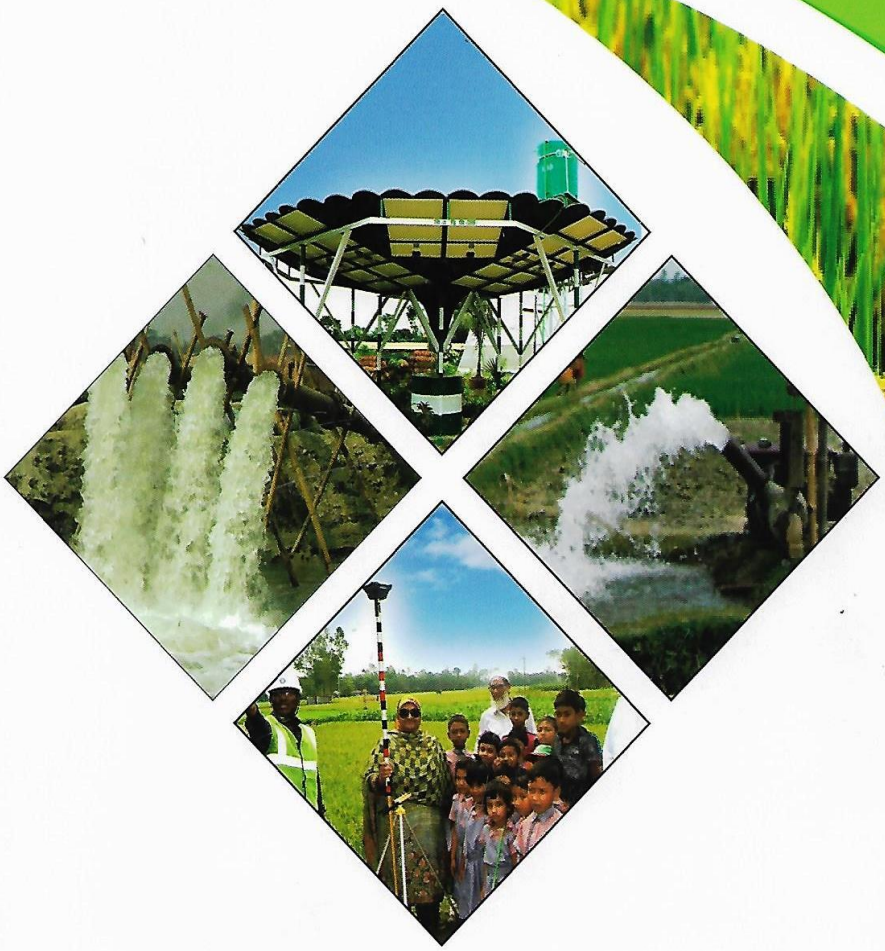
Government of the People's Republic of Bangladesh
Ministry of Agriculture

Minor Irrigation Survey Report 2017-18



Bangladesh Agricultural Development Corporation (BADC)

Digitalization of Survey and Monitoring for Development of Minor Irrigation Project

March-2019

Government of the People's Republic of Bangladesh
Ministry of Agriculture

Minor Irrigation Survey Report 2017-18

(*Rabi Season*)

Survey Conducted by

Bangladesh Agricultural Development Corporation (BADC)
Department of Agriculture Extension (DAE)
Barind Multipurpose Development Authority (BMDA)

Report Prepared by

BANGLADESH AGRICULTURAL DEVELOPMENT CORPORATION

Digitalization of Survey & Monitoring for Development of Minor Irrigation Project
22, Manikmia Avenue, Sher e Bangla Nagar
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January, 2019

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Copy Right	:	Digitalization of Survey and Monitoring for Development of Minor Irrigation Project, BADC.
Publisher	:	Project Director Digitalization of Survey and Monitoring for Development of Minor Irrigation Project 22, Manik Mia Avenue, Sher-e-Bangla Nagar BADC, Sech bhaban, Dhaka-1207.
Date of Publication	:	January, 2019
Price	:	Tk. 2000.00 Only.

FOREWORD

Bangladesh Agricultural Development Corporation (BADC) has been successfully working on collecting and monitoring the irrigation data and information since its inception. Primary data about operation and installation of irrigation equipment necessary for both planning and research work could be found from this report.

