

**STUDY ON AGRICULTURE WATER  
MANAGEMENT OF SMALL AND  
MARGINAL FARMERS IN THE  
DISTRICT OF MORIGAON  
*UNDER*  
SUSTAINABLE DEVELOPMENT  
INVESTMENT PORTFOLIO (SDIP) PROJECT**



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## **PREFACE**

97% of the World's water resources are present in oceans. The remaining 3% of the water resources are present on land. Out of the 3 % of water available on land, 2% is on ice caps which cannot be utilized. The remaining is the only the available utilizable water on land. 97% of the available fresh water on earth is groundwater. India has 16% of world's population while having scarce fresh water resources.

The global food and nutritional security of growing population is a great challenge, which looks for new crop as source of food and nutrition. Water is one of the most important inputs essential crops. It profoundly influences photosynthesis, respiration, absorption, translocation and utilization of universal nutrients and cell division besides some other processes. Both its shortage and excess affects the growth and development of the plants, yields and quality of produce.

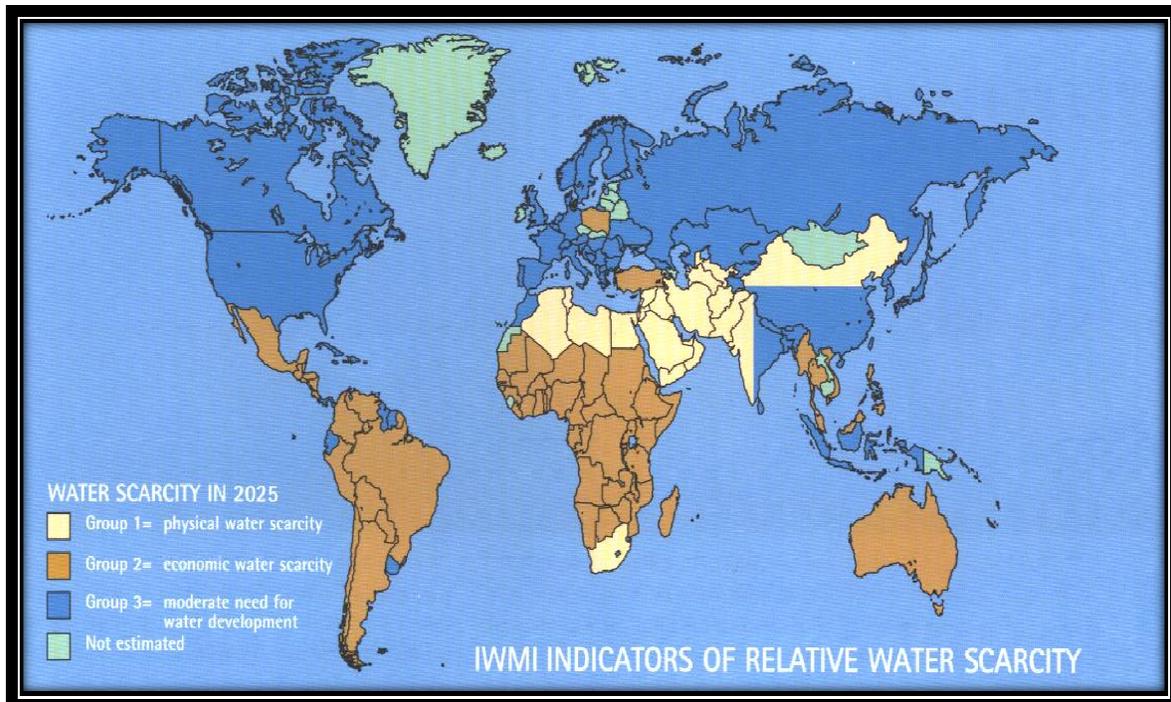
Rainfall is the cheapest of source of natural water supply. Its distribution is very uneven and uncertain. Artificial water supply through irrigation on one occasion and removal of excess water through drainage on the other becomes imperative. Water management in India thus comprises of irrigation and drainage or both. With proper combination of water and soil nutrients the crop yields can be boosted manifold under irrigated agriculture. Water is a costly input when canals supply it misuse of water leads to water logging, salt imbalance etc. rendering agricultural lands unproductive. Proper appreciation of the relationships among soils, crops, climate and water is essential for an efficient and economic use of water resources for maximum crop production.

Agriculture Water Management becomes crucial for small farmers as they are not able to use irrigation techniques on their own. Therefore, it is imperative to inculcate good water management practices as also to increase the state's role in doing so. With this in mind, RGVN has conducted a study on Agriculture Water Management in Morigaon district of Assam.

Morigaon is one of the youngest districts in Assam carved out of Kamrup & Nogaon Dist. The district is poor ravaged by flood and mostly depends on agriculture. Peoples of the region mostly are tribal and immigrant shelter under MGD, it is a district targeted to reach the MGD before 2015. Although, the findings do not indicate this.

## CHAPTER - I: INTRODUCTION

### 1.1 WATER RESOURCES IN THE WORLD AND INDIA



**97% of the World's water resources are present in oceans. The remaining 3% of the water resources are present on land. Out of the 3 % of water available on land, 2% is on ice caps which cannot be utilized. The remaining 1 % is only the available utilizable water on land. 97% of the available fresh water on earth is groundwater.**

Fig 1: Water Scarce region of the world.

Source: [http://www.iwmi.cgiar.org/Publications/IWMI\\_Research\\_Reports/PDF/PUB019/REPORT19.PDF](http://www.iwmi.cgiar.org/Publications/IWMI_Research_Reports/PDF/PUB019/REPORT19.PDF)

Water is one of the most important inputs for crops. It is required continuously in large quantities during their life and influences photosynthesis, respiration, absorption, mineral nutrition and growth. A shortage of water affects the growth and development of a plant directly and has bearings on its yield and quality. Most of the small and marginal farmers in a country like India are dependent on rainfall. Rainfall is capricious, causing floods and droughts alternately. Thus the distribution of water is not concordant to needs of the crops. Artificial water supply through irrigation on one occasion, and the removal of excess water through drainage on another occasion, therefore, is crucial for good crop production. Water management in India, thus, comprises irrigation or

drainage or both, depending considerably on the environmental conditions, soil, crops and climate. It is a situation oriented entity. Crop yield can be boosted considerably via irrigation.

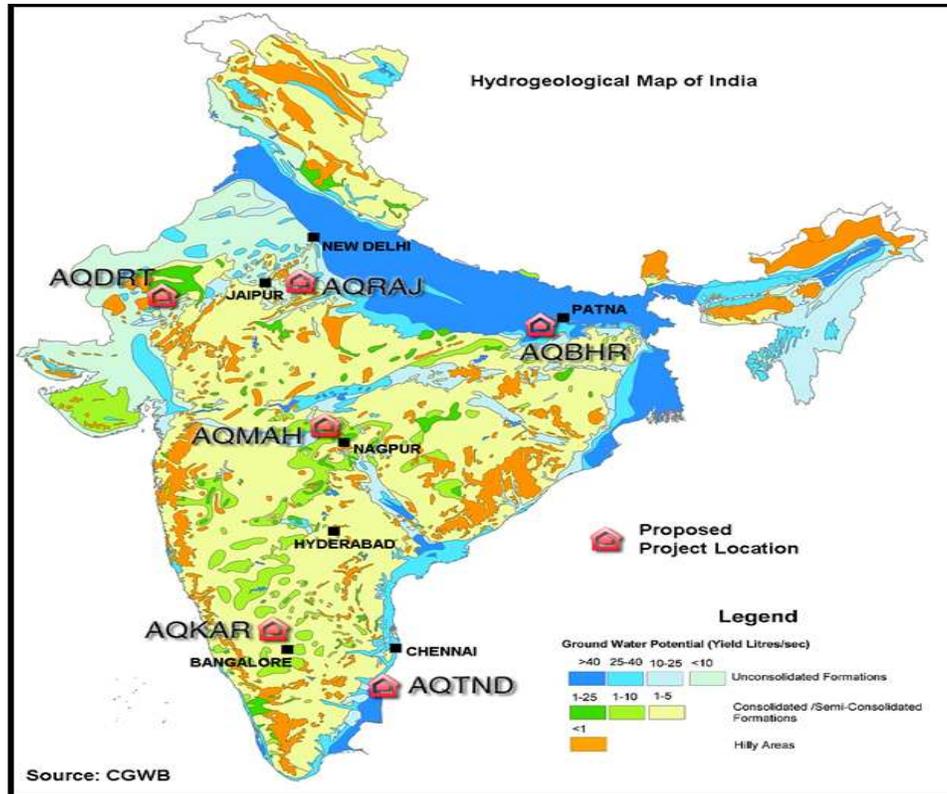


Fig 2: Hydrological Map of India

Report of Technical training Workshop organized by Gujarat Institute of Development Research (GIDR), Ahmadabad & Institute for Resource Analysis and Policy (IRAP) Hyderabad.

The relationship and economic utilization of water resources for maximum crop production is imperative. Where water is not available improper qualities, it becomes necessary to the constructing of dams and reservoirs, the conveying of water from storage points to the fields, the operating and the maintaining of canal systems involve huge expense. The misuse of water leads to the problems of water logging and an imbalance of salt and nutrients, thus rendering agricultural lands unproductive.

Irrigation in India is estimated to consume nearly 500 BCM (Billion Cubic Meter) of the world consumption of water annually. Thus it is crucial to raise crop water productivity

so as to ease water scarcity and to make available water for other purposes. Definition of water productivity is scale dependent. Water productivity can be analyzed at the plant, field, farm, system and basin levels, and its value would change with the changing scale of analysis.

There has been a remarkable growth in well irrigation in the past few years, which has brought remarkable benefits for agriculture but also resulted in negative consequences on the environment, questioning the long-term sustainability. Many parts of India, especially the west and the north western parts, face the depletion of groundwater resources and water scarcity. Poor and marginal farmers are unable to use groundwater efficiently and sustainably.

