



LOCAL GOVERNMENT  
ENGINEERING DEPARTMENT

**VOLUME III**

# SURVEY REPORTS (DRAFT 2)

REVIEW & UPDATE OF NAWABGANJ UPAZILA  
DEVELOPMENT PLAN (MASTER PLAN) UNDER  
UTMIDP, LGED

**VOL III: WORKING PAPERS**

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## EXECUTIVE SUMMARY

### Working Papers

#### CONTEXT OF THE PROJECT

The main objective of this master plan project is to review and update the master plan of Nawabganj Upazila under UTMIDP/UMPR-2. Nawabganj Upazila, which had been prepared by the Urban Development Directorate (UDD) earlier Upazila administration, has been recognized as the most important administration level according to the government's recent administrative restructuring policy. The main objective of the preparation of the master plan is to assess and improve the quality of all social, economic, administrative, and infrastructure services of the upazila. Review and update of the Nawabganj Upazila Master Plan is a recent initiative of the Local Government Engineering Department (LGED), which is being prepared by Sheltech (Pvt.) Ltd. and Sheltech Consultants (Pvt.) Ltd. The current Survey Report (Draft 2) has been prepared in persuasion of Part B (Survey Studies) of the Terms of Reference of Review & Update of Nawabganj Upazila Development Plan (Master Plan). The second draft report, submitted following the first draft in March and a data-sharing workshop on April 2024 at Nawabganj Upazila Complex with local stakeholders, incorporates revised data obtained through field checks, as directed by the ToR and inception report.



#### Major Phases of the Project

#### REPORT STRUCTURE AND CONTENT

Survey Reports	
Volume I	Report on Engineering and Land/ Space Use Survey, Geotechnical and Seismological Survey, and Hydrographic Survey
Volume II	Report on Socio-Economic Survey, Economic Activity Survey, and Traffic and Transportation Surveys
Volume III	Working Paper on Population, Heritage, Recreation and Open Space, Health Facility, Education Facility, Agriculture including fisheries, livestock and forestry, Bio-diversity Including flora and fauna, Hazard and disaster, Public health, disease control and wellbeing, Environment, Legal and Institutional Framework for implementation of the project output
Volume IV	Community Engagement (PRA and KII related) Report

#### SCOPE OF WORK

The scope of the Survey Report is as follows:

- To collect all the information as indicated in the ToR for the Project Area.
- This report also includes preparing a detailed survey inventory, processing and analyzing survey data, and presenting them through mapping and reporting are also a part of this report. These data include the physical features, topography, land use, hydrographic,

geotechnical and seismologic, environmental, socio-economic, economic, and transportation situations of the project area. Stereo (3D) Satellite Image-based advanced technology has been used for the project area's topographic, physical features, and land use surveys.

- Collection of different utility networks like drainage lines (stormwater), sewerage networks, gas supply networks, water supply networks, and electricity networks from respective agencies;
- Conducting stakeholder consultation meetings with Local People/Leaders/Representatives/Communities to involve them in the process of plan preparation through Participatory Rapid Appraisal (PRA) and incorporate the knowledge and opinions of local/community people in formulating planning proposals.

**Table: Administrative Units of Nawabganj Upazila**

Local Government Area Type	Units
<b>District</b>	Dhaka
<b>Upazila</b>	Nawabganj
<b>Union</b>	Agla, Bakshanagar, Bandura, Barraha, Baruakhali, Churain, Galimpur, Jantrail, Joykrishnapur, Kailail, Kolakopa, Nayansree, Shikari Para, Sholla

**Introduction:** This volume aims to provide essential insights into each topic, thereby assisting in the formulation of pertinent aspects of the planning process. The selection of these issues has been carefully curated to align with the client's priorities.

Working paper serves as an initial draft outlining the current situation, its parameters, and a plan for future work. It can be utilized as a reference for background research and as a source of ideas and information during the preparation of a master plan for an Upazila. The working paper volume encompasses the nine key areas, encompasses population; heritage, open space; recreation, and tourism; health facilities, public health, disease control, and wellbeing; education facilities; agriculture, fisheries, livestock, and forestry; biodiversity, including flora, fauna, and environment; hazards and disasters; and legal and institutional framework for implementing the upazila master plan.

**Population:** The demographic landscape of Nawabganj Upazila, as of the 2022 census, shows a stable population of 348,786, with a population density of 1424.779 individuals per square kilometer. Nawabganj Upazila has a stable demographic structure, with a balanced gender distribution of 1,62,232 males and 1,86,554 females, resulting in a sex ratio of 87 males per 100 females. This stable demographic has implications for socioeconomic planning and development, suggesting a steady demand for essential services like healthcare, education, and infrastructure.

**Age Sex Structure/Composition:** The population exhibits a balanced age group distribution, with a notable concentration in the 30-49 age range. Females dominate the 20-24 age group at 60.93%, while males comprise 54.90% in the 75-79 age group, indicating distinct patterns in life expectancy and migration. The sex ratios fluctuate across age groups, showing higher male representation in younger cohorts, while older age groups, particularly those aged 55-59 and above, have a higher female population.

**Ethnic Structure:** Nawabganj Upazila predominantly consists of a Muslim population totaling 252,820 individuals, making them the majority community in the region. The Hindu community is the second largest group, with 61,087 members, while the Christian population stands at 4,877.

Kailail, Nayansree, and Bandura showcase significant religious diversity, featuring substantial Hindu populations alongside Muslims. In contrast, unions such as Agla and Galimpur display minimal representation of non-Muslim religious groups.

**Population with Disabilities/Special Needs:** The total population of Nawabganj Upazila shows a relatively low percentage of individuals with disabilities, with 1.4% affected across all categories. Among the individual unions, Nayansree has the highest percentage of individuals with disabilities, whereas Kalakopa, Churain, and Bakshanagar exhibit the lowest percentages.

**Growth Rate:** Nawabganj Upazila's population growth rate is a key indicator of demographic change and socio-economic development. From 2001-2011, it was 3.84% and 3.48%, indicating a declining trend in population growth within Nawabganj Upazila during this period. While the growth rate remains relatively low compared to Bangladesh and Dhaka, a slight increase in the growth rate from 2011 to 2022 can be observed after experiencing a dip from 2001 to 2011. This suggests a potential stabilization or modest resurgence in population growth within Nawabganj Upazila in recent years, albeit at a slower pace compared to the national and city-level trends.

**Migration Scenario:** The lack of economic activity in rural-urban environments drives poor job seekers to migrate to larger cities, driven by poverty and unemployment. The population census does not include migration information, making population prediction challenging.

**Population Projection:** The population projection for Nawabganj Upazila employs a comprehensive methodology using historical census data from the Bangladesh Bureau of Statistics (BBS) and natural rate change statistics from UNData, calculating intermediary population figures through geometric growth methods and accounting for migration trends. The analysis considers various scenarios for future growth, with Scenario 2 projected to yield a population of 523,439 by 2044, reflecting a sustainable growth rate of 1.86%. This projection is underpinned by rigorous historical data analysis, migration trend assumptions, and methodological robustness, indicating a balanced and feasible approach for future urban planning and resource allocation.

**Heritage:** Nawabganj Upazila boasts a rich historical and cultural heritage, with numerous old buildings and sites, but faces critical challenges. An inventory of heritage sites was compiled through a questionnaire survey, highlighting significant locations such as Afaz Uddin Shah Shrine, Boktar Nagar Zamidar Bari, and various churches and historical residences. While some sites, like Boktar Nagar Zamidar Bari, have historical significance dating back over 300 years, they are in poor condition, with many facing neglect and lack of maintenance. Key locations, including the residences of notable figures like the poet Kaykobad, are at risk of destruction due to abandonment. Furthermore, accessibility issues due to inadequate roads hinder the promotion of these sites as tourist attractions. Despite their cultural richness, many heritage sites remain underutilized and require urgent attention to prevent further decay and to enhance their potential as heritage tourism destinations.

**Open Space and Recreation:** The working paper assesses the existing scenario of recreation and open space in Nawabganj Upazila, highlighting critical issues based on a physical feature survey and stakeholder consultations. The survey identified various recreation and open space sites, including playgrounds, parks, and heritage landmarks, with a total of 338 recreational facilities distributed across different unions. Key findings indicate a significant number of public playgrounds (288), though many are underutilized and lack adequate facilities for diverse activities such as basketball, football, and cricket. Residents have expressed concerns about the insufficient recreational options, indicating a pressing need for improved infrastructure and amenities. Notable recreational events and potential sites, like the Snap Melon Bazar, were also

recognized for their impact on the community. Reviewing environmental rules and regulations for recreational facilities in Nawabganj Upazila examines local and higher-level planning policies, including the Sustainable Development Goals, the Dhaka Strategic Plan (2016-2035), and environmental conservation acts. Key issues identified include creating green spaces, restoring damaged lands, conserving river channels and wetlands, and protecting open spaces and water bodies from unauthorized use.

**Health Facilities, Public Health, Disease Control, And Wellbeing:** Nawabganj Upazila, located near Dhaka, serves a population of 348,786 through a diverse healthcare system comprising 10 hospitals, one Upazila Health Complex, 58 Community Clinics, and 13 Union Health and Family Welfare Centers. Despite this robust public infrastructure, residents express dissatisfaction with service quality, leading many to seek private care, although it often comes at a higher cost. The Upazila Health Complex, established in 1976, has 50 beds and a limited number of medical personnel, contributing to challenges such as inadequate medical equipment, a low doctor-patient ratio, and accessibility issues for remote areas. The healthcare landscape is characterized by high pediatric demand and a significant reliance on community clinics. At the same time, private facilities, primarily located in Kolakopa, are perceived as less reliable, prompting patients with severe conditions to travel to Dhaka for better treatment.

Public perception reveals a lack of sufficient pharmacies, diagnostic centers, maternal and child health centers, and immunization centers in the Upazila, along with the absence of a drug addiction rehabilitation center. Residents emphasize the need for improved healthcare infrastructure, highlighting concerns over safe drinking water and unhygienic sanitation practices. The community prioritizes access to arsenic-free water and acknowledges poor sanitation as a significant issue.

**Education facilities:** Education is crucial for personal and social development. It promotes social and economic mobility, reduces poverty, and creates opportunities for personal growth. It also plays a critical role in building a knowledgeable citizenry and promoting social cohesion. Nawabganj Upazila in Bangladesh has an average literacy rate of 79.27%. It has seven colleges, 45 secondary schools, 139 primary schools, and 76 madrasas. Primary schools follow the government's curriculum, while secondary schools have more advanced infrastructure. Positively, there is at least one primary school in every union, an increasing number of school-going children, and satisfactory results in public exams, indicating a growing emphasis on education. However, significant challenges persist, including poor infrastructure, insufficient playgrounds, a low teacher-to-student ratio in some schools, and a lack of basic facilities needing financial support. The socio-economic survey shows a diverse educational landscape, with most individuals having completed primary education but some remaining uneducated, highlighting the need for literacy and skill development initiatives. Youth-focused participatory rural appraisals (PRAs) reveal declining interest in higher education, particularly among male students, due to financial burdens and a preference for employment abroad. Female students are more interested in higher education, though early marriages pose barriers. Overall, there is a clear need for improved educational infrastructure, including public libraries, vocational institutions, and training centers, to enhance educational opportunities for all residents.

**Agriculture, Fisheries, Livestock, and Forestry:** Agriculture is the backbone of Nawabganj's economy, supporting the livelihoods of the majority of its population. The region's demographic profile reveals a population engaged predominantly in agricultural activities, with approximately 95% of individuals aged 15 and above involved in the sector, primarily male labor. The total land area of Nawabganj Upazila is 17,827 hectares, comprising various land types, with medium-low land occupying the largest area. The area's soil is well-suited for agriculture, featuring sandy loam and clay types that support diverse cropping patterns. Major crops cultivated include rice, jute,

vegetables, and fruits, with Boro rice and oilseed occupying the largest cultivated land areas. The agricultural sector operates on single, double, and triple cropping systems, with significant production during the Rabi and Kharif seasons. The total food crop production in Nawabganj exceeds local demand, resulting in a food surplus, underscoring the region's vital role in the national economy. Nawabganj Upazila's agricultural landscape is characterized by a blend of traditional practices and a shift towards modern technologies, with a high reliance on tractors (96% usage) and groundwater for irrigation (74.6% from deep tube wells). Despite a considerable area of cultivated land (9,060.11 hectares) and a cropping intensity of 132%, challenges abound. Environmental issues, such as declining irrigation canal functionality, persistent waterlogging, and declining soil fertility from multiple crop cycles, threaten productivity. Socioeconomic pressures, driven by urbanization and small landholdings, further hinder agricultural viability, while inadequate infrastructure, storage facilities, and marketing challenges exacerbate the situation. Farmers also face climate vulnerabilities, with increasing risks from pests, drought, and waterlogging. Inappropriate agricultural practices, including unbalanced fertilizer use and reliance on low-quality seeds, contribute to declining yields. Labor availability has become a concern, with a growing dependence on migrant workers, particularly women. Addressing these multifaceted challenges requires collaborative efforts from policymakers, agricultural experts, and local communities to foster sustainable agricultural development in the region.

In Nawabganj Upazila, Bangladesh, the inland water fisheries encompass both open and closed water systems, providing a significant source of animal protein and income for local communities. The region features diverse aquatic resources, including 1,824 ponds, non-government seed production farms, and a single fish sanctuary. However, fish production falls short of annual demand, indicating a need for enhanced aquaculture practices. Traditional fish farming methods dominate, with limited use of semi-intensive techniques, leading to low production levels. Farmers face numerous challenges, including fish health issues, high production costs, poor market management, and environmental pollution. The government's water policy aims to support fisheries development by preserving natural water channels and promoting fish migration, aligning with the region's potential for sustainable aquaculture and economic growth. Nonetheless, critical issues such as a lack of fish hatcheries, inadequate infrastructure, and climate vulnerabilities persist, hindering the sector's progress.

The livestock and poultry subsector is a vital component of agriculture with significant potential for poverty reduction and job creation, particularly among marginalized groups such as landless individuals, unemployed youth, and destitute women. According to Upazila Livestock Office, farmers of this region have 10485 goats, 1286 sheep, 37 Buffalos, 1252 Quails, 565527 Hen, 35225 Ducks, 715 Turkeys, and 33222 Pigeons. However, this sector faces challenges due to unfavorable climatic and topographic conditions, limited pasture availability, and water shortages. Despite these hurdles, livestock farming is increasingly recognized as a crucial income source, with many farmers engaged in small to medium-scale operations. Livestock products, primarily dairy and meat, are mainly sold in local markets, often facilitated by intermediaries. Most farmers lack sufficient knowledge of effective feeding strategies and veterinary care, which impacts animal health and productivity. Critical issues such as inadequate grazing land, low feed efficiency, and insufficient animal health services hinder sector development. Additionally, the impacts of climate change, including heat stress and extreme weather events, pose significant risks to livestock and poultry health, highlighting the need for improved management strategies and support systems.

**Bio-Diversity Including Flora and Fauna:** Nawabganj is home to a wide range of terrestrial and aquatic fauna, including notable species such as the threatened Brahminy Kite. The ecological landscape of Nawabganj Upazila is categorized into several distinct environments: crop fields, homestead areas, roadside vegetation, and wetland ecosystems. The agricultural sector is characterized by the cultivation of various crops, including paddy and vegetables, particularly during the monsoon season. Homestead vegetation features diverse tree species, which not only

provide shelter for local wildlife but also contribute to the region's agricultural economy. Roadside vegetation consists primarily of deliberately planted species and a range of herbs and shrubs, while river and canal sides support local flora that serves as habitats for insects, reptiles, and small mammals.

Aquatic ecosystems play a pivotal role in supporting biodiversity, with the wetlands of Nawabganj Upazila serving as vital habitats for a diverse range of aquatic species. The working paper notes the presence of both perennial and seasonal wetlands, which are rich in aquatic flora, including submerged species like Tape grass and free-floating plants such as Water hyacinth and Water cabbage. The wetlands contribute essential nutrients to the ecosystem and support a variety of aquatic plant communities, underscoring the interconnectedness of terrestrial and aquatic environments.

**Hazard and Disaster:** Nawabganj Upazila is highly vulnerable to various natural hazards, including riverbank erosion, earthquakes, arsenic contamination, cyclones, flooding, thunderstorms, and fire hazards. Riverbank erosion, influenced by climate change and human activities, has resulted in significant land loss along the Padma and Ichamoti rivers, while the seismic activity in the area poses risks of moderate earthquakes, with recent tremors measuring up to 5.50 in magnitude. Arsenic in drinking water remains a public health crisis, necessitating comprehensive intervention strategies. Cyclones can cause severe weather effects, and flooding risks vary across the region. Thunderstorms lead to numerous lightning-related fatalities, prompting governmental declarations of thunderstorms as natural disasters. Additionally, fire hazards are exacerbated by inadequate safety measures and non-compliance with regulations, highlighting the urgent need for improved fire safety standards and community preparedness across the upazila. Drought is a significant natural hazard in Bangladesh, particularly during the dry season from November to May, affecting agriculture and livelihoods, with current conditions categorized as moderate drought. Waterlogging is another issue caused by excess water in low-lying areas, disrupting urban life and agricultural production, mainly due to inadequate drainage systems. Wetland loss, often exacerbated by urbanization, threatens biodiversity and ecological balance, although Nawabganj Upazila has seen an increase in wetland areas over the past 30 years. Road accidents remain a critical concern, with a marked increase in fatalities and injuries in 2022, primarily attributed to reckless driving and poor infrastructure. The civil disorder has emerged due to political tensions and land disputes, yet Nawabganj has remained largely unaffected by the recent unrest. Although terrorism incidents have decreased, the threat remains, necessitating comprehensive countermeasures. Cybersecurity has gained importance with rising internet use, highlighting the need for robust protective measures against cyberattacks. Additionally, the increasing prevalence of smartphone addiction among the youth poses a public health challenge, underscoring the need for awareness and intervention strategies.

**Environment:** Data from Nawabganj Upazila indicates a gradual rise in average temperatures, with an increase of 1.4°C over two decades, while average precipitation has declined by 74.55 mm during the same period. The area's geology consists of alluvial deposits from the Ganges, Meghna, and Brahmaputra rivers, divided into three main structural units. The soil is characterized by a complex mix of calcareous sandy and clay alluvium, with significant variations across the region, predominantly comprising calcareous dark grey floodplain soils and non-calcareous grey floodplain soils, vital for agricultural planning and land use. The topsoil texture in Nawabganj Upazila is predominantly mixed silty clay and silty clay loam, covering 26.42% of the area. The engineering soil characteristics reveal three types: medium-dense, loose to medium-dense, and loose or soft soil, each affecting construction stability and foundation design. The Upazila is divided into four agroecological zones, including fertile floodplains that support various crops but are also vulnerable to flooding, as seen in past events in 1998, 2004, and 2007, and more recently in 2020, affecting over 71,000 people. Groundwater quality is generally good,

with chloride levels below standards and fluoride levels undetectable, while surface water shows pH values within acceptable limits. However, air quality monitoring indicates particulate matter and nitrogen dioxide exceed WHO guidelines, and noise levels are within permissible limits. Lastly, sanitation coverage stands at approximately 91.95%, with variations across unions highlighting the importance of access to sanitary facilities for public health.

**Carbon Footprint Assessment:** This research's carbon footprint assessment methodology involved collecting spatial and attribute data from Landsat imagery and field surveys. The field survey utilized questionnaires to gather information on citizen consumption across various categories, including food, goods, shelter, mobility, and services. Land Use and Land Cover data were derived from satellite images classified using supervised techniques, identifying elements such as built-up areas, vegetation, cropland, waterbodies, and barren soil. A "bottom-up" component-based approach was used to derive footprint values, assessing ecological impacts through pre-calculated environmental footprint estimates tailored to the region. Emission calculations were made using formulas incorporating total consumption, carbon emission factors, sequestration rates, and equivalency factors, with detailed tables outlining the carbon emission coefficients for different consumption categories, including food, goods, and services, providing a comprehensive framework for evaluating carbon footprints.

**Bio Capacity Assessment:** The biocapacity (BC) assessment evaluates an environment's ability to produce biological materials and absorb waste, including CO<sub>2</sub> emissions, utilizing various land types such as farmland, forests, water bodies, and developed areas. The formula for calculating biocapacity incorporates the area of different land cover types, yield factors, and equivalency factors, with specified values for each type. In contrast, an ecological deficit occurs when a population's ecological footprint exceeds the region's biocapacity.

**Ecological Deficit:** The ecological deficit is calculated by subtracting the ecological footprint of consumption from the biocapacity. Additionally, the ecosystem service value (ESV) assessment quantifies the value of ecosystem services derived from land use and cover classifications, employing a formula that multiplies land area by specific ESV coefficients for different land types. These coefficients reflect the economic value of services such as climate regulation, food production, gas regulation, and biodiversity, providing a comprehensive overview of the ecological and economic dynamics of the environment.

**Legal and Institutional Framework for Implementation of the Upazila Master Plan:** Governmental policies, laws, and regulations influence the creation and implementation of a master plan, particularly one for an urban region, both directly and indirectly. Before beginning the preparation of a master plan for Nawabganj Upazila, it is critical to evaluate the relevant policies, rules, and regulations. Master plans serve as blueprints for long-term development, guiding everything from infrastructure projects to land use. To ensure their effectiveness, they rely on a strong foundation of legal and institutional frameworks. Laws establish the mandate for creating master plans, defining the responsible agencies and their powers. This legal backing legitimizes the plan and strengthens its enforcement. Relevant parts of the documents are shown below.

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## **VOLUME III: WORKING PAPER**

### **CHAPTER ONE: INTRODUCTION**

#### **1.1 Introductory**

This is the third volume of the survey report. This volume contains a series of working papers covering a large number of issues of local interest. These working papers are designed to unveil the facts about the issues concerned. Each issue has been carefully chosen by the client so that they can assist in formulation of the concerned part of the planning. The working paper volume in total contains 11 issues, these are given below:

- Population
- Heritage
- Recreation and Open Space
- Health Facility
- Education Facility
- Agriculture including Fishery, Livestock and Forestry
- Biodiversity including Flora and Fauna
- Hazard and Disaster
- Public Health, Disease Control and Wellbeing
- Environment
- Legal and Institutional Framework for Implementation of the Project Output.

All the above working papers bear the testimony of unveiling overall picture of the upazila with respect to the most important issues concerned. The papers have researched in depth into the issues to expose the real picture that would greatly assist in drawing up the development proposals under the master plan.

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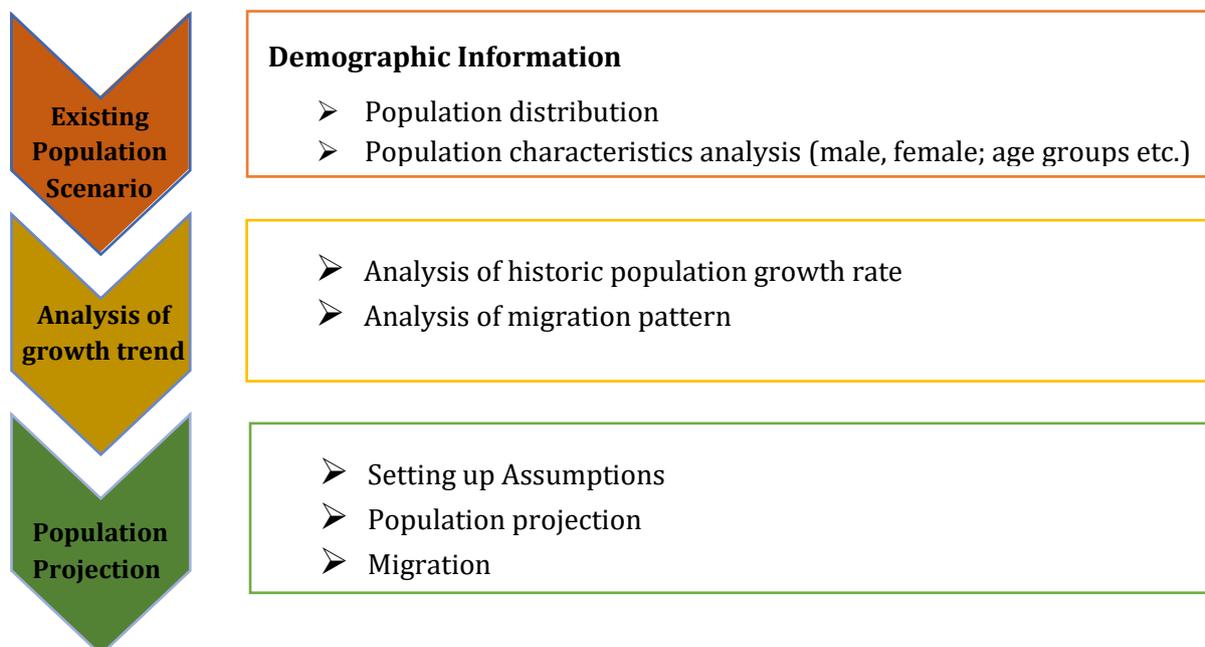
## CHAPTER TWO: POPULATION

### 2.1 Introduction

The term "population" is frequently used to describe the total number of people living in a certain area. Population is one of the many issues that must be addressed before beginning any planning initiative. Population is the complete set group of individuals; it can be a nation or a group of people with a common characteristic. To estimate the number of people who live within a particular area, government conduct population census.

In ordinary usage, a population is a particular group of people who share citizenship, identity, or traits. In statistics, population is a sample taken at random from a larger group of individuals who share one or more traits. In planning, the method of modifying a population's pace of growth is known as human population planning. Human population management has traditionally been used to slow down the rate of population expansion. While population control techniques may enhance people's lives by allowing them more reproductive autonomy.

This working paper provides an overview of the state of demography and related concerns in the Nawabganj Upazila, followed by policy recommendations for density management, job creation, and improving the impoverished community's life. To prepare this study report, the district and community series volumes of the censuses of 2021, 2011, 2001, and 1991 and valid data on migratory patterns, demographic structure, and other factors relevant to this study have been consulted. Any shift in the way from the census reports from 2001, 2011, or 2021 have also been examined. Both an aggregate level time series analysis and a disaggregate level cohort survival approach was used to project the population. However, assumptions about the survival and fertility rates at the monthly national level was employed for disaggregate predictions.



## 2.2 Objectives of the Working Paper on Population

A working paper on population aims to analyze demographic data, evaluate existing policies, and project future trends. It covers birth rates, death rates, migration, and age structure while assessing the effectiveness of current policies and proposing adjustments. The document also explores the impact of demographic changes on health, migration, economics, social cohesion, and environmental sustainability. Through international comparisons and public awareness efforts, the paper seeks to inform decision-makers and guide the development of holistic policies addressing the complexities of population dynamics.

The key objectives of this working paper are outlined below:

- i. To assess the existing scenario of the Current Population including growth, distribution and density of Nawabganj upazila
- ii. To evaluate Land Use Patterns and Spatial Distribution for Future Development
- iii. To forecast population Growth and projection and Demographic Changes up to next 20 years
- iv. To develop recommendations for sustainable urbanization and socio-economic progress

## 2.3 Existing Scenario of the Current Population

According to BBS, the population of the whole Nawabganj Upazila is increased from decade to decade (from 2001 to 2011). Also, the ward wise population under the Nawabganj Upazila is increased in that decade.

