 200 liters per capita per day (leap) should be provided for domestic consumption in cities with full flushing system. It is also mention that the amount of water supply may be reduced to 135 lpcd for the LIG and economically weaker sections (EWS) of the society and in small town.

Total population of Purnea district in 2015 was 35911082 and projected population in 2020 would be 39,97,933 Average per capita Domestic Water Requirement according to PHED (Municipal Corporation) is **87** lpcd. Based on this information Gross Water Demand for whole District in year is 114.0348089 lpcd or 114.0348089 MCM per annum. Projected Gross water Demand for year 2020 would be 1269543624 lpcd. per annum approx. **126.9543624 MCM.**

(Table No.: 4.1*(Population and Water demand in different Blocks)*

4.2 Crop Water Demand

It is essential to know the water requirement of a crop, which is the total quantity of water required from its sowing time up to harvest. Naturally different crops may have different water requirements at different places of the same country, depending upon the climate, type of soil, method of cultivation, effective rain etc. The total water required for crop growth is not uniformly distributed over its entire life span, which is also called crop period. Actually, the watering stops same time before harvest

and the time duration from the first irrigation during sawing up to the last before harvest is called base period. Though crop period is slightly more than the base period, they do not differ from practical purposes.

The estimation of the water requirement of crops is one of the basic needs for crop planning on the farm and for the planning of any irrigation project. Crop water requirement is the water required by the plants for its survival, growth, development and to produce economic parts. This requirement is applied either naturally by precipitation or artificially by irrigation. Hence, the crop water requirement includes all losses like –

a) Transpiration loss through leaves (T).
b) Evaporation loss through soil surface in cropped area (E).
c) Amount of water used by plants (WP) for its metabolic activities which is estimated at less than 1% of the total absorption. These three components cannot be separated so easily. Hence, the ET loss is taken as crop water use or crop water consumptive use.
d) Other application losses are conveyance loss, percolation loss, runoff loss etc., (WL).
e) The water required for special purposes (WSP) like puddling operation, ploughing operation, leaching, requirement for the purpose of weeding, for dissolving fertilizer and chemicals etc.

The water requirement is symbolically represented as :

$$WR = T + E + WP + WL + WSP$$

(The other application losses and special purposes are mostly indented for wet land cultivation. Hence foe irrigated dry land crop the ET loss alone is accounted for crop water requirement.)

The total depth of water required to raise a crop over a unit area of land is usually called delta. Some typical value of delta for common crops in some regions of India is as follows:

Crop	***Water requirement***
Rice	✓ 1000mm to 1500mm for heavy soils or high water table ✓ 1500mm to 2000mm for medium soil ✓ 2000mm to 2500mm for light soil or deep water table ✓ 1600mm for upland condition
Wheat	✓ 250mm to 400mm in north India ✓ 500mm to 600mm in central India
Barley	✓ 450mm
Maze	✓ 100mm during rainy season ✓ 500mm during winter season ✓ 900mm during summer season

Cotton	✓ 400mm to 500mm
Sugarcane	✓ 1400mm to 1500mm in Bihar ✓ 1600mm to 1700mm in Andhra Pradesh ✓ 1700mm to 1800mm in Punjab ✓ 2200mm to 2400mm in Madhya Pradesh ✓ 2800mm to 3000mm in Maharashtra

This information is based on Handbook of Agriculture (5th edition, 2000) published by the Indian Council of Agriculture Research (ICAR).

Crop water requirement for Purnea district is calculated on the basis of water depth required for each crop and area sown given in ***Table 4.2***. Total crop water potential required for 2015 is 1772.615639 MCM. Existing crop water availability is 324.16588 MCM. Hence, **1430.079579 MCM** has to be created.

4.3 Livestock water Demand

Bihar's livestock sector is crucial not only in terms of its contribution to rural income, but also for the section of the population to which this income goes. Bihar's livestock sector accounted for approximately one-quarter of the total value of agricultural output in TE 2002-03. Livestock activity is concentrated among landless households and those with marginal holdings of less than 1 hectare of land. Approximately 35 percent of rural households in Bihar report owning cattle, 20 percent buffalo, and 15 percent sheep and goats (NSSO-2003). Of all rural households owning cattle in Bihar, more than three-quarters are either landless or have less than 1 hectare of land. Sheep and goats tend to be even more concentrated among landless and marginal rural households.

The global trend in animal production indicates a rapid and massive increase in the consumption of livestock products. It is predicted that meat and milk consumption will grow at the rate of 2.8 and 3.3% per annum, respectively in developing countries. In India whole system of rural economy has revolved around livestock production. Providing enough quality water is essential for good livestock husbandry. Water makes up 80% of the blood, regulates body temperature and is also vital for the function of the organs such as digestion, waste removal and the absorption of nutrients. Understand daily livestock watering needs is a key when designing a livestock watering system.

The daily water requirement of livestock varies significantly among animal species. The animal's size and growth stage will have a strong influence on daily water intake. Consumption rates can be affected by environmental and management

factors. Air temperature, relative humidity and level of animal exertion or production level are examples for these factors. The quality of water, which includes temperature, salinity and impurities affecting taste and odour, will also have an effect. The water content decreases the quality of drinking water required.

Table 4.3 gives information regarding the block wise water demand for livestock from current year till 2020. Number of livestock as per 2011 census is 1,524325 Estimation is done based on livestock water demand which is different for the different types of animals. There is no additional water requirement as stored water is more than water requirement. 25% of water is reserved for this purpose in all current and future structures.

4.4 Industrial Water Demand

Water use across various sectors in India is on the rise. Various estimates and projections indicate an increasing trend in water demand for agriculture, industrial and domestic uses in the coming decades. India is also projected to move into the category of water stressed nation by 2020.

The water demand for the industrial sector is on a rise and will account for 8.5 and 10.1 per cent of the total freshwater abstraction in 2025 and 2050 respectively. This is a 4 per cent rise from the current level of 6 per cent of the total freshwater abstraction by the industries in 2010.

Surface water is the major source of water for the industries (41%) followed by groundwater (35%) and municipal water (24%). The use of municipal water is limited to industries located in urban / peri-urban areas. A vast majority of industries use surface and groundwater in conjunction with groundwater being relied as a source when surface water availability is on a decline or is impacted by water pollution bound to have an impact on the industrial process.

When asked about the nature of risks associated with water there are a variety of responses that emerge from the survey. While inadequate availability is the major risk facing the industries (37%), others agree that poor water quality is another major risk in the running of business (14%). Sectors like pharmaceuticals, power, food processing and agriculture feel the brunt of poor water quality. High costs for obtaining water are hindering the business interest of smaller industries and the ones which are located in the drier regions of the country.

Bihar is one of the strongest agricultural states. The percentage of population employed in agricultural production in Bihar is around 80 per cent, which is much higher than the national average. It is the largest producer of vegetables and the

second largest producer of fruits in India. Food processing, dairy, sugar, manufacturing and healthcare are some of the fast growing industries in the state.

The economy of Bihar is largely service-oriented, but it also has a significant agricultural base. The state also has a small industrial sector. As of 2012, agriculture accounts for 22%, industry 5% and service 73% of the economy of the state.

Groundwater has emerged as an important source to meet the water requirements for industries. Choice of source of water depends on the availability of sufficient and regular supply of water and the cost of water from the source. While the running cost of surface water is mainly the price paid to the supplier – the municipal bodies; the cost of groundwater is the extraction cost – energy used (electricity / diesel). Since the prices of all the inputs, water, electricity and diesel are administered or regulated by the government, the inefficient use of water remains a normal practice. Science the surface water supply from municipal sources is not sufficiently guaranteed, industrial units tend to depend on groundwater.

Data regarding the status of Industrial water demand in the district is unavailable.

4.5 Water Demand for Power Generation

There is no power plant in the district of Purnea (Bihar). Table

4.6 Total Water Demand of the District for Various Sectors

Detailed data of Total water demand of the Purnea district for varies sectors is well compiled in ***Table N0. : 4.6***

Based on the calculation it is reflecting that total current water requirement is 1942.6018714250000 MCM. Highest water requirement is in Purnea East block and lowest requirement is in K. Nagar Block. Due to rapid urbanization and increasing population, in coming year 2020, water requirement for the district with increased demand of 2.149% which would be near about **1984.348386 MCM**.