Under the circumstances, the efficiencies of public surface irrigation systems are crucial. It becomes necessary to have reliable and controlled water supply not only to replenish the depleted water, but also to ensure that there is enough water for other productive use as well. It is also expected that controlled water delivery utilization and efficiency of water will increase.

## 1.2 AGRICULTURE WATER MANAGEMENT IN ASSAM

About 86 per cent of the population in Assam lives in rural areas as per the 2011 Census. About 69 percent of the workforce in the state is actually engaged in agricultural activities. However, agriculture in Assam is highly underdeveloped with a high dependence on agriculture for livelihood, traditional farming techniques and low usage of modern farm inputs with inadequate agricultural infrastructure. Much of the area is rainfed.

Rainfall Zone	No. of Districts	Rainfall(mm)			Cropped Area (lakh ha.)		Cropping Intensity
		Actual	Normal	% Departure	Net	Gross	
Arid	Nil	--	--	--	--	--	--
Semi Arid	Nil	--	--	--	--	--	--
Sub-humid	4	962.5	1689.3	-43%	4.34	5.95	137%
Humid	23	1479.4	2084.5	-29%	23.77	35.04	148%
<b>Total</b>					<b>28.11</b>	<b>40.99</b>	<b>146%</b>

TABLE - 1:- Extent of Rainfed Area (2011)

<http://www.agriassam.in/presentations/aPresentation%20on%20Water%20Management%20-%20Assam.pdf>

In Assam though the annual rainfall of 2296.3 mm(2011) is high, many of the areas suffer from moisture stress as most of the rainfall is received during monsoon (Jun-Sept) and major portion of the rainwater is lost through run off, causing erosion, and water logging of low areas. Due to these reasons, after the monsoon there is less water to support agriculture production. The table below indicates the rainfed areas in Assam: Assam receives abundant rainfall during the kharif season as a result of which humidity levels are very high. The hot and humid condition during kharif season favors spread of pests and disease, resulting in crop losses. The excessive humidity conditions also implies that the grain harvested during the kharif season often contains a higher than acceptable level of moisture, because of which sometimes farmers are forced to sell their output at a very low price. Over and above all these, the state is also subject to frequent floods and extensive water logging. Frequent floods, mainly during the kharif-cropping season, expose farmers in Assam to severe risk of crop and property loss. Besides, floods also introduce uncertainty in the length of the kharif-cropping season. The problems can be summarized in the following manner:

- Low rain water use efficiency.
- Less investment in water use efficiency.
- Inappropriate Natural resource management practices followed by farmers.
- Lack of proper techniques available for dry land farming suitable for the region.
- Due to erratic behavior & improper distribution of rainfall agriculture becomes risky; farmers do not want to adopt proper methods for dry land farming.
- Losses of soil fertility due to high velocity run off for undulating topography.
- Water logging in crop field in summer due to poor management of seasonal stream going through the field.
- Crop field affected due to siltation from seasonal stream
- Gully formation in crop field, rapid top soil erosion in hilly districts

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## **CHAPTER -II: STUDY METHODOLOGY**

### **2.1 OVERVIEW**

The study employed two types of methodologies for information collection - Secondary data analysis and primary data from the participants through fieldwork from 1 block of Morigaon district of Assam. The quantitative method had applied to collect relevant data/information from the selected households in implementation areas.

### **2.2 SECONDARY DATA ANALYSIS**

The secondary data analysis constituted analysis of accumulated information available in the literature. It provided a general overview on different issues of the project areas. Secondary data collection helped in identifying macro issues, apart from understanding the overall agri water management scenario in the State.

The process helped to get idea on the existing state of knowledge, identify items of enquiry and design appropriate instruments for fieldwork. Websites of District Irrigation departments, prominent organizations, and various websites were considered as secondary data.

### **2.3 PRIMARY DATA COLLECTION**

The primary data for the study was collected through a set of survey questionnaire administered to small farmers at the household level. A brief description and steps of the primary data collection methods used is given below:

Primary Respondent: 300 (1-2 Farmers in each Primary data collection)

Focal Group Discussions: 180 (20 farmers in each group)

Personal Interviews: 50

#### **2.3.1 SURVEY: INSTRUMENT OF QUANTITATIVE DATA**

The quantitative method is applied to collect relevant data/information from the cultivators across the block. A systematic approach of random sampling process

was introduced in selection of respondents from the project areas to make it more representatives.

The household level survey was conducted with the members of household. The survey included questions on present status of household income, expenditure, household resources, use of ground water, sources of irrigation, crop production, linkage with govt. and other related issues. The questionnaire was in English, which was translated into Assamese by the interviewer during interview.

### **2.3.2 DETERMINATION OF SAMPLE SIZE**

It was decided that an approximate sample size of 500 HH under the Manoha GP of Mayong block, Morigaon district was an appropriate sample size to understand the ground situation. Of the above, 300 were directly administered questionnaires, 150 were covered through Focal group Discussions and another 50 through interviews, both formal and non formal. Some of the more progressive farmers, persons belonging to Local Service Providers' Associations etc were interviewed , as well as the small farmer HH.

### **2.3.3 QUESTIONNAIRE FOR HOUSEHOLD SURVEY**

The questionnaire for the household survey was designed around key expected outcomes and associated indicators of the Study. The aim was to have a questionnaire that was simple to answer and record responses, and not take more than 45 minutes on average to complete.

The questionnaires were prepared in English language and translated to Assamese language by the interviewer during interview. A copy of the household questionnaire is given in the [Annexure: 1](#)

### **2.3.4 QUESTIONNAIRE CONTENT OF HOUSEHOLD SURVEY**

The following summarizes the key questionnaire topics and information collected through Questionnaire:

- General Information (Sub-division, Block, Village, etc.)
- General background of the cultivator (Name, Address, Age, Land, Crops, National ID, etc.)
- Sources of water

- Irrigation facilities
- Agriculture water management through the year
- Quality of water
- Size of production and land size



**Picture 1: Photo taken during Survey in Morigaon District**

## **2.4 DATA ANALYSIS**

Hard copy of questionnaire was collected by RGVN from the field investigators and data was then entered into MS Excel sheet and analysis was then undertaken using MS Excel.

## **2.5 LIMITATIONS OF THE RESEARCH**

- Absence of formal recorded information on agriculture water management.
- Very limited understanding of the topic by farmer HH
- Study conducted only in one block so cannot be taken as representative of the whole state
- Limited time and budget for detailed study.

## CHAPTER - III

### 3.1 SUSTAINABLE DEVELOPMENT INVESTMENT PORTFOLIO PROJECT

The Sustainable Development Investment Portfolio (SDIP) designed by Department of Foreign Affairs and Trade (DFAT), Australia, aims to tackle some of the basic development challenges in South Asian region by strengthening trans-boundary cooperation in order to promote all-encompassing, robust and resilient economic growth. The primary goal of SDIP is to promote water, food and energy security in the basins of the three Himalayan Rivers namely Ganga, Indus and Brahmaputra. The target groups are the poorest and most vulnerable sections of South Asian population, particularly women and girls. The project spans over 12 years in three phases of four years each. The main objectives are broadly stated as follows:

- Confident and cooperative decision-making across jurisdictional borders for the effective and equitable management of shared water resources.
- Increased access to and cooperation on energy.
- Increased agricultural productivity and farm incomes through the adoption of more efficient and sustainable agricultural practice and better developed value-added market chains.

**SDIP** undertakes an innovative and multi-disciplinary partnership approach called 'Portfolio Approach' that aims at fostering direct and cross synergies. Following the same approach, CUTS identified 8 strategic partners to strengthen its network across the region.

The shared objectives of CUTS with its partners "is to act as a change agent and work towards enhancing the value of SDIP by linking its interventions with key actors (other partner organizations) and stakeholders through local and regional networks and to enable policy changes at sub national, national and regional levels through policy research and advocacy".

### 3.2 CUTS

CUTS began in 1983 from a rural development communication initiative, a wall-newspaper *Gram Gadar* (Village Revolution) with a group of concerned citizens to do research and advocacy on basic economic and development issues, including:

- Consumer protection.
- International trade and development.
- Competition investment and economic regulation.
- Good governance with a focus on accountability and access to information.
- Human development.
- Consumer safety.

Consumer Unity and Trust Society (CUTS International) is a registered, recognized, non-profit, non-partisan, non-government organization (NGO) with its headquarters in Jaipur, India and presence throughout the world. Our organization is working on the following programme areas: Consumer Protection and Good Governance; International Trade and Development; Competition, Investment and Economic Regulation; Human Development; and Consumer Safety.

CUTS as one of the portfolio partners will mainly indulge in policy research, policy advocacy and policy dialogues in the above mentioned areas of intervention and enhance outreach by linking with relevant Civil Society Organization, media and policy makers in the selected South Asian region.

### **3.3 RGVN**

#### **ABOUT RGVN**

##### **Vision:**

Creating an enabling environment where the poor and underprivileged can ensure sustainable livelihood with dignity.

##### **Mission:**

To improve the economic and social status of the poor and underprivileged rural and urban people through institution building and livelihood enhancement.