I am very glad to know that Digitalization of Survey and Monitoring for Development of Minor Irrigation Project of BADC is going to publish an informative report on survey of irrigation equipment, irrigated area and benefited farmers during the **Rabi** season **2017-18** as a part of the project's main routine work. I expect that the report would meet the requirement of some basic information on irrigation covered by low lift pumps, deep tube wells, shallow tube wells, artesian wells, manually operated pumps, traditional and by gravity flow.

I believe, the findings of the report will help the Government in formulation of policy and taking decisions for effective minor irrigation sub-sector which plays a key role in the production of agri-produces. I also hope that this report will furnish the planners, researchers and administrators necessary irrigation related data for effective planning in irrigation sub-sector.

I like to extend my thanks to my colleagues of Minor Irrigation Wing of BADC, BMDA and DAE who contributed in preparing and publication of the report.

(Md.Fazle Wahid Khondaker)
Chairman, BADC.

PREFACE

Digitalization of Survey and Monitoring for Development of Minor Irrigation Project is directly involved with collection of data regarding groundwater and surface water monitoring, survey of irrigation equipment & irrigated area, benefited farmers, groundwater level & irrigation water quality, irrigation costs etc. Main objective of this project is to generate reliable and adequate statistical data about minor irrigation development. So, Survey and Monitoring Project has been introduced to make the prevailing monitoring system more widened, consolidated, stronger and modernized as well as to provide technical support and cooperation to the users.

Minor irrigation survey has been being performed by three organizations jointly and the report is published on the basis of the information collected by BADC, BMDA and DAE since Rabi season 2004-05..

I believe that the findings of the report will help the Government in formulation of decisions for effective irrigation planning. I also hope that this report will furnish the planners, researchers and administrators necessary irrigation related data for effective planning in minor irrigation sub-sector.

I would like to extend my sincere thanks to all my colleagues both in the field and at project office for their efforts to publish the report. I am especially grateful to Mr. Debesh Chakrabarti, Deputy Director, DAE, Md. Moniruzzaman Monir, Executive Engineer, BMDA for their sincere efforts in composing this report.

I am very much grateful to Chief Engineers of irrigation wingand also Member Director (MI), BADC for their valuable suggestions for preparing and publication of this report.

Special thanks to Mr. Md. Fazle Wahid Khondaker, Chairman, BADC, Amitava Das, Director General DAE and Md. Abdur Rashid, Executive Director, BMDA for their participation and valuable suggestions to make this effort successful.

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and
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BADC.

LIST OF ACRONYMS

Agril.	-	Agricultural
ATIA	-	Agricultural Institutions Technical Assistance
BADC	-	Bangladesh Agricultural Development Corporation
BMDA	-	Barind Multipurpose Development Authority
BPDB	-	Bangladesh Power Development Board
BRDB	-	Bangladesh Rural Development Board
BWDB	-	Bangladesh Water Development Board
DAE	-	Department of Agriculture Extension
DTW	-	Deep Tube Well
EPADC	-	East Pakistan Agricultural Development Corporation
FY	-	Financial Year
GIS	-	Geographical Information System
HYV	-	High Yielding Variety
ha	-	Hectare
IDA	-	International Development Agency
KSS	-	Krishak Somabay Samity
LGED	-	Local Government Engineering Department
LLP		Low Lift Pump
PVC	-	Polyvinyl Chloride
REB	-	Rural Electrification Board
STW	-	Shallow Tube Well

SUMMARY OF SURVEY REPORT 2017-18

The key objective of this report was the survey on current agricultural practices by irrigation in **Rabi** season. In 2017-18 Irrigation Season total irrigated area is **5556614** hectares of which **4081041 (73.44%)** hectares are through utilization of groundwater and **1475573 (26.56%)** hectares through utilization of surface water. Currently, Net Cultivable Area in Bangladesh is about 8585207 ha where Total Irrigated Area is **5556614** ha, which is about **64.72%** of Net Cultivable Area. Increased groundwater accessibility resulting from the expansion of deep and shallow tube wells helped Bangladesh to attain near self-sufficiency in rice. Available evidence suggests that the policy focus so far has been largely on “resource development”, and not on “resource management”. This has resulted in serious problems, most notably excessive drawdown (declined static water level) in intensively irrigated areas and the deterioration of groundwater quality. Increasing energy prices are also threatening the sustainability of irrigation in Bangladesh.