4.7 Water Budget

A water budget reflects the relationship between input and output of water through a region. Thus we have a direct comparison of supply of water and the natural demand for water. The following data provides current water gap and projected water gap for the year 2020. **(*See, Table no.: 4.7, Water Budget*)**

4.1) Population and Water demand in different blocks

Name of State : Bihar | **Source - PHED (Municipal Corporation)**

Name of District : purnea

S. No	Blocks	2015		2020		Gross Water Demand (MCM)
		Population	Water Demand	Projected population	Water Demand	
1	2	3	4	5	6	7
1	Purnea East	489859	15.55547255	545524	17.32311462	17.32311462
2	Kasba	207175	6.578842125	230718	7.32645009	7.32645009
3	K.nagar	253554	8.05160727	282367	8.966564085	8.966564085
4	Jalalgrah	124246	3.94543173	138365	4.393780575	4.393780575
5	Srinagar	121064	3.84438732	134821	4.281240855	4.281240855
6	Baisi	250477	7.953897135	278940	8.8577397	8.8577397
7	Dagarua	243256	7.72459428	270899	8.602397745	8.602397745
8	Amour	319615	10.14937433	355935	11.30271593	11.30271593
9	Baisa	212440	6.7460322	236581	7.512629655	7.512629655
10	Banbankhi	386557	12.27511754	430483	13.66998767	13.66998767
11	Dhamdaha	316892	10.06290546	352903	11.20643477	11.20643477
12	B.khoti	229900	7.3004745	254800	8.091174	8.091174
13	Bhawanipur	177892	5.64896046	198107	6.290887785	6.290887785
14	Rupouli	258155	8.197712025	287490	9.12924495	9.12924495
	Total	**3591082**	**114.0348089**	**3997933**	**126.9543624**	126.9543624

Unit- 87 Ltr. Per day Per capita

Source - .Calculated from Census Data (Year) - 2011

4.2 Crop water Requirement

Name of State : Bihar					**Source - Dynamic ground water resources of Bihar/KVK/ SAU**			
Name of District : Purnea								
Sl. No.	**Name of Block**	**Crop**	**Area sown (ha)**	**Irrigated Area (ha)**	**Crop water demand (mm) ****	**Water Potential required(MCM)**	**Existing Water Potential (MCM)**	**Water Potential to be created (MCM) (7-8)**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1	Purnea East	Paddy	8015	7025	1700	119.425	10.42	109.005
		Maize	5955	5955	650	38.7075	6.19	32.5175
		Wheat	5500	2262.83	550	12.445565	5.71	6.735565
		Pulses	1415	582.16	144	1.8383104	1.46	0.3783104
		Oilseeds	450	185.14	226	1.4184164	0.47	0.9484164
		jute	750.35	308.71	200	1.61742	0.78	0.83742
		Horticulture crop	2690	1106.73	1700	18.81441	2.79	16.02441
		other crop	12	4.94	550	0.02717	0.012	0.01517
2	Kasba	Paddy	5870	4003.06	1700	68.05202	6.39	61.66202
		Maize	3485	2376.06	650	15.44439	3.79	11.65439
		Wheat	3305	2253.85	550	12.396175	3.6	8.796175
		Pulses	801	546.24	144	1.7865856	0.87	0.9165856
		Oilseeds	427	291.19	226	0.6580894	0.46	0.1980894
		jute	829.55	565.71	200	1.13142	0.9	0.23142
		Horticulture crop	1740	1186.6	1700	20.1722	1.89	18.2822
		other crop	4	2.73	550	0.015015	0.0043	0.010715
3	Jalagarh	Paddy	4580	2350.09	1700	39.95153	3.84	36.11153
		Maize	3157	1619.92	650	10.52948	2.65	7.87948
		Wheat	2800	1436.74	550	7.90207	2.35	5.55207

		Pulses	669	343.28	144	1.4943232	0.86	0.6343232
		Oilseeds	242	124.17	226	0.2806242	0.2	0.0806242
		jute	850.45	436.38	200	0.87276	0.71	0.16276
		Horticulture crop	2275	1167.35	1700	19.84495	1.91	17.93495
		other crop	4	2.05	550	0.011275	0.0034	0.007875
4	K.Nagar	Paddy	8734	3816.2	1700	64.8754	11.42	53.4554
		Maize	5016	2191.67	650	14.245855	6.56	7.685855
		Wheat	4194	1832.51	550	10.078805	5.48	4.598805
		Pulses	1445	631.37	144	1.9091728	1.89	0.0191728
		Oilseeds	493	215.41	226	1.4868266	0.64	0.8468266
		jute	0	0	200	0	0	0
		Horticulture crop	1715	799.34	1700	13.58878	2.24	11.34878
		other crop	8	3.5	550	0.01925	0.01	0.00925
5	Sri.Nagar	Paddy	4765	3285.04	1700	55.84568	5.34	50.50568
		Maize	3890	2681.81	650	17.431765	4.35	13.081765
		Wheat	2236	1541.52	550	8.47836	2.5	5.97836
		Pulses	468	322.64	144	1.4646016	0.52	0.9446016
		Oilseeds	219	150.98	226	0.3412148	0.25	0.0912148
		jute	887.85	612.09	200	1.22418	0.99	0.23418
		Horticulture crop	1385	954.83	1700	16.23211	1.55	14.68211
		other crop	3	2.06	550	0.01133	0.0034	0.00793
6	Banmankhi	Paddy	10534	3680.65	1700	62.57105	10.11	52.46105
		Maize	9575	3345.56	650	21.74614	9.19	12.55614
		Wheat	6800	2375.96	550	13.06778	6.52	6.54778
		Pulses	1743	609.02	144	1.8769888	1.67	0.2069888
		Oilseeds	712	248.78	226	1.5622428	0.68	0.8822428
		jute	829.55	289.85	200	1.5797	0.8	0.7797

		Horticulture crop	1780	621.94	1700	10.57298	1.71	8.86298
		other crop	15	5.24	550	0.02882	0.014	0.01482
7	Dhamdaha	Paddy	9100	4153.78	1700	70.61426	10.95	59.66426
		Maize	7215	3293.36	650	21.40684	8.68	12.72684
		Wheat	6600	3012.63	550	16.569465	7.94	8.629465
		Pulses	1705	778.26	144	2.1206944	2.05	0.0706944
		Oilseeds	639	291.68	226	1.6591968	0.77	0.8891968
		jute	0	0	200	0	0	0
		Horticulture crop	2985	1362.53	1700	23.16301	3.59	19.57301
		other crop	6	2.74	550	0.01507	0.0072	0.00787
8	Bhawanipur	Paddy	5474	2916.36	1700	49.57812	5.14	44.43812
		Maize	5735	3055.41	650	19.860165	5.38	14.480165
		Wheat	3753	1999.47	550	10.997085	3.52	7.477085
		Pulses	1508	803.41	144	2.1569104	1.42	0.7369104
		Oilseeds	349	185.93	226	0.4202018	0.32	0.1002018
		jute	0	0	200	0	0	0
		Horticulture crop	3260	1736.82	1700	29.52594	3.06	26.46594
		other crop	3	1.6	550	0.0088	0.0028	0.006
9	Rupouli	Paddy	7500	4756.89	1700	80.86713	8.42	72.44713
		Maize	6480	4109.95	650	26.714675	7.27	19.444675
		Wheat	4462	2830.03	550	15.565165	5.01	10.555165
		Pulses	1494	947.57	144	2.3645008	1.68	0.6845008
		Oilseeds	507	321.56	226	0.7267256	0.57	0.1567256
		jute	829.55	326.14	200	1.65228	0.93	0.72228
		Horticulture crop	3555	2254.77	1700	38.33109	3.99	34.34109
		other crop	8	5.07	550	0.027885	0.009	0.018885

10	B.Kothi	Paddy	9900	4383.64	1700	74.52188	9.21	65.31188
		Maize	7109	3147.81	650	20.460765	6.62	13.840765
		Wheat	4518	2000.53	550	11.002915	4.2	6.802915
		Pulses	1816	804.11	144	2.1579184	1.69	0.4679184
		Oilseeds	456	201.91	226	0.4563166	0.42	0.0363166
		jute	0	0	200	0	0	0
		Horticulture crop	1610	712.89	1700	12.11913	1.5	10.61913
		other crop	7	3.1	550	0.01705	0.0065	0.01055
11	Dagarua	Paddy	8310	5115.31	1700	86.96027	13.53	73.43027
		Maize	2406	1481.04	650	9.62676	3.92	5.70676
		Wheat	3545	2182.16	550	12.00188	5.77	6.23188
		Pulses	872	536.77	144	2.7729488	1.42	1.3529488
		Oilseeds	430	264.69	226	1.5981994	0.7	0.8981994
		jute	3903.4	2402.78	200	6.80556	6.35	0.45556
		Horticulture crop	2265	1394.25	1700	23.70225	3.69	20.01225
		other crop	0	0	550	0	0	0
12	Baisi	Paddy	9501	5304.35	1700	90.17395	13.89	76.28395
		Maize	1305	728.57	650	4.735705	1.91	2.825705
		Wheat	3238	1807.75	550	9.942625	4.73	5.212625
		Pulses	662	369.59	144	1.5322096	0.95328	0.5789296
		Oilseeds	389	217.18	226	1.4980268	0.57	0.9280268
		jute	2890	1613.47	200	4.22694	4.22	0.00694
		Horticulture crop	156	87.09	1700	1.48053	0.23	1.25053
		other crop	0	0	550	0	0	0
13	Amour	Paddy	12730	7320.52	1700	124.44884	16.33	108.11884
		Maize	837	481.32	650	3.12858	1.07	2.05858
		Wheat	1899	1092.04	550	6.00622	2.44	3.56622