##### **History:**

RGVN was founded in April 1990 as a national development support organization focusing on livelihood enhancement of poor. RGVN is registered under the Societies Registration Act of 1860 in the State of Assam, with Head Quarters at Guwahati. RGVN's mission is to improve the quality of life of the poor and otherwise underprivileged rural and urban people through social action. RGVN began its operations in the North East India and later on expanded to other parts of Eastern India. RGVN now operates in 14 states of the country,

namely – Assam, Meghalaya, Arunachal Pradesh, Tripura, Nagaland, Manipur, Mizoram, Sikkim, Orissa, Bihar, Jharkhand, Eastern Uttar Pradesh, Chhattisgarh and coastal Andhra Pradesh. RGVN's founder sponsor was Industrial Financial Corporation of India (IFCI). The other sponsors of RGVN are Industrial Development Bank of India (IDBI), National Bank for Agriculture and Rural Development (NABARD), and Tata Social Welfare Trust (TSWT)

RGVN was founded by Shri S.M. Palia, former Executive Director, IDBI. Shri S.M. Palia was also the founder Chairperson of RGVN. Late Dr L.C. Jain, an eminent Gandhian and former member of Planning Commission was also one of the members of the Governing Board of RGVN during the initial years. Shri Deep Joshi, an eminent person in the field of development and a Magsaysay Awardee, Shri Krishna Kumar of the Tata Group, Mr Vijay Mahajan, Shri D N Bezboruah were some of the former Members of the Board, RGVN.

### **RGVN's OBJECTIVES**

RGVN's main objectives are to:

- Promote, support and develop voluntary organizations engaged in the social and economic uplift of rural and urban poor, physically and socio-economically handicapped people;
- Improve the pace and quality of economic development, especially relating to the village and decentralized sector;
- Focus attention on groups which are disadvantageously placed in society, but have the potential for pursuing socially and economically productive activities;
- Assist the urban and rural poor especially tribal's, scheduled caste, women and children for their economic self-sustenance.

### **RGVN's ACHIEVEMENTS**

RGVN's main achievements are:

**Institution Building:** Institution Building has always been a primary focus of RGVN. RGVN has through its various Programmes tried to build up institutions in remote and inaccessible places. The Credit and Savings Programme (CSP), the micro finance retail program of RGVN which started as a pilot project in 1995, is now an NBFC called RGVN (NE) Micro Finance Ltd. Another institution build up by RGVN is UMASS in Orissa. During 2005, RGVN hived off its micro finance retail program in Orissa into a

cooperative christened as UMASS situated at Bhejput, Ganjam district, Orissa. Apart from these two independent institutions, RGVN has provided handholding to a number of small NGOs/CBOs in various parts of East and Northeast India.

**Promoting & supporting grass root level NGOs and CBOs:** RGVN has till now supported more than 2000 NGOs/ Projects and more than 15000 Self Help Groups.

**Livelihood Promotion for poorest of the poor:** RGVN's main focus area is livelihood promotion. RGVN has provided ` 295 crore (as on March, 2010) towards livelihood promotion under its various programmes.

**Raising Status of women:** Majority of RGVN's beneficiaries are women, almost 80% of RGVN's clients are women. Hence women empowerment and gender related issues are one of the focus areas of RGVN.

**Improving quality of life of the poor:** RGVN ultimately aims to improve the quality of life of the poor, hence along with livelihood promotion RGVN also takes up other development programmes leading to all-round development. Drinking water, solar lanterns, low cost sanitation are some of the programmes.

**Promoting Microfinance:** To reach the unbanked and reduce dependence on private money lenders which pushes the poor into a poverty trap, RGVN promotes micro finance for the poor.

**Capacity Building:** RGVN helps many of its partner NGOs by providing various capacity building programmes' to strengthen its internal and operational systems to take up any development work in a sustainable manner.

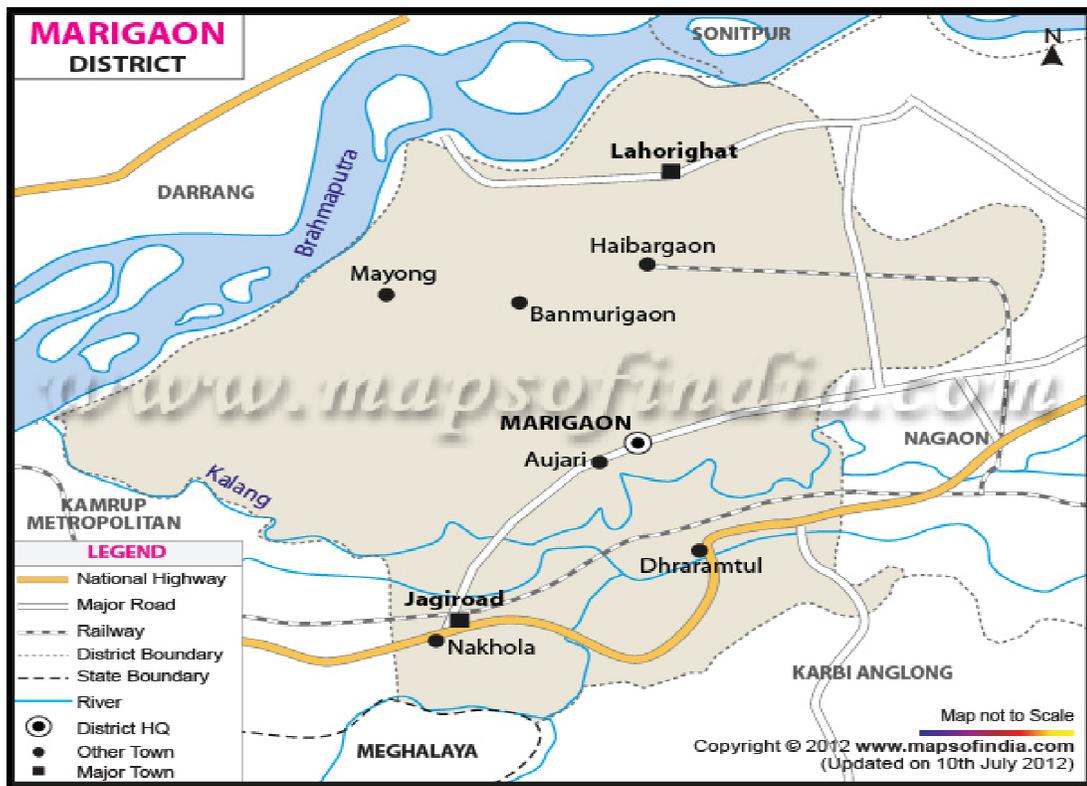
### **ACTIVITIES:**

RGVN had taken up a safe drinking water project with one of the Harijan Colonies in Guwahati. The project was funded by RGVN from its own limited resources and water filters were distributed to 50 households in the colony on revolving fund basis.

RGVN has also taken steps in providing safe drinking water facility and low cost sanitation in Byrnihat under the CSR initiative of Hindustan Coca-Cola Beverages Pvt. Ltd.

Under the IFCI-CSR initiative, RGVN has provided low cost sanitation and solar lighting in areas in and around Guwahati. Awareness programmes on health and hygiene have also been conducted under this project.

## CHAPTER -IV: MORIGAON DISTRICT



Map 1: Map of Morigaon District.

### 4.1 RATIONALE FOR SELECTION OF MORIGAON DISTRICT

Morigaon is a district that faces various problems in terms of Agriculture Water Management due to the unique conditions present here. Annual Flooding with recurrent periods of scanty rainfall make it highly susceptible to low yield in productivity and crop loss. A large part of the district is dependent on rain fed agriculture and the presence of a high level of humidity makes the productivity of the soil low.

Irrigation facilities are inadequate and investment on water management is far below the mark, despite Morigaon having been selected as one of the districts in Assam for achievement of MDGs. This causes great hardship to small and marginal farmers who are often forced to go and work as daily wage labour.

Other challenges in the district relate to a high preponderance of natural disasters, difficult terrain, and water induced hazards. For these reasons it becomes necessary to focus attention on this district and prompt law makers and requisite authorities to take necessary steps for agricultural water management of small and marginal farmers.

#### **4.2 AREA AND LOCATION**

Morigaon is an agrarian district. It is situated between 26.15 degrees North and 26.5 degrees North latitude and between 92 degree East longitudes. On the south bank of the river Brahmaputra Nagaon district is situated on its East, Darrang on the North, Kamrup on the West and South West Karbi anglong on its south. The total area of Morigaon district is 1551 sq. km. The greater part of the district is an alluvial plain, criss-crossed with numerous rivulets and water ways and dotted with wetlands and marshes. The river Brahmaputra flows along with the northern boundary of the district, while Killing, Kollong and Kopili rivers flow through the southern part of the district. The river Killing meets Kopili at the Matiparbat where from Kopili moves westward. Kollong joins Kapili at the Jagi Dui Khuti Mukh and from here they jointly flow into the Brahmaputra. There are three Reserved Forest constituted under Assam Forest Regulation Act, 1891 namely Sunaikuchi, Khulahat, and Bura Mayong and a wildlife Sanctuary Pabitora, famous for the Indian one horned Rhinoceros.

#### **4.3 ADMINISTRATIVE DIVISION**

Morigaon has one sub-division namely Morigaon, which was a civil sub-division of the undivided Nagaon district since 1972 to 1989. The present district of Morigaon has five revenue circles (Morigaon Sadar, Mikirbheta, Laharighat, Bhuragaon and Mayong) five development blocks (Mayaong, Kapili, Bhurbondha Laharighat and Moirabari). The total number of revenue villages in the district is 636 and there are 85 Gram Panchayats under five development blocks.

#### **4.4 WATER BODIES IN MORIGAON**

The district is also endowed with tributary rivers Kolong, Sonai etc., along with a few natural wetlands like Gauranga Beel, Mer Beel etc. These water sources are important reservoirs of fisheries. The district has a total of 35 registered beel fisheries and 5 river fisheries. The normal rainfall of the district is 1772.4 mm.

However, nearly 60 per cent of the rainfall is received during the four monsoon months when intensity of rainfall is very high. However, irrigation in the study area is mostly done by Shallow Tube Wells (STW) and by using Low Lift Pumps to draw water from wetland by a few farmers. Canal system irrigation is not possible in the study area as it is a water scarce region.