### 2.3.1 Upazila in National and Regional Context

The population of the entire Dhaka Zilla witnessed a substantial increase from 2001 to 2011, growing from 85,11,228 to 1,20,43,977.

In Nawabganj Upazila during the same period (2001 to 2011), there was a substantial decrease in the annual growth rate, a notable reduction in average household size, and a significant increase in population density from 1212 to 1302 individuals per square kilometer.

#### 2.3.1.1 Population Size

In 2001, Bangladesh had a population of approximately 123.1 million, with Dhaka and Nawabganj having 8,575,533 and 296,605 individuals respectively. By 2011, Bangladesh's population increased to around 144.0 million, with Dhaka and Nawabganj seeing significant growth to 12.04 million and 318,811 residents respectively. By 2022, Bangladesh's population further rose to approximately 165.2 million, with Dhaka and Nawabganj's populations increasing to 14,734,701 and 348,786 individuals respectively. Population size at the upazila through the year 2011 -

Table 2-1: BBS population

	BBS Population		
	2001	2011	2022
<b>Bangladesh</b>	12,31,51,246	144,043,697	165,158,616
<b>Dhaka</b>	8575533	1,20,43,977	14,734,701
<b>Nawabganj</b>	296605	318811	348786

### 2.3.1.2 Density

Over the same period, the average household size in Dhaka Zilla decreased from 4.66 to 4.21, whereas the national household size was 4.44. This trend was mirrored in Nawabganj Upazila, where household size decreased from 5.05 to 4.47. In 2001, Bangladesh had a population density of 834 people per square kilometer, which increased to 976 in 2011 and further to 1119 by 2022. Dhaka, the capital city, experienced significant population density growth, rising from 5831 people per square kilometer in 2001 to 8229 in 2011 and reaching 10,067.43 by 2022. Similarly, Nawabganj saw an increase in population density from 1212 in 2001 to 1302 in 2011, and further to 1424.779 by 2022. These figures reflect the intensifying demographic pressures in urban areas.

Table 2-2: Location wise population

	Population Density		
	2001	2011	2022
Bangladesh	834	976	1119
Dhaka	5831	8229	10,067.43
Nawabganj	1212	1302	1424.779

### 2.3.1.3 Growth Rate

The district's annual growth rate declined from 3.84% in 2001 to 3.48% in 2011, in contrast to the national growth rate of 1.47%. Similarly, the annual growth rate in the Upazila also notably decreased from 0.97% to 0.71%.

A consistent decline is seen in growth rates for Bangladesh and Dhaka from 2001 to 2022, indicating a slowing population growth trend. Regional disparities are evident, with Dhaka consistently exhibiting higher growth rates compared to Nawabganj, which experiences fluctuating rates. Nawabganj maintains relatively stable growth patterns throughout the period, possibly influenced by factors such as agricultural activities and limited urbanization.

Table 2-3: Growth Rate

	Growth Rate		
	2001	2011	2022
Bangladesh	1.48	1.37	1.22
Dhaka	3.84	3.48	3.13
Nawabganj	0.97	0.71	0.92

## 2.3.2 Existing Demographic Characteristics of The Upazila

### 2.3.2.1 Population and Spatial distribution

Union populations from 2001 to 2011 indicates a general increase in total population across all Unions. While females outnumber males slightly in most Unions, gender ratios remain relatively stable over the decade.

**Table 2-4: Population and Spatial Distribution**

Union Name	2001		1.	2011		
	Male	Female	Total	Male	Female	Total
Agla	7863	8257	16120	8102	9012	17114
Kalakopa	10778	10015	20793	11133	11613	22746
Kailail	13415	12700	26115	13051	14154	27205
Galimpur	5713	6063	11776	6024	6920	12944
Churain	10494	10902	21396	10896	12375	23271
Joykrishnapur	7727	8759	16486	7496	9157	16653
Nayansree	12061	13370	25431	12049	14720	26769
Bakshanagar	8976	9464	18440	9668	10791	20459
Baruakhali	6499	7021	13520	7557	8758	16315
Barrah	11433	12077	23510	12138	13579	25717
Bandura	14662	14871	29533	14028	16001	30029
Jantrail	11072	11273	22345	10996	12768	23764
Shikaripara	7743	8599	16342	8057	9567	17624
Sholla	17112	17686	34798	18103	20098	38201

The trend in the population from 2001 to 2011 shows a consistent increase across all Unions, indicating overall population growth over the decade. While there are variations in the rate of growth among different Unions, the general pattern is one of expansion. Additionally, the gender distribution remains relatively stable, with females slightly outnumbering males in most Unions throughout the period. Overall, the trend suggests ongoing demographic changes and potential socio-economic factors influencing population dynamics within each Union.

### 2.3.2.2 Age Sex Structure/Composition

The following table displays the age distribution for each union, categorized into different age groups (in years). Each row represents a union, while columns correspond to specific age groups ranging from 0-4 years to 65+ years. The numerical values in the chart represent the percentage of the population within each union falling into each age group category.

**Table 2-5: Percentage distribution of population by age group, residence and community**

Union Name	Age Groups (in years)									
	0-4	5-9	10-14	15-19	20-24	25-29	30-49	50-59	60-64	65+
Agla	9.4	10.8	11.5	9.1	9.2	9.0	25.1	6.6	3.1	6.3
Kalakopa	9.5	10.9	10.6	8.6	9.5	10.2	26.7	6.3	2.8	5
Kailail	10.4	11.8	11.4	8.1	9	8.9	24	6.6	3.4	6.5
Galimpur	9.3	11.4	11.5	8.6	9.4	9.2	25.4	6.3	2.9	6
Churain	9.4	11.4	11.5	8.9	9.2	9.4	23.9	6.5	3.4	6.5
Joykrishnapur	10.4	11.4	10.8	8.5	8.2	8.2	22.3	8.2	4.3	7.8
Nayansree	9.7	10.2	10.8	9	8.9	9.1	24.3	7.6	3.6	7
Bakshanagar	9.4	10.4	10.9	8.9	9.7	9.4	25	7.1	3.2	6.1
Baruakhali	10.1	11.0	11.2	9.3	9.7	9.4	22.5	6.9	3.2	6.8

Barrah	10.1	10.7	11.5	9	9.4	8.7	24	7.2	3.2	6.1
Bandura	9.2	10.7	10.9	9.1	9.6	9.2	24.8	7	3.4	6.1
Jantrail	9.5	11.4	11.1	9.1	9.2	9.2	24.0	6.9	3.3	6.3
Shikaripara	10.1	11.2	11.4	8.9	8.8	9.0	23.3	7.5	3.5	6.3
Sholla	10	11.6	11.4	8.7	9	8.7	23.6	6.9	3.4	6.8

The female percentage is highest in the age group of 20-24, with females accounting for 60.93% of the population within that age bracket. On the other hand, the male percentage is highest in the age group of 75-79, where males constitute 54.90% of the population. These observations highlight distinct demographic patterns within the population, reflecting potential differences in life expectancy, migration patterns, or cultural factors affecting the composition of specific age groups.

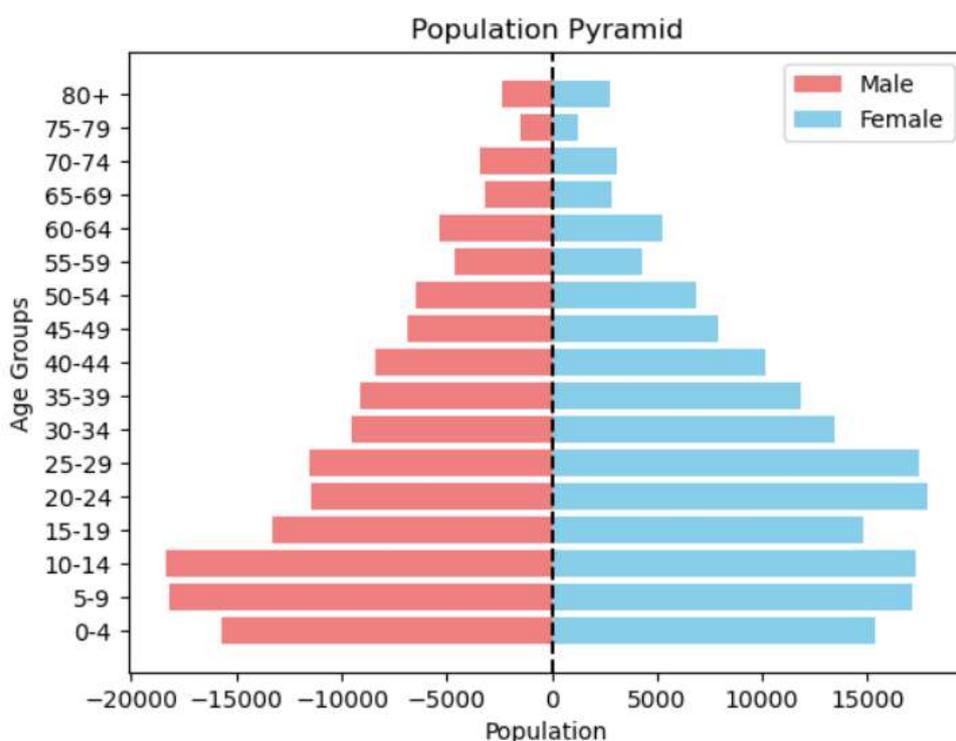


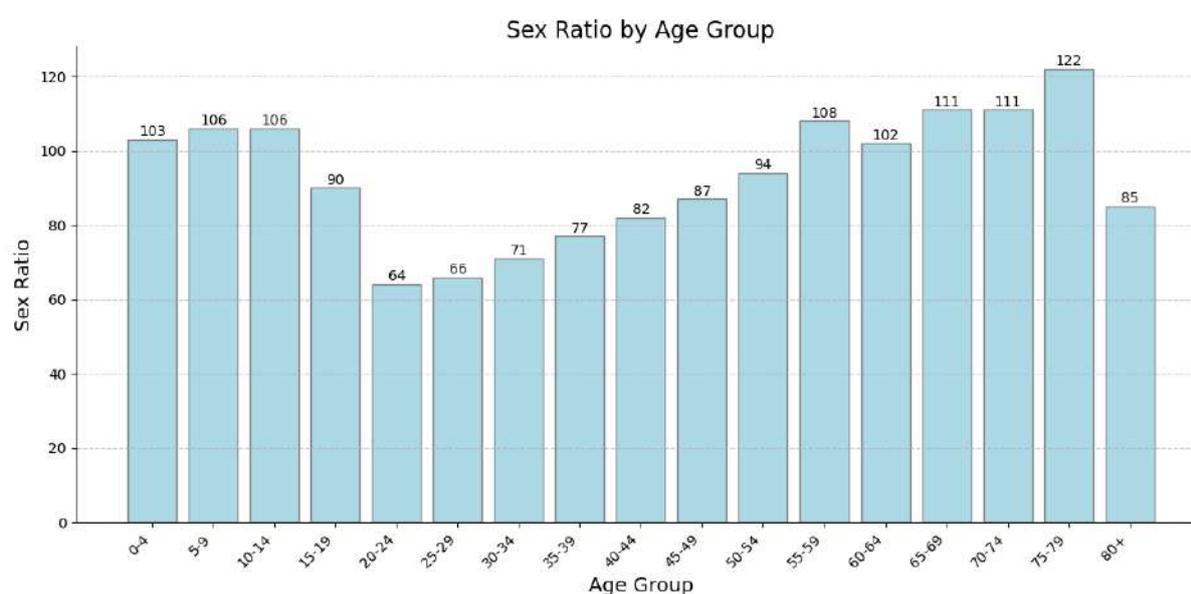
Figure 2-1: Population Pyramid

Table 2-6 : Population by Age Group, Sex, Sex Ratio

Age Group	Male		Female		Sex Ratio
	Number	Percent	Number	Percent	
0-4	15733	50.63	15339	49.37	103
5-9	18166	51.47	17129	48.53	106
10-14	18336	51.51	17259	48.49	106
15-19	13320	47.32	14826	52.68	90
20-24	11456	39.07	17868	60.93	64
25-29	11496	39.67	17485	60.33	66
30-34	9547	41.56	13422	58.44	71

35-39	9142	43.59	11832	56.41	77
40-44	8365	45.19	10144	54.81	82
45-49	6845	46.52	7868	53.48	87
50-54	6463	48.45	6876	51.55	94
55-59	4606	51.95	4261	48.05	108
60-64	5375	50.51	5266	49.49	102
65-69	3202	52.66	2878	47.34	111
70-74	3397	52.65	3055	47.35	111
75-79	1495	54.90	1228	45.10	122
80+	2354	45.88	2777	54.12	85

The age sex composition of Nawabganj Upazila in 2011.



**Figure 2-2: Age Sex Ratio**

Sex Ratio is highest 75-79 age cohort in Nawabganj Upazila.

The trend in sex ratios across age groups displays fluctuations and disparities within the population. With some age categories consistently showing a slightly higher proportion of males, such as '5-9', '10-14', and '50-54', with sex ratios around or slightly above 100. Notably, younger age groups ('0-4', '15-19', '20-24', '25-29', and '30-34') exhibit lower sex ratios, indicating a higher proportion of females, possibly influenced by demographic shifts or cultural dynamics. Conversely, certain age ranges, like '55-59' and '60-64', display higher female populations, possibly due to factors such as longevity or migration patterns. These variations in sex ratios have implications for age dependency ratios and social-economic planning, highlighting the dynamic interplay of demographic factors in shaping population dynamics.

### **2.3.2.3 Ethnic Structure**

The Muslim community is the majority in Nawabganj Upazila with a population size of 252820 and the 2<sup>nd</sup> highest is the Hindu community with 61087 number but there is no Buddhist in the region.

The population of Nawabganj Upazila is primarily Muslim with a population size of 252820. The Hindu community is the second largest with 61087 individuals and the Christian holds 4,877 numbers, while the Buddhist community is nonexistent in the region.

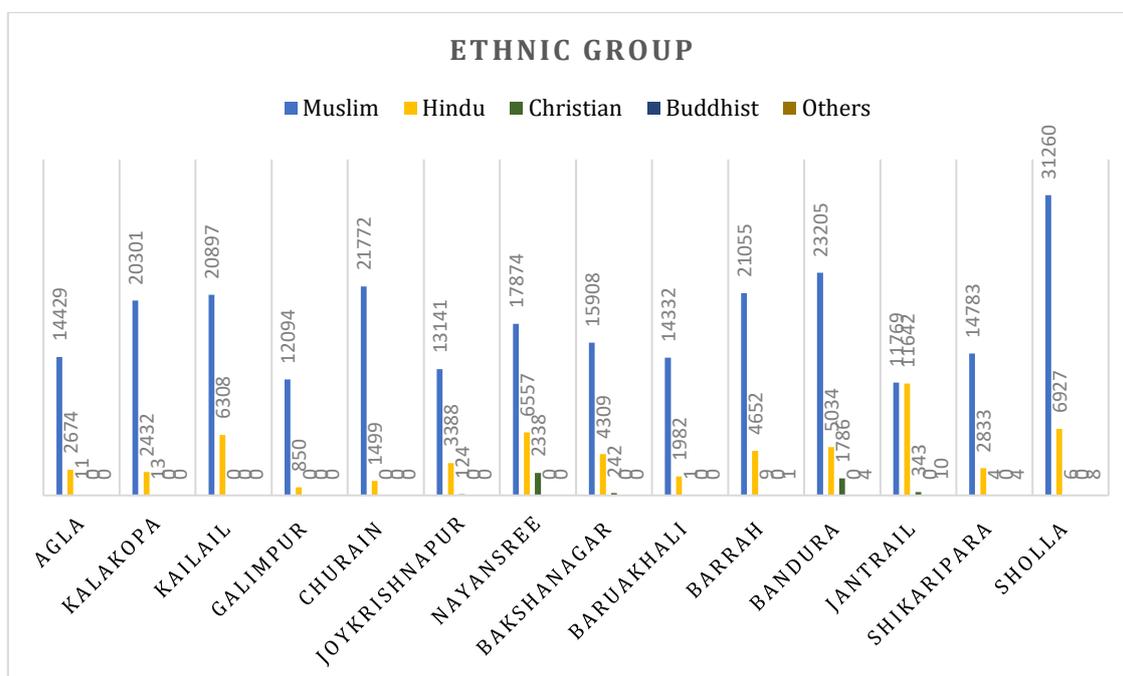


Figure 2-3: Ethnic Group

Table 2-7: Population based on Religion

Union Name	Total	Muslim	Hindu	Christian	Buddhist	Others
Agla	17114	14429	2674	11	0	0
Kalakopa	22746	20301	2432	13	0	0
Kailail	27205	20897	6308	0	0	0
Galimpur	12944	12094	850	0	0	0
Churain	23271	21772	1499	0	0	0
Joykrishnapur	16653	13141	3388	124	0	0
Nayansree	26769	17874	6557	2338	0	0
Bakshanagar	20459	15908	4309	242	0	0
Baruakhali	16315	14332	1982	1	0	0
Barrah	25717	21055	4652	9	0	1
Bandura	30029	23205	5034	1786	0	4
Jantrail	23764	11769	11642	343	0	10
Shikaripara	17624	14783	2833	4	0	4
Sholla	38201	31260	6927	6	0	8

Most unions exhibit a predominantly Muslim population, with varying proportions of Hindus and small numbers of Christians and individuals belonging to other religious groups. Unions like Kailail, Nayansree, and Bandura demonstrate significant diversity in religious composition, with sizable Hindu populations alongside Muslims. Conversely, unions such as Agla and Galimpur have negligible populations of non-Muslim religious groups.

### 2.3.2.4 Slum Population

Kalakopa has the highest slum population in the Nawabganj Upazila.

Table 2-8: Floating Population

Union Name	Floating population
Agla	0
Kalakopa	239
Kailail	8
Galimpur	0
Churain	0
Joykrishnapur	0
Nayansree	1
Bakshanagar	1
Baruakhali	58
Barrah	28
Bandura	41
Jantrail	0
Shikaripara	0
Sholla	6

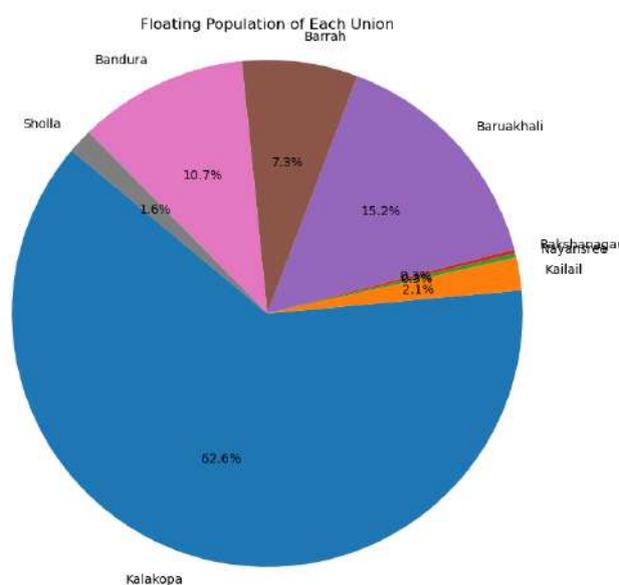


Figure 2-4: Floating population

Some unions, such as Agla, Galimpur, Churain, Joykrishnapur, Jantrail, Shikaripara, have zero floating population, indicating no temporary residents in those areas. Conversely, unions like Kalakopa, Kailail, Nayansree, Bakshanagar, Baruakhali, Barrah, Bandura, and Sholla have non-zero floating populations, with varying counts ranging from 1 to 239. These figures offer insights into the transient demographic patterns across different unions within the area.

### 2.3.2.5 Population with Disabilities/Special Needs

The highest disability rate overall is observed in Nayansree Union within the upazila. In terms of disability across all aspects, Nayansree has the highest percentage, while Kalakopa, Churain, and Bakshanagar Union have the lowest percentages.

Table 2-9: Percentage distribution of population by type of disability, residence and community

Administrative Unit	Total Population	Percentage of Type of Disability						
		All	Speech	Vision	Hearing	Physical	Mental	Autistic
Nawabganj Upazila Total	318811	1.4	.2	.3	.1	.5	.2	.1
Agla Union	17114	2.3	.2	.6	.1	1	.2	.1
Kalakopa Union	22746	.9	.1	.1	0	.3	.1	.1
Kailail Union	27205	2.1	.3	.5	.2	.7	.3	.1
Galimpur Union	12944	1	.1	.2	.1	.4	.2	0

Churain Union	23271	.9	.1	.1	.1	.4	.2	0
Joykrishnapur Union	16653	1.6	.2	.2	.2	.7	.2	.1
Nayansree Union	26769	2.4	.2	.9	.2	.8	.2	.1
Bakshanagar Union	20,459	.9	.2	.1	.1	.3	.1	.1
Baruakhali Union	16315	1.4	.2	.3	.1	.5	.2	.1
Barrah Union	25717	1.8	.2	.5	.2	.6	.2	.1
Bandura Union	30029	1	.2	.1	.1	.3	.2	.1
Jantrail Union	23764	1	.2	.1	.1	.3	.3	.1
Shikaripara Union	17624	1.4	.2	.1	.1	.7	.3	0
Sholla Union	38201	1.2	.2	.2	.1	.5	.2	.1

The Nawabganj Upazila Total has a relatively low percentage of individuals with disabilities across all categories, with speech and physical disabilities being the most prevalent. Among the individual unions, Nayansree Union stands out with the highest percentage of individuals with disabilities, particularly in the categories of speech, vision, and physical disabilities. Conversely, some unions like Kalakopa and Galimpur have lower percentages of disability prevalence across most categories. Overall, there appears to be variability in the prevalence of disabilities across different administrative units, suggesting potential differences in healthcare access, socioeconomic factors, or population demographics.

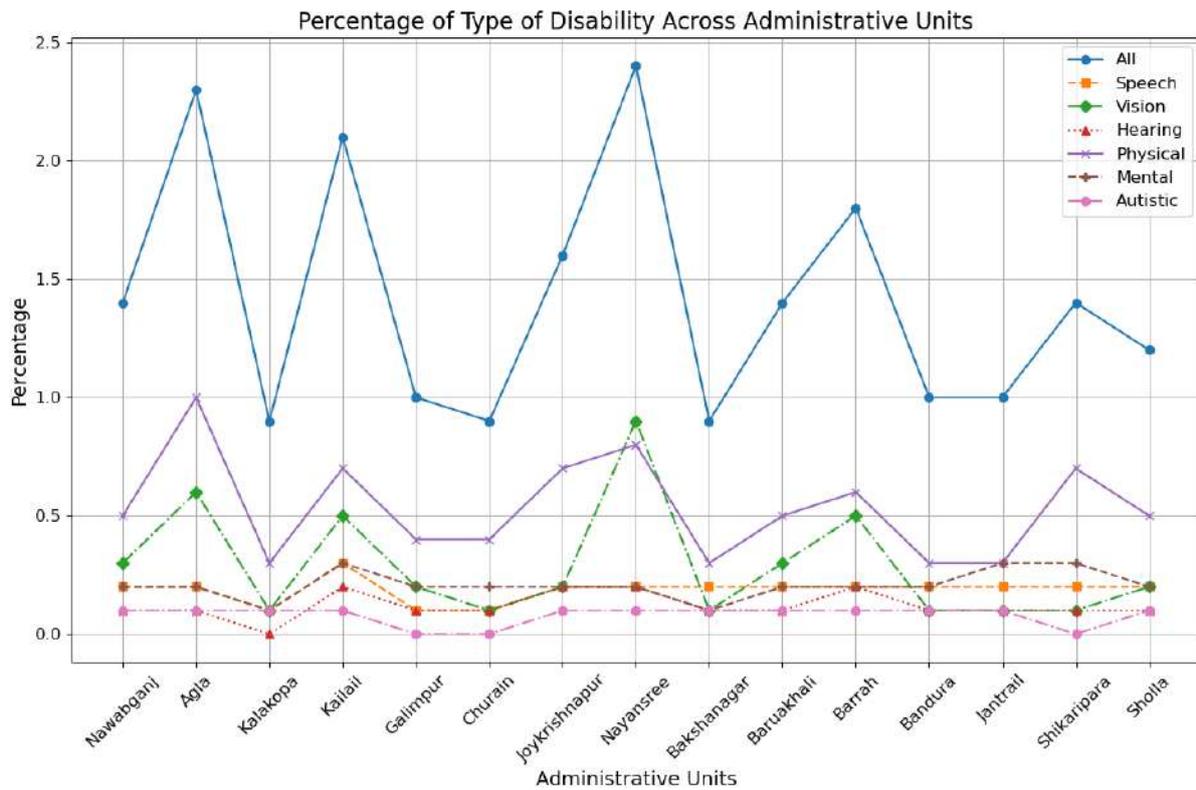


Figure 2-5: Percentage of types of disability

### 2.3.2.6 Population Density

Population density is highest in Kolakopa union during both 2001 and 2011 in Nawabganj Upazila. The majority of unions in Nawabganj experienced an increase in population density from 2001 to 2011. The extent of change in population density varied among different unions. Some unions saw significant increases in population density, such as Kolakopa, Bakshanagar, and Baruakhali, indicating potentially rapid urbanization or demographic shifts in those areas. On the other hand, some unions had relatively minor changes in population density, suggesting more stable demographic patterns.