		Pulses	875	503.18	144	1.7245792	1.12	0.6045792
		Oilseeds	470	270.27	226	0.6108102	0.6	0.0108102
		jute	2705.7	1555.94	200	4.11188	3.47	0.64188
		Horticulture crop	156	89.7	1700	1.5249	0.2	1.3249
		other crop	0	0	550	0	0	0
14	**Baisa**	Paddy	**9235**	**6255.86**	1700	106.34962	**10.85**	95.49962
		Maize	**835**	**565.64**	650	3.67666	**0.98**	2.69666
		Wheat	**1800**	**1219.33**	550	6.706315	**2.12**	4.586315
		Pulses	**207**	**140.22**	144	1.2019168	**0.24**	0.9619168
		Oilseeds	**349**	**236.41**	226	0.5342866	**0.41**	0.1242866
		jute	**3114**	**2109.45**	200	4.2189	**3.66**	0.5589
		Horticulture crop	**100.5**	**68.08**	1700	1.15736	**0.11**	1.04736
		other crop	**0**	**0**	550	0	**0**	0
	Total		**297042.9**	**34810.63**	**80080**	**1772.615639**	**324.16588**	**1430.079759**

** Cropwise water requirement sent on your e-mail

Source -Dao Office, Purnea, Dynamics of Ground water resources Bihar (Year) - 2015

4.3 Livestock Water Demand

Name of State : Bihar | **Source - Dynamic ground water resources of Bihar + AHD**

Name of District : Purnea

Sl. No.	Name of Block	Total Number of live Stock	Present water demand(MCM)	water demand in 2020 (MCM)	Existing Water Potential(MCM)	Water Potential to be created (MCM) (5-6)
1	2	3	4	5	6	7
1	Purnea East	207437	7.5714505	7.5714505	27.85	-20.2785495
2	Kasba	97396	3.554954	3.554954	17.92	-14.365046
3	K.Nagar	107937	3.9397005	3.9397005	28.25	-24.3102995
4	Jalalgarh	51935	1.8956275	1.8956275	12.24	-10.3443725
5	S.Nagar	42976	1.568624	1.568624	15.52	-13.951376
6	Baisi	179989	6.5695985	6.5695985	26.52	-19.9504015
7	Dagarua	96960	3.53904	3.53904	35.37	-31.83096
8	Amour	142424	5.198476	5.198476	25.25	-20.051524
9	Baisa	92115	3.3621975	3.3621975	18.38	-15.0178025
10	Banmankhi	129758	4.736167	4.736167	30.7	-25.963833
11	Dhamdaha	123423	4.5049395	4.5049395	34.01	-29.5050605
12	B.Kothi	82740	3.02001	3.02001	23.86	-20.83999
13	Bhawanipur	76797	2.8030905	2.8030905	18.85	-16.0469095
14	Rupauli	92438	3.373987	3.373987	27.88	-24.506013
	Total	1524325	55.6378625	55.6378625	342.6	-286.9621375

Source - Dynamics of ground water recourses of Bihar, Dept. of Animal Husbandry, Purnea (Year) - 2015

4.4 Industrial Water Demand

Name of state : BIHAR | **Source - District Industry Office**

Name of District : Purnea

Sl. No.	Name of Block	Name of the Industry	Water Demand (MCM)	Water Demand 2020(MCM)	Existing Water Potential (MCM)	Water Potential to be created (MCM) (5-6)
1	2	3	4	5	6	7
1	Purnea East	-	0.225	0.2475	27.85	-27.6025
2	Kasba	-	0.021	0.0231	17.92	-17.8969
3	Jalagadh	-	0.015	0.0165	12.24	-12.2235
4	Srinagar	-	0.0021	0.00231	15.52	-15.51769
5	K.Nagar	-	0.0063	0.00693	28.25	-28.24307
6	Banmankhi	-	0.015	0.0165	30.7	-30.6835
7	Dhamdaha	-	0.012	0.0132	34.01	-33.9968
8	B.Kothi	-	0.003	0.0033	23.86	-23.8567
9	Rupauli	-	0.0048	0.00528	27.88	-27.87472
10	Bhawanipur	-	0.006	0.0066	18.85	-18.8434
11	Baisi	-	0.009	0.0099	26.52	-26.5101
12	Dagarua	-	0.018	0.0198	35.37	-35.3502
13	Amour	-	0.012	0.0132	25.25	-25.2368
14	Baisa	-	0	0	18.38	-18.38
	Total		**0.3492**	**0.38412**	**342.6**	-342.21588

Source - DIC,Purnea (Year) - 2015-16

4.5 Water Demand for Power Generation

Name of state : BIHAR					Source - Power Plants of your district	
Name of District : Purnea						
Sl. No.	Block	Power requirement, MW	Water Demand (MCM)	Water Demand 2020(MCM)	Existing Water Potential (MCM)	Water Potential to be created (MCM) (4-5)
1	2	2	3	4	5	6
1	P.E	N/A	N/A	N/A	N/A	#VALUE!
2	Kasba	N/A	N/A	N/A	N/A	#VALUE!
3	Jalalgarh	N/A	N/A	N/A	N/A	#VALUE!
4	S.Nagar	N/A	N/A	N/A	N/A	#VALUE!
5	K.Nagar	N/A	N/A	N/A	N/A	#VALUE!
6	Dhamdaha	N/A	N/A	N/A	N/A	#VALUE!
7	B.Kothi	N/A	N/A	N/A	N/A	#VALUE!
8	Bhawanipur	N/A	N/A	N/A	N/A	#VALUE!
9	Rupauli	N/A	N/A	N/A	N/A	#VALUE!
10	Banmankhi	N/A	N/A	N/A	N/A	#VALUE!
11	Dagrua	N/A	N/A	N/A	N/A	#VALUE!
12	Baisi	N/A	N/A	N/A	N/A	#VALUE!
13	Amour	N/A	N/A	N/A	N/A	#VALUE!
14	Baisa	N/A	N/A	N/A	N/A	#VALUE!
	Total	**0**	**0**	**0**	**0**	0

				Source - ..... (Year) - .....

4.6 Total Water Demand of the district for various sectors

Name of State : Bihar — **Source - Dynamic ground water resources of Bihar + AHD**

Name of District : Purena

s.no	Name of Block	Components					Total MCM
		Domestic	Crop	Livestock	Industrial	Power generation	
1	2	3	4	5	6	7	8
1	P.East	15.555472550000	194.29	7.5714505	0.225	0	217.641923050000
2	Kasba	6.5788421250000	119.65	3.554954	0.021	0	129.804796125000
3	K.Nagar	8.0516072700000	80.88	3.9397005	0.015	0	92.886307770000
4	Jalagarh	3.9454317300000	106.2	1.8956275	0.0021	0	112.043159230000
5	S.Nagar	3.8443873200000	101.03	1.568624	0.0063	0	106.449311320000
6	Baisi	7.9538971350000	113	6.5695985	0.015	0	127.538495635000
7	Dagarua	7.7245942800000	135.54	3.53904	0.012	0	146.815634280000
8	Amour	10.1493743300000	112.55	5.198476	0.003	0	127.900850330000
9	Baisa	6.7460322000000	166.25	3.3621975	0.0048	0	176.363029700000
10	Banmankhi	12.2751175400000	120.73	4.736167	0.006	0	137.747284540000
11	Dhamdaha	10.0629054600000	143.47	4.5049395	0.009	0	158.046844960000
12	B.Kothi	7.3004745000000	113.59	3.02001	0.018	0	123.928484500000
13	Bhawanipur	5.6489604600000	141.55	2.8030905	0.012	0	150.014050960000
14	Rupouli	8.1977120250000	123.85	3.373987	0	0	135.421699025000
	Total	**114.0348089250000**	**1772.58000**	**55.637862500**	**0.349200000**	**0.000000000**	**1942.6018714250000**

Source - Dynamics of ground water recources DAO Office, DHO, census Data (Year) - 2015