#### **4.5 DRINKING WATER FACILITIES IN MORIGAON:**

The result of the household survey reveals that the sample households procure drinking water from various sources including hand pumps/tube wells, dug wells, ponds, rives, and streams. No household is found using public water supply. Other sources of water supply have been availed by small segments of the population. It is also observed that majority of the households avail water supply sources within a distance of less than 10 meters.

#### **4.6 SOIL**

The flood plain is made up sandy silty loan to clay loam with moderate to high permeability developed under the Kolong and Kopili river influences. The soil is acidic in reaction and fine loamy Inceptisol (new alluvial) with a Ph of 4 to 4.5. The soil is light grey to dark grey in colour.. The Upper texture is sandy loam to loamy.

#### **4.7 CLIMATE AND RAINFALL**

Monsoon is from April to July and sometimes delayed due to the vagaries of climate change. Average rainfall is about 1530.9 mm (annual average rainfall 2006-2010 IMD). Summer temperatures varies from 25degrees Celsius to 33 degrees Celsius, whereas winter temperature ranges from 24.8 degrees Celsius to 11.2 degrees Celsius.

#### **4.8 STATUS OF GROUND & SURFACE WATER DEVELOPMENT**

Even though the district is highly flood prone with three to four spells of flood annually as majority of the area lies below the maximum flooding level mark of Brahamaputra, the area still faces Intermittent dry spells and becomes extreme during the kharif & rabi period and therefore irrigation based on ground water become a vital need for raising crops during the period. CGWB during 1998 estimated a total annual replenishable recharge of 386.40 mcm with an annual draft of 130.11 mcm.

Source: Hydrogeology Assessment for Mayong & Bhurbandha block, Morigaon dist.  
Assam

RCSD Project Report No 09, 2011 GRS&GIS

RCSD

Baseline Survey of Minority Concentrated Areas –ICCSR

#### **4.9 SOCIO-ECONOMIC STATUS:**

The Villages of the district suffer from serious deprivation relating to public health, education, and other social sectors. From the productivity status, it is found that low farm productivity and insufficient market supply has resulted from a host of basic problems like lack or insufficient irrigation facilities, absence of farm mechanization and farmers' ignorance. The socio-economic status of the Muslim as well as Hindus living in the study region does not differ significantly. Instead, it is seen that the government promoted development schemes have provided sufficient importance on all the religious communities. In contrast, the Scheduled Caste and Scheduled Tribe population are found to be the least beneficiaries of the development schemes.

#### **4.10 MORIGAON DISTRICT: CENSUS 2011 DATA**

##### **4.10.1 Morigaon District Overview**

An official Census 2011 detail of Morigaon, a district of Assam has been released by Directorate of Census Operations in Assam. Enumeration of key persons was also done by census officials in Morigaon District of Assam.

##### **4.10.2 Morigaon District Population 2011**

In 2011, Morigaon had population of 957,423 of which male and female were 486,651 and 470,772 respectively. In 2001 census, Morigaon had a population of 776,256 of which males were 398,926 and remaining 377,330 were females. Morigaon District population constituted 3.07 percent of total Maharashtra population. In 2001 census, this figure for Morigaon District was at 2.91 percent of Maharashtra population.

### **Morigaon District Population Growth Rate**

There was change of 23.34 percent in the population compared to population as per 2001. In the previous census of India 2001, Morigaon District recorded increase of 21.35 percent to its population compared to 1991.

### **Morigaon District Density 2011**

The initial provisional data released by census India 2011, shows that density of Morigaon district for 2011 is 617 people per sq. km. In 2001, Morigaon district density was at 500 people per sq. km. Morigaon district administers 1,551 square kilometers of areas.

### **Morigaon Literacy Rate 2011**

Average literacy rate of Morigaon in 2011 were 68.03 compared to 58.53 of 2001. If things are looked out at gender wise, male and female literacy were 71.90 and 64.04 respectively. For 2001 census, same figures stood at 65.15 and 51.51 in Morigaon District. Total literate in Morigaon District were 539,902 of which male and female were 289,698 and 250,204 respectively. In 2001, Morigaon District had 5,312,396 in its district.

### **Morigaon Sex Ratio 2011**

With regards to Sex Ratio in Morigaon, it stood at 967 per 1000 male compared to 2001 census figure of 946. The average national sex ratio in India is 940 as per latest reports of Census 2011 Directorate. In 2011 census, child sex ratio is 956 girls per 1000 boys compared to figure of 966 girls per 1000 boys of 2001 census data.

### **Morigaon Child Population 2011**

In census enumeration, data regarding child under 0-6 age were also collected for all districts including Morigaon. There were total 163,819 children under age of 0-6 against 148,765 of 2001 census. Of total 163,819 male and female were 83,746 and 80,073 respectively. Child Sex Ratio as per census 2011 was 956 compared to 966 of census 2001. In 2011, Children under 0-6 formed 17.11 percent of Morigaon District compared to 19.16 percent of 2001. There was net change of -2.05 percent in this compared to previous census of India.

Description	2011	2001
Actual Population	957,423	776,256
Male	486,651	398,926
Female	470,772	377,330
Population Growth	23.34%	21.35%
Area Sq. Km	1,551	1,551
Density/km2	617	500
Proportion to Assam Population	3.07%	2.91%
Sex Ratio (Per 1000)	967	946
Child Sex Ratio (0-6 Age)	956	966
Average Literacy	68.03	58.53
Male Literacy	71.9	65.15
Female Literacy	64.04	51.51
Total Child Population (0-6 Age)	163,819	148,765
Male Population (0-6 Age)	83,746	75,676
Female Population (0-6 Age)	80,073	73,089
Literates	539,902	5,312,396
Male Literates	289,698	2,872,529
Female Literates	250,204	2,439,868
Child Proportion (0-6 Age)	17.11%	19.16%
Boys Proportion (0-6 Age)	17.21%	18.97%
Girls Proportion (0-6 Age)	17.01%	19.37%

Population (%)	92.34%	7.66%
Total Population	884,125	73,298
Male Population	449,123	37,528
Female Population	435,002	35,770
Sex Ratio	969	953
Child Sex Ratio (0-6)	957	937
Child Population (0-6)	155,116	8,703
Male Child(0-6)	79,253	4,493
Female Child(0-6)	75,863	4,210
Child Percentage (0-6)	17.54%	11.87%
Male Child Percentage	17.65%	11.97%
Female Child Percentage	17.44%	11.77%
Literates	485,530	54,372
Male Literates	260,603	29,095

**Table: Population of Morigaon District, Assam**

### **Morigaon District Urban Population 2011**

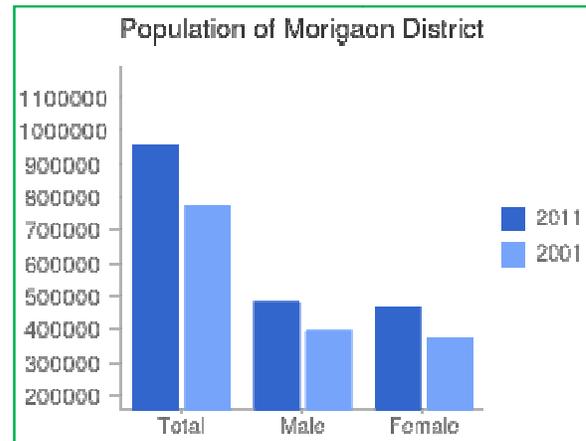
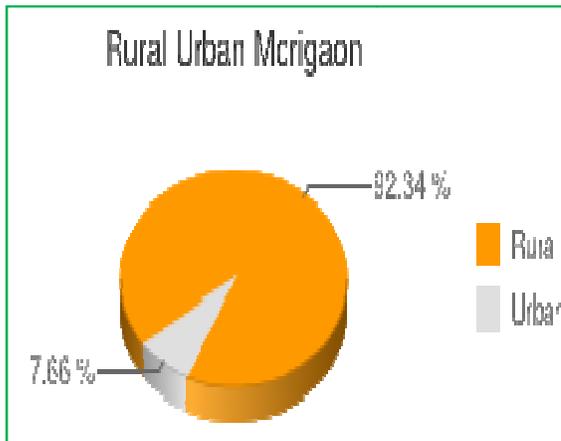
Out of the total Morigaon population for 2011 census, 7.66 percent lives in urban regions of district. In total 73,298 people lives in urban areas of which males are 37,528 and females are 35,770. Sex Ratio in urban region of Morigaon district is 953 as per 2011 census data. Similarly child sex ratio in Morigaon district was 937 in 2011 census. Child population (0-6) in urban region was 8,703 of which males and females were 4,493 and 4,210. This child population figure of Morigaon district is 11.97 % of total urban population. Average literacy rate in Morigaon district as per census 2011 is 84.17 % of which males and females are 88.07 % and 80.09 % literates respectively. In actual number 54,372 people are literate in urban region of which males and females are 29,095 and 25,277 respectively.

### **Morigaon District Rural Population 2011**

As per 2011 census, 92.34 % population of Morigaon districts lives in rural areas of villages. The total Morigaon district population living in rural areas is 884,125 of which males and females are 449,123 and 435,002 respectively. In rural areas of Morigaon district, sex ratio is 969 females per 1000 males. If child sex ratio data of Morigaon district is considered, figure is 957 girls per 1000 boys. Child population in the age 0-6 is 155,116 in rural areas of which males were 79,253 and females were 75,863. The child population comprises 17.65 % of total rural population of Morigaon district. Literacy rate in rural areas of Morigaon district is 66.60 % as per census data 2011. Gender wise, male and female literacy stood at 70.46 and 62.63 percent respectively. In total, 485,530 people were literate of which males and females was 260,603 and 224,927 respectively. All details regarding Morigaon District have been processed by us after receiving from Govt. of India. We are not responsible for errors to population census details of Morigaon District.

### **Morigaon District No of Govt. institution:**

In Morigaon district there are total 60 govt. and public schools, 3 colleges, 7 Banks and 39 health centers.