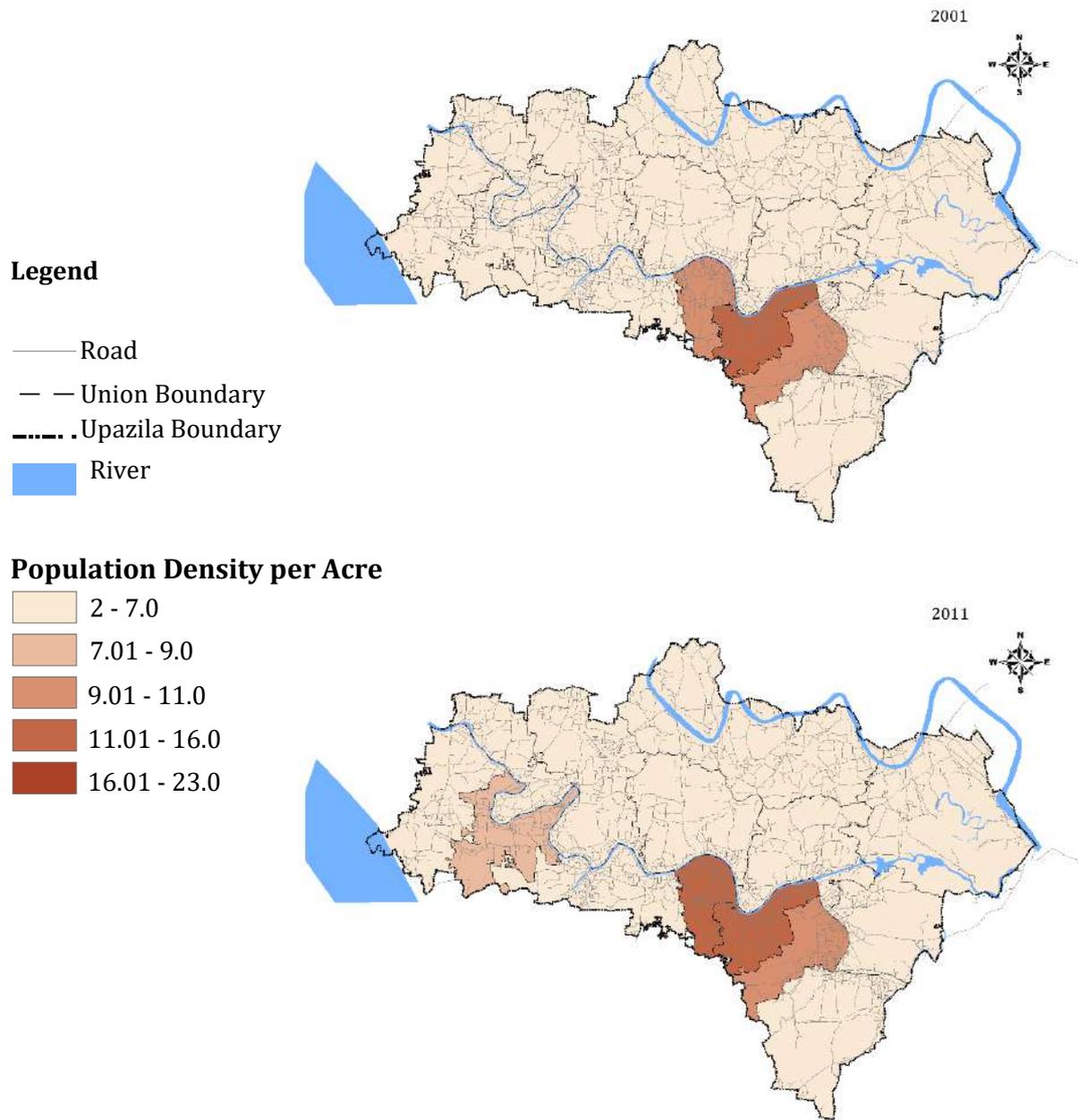


Figure 2-6: Population Density of 2001 and 2011

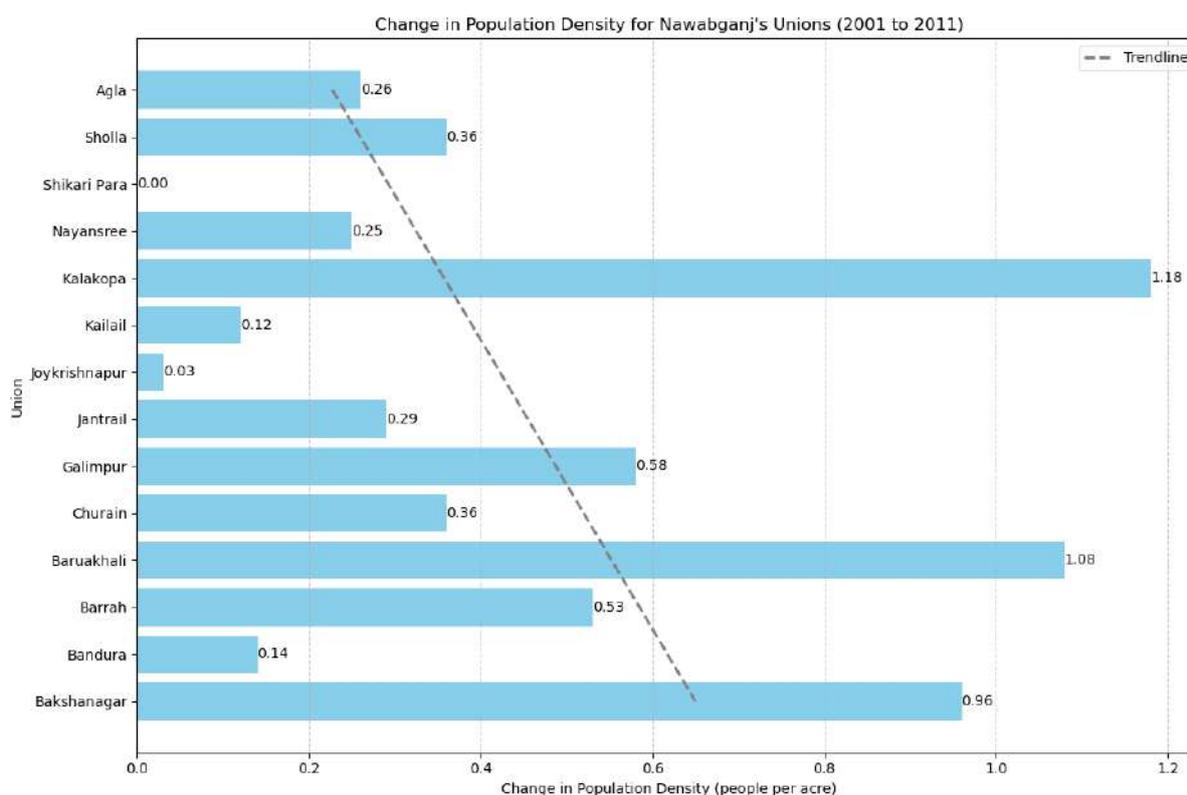


Figure 2-7: Change in Population density from 2001 to 2011

The trendline in the graph exhibits a positive slope, indicating an overall increase in population density across Nawabganj's unions from 2001 to 2011. While some unions experienced significant rises, others showed more moderate changes, reflecting diverse demographic dynamics. The alignment of the trendline with the bars representing population density changes suggests its effectiveness in capturing the observed trend. Understanding these trends is crucial for planning infrastructure and resource allocation to accommodate the region's growing population.

The gradual decrease in population density observed as we move from unions with higher densities to those with lower densities. This trend suggests a concentration of population in specific areas or clusters, potentially indicating the presence of urban centers or areas with better access to resources and amenities. Additionally, the presence of both densely populated and sparsely populated areas underscores the diverse socio-economic and environmental factors influencing settlement patterns within the upazila.

### 2.3.2.7 Growth Rate

Table 2-10: Growth Rate

	Growth Rate		
	2001	2011	2022
Bangladesh	1.48	1.37	1.22
Dhaka	3.84	3.48	3.13
Nawabganj	0.97	0.71	0.92

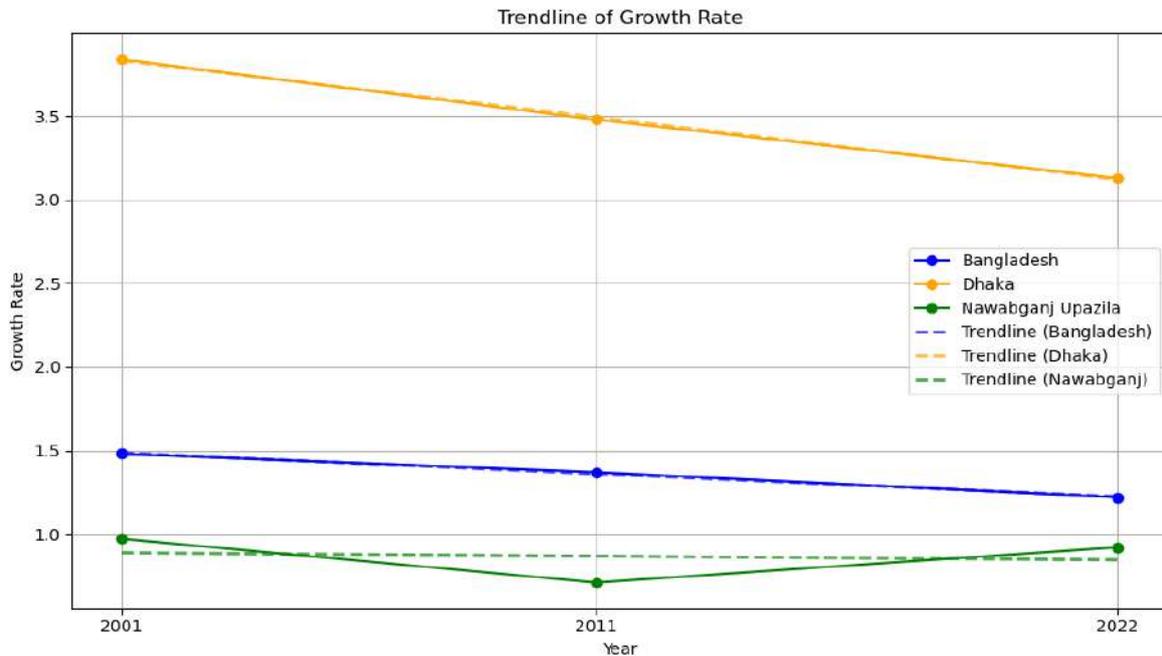


Figure 2-8: Trendline of Growth Rate

The trendline for Nawabganj Upazila illustrates a gradual decrease in the growth rate over the years 2001 to 2022. The linear regression trendline suggests a downward slope, indicating a declining trend in population growth within Nawabganj Upazila during this period. While the growth rate remains relatively low compared to Bangladesh and Dhaka, the trendline indicates a slight increase in the growth rate from 2011 to 2022 after experiencing a dip from 2001 to 2011. This suggests a potential stabilization or modest resurgence in population growth within Nawabganj Upazila in recent years, albeit at a slower pace compared to the national and city-level trends.

**2.3.2.8 Migration Scenario**

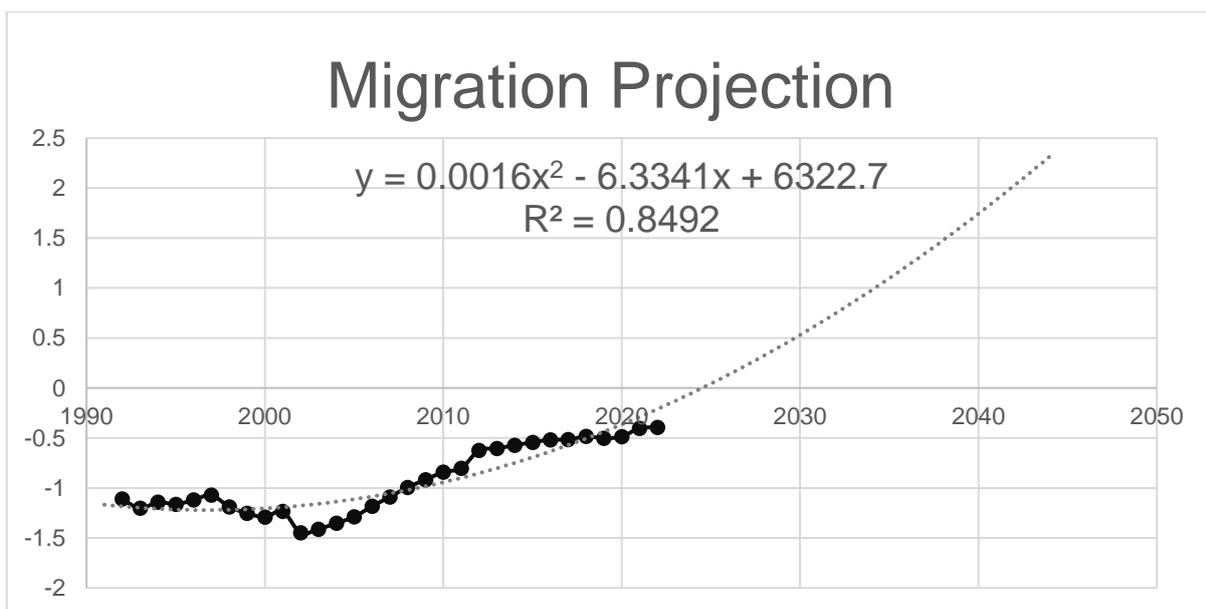


Figure 2-9: Migration Projection

## 2.4 Population Projection

### 2.4.1 Method

#### Data Sources

- **Population Data:** Utilize the last four Bangladesh Bureau of Statistics (BBS) census reports as the primary data source for historical population figures.
- **Natural Rate of Population Change:** Obtain the natural rate of population change from UNData, which includes vital statistics such as birth and death rates.

#### Calculation Steps

#### Intermediary Year Data Calculation

- **Geometric Population Growth:**
  - By Applying the geometric population growth method as outlined by BBS to estimate the population for intermediary years between the census data.
  - The formula:

$$P_t = P_0 \times (1+r)^n$$

Where,

- $P_t$  = Population at time t
- $P_0$  = Initial population
- r = Growth rate (calculated from previous census data)
- n = Number of years since the initial census

#### Expected Population Calculation Using Natural Rate Change

- **Natural Rate Calculation:**
  - Utilizing the natural rate of population change obtained from UNData to estimate the expected population growth over the same time frame.

#### Migration Rate Calculation

- **Population Difference:**
  - Subtracting the population from Step 1 (intermediary year data) from the expected population calculated in Step 2:
  - $M = E_t - P_t$  where:
    - M = Migration rate
- This is how we get the net migration effect on the population during the period.

#### Migration Trend Assumption

- **Exponential Migration Trend:**
  - Assuming that the migration will follow an exponential trend due to the attraction of economies of scale.
  - This can be modeled as:
  - $M_t = M_0 * e^{kt}$
  - where:
    - $M_t$  = Migration at time t
    - $M_0$  = Initial migration value

- $k$  = Growth rate of migration
- $t$  = Time

### Final Growth Rate Calculation

- **Balancing Migration and Natural Change:**
  - Finally, balancing the migration rate with the natural population change to calculate the final expected growth rate:

$$G=r_n+M$$

where:

- $G$  = Final expected growth rate

This methodology outlines a comprehensive approach for population projection using data from the last four BBS census reports and natural rate change statistics from UNData. By employing geometric growth calculations and considering migration trends, it provides a robust framework for estimating future population dynamics

### 2.4.2 Assumptions

1. For Nawabganj, the net migration rate for the years 2001, 2011, and 2021 has been averaged over the preceding 20-year periods to provide a more stable and representative view of migration trends. This analysis offers valuable insights into how migration has influenced the population dynamics in the Upazila.
2. The natural rate of change for Nawabganj is assumed to be 20% higher than the corresponding national rate. This adjustment acknowledges the unique demographic and socio-economic factors impacting Nawabganj, leading to a more significant natural population increase compared to national averages.
3. The average net migration during the period 2001-2011 was notably low, indicating a trend of out-migration. This decline can be attributed primarily to the crisis in the handloom sector, driven by rising prices for raw materials such as thread, yarn, and dye, coupled with inadequate supply chain and transportation infrastructure. Many weavers were compelled to leave their jobs, resulting in significant out-migration.
4. Moving forward, the average net migration is projected to stabilize to almost neutral during the decade of 2012-2021, with a gradual decrease in in-migration estimated at 0.2% per year.

From 2022-2031, average net migration is expected to gradually increase at a rate of 0.1% per year. Following this, another increase in average net migration is anticipated from 2032-2041 at a rate of 0.05% per year, and from 2042-2044, the rate is expected to rise to 0.025% per year.

### 2.4.3 Population Projection for the Next 20 Years

Population projection is the process of estimating the future size and demographic characteristics of a population. Population projection is important for a variety of reasons, including urban planning, healthcare planning, and resource allocation. For example, accurate population projections can help cities plan for infrastructure needs, such as housing, transportation, and public services, as well as predict future demand for healthcare services. The population projection of Nawabganj Upazila up to 2044 estimate the future size of population at 5 years intervals. Also estimating the gross density of Nawabganj up to 2044 at 10-year interval. The

gross density of an area is also important in determining the type and amount of housing that can be built. In areas with high gross density, multi-unit buildings such as apartments and condos may be more appropriate, while in areas with lower gross density, single-family homes may be more common.

Scenario 1:

**Table 2-11: Scenario 1 of Population projection**

Location	1991	2001	2011	2022	2034	2044
Agla	14707	16120	17114	18960	20587	21944
Kalakopa	16317	20793	22746	21036	22841	24347
Kailail	23631	26115	27205	30466	33083	35264
Galimpur	10153	11776	12944	13088	14212	15148
Churain	20740	21396	23271	26738	29034	30949
Joykrishnapur	15390	16486	16653	19840	21543	22963
Nayansree	24017	25431	26769	30964	33623	35841
Bakshanagar	14797	18440	20459	19076	20713	22078
Baruakhali	14633	13520	16315	18864	20484	21833
Barrah	22573	23510	25717	29102	31601	33685
Bandura	26209	29533	30029	33790	36693	39113
Jantrail	18374	22345	23764	23688	25721	27417
Shikaripara	15993	16342	17624	20618	22388	23863
Sholla	31655	34798	38201	40813	44320	47245
<b>Total</b>	<b>269189</b>	<b>296605</b>	<b>318811</b>	<b>347043</b>	<b>376844</b>	<b>401689</b>

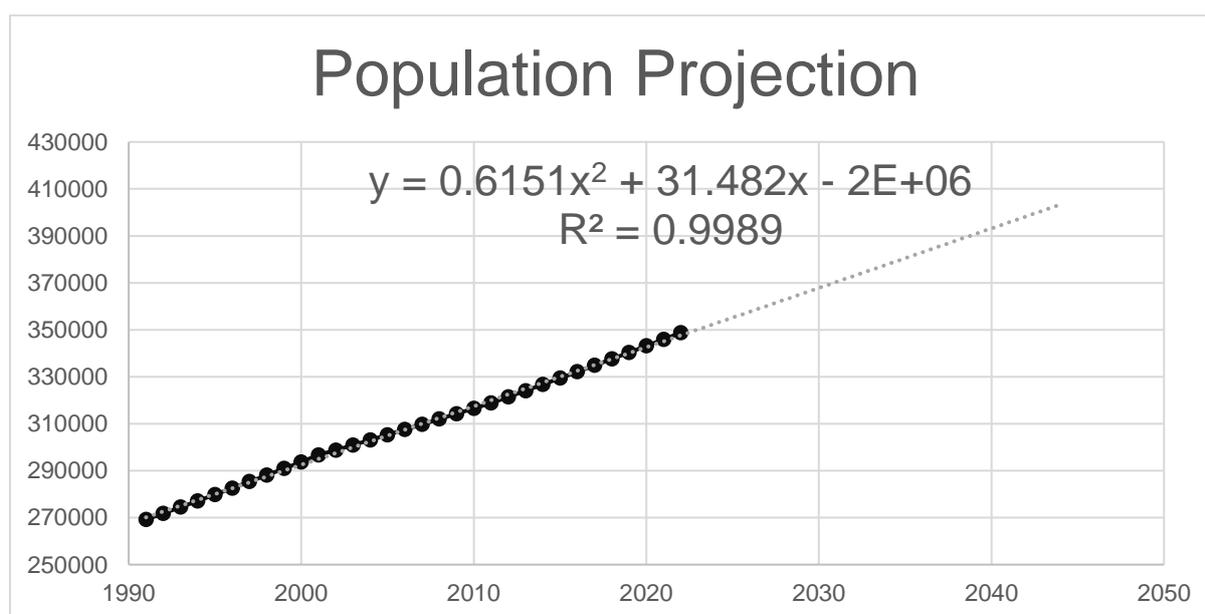


Figure 2-10: Population projection

The population data across various locations from 1991 to 2044 reveals a consistent upward trend, with overall growth in each area over the five-decade period. Some regions, like Sholla and Bandura, show particularly strong growth, with their populations increasing significantly, reflecting likely urbanization or development trends. On the other hand, areas like Galimpur and Baruakhali have shown more modest increases, with slight fluctuations in certain decades. Despite some regional variations, the total population for all locations combined has steadily risen from 269,189 in 1991 to a projected 401,689 by 2044, indicating overall population growth and potentially increasing pressure on resources and infrastructure in these areas. The trendline in scenario 1-

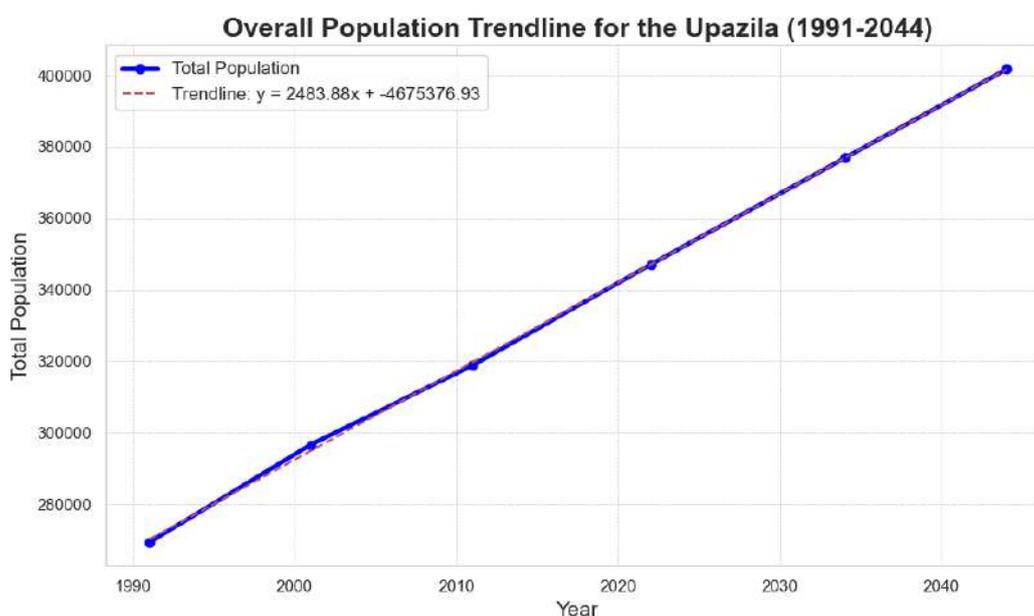


Figure 2-11: Population Trendline from 1991 to 2044 in scenario 1

Scenario 2:

Table 2-12: Scenario 2 of Population Projection

Location	1991	2001	2011	2022	2034	2044
Agla	14707	16120	17114	18723	22212	28099
Kalakopa	16317	20793	22746	24885	29522	37345
Kailail	23631	26115	27205	29763	35309	44666
Galimpur	10153	11776	12944	14161	16800	21252
Churain	20740	21396	23271	25459	30203	38207
Joykrishnapur	15390	16486	16653	18219	21614	27342
Nayansree	24017	25431	26769	29286	34743	43951
Bakshanagar	14797	18440	20459	22383	26554	33591
Baruakhali	14633	13520	16315	17849	21175	26787
Barrah	22573	23510	25717	28135	33378	42223
Bandura	26209	29533	30029	32852	38975	49303
Jantrail	18374	22345	23764	25998	30843	39017

Shikaripara	15993	16342	17624	19281	22874	28936
Sholla	31655	34798	38201	41793	49581	62720
<b>Total</b>	<b>269189</b>	<b>296605</b>	<b>318811</b>	<b>348786</b>	<b>413784</b>	<b>523439</b>

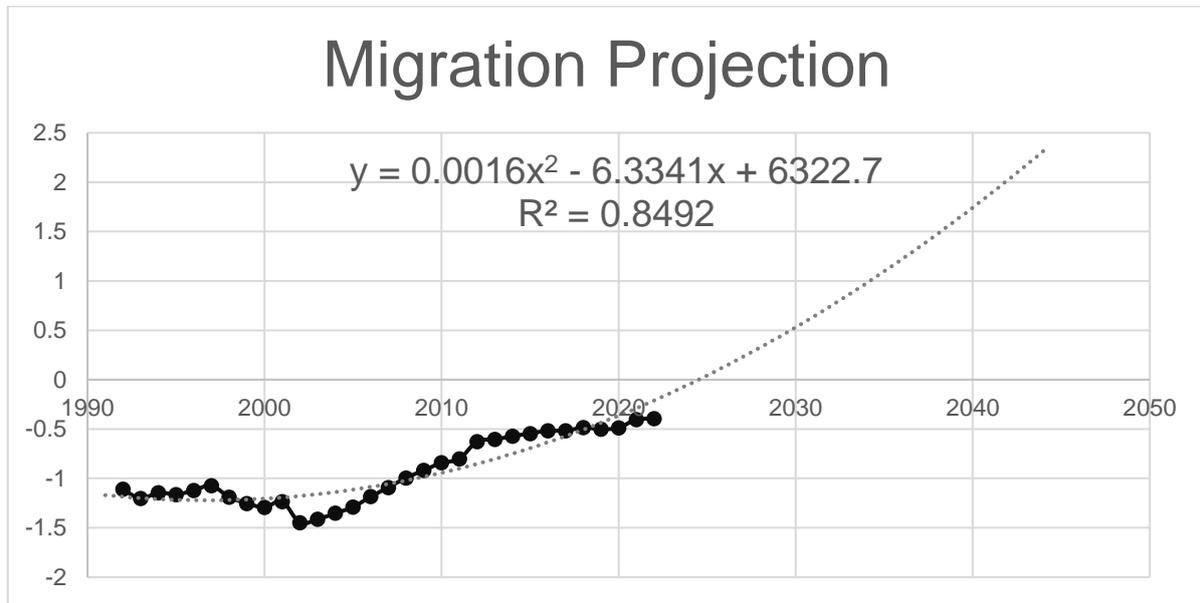


Figure 2-12: Migration Projection

The population trend from 1991 to 2044 across the specified locations shows a strong and consistent growth pattern. Each area experiences significant population increases, particularly from 2022 onward. For instance, locations like Agla, Kalakopa, and Sholla exhibit sharp rises, with their populations nearly doubling by 2044 compared to 1991. Sholla, in particular, sees one of the highest population increases, reaching an estimated 62,720 by 2044. This upward trend is indicative of ongoing urbanization, economic development, or improved living conditions in these areas. Smaller locations such as Galimpur and Shikaripara, while growing at a slower pace, still demonstrate substantial growth, suggesting that even less prominent areas are benefiting from broader developmental trends. The overall population across all locations combined increases from 269,189 in 1991 to a projected 523,439 by 2044, representing nearly a twofold increase. This robust growth trend may put increasing pressure on local resources and infrastructure, necessitating strategic planning and resource management to accommodate the burgeoning population.