4.7. Water Budget

Name of State : Bihar | **Source - Dynamic ground water resources of Bihar**

Name of District : Purnea

S.No.	Name of Blocks	Existing water availability MCM)		Total MCM (3+4)	Water Demand MCM		Water Gap MCM	
		Surface water	Ground water		Present	Projected (2020)	Present (6-5)	Projected (2020) (7-5)
1	2	3	4	5	6	7	8	9
1	P.East	18.04	12.59	30.63	217.63	236.969	187	206.339
2	Kasba	37.22	14.59	51.81	129.79	141.626	77.98	89.816
3	K.Nagar	21.53	15.52	37.05	92.89	128.748	55.84	91.698
4	Jalalgarh	18.15	21.32	39.47	112.04	122.652	72.57	83.182
5	S.Nagar	23.01	71.46	94.47	106.43	116.590	11.96	22.120
6	Baisi	0.39	13.98	14.37	128.12	138.745	113.75	124.375
7	Dagarua	12.68	9.32	22	146.81	169.096	124.81	147.096
8	Amour	0.42	8.23	8.65	127.9	170.925	119.25	162.275
9	Baisa	0.4	1.716	2.116	176.36	186.264	174.244	184.148
10	Banmankhi	71.94	53.01	124.95	137.74	141.539	12.79	16.589
11	Dhamdaha	20.16	22.45	42.61	158.04	163.688	115.43	121.078
12	B.Kothi	43.92	14.67	58.59	123.92	143.159	65.33	84.569
13	Bhawanipur	27.7	10.81	38.51	150.01	158.210	111.5	119.700
14	Rupouli	20.55	14.66	35.21	135.42	194.535	100.21	159.325
	Total	**316.11**	**284.326**	**600.436**	**1943.10**	**2212.746**	**1342.664**	**1612.310**

				Source - Irrigation Deptt., DAO, AHD, Purnea (Year) - 2015				

Chapter – V

Strategic Action Plan for Irrigation in District under PMKSY

Strategic Action Plan for Irrigation in District under PMKSY

India has the largest irrigated agriculture with 65 million ha. net irrigated area (21 million ha. through surface and 44 million ha. through groundwater). India's canal systems are designed to mobilize and move around 300 billion cubic meter (BCM) of water annually in a normal year providing about 15,000 cubic meter (150 cm) per ha. Whereas, 300 BCM of groundwater pumping from 44 million ha land indicates that water utilization per ha in uplands is about 6800 m3 (i.e., 68 cm) (Shah, 2011) which clearly points out the gross inefficient use of water in surface irrigation schemes as compared to the groundwater irrigated areas.

The Government of India's huge investments in water resources development since independence has helped the country to become self-sufficient in food production. However, the irrigated area expansion is not in tune with the rate of capital investments made in this field. The performance of public funded irrigation projects is continually declining over the years due to systemic maintenance issues, inefficient delivery systems as well as inefficient management at field level. Serious issues are arising due to the existence of huge disparity in water access and utilization among head and tail end users, which has resulted in the over exploitation of groundwater, thus declining the groundwater table in the canal irrigated areas as well.

Further, an increased cost of cultivation and soil salinity results in unsustainable agriculture in such irrigated areas. Moreover, the storage capacity of most of the large and medium capacity reservoirs has declined (both live and dead storage capacity) by 20-30% over the years due to the excessive siltation leading to less water availability.

In addition, the individual farmers have made huge private investments for developing and using groundwater resources, significantly enhancing the irrigated areas. Innovations in pumping technology along with free or subsidized power supply has accelerated the groundwater extraction, resulting in overexploitation and declining groundwater resources to unsustainable levels in many parts of the country. In irrigated areas, the farmers' have switched over to high water requiring and economically remunerative crops and intensive cultivation. These unsustainable practices are threatening agriculture and food security in the country. The latest reports from the GRACE Mission of NASA showed continued groundwater decline of 4.0+/- 1.0 cm/yr, equivalent height of water (17.7645 km3/yr) over the Indian states of Rajasthan, Punjab, Haryana, and Delhi. During the study period of August 2002 to

October 2008, the groundwater depletion was equivalent to a net loss of 109 km3 of water in northwest India. Such high rates of groundwater exploitation has increased the percentage of 'unsafe' districts from 9% to 30% in a span of nine years between 1995 and 2004 (Vijay Shankar and Kulkarni, 2011) thereby reducing well-being, particularly for the poorest members of society.

For enhancing the water use efficiency (WUE) and minimizing the unproductive evaporation loss of water, the government has promoted micro irrigation (MI) systems using sprinklers and drip as key demand management interventions for water saving purposes. Properly designed and managed MI systems can save up to 40% to 80% of water through increased WUE up to 100% when compared to a mere 30-40% of water under the conventional surface irrigation system . Large scale investments by the government and private individuals on the use of micro-irrigation especially in horticulture and high-value crops has benefited large numbers of farmers across the region in terms of water saving, enhancing crop productivity, increased area under irrigation, improved income and livelihoods. In India, total potential area coverage under MI is about 44 million ha through groundwater resources. Out of this, about 30 million ha area is suitable for sprinkler irrigation for crops like cereals, pulses, and oilseeds in addition to fodder crops. This is followed by drip irrigation with a potential of around 12 million ha under cotton, sugarcane, fruits and vegetables, spices and some pulse crops like pigeon pea, etc. The percentage of actual area against the potential area estimated under drip irrigation in different states ranges from negligible in Nagaland to as much as 50% in undivided Andhra Pradesh (presently Andhra Pradesh and Telangana state), followed by Maharashtra (43%), and Tamil Nadu with 24%. In case of sprinkler irrigation, the percentage of actual area against the potential area estimated was as lower as 0.01% (Bihar) and the highest was 52% (Andhra Pradesh). Compared to the potential of 42 million ha in the country, area under MI during 2011 accounted only 3.87 million ha (1.42 million ha under drip and 2.44 million ha under sprinkler) which is about 9.16% of the entire potential, which shows huge scope to harness the full potential. Along with technological innovation, infrastructure development, institutional arrangement, and right water policy are needed to scale-up suitable interventions, which can bridge the demand-supply gap.

In spite of a huge potential to adopt and harness benefits from MI, the rate of adoption of MI technology is still low in the country. Only a few states like Telangana, Andhra Pradesh, Maharashtra, and Tamil Nadu have adopted significant areas under micro-irrigation. The poor adoption is attributed to number of factors such as high cost, complexity of the technology, and other socio-economic issues such as lack of access

to credit facilities, fragmented landholdings, localized crop pattern, etc. Further, in the absence of improper design of irrigation system is another important factor forcing poor adoption of micro-irrigation especially among the small and marginal farmers. Evidence shows that the system design is followed according to a fixed protocol set by the irrigation consultants irrespective of the available resources and without considering farmers' wisdom as well as relevance. For example, a farmer who owns a high discharge capacity pump-set can irrigate more area potentially. Micro-irrigation system for relatively smaller acreage with this pump set will generally lead to underutilization of pump capacity. Farmers, in such cases, are reluctant to practice micro-irrigation as number of irrigations and the total energy requirement is much higher than the traditional practices of surface irrigation. Therefore, the MI system design needs to take into consideration, the resource availability and farmers' concerns. In some parts of Bihar, farmers were ignorant about the maintenance package to be adopted for the drip system, which acted as one of the constraints for its adoption. In addition, the lack of skill and knowledge of the farmers' about the drip irrigation and its maintenance practices itself, remained as constraints for its adoption. High costs of the soluble fertilizers also restricted the use of efficient fertilization practices by the farmers.

The important issues emerging from the irrigated agriculture scenario need urgent attention to address the issues of sustainability of food production. This is possible only by enhancing the efficiency of the irrigation schemes, minimizing the transmission losses, minimizing the land degradation (salinisation, water logging and pollution of groundwater and environment), controlling overexploitation of groundwater, and increasing the agricultural productivity as well as profitability, thus protecting the environment. Further, to overcome the labor scarcity, cooperative farming can be encouraged by involving Self-Help Groups (SHGs) and Production Groups, along with mechanization of agricultural operations.

Increase in agricultural production and productivity depends, to a large extent, on the availability of water. Hence, the importance of irrigation is however, the availability of irrigation facilities which is highly inadequate in India. For example, in 1950-51, gross irrigated area as percentage of gross cropped area was only 17%. Even now 60% of gross cropped area depends on rain. That is why Indian agriculture is called a gamble in the monsoon.

Uncertain and irregular rain causes uncertainty in agriculture. The period of rain is restricted to only four months in a year, June to September, when monsoon arrives. The remaining eight months are dry. There is some rainfall during the months of

December and January in some parts of the country. Even during monsoon, the rainfall is scanty and undependable in many parts of the country. Sometimes the monsoon delayed considerably while sometimes they cease prematurely. This pushes large areas of the country into drought conditions. With the help of irrigation, droughts and famines can be effectively controlled.