The forefront challenge, therefore, is to take the necessary corrective measures before the problem becomes either insolvable or too costly to remediate. So, attention must be given to the development and management of surface water resources to lessen pressure on groundwater. In addition to supply-side solutions, water demand will also need to be curtailed by increasing water use efficiency through the adoption of water conserving management practices, for example reduced tillage and raised bed planting, improve irrigation water management technology and the right choice of appropriate crops. Decreasing water availability both in terms of quantity and quality suggested that the unchecked expansion of dry season **boro** rice cultivation is probably not a long-term option for Bangladesh. Therefore cropping patterns need to be rationalized considering water availability and the sustainability of aquifers.

In the absence of proper institutional arrangements, evaluation of strategic options and monitoring national policies implementation for the public water sector will remain a challenge. At present, seven different agencies are responsible for the management of groundwater resources. In addition to technical solutions, needs a strong linkages and improved communications between different organizations involved in the management of groundwater resources. This report has prepared on the basis of the data/information collected through the survey conducted by three organizations BADC, DAE and BMDA in the **Rabi** season of **2017-18**. The survey has been conducted on **Boro, Wheat, Potato, Maize, Fruits and Vegetables** which has been irrigated by minor irrigation equipment.

KEY MESSAGES

1. In the year 2017-18; 37,538 Deep Tube Wells, 13,55,852 Shallow Tube Wells and 1,81,469 Low Lift Pumps are operated in Bangladesh to provide water for minor irrigation. About 73.44% of the total cultivated area is irrigated by groundwater and the remaining 26.56% area is irrigated by surface water.

2. About 15,74,859 Nos. of irrigation equipment's are used in irrigation season of which 78.59% equipment's are operated by diesel engines and about 21.41% operated by electricity. Despite subsidies on electricity, diesel pumps are preferred by farmers due to low capital cost and mobility ease within small and fragmented farm lands.

3. Improving water use efficiencies through the adoption of resource conserving crop management practices such as alternate wetting and drying (AWD), direct-seeded rice, and bed planting could help in reducing groundwater demand for agriculture. Fixed-irrigation rates, non-availability of water on needed schedules, and lack of technical understanding are the major constraints in the wide scale adoption of AWD in Bangladesh.

4. Groundwater demand for irrigation can also be reduced by rationalizing cropping patterns. Decreasing water availability both in terms of quantity and quality suggest that the unchecked expansion of dry season rice cultivation is probably not a long-term option for Bangladesh.

5. For sustainable groundwater resource management, integrate water users, investments in development water resources and agricultural technologies, irrigation charge by developing pre-paid meter system or crop specific pricing.

6. Facilitate markets for non-rice crops, promotion of alternative cropping patterns, and extra support for farmers making transition to less water demanding crops is needed.

OBJECTIVES OF THE SURVEY

Bangladesh is one of the largest deltaic countries in the world. It has limited fertile agricultural land in relation to its population. There is abundant water in rainy season but limited water in Rabi Season (January to April) when plenty of water is needed for irrigation purpose. Irrigation is the life blood for increasing agricultural production. In Bangladesh minor irrigation plays the vital role to expand irrigated area, increase food production and thereby to help insuring food security of the country. For the formulation of economic policy and plan for agricultural development, adequate and reliable statistical data about the number & types of irrigation equipment (both diesel and electric), irrigated area, benefited farmers are very much essential.

The main objectives of this report are to survey and monitor the minor irrigation equipment operated for irrigation by utilizing diesel and electricity, area of land are irrigated through utilization of surface water & groundwater and farmers are benefited in **Rabi** season.

The primary objective of the minor irrigation survey **2017-18** is to gather a better knowledge about minor irrigation facilities and to know the present trend and status of minor irrigation system all over the country.

The detail objectives of the minor irrigation survey **2017-18** are outlined as follows:

- To assess the present trend and status of minor irrigation system;
- To assess the present status of diesel & electric driven minor irrigation equipment in terms of numbers & types such as Deep Tube Well, Low Lift Pump & Shallow Tube Well separately and thereby to help estimating the future requirement of diesel and electricity during the next **Rabi** Season;
- To assess the irrigated area through utilization of surface water and groundwater and the irrigated area (command area) per equipment;
- To find out the incremental utilization of irrigation facilities; irrigated area and benefited farmers;
- To furnish the planner, researchers and administrators necessary irrigation related data for effective planning in irrigation sub-sector;

- To help the Government in formulation of decisions for effective minor irrigation planning which plays a key role in the production of food grains and thereby to help ensuring the food security of the country;
- To develop skill of the officers and staff of survey and monitoring project through training on irrigation survey, preparing survey procedures and methodologies for the purpose of collecting adequate and accurate data on minor irrigation.