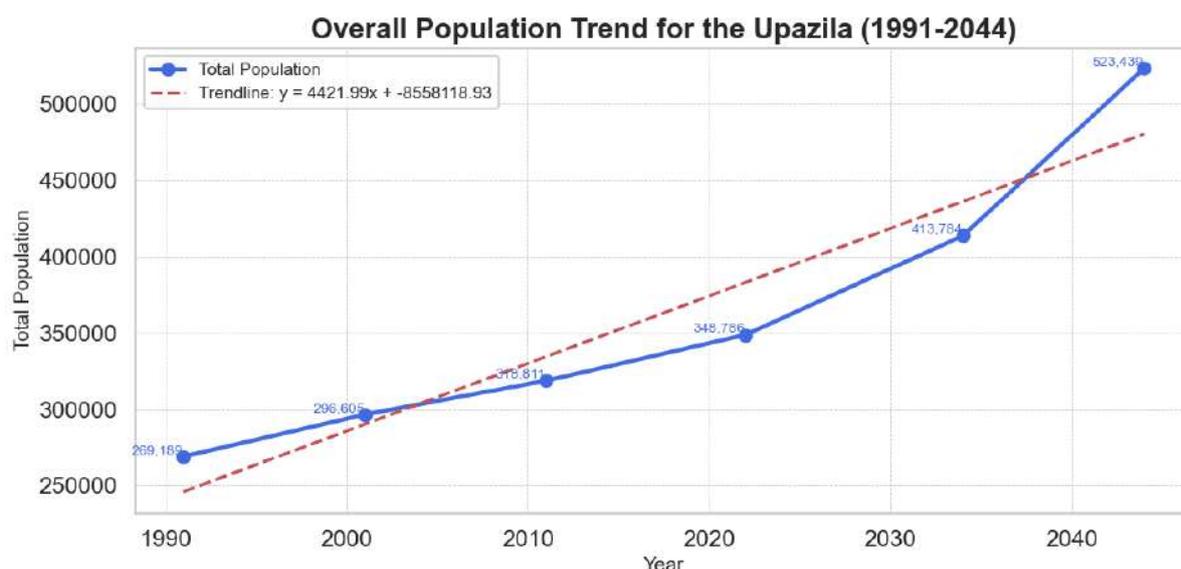


Figure 2-13: opulation Trendline from 1991 to 2044 in scenario 2

Scenario 3:

Table 2-13: Scenario of population projection

Location	1991	2001	2011	2022	2034	2044
Agla	14707	16120	17114	18723	21352	24363
Kalakopa	16317	20793	22746	24885	28379	32381
Kailail	23631	26115	27205	29763	33943	38728
Galimpur	10153	11776	12944	14161	16150	18427
Churain	20740	21396	23271	25459	29034	33128
Joykrishnapur	15390	16486	16653	18219	20777	23707
Nayansree	24017	25431	26769	29286	33399	38108
Bakshanagar	14797	18440	20459	22383	25526	29125
Baruakhali	14633	13520	16315	17849	20356	23226
Barrah	22573	23510	25717	28135	32086	36610
Bandura	26209	29533	30029	32852	37466	42749
Jantrail	18374	22345	23764	25998	29649	33830
Shikaripara	15993	16342	17624	19281	21989	25089
Sholla	31655	34798	38201	41793	47662	54382
<b>Total</b>	<b>269189</b>	<b>296605</b>	<b>318811</b>	<b>348786</b>	<b>397768</b>	<b>453852</b>

The overall population trend for the upazila from 1991 to 2044 exhibits a consistent and significant upward trajectory. Beginning with a population of 269,189 in 1991, the total population rises steadily, reaching 348,786 by 2022. The growth accelerates in the subsequent decades, with projections indicating a substantial increase to 453,852 by 2044. The linear trendline highlights this strong growth trend, suggesting that the upazila's population is expanding at an accelerating rate. This upward trend reflects likely factors such as improved living conditions, economic development, and increased migration into the area. The data

indicates that the upazila will experience robust growth, necessitating careful planning and development to accommodate the expanding population and to ensure sustainable growth in infrastructure and services.

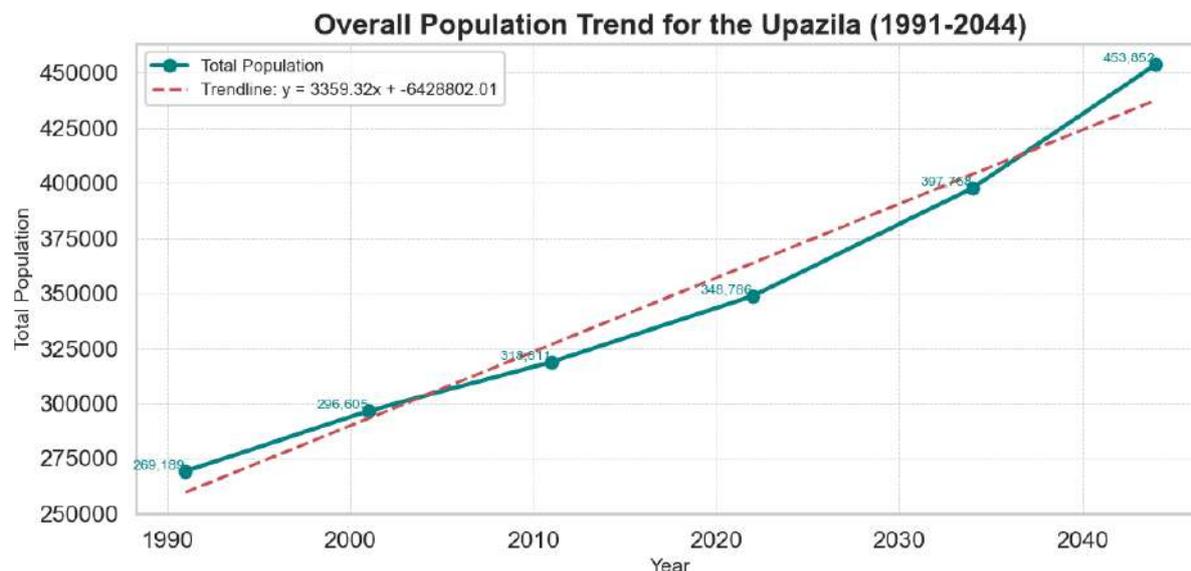


Figure 2-14: opulation Trendline from 1991 to 2044 in scenario 3

Scenario 4:

Table 2-14: Scenario 4 of population projection

Location	1991	2001	2011	2022	2034	2044
Agla	14707	16120	17114	18723	21800	27336
Kalakopa	16317	20793	22746	24885	28974	36332
Kailail	23631	26115	27205	29763	34654	43454
Galimpur	10153	11776	12944	14161	16488	20675
Churain	20740	21396	23271	25459	29643	37171
Joykrishnapur	15390	16486	16653	18219	21213	26600
Nayansree	24017	25431	26769	29286	34099	42758
Bakshanagar	14797	18440	20459	22383	26061	32679
Baruakhali	14633	13520	16315	17849	20782	26060
Barrah	22573	23510	25717	28135	32758	41078
Bandura	26209	29533	30029	32852	38251	47965
Jantrail	18374	22345	23764	25998	30271	37958
Shikaripara	15993	16342	17624	19281	22450	28151
Sholla	31655	34798	38201	41793	48661	61018
<b>Total</b>	<b>269189</b>	<b>296605</b>	<b>318811</b>	<b>348786</b>	<b>406103</b>	<b>509234</b>

The overall population trend for the upazila from 1991 to 2044 demonstrates a robust and continuous increase. Starting from a population of 269,189 in 1991, the total population rises steadily, reaching 348,786 by 2022. The growth becomes more pronounced in the following decades, with projections indicating a significant leap to 509,234 by 2044.

The linear trendline highlights a clear upward trajectory, reflecting an average annual growth rate that accelerates over time. This trend suggests that the upazila is experiencing a period of substantial expansion, likely driven by factors such as improved living standards, economic development, and possibly increased migration. The marked increase in population growth rates in recent years suggests that the area is becoming increasingly attractive for residents, which may necessitate proactive planning for infrastructure, services, and resources to accommodate the growing population and ensure sustainable development.

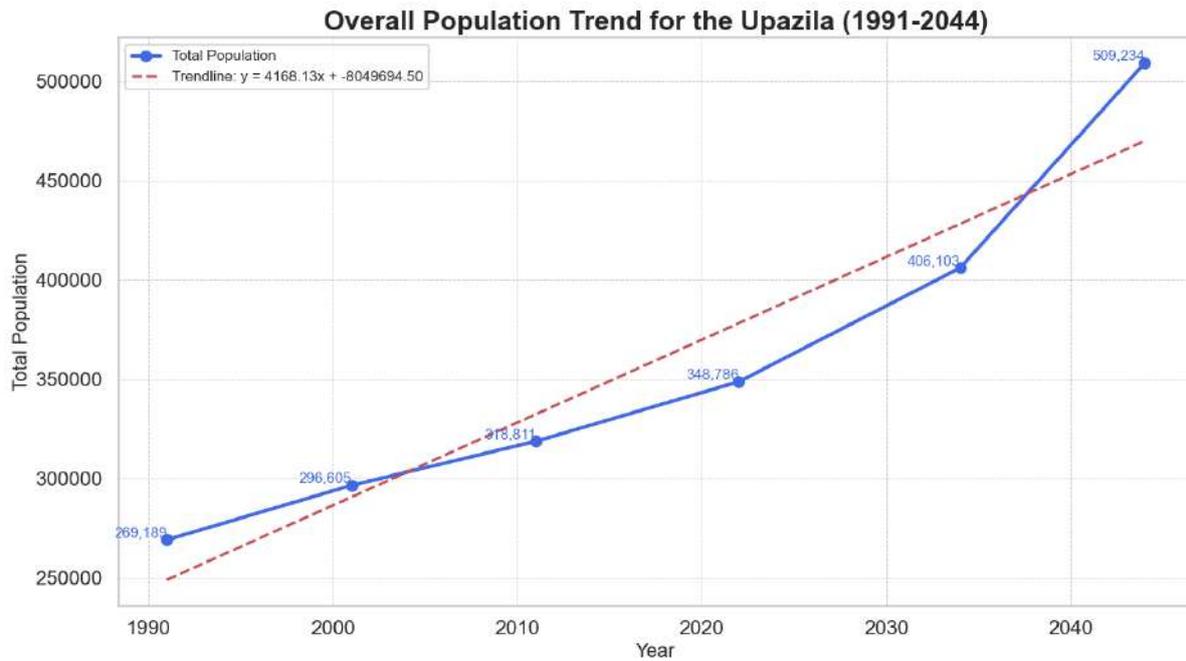


Figure 2-15: Population Trendline from 1991 to 2044 in scenario 4

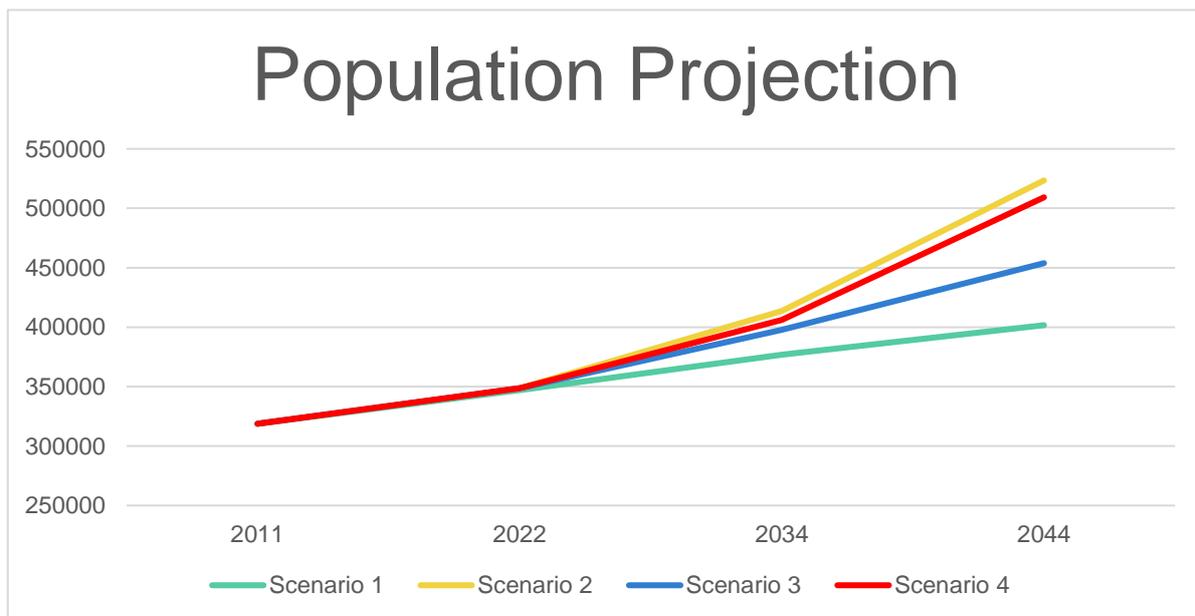


Figure 2-16: Comparison of all 4 scenarios in population projection

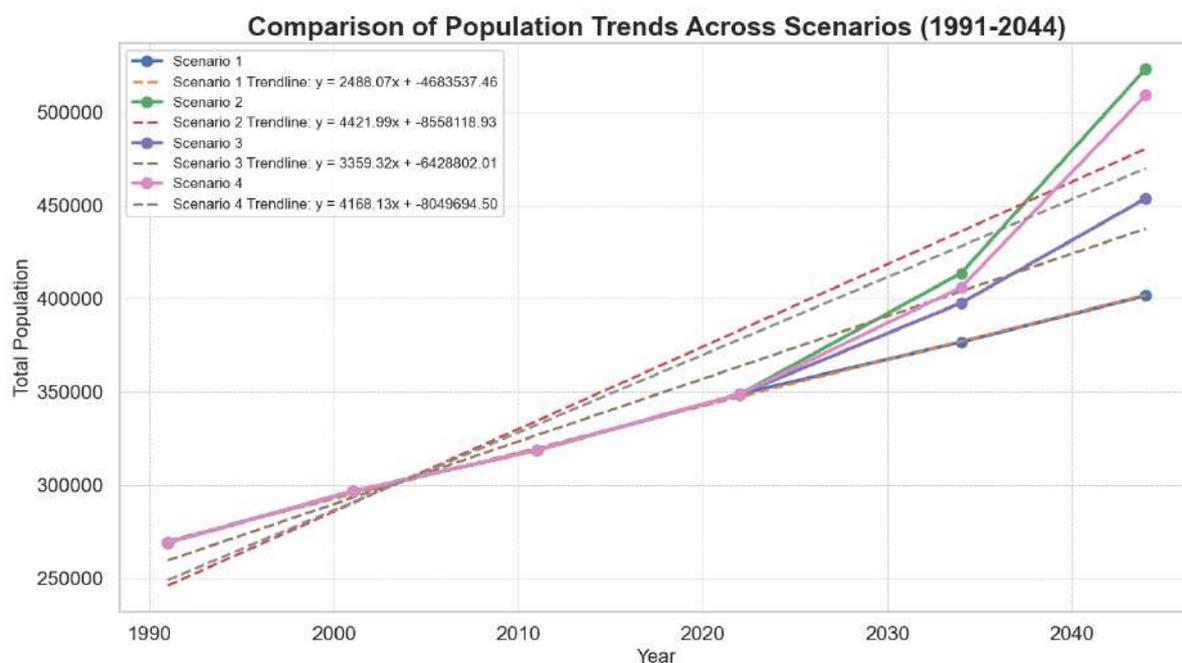


Figure 2-17: Comparison of Trendline in all 4 Scenarios

Scenario 2 projects the population for Nawabganj Upazila to reach 523,439 by 2044, with a growth rate of 1.86%. This scenario is identified as the best and most acceptable projection due to its balanced and realistic approach to population growth.

**Detailed Justification:**

**1. Balanced Growth Rate:**

- Scenario 2 assumes a growth rate of 1.86%, which is a moderate and sustainable increase. This rate is based on a realistic assessment of both natural population changes and migration patterns.

**2. Consideration of Historical Data:**

- The projection uses historical BBS census data, which provides a solid foundation by incorporating trends from 1991-2022. This historical grounding ensures that the projections are based on observed and reliable data.

**3. Methodological Rigor:**

- The use of polynomial curves for extrapolating future years and interpolating intermediate years ensures a robust methodological approach. This method captures the complexity of population dynamics more accurately than simpler linear models.

**4. Migration Trends:**

- Scenario 2 accounts for migration rates in a nuanced manner, projecting changes based on past trends and expected future shifts. This includes both natural change and migration data, providing a comprehensive view of population growth.

**5. Feasibility and Planning:**

- The projected population and growth rate align with strategic planning needs, ensuring that resource allocation, infrastructure development, and service provision can be adequately planned and managed. The growth rate of 1.86% is realistic, allowing local authorities to prepare effectively.

**6. Realistic Assumptions:**

- The assumptions made in Scenario 2 are realistic and based on past data trends. This avoids the pitfalls of overly optimistic projections that could lead to under preparedness or overly conservative estimates that might hinder development plans.

**2.4.4 Projected Population Density**

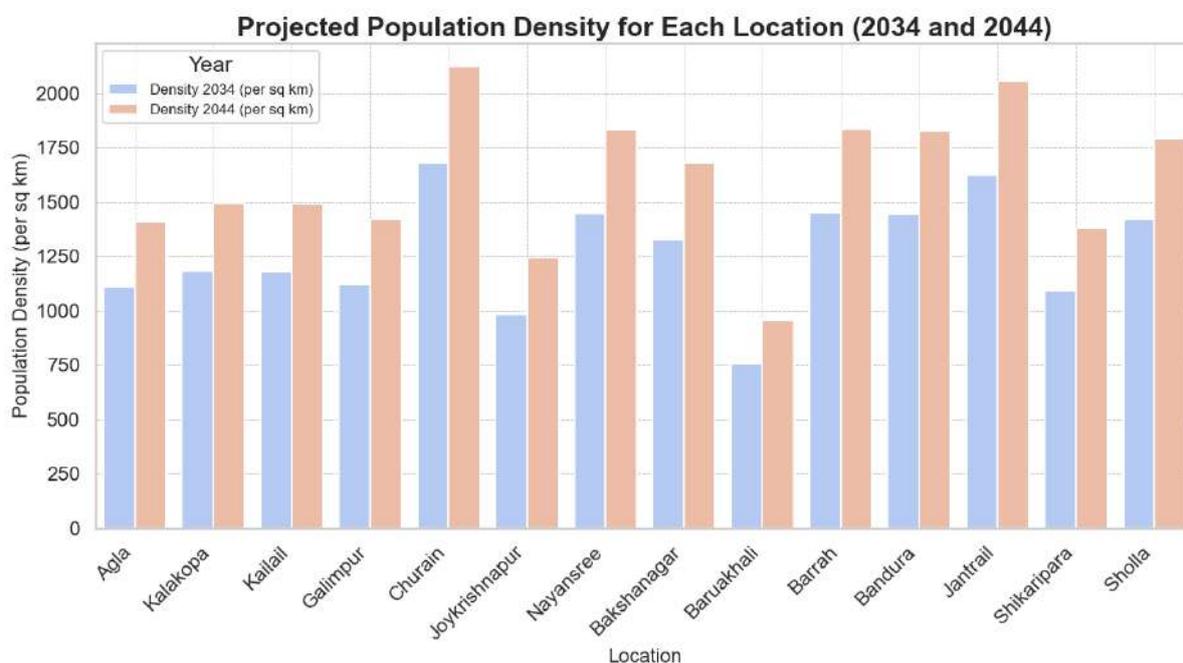


Figure 2-18: Projected population density across unions

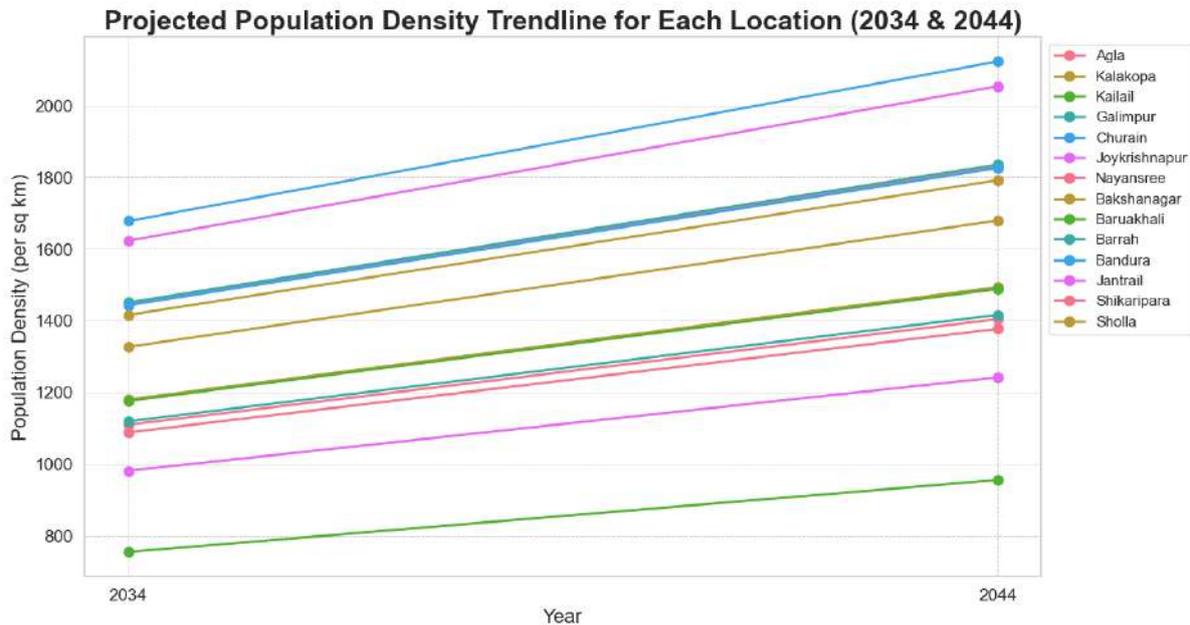


Figure 2-19: Projected Population Density Trendline

The trendline graph shows that most locations experience increased population density from 2034 to 2044, with significant growth in areas like Sholla and Bandura. The enhanced visual elements and color palette help clearly distinguish between locations and highlight these trends.

## 2.5 SWOT Analysis

This SWOT analysis outlines strengths like robust census data analysis and accurate population projections, while noting weaknesses such as limited migration data and underrepresentation of marginalized groups. It identifies opportunities for development through urbanization and informed resource allocation, but also acknowledges threats from infrastructure strain, environmental impact, and economic disparities due to uneven growth.



Figure 2-20: SWOT Analysis

## 2.6 Strategies and Policies for Population Management

### Policy 01: Population Projection and Density Management

Nawabganj Upazila is projected to experience significant population growth, with an increase from approximately 347,043 in 2022 to 376,844 by 2034 and further to 401,689 by 2044. This growth demands effective management strategies to maintain a sustainable population density.

### Policy 02: Provision of Social Amenities and Community Facilities

This policy aims to address the needs of the existing and projected population by enhancing access to secure land tenure and fostering a vibrant social environment. Public and private sector investments should be encouraged to facilitate development. Standards and regulations must be adhered to in the allocation of educational, religious, and community centers within the urban land use plan.

### Policy 03: Promotion of Family Planning and Reproductive Health Services

Enhancing access to family planning methods, including contraceptives, is vital for reducing population growth and maintaining a sustainable density. This empowers individuals to make informed decisions regarding family size and spacing.

### Policy 04: Implementation of Immigration Policies

Immigration policies should be designed to regulate population growth and ensure the smooth integration of migrants into society, which can help balance population density and promote economic growth. Effective policies will facilitate the integration of migrants while managing overall population levels.

### Policy 05: Investment in Education and Healthcare

Education is a critical factor in managing population growth. Improved education typically leads to lower birth rates as individuals become more aware of family planning and their socio-economic choices. Additionally, investing in healthcare can reduce infant mortality rates and enhance overall health outcomes, contributing to sustainable population density.

### **Strategic Recommendations**

To manage the anticipated population growth effectively, the following strategies are recommended:

1. **Density Regulation:** Establish zoning and land use regulations to control development intensity. This includes defining areas for high-density and low-density development to prevent overcrowding.
2. **Infrastructure Development:** Invest in essential urban services, such as healthcare, education, and transportation, to support the growing population and enhance quality of life.
3. **Community Facilities:** Ensure the provision of adequate community facilities, such as parks, schools, and health centers, tailored to the needs of the current and projected population.
4. **Social Programs:** Promote family planning and reproductive health services to empower residents to make informed decisions about family size, which can help stabilize population growth.
5. **Public Awareness Campaigns:** Conduct campaigns to raise awareness about the importance of sustainable population practices and responsible urban development among residents.

By implementing these strategies, Nawabganj Upazila can effectively manage its population growth while maintaining a sustainable and livable environment for its residents.

## **2.7 Conclusion**

Managing population growth effectively is key to achieving sustainable development and enhancing quality of life. Population studies offer vital insights into how economic growth corresponds with population changes, particularly in Nawabganj Upazila. These studies evaluate demographic trends in relation to economic and social development, environmental factors, and cultural influences, providing essential data for informed decision-making in business, government, and social services. This working paper focuses on population growth and migration projections, facilitating more efficient resource allocation within the Upazila.

## CHAPTER THREE: HERITAGE

### 3.1 Introduction

The Nobel Laureate poet Rabindra Nath Tagore held a firm believe that "if the diamond ring is learning, the light reflected from it is culture" (SHESHER KABITA, R.N. Tagore, published by Biswa Bharati, Page 3, translated), implying that a nation's civilization is reflected through its culture. Bangladesh is a country that belongs to the ancient and historic region of Bengal in the Eastern part of the Subcontinent, despite the fact that it only gained its independence relatively recently, in 1971, after a bloody liberation war. The country's civilization began more than 4,000 years ago, during the Copper Age. Bangladesh's people's faith, ethnic heritage, ideas, aspirations, and creativity, as well as their love of life and the natural world, all contribute to the country's culture and traditions. Throughout history, the country's unique geographic location, wealth of riches, and natural beauty have drawn traders, travelers, and religious missionaries from abroad to come and reside there. Bangladesh's culture and civilization have been further enriched by these ongoing exchanges with people from different races, civilizations, and cultural backgrounds while yet preserving the distinctive indigenous aspects. In the same vein, generations of settlers have fostered their own culture and civilization here. Bangladesh currently benefits from a rich, varied cultural legacy.

The section - 5 of "The Bangladesh Environment Conservation Act, 1995" (ECA, 1995) and Rule – 3 declared ecologically critical area in order to conserve history, heritage, culture, tourism, and importance of environmental perspective required to protect or conserve from destructive activities.

A nation's cultural history is supported by its heritage. The need to halt the rapid deterioration and eradication of the heritages is quite an urge in Bangladesh. The working paper aims to assess the existing scenario regarding historical, heritage and tourism and finally to provide recommendations for future development and conservation of historical, heritage and tourism establishments.

### 3.2 History of the Upazila

#### 3.2.1 Origin of Nawabganj

In antiquity, Nawabganj likely occupied a strategic position within the Indian subcontinent, potentially witnessing the ebb and flow of various local empires and dynasties. During the medieval era, the region might have been part of the influential Sultanate of Bengal, contributing to trade and administrative networks that crisscrossed the subcontinent (The city of Heritage and Hospitality, 2018). With the advent of the Mughal Empire, Nawabganj could have continued to thrive as an economic and administrative center, potentially seeing the construction of architectural marvels that characterized Mughal urban planning.

As the British colonial era dawned, Nawabganj's destiny would have intersected with that of the larger region. The British administration's imprint likely brought about changes in governance, land use, and infrastructure, possibly shaping the foundations of the modern Nawabganj Upazila.

The area's cultural landscape would have comprised religious sites, reflecting the diverse religious practices of its inhabitants.

Nawabganj might have contributed significantly to the sociopolitical movements that culminated in Bangladesh's independence in 1971. The local population's participation in protests, rallies, and resistance efforts would have added to the momentum of the broader liberation movement.

Nawabganj is one of the prominent regions in Dhaka containing a large number of old buildings and Zamindari Bari (The city of Heritage and Hospitality, 2018). Amongst the archaeologically or historically famous buildings the most well-known ones are Hasnabad Church, Braz-Niketan, Bagmara Moth, Shahi-vanga mosque, Adnan palace, Bakshanagar Church, residence of Khelaramdata etc.