Since India has a tropical and sub-tropical climate, it has potentialities to grow crops on a year round basis. However, since 80% of the annual rainfall is received in less than four months, multiple cropping is generally not possible. Provision of irrigation facilities can make possible the growing of two or three crops in a year in most areas of the country. This will considerably enhance agriculture production and productivity. With the help of irrigation the successful implementation of the High Yielding Programme enhances agricultural production in a great intent.

Rainfed agriculture covers a continuum of agriculture and comprises of areas that are completely dependent on rain and areas with supplemental irrigation through rainwater harvesting or groundwater recharge. Seventy six million ha (56% of arable land) rainfed areas in the country support 40% of human population, 78% of cattle, 64% of sheep and 75% of goat population. Rainfed agriculture has a large share of cropped area under rice (42%), pulses (77%), oilseeds (66%) and nutritious cereals (85%). As estimated by the Technical Committee on Watershed Development (2006), even in the best possible scenario of irrigation development, about 40% of the additional supply of food grains needed to match the future rise in demand will have to be generated from the rainfed agriculture in India. In a country like India, with an average rainfall of 1100 mm per annum, there exists a problem of physical water scarcity in rainfed areas which can be counted as the prime areas in terms of low agricultural productivity (1 to 1.5 t per ha), poverty, food insecurity, and malnutrition.

Further, rainfed agriculture is also prone to severe land degradation and much vulnerable to the adverse impacts of climate change. Globally, rainfed agriculture covers 80% of agriculture and varies across regions (60% in Asia and 97% in Africa). Rainfed agriculture has a vast untapped potential and without harnessing this large potential, food security for the growing population cannot be achieved sustainably with scarce water and land resources. In India rainfed agriculture is neglected over the period by the researchers, development investors, and policy makers alike. However, currently the potential of rainfed agriculture is well recognized and efforts are being made to harness the untapped potential. For example, in India in spite of the available soil moisture, two million ha black cotton soil areas during the rainy season in Madhya Pradesh and 12 million ha areas in Indo Gangetic plains are left fallow in Rabi after

growing rice. With the accessibility to technologies for managing the soil water and improved crop cultivars, 13 million ha can be brought under double cropping, thereby solving the problem of pulses and oil seeds shortages in due time. It is well established that 2/3rd of food production uses soil moisture (green water). However, while considering water management for agriculture, blue water has been largely emphasized, as it is visible and huge quantity of soil moisture (green water) is neglected. The current WUE in rain fed agriculture varies from 35 to 45% with huge amount of fresh water harvesting, as soil moisture during monsoon period is lost through the non-productive evaporation resulting in poor water use efficiency.

The groundwater is a major source of water in rain fed system (62% of irrigated area) and this resource is unsustainably overexploited resulting in changed hydro-geological regime that has resulted in the alteration of natural recharge components to a great extent. It is estimated that out of the 5842 assessment units, 802 units have been categorized as over-exploited, 169 as critical and 523 units as semi-critical. About 58% of the replenish-able groundwater in the country is already exploited through tube wells and dug wells. However, extraction through tube wells is causing steady depletion of the groundwater table, particularly in the alluvial belts of the country as well as causing degradation in the quality of groundwater. Groundwater management, policies and institutional innovations are urgently needed for the protection of this valuable source and for the sake of human survival.

Watershed programs in the country underwent a great transformation in the year 2008 by bringing together all the watershed programs under one ministry (convergence) and adopted livelihood approach (holistic system approach) and demand-based projects from the states, with increased emphasis on capacity building. Although, changes were made at the national level, many states still continued with the new watershed guideline programs in business as usual, without internalizing the concept of convergence, collective and participatory livelihood approach, objective monitoring and evaluation using remote sensing, and GIS tools. India is having unique position in the world due to its watershed implementation.

However, urgent steps are needed in terms of institutional, technical, and policy innovations to harness the maximum benefits using science-led and demand driven watershed implementation for transforming the rain fed agriculture scenario in the country. New watershed initiatives such as “Neeranchal” would further upgrade the Integrated Watershed Development Program (IWMP) and benefit the country at the same time.

Through the convergence of schemes, incentivized supply of micronutrients and improved seeds along with innovative monitoring and evaluation system resulted in increased productivity for different crops by 20 to 66 per cent over the farmers' conventional management practices. During 2009 to 2013, more than 5 million farmers' benefitted and net economic benefits through increased production were estimated to the tune of US $ 353 million (Rs 1963 crores).

Similarly, efforts in Gujarat resulted in a large number of rainwater harvesting structures in farmers' fields. In addition, annual campaigns, soil health mapping, and new technologies were helpful in increasing the awareness in this part owing to this implementation, this state managed to achieve 10 per cent annual growth rate as against the 2 to 3% growth rate in the country over the last decade. All these examples showed that with a strong political will on ground, remarkable impacts can be achieved in rain fed areas.

Although, good examples of improved technologies for increasing agricultural productivity and profitability in rain fed areas are available and demonstrated by the scientists at pilot scales in different parts of the country, large-scale impacts have been eluding in the rainfed areas. Over the years, with increasing frequency of longer dry spells and droughts along with heavy intensity rainfall events, rainfed farmers are facing more difficulties and resorting to extreme steps like suicides. There is an urgent need to transform the rainfed agriculture not only for increasing the agricultural production, profits and for minimizing land degradation but to make it attractive for the youth and women as a respectable profession, by using scientific tools for mechanization, knowledge sharing, establishing market linkages and value addition. Such practices ensure larger share of benefits through processing etc. that are retained in the villages with substantially increased investments, enabling policies and institutions.

Water management is the branch of science and technology covering the account, studies, use and conservation of water resources as well as control of adverse effect of water , a sphere of activities responsible for water resources management with a view to meet the demands of population and national economy for water, to ensure rational use of water resources and their protection from pollution and depletion, to ensure operation of water management schemes, as well as to prevent and eliminate the adverse effect of water. Effective measures to cope with long term, drought and water scarcity are limited and difficult to implement due to a variety of stakeholders involved and lack of adequate means to negotiate new policies.

Without water survival of mankind is impossible. Therefore, water resource plans and management policies are essentially be adopted to manage this scarce resource with maintaining the environmental sustainability.

Water resources management efforts have been shifted from engineering (e.g. Dam and water channel construction) to economic/resource based water management approach .The UN Charter of year 2002 accepts the Rights to Safe Water with respect to safety, affordability and accessibility as a basic human right. Water is the most precious natural resource and is a critical element in any kind of development planning. We should aim at providing adequate water supply at a suitable pressure for various uses such as, domestic, irrigation, drinking, sanitation, industrial, commercial, construction and other uses and at the same time protecting the environment. Irrigation activities in India alone consume about 80% of available water as the practices adopted are outdated and largely wasteful. Improved methods of irrigation are available today whereby the same amount of crops can be grown using only about 20% of the irrigation water presently being used. So, water conservation is an urgent necessity with enough storage by rain water harvesting, economizing on water use, reducing waste to the minimum, recycling and reusing of used water.

Sustainable plans and policies are more likely to be those that reflect a consensus, to the extent possible, among all impacted stakeholders. Compromises are often necessary for participatory water resources planning and management (Takayanagi et al. 2011). The various demands for water are all essential to our way of life: economic growth and prosperity, agriculture, and improved quality of life.

For water resource planning and management, we have to consider our stakeholders and their interest; our legal and political constraints; and technical information and knowledge, emphasizes to use benchmarking. Techniques to improve the operating efficiency of the entire distribution system. Infiltration supports groundwater recharge, decrease groundwater salinity, allows smaller diameters for sewers (resulting in cost reduction), and improves the water quality of receiving waters. Therefore, Best Management Practices (BMP's) based on infiltration are the foundation of many low impact development and green infrastructure practices. Groundwater banking is one approach leading to better water management. Deficits occur when the bank is empty, and the other two sources are unable to satisfy the demand.

India is an agricultural and populous country. About 70 per cent of people depend on agriculture. In order to grow food-crops and agricultural products in large quantities to feed the growing millions, intensive farming and rotation of crops are

essential. Extensive irrigation is, therefore, necessary for more production. When our country got freedom, there was provision of irrigation only in 17 per cent of the total farm lands. More attention was paid to irrigation in order to make the country self-sufficient in production of food-crops, as a result of which about 37 per cent of the total farm lands have been provided with irrigational facility by now.

Hence, irrigation is of utmost importance for a agriculture based country like India. To feed a population of over one billion people, there is a need for production of crops round the year. But for this purpose, irrigation water is needed. So, for the production of food crops and cash crops, irrigation is a must.