INTRODUCTION

For proper utilization of valuable water in irrigation, it is necessary to collect related in formations regarding irrigation systems from the field, prepare data base, GIS maps & report for future use. Necessity of irrigation related information increases day by day for demand based planning in irrigation sub-sector to enhance irrigated area for ensuring sustainable food grain production in the country.

Minor irrigation consists of mechanized, semi-mechanized and non-mechanized systems of irrigation. Low lift pumps, shallow tube wells and deep tube wells are under mechanized irrigation system; manually operated pumps such as hand tube wells, treadle pumps, artesian wells etc, and gravity flow systems are under semi-mechanized irrigation system. Traditional systems such as doans, swing baskets etc come under non-mechanized irrigation systems.

BADC started irrigation activities through utilization of 1555 nos. of Low lift pumps. Later on in 1967-68, Deep Tube Wells were installed for irrigation purposes where surface water was not available. Similarly in 1973-74 Shallow Tube wells were installed for the same purposes. Besides these methods, irrigation activities in some area of the country are performed through Manual & Artesian Well, Traditional Method, and Gravity Flow Method. The summary of irrigation through utilization of surface and groundwater by different modes is shown in **Table-1**.

Table-1: Summary of Surface water and Groundwater Irrigation by Different Modes during Rabi Season 2017-18

Sl. No.	Mode of irrigation	No. of Equipment	Area Irrigated (ha)	% of Surface water	% of Total Irrigated Area (ha)	Area Irrigated per Equipment (ha)
A.	Surface water Irrigation by:					
1	Low lift pump	181469	1220879	82.74	21.97	6.72
2	Gravity flow		241925	16.39	4.35	
3	Traditional method		12769	0.87	0.23	
Sub Total		181469	1475573	100.00	26.56	
B.	Groundwater Irrigation by:			% of Ground water		
1	Deep tube well	37538	1072539	26.28	19.30	28.57
2	Shallow tube well	1355852	2981646	73.06	53.66	2.19
3	Manual & Artesian well		26856	0.66	0.48	
Sub Total		1393390	4081041	100.00	73.44	
GRAND TOTAL		1574859	5556614		100.00	

From Table-1, it is revealed that during the **Rabi** season **2017–2018**, total **1574859** numbers of irrigation equipment's are used for irrigation in the country which is **2.34%** lower than that of **2016-17 Rabi** season in which **1612613** nos. of irrigation equipment's were operated. On the other hand, irrigated area was **5556614** hectares in **Rabi** season **2017–2018** which is **0.53 %** higher than that of **2016–2017 Rabi** season irrigated area was **5527266** hectares. Out of total **5556614** hectares irrigated area**, 5275064** hectares irrigated by DTW, STW & LLP and **281550** hectares irrigated by Manual/Artesian well, traditional method and gravity flow. Out of total **5556614** hectares irrigated area **4081041** hectares through utilization of groundwater i.e. **73.44%** of total irrigated area and **1475573** hectares through utilization of surface water i.e. **26.56%** of total irrigated area. The historical development of different types of irrigation equipment's in Bangladesh is shown in **Figure-1.**