**Fig: Morigaon Rural and Urban Population**

**Fig: Morigaon Population Growth**

Source: <http://www.census2011.co.in/census/district/161-morigaon.html>

**Context of the proposed areas and community:**

The Morigaon district selected based on the following considerations:

	Morigaon
Population of ST	68395
Population of SC	57647
Female Marginal Workers	53346
Female Literacy	250204
Backward Ranking (most backward 1 out of 23)	10

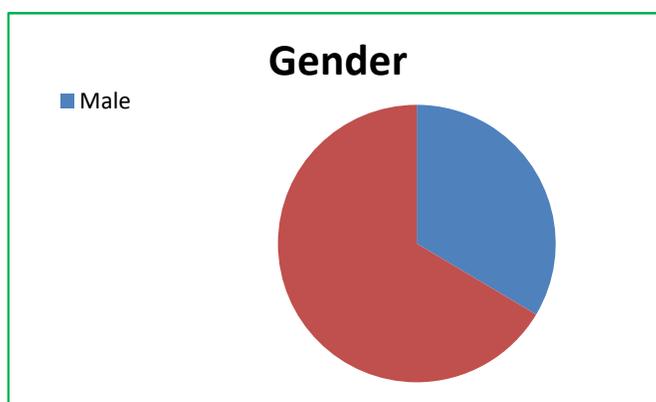
Source: From RGVN official data (Census 2011 data)

## CHAPTER -V: FINDINGS

### 5.1 DESCRIPTION OF RESPONDENTS

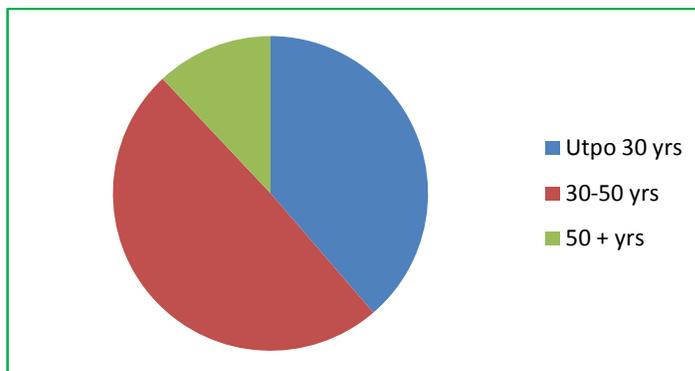
The study was conducted on a total of 480 persons in the villages of Barukota, Khulagaon, Konwargaon, Aamkota and Bankukurajan in the Mayong block of the Morigaon district of Assam. The Following gives the types of respondents.

**Gender:** Of the 480 farmers surveyed, there were 161(33.54%) males and 319 (66.46%) females.



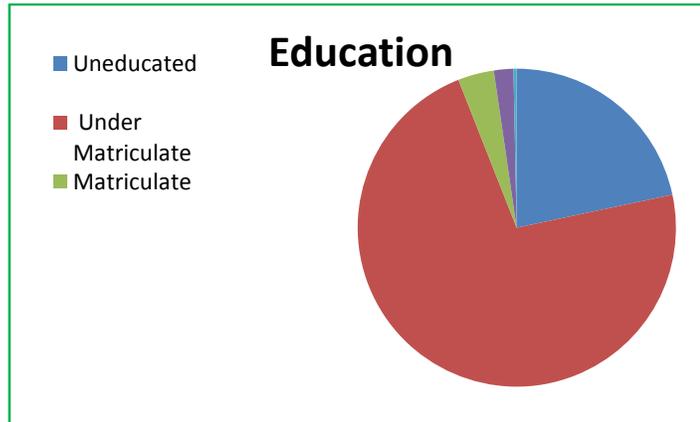
**Pie chart 1: Gender ratio.**

**Age:** Most of the people belonged to the age group 15 -30 yrs (38.67%) and 31-50 yrs (49.33%). Most of the respondents thus were in the productive age and rest are belongs to above 50 yrs (12%) Being agricultural cultivators, they had a firsthand experience in agriculture water management.



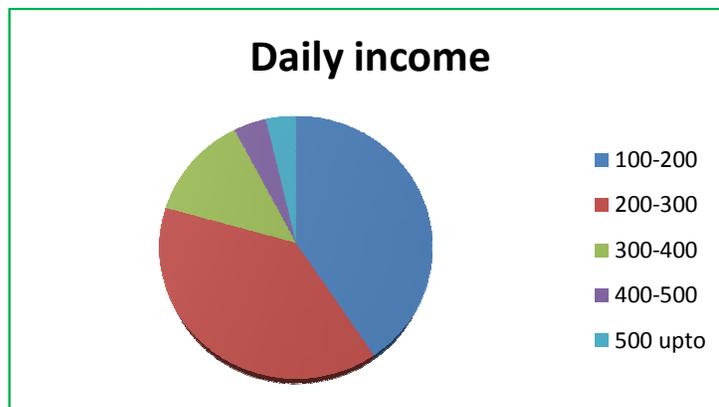
**Pie chart 2: Age Group**

**EDUCATION:** Most of the respondents had received some amount of education but 217 were under matriculates (72.33%). 21.67 % had not received any education. A very small percentage of 3.67% of the respondents were matriculates, 2% are Higher Secondary Passed and .33% graduate.



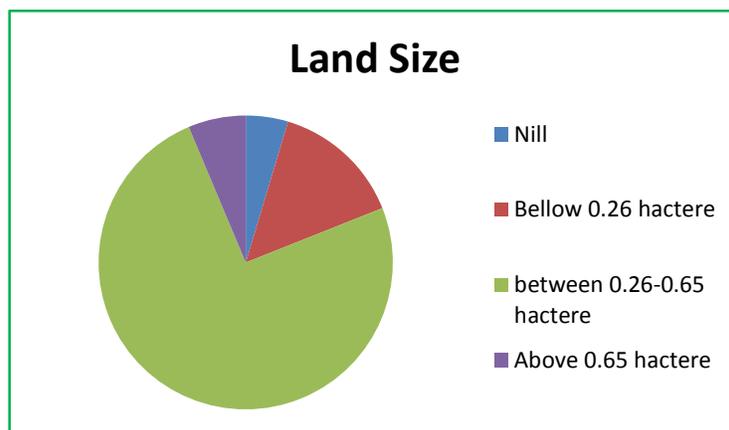
Pie chart 3: Educational Qualification

**INCOME LEVEL:** 40.67 % of the respondents earned a Daily income between Rs 100 to Rs 200. 38.67% of the respondents earned Rs 200 to Rs 300 per day. While calculating income, it should be borne in mind that the respondents were referring to the cash income earned from farm produce and did not calculate consumption etc.



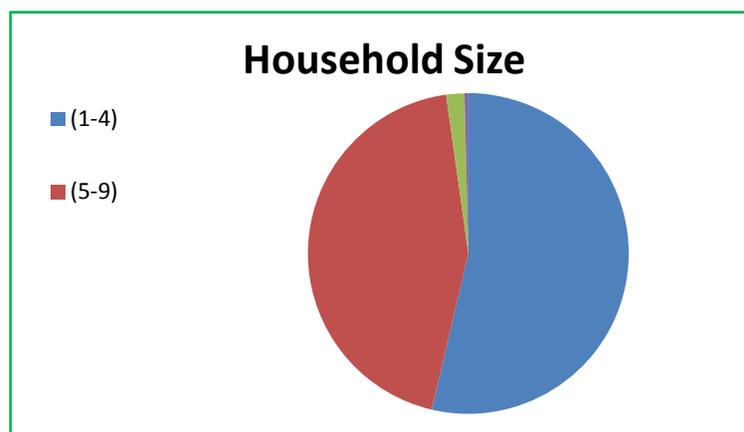
Pie chart 4: Daily Income

**Land Size:** Land Size of 74.67% of the respondents have between 0.26 hectare-0.65 hectare , 14.2% have bellow 0.26 hectare and 6.33 have above 0.65 hectare.



Pie chart 5: Land Size

**Household Size:** 48.67% of the respondents had a family size of 1 to 4 and 5 to 9 Members, whereas 2.33% and had family size over 10-15 members.



Pie chart 6: Household Size

## 5.2 FINDINGS

Growth of population in Morigaon district has not been corresponding with increase of production. Statistics show that between the years 2000 to 2011 the population of Morigaon district has increased by 23.39%, though rise in production has not gone up correspondingly. To feed the rapidly increasing number of people, food

production will have to increase but the amount of water and arable land available remains the same this is a major challenge. Within the context of demographic growth, increased competition for water and improved attention to environmental issues, water for food remains a core issue that can no longer be tackled through a narrow sectoral approach.

### **(i) Major Crops (wetland Crops)**

Morigaon district of Brahmaputra valley of Assam with its tropical climate with moderate to heavy rainfall harbors many smaller to larger wetlands where different types of wetland crops can be seen. These crops are economically important for the farmers. Main crops grown in the district are Mustard, Jute, Wheat, Paddy, and Vegetable. However paddy is the prime crop for the people. Due to climatic change like flood and drought has vast effect on agriculture. Every year crops are destroyed due to flood and drought. Due to drought the farmers can only able to cultivate *Boro Dhaan* (summer rice) and in the other seasons the crop fields remain unused.

### **(ii) Irrigation Facilities**

The survey establishes that 30% people use canal irrigation while 70% of the cultivators use shallow tube well irrigation. In the area surveyed there is a lack of irrigation facilities. STWs in the area extend to a depth of 37 to 40 m and are fitted with diesel engine pumps and use the lift irrigation system. During the lean season they do not work.

The Irrigation Department is presently operating/ functioning 3(three) types of minor Irrigation schemes, namely Low Lift Pumps, Deep tube wells and Shallow tube wells. Farmers can avail the subsidy on these items.