In short, water is essential for sustaining life and at the same time, it is an important component for almost all development plans. Obviously, the schemes for development of water resources for beneficial use of the society have been taken up since the time immemorial. Considerable progress has been made in respect of water resources development in India after independence through various plans and such development have helped in almost five fold increase in creation of irrigation potential. Total created irrigation potential at pre-plan period was about 22.6 million hectares (Mha.) which at present is about 108.2 Mha. There has also been appreciable development in the area of drinking water supply and other uses. However, growing population, urbanization and industrialization has led to considerable increase in demand of water for various purposes e.g., irrigation, domestic needs, industrial requirements etc.

In this regard, it may be mentioned that the water sector has very strong linkages with all other developmental activities. In view of fast changing development scenario, it is emphasized that the key priorities and identified strategies cannot be considered as static and firm. These needs to be reviewed and improved upon from time to time. In this regard a comprehensive *"Strategic Plan for District Irrigation"* has been prepared through geo-spatial approach:

Methodology adopted for the purpose:

Diverse research methodologies using RS and GIS have been applied by different authors to identify potential rainwater harvesting in remote and data scarce area; in most of these methods, thematic maps are derived from remote sensing data and integrated in GIS to evaluate suitable sites for rain water harvesting. Remote sensing is of immense use for natural resources mapping and generating necessary spatial database required as an input for GIS analysis. GIS is a tool for collecting, storing and analyzing spatial and non-spatial data and developing a model based on

local factors can be used to evaluate appropriate natural resources development and management action plans. Both these techniques can complement each other to be used as an effective tool for selecting suitable sites for water harvesting structures.

In assessment of proposed rainwater harvesting structures potentially using GIS and RS, outlines six key factors that require to be integrated into a GIS framework in order to successfully develop a suitable model for RWH. This include; rainfall, hydrology (rainfall – runoff relationship), slope, land cover, soil (texture, structure, depth) and socio-economics of the area under consideration.

The following criteria have been followed for making decisions on selecting suitable site for various water harvesting structures as Integrated Mission for Sustainable Development (IMSD) guidelines.

Check dams	***Percolation tanks and nala bunds***
➢ The slope should be less than 15 % ➢ The land use may be barren, shrub land and riverbed. ➢ The infiltration rate of the soil should be less. ➢ The type of soil should be sandy clay loam.	➢ The slope should be less than 10 % ➢ The infiltration rate of the soil should be moderately high. ➢ The land use / cover may be barren or scrub land. ➢ The type of soil should be silt loam.

The suitability of WHS sites can be confirmed as the site is located on second and third order drainage and satisfies the condition of land use, soil type and slop as per IMSD guidelines. Water harvesting structures are extremely important to conserve precious natural resources like soil and water, which is depleting day by day at alarming rate. The following table provide strategic action plan for irrigation for each block as well as for whole district and estimated costs and period of implementation.

Prioritization of Blocks and Activities for Strategic Planning

The Prioritization is the heat of the programme in which any programme will be implemented. Some of the important activities to be included in first phase or first year and some of the activities include in last year or last phase. For, prioritization of the activities the following criteria would have been adopted.

Criteria for Prioritization	
1.	Map the present situation.
2.	Talk to local peoples and Public representatives.
3.	Availability of Resources.
4.	Poverty Index.
5.	Percentage of SC & ST population.
6.	Percentage of Farmers.
7.	Cropping Intensity.
8.	Ground Water Situation.

9.	Available Degraded Land.
10.	Land Capability Status.
11.	Percentage of Irrigated are to total cropped area.

See, **Table no. 5: Block / Sub District wise, component wise activities, estimated cost and period of implementation.**

5. Strategic Action Plan for Irrigation in District under PMKSY

Name of State : Bihar | **Source - Kosi Area**

Name of District : Purnea

S. No.	Name of the Blocks/ Sub Districts	Concerned Ministry/ Department	Component	Activity	Total Number	Total Capacity (cum)	Command Area (Ha)	Irrigation Potential (Ha)	Period of Implementation (0-5yrs)	Estimated Cost (in Rs.)
1	P. East	MOWR	AIBP	Major Irrigation	66	0	4355	0	5	90000000
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	58	17430000	1743	2091.6	2	75846645
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	13	1940000	194	232.8	2	9700000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	800		800	800	5	56100960
		MOA & FW		Non DPAP Sprinkler	750		750	750	5	18300000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/ Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe /Raised Bed & Furrow system etc.)	1178	0.030144	2356	2356	5	41230000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						

		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	5	0	0	0	5	875000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	2	0	0	0	5	350000
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	280	756000	25.86	487	5	44100000
		DOLR-MORD		Water Harvesting	23	55200	1.38	69	5	49500000
		DOLR-MORD		Creation of Irrigation canals and Drains	42	95157	84	180	5	15000000
		DOLR-MORD		Providing Infrastructure for Irrigation	25	0	0	0	5	12500000
		DOLR-MORD		Land Development	80	90680	160	160	5	14300000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	65	111255	101.11	108.33	5	16200000
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	21					
		State Planned Scheme of Irrigation								

		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	6	480	0	0	5	3000000
		Other Loan Projects like NABARD	Name of the Scheme							
2	K. Nagar	MOWR	AIBP	Major Irrigation	19	0	2245	0	5	25000000
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	385	115630000	11563	13875.5	2	503163945
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	86	12850000	1285	1542	2	64250000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	650		650	650	5	45582030
		MOA & FW		Non DPAP Sprinkler	550		550	550	5	13420000
		MOA & FW	Per drop more	Topping of MGNREGA						

		MOA & FW	crop (Supplementary Water Management Activities)	Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/ Raised Bed & Furrow system etc.)	4656	0.030144	9312	9312	5	162960000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	4	0	0	0	5	700000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	1	0	0	0	5	175000
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	300	912000	26.95	510	5	
		DOLR-MORD		Water Harvesting	27	56900	1.62	73	5	
		DOLR-MORD		Creation of Irrigation canals and Drains	45	98200	57	200	5	

		DOLR-MORD		Providing Infrastructure for Irrigation	28	0	0	0	5	
		DOLR-MORD		Land Development	85	91680	165	165	5	
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	70	111565	102.22	110.21	5	
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	24	42500	37.25	79.15	5	
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	1	80	0	0	5	3500000
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	3	240	0	0	5	1500000
		Other Loan Projects like NABARD	Name of the Scheme							
3	Srinagar	MOWR	AIBP	Major Irrigation	35	0	34938	0	5	400000000
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						

		MOWR		Lined Field Channels	75	22570000	2257	2708.4	2	98213355
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	17	2510000	251	301.2	2	12550000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	800		800	800	5	56100960
		MOA & FW		Non DPAP Sprinkler	550		550	550	5	13420000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/ Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/ Raised Bed & Furrow system etc.)	1014	0.030144	2028	2028	5	35490000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	2	0	0	0	5	350000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	1	0	0	0	5	175000
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						

		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	10	22952.6	1.86	1674	5	4000000
		DOLR-MORD		Water Harvesting	26	3398	20	0	5	700000
		DOLR-MORD		Creation of Irrigation canals and Drains	39	36500	25	0	5	3800000
		DOLR-MORD		Providing Infrastructure for Irrigation	13	6000	3	0	5	6200000
		DOLR-MORD		Land Development	38	87220.17	3.53	17670	5	7600000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	10	22662	1.83	1652.52	5	2000000
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	13	36500	300	0	5	3800000
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	0	0	0	0	0	0
		Other Loan Projects like	Name of the Scheme							

		NABARD								
4	Jalalgarh	MOWR	AIBP	Major Irrigation	27	0	5270	0	5	40000000
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	460	137860000	13786	16543.2	2	599897790
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	102	15320000	1532	1838.4	2	76600000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	800		800	800	5	56100960
		MOA & FW		Non DPAP Sprinkler	600		600	600	5	14640000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	300	0.030144	600	600	5	10500000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						

		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	1	0	0	0	5	175000
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	56	1415.63	0	0	5	9060800
		DOLR-MORD		Water Harvesting	0	0	0	0	0	0
		DOLR-MORD		Creation of Irrigation canals and Drains	10	0	0	0	5	4500000
		DOLR-MORD		Providing Infrastructure for Irrigation	0	0	0	0	0	0
		DOLR-MORD		Land Development	90	0	16.988	0	5	6695000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	15	456.613	0	0	5	1600000
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	10	0	0	0	5	490500
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						

		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	0	0	0	0	0	0
		Other Loan Projects like NABARD	Name of the Scheme							
5	Dagarua	MOWR	AIBP	Major Irrigation	15	0	2400	0	5	10000000
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	40	12040000	1204	1444.8	2	52392060
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	9	1340000	134	160.8	2	6700000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	200		200	200	5	14025240
		MOA & FW		Non DPAP Sprinkler	250		250	250	5	6100000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						