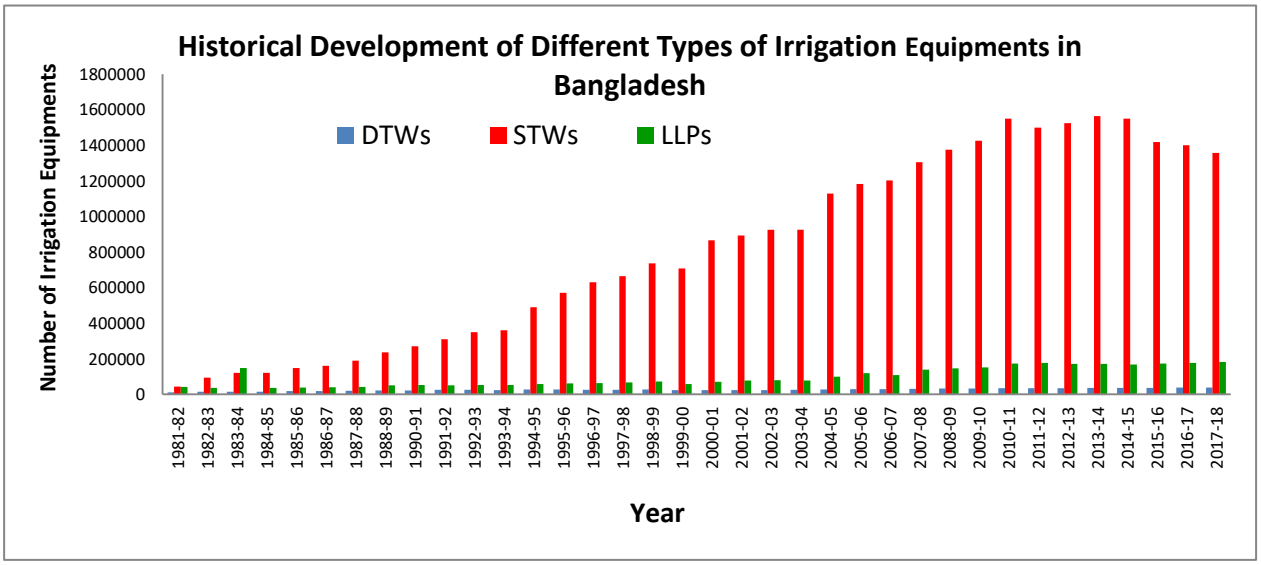

Figure 1: Historical Development of Different Types of Pumps in Bangladesh

With the introduction of high yielding rice varieties in 1980-90s that responded favorably to irrigation and fertilizer, and which are suitable for boro rice, demand for reliable irrigation. Since aquifer conditions were favorable in most parts of the Teesta, Brahmaputra-Jamuna and Ganges river floodplain, the attention was diverted to the development of groundwater resources. The installation of deep tube wells (DTWs) started in the late 1960s, but gained momentum in late 1980s. Within 1992, about 25,500 DTWs were installed throughout the country by BADC. Currently, 37538 DTWs are working in Bangladesh to provide water for irrigation purposes.

The expansion of DTWs was followed by the development of Shallow Tube Wells (STWs) with discharge capacities of 10-20 lit/ sec. However, despite visible benefits of groundwater irrigation, STWs were not initially adopted due to restrictions on tube well spacing and embargo on the import of all types of diesel engines. After devastating floods of 1988 and subsequent cyclones in the early 1990s it is realizing that the need for agricultural machinery to kick-off

farming economies back into action. The government lifted all restrictions and embargos on the import of irrigation equipment. Consequently, local markets were flooded with inexpensive and easy to operate irrigation pumps and small engines (<12 HP), mainly imported from India and China.