According to Irrigation dept authorities, the coverage of Irrigation facilities within the District in comparison to the other district is very low. Hence a lot of energy is given to studying the natural sources such as rivers, ponds beels tank etc, regarding their availability of water in various seasons of the year which is the principal factor in selecting an Irrigation scheme. According to department sources, it also looks into the matter very seriously in distributing the scanty Irrigation water particularly in the lean period.

While Participatory Irrigation Management (PIM) had been encouraged by the govt. in the World Bank ARIASP project, presently the water users' bodies are almost defunct with much of the infrastructure lying in a practically unusable condition. Reasons for the present condition of infrastructure have been given as high diesel costs of running the wells, lack of electricity, uneven distribution of wells and lack of repair of the infrastructure.

Under these conditions, some private entrepreneurs and farmers have installed STWs under the new schemes of the Govt. These have been found in the project villages and contribute to part of the irrigated area under Boro/winter paddy cultivation. In Khuburgaon 7 STW and 6 Lift Irrigation pumps were found, in Konwargaon 10 STWs and 5 Hondas lift irrigation pumps and in Bankukurajan 15 diesel pumps, 8 Honda lift. These have been purchased with subsidy under the Govt of Assam. However, only 15% of the farmers are using Motor operated pumps for irrigation and rest 85% of small and marginal farmers are unable to afford the use of this. About half the small and marginal farmers source water from wetland and marshy areas, community tanks with diesel pump sets and canoes for winter boro paddy and mustard cultivation. In some of the areas it has not been possible to use STWs because of non electrification.

### (iii) **Ground Water Depletion**

Groundwater is an integral part of the environment, and hence cannot be looked upon in isolation. In the district, as in other districts of Assam, there is a fallacy that water is in plenty. Hence scant attention is paid to water conservation, efficiency in water use, water re-use, groundwater recharge, and ecosystem sustainability. Also, in some places, uncontrolled use of the bore well technology has led to the extraction of groundwater at such a high rate that often recharge is not sufficient. Reducing forest cover and soil degradation also adds to the problem.

In the areas surveyed the 100% of respondents reported a change in the level of ground water since the past. They were of the opinion that earlier the amount of ground water was much more than the present, resulting in serious issues such as a lack of water for irrigation during the summer crop. In the area, in many places it is not possible to grow winter crops due to flooding during the rainy season hence the small and marginal farmers are dependent on summer crop. Communities have begun to realize

changes in surface and ground water availability and express a willingness to adopt ground water management practices. Ground water is based on precipitation and influent seepage from water bodies. The alluvial soil in the area allows for this.

**(iv) Quality of ground water**

Samples	H2S	Iron	Nitrate	Fluoride	Arsenic
20	7 positive	2-10ppm	10-20 ppm	0.5 -2 ppm	0.05 ppm

Table 3 : Iron, Nitrate, fluorides, Arsenic and H2S content in ground water in Morigaon, 2011 Source: [http://www.rcsdin.org/Hydrogeology\\_assmt\\_Rpt.pdf](http://www.rcsdin.org/Hydrogeology_assmt_Rpt.pdf)

All the above mentioned water parameters are in between permissible limits prescribed by WHO. However, 77.33% of respondents said that the govt. and tube well water is Iron contaminated and 22.67% of respondents have no contamination in water. Water extraction without proper recharge and leaching of pollutants from pesticides and fertilizers into the aquifers has polluted groundwater supplies. In addition, leachates from agriculture, have also polluted surface- and ground-water.

**(v) Drinking Water**

The problems of safe drinking water are also found in certain areas of Morigaon district. Although the majority of the households have access to safe drinking water, water is impure. Availability and access to safe drinking water has been one of the most crucial factors for the villagers of the areas. The various sources of water supply facilities as reported by the respondents are well, tube well etc. However, some villages are found having the access to public water supply but not sufficient for them. Distribution of govt. drinking water supply facilities shows that 5-6 taps among 250 households which cannot fulfill their daily needs of water. Tube well is the main sources for drinking water and 77.33% of the respondent said that the water is iron contaminated. Majority of people depends on their own drinking water facilities.

**(vi) Fertilizer Use**

Most of the farmers are still using chemical fertilizers which they say are easily available and act effectively during any season. 70% of the farmers interviewed say that though they have heard about the benefits of using organic or bio fertilizers they are reluctant to try them out as they feel organic fertilizers will not prevent a pest attack.

Due to a shortage of water for agriculture or else due to flooding in the rainy season, farmers feel more comfortable with chemical fertilizers. Farmers are unaware that the moisture holding capacity of the soil is lessened with chemical fertilizers.

Cultivators are, however, aware about the benefits of organic farming and 25% percent have been trying out organic cultivation. They are aware that soil health can be improved. In some places SRI and bio fertilizers have been used with success. In Khulagaon and Konwargaon it was observed that a large percentage of the cultivator households had compost pits and are using them successfully. Similarly floating beds (ie beds made out of decomposed water hyacinth and floating on water bodies) have been demonstrated with success.

### **(vii) Climate Change**

Of the respondents interviewed, almost 98% have said that in the past three years the effects of climate change are clearly visible and it is the major reason for crop loss every year. The weather is largely unpredictable, affecting the normal crop patterns. With agriculture still rain-fed in large parts of the state, significant aberrations in regional weather climate patterns negatively affect agricultural output. As a direct result of strange winter weather, yields of rabi crops like vegetables, lentils and potato etc which are extremely sensitive to rainfall patterns, especially winter rains etc were poor. Similarly flooding from extended floods and land siltation affect the crop patterns. Crops yields are down and well to do farmers are replacing traditional crops with new varieties of summer rice (Boro varieties), with provision for irrigation.

Productivity of natural fisheries is also affected by the vagaries of the weather. Increasing turbidity and irregular rainfall patterns also affect the breeding, migration and harvesting of fish, reducing the productivity of natural fisheries. Some of the fishermen in the area are reduced to doing manual labour in Morigaon town due to this.

More frequent and severe droughts and floods are already apparent in the area and this is impacting on the extent and productivity of both irrigated and rainfed agriculture across the district.

### **(viii) Governance, institutions and right policies:**

Agriculture Water Management relies heavily not only on water but also other factors such as right governance frameworks, proper govt. machinery and institutions in place. Presently it is observed that a large percentage of people are not linked with the

government machinery. The agriculture department does not have enough resources, human or other, to reach out to the farmers. Sixty percent of the farmers reported that they did not have linkage with the agriculture department.

Most of the people surveyed were out of the purview of irrigation. A look at the table below shows that Morigaon ranks 19 in terms of Irrigated Area in the State of Assam with 21946 hectares (24%) under irrigation. This is significantly lower than more developed districts such as Bongaigaon which has 61 % under irrigation.

Sl. NO	DISTRICT	Net/Assured irrigated Area By Source (hectare)			Net Cropped area(hectare)	% area under assured irrigation
		Major/Medium	Minor	Total		
1	Baksa	26687	7275	33962	66085	51%
2	Barpeta	17445	28810	46225	159311	29%
3	Bongaigaon	1793	39737	41530	67635	61%
4	Cachar	2318	7338	9656	115386	8%
5	Chirang	6093	4222	10315	46767	22%
6	Darrang	4150	39414	43564	103833	42%
7	Dhemaji	1080	17367	18447	67506	27%
8	Dhubri	1589	50424	52013	134349	39%
9	Dibrugarh	2320	7473	9793	139498	7%
10	Goalpara	3686	54778	58464	80753	72%
11	Golaghat	1738	9786	11524	119056	10%
12	Hailakandi	575	4228	4803	50294	10%
13	Jorhat	2443	5950	8393	120240	7%
14	Kamruo (R&M)	11011	41695	52706	220571	24%
15	Karbi Anglong	43066	7404	50470	126399	40%
16	Karimganj	332	6157	6489	76035	9%
17	Kokrajhar	16872	18588	45460	86556	41%
18	Lakhimpur	1922	19760	21682	100169	22%
19	Morigaon	1699	20247	21946	92011	24%
20	N.C. Hills	4994	982	5976	28171	21%
21	Nagaon	46367	51098	97465	235626	41%
22	Nalbari	1450	31397	32847	67730	48%
23	Sibsagar	4017	6356	10403	136822	8%
24	Sonitpur	24891	21027	45918	165141	28%
25	Tinsukia	1564	9731	11295	104714	11%
26	Udalguri	31531	5894	37425	99949	37%
<b>Total</b>		<b>261663</b>	<b>517138</b>	<b>778801</b>	<b>2810597</b>	<b>28%</b>

Table 3: District wise net cropped area under assured irrigation in Assam

Source: <http://www.agriassam.in/presentations/aPresentation%20on%20Water%20Management%20-%20Assam.pdf>

**(ix) Gender Roles**

Women are involved in various aspects of agriculture from sowing to harvesting and therefore, agriculture water management is a crucial part of their lives. Women respondents felt that their contribution to agriculture was 60%-70% from sowing to harvesting stage. Hence their dependency on agriculture water management is crucial.

They were of the opinion that their role in agriculture was not visible, in the sense that though they did an immense deal of work, it largely was acknowledged. Even government policies and reforms paid scarce attention to reducing their burden.

While women's names were included in the participatory management process, such as being members of the water management groups that had been set up some years ago, their role was almost negligible as decisions were taken by the male members of the group.

**(x) Crops Cultivated:**

The farmers of the area are dominantly cultivating paddy. 100% of the farmers are growing paddy in every year. Also among these farmers 56% grow vegetables, 5.33% grows Mustard, .33% grows Turmeric and few fruits, 1.33% grows Potato and 1% grows Ginger.