There is no written history about the naming of Nawabganj. But there is a popular legend about the growth and flourishing of Nawabganj. During Nawabi period, the Nawabs and their subordinates and soldiers used to travel to Dhaka by boat from Murshidabad through the Ichamoti river. They used to pitch their tents and rest in this area along the banks of the Ichamoti. At one point the servants of the Nawab (subordinate staff) started living in this area to collect rent. In this way, the population gradually increased in this area and the ganj or market place was built. Gradually, settlement developed around and a city was born. During Nawabi reign the place was named as Nawabganj. Nawab Alibardi Khan admired his journey from Murshidabad to Dhaka through Nawabganj's Ichamoti river. Emperor Sher Shah Suri extended Grand Trunk Road from Sonargaon to Nawabganj's Kolakopa region connecting Jessore. During that time, postal services carried horses as a means of vehicle. The-then Kolakopa-Bandura was focal of trade and business center for around having 200 years of tradition of oil, salt, betel-leaf etc. business. The Zamindari house were also named accordingly. For example, the house engaged with oil business was locally known as Teli Bari, and betel-leaf business known as Painna Bari. The legend Hazrat Shah Sufi Qari Muhammad Ismail (R.A.H.) was born in Sonahazra, Nawabganj who initiated present Jail dress up following Islamic tradition with Tupi (cap), full pant. Previously, British style was followed with half-pant culture.

### **3.2.2 Arrival of Christian Community**

The base of arrival of Christian community started during the arrival of Vasco da Gama in the Indian sub-continent by preaching Christian sermons of the-then Portuguese Kings. It is assumed that during the year 1576 to 1676, the Christian community developed in Nawabganj Upazila with the help of missionaries. The famous Hasnabad church (Holy Rosary Church), local known as 'Pobitro Rani Jopmala Girza' was established in 1777 and the Christian community extended towards present Hasnabad, Golla, Tuital, Bakhshanagar having the focal towards Hasnabad. Portuguese traders, subordinate Portuguese officers of the Mughal empire and their marriage to local women, local peoples' religion divert to Christianity helped to build Indo-Portuguese culture and the evolution of Christian community.

### **3.2.3 Arrival of Hindu community**

The Hindu community bears the root from the Sindhu province of Pakistan. Gradually they came to Nawabganj's Kolakopa area. They established huge artistic buildings with crafting design including Teli bari, Khelaram Datar Bari, Poddar Bari, Braz-Niketan etc. They were engaged in oil,

salt, wood, betel-leaf business. The puja festivals were celebrated in a grand gesture. Kolkata's ancient stage performances (Jatra Pala) and entertainment were arranged also.

### **3.2.4 Anti-British Movement**

Nawabganj region played a crucial role in anti-British movement started from 1905. Nawabganj took part in that movement by boycotting foreign clothing and encouraging indigenous products. Notable persons from Nawabganj were Hasmat Ali Chowdhury of Galimpur, Rajendro Chondro Ray and Pitthinaddar Digindro Shingho of Govindopur. Bengal participation was restricted in 1911. The Khilafat movement was established in 1920 and also took part in anti-British movement. The women's organization from Nawabganj also took part in the movement. Komolarani of Kashimpur gave her life (beaten to death) on the accused of hosting flag of independence in gate of the-then Nawabganj thana. Mahatma Gandhi came to Nawabganj through Komola Launch, Moinot Ghat in the year June 1925. He gave a speech in Kolakopa village of Radhanath Saha addressing woman community. He was given a welcome letter and a bouquet costing the-then six thousand five hundred ten taka and six ana/pence. Netaji Subhas Chandra Bose also came to Nawabganj on March 1929 to encourage the youths of Govindapur and Nawabganj.

### **3.2.5 Liberation war**

In the Great War of Liberation, the freedom-mad people of Nawabganj have an immortal success story. On April 1, 1971, the flag of Bangladesh was hoisted on the grounds of Nawabganj Pilot High School under the leadership of the then member of the People's Council, Abu Mohammad Subid Ali Tipu. At that time, the-then liberation war commander Badiuzzaman Badi, Shaukat Hossain Angur, Baten Mia, Mumtaz Uddin Ahmed, and many other freedom fighters were present. The name 'Azizur Razman Faku' comes first while describing in the history of Nawabganj's liberation war. In 1971, the biggest and most talked about liberation war was occurred in Agla, Galimpur, Churain. On September 23, 1971, at around 4.00 p.m., a large number of Pak Army arrived at Galimpur on the way to Nawabganj from Dhaka on the river route (Ichamoti) with a launch named ML Pointer. They were ambushed by Mukti Bahini and after three days of fighting, all the 45 Pak soldiers in the launch were killed. The group leader of Pak Army Captain Zafar Ullah Khan was killed in that battle. In November 1971, the camp of Nawabganj Pilot School was attacked by Pak Army. After Tarabi prayers in the month of fasting, the freedom fighters attacked from three sides and destroyed the camp and killed 17/18 Pak soldiers. The survivors were taken from Dhaka by the Pak Army.

### **3.2.6 Language, Culture, and Tradition**

Nawabganj Upazila has an ancient township. The language here is fluent and clean Bengali. Asamiya effect is observed in some words. Persian language is still used in ancient Muslim zamindar families here. Nawabganj is the birthplace of the famous The Lion Circus of Bangladesh. The victory of Nawabganj in the cultural arena is remarkable. Kabigan, Bichargan, Zarigan, Yatra (Jatrapala), Sarigan, Snake-charmer performances, Boat race, Bull race, Natak (drama) entertain people throughout the year. Nawabganj is a traditional upazila near Dhaka (The city of Heritage and Hospitality, 2018). Muslims, Hindus, Christians have been living in brotherhood here for ages.

Here the ancient religious institutions of different religions bear witness to it. Vanga Masjid at New Bandura, Ancient church founded in 1776 at Hasnabad village, Khelaram Datar's house at Kalakopa village, ancient mosque of Nawabi age at Kashimpur, Shiv Mandir/Math at Jantrail Union. Moreover, the birthplace of Mahakobi (The Great Poet) Kaikobad is in the Agla Union of this upazila.

### 3.2.7 Project Area

Nawabganj Upazila, situated within the broader Dhaka District, spans an area of 247.01 square kilometers, positioned between 23°34' and 23°45' north latitudes, and 90°01' and 90°17' east longitudes. Positioned at a distance of 35 kilometers southwest of Dhaka city. The topography of this Upazila is defined by the convergence of Ichamoti river, Kaliganga river, and Padma River, which traverse the region, contributing to its distinctive landscape and environmental characteristics.

Table 3-1: Profile of Nawabganj Upazila

Indicator	Nawabganj
<b>Population</b>	3,48,786
Male	1,62,232
Female	1,86,554
<b>Household</b>	90,694
Total	90,694
<b>Density</b>	1483
Population density (per sq. km.)	1483
<b>Literacy rate</b>	79.27%

(Source: Population and Housing Census 2022)

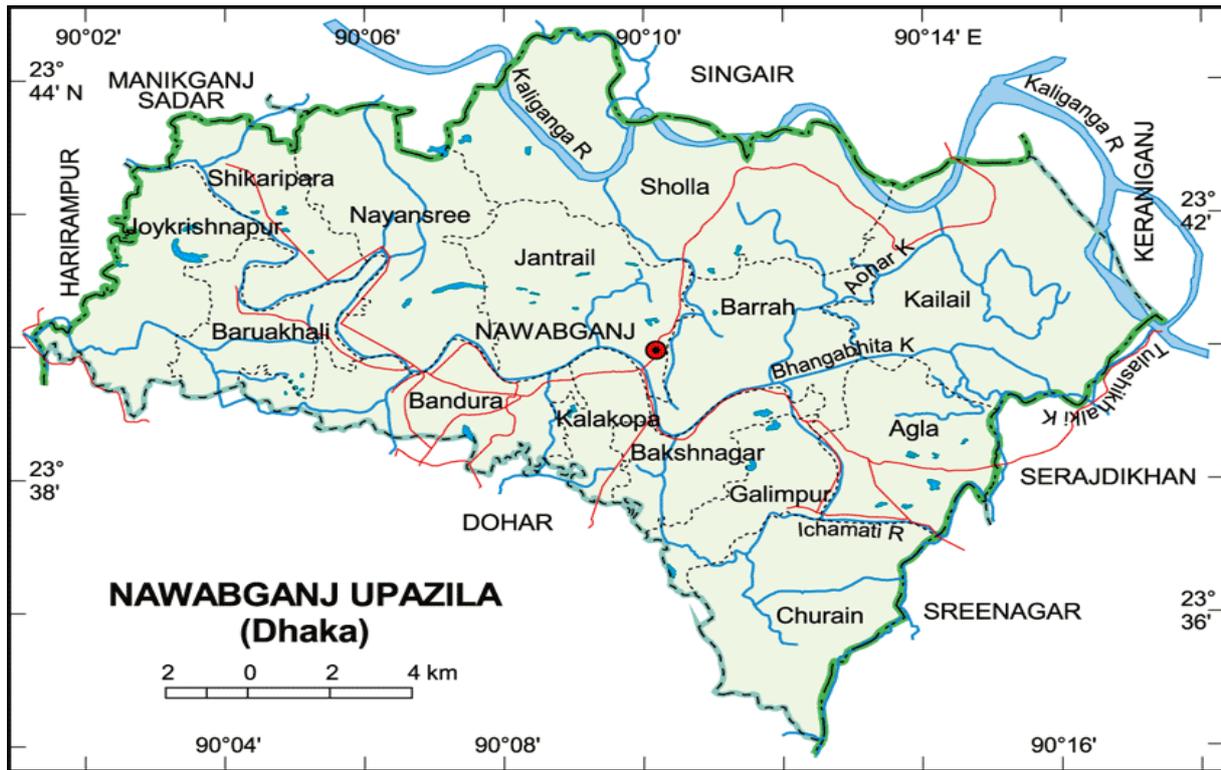


Figure 3-1: Administrative Boundary of Nawabganj Upazila

### 3.2.8 Places of Interest

In antiquity, Nawabganj likely occupied a strategic position within the Indian subcontinent, potentially witnessing the ebb and flow of various local empires and dynasties. During the medieval era, the region might have been part of the influential Sultanate of Bengal, contributing to trade and administrative networks that crisscrossed the subcontinent. With the advent of the Mughal Empire, Nawabganj could have continued to thrive as an economic and administrative center, potentially seeing the construction of architectural marvels that characterized Mughal urban planning. The notable site seeing spots attracting tourists are Afaz Uddin Shah Majar, Braja Niketan, Baktarnagar Zamidar bari, Khelaram Datar Kotha, Vanga Masjid, Hasnabad church and many more.

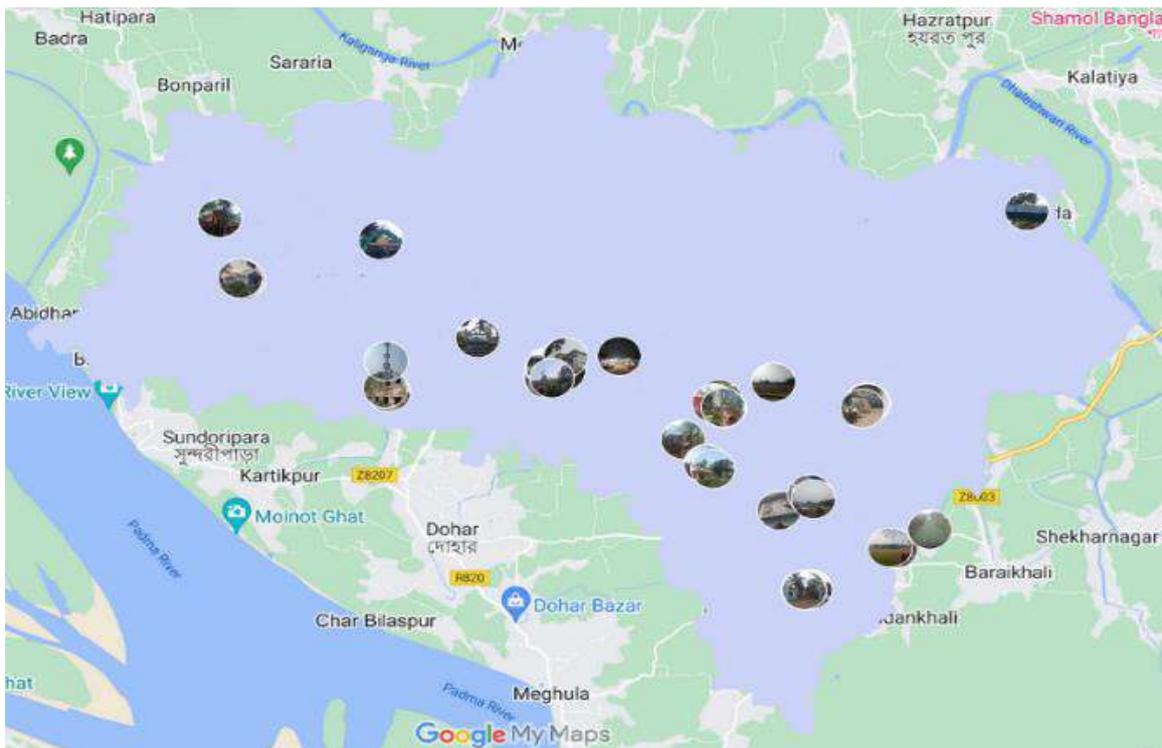


Figure 3-2: Notable Site Seeing of Nawabganj Upazila



Figure 3-3: Heritage site inventory with Director, 17 Ansar Battalion, Kolakopa

### 3.2.9 Sports and Recreation

Nawabganj upazila has a glorious past in sports. East Bengal and Mohon Bagan teams used to come from Kolkata to play football at the field of Yunus Sareng in Komarganj. The playground of

Nawabganj Pilot High School is located in the center of the upazila. Every year, Deputy Commissioner Gold Cup football competition, Deputy Commissioner Gold Cup cricket competition and various school sports games are arranged here. Kabigan-Bichargan still keeps the village people of this area entertained throughout the winter. Kolakopa, Bandura, Chandrakhola, Dighirpar, Bhanga Vita boats attract crowds during monsoons. Various fairs are held in Battala, Hattala, temple premises of the area. Kolakopa Harihar Ghosh fair, Galimpur fair, Gobindpur fair, Dohar-Nawabganj college ground fair still keeps the environment vibrant.

### 3.2.10 Famous Personalities

Nawabganj's famous personalities include the great poet Kaykobad, Shah Qari Mohammad Ismail, Sufi Pir Afaz Uddin Shah, local folk singer Abdur Rahman Boyati, Unique group's Chairman Md. Noor Ali, Jamuna group's Chairman Nurul Islam Babul and many more.

## 3.3 Present Practice of Selecting Heritage Buildings and Site in Bangladesh

The current method used by the concerned authority to choose a new heritage building or site for protection is not a scientific one. The relevant authority currently uses a piecemeal approach. An establishment or location was requested or put forward for inclusion on the protected list of Dept. of Archaeology (DOA) by the local government or Member of Parliament (MP). The DOA dispatched an officer to the building or site after receiving a request from the field level. The building or location is initially approved as a protected monument by the Director General (DG) of DOA based on the officer's favorable report. The Ministry of Culture, however, has the last say in the matter. However, there is no advisory group or technical committee involved in the selection process. As a result, there is a lower likelihood of choosing additional potential buildings or sites for future conservation. Because DOA lacks a list of historically significant structures or sites that have been given priority for future conservation based on a grading system. To evaluate historical structures or locations for potential future conservation work, a grading system is crucial (Ali, 2017).

Table 3-2: Criteria for considering a Heritage Site

Criterion	Sub - Criterion
Associate historical significance	Associated with an event
	Associated with a notable person
	Age of the building or site
	Importance of building or site in the historical development of Bangladesh
	Trends/ Patterns/ Themes
Architectural, Artistic & Aesthetic significance	Style
	Designer/Builder
	Construction materials
	Aesthetic
	Potential for conservation
Setting and landmark status	Group or setting significance

	Community context
	Landmark status
	Zoning compatibility
	Collective memory of the community
Authenticity, Integrity, and Rarity	Survival status
	State of preservation
	Site and foundation
	Compatibility to current use
	Adaptive re-use potential
Significance from archaeological, technological, scientific, and spiritual perspective	Rarity of age, construction materials
	Archaeological potential
	Technological and scientific potential
	Spiritual significance
	Social significance

### 3.4 Study Methodology

The study was conducted by review approach, brainstorming and literature review on historical, heritage and tourism. The Dhaka City Structure Plan, Detail Area Plan (DAP), previous upazila master plan and working papers, existing rules and regulations, higher level plans are reviewed. For the convenience of the study, stakeholder mapping is done to picturesque the related stakeholders so that none of the opinions are missed and to develop a bridge between end-users and authority encouraging bottom-up approach of planning. Before moving onto the field visit for secondary data collection from different offices in the Nawabganj Upazila Parishad, Key Informant Interview (KII), meeting minutes and to picturesque the heritages co-ordination schema along with a questionnaire is developed. Finally, policy guidelines are prepared to present it in the form of report writing and power point presentation. The consultants appointed a team to conduct an expedition in the project area. The purpose of this visit is to achieve a preliminary idea, secondary data collection, physical characteristics of the surrounding environment, including various kinds of problem, infrastructure, the state of the transportation system etc. about the history, heritage, tradition, and culture.

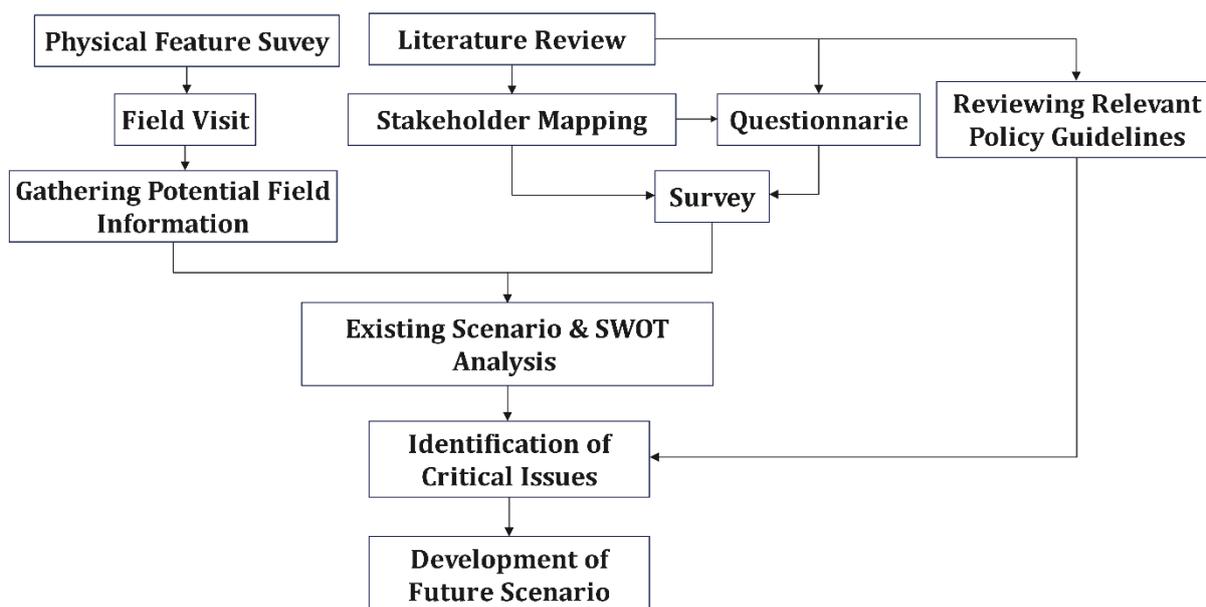


Figure 3-4: Core Methodological framework for heritage study

### 3.5 Stakeholder Mapping

A stakeholder is any individual or organization that has an interest in the development of a particular sector. In other words, persons, and groups (including the general public, local communities, interested groups etc.) who are affected by or can affect the implementation of a plan are called stakeholders. It is very helpful to target people who are related to the project. The diagram for stakeholder mapping is divided into a quadrant having x-axis and y-axis. The stakeholders having Interest in the project are put in x-axis where the stakeholders having Power to implement the project are put in y-axis. The national government should be satisfied as they are all in all. The residents and students have more interest in the project and least power to implement the project. This is why residents and students should be kept always informed. The stakeholders who will monitor the project have similar least weight regarding Power and Interest to the project. Lastly, those who will manage closely have greater but similar weight in Power and Interest to the project.

## Stakeholder Mapping

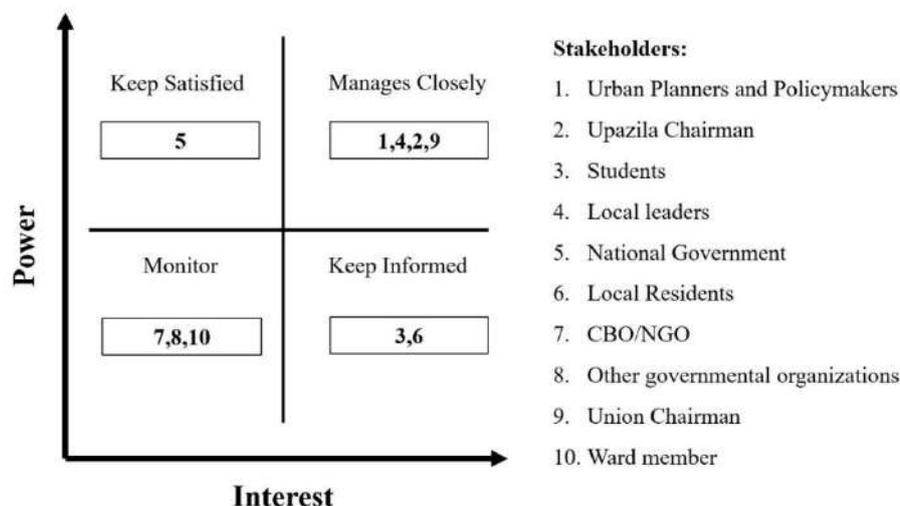


Figure 3-5: Stakeholder mapping for heritage site study

### 3.6 Existing Scenario of Heritage and Critical Issues

Nawabganj upazila is enriched in its history, old buildings, and heritage sites. The inventory of heritage sites was done with a questionnaire survey covering the important aspects for being a heritage site.

Table 3-3: Heritage site inventory of Nawabganj Upazila

Union Name/Location	Name of potential heritages
Galimpur	Afaz Uddin Shah Shrine (Major)
	Martyrs Monument
Shikharipara	Boktar Nagar Zamidar Bari
Kailail	Binod Shah Major
	Vanga Vita Snap Melon (Bangee) Floating Market
Churain	Muskil Kosha/Shona Hazra Madrasha
	Nur Ali Shaheb's residence
	Jamuna Group owner's residence
	Cow/Bull race
	Churain cultural club
	Boat race
Bakhshanagar	Komorganj evening market
	Late actor Jashim's residence
	Bakhshanagar Church/ St. Anthony of Padua's Church
	Hormohon Shah Zamidar Bari and Temple
	Row Saraj Gosai Akhra
	The Great Lion Circus troupe origination
Agla	Moha Kobi Kaykobad's residence

	Hazrat Shah Sufi Sayed Mokarram Ali
Bandura	Hasnabad Church (Rani Jopmala church)
	Shahi Vanga Masjid
Joykrishnapur	Zomidar Bari & Shibmondir Bari
Kolakopa	Braja Niketon
	Ansar Camp (Painna Bari & Teli Bari & Podder Bari & Moth Bari)
	Kokil Peyari
	Radha Romon Zamidar Bari (Adjacent to Braja Niketon)
	Bagmara Moth
	Khelaram Datar Kotha
	Adnan Palace
Nayansree	Mohamaya Temple
	Borogolla Church/St.Francis Xavier's Church
	Tuital Church/Holy Spirit Church

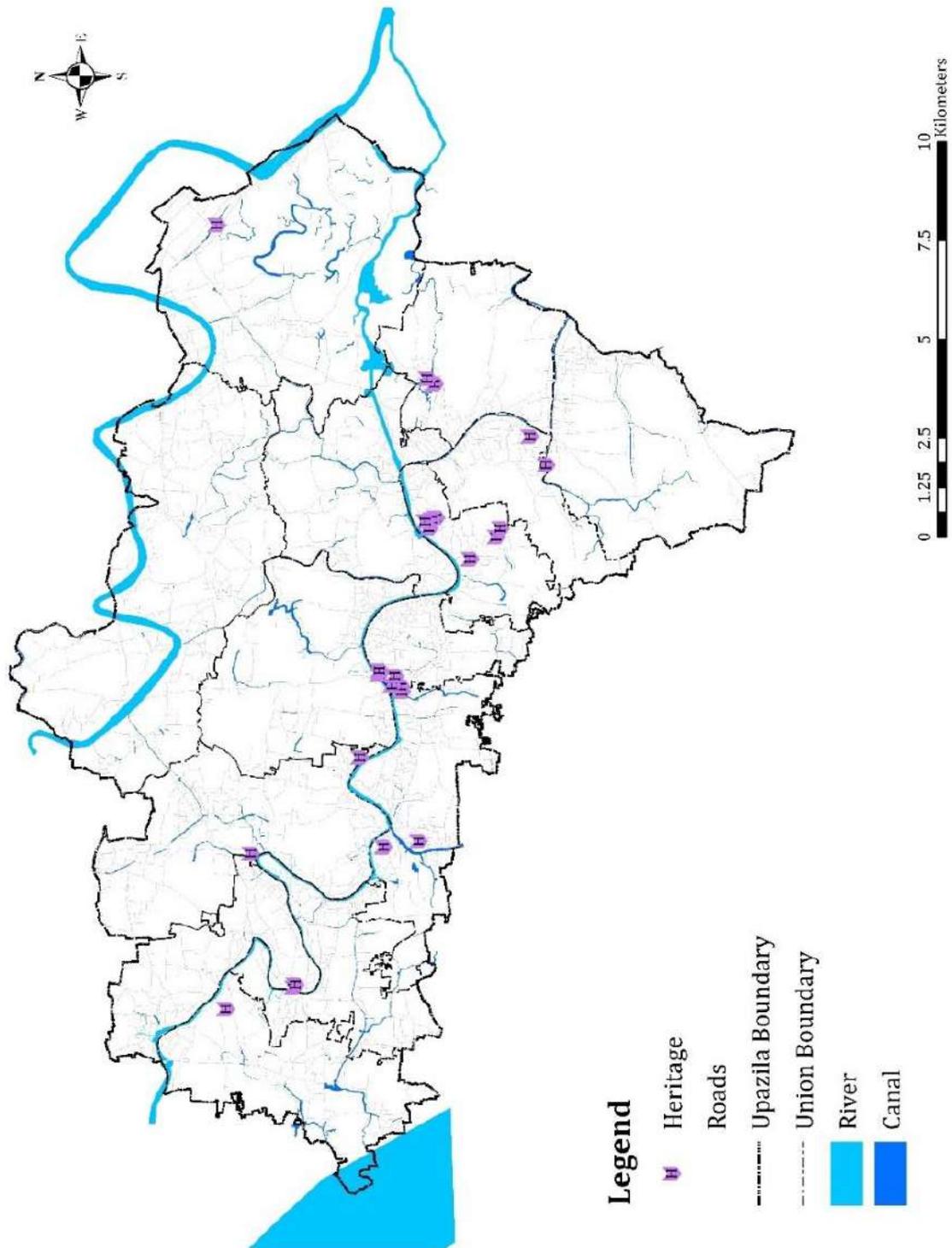


Figure 3-6: Heritage site map

### 3.6.1 Boktar Nagar Zamidar Bari

Boktar Nagar Zamidar Bari has a history of minimum 300 years. It has private ownership, and some parts were land handed over through Waqf. It is located at Boktar Nagar, ward no. 06 of Shikaripara union. Previously, it was used as residential purpose of Zamidari affairs but now these are ruins. Only Boktar Nagar Zamidar Bari Masjid has been renovated. The overall conditions of the site and surrounding natural site is dilapidated. The site has exotic old trees like Palm, Date, Mango, Sonali, and Shimul trees. The road condition for accessibility is bad having no parking facilities. According to local residents, yearly around 5000 people visit this area.