The groundwater and surface water irrigated area are shown in **Figure-2.**

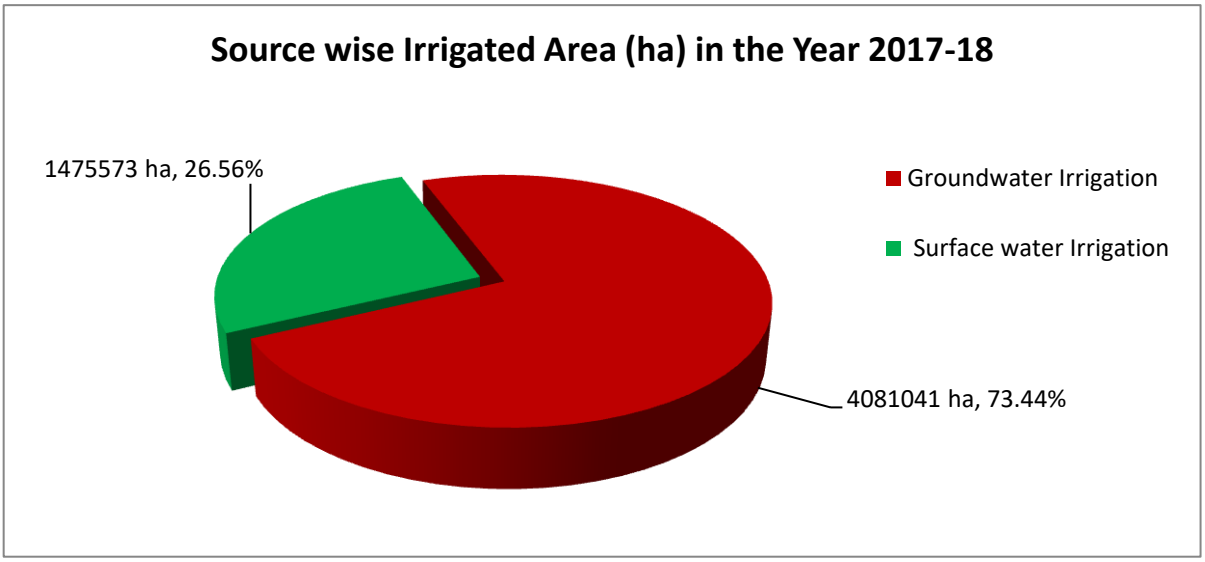

Figure 2: Irrigated Area (ha) of Surface water & Groundwater during Rabi Season 2017-18

Distribution of irrigation equipment's (DTW, STW, LLP) used during **Rabi** season **2017-18** are shown in the **Table-2** and graphical presentation shown in **Figure 3.**

Table-2: Division wise distribution of irrigation equipment's (DTW, STW, LLP) used during Rabi Season 2017-18

Name of Division	Nos. of Irrigation equipment's in the Year 2017-18		
	DTW	STW	LLP
Dhaka	3244	186280	21351
Mymensingh	4376	155778	11287
Rajshahi	16501	279420	10035
Rangpur	7677	391645	2124
Chittagong	2395	57741	41074
Khulna	3153	262406	35902
Sylhet	191	22543	42107
Barisal	1	39	17589
Total	**37538**	**1355852**	**181469**

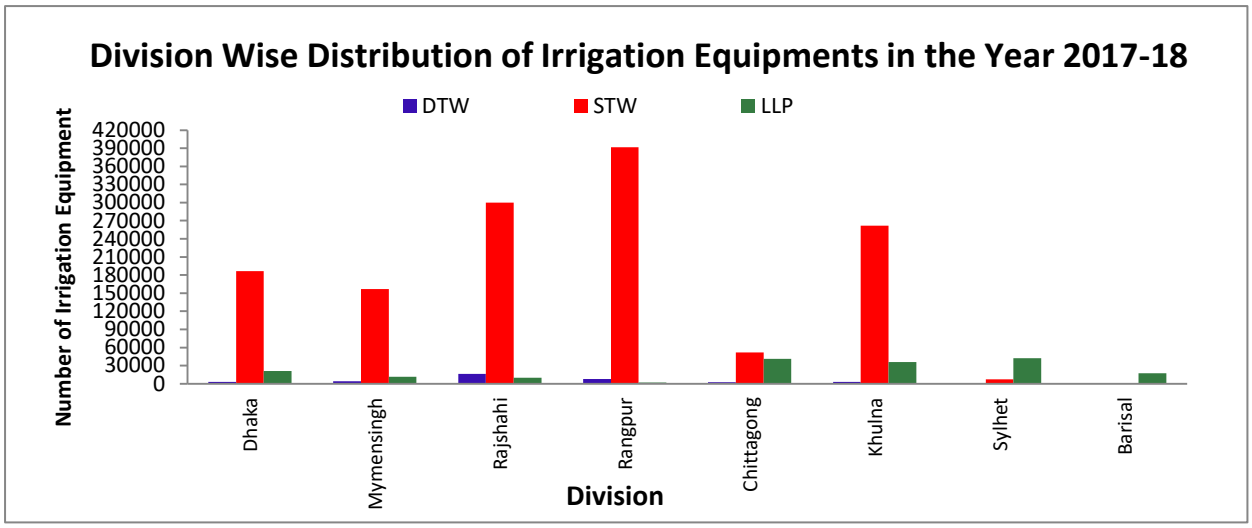

Figure 3: Division wise Distribution of Irrigation Equipment's in the Year 2017-18

Table-3: Division wise distribution of Total Irrigated Area (ha) during Rabi Season 2017-18