## **CHAPTER 6: RECOMMENDATIONS**

### **6.1 SCIENTIFIC CROPPING AND PRODUCTION TECHNOLOGIES**

A scientific response to the problems mentioned above has to be translated from theory to the grassroots. The development of alternative cropping system and production technologies which can effectively combat natural constraints needs to be introduced to management practices.. Separate cropping systems should be proposed for different soil and flood situations found in different parts of Morigaon. For food security, these cropping systems should be centered on paddy with mustard, lentils, fruits and vegetable forming the periphery. Appropriate short duration varieties with high photosynthetic efficiency and pest / disease resistance capability should be developed for rice to suit the proposed cropping pattern. Combinations of crop cultivation and animal farming (fishery, livestock, poultry, silk worm breeding, and the like) also may be developed.

Farmers in Morigaon have not adopted scientific cropping patterns and modern farming techniques as they do not have access to knowledge, seeds and tools that are necessary for popularizing such scientific techniques. It is recorded that HYV seeds and fertilizer usage has been very low in the district. However, some blocks particularly within the district use high doses of fertilizers along with HYV seeds. Awareness on these practices should be raised through films, dissemination brochures, leaflets and on field training programmes. Local Community Resource Persons can be developed as trainers.

There is a need for a handholding in terms of contextualizing these methodologies to the local situation. In Assam, extension has been very slow and it is rarely that the Agriculture department works hand in hand with the farmers at the grassroots. The State Agriculture University should act as a bridge and help translate technologies and intervention to the communities.

Recommendations are found in various University journals. The Planning Commission and various other official Committees too have recommended the adoption of these scientific solutions (see, for example, the Jain Committee Report on Economic Development of Assam, and also the Shukla Commission Report on Transforming the North-East). However, this is yet to become a reality in far flung areas of the state.

## **6.2 BUILDING A BRIDGE BETWEEN AGRICULTURE DEPARTMENT AND FARMERS**

As 90% of the respondents reported that they do not have any linkage with the agriculture department and rarely did they receive any form of incentives such as HYV seeds, sprinklers, pumps, efforts should be made in bringing the agriculture department close to the grassroots. The agriculture department needs to play a much more pro active role in agriculture water management of the District.

Government offices are short staffed and due to a lack of human and other resources, they are not able to reach out to poor and marginal farmers. As a result of this the delivery it is very difficult for people to approach the agriculture department. Provision of Community Resource Persons (CRPS), who are trained by the Govt. departments and institutions, and then act as master trainers for the community can help in bridging this gap. This will also create a strong knowledge base within the community through intensive training in sustainable agricultural practices and biodiversity conservation. Both men and women should be recruited as CRPs and then provided exposure, technical skills and the necessary expertise which will enable them to carry forward the message of sustainable agriculture long after the intervention stops.

## **6.3 CONSERVATION OF RAIN WATER:**

This area, which faces intermittent floods and drought is a potential area for Conservation of rain water. In the areas surveyed there was no evidence of water shed projects though there is a IMWP Project in Bhurbondha development Block and Kapili development Block implemented by Agriculture Department under centrally sponsored scheme. The Resources Centre for Sustainable Development (RCDS) is also carrying out some watershed projects. More rainwater harvesting structures for recharging ground water will be advantageous in the area.

## **6.4 DEVELOPMENT OF NATURAL ECOSYSTEMS LIKE SWAMPS AND BEELS:**

Most of the agriculture in the area depends upon the wetlands which are available in plenty in the area. Many of these water bodies are, however choked due to siltation. Progressive choking up of swamps and beels must be stopped. Programmes are required to remove silt from the swamps or beels. The Govt agencies need to play a pro active role in this respect. This will help improve environment of our natural

heritage, create recreation sites and recharge ground water besides providing shelter to fish and birds.

#### **6.5 ADDRESSING GENDER GAP:**

Women in the area have informal means and mechanisms to obtain and secure access to water due to the abundance of rivers and wetlands in the area. Here, like in other parts of Assam, there has to be recognition of women's specific water needs, especially for production, as opposed to domestic consumption. There should be responsiveness to specific women's water needs and interests so that they play a visible role in efficiencies of water distribution.

Women also play a pivotal role in management of resources of household and community. Fuel and water supplies, backyard poultry, weaving, kitchen gardening and a lot of farm activities from planting to harvesting, drying, milling etc. are taken care of by women besides attending to their regular work of cooking, cleaning and looking after the family members. Women are left out of training programmes designed for successful environment management in Assam and they need the center of sustainable water management programmes.

#### **6.6 GOVERNANCE AND NEED FOR IMPLEMENTATION OF STATE WATER POLICY:**

The State Ground water policy, after intense consultations has been passed but not yet been implemented. There have been suggestions on having a regional water policy, including Sikkim and North Bengal instead of a state policy. It has also pointed out in various forums that it was imperative to take Bhutan and its rivers that flow down to the western part of Assam into account.

Concordant to the Policy for Integrated Management of ground water, a road map of activities in action research and strategies, which are acceptable to people, should be implemented. The causes and implications of the water induced hazards that the area has been relentlessly suffering for last five decades and search for possible solutions.

Flood management is a crucial aspect of governance, but besides temporary measures, very little action has been taken. State of the art science and technological innovations acceptable to the people are necessary. The policy should be based on

engagement with communities and stakeholders, for integrated management of flood, water bodies and river bank erosion.

#### **6.7 HOLISTIC INTERVENTION REQUIRED:**

The various institutions and departments involved such as the Public Health Engineering Department (PHED), irrigation, agriculture and the disaster management departments have to work in synergy for agriculture water management. They should synchronize their work instead of working as independent bodies. Only short-term policies are being followed to firefight the resulting hazards that may arise and experts need to converge on one policy. The area has local traditional ingenuity which has stood the test of time and this needs to be documented promoted.

#### **6.8 PARTICIPATORY MANAGEMENT POLICIES FOR GROUND WATER MANAGEMENT:**

The most important aspect of Ground Water Management would be to organize farmers for equitable and sustainable water management and maintenance and operation of irrigation and drainage systems.

A participatory approach may be adopted and community bodies such as SHGs, water user's groups, farmers groups should be given the management and maintenance of local water resources. In the past this was encouraged and water user's bodies had been working in this direction, but unfortunately most of them are defunct. Some investment in terms of training and infrastructure into these community collectives could infuse new life into them. Necessary legal and institutional changes could be made at various levels for this purpose. Water Users Associations and local bodies such as municipalities and *Gaon Panchayats* could particularly be involved progressively at appropriate levels with a view to eventually transferring the management of such facilities to the community

## CHAPTER 7: CONCLUSION

The overall picture presents that there is high demands of Agriculture water. Illiteracy is one of the main problems. The village survey findings reveal that the sample villages of the district suffer from serious problems of both drinking and agricultural water, lack of electrification, education, public health and other social sectors. From the productivity status, it is found there is low agricultural productivity resulting from basic problems like lack or insufficient irrigation facilities, flood and drought and farmers' ignorance. At the same time, it is seen that the government promoted development schemes like supply of seeds, fertilizers are not provided on timely and also equitably. In contrast, some villagers are found to be benefited by the govt.



Picture 2: Photo taken During FGD in Khulagaon- Nijorapar Village.

### **SOURCES OF INFORMATION**

- Morigaon (ii) [sinaiwmpassam.gov.in](http://sinaiwmpassam.gov.in)
- Assam state water policy [indiawaterportal.org](http://indiawaterportal.org)
- World Bank Report [.doc.nird.org.in](http://.doc.nird.org.in)
- Agrivision (2025)
- [Ecostatassam.nic.in](http://Ecostatassam.nic.in)
- Hydreology Assessment for Mayong and Bhurbandha Block, Morigaon Dist, Assam -RCSD 2011
- [Planning commission.nic.in](http://Planning commission.nic.in)
- Awm –training brochure (i) [saciwaters.org](http://saciwaters.org)
- Dynamic GW Resources 2009 – CGWB
- [Groundwater\\_governance-india2013.indiawaterportal.org](http://Groundwater_governance-india2013.indiawaterportal.org)
- Other sources from website

# Annexure-I

## Questionnaire for Survey

QUESTIONNAIRE for Study on AWM - case study on Morigaon District;

Question 1:

Put Tick(✓)

- a) Respondants Name
- b) Age
- c) Sex(M/F)
- d) Primary Occupation

Agriculture		Non-agriculture	
Cultivator	Marginal worker	Casual work	Service

- e). Household Size
- f). No. of regular income earners in your family?

Amount

- g). Daily wage earned by you?

- g). Have you undergone any formal education?

- h). If yes, level of education

Yes	No
Under matriculate	Matriculate
	12th Pass
	Graduate

**question 2: Extent of land ownership and operational land holdings based on per unit of local land:**

a). Is the land used for cultivation is owned land?

		Put tick(✓)	
		Yes	No
Below 2 bigha	Between 2 and 5 bighas		
	Above 5 bighas		

If yes, total area(in bigha) ?

Yes	No
Land leased in	Land leased out

b). Have you taken any land on lease?

If yes, land leased?

c). How is the amount paid for the leased land?

Income earned from crop sold	Amount taken on rent
Yes	No

d). Do you feel there have been climate change?

If yes, What has been its effect on you?

More rain	Increase Drought	More flood	More Dry spells	Shifting livelihood
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**question 3: Crop details**

a). Name of Crop

maize	Put tick(✓)			
	Pulses	Ginger	Potato	Mustard
				paddy
				Others
	Local			
		HV		

b). Source of seeds for crop plantation?

	Government	Public agencies	Private agencies
Good	Bad	Bad	Good
			Bad

c). Provision of Seeds by?

	Organic farming	IPM system	Application of Chemical fertilizers
	Chemical	Bio-fertilizer	
	Yes	No	

f). How crop cultivation is carried out?

	Weekly	Monthly	Often
	Yes	No	

g). What kind of fertilizers mainly used?

	Yes	No
--	-----	----

h). Do you apply pesticides?

	Yes	No
--	-----	----

i). If yes, to what extent Are you given any training regarding usage of chemical fertilizers?