Figure 3- 7: Boktar Nagar Zamidar Bari Ruins



Figure 3-8: Visitors in Boktar Nagar Zamidar Bari for photoshoot



Figure 3-9: Boktar Nagar Zamidar Bari Palm trees



Figure 3-10: Boktar Nagar Zamidar Bari Pond



Figure 3-11: Boktar Nagar Zamidar Bari Masjid

### 3.6.2 Binod Shah Mazar

Shah Sufi Hazrat Binod Shah (R.A.H) was a sufi pir who came to the Kailail region minimum of 100 years ago. He instructed his fellows not to share anything about his life, not even his birth date and no festivals in his name to be arranged till date. It is located at Noyakanda, ward no. 09, Kailail. Programs like waaz-mahafil, mojlish occurs specially for 2 days in winter season. It is highly restricted to taking photos from inside.



Figure 3-12: Entrance gate of Binod Shah Majar

### 3.6.3 Afaz Uddin Shah Mazar

It is said that Mawlana Sufi Pir Afaz Uddin Shah was born in 19<sup>th</sup> century at Galimpur region. He used to travel to different region of Bengal for preaching Islamic religion. Shah Qari Ismail was a contemporary with Afaz Uddin Shah. Two largest Orosch are arranged every year on last Sunday of Ashar (Bengali month) and 9<sup>th</sup> of Poush (Bengali month). Besides, there are other four small Orosch arranged. Presently, Babu Shah, the grandchildren of Afaz Uddin Shah is now in charge of the authority of the majar.



Figure 3-13: Entrance of Afaz Uddin Shah Mazar



Figure 3-14: Afaz Uddin Shah Mazar's Fair

### 3.6.4 Shona Hazra Madrasha

Shah Qari Mohammad Ismail (R.A.H.) was born in Shona Hazra village of Churain union. A madrasha, named Shona Hazra Mofizia Madrasha was built on his father's name, Shah Mofiz as a memory. During the-then British period, he went to jail for the acquisition of cutting his wife's ear for disobeying. He did it for making it a reason to go to jail to change the culture of British jail system and dress-up and also to spread Islam in the darkness of jail rooms. He initiated present Jail dress up following Islamic tradition with Tupi (cap), full pant. Previously, British style was

followed with half-pant culture. He ordered his fellow, Munsii Kamal Uddin to establish a masjid named Masjid-e- Mushkil Kosha.



Figure 3-15: Shona Hazra Mufizia Madrasha



Figure 3-16: Muskil -e-Kosha Masjid

### 3.6.5 Komorganj Evening Market

Komorganj evening market is around 100-150 years old and located at ward no. 01 of Bakhshanagar union. It is as weekly haat (Sunday) having an area of around 4 acres. Every Monday, cow haat is also arranged beside the market region. Younus Sareng, a wealthy businessman in Kolkata authorized his trading in Komorganj area through Ichamoti river. In this way, Komorganj market evolved. This market has a specialty for the day laborers that they get their wages in the evening after that they buy their daily/weekly needs from the market. There are other daily markets too, but this weekly evening market is bustling with people.



Figure 3-17: Komorganj Evening Market's place

### 3.6.6 Bakhshanagar Church

St. Anthony's church is widely known as "Bakhshanagar Church" located at ward no. 06 of Bakhshanagar Union of Nawabganj Upazila. It was established in 1894 and transferred to a new location after its renovation. The old one is currently used as Fr. Evans Kindergarten school. The church is aesthetically sound having a beautiful grotto.



Figure 3-18: Old Bakhshanagar Church



Figure 3-19: New Bakshanagar Church

Grotto means the praying space. Sunday prayer, wedding ceremony, Easter Sunday, Christmas festivals make the environment bustling with people.



Figure 3-20: Band Party Celebration during wedding ceremony in Bakshanagar church



Figure 3-21: Aesthetic Grotto, a praying space

### 3.6.7 Hasnabad Church

Hasnabad church is widely known as “Pabitra Rani Jopmala Girza” (Holy Rosary Church) which was established in 1777. It is situated in ward no. 05 of Bandura union. Programs are arranged on the occasion of Sunday prayer, wedding ceremony, Easter Sunday, and Christmas festivals. The evolution and arrival of Christian community started from Hasnabad region and spread gradually.



Figure 3-24: Servant of God Archbishop T.A. Ganguly Memorial



Figure 3-23: Grotto space for praying



Figure 3-25: Cemetery inside Hasnabad church

### 3.6.8 Borogolla Church

The name of the church in Borogolla is St. Francis Xavier Church which is situated in ward no. 09 of Nayansree union. It was established in the year 1850. Veteran Fr. Benin came in Golla and established a preaching center at first. Gradually settlement of Christian community evolved in this area. Saint Francis Xavier was born in Spain in the year 1506. The church was named after him.



Figure 3-26: Borogolla Church



Figure 3-27: Saint Xavier's Sculpture



Figure 3-28: Cemetery inside church



Figure 3-29: Grotto, a praying space

### 3.6.9 Tuital Church

The Holy Spirit Church is located at Tuital of Nayansree union. It was established during the year 1894. And re-established in the year 1993 by the initiative of Archbishop Michael Rozario. The first Father of this church was Fr. Noberto Avelino Lobo. The trees and open field in the church create a pleasant environment.



Figure 3-30: Entrance gate of Tuital Church



Figure 3-31: Holy Spirit Church, Tuital, Nayansree



Figure 1-32: Grotto, a praying space

### 3.6.10 Late Actor Jashim's Residence



Figure 3-33: Ruins of actor Jashim's house



Figure 3-34: Entrance towards actor Jashim's house

### 3.6.11 Great Poet Kaykobad's residence

The ancestral house, which houses the memory of the great poet of Bengali literature, Kaykobad, is currently on the verge of destruction due to vacancy and neglect.



Figure 3-35: Great Poet Kaykobad's residence and name plate ruins

This great poet was born in Agla Purvapara village of Nawabganj, Dhaka in 1858 and he breathed his last at Dhaka Medical College Hospital on July 21, 1951 due to old age. The residents of the area complained that the poet's memorial house and a part of the land had been sold by his descendants to the local people. But now they have taken over all the property of the poet. Now there is no trace of the poet in Agla Purbapara village of Nawabganj. Necessary steps can be taken to restore the ruined homestead of poet Kayakobad and establish a museum or library there and preserve his belongings.

### 3.6.12 Hazrat Shah Sufi Sayed Mokarram Ali Majar

Hazrat Shah Sufi Sayed Mokarram Ali was born in 1878 at Purbopara Miah Bari, Agla union. The Miah Bari Masjid was established in 1894 (1300 Bengali Year) having Mughal architectural influence.



Figure 3-37: Miah Bari Kachari House

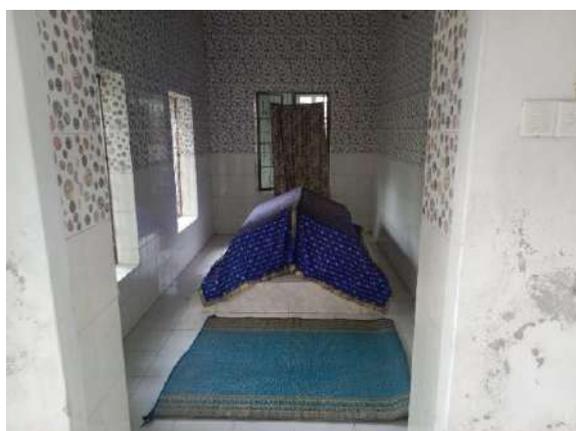


Figure 3-38: Hazrat Shah Sufi Sayed Mokarram Ali Majar



Figure 3-36: Miah Bari Masjid, Agla

### 3.6.13 Shahi Vanga Masjid

Shahi Vanga Masjid was established during the year 1616 (approximately). Its original year of establishment is not yet known. The masjid has a Mughal architectural blend in its design. It is situated in ward no. 07 of Bandura union. The Mughal emperors used to come in Bengal for state affairs via Ichamoti river. During the journey, they made a halt in this region and established a masjid for praying. It is believed that it was built during the period of Mughal Emperor Jahangir, that's why it is assumed that it was built around 600 years ago. When the Mughal empire ended, the masjid was abandoned. It gradually turned into ruins. So, when the local people discovered the masjid and named it as Vanga (Broken) masjid. The Actual name of this mosque is still unknown. The mosque has a legend about it. It is believed that one morning some people found it in the jungle with unfinished construction work. From that time the mosque has named "Vanga Masjid" as in the native language Vanga means broken. A person who is regionally known as Abjal Police (worked in Bandura Police outpost) re-established the masjid's construction works. Muslim, Hindu, Christian people from every religion come to offer their vows in the masjid.



Figure 3-39: Entrance of Shahi Vanga Masjid



Figure 3-40: Present outlook of Shahi Vanga Masjid



Figure 3-41: Shahi Vanga Masjid's Minaret

### 3.6.14 Mohamaya Temple

Mohamaya temple is located at Goaal Nogor, ward no. 01 of Kalakopa union. It was established by Horihor Ghosh in the year 1929 (1335 Bengali year). Horihor Ghosh used to be engaged with woodworks and wood business. Once during the shipment of wood in Horihor Ghosh's name in Moinot Ghat, a wrapped log of wood also came. Horihor Ghosh was not aware of that while his business staff gave unimportance to the wrapped log of wood. That very day, an old woman came to Horihor Ghosh's house in the morning and told that the wrapped log of wood was Mohamaya (Hindu goddess) herself and want a place in Horihor Ghosh's house. After hearing this, Horihor Ghosh's turned his face towards his family members to bring water, food to welcome the old lady. It is said that, in the meantime, the old woman disappeared within the blink of an eye. Horihor Ghosh realized that she was none other than Mohamaya herself. Without wasting any time, Horihor Ghosh made the arrangement to place the wrapped wood log and transformed it into a temple. All religions' people come in the Mohamaya temple to offer their vows.



Figure 3-42: Inside of Mohamaya Temple

### 3.6.15 Braja Niketan

It is one of the historical places of Nawabganj Upazila. It is in the Kalakopa Union. For almost four decades, a local power leader has been occupying it as his place. He used to herd deer here illegally. Later in 2023, the Govt. acquired it and declared as a historical place. Govt. also renovate it and very soon it will be opened for the public. Braja Niketan is a magnificent monument in architectural style. Zamindar Brajen Roy aka Sudarshan Roy built a magnificent palace in Hazratpur Mauza in Kalakopa Union of Nawabganj Upazila of Dhaka District around 200 years

ago near the banks of Ichamoti River. Archaeologically and historically valuable, this structure is a unique link between past and present.



Figure 3-43: Braja Niketan



Figure 3-44: Heritage Site Visit with Team Leader at Braja Niketan



Figure 3-45: Heritage Site Visit with Team Leader at Ansar Camp



Figure 3-46: Heritage Site Visit with Team Leader at Khelaram Datar Kotha

### 3.6.16 Ansar Camp

There are also several clusters of old buildings in Kolakopa union mostly set up by merchants who lived that region previous years, who were traders of various kinds of produces, including salt. Over time, many of these buildings have fallen prey to locally influential land grabbers. Most of these buildings are in a state of ruins, desperately requiring due attention. Some buildings have been acquired by the Ansar & Village Defense Party (VDP), a paramilitary force of the government, and the authorities have renovated some of these structures and maintain them fairly well. Currently used as the Director's office of 17 Ansar Battalion, Kolakopa. The area's one part is also

leased to Vocational Training Center (VTC). It consists of Teli Bari, Poddar Bari, Moth Bari, Painna Bari.



Figure 3-47: Teli Bari in Ansar Camp



Figure 3-48: Poddar Bari in Ansar Camp



Figure 3-49: Moth Bari in Ansar Camp



Figure 3-50: Painna Bari in Ansar Camp

### 3.6.17 Adnan palace

A large park has been established in Kalakopa Union of Nawabganj Upazila of Dhaka District, owned by brave freedom fighter KM Alam Pokraj. The park is named after his only child Khandaker Adnan, named "Adnan Palace". Many people visit this park with their families during the holidays.

Located in the heart of Nawabganj Upazila of Dhaka District, Kalakopa, this modern entertainment center built in a scenic and pleasant environment has already become popular among people of all ages. Palace Park offers a wonderful opportunity to enrich children's knowledge base by introducing them to unknown and unfamiliar subjects, as well as increasing their mental and physical strength.

## Khelaram Datar Kotha

### Kolakopa Union



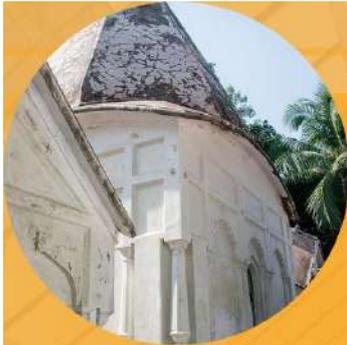
#### Before renovation

- 200 years old.
- Consists of 5 floors(now 2) with a large water tank on the roof.
- Declared as a national heritage by Department of Archaeology in 1989.
- Before renovation, it was reddish in colour but now the colour is white.

- Named after ferocious dacoit Khelaram.
- Khelaram used to bring dacoit loots through a secret tunnel into his house which were distributed among the poor. Thus, he got famed locally as Robin Hood.
- The building is situated beside a large water body that was used for worship.



Renovation by  
Archaeology  
Department, 2014.



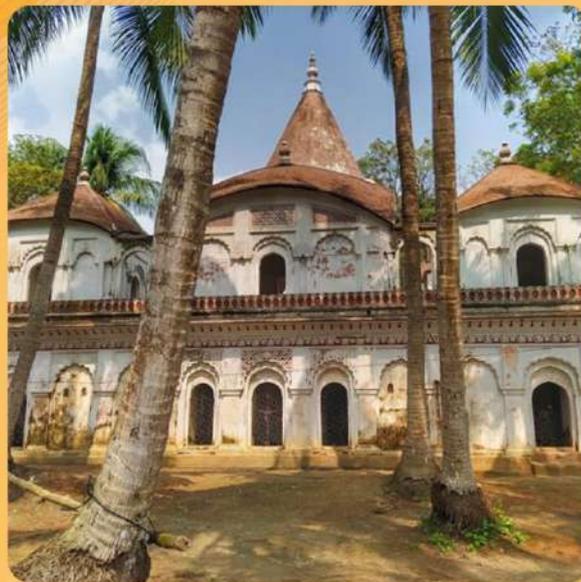
**Khelaram Datar Kotha  
Temple**

The artistic works has a blend of bengali or Gauriya tradition with European trends.



**Artistic clay work in  
Temple building**

A secret tunnel was used to bring the loots into Khelaram's kotha. Later on, the lootings were distributed among the poor.



**Khelaram Datar Kotha locally known  
as 'Andhar Kotha'**

There is a fiction that the moth shaped room was used to be a temple where the loots were kept.



**View of Tunnel connecting Ichamoti  
river and Khelaram temple**

It was named as 'Andhar Kotha' as no sunlight entered the building.



**Bathing space in  
building**



Horse performing acts during the show

- Thrilling shows are featured including live elephant, bear, horse, donkey, hyena, dog, deer etc.
- At present, the circus troupe has 3 elephants namely, Gopal, Chandrika, Rashmoni.



Bear riding bicycle during the show

- One of the oldest circus troupe in Bangladesh which was established by 'Raymohon Sarker' in 1905.
- Its legacy has continued as a family tradition where the fame has decreased with the time.
- The show runs in Matinee, Evening and Night show of 3 hours each.



The great 'Lion Circus' troupe of Nawabganj

- It originates from Bakhshanagar union of Nawabganj Upazila.
- The circus troupe performed 4-5 months yearly, scheduled for 15-20 days in one place.
- The circus troupe had 130 artists and performed 152 types games.



Laughter and thrills patronaged by circus troupe performers, artists

Besides all these notable heritage sites, there are also a few other old buildings in the ruined state which make it difficult to know the history of their establishment and ownership. Among them, Joykrishnapur union has the Shibmondir Bari, Bakhshanagar union has Hormohon Shah Zamidar Bari and temple, Row Saraj Gosai Akhra and Kalakopa union has Radha Romon Zamidar Bari, Ansar camp ghatpar and in Galimpur, there are liberation war memorials etc. built in memory of freedom fighters.



Figure 3-51: Shibmondir Bari, Joykrishnapur



Figure 3-52: Hormohon Shah Zamidar Bari



Figure 3-53: Hormohon Shah Zamidar Bari Temple, Bakhshanagar



Figure 3-54: Row Saraj Gosai Akhra, Bakhshanagar



Figure 3-55: Radha Romon Zamidar Bari, Kolakopa

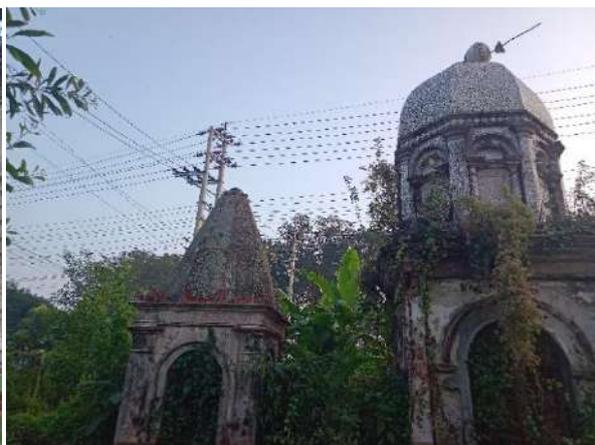


Figure 3-56: Radha Romon Zamidar Bari Moth, Kolakopa



Figure 3-57: Ansar Camp Ghatpar, Kolakopa

The critical issue among these heritage sites is that most of them are abandoned. They are found in ruin state, not properly maintained while some of them are left alone. Nawabganj upazila has a vast area having 14 unions which make challenging for proper mobility and accessibility to these heritage spots and further to convert it into tourist spot. All these heritage sites are enriched with history, tradition, and culture. The road width is also not sufficient for proper accessibility of vehicles.

### 3.7 SWOT Analysis

A useful technique for conducting a thorough evaluation of heritage assets, the SWOT analysis helps make well-informed decisions and takes appropriate action to guarantee the sites' viability, protection, and beneficial contributions to society. The strengths of the heritage sites of Nawabganj upazila are that they are abundant in number of heritage sites, historical relics and resources having the provision of low-cost destination. The locals are also very eager to be engaged in the publicity of these heritage sites. The weakness of these sites is that there prevails defective land transfer laws, rules and regulations, weakness in marketing, image and branding of heritage sites, poor road accessibility, inadequate media coverage, and no proper signage. There are opportunities to brand heritages, favorable access to a destination, creating employment for museum professionals and cultural managers for the promotion and conservation of heritage, and application of TDR strategies. The threats of these heritage sites

include the conflict of interest between land brokers and implementing authority, insufficient finances to address heritage issues etc.

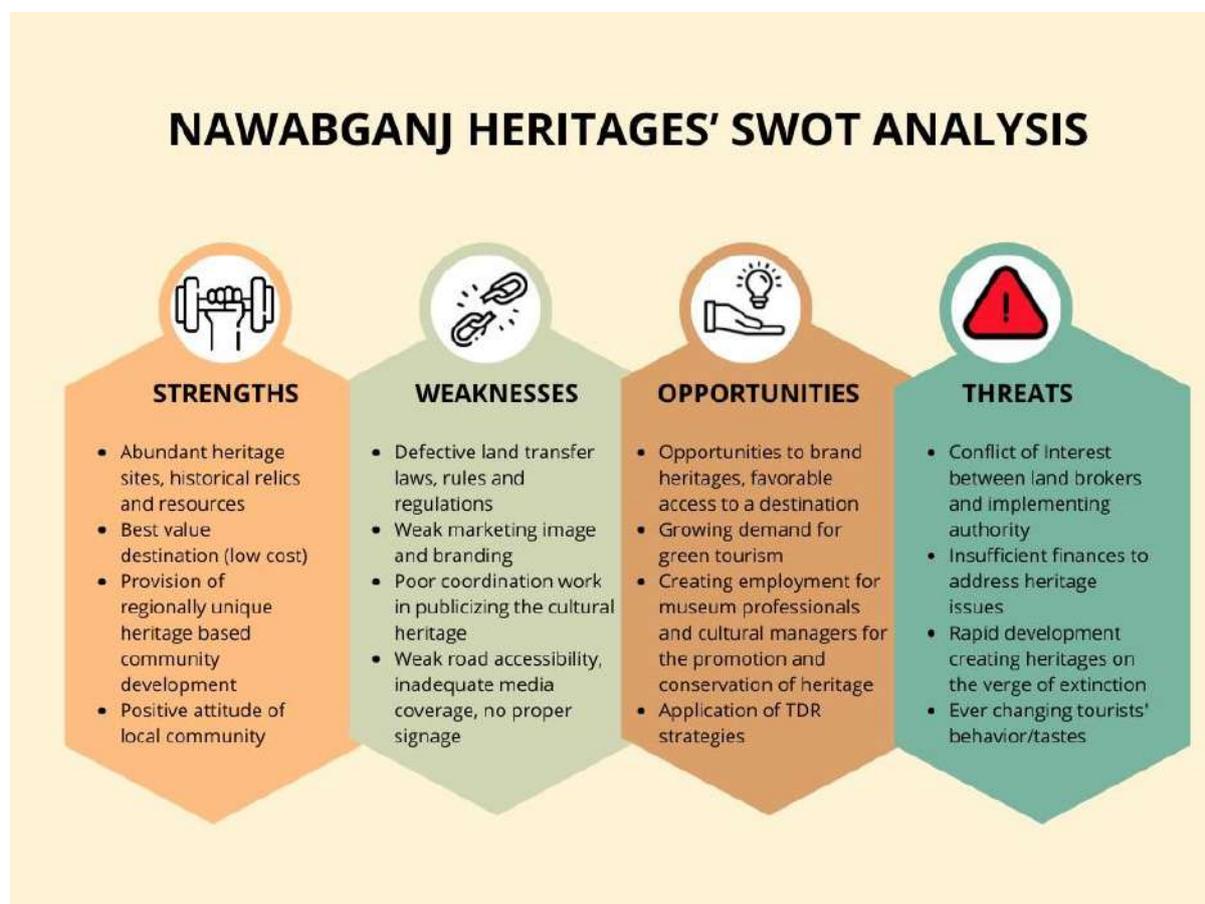


Figure 3-58: SWOT analysis for the heritage sites of Nawabganj Upazila

### 3.8 Recommendations

1. Improvement of the historical places, heritage, and tourism needs inventory of the places of interest in the upazila.
2. Can work out heritage-based TDR (Transfer of Development rights) as an incentive for maintenance and upkeep of heritage buildings and sites. Thus, will enhance property value by introducing tourist destination branding. They can be exempted from property tax.
3. Promotion of conservation and creation of awareness about heritage with publicity and involving the local public representatives.
4. Local fund may be generated for maintenance, repair and restoration of heritage buildings and sites.
5. Promotion of tourist destination branding to create place's competitive identity.

It makes the destination distinctive and differentiates it from all others. A destination brand refers to the enduring essence, or core characteristics, of the destination, which comprise its personality and make it distinctive and different from all its competitors. A destination brand exists in the eyes of the beholder. It is a dynamic relationship between the destination and how

it is perceived by potential customers and visitors. A destination brand is the fundamental building block from which all marketing communications and behavior should flow. To be truly effective, there must be harmony between the perceptions of both visitors and residents regarding the destination brand, in terms of the destination's key assets and how it is presented in marketing communications.



6. Introduction of awards for best maintained heritage buildings and sites. Government may purchase the heritage buildings and sites for conservation and maintenance.
7. The sites may be promoted through events or festivals, film, documentaries.

## **CHAPTER FOUR: OPEN SPACE AND RECREATION**

### **4.1 Introduction**

Nawabganj upazila is situated in very close proximity to Dhaka with an enriched prospect of linking open spaces for recreation. It needs immediate attention by regularizing and ordering of land, services, and infrastructural development to make both cities functional and compatible with local and regional settings.

Chapter 9 of the 8th Five Year Plan addresses the greatest challenge of rapid urbanization on a massive scale in the form of degradation of the urban environment. As a result, in order to accommodate rapid urbanization and increasing population, recreation and open space are filling up. One objective and strategy of 8<sup>th</sup> FYP for the Municipality and City Corporation's is "Ensuring land use Planning and Development Control of towns". The section-5 of "The Bangladesh Environment Conservation Act, 1995" (ECA, 1995) and Rule – 3 declared ecologically critical area for conservation. A nation's cultural history is supported by its heritage. The current era calls for the preservation of historic structures and locations. The need to halt the rapid deterioration and eradication of the heritages is quite an urge in Bangladesh. The working paper aims to assess the existing scenario regarding recreation and open space and finally to provide policy guidelines for future requirements regarding recreation and open space.

### **4.2 Definition and Classification**

The phrase "open space" is used extremely broadly to describe all areas that is not exploited for construction and is left in its natural state. Open space is not vacant space. The purposes of open space are connected to this usage of land, water, and air. Numerous active and passive recreational activities take place in open places. For outdoor physical recreation, there are playgrounds, sports fields, stadiums, etc. For mental and intellectual relaxation, there are parks, attractive gardens, and serene places of beauty with grass, trees, and water features. Open space can be used to create a beautiful image of visual elements. Open space can be defined as un-built lands within the city which provides environmental, social, and economic benefits for the communities. These areas typically include water and land areas used for recreation, scenic beauty, and conservation. Open areas serve as leisure spaces for urban residents, both actively and passively, in addition to their ecological and aesthetic significance. Outside of urban heritage, open space is a crucial component of both domestic and international tourists' leisure time. They are crucial livability indicators for towns and communities to guarantee the health and wellness of people living there.

The lungs of cities are thought to "be open spaces. The two are connected because of them. They provide a break from the routine of city life. Without an open space system, no municipal layout is complete. It is currently understood that their provision is a civic duty that should be carried out through town and rural planning. In order to provide adequate recreational opportunities, 10% of urban land should be set aside as open space (Murray, 1997) and apportioned in accordance with the town's population density. Any prudent human activity that produces a pleasurable reaction, at any time, location, or circumstance, and has accompanying enriching physical, intellectual, or emotional benefits is referred to as recreation. These areas are used for

mental or physical refreshment following a day of labor through amusing or simulating play activities. Through its surroundings, environments, and locations, it offers mental relaxation.