		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	652	0.030144	1304	1304	5	22820000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	4	0	0	0	5	700000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	0	0	0	0	0	0
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	5	0	0	0	5	875000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	70	13.77	466	850	5	80300000
		DOLR-MORD		Water Harvesting	90	20.57	590	270	5	190000000
		DOLR-MORD		Creation of Irrigation canals and Drains	90	2.03	150	385	5	32500000
		DOLR-MORD		Providing Infrastructure for Irrigation	90	0	0	0	5	42500000
		DOLR-MORD		Land Development	90	1.02	180	195	5	15000000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	110	1.88	170	180	5	25000000

		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	90	1.58	140	300	5	25000000
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	2	160	0	0	5	1000000
		Other Loan Projects like NABARD	Name of the Scheme							
6	Kasba	MOWR	AIBP	Major Irrigation	41	0	3107	0	5	60000000
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	123	36930000	3693	44315	2	160700895
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	27	4100000	410	492	2	20500000
		MOA & FW	Per drop more crop (Micro	DPAP Drip						
		MOA & FW		DPAP Sprinkler						

		MOA & FW	Irrigation)	Non DPAP Drip	800		800	800	5	56100960
		MOA & FW		Non DPAP Sprinkler	550		550	550	5	13420000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/ Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/ Raised Bed & Furrow system etc.)	1318	0.030144	2636	2636	5	46130000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	1	0	0	0	5	175000
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	50	32000	100	150	5	1250000
		DOLR-MORD		Water Harvesting	10	5000	20	50	5	250000

		DOLR-MORD		Creation of Irrigation canals and Drains	15	200000	250	350	5	7500000
		DOLR-MORD		Providing Infrastructure for Irrigation	10	200000	250	300	5	9000000
		DOLR-MORD		Land Development	25	3000	50	75	5	1000000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	32	400000	300	350	5	3200000
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	45	500000	300	350	5	9500000
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	0	0	0	0	0	0
		Other Loan Projects like NABARD	Name of the Scheme							
7	Banmankhi	MOWR	AIBP	Major Irrigation	50	0	6000	0	5	10000000
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	4	320	0	0	5	20000000
		MOWR		Ground Water Development						

		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	240	71870000	7187	8624.4	2	312742305
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	53	7990000	799	958.8	2	39950000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	800		800	800	5	56100960
		MOA & FW		Non DPAP Sprinkler	600		600	600	5	14640000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	12518	0.030144	25036	25036	5	438130000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	1	0	0	0	5	175000
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						

		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	27	123943.5	5.01	9040.23	5	16200000
		DOLR-MORD		Water Harvesting	108	5293.02	31.14	0	5	54000000
		DOLR-MORD		Creation of Irrigation canals and Drains	0	0	0	0	0	0
		DOLR-MORD		Providing Infrastructure for Irrigation	0	0	0	0	0	0
		DOLR-MORD		Land Development	81	185916.31	7.52	5.74	5	16200000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	40	90648	7.32	6611.68	5	800000
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	0	0	0	0	0	0
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	2	160	0	0	5	1000000

		Other Loan Projects like NABARD	Name of the Scheme							
8	Dhamdaha	MOWR	AIBP	Major Irrigation	0	0	0	0	0	0
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	66	19750000	1975	2370	2	85942125
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	15	2190000	219	262.8	2	10950000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	1000		1000	1000	5	70126200
		MOA & FW		Non DPAP Sprinkler	800		800	800	5	19520000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	8778	0.030144	17556	17756	5	307230000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						

		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	4	0	0	0	5	700000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	0	0	0	0	0	0
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	4	0	0	0	5	700000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	104	83602	0	0	5	100400000
		DOLR-MORD		Water Harvesting	52	6796	40	0	5	700000
		DOLR-MORD		Creation of Irrigation canals and Drains	78	73000	50	0	5	7600000
		DOLR-MORD		Providing Infrastructure for Irrigation	26	120000	6	0	5	12400000
		DOLR-MORD		Land Development	260	130000	20	0	5	10800000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	260	463891	2600	0	5	48300000
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	26	73000	600	0	5	7600000
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						

		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	3	240	0	0	5	10500000
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	0	0	0	0	0	0
		Other Loan Projects like NABARD	Name of the Scheme							
9	B. Kothi	MOWR	AIBP	Major Irrigation	0	0	0	0	0	0
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	92	27585000	2758.5	3310.2	2	1200361275
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	20	3065000	306.5	367.8	2	15325000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	700		700	700	5	49088340
		MOA & FW		Non DPAP Sprinkler	500		500	500	5	12200000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						

		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	4808	0.030144	9616	9616	5	168280000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	0	0	0	0	0	0
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	106	27017			5	21189000
		DOLR-MORD		Water Harvesting	52	6796	40		5	1000000
		DOLR-MORD		Creation of Irrigation canals and Drains	75	71500	48		5	12100000
		DOLR-MORD		Providing Infrastructure for Irrigation	26	120000	6		5	12400000
		DOLR-MORD		Land Development	210	129500	16		5	9800000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	249	449535	2200		5	45500000

		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	36	75000	800		5	8500000
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	1	80	0	0	5	500000
		Other Loan Projects like NABARD	Name of the Scheme							
10	Bhawanipur	MOWR	AIBP	Major Irrigation	0	0	0	0	0	0
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	1	80	0	0	5	5000000
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	141	42420000	4242	5090.4	2	184590630
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	31	4710000	471	565.2	2	23550000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	1200		1200	1200	5	84151440

		MOA & FW		Non DPAP Sprinkler	800		800	800	5	19520000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	436	0.030144	872	872	5	15260000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	0	0	0	0	0	0
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	460	12.42	42.5	800	5	72500000
		DOLR-MORD		Water Harvesting	70	168	420	210	5	15000000

		DOLR-MORD		Creation of Irrigation canals and Drains	70	1.58	140	300	5	25000000
		DOLR-MORD		Providing Infrastructure for Irrigation	70	0	0	0	5	35000000
		DOLR-MORD		Land Development	70	0.79345	140	160	5	12500000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	90	1.54045	140	150	5	22500000
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	80	1.5804	140	300	5	22500000
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	1	80	0	0	5	500000
		Other Loan Projects like NABARD	Name of the Scheme							
11	Rupouli	MOWR	AIBP	Major Irrigation	0	0	0	0	0	0
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko	Lift Irrigation	3	240	0	0	5	15000000

		MOWR	Pani	Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels	66	19750000	1975	2370	2	85942125
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation	15	2190000	219	262.8	2	10950000
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	1000		1000	1000	5	70126200
		MOA & FW		Non DPAP Sprinkler	800		800	800	5	19520000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	630	0.030144	1260	1260	5	22050000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	0	0	0	0	0	0
		DOLR-MORD		Check Dams						

		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	200	3.44	36.36	750	5	42500000
		DOLR-MORD		Water Harvesting	60	150	765	197	5	146000000
		DOLR-MORD		Creation of Irrigation canals and Drains	20	0.95	119	266	5	17700000
		DOLR-MORD		Providing Infrastructure for Irrigation	60	0	0	0	5	34800000
		DOLR-MORD		Land Development	120	1.35	188	200	5	26700000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	87	1.47	137	146.5	5	22200000
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	82	1.53	149	315	5	23200000
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	1	80	0	0	5	3500000

		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	2	160	0	0	5	1000000
		Other Loan Projects like NABARD	Name of the Scheme							
12	Baisi	MOWR	AIBP	Major Irrigation	0	0	0	0	0	0
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels						
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation						
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	0		0	0	0	0
		MOA & FW		Non DPAP Sprinkler	150		150	150	5	3660000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	812	0.030144	1624	1624	5	28420000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						

		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	2	0	0	0	5	350000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	0	0	0	0	0	0
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	17	39019.4	3.16	2846	5	5100000
		DOLR-MORD		Water Harvesting	30	3920.76	23.07	0	5	400000
		DOLR-MORD		Creation of Irrigation canals and Drains	0	0	0	0	0	0
		DOLR-MORD		Providing Infrastructure for Irrigation	0	0	0	0	0	0
		DOLR-MORD		Land Development	38	87220.17	3.53	17670	5	7600000
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	10	22662	1.83	1652.32	5	2000000
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	0	0	0	0	0	0
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						