	Yes	No
--	-----	----

j). Whether there is any crop loss?

	Yes	No
--	-----	----

If yes, what are the reasons?

Heavy rainfall	Drought	Flood	Scarcity of water	Soil Erosion
Maize	Paddy	Mustard	Potato	Pulses
		Yes	No	Others

k). Amount of income earned per crop?

	Increase	Decrease	Indifferent
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l). Are you aware of any government scheme for boosting crop yields?

If yes, what results you have seen in crop yields (last 3 years)

**Question 4: Irrigation Details**

a).Is irrigation water available for crop cultivation?

Put tick(✓)	
Yes	No

b). Source of Irrigation:

Canals	Tanks	Natural Springs	Rivers	Rain fed
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c).Device used for Irrigation

Yes	No
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If Yes, devices used are:

Low lift Pumps(No.)	Pump sets(No.)	Shallow Tube Wells(STW)(No.)
Government	Public agencies	Private Agencies
No contamination of Iron or fluoride   Contamination of Iron or Fluoride		

d). Irrigation devices obtained from:

e).Quality of Irrigation Water:

Yes	No

f). If contaminated , have you complained to the authority?

If Yes, Have any actions been taken so far?

g).Is rain water harvesting used for crop cultivation?

h). If no, do you feel its necessary to take up such method?

i). Are you aware of any government schemes provided for irrigation?

If Yes, What impact have you seen in crop yields under the schemes?

Increase in crop yields	Indifferent	Decrease in crop yields
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**Question 5: Accessibility to markets:**

a). Do you sell your produce in the market?

b) If Yes, where do you sell your produce?

c). What is the average market price you get for the price?

d). Do the price varies ?

e). What according to you the prices of the produced are varying? Comments:

f). What are your demands to the Government in this regard? Comments:

Local(Distance-km)	Put tick(✓)	
	Yes	No
Outside village(Distance-km)		
Amount(in Rs.)		
	Yes	No

**Question 6: Water and its availability :**

Put tick(✓)

River	Ponds	Wetlands	Beel	Marsh areas	Channels
Paddy	Mustard	Pulses	Vegetables	Cereals	

a). Sources of water:

b). Quantity of water used per crop cultivation:

c).Is drinking water available?

If yes, how is the quality of the water?

d). Is there any contamination in the water available?

If yes, water contaminated mainly with?

e) How is the provision of supply of water ?

f). Is there any river as a resource contributing to crop yields?

If yes, to what extent?

g).How does changes in the riverine courses affects the crop productivity?

h). Pisciculture has been an important sector in Morigaon, but fishes are affected due to water pollution, what according to you are the reasons for such polluted water?

i).What are your demands from the Government in this regard?Comments

Yes	No		
Clean and good	Impure		
Yes	No		
Iron	Fluoride	Other dirt	
Government	Natural springs	Hand pumps	Tube wells
Yes	No		
Largely	Not much	Indifferent	
Increase	Decrease	High variability	Indifferent
	Solid waste	Industrial waste	Chemical discharges from crop fields

Put Tick (✓)

Question 7: Details of the Following:

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Seed												
Plantation period												
Month of sowing												
Month of harvesting												
Variation of market prices of crops sold												
Frequency of Irrigation												
Period of Scarcity of water												
Changes observed in the riverine courses												

## ANNEXURE 2: FGD report

NAME OF VILLAGE	NUMBER OF FGD	NUMBER OF PARTICIPANTS	
		MALE	FEMALE
KONWARGAON	4	12	28
KHULAGAON-NIZARAPAR	1	0	10
BANKUKURAJAN	1	0	10
MONOHA, MONOHA-KACHARIGAON, MONOHA-NASATRA	4	48	72

TABLE FOR FOCAL GROUP DISCUSSION IN MORIGAON DISTRICT

### Summary of the FGD

Morigaon is comparatively a smaller district of Assam with slow in economic progress. Out of the total population of the focal group discussion (180) under study, 60 (33.33 per cent) are male and 120 (66.66 per cent) are female. As the survey reveals, more than 60 per cent of population in each of the communities are engaged in farming activities. 6 villages were selected namely **Konwargaon, Khulagaon-Nizarapar, Bankukurajan, Monoha, Monoha-kacharigaon and Monoha-nasatra** for FGD. The major issues of the above mentioned villages are as follows:

- Ground and surface water scarcity during winter season.
- Lack of proper drainage system.
- Flood problem.
- Lack of electrification.
- No govt. scheme provided.
- Lack of pure drinking water.
- Lack of irrigational system.
- In some places ground water extraction is not possible for the presence of rocky layer.
- One well is shared by 20-25 houses.
- No govt. scheme provided for AWM.
- Lack of surface water from November to April.
- Flood and Drought both are the major causes of destruction of crops.
- The amount of govt. water supply could not fulfil their daily need of drinking water.

- **Wetland cops**

Morigaon district of Brahmaputra valley of Assam with its tropical climate with moderate to heavy rainfall harbours many small to large wetlands where different types of wetland crops can be seen. These crops are economically important for the farmers. Main crops grown in the district are Mustard, Jute, Wheat, Paddy, and Vegetable. However paddy is the prime crop for the people. Climatic change like flood and drought has vast effect on agriculture. Every year crops are destroyed due to flood and drought. Due to drought the farmers can only able to cultivate *Boro Dhaan* (summer crop) and in the other seasons the crop fields remain unused.

- **Flood**

Morigaon district is highly affected by the flood. Flood is one of the most common problems found in villages visited. Flood is the major causes for agricultural deterioration. So far, flood waters have destroyed standing crops like rice in agricultural land. . Water recedes in 2-3 weeks which causes lack of time for Rabi crops. The first wave of floods starts from the month of May. During or after the flood, people related with agriculture fail to work in the field as flood caused great damage. As a result of which they need a alternate source of livelihood during those days. As Morigaon district is rich in wetland so fishing is one of the most preferable sources of livelihood for the people. They sell the fishes in the neighboring markets and earn money and manage their family. Both male and female went for the labor work as an alternate source of livelihood in case of flood damage. Besides, the cultivators also use cattle livestock.

- **Electricity**

The FGD and house to house survey (primary data) shows that most of villages are not been electrified yet. They have to depend upon other conventional sources of domestic lighting. It is also to note that severe power cuts and low voltage have been a common experience of the electrified villages. The sample data also reflect that due to unavailability of transformer which causes low voltage condition they are unable to run electric motor pump. Electric pump is a more cost effective method rather than diesel pump. Govt. provides shallow tube wells which farmers are unable to run, because these machines run

on diesel and costs more and consumes more oil too. They are unable to buy enough diesels to run these machines due to their poor financial condition.

- **Drinking Water**

The problem of safe drinking water is also found in certain areas of Morigaon district. Although the majority of the households have access to safe drinking water, water is impure. Availability and access to safe drinking water has been one of the most crucial factors for the villagers of the areas. The various sources of water supply facilities as reported by the respondents are well, tube well etc. However, some villages are found having the access to public water supply but not sufficient for them. Distribution of govt. drinking water supply facilities shows that 5-6 taps among 250 households which cannot fulfill their daily needs of water. Tube well is the main sources for drinking water but water is iron contaminated. Majority of people depends on their own drinking water facilities.

- **Ground water**

Ground water scarcity occurs during the months of November-April. During Rabi season, when most of the surface water dries up, the ground water is the only source of irrigation. The number of STWs is very low. Though the growth of irrigation based on the ground water availability has remained low.

- **Irrigation facility**

The survey establishes that 30% people use canal irrigation while 70% of the cultivators use shallow tube well irrigation. Most of the cultivators use pesticides/insecticides and chemical fertilizers. Morigaon district, being highly flood prone, is affected by three to four spells of flood every year. Availability of irrigation facilities is also very limited. Shortage of power supply and low voltage is another constraint affecting irrigation. Ground water development is mainly through STWs fitted with diesel engine pumps. In that area irrigation system is not available due to lack of irrigational water source. They depend only on boring system but they have to share the boring system among 40-50 farmers. In the month of March-April, dried off both ground and surface water which causes damage to agriculture.

- **Climate change**

Morigaon district suffers drought-like conditions due to climate change. The farmers suffer due to rainfall deficit from November which results low agricultural productivity. Transplanting and sowing of rice is severely hampered. In the absence of water source and an irrigation management plan, the area faces complete or partial crop loss. Besides heavy rainfall during monsoon season increases water level causing flood problem. Change in climate patterns negatively affects agricultural production. Flood problem delays new planting of crops. Irregular rainfall patterns also affect the crops specially rainfall sensitive crops like rice, mustard. Crops yields are down and farmers are replacing traditional crops with newer ones like summer rice (boro dhaan varieties).

- **Role of woman**

The survey reveals that woman of that area have 60%-70% contribution in agricultural field. From starting to end i, e. from sowing to harvesting woman do the all task. Even they are also related with plantation of seed. They feel woman could play a great role in agriculture.

- **Government infrastructure facilities**

It is seen that the government promoted development schemes like supply of seeds, fertilizers have not provided on time. In contrast, some villagers are found to the least benefited by the Govt. also supply drinking water but it is very limited to some area. The quality of water is not very good and contaminated.

## **CONCLUSION**

The overall picture presents that there is high demands of agricultural water. Illiteracy is one of the main problems. The survey data indicate that 60% people related with agriculture.

The village survey findings reveal that the sample villages of the district suffer from serious problems of both drinking and agricultural water, lack of electrification, education, public health and other social sectors. From the productivity status, it is found there is a low agricultural productivity resulted from a basic problem like lack or insufficient irrigation facilities, flood and drought and farmers' ignorance. At the same time, it is seen that the government promoted development schemes like supply of seeds, fertilizers have not provided on time. In contrast, some villagers are found to the least benefited by the govt.