**Open Space:** Open spaces are defined as all publicly accessible and privately owned lands that have an open feel and are used for outdoor leisure. This includes not just undeveloped land but also, water and the upper atmosphere. They could range from modest playgrounds to sizable hunting grounds, lakes, and beaches.

**Recreation:** Recreation refers to activities or experiences that people engage in for enjoyment, relaxation, and fun. It is a way to take a break from work, school, or other daily responsibilities and to recharge and rejuvenate oneself. Recreation can take many different forms, such as sports, games, outdoor activities, creative pursuits like art and music, or simply spending time with friends and family. It refers to the provision of recreational spaces, facilities, and services for the residents of a city or town. This includes parks, playgrounds, sports fields, swimming pools, community centers, and other public spaces where people can engage in recreational activities.

### 4.3 Typology of Recreation and Open Space Facilities

Typology for recreation and open space facilities describes the concept of classification or categorization that is used for understanding and arranging various kinds of open space and recreational places. This typology facilitates the conception, design, and administration of areas that meet the many recreational demands of a community by urban planners, architects, and legislators. It offers a framework for classifying and recognizing different facilities, making sure they satisfy user preferences and particular goals.

Typically, typology takes into account elements like the size, purpose, user demographics, and activities available in these places. The following are some typical categories included in a typology of open-space and recreational facilities:

Table 4-1: Recreation Typology

Type	Description
Active recreation	Activities that require physical exertion and can range from team sports like soccer or basketball, to individual activities such as jogging, cycling, or hiking. These types of activities are typically well-suited for larger open spaces such as parks or trails.
Passive recreation	Activities that are more relaxed and can be enjoyed in a more tranquil setting. Examples of passive recreation include reading a book, having a picnic, or enjoying the scenery. These types of activities are typically well-suited for smaller open spaces such as plazas or gardens.
Water recreation	Activities that are centered around bodies of water such as lakes, rivers, or oceans. Examples of water recreation include swimming, fishing, boating, or paddleboarding. These types of activities are typically well-suited for open spaces with water features such as waterfront parks or beaches.

Cultural and Educational recreation	Activities that focus on learning about and appreciating the cultural or natural history of a place. Examples of cultural and educational recreation include nature walks, historical tours, or art exhibits. These types of activities are typically well-suited for open spaces with historical or cultural significance such as museums, monuments, or heritage sites.
Social and Community recreation	Activities that are designed to bring people together and foster social connections. Examples of social and community recreation include community events, festivals, or concerts. These types of activities are typically well-suited for open spaces that are centrally located and easily accessible to the community.

**Table 4-2: Typology for Open Space**

Type		Description
Neighborhood Open Space	Play lot	Small area intended for children of pre-school age having playing equipment such as low swings, slides, see-saw, sand boxes etc.
	Playground	Areas intended for children of ages 6-14 having courts like tennis, basketball, badminton, volleyball etc. for informal play.
	Play field	Area combining play lot and playground for young people and adults having provision of football, baseball, cricket etc.
	Parks	Areas like small parks, school parks and banks of small watercourses are designed mainly to serve a local area to get rid of noise and traffic rush being indiscriminately accessible in terms of age, gender, race, ethnicity, and religion.
	Incidental Open space	It means not the land just left over but properly designed open space such as the space between two buildings, footpath spaces etc.
City Open Space	City parks	Areas for passive recreation provided in or around the heart of the city.
	Parkways/ Boulevards	Areas with tree-lined avenues having separate provisions for cyclists, pedestrian, additional carriageways for vehicular traffic.
	Green belts	Areas not usually devoted to public recreation entirely but serves to restrict the further outward growth of city/town.
	Stadium	Areas for sports center, athletic fields, golf courses, racecourses etc. comparatively larger than play fields.
	Water bodies	Areas having opportunities for bathing, swimming, fishing, boating etc.
Regional/ National Open Space	National Park	Areas to picturesque mountainous regions, marshy lowlands, foreshore, flora, fauna, geology, entomology, forest ecology, meteorology, seismology etc.
	Botanical garden	Areas for scientific purposes having opportunity for passive recreation covering flora.

	Zoological garden	Areas for scientific purposes having opportunity for passive recreation covering fauna.
Public parks and gardens		Areas of land normally enclosed, designed, constructed, managed, and maintained as a public park or garden. These may be owned or managed by community groups.
Private gardens or grounds		Areas of land normally enclosed and associated with a house or institution and reserved for private use.
Amenity greenspace		Landscaped areas providing visual amenity or separating different buildings or land uses for environmental, visual or safety reasons and used for a variety of informal or social activities such as sunbathing, picnics or kickabouts.
Play space for children and teenagers		Areas providing safe and accessible opportunities for children's play, usually linked to housing areas.
Sports areas		Large and generally flat areas of grassland or specially designed surfaces, used primarily for designated sports (including playing fields, golf courses, tennis courts and bowling greens) and which are generally bookable.
Green corridors		Routes including canals, river corridors and old railway lines, linking different areas within a town or city as part of a designated and managed network and used for walking, cycling, or linking towns and cities to their surrounding rural areas. These may link green spaces together.
Natural/semi-natural greenspaces		Areas of undeveloped or previously developed land with residual natural habitats or which have been planted or colonized by vegetation and wildlife, including woodland and wetland areas.
Allotments and community growing spaces		Areas of land for growing fruit, vegetables, and other plants, either in individual allotments or as a community activity.
Civic space		Squares, streets, and waterfront promenades, predominantly of hard landscaping that provide a focus for pedestrian activity and can make connections for people and for wildlife.
Burial grounds		Includes churchyards and cemeteries.
Another functional greenspace		May be one or more types as required by local circumstances or priorities.

The typology may change depending on goals, setting, and features of a developed area or community. By using a thorough typology, planners and designers can make sure that the community's varied requirements and preferences are met by building a well-rounded network of open spaces and recreational areas.

## 4.4 Study Methodology

The study was conducted by review approach, brainstorming and literature review on historical, heritage and tourism. The Dhaka City Structure Plan, Detail Area Plan (DAP), previous Upazila master plan and working papers, existing rules and regulations, higher level plans are reviewed. For the convenience of the study, stakeholder mapping is done to picturesque the related stakeholders so that none of the opinions are missed and to develop a bridge between end-users and authority encouraging bottom-up approach of planning. Before moving onto the field visit for secondary data collection from different offices in the Nawabganj upazila, KII, meeting and to picturesque the heritages co-ordination schema along with a questionnaire is developed. At last policy guidelines are prepared to present it in the form of report writing and power point presentation.

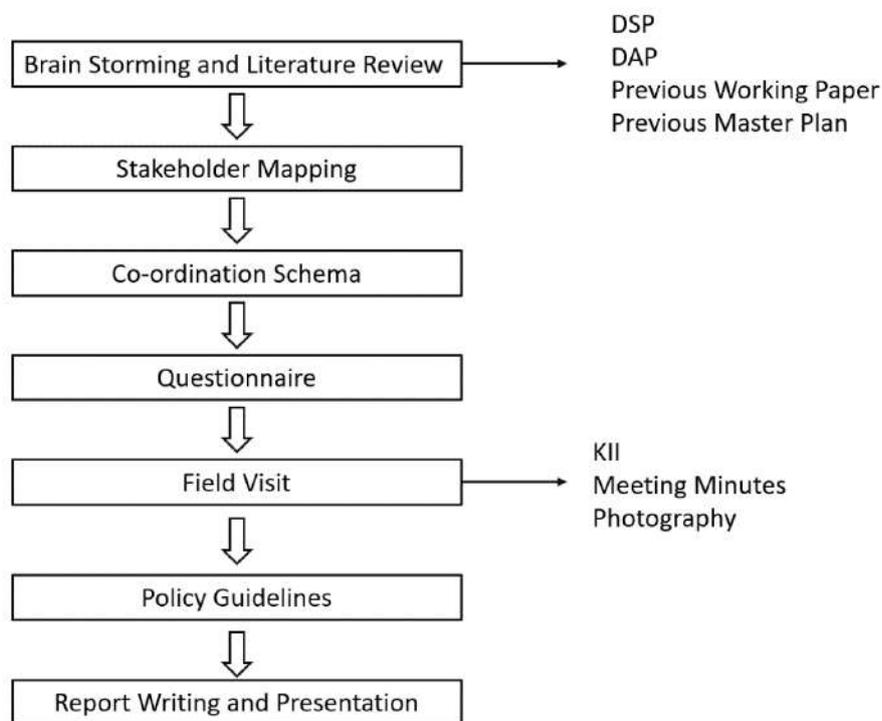


Figure 4-1: Core Methodological Framework

## 4.5 Stakeholder Mapping

A stakeholder is any individual or organization that has an interest in the development of a particular sector. In other words, persons, and groups (including the general public, local communities, interested groups etc.) who are affected by or can affect the implementation of a plan are called stakeholders. It is very helpful to target people who are related to the project. The diagram for stakeholder mapping is divided into a quadrant having x-axis and y-axis. The stakeholders having Interest in the project are put in x-axis where the stakeholders having Power to implement the project are put in y-axis. The national government should be satisfied as they are all in all. The residents and students have more interest in the project and least power to implement the project. This is why residents and students should be kept always informed. The stakeholders who will monitor the project have similar least weight regarding Power and Interest to the project. Lastly, those who will manage closely have greater but similar weight in Power and Interest to the project.

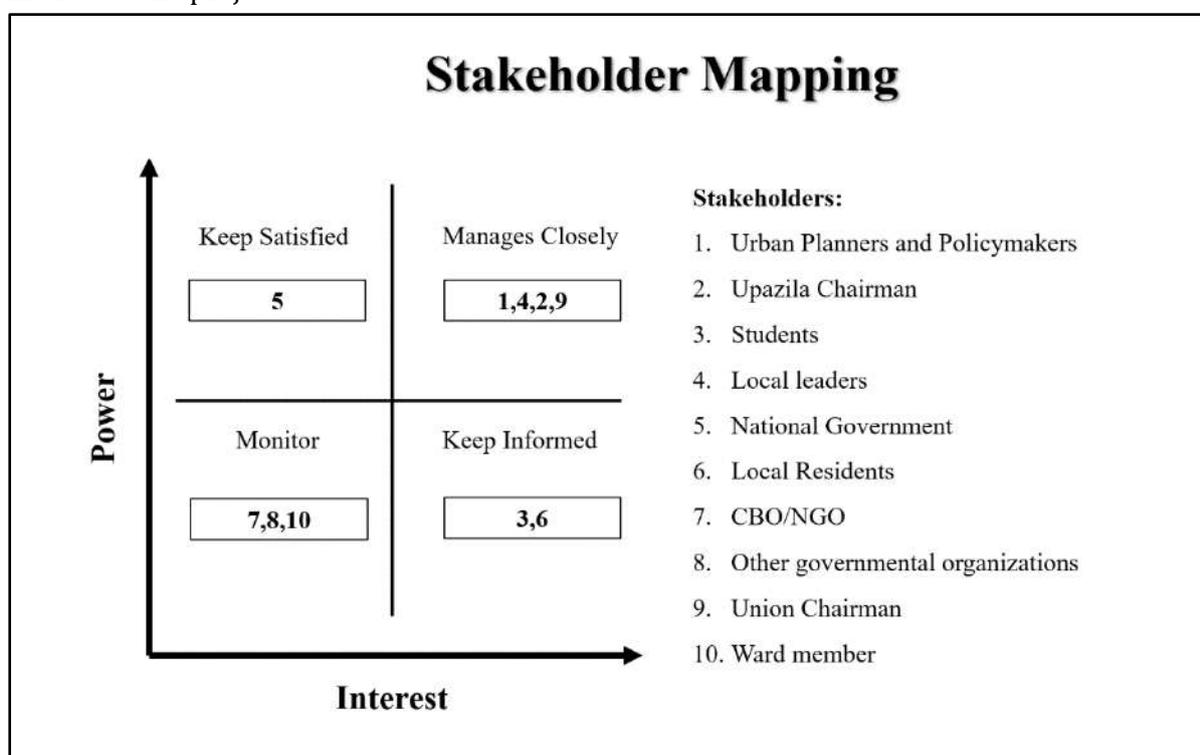


Figure 4-2: Stakeholder Mapping

Table 4-3: Co-ordination Schema

Objective 01: To assess the existing scenario regarding recreation and open space		
Complex Variable	Simple Variable	Data Collection Method / Work Approach
Open spaces	<ul style="list-style-type: none"> <li>• Classification and listing</li> <li>• Natural and man-made elements</li> <li>• Plant categories</li> <li>• Soil quality</li> <li>• Standards</li> </ul>	Physical Survey, Secondary Data Collection <b>Divisional Forest Office Dhaka, DoE, District Commissioner</b>

	<ul style="list-style-type: none"> <li>• Hierarchy</li> </ul>	
Recreation	<ul style="list-style-type: none"> <li>• Linkage between open space and recreation</li> <li>• Natural recreational facilities</li> <li>• Man- made recreational facilities</li> <li>• Important landmarks</li> </ul>	Physical Survey, Secondary Data Collection
Recreation facility types	<ul style="list-style-type: none"> <li>• Outdoor recreation facilities</li> <li>• Indoor recreation facilities</li> </ul>	Physical Survey, Secondary Data Collection
Environment	<ul style="list-style-type: none"> <li>• Pollution</li> <li>• Surrounding features</li> <li>• Heat island</li> <li>• Weather</li> <li>• Temperature</li> </ul>	Physical Survey, Secondary Data Collection
<b>Objective 02: To assess future requirements regarding recreation and open space</b>		
Wildlife habitat	<ul style="list-style-type: none"> <li>• Flora</li> <li>• Fauna</li> <li>• Sanctuary</li> </ul>	Physical Survey, Secondary Data Collection <b>Divisional Forest Office Dhaka, DoE, District Commissioner</b>
Mobility	<ul style="list-style-type: none"> <li>• Pedestrian Walkway</li> <li>• Bi-Cycle Lane</li> <li>• Vehicle Choice</li> </ul>	Physical Survey / Design Process
Accessibility	<ul style="list-style-type: none"> <li>• Parking Facilities</li> <li>• Roadway</li> </ul>	Physical Survey / Design Process
Services and Facilities	<ul style="list-style-type: none"> <li>• Restaurants</li> <li>• Recreational Points</li> <li>• Price Range</li> <li>• Viewpoint</li> <li>• Relaxing Spot</li> </ul>	Physical Survey / Design Process
Safety and Security	<ul style="list-style-type: none"> <li>• Area Boundary</li> <li>• Unsocial Activity</li> <li>• Emergency Equipment</li> <li>• Street Lighting</li> </ul>	Physical Survey / Design Process

## 4.6 Existing Scenario and Critical Issues

### 4.6.1 Recreation and Open Space Sites

The consultants appointed a team to conduct a secondary data collection expedition and to picturesque heritage landmarks in the project area. The purpose of this visit is to achieve an idea about the physical characteristics of the heritages, history, tourism, its surrounding environment, including various kinds of problem, infrastructure and utility facilities, the state of the transportation system, institutional adequacy etc. The team has also performed a preliminary consultation with a number of important project stakeholders, which are covered in the following

sections. A courtesy meeting with Assistant Engineer, Nawabganj Upazila was conducted at his office. The team was able to explain all the specifics required of the project's completion of Nawabganj upazila master plan. He showed the crew with some necessary material and expressed a strong interest in the upazila master plan. Additionally, he briefly discussed some of upazilas most pressing issues on public spaces. He quoted:

**Table 4-4: Recreation and Open Spaces Sites**

<b>Name of the site</b>	<b>Type</b>	<b>Location</b>	<b>Having any impact on Nawabganj upazila or not?</b>
Cow/Bull race	Race	Churain	No
Boat race	Race	Churain	No
Churain field	Cricket, football	Churain	Yes
Afaz Uddin Shah Fair	Fair	Galimpur	Yes
Snap Melon (Bangee) Bazar	Floating market (potentiality)	Kailail	Yes
Dokkhin Bolumonto Shadhur Mela	Fair	Sholla	Yes
Shingzor Majar Mela	Fair	Sholla	Yes
Hindu tradition Kacha chera festival	During Saraswati Puja	Sholla	No

*(Source: Physical Feature Survey, 2023)*

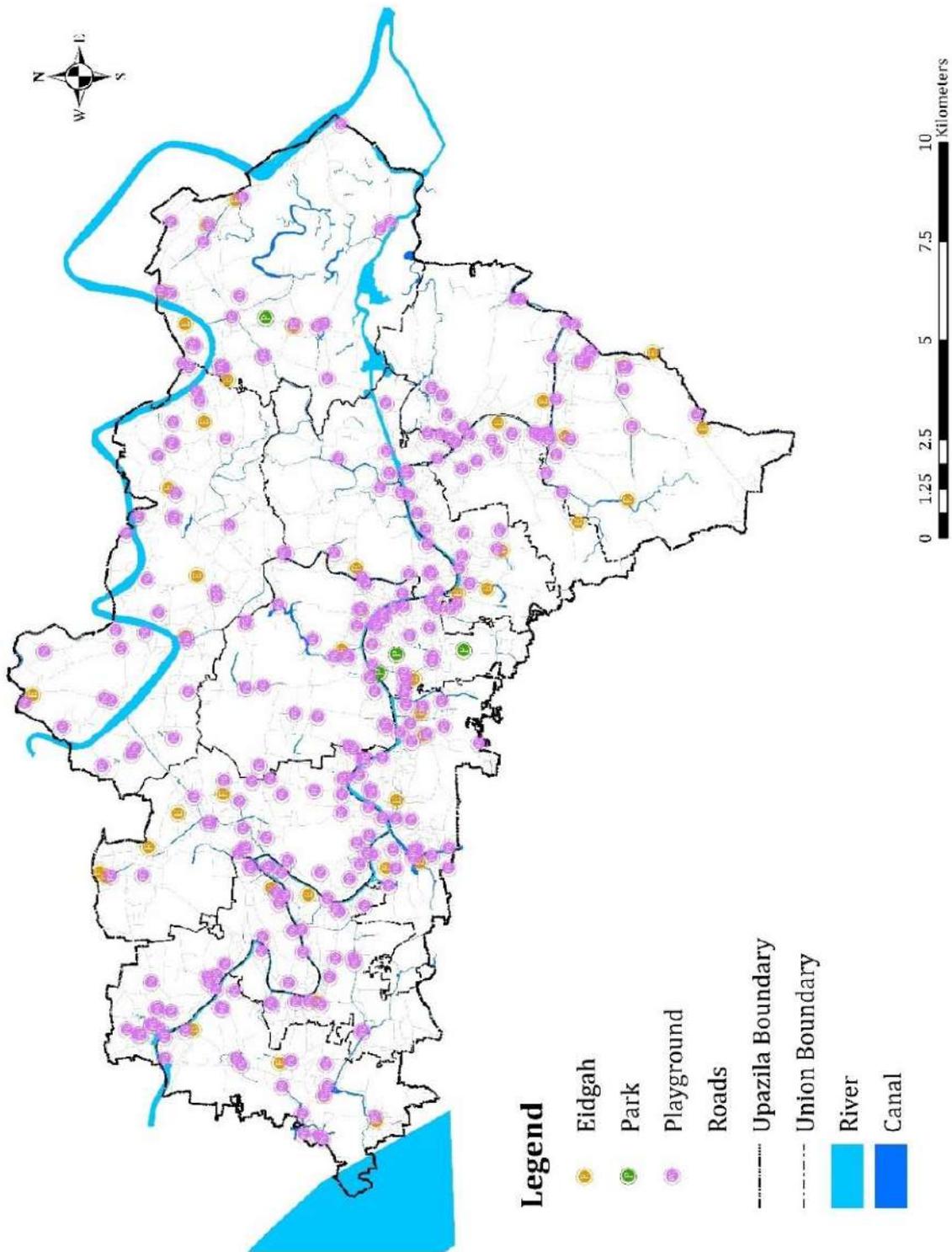


Figure 4-3: Location of Open Space and Recreation Facilities in Nawabganj Upazila

#### 4.6.2 Findings of Physical Feature Survey

There are different type of recreation and open spaces that are identified through physical feature survey.

**Table 4-5: Type of Recreation and Open Spaces**

Serial No	Type	Number	Ownership
1	Playground	288	Public
2	Eidgah	46	Public
3	Shahid Minar	9	Public
4	Park	4	private
5	Heritage site/Zamidar Bari	32	Private, public

(Source: Physical Feature Survey, 2023)

Union-wise recreational facilities are also identified through physical feature survey.

**Table 4-6: Union-wise Recreational Facilities**

Union Name	Eidgah	Park	Playground	Grand Total
Agla	1		12	13
Bakshanagar	3		13	16
Bandura	5		27	32
Barrah	1		17	18
Baruakhali	2		19	21
Churain	7		15	22
Galimpur	2		12	14
Jantrail	2		22	24
Joykrishnapur	4		18	22
Kailail	6	1	23	30
Kolakopa	1	3	19	23
Nayansree	5		36	41
Shikaripara	1		22	23
Sholla	6		33	39
<b>Grand Total</b>	<b>46</b>	<b>4</b>	<b>288</b>	<b>338</b>

(Source: Physical Feature Survey, 2023)



Figure 4-4: Open space and Recreation facilities in Nawabganj Upazila



Figure 4-5: Playgrounds in Nawabganj Upazila

According to the local people, there is a lack of proper recreation facilities. Existing playground needs different types of activity such as basketball ground, football ground, cricket ground etc.

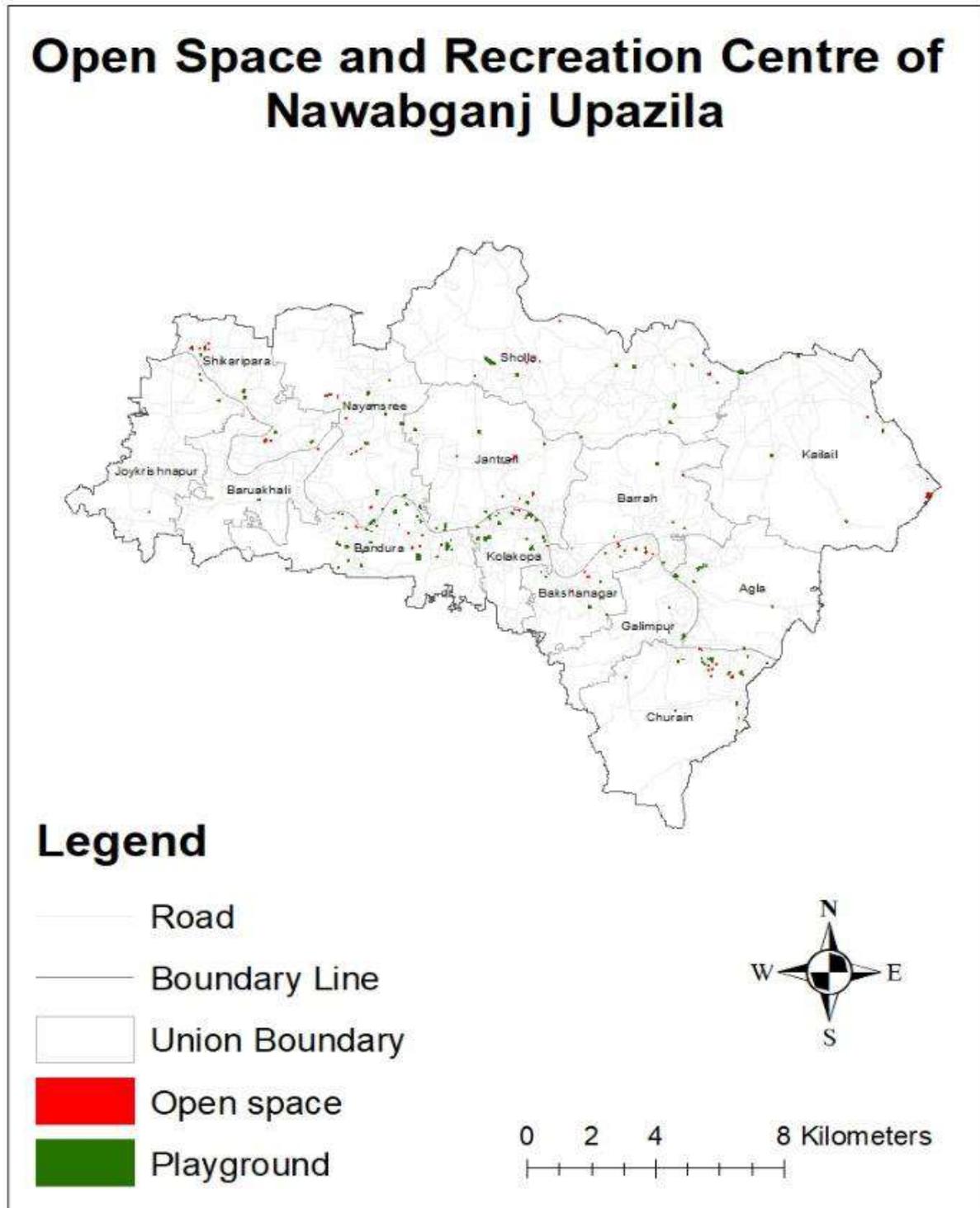


Figure 4-6: Open space and Recreation facilities centre of Nawabganj Upazila

### 4.6.3 SWOT Analysis

SWOT analysis was also done by discussing with key informants. The planning team also visited the Upazila and noted the key points of SWOT analysis.

Table 4-7: SWOT Analysis

<b>Strength</b>	<b>Weakness</b>
Playlot, play field are observed within school, high-school, and college	Defective land transfer laws, rules, and regulations
Providing very important open space and recreation through Nawabganj Zamidarbari.	The UNO does not have the proper authority to enforce open space and recreation conservation
There are many old and manor houses which bear witness to history	Poor management of formal open space
Youth sectors are becoming more aware of the necessity and conservation of open spaces and recreation	Failure of development agencies and urban local governments to implement plan designated open space provisions
<b>Opportunity</b>	<b>Threat</b>
With proper maintenance, old zamindar houses can become tourist attractions.	Conflict of Interest between land brokers and implementing authority
Opportunity to raise public awareness of local community	Insufficient finances to address urban linkage between open space and recreation
Scope to develop recreational open space in suburban areas due to presence of unused land and natural landscape	Degradation of the recreation and open space due to pollution and lack of conservation. Encroachment of public open space

## 4.7 Review of Relevant Existing Plans, Rules, Regulation and Policies

### 4.7.1 Reviewed Relevant Plans

Environment related existing rules and regulations are reviewed to assess the existing recreational facilities. Local level to higher level planning policy both are considered i.e., Sustainable Development Goals (SDGs), Dhaka Strategic Plan (2016-2035), Patuakhali Municipal Master Plan (2010-2030), The Environment Conservation Act (ECA) 1995, The Environment Conservation (Amendment) Act 2010, National Urban Sector Policy 2011, (Draft) Land Use Policy, 2001. The relevant matters are discussed below-

Table 4-8: Review of Existing Planning Policy

Existing Rules and Regulations/Higher Level Plans	Relevant Issues
<b>Sustainable Development Goals (SDGs)</b>	Aim-11 – Creating green spaces Aim-15 – Restoration of damaged land
<b>Dhaka Strategic Plan (2016-2035)</b>	Conservation of river channels, canal banks and wetlands
<b>Patuakhali Municipal Master Plan (2010-2030)</b>	Population, considering distance and suitable land, most urban social services are offered to citizens within 1-2 km range
<b>The Act of 2000 for conservation of Open Space, Waterbody</b>	The act prohibits change of use of open space and waterbody as recommended in the local master plan without prior approval.
<b>The Environment Conservation Act (ECA), 1995</b>	The declaration of ecologically critical area is addressed under section-5 of ECA, 1995 and Rule – 3 by considering the factors as mentioned in Chapter 2.2
<b>The Environment Conservation (Amendment) Act, 2010</b>	Environmentally sensitive areas (Ecologically Critical Area) determination Regarding conducting activities in environmentally sensitive areas
<b>National Urban Sector Policy, 2011 (Draft)</b>	– Conservation of land resources in ecologically sensitive areas
<b>Land Use Policy, 2001</b>	Reservation of special land

## 4.8 Conclusion and Recommendations

This paper shows not only the condition of recreational or open spaces but also heritage sights and historical background of Nawabganj Upazila. It has potential to develop as an environmentally friendly Upazila. This study will help to decide the development policy of recreational spaces and conservation policy for historical places. Some recommendations are –

- Conservation of Nawabganj Zamidarbari.
- Conservation of Ichamoti River.
- Renewal of existing play fields.
- Open spaces should be utilized by providing recreational activity.
- Parks for children should be established.
- Recreational activity might be created around pond side.