Name of Division	Irrigation Year 2017-18	
	Irrigated Area (ha)	% of total area
Dhaka	729934	13.14%
Mymensingh	580616	10.45%
Rajshahi	1172251	21.10%
Rangpur	1035248	18.63%
Chittagong	642593	11.56%
Khulna	745229	13.41%
Sylhet	474656	8.54%
Barisal	176087	3.17%
Total	**5556614**	**100.00**

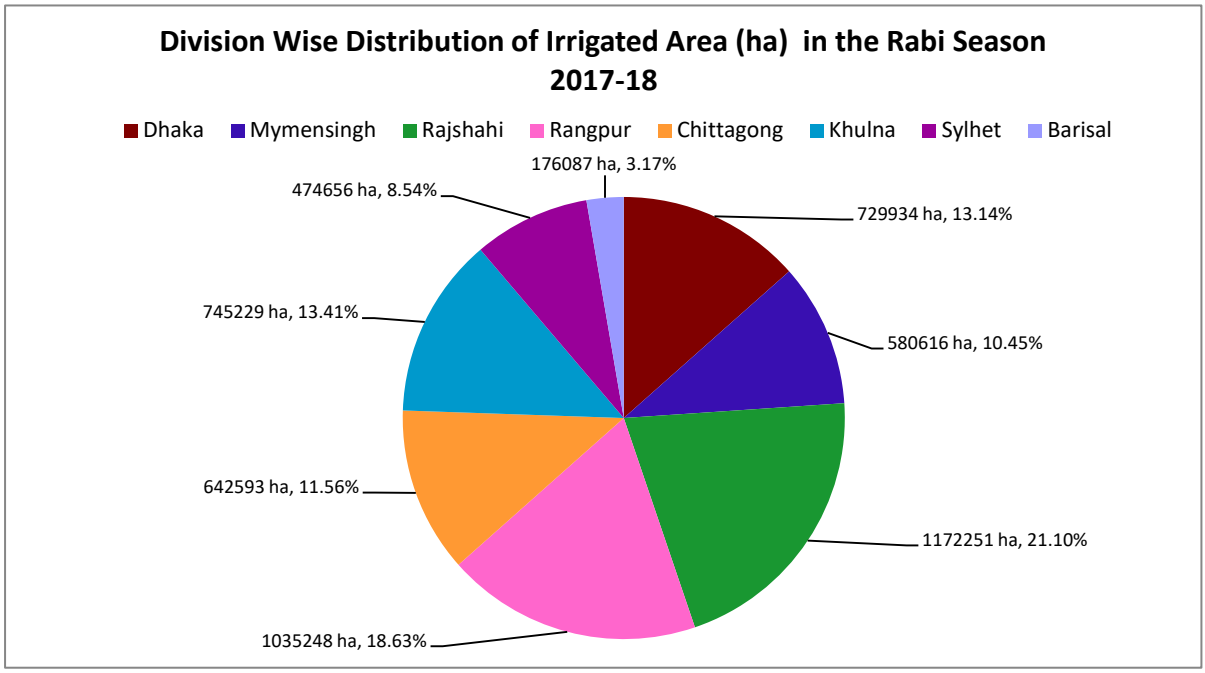

Figure 4: Division wise Distribution of Irrigated Area (ha) in Rabi Season 2017-18

GROUNDWATER IRRIGATION

Figure 5: Electrically Operated Deep Tube Well and Buried Pipe Line.

Figure 6: Deep Tube Well Operating System and Discharge Box

Figure 7: Diesel Operated STW

Figure 8: Solar Operated Dug Well, Jessore.

Figure 9: 5 Cusec capacities LLP in Sunamganj Sadar Upazila, Sunamganj.

SURFACE WATER IRRIGATION

Figure 10: Chellakhali Rubber Dam, Nalitabari, Sherpur.

Figure 11: Michhakhali Rubber Dam, Bishambhampur, Sunamganj.

Figure 12: Intake Point Sluice Gate, B. Baria

Figure 13: Submerged Weir, B. Baria

Figure 14: CC Channel of Rampal Upazila

Figure 15: Bergobindopur Khal, Jessore

Figure 16: Low Lift Pump, Shariotpur

Figure 17: Floating Pump, Sunamgonj

Figure 18: Don

Figure 19: Swing Basket