				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	0	0	0	0	0	0
		Other Loan Projects like NABARD	Name of the Scheme							
13	Baisa	MOWR	AIBP	Major Irrigation	0	0	0	0	0	0
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels						
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation						
		MOA & FW	Per drop more crop (Micro Irrigation)	DPAP Drip						
		MOA & FW		DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	0		0	0	0	0
		MOA & FW		Non DPAP Sprinkler	150		150	150	5	3660000
		MOA & FW	Per drop more crop (Supplementary Water	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						

		MOA & FW	Management Activities)	Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	650	0.030144	1300	1300	5	22750000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	2	0	0	0	5	350000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	0	0	0	0	0	0
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	2	0	0	0	5	350000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	10	22952.6	1.86	1674	5	40000
		DOLR-MORD		Water Harvesting	0	0	0	0	0	0
		DOLR-MORD		Creation of Irrigation canals and Drains	0	0	0	0	0	0
		DOLR-MORD		Providing Infrastructure for Irrigation	0	0	0	0	0	0
		DOLR-MORD		Land Development	38	87222.17	3.53	17670	5	76000
		DOLR-MORD		Renovation						

		DOLR-MORD		Renovation of water bodies including desilting	0	0	0	0	0	0
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	0	0	0	0	0	0
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	0	0	0	0	0	0
		Other Loan Projects like NABARD	Name of the Scheme							
14	Amour	MOWR	AIBP	Major Irrigation	0	0	0	0	0	0
		MOWR		Medium Irrigation						
		MOWR		Surface Minor Irrigation						
		MOWR	Har Khet ko Pani	Lift Irrigation	0	0	0	0	0	0
		MOWR		Ground Water Development						
		MOWR		RRR of Water Bodies						
		MOWR		Lined Field Channels						
		MOWR		Unlined Field Channels						
		MOWR		Micro Irrigation						
		MOA & FW	Per drop more	DPAP Drip						

		MOA & FW	crop (Micro Irrigation)	DPAP Sprinkler						
		MOA & FW		Non DPAP Drip	0		0	0	0	0
		MOA & FW		Non DPAP Sprinkler	200		200	200	5	4880000
		MOA & FW	Per drop more crop (Supplementary Water Management Activities)	Topping of MGNREGA						
		MOA & FW		Drought Proofing through check Dams/Water Harvesting Structures						
		MOA & FW		Secondary Storage Structures						
		MOA & FW		On Farm Development (Distribution Pipe/Raised Bed & Furrow system etc.)	972	0.030144	1944	1944	5	34020000
		DOLR-MORD	PMKSY Water Shed	Newly Created WHS						
		DOLR-MORD		Farm Ponds						
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD		Renovated WHS						
		DOLR-MORD		Farm Ponds	0	0	0	0	0	0
		DOLR-MORD		Check Dams						
		DOLR-MORD		Nallah Bunds						
		DOLR-MORD		Percolation Tanks						
		DOLR-MORD		Other Ground Water Recharge Structure						
		DOLR-MORD		Fishery Ponds/Cattle Pond	3	0	0	0	5	525000
		DOLR-MORD	Convergence with MGNREGA	Newly Created						
		DOLR-MORD		Water Conservation	104	221306.49	22499.65	7587.25	5	39268885

		DOLR-MORD		Water Harvesting	0	0	0	0	0	0
		DOLR-MORD		Creation of Irrigation canals and Drains	0	0	0	0	0	0
		DOLR-MORD		Providing Infrastructure for Irrigation	0	0	0	0	0	0
		DOLR-MORD		Land Development	79	96430.45	0	0	5	12029073
		DOLR-MORD		Renovation						
		DOLR-MORD		Renovation of water bodies including desilting	0	0	0	0	0	0
		DOLR-MORD		Renovation & Maintenance of Irrigation Canals & Drains	0	0	0	0	0	0
		State Planned Scheme of Irrigation								
		State Irrigation Department	Name of the Scheme	Major Irrigation						
				Medium Irrigation						
				Surface Minor Irrigation						
		Irrigation Scheme of State Agriculture Department	Name of the Scheme							
		Irrigation Scheme of other Line Departments of State Government	Name of the Scheme	Renovation of lift irrigation	0	0	0	0	0	0
		Externally aided Projects	Name of the Scheme	Renovation of old state tube wells	1	80	0	0	5	500000
		Other Loan Projects like NABARD	Name of the Scheme							

Table 5.2 Component wise expenditure

Component	Estimated Cost (in Lakh)
Convergence with MGNREGA	16210.0558
Per drop more crop	21457.7425
HAR khet ko pani	36908.1815
AIBP	6350.0000
PMKSY Watershed	166.2500
State Planned Scheme of Irrigation	265.0000
Grand Total	81357.2298

5.3 Department/ Component wise Expenditure

Department -	**Component**	**Total (in Lakh)**
Convergence with MGNREGA	Convergence with MGNREGA	16210.0558
Convergence with MGNREGA Total		**16210.0558**
Depart of Horticulture	Per drop more crop	21457.7425
Depart of Horticulture Total		**21457.7425**
Irrigation Department	HAR khet ko pani	36908.1815
Irrigation Department Total		**36908.1815**
Minar irrigation Department	AIBP	6350.0000
Minar irrigation Department Total		**6350.0000**
Soil conservation Department	PMKSY Watershed	166.2500
Soil conservation Department/IWMP Total		**166.2500**
State Irrigation Department	State Planned Scheme of Irrigation	265.0000
State Irrigation Department Total		**265.0000**
Grand Total		**81357.2298**

Table 5.4 Ministry wise expenditure-	
Concerned Ministry / Department	**Total (inLakh)**
MOWR	**43257.42044**
MOA & FW	**21457.7425**
DOLR-MORD	**16377.0669**
State Irrigation Department	**265.0000**
Total	**81357.2298**

Through, PRADHANMANTRI KRISHI SINCHAI YOJNA (PMKSY), we are envisaging to increase irrigation potential in the district. Under AIBP, irrigation projects are proposed in the plan which shall increase the irrigation potential in the district. The model irrigation plan envisages educating the farmers to adhere to the scientific practices in the command area. This will increase the crop production per unit area of agriculture land and ensure the recycling of ground water in a balanced manner. Under Har Kheth ko Paani, Minor and Lift irrigation projects proposed shall enable to provide irrigation access to some of the remote blocks in the district favouring second cropping during the Rabi season. The aforementioned minor irrigation projects will facilitate better availability of water. A lot of Water Harvesting and conservation structures, like Farm Ponds, Check Dams, Percolation Tanks, Nalah bunds are proposed which shall enhance the Net Irrigated Area. This shall be undertaken in convergence with MGNREGS and Integrated Watershed Management Program. On the other hand, there is depletion of ground water levels in Purnea district. Hence the plan has proposed for many ground water table recharge structures. This shall favour micro irrigation activities in the region mainly drip and sprinkler irrigation. This will also spur a change in cropping patterns and farmers will show interests towards vegetable and other horticultural crops. This can be boost commercial precision agriculture fostering local economy. There is high potential for micro irrigation in Purnea and the plan has proposed for maximum utilization of the same. Nearly 15% of the total cropped area can be brought under micro-irrigation system. Target of “More Crop per Drop” will be achieved. New Structures shall provide more surface water opportunities and shall act as support for the live stock. This is one of the major water needs that goes unnoticed. The plan has proposals for cattle troughs and village ponds that favour cattle and other livestock. Increased Water Availability shall spur many Agro-based industries in the region providing employment generation.

Conclusion

1. The holistic irrigation plan was prepared at Block level & District level.
2. PMKSY DIP will fulfill the resource gap in the irrigation chain.
3. Irrigation to every farm will be achieved through completion of major, medium & surface minor projects proposed under AIBP.
4. Under, Per Drop More crop, we will achieve enhance cropping & productivity which leads to rural prosperity.

5. Net Cropped Area (NCA) of the district is **208,504.35** ha.

6. Net Irrigated area of the district is **112,247.82 ha.** this is 53.84% of NCA. Hence, **96,523.76 ha.** (46.16%) has to be irrigated.

7. By implementing this action plan, we are hoping to achieve 70% plus irrigated land status for the district in coming five years.

8. This action plan proposes for better water use efficiency & management along with best distribution of water sources.

Recommendation

Purnea district has high availability of water both through rainfall and rivers, streams intersecting the mainland. However much of the potential has not been capitalized till date. Pradhan Mantri Krishi Sinchayi Yojana (PMKSY) is a boon at this important juncture for Purnea district. The district has to undergo a transformational phase of development mainly in irrigation as agriculture is the spine of the district economy. Access to irrigation to small and marginal farmers who comprise nearly 70 % of total farmers, alone shall bring a synergy in rural economy and it is high time the water potential of Purnea is utilized to its fullest. At present the irrigation potential of Purnea district is 54%. We have to increase the irrigation potential up to 70% by adopting strategic action plan under PMKSY.