## CHAPTER FIVE: HEALTH FACILITIES, PUBLIC HEALTH, DISEASE CONTROL AND WELLBEING

### 5.1 Health Facility

This working paper on Health Facilities of Nawabganj Upazila analyzes the current situation of health facilities and services. Data for this working paper have been collected from primary and secondary sources. The paper analyzes the findings to make health sector development proposals for improving the current situation. The paper intends to assist the master plan in making better proposals on health issues.

Health facilities are essential in any community, including an Upazila. Following is some of the reasons why health facilities are critical in Nawabganj Upazila:

1. **Access to healthcare:** Easy access to health facilities help residents to maintain healthy life with treatment facilities. The basic health services include primary care services such as routine check-ups, immunizations, and treatment for minor illnesses.
2. **Emergency care:** Health facilities have to be equipped to handle emergencies and provide life-saving care. In case of any accident or sudden illness, quick access to medical care can be critical in saving lives.
3. **Disease prevention and control:** Health facilities can help prevent and control the spread of communicable diseases by providing vaccinations, conducting health screenings, and monitoring disease outbreaks.
4. **Maternal and child health:** Health facilities are critical in promoting maternal and child health by providing prenatal care, delivery services, and postpartum care. This can help reduce maternal and infant mortality rates.
5. **Mental health:** Health facilities can provide mental health services and support, which are critical in improving the overall well-being of the society.

### 5.2 Approach and Methodology

The working paper draws upon data gathered from both primary and secondary sources. Primary data was obtained through a physical feature survey conducted in 2023. This survey collected detailed information regarding health facilities throughout Nawabganj Upazila, including the number and types of health facilities (e.g., Hospitals, Community Clinics, and Union Health and Family Welfare Centers). Data were collected from the field about physical and operational characteristics of selected health facilities, including bed capacity, staffing, and service offering. Secondary data sources comprised statistics from the Population and Housing Census 2022, Health Bulletin 2014 of Nawabganj UHC, and previous planning standards from national and local sources were used to benchmark existing healthcare provisions against recognized standards. The data analysis involved a thorough situational analysis that provided a union-wise overview of existing facilities and comprehensive information on public and private healthcare services. To analyze the service gap in existing provisions, the distribution of healthcare facilities was compared against population density and projected growth, revealing discrepancies in capacity in each union. Planning standards were utilized to quantify these gaps and

highlight areas with insufficient services. The healthcare system was also evaluated, emphasizing sectors such as pharmacies, diagnostic centers, maternal and child health centers, immunization centers, and drug treatment facilities. It was further supported by a SWOT analysis, which examined the strengths, weaknesses, opportunities, and threats associated with the current healthcare infrastructure. In light of these findings, the working paper concluded with policy recommendations to enhance healthcare capacity, elevate service quality, and ensure improved geographic accessibility to health services within Nawabganj Upazila.

## 5.3 Scenario Analysis

### 5.3.1 General Overview

Nawabganj Upazila, located on the outskirts of the Dhaka district, is home to a considerable population totaling 348,786 individuals. Recognizing the crucial importance of healthcare accessibility for such a sizable populace, the Upazila boasts a network of 10 hospitals, including one Upazila Health Complex, 58 Community Clinics, and 13 Union Health and Family Welfare Centers. A health complex strategically positioned within the region as a basic service establishment in the healthcare landscape of the upazila.

Despite the commendable public healthcare infrastructure, the healthcare ecosystem of Nawabganj Upazila is enriched by the presence of numerous private health facilities. This diverse healthcare landscape, comprising both public and private entities, underscores a comprehensive approach to meeting the varied medical needs of the residents.

According to the latest Urban Development Directorate (UDD) master plan report, the collective footprint of these health facilities encompasses approximately 2.98 acres of land. This allocation of space reflects a thoughtful distribution strategy, ensuring accessibility across the upazila. While a dispersed arrangement prevails, there are observable instances of clustering, highlighting the need for a nuanced understanding of local healthcare demands and strategic facility placement.

In essence, Nawabganj Upazila not only acknowledges the significance of healthcare provision for its substantial population but also embraces a diversified healthcare framework. The coexistence of public and private health entities, coupled with a thoughtful allocation of physical space, exemplifies a concerted effort to address the multifaceted healthcare needs of the community.

Table 5-1: Nawabganj Upazila Profile

Indicator	Nawabganj
<b>Population</b>	3,48,786
Male	1,62,232
Female	1,86,554
<b>Household</b>	
Total	90,694
<b>Density</b>	
Area sq. km.	247.01
Population density (per sq. km.)	1483
Growth Centers (LGED)	5
Literacy rate (7 Years and Above)	79.27%

Indicator	Nawabganj
<b>Sources of Drinking Water (Coverage of Households)</b>	
Tap	4.72%
Tube well.	94.49%
Pond/River/Canal/Lake	0.33%
Other	0.46%
<b>Sanitation (Coverage of Households)</b>	
Safe Disposal with Flushing/Pouring Water	72.97%
Unsafe Disposal with Flushing/ Pouring Water	10.02%
Pit Latrine with Slab/ Ventilated Improved Latrine/ Composting Latrine	15.30%
Pit Latrine Without Slab/Open Pit	1.11%
Kancha/Open/Hanging Latrine (Permanent/ Temporary)	0.43%
Open Defecation/ No Latrine Available	0.17%
<b>Maternal and Child Health (Health Bulletin 2014)</b>	
Neonatal Mortality Rate (January-December,2013)	15.42 per 1,000 live births
Maternal Mortality Ratio (January-December,2013)	109.19 per 1,00,000 live births

*Source: Population and Housing Census 2022, District Report: Dhaka; Health Bulletin 2014, Nawabganj UHC, Ministry of Health, and Family Welfare*

Upazila has several health facilities that provide healthcare services to the local population. However, according to the local health service recipients the health services provided by the health facilities are not satisfactory. The existing notable public sector health facilities are:

**Table 5-2: Existing Health Facilities**

Facility Type	Total Number of Facility
Hospital	10
Community Clinic	58
Vice Union Health and Family Welfare Centers	13
<b>Total</b>	<b>81</b>

*Source: Field Survey, 2023*



Source: Nawabganj Upazila Health Complex

Figure 5-1: Location of Existing Health Facilities

### 5.3.2 Distribution of Existing Health Facilities

Table 5-3: Population served by the health facilities by Union

Union	Organization type	Number	Population	Area(acre)
Agla	Community Clinic	03	19185	3689
	Union Health and Family Welfare Centers	01		
Kalakopa	Hospital	07	24177	1642
	Community Clinic	08		
	Union Health and Family Welfare Centers	-		
Kailail	Hospital	01	28858	8614
	Community Clinic	05		
	Union Health and Family Welfare Centers	01		
Galimpur	Community Clinic	02	14853	2275
	Union Health and Family Welfare Centers	01		

<b>Churain</b>	Community Clinic	02	25942	5246
	Union Health and Family Welfare Centers	01		
<b>Joykrishnapur</b>	Community Clinic	03	18874	4019
	Union Health and Family Welfare Centers	01		
<b>Nayansree</b>	Community Clinic	04	29830	5488
	Union Health and Family Welfare Centers	01		
<b>Bakshanagar</b>	Community Clinic	04	22889	2120
	Union Health and Family Welfare Centers	01		
<b>Baruakhali</b>	Hospital	01	18310	2973
	Community Clinic	02		
	Union Health and Family Welfare Centers	01		
<b>Barrah</b>	Community Clinic	04	28155	4232
	Union Health and Family Welfare Centers	01		
<b>Bandura</b>	Hospital	01	30999	3653
	Community Clinic	07		
	Union Health and Family Welfare Centers	01		
<b>Jantrail</b>	Community Clinic	05	25027	4813
	Union Health and Family Welfare Centers	01		
<b>Shikari Para</b>	Community Clinic	02	18974	2803
	Union Health and Family Welfare Centers	01		
<b>Sholla</b>	Community Clinic	07	42713	9498
	Union Health and Family Welfare Centers	01		

Source: Field Survey, 2023

Table 5-4: Planning standard (Area in Acre & 'F' for facility)

Type	PRLDR, 2004	DTIDP, 2004	UTIDP, 2008	UDD	LGED
<b>Small clinic/ Clinic/</b>	(1F/ 15000 popn, area: .6)	(1F/ 5000 popn, area: .6)	(1F/ 5000 popn, area: 1)	(1F/ 5000 popn, area: 1)	(1F/ 5000 popn, area: 1)

<b>Health centre</b>					
<b>Hospital</b>	1F/ 100000 popn, area: 4)	(1F/ 100000 popn, area: 4)		(1F/ 20000 popn, area: 5)	(1F/ 20000 popn, area: 5)

Source: *Developing planning standard for community facilities: A study in the context of urban areas in Bangladesh (Thesis), Time Saver Standard, Mirsharai & Baroiarhat Paurashava Master Plan (2011-2031)*

People generally seek out experienced or competent health treatment providers but also seek out less expensive or free sources. Public health sector facilities normally provide less costly health services. The public health sector continues to be a major source of service giver, particularly for low-income people.

### 5.3.3 Public Healthcare Facility

Nawabganj Upazila Health Complex is a government-run health complex that provides medical services to the local community. There is only one government hospital in Nawabganj Upazila, the Nawabganj Upazila Health Complex, located in Kolakopa Union. The health complex has 50 beds and positions for 35 doctors, 15 nurses, and 11 technicians.

Table 5-5: Basic Information about Nawabganj Upazila Health Complex

Basic Information	
<b>Year of Established</b>	1976
<b>Area</b>	1.889824 acre
<b>Bed Number</b>	50
<b>Ward Number</b>	04
<b>Service</b>	Outpatient services, Emergency Care, Maternity care, Diagnostic services, etc.
<b>Doctor (Positions)</b>	35
<b>Nurse (Positions)</b>	15
<b>Technician (Positions)</b>	11

Source: Nawabganj Upazila Health Complex



Figure 5-2: Existing condition of Nawabganj Upazila Health Complex

Table 5-6: Utilization of services at Upazila Health Complex

Indicator	
Total Patient days in Upazila Health Complex in 365 days (No.)	18,152
Bed Occupancy Rates (%)	102.34
Average Length of Hospital Stay (No. of days per patient)	2.44
Hospital Death Rate (%)	0.47

Source: Health Bulletin 2014, Nawabganj UHC, Ministry of Health, and Family Welfare

Related to Nawabganj Upazila’s health facilities are as follows:

- Upazila Health Complex is far away from the unserved area.
- Private Clinics are not reliable, as per the comments of local people.
- There is a lack of appropriate medical equipment and medical services.
- Late-night transport is inaccessible to get services from Upazila Health Complex.
- Inadequate doctor-patient ratio: Only 35 doctors are in the Upazila Health Complex.
- Medical centers are not well equipped and do not have hygienic conditions.

- Medical personnel are not attending to their duties regularly.

### 5.3.4 Health Service Utilization

The frequency of using health facilities indicates significant health patterns, including the frequency of emergency room visits, hospital admissions, and fatalities. Such insights can guide public health initiatives. The statistics regarding the frequency of healthcare service usage in Nawabganj have been sourced from the Health Bulletin 2014, Nawabganj UHC, Ministry of Health, and Family Welfare.

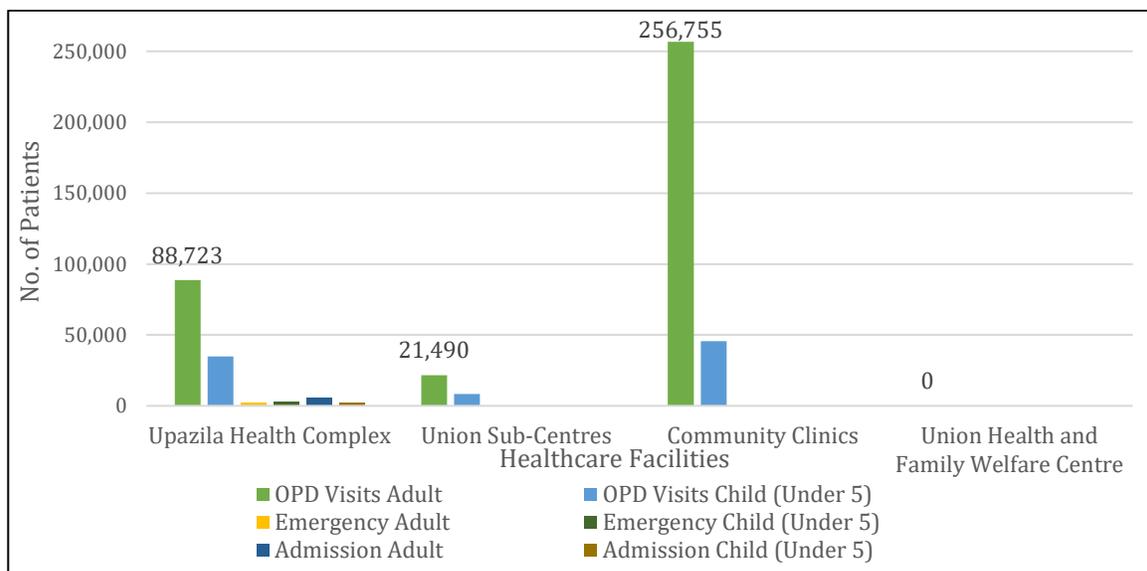


Figure 5-3: No. Of OPD and Emergency Visits and Admissions in Health Care Facilities

Figure 5-3 illustrates the use of different healthcare facilities for OPD, emergency, and inpatient admissions. It is evident from the figure that the pediatric healthcare demand in the Upazila is high as children under 5 form a substantial portion of patients across OPD, emergency, and inpatient admissions. Community clinics record the highest volume of outpatient visits, encompassing adult and pediatric patients, compared to other healthcare facilities. The figure also shows that emergency cases are exclusively managed by the Upazila Health Complex.

### 5.3.5 Private Healthcare Facility

The private sector has invested substantially in establishing hospitals, clinics, and diagnostic centers in the upazila. Generally, private health facilities provide high-cost health services. In addition to the government hospital, there are several private clinics and diagnostic centers in the Upazila. These clinics offer various services, including general consultations, laboratory tests, and ultrasound scans. Private health facilities are mostly in Kolakopa, the headquarters of the upazila. However, the quality of health service is not up to the mark, according to the residents' comments. People with severe health complications usually move to Dhaka for better treatment.



New life medical services

Central hospital

Figure 5-4: Private Health Care Medical Services

## 5.4 Service Gap Analysis

Table 5-7: Union-wise Demand for Community Clinics

Union	Popula tion 2022	Facility Requir ement in 2022	Existi ng Facilit ies	Gap in Service Provision	Populati on 2044	Facility Requir ement in 2044	Number of New Facilitie s by 2044

<b>Agla</b>	19185	4	3	1	28795	6	3
<b>Kalakopa</b>	24177	5	4	1	36285	7	3
<b>Kailail</b>	28858	6	7	-1*	43316	9	2
<b>Galimpur</b>	14853	3	4	-1*	22291	4	0
<b>Churain</b>	25942	5	2	3	38932	8	6
<b>Joykrishnapur</b>	18874	4	2	2	28325	6	4
<b>Nayansree</b>	29830	6	2	4	44770	9	7
<b>Bakshanagar</b>	22889	5	5	0	34355	7	2
<b>Baruakhali</b>	18310	4	3	1	27479	5	2
<b>Barrah</b>	28155	6	5	1	42254	8	3
<b>Bandura</b>	30999	6	8	-2*	46523	9	1
<b>Jantrail</b>	25027	5	4	1	37561	8	4
<b>Shikaripara</b>	18974	4	2	2	28475	6	4
<b>Sholla</b>	42713	9	7	2	64110	13	6

\* (-) indicates surplus in the provision of facilities

As the Table 5-7, shows, one community clinic per 5,000 population, is recommended by UTMIDP/UMPR2. Compared to recommended standard community clinics are deficient in Agla, Kalakopa, Churain, Joykrishnapur, Nayanshree, Baruakhali, Barrah, Jantrail, Shikaripara, and Sholla. In contrast, Kailail, Galimpur, and Bandura exhibit an excess of such facilities compared to the standard. The population is projected to escalate by 2044, resulting in an increased demand for community clinics throughout all unions, except for Galimpur, which possesses a sufficient number of community clinics to adequately cater to the need of its population until 2044.

## 5.5 Evaluation of Available Medical Facilities as Perceived by People



### Pharmacy:

The majority of individuals think there are few “Pharmacies” in Nawabganj Upazila. Some stated that though there are pharmacies in the Upazila, the number is inadequate.

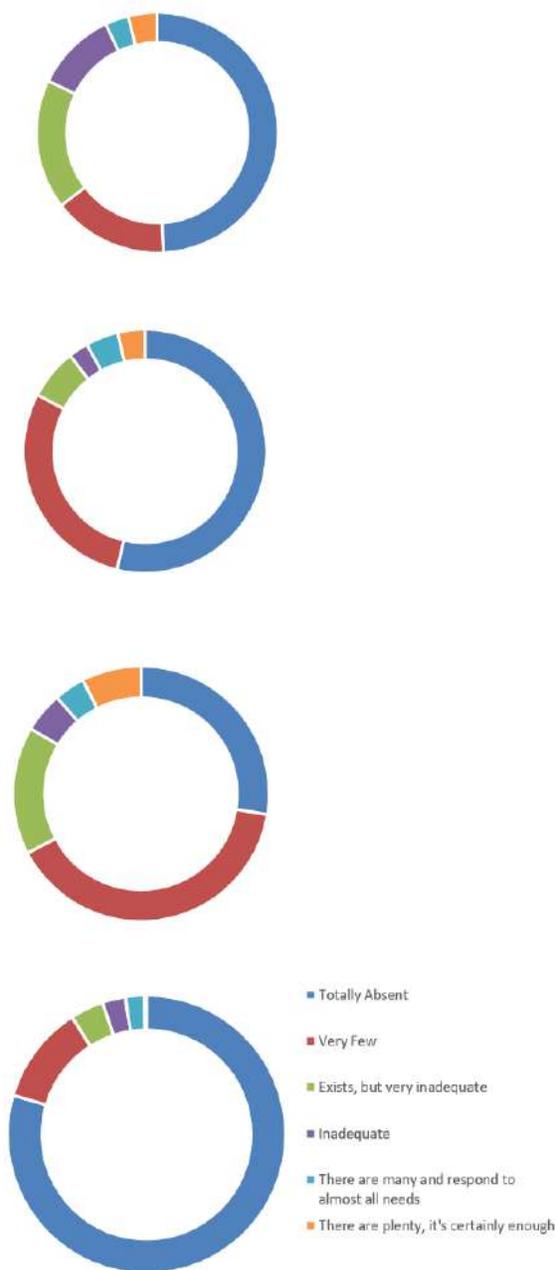


Figure 5-5: People's Perception of Available Medical Facilities

Findings regarding the condition of health infrastructure in Nawabganj Upazila reveal the following observations:

- Most individuals perceive "Pharmacies" in the area insufficient, indicating challenges in accessing adequate healthcare services.
- The perception that the "Diagnostic Centre, Union Health and Family Welfare Centre" are absent suggests limited access to healthcare facilities within the town.
- There are very few or even no "Maternal and Child Health Centers" available to the residents. This indicates a gap in accessible healthcare services for mother and childcare.

**Diagnostic Center, Union Health and Family Welfare Center:**

Most individuals stated that the "Diagnostic Centre, Union Health and Family Welfare Centre" is entirely absent in the Upazila.

**Maternal and Child Health Center:**

The majority of individuals stated that "Maternal and Child Health Centers" do not exist in their areas.

**EPI/ Immunization Center**

Majority of individuals mentioned that "Immunization Center" in the Upazila. The number is not adequate for the existing population.

**Rehab/ Drug Treatment Center:**

The absence of a "Rehab/Drug Center" was identified in the Upazila.

- There are also a few EPI and immunization centers in Nawabganj Upazila.
- There is total absence of a drug addicted rehabilitation center in Upazila, though drug addiction is a concern now in Upazila.
- The findings underscore the need for healthcare infrastructure improvements, especially in increasing the availability of government and private healthcare facilities for health, clinics, and diagnostic centers.
- Ensuring a well-balanced and accessible healthcare ecosystem is crucial for the overall health and well-being of the Nawabganj Upazila community.
- The residents of Nawabganj Upazila prioritize safe drinking water, evidenced by their inclusion of this issue in the significant problem list across 14 unions. The community's health consciousness is reflected in their rejection of arsenic-contaminated tube well water, opting instead for deep tube wells that extract arsenic-free water, showcasing a proactive stance toward ensuring a safe water supply.
- The people of Nawabganj recognize unhygienic sanitation practices as a significant problem, particularly in eight out of 14 unions. This acknowledgment indicates a heightened awareness among the population regarding the importance of maintaining healthy sanitation practices for overall well-being.
- The leading cause of waterlogging in Nawabganj Upazila is siltation of the natural water channels, leading to flooding in low-lying areas during the early monsoon. Human interventions such as inadequate drainage systems, silted channels, and illegal encroachments exacerbate the issue, causing inundation for several months. Beyond agricultural damage, water logging adversely affects transportation and surface water quality and contributes to the spread of waterborne diseases, emphasizing the complex interplay between environmental factors and public health in the region.

## 5.6 SWOT Analysis

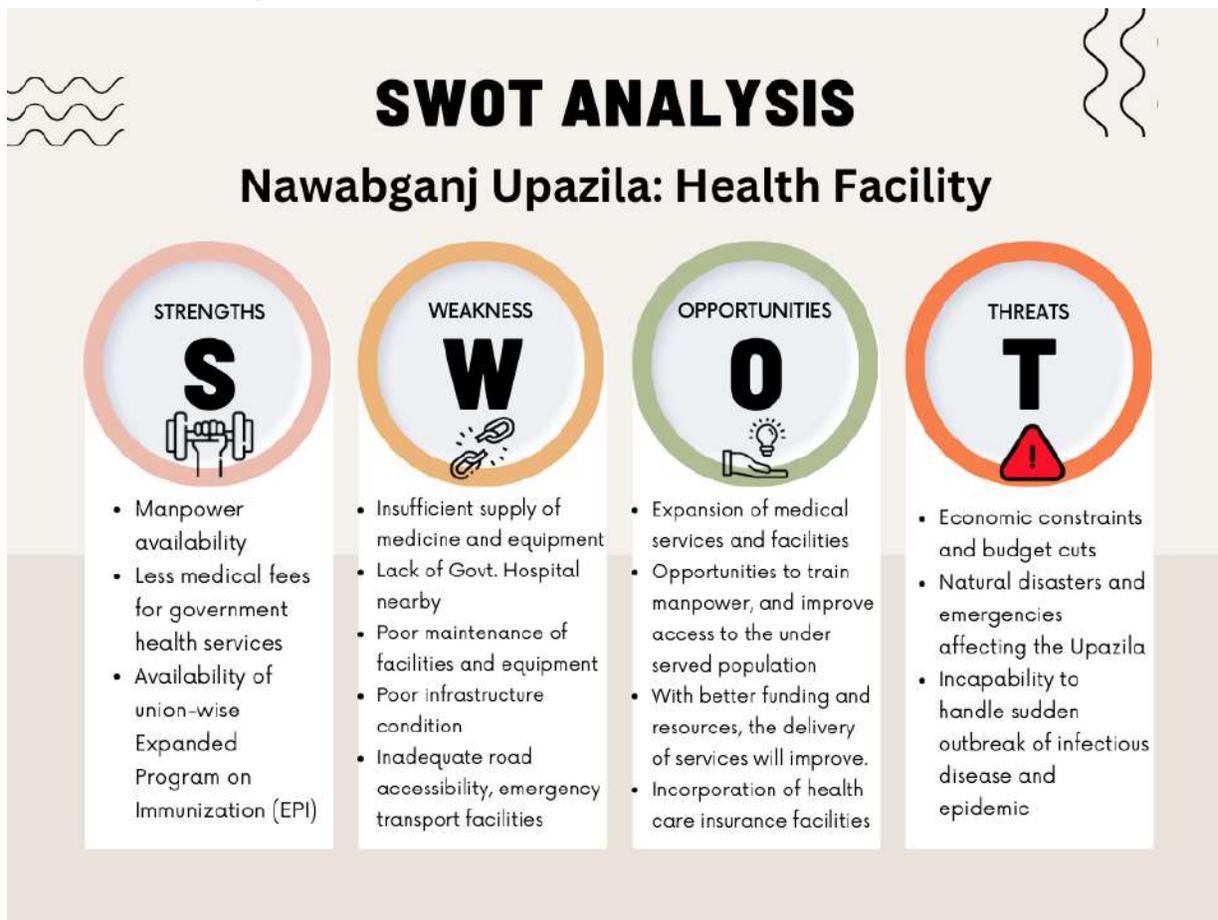


Figure 5-6: SWOT Analysis of Health Facilities

## 5.7 Review of Higher-Level Policy

### 5.7.1 National Health Policy (NHP)

The National Health Policy of Bangladesh was last updated in 2011. The policy aims to improve the health status of the population by providing accessible, affordable, and quality healthcare services. The National Health Policy (NHP) perceives 'Primary Health Care' as very important for common people and recommends universal access to primary health care for all. It envisages a 'Community Clinic' as the fundamental base for providing this care to everyone.

The key objectives of the National Health Policy of Bangladesh are:

- ❖ To make necessary basic medical utilities reach people of all strata as per Section 15(A) of the Bangladesh Constitution and to develop the health and nutrition status of the people as per Section 18(A) of the Bangladesh Constitution.
- ❖ To develop a system to ensure easy and sustained availability of health services for the people, especially communities in both rural and urban areas.

- ❖ To ensure optimum quality, acceptance, and availability of primary health care and governmental medical services at the Upazila and Union levels.
- ❖ To reduce the intensity of malnutrition among people, especially children and mothers; and implement effective and integrated programs for improving nutrition status of all segments of the population.
- ❖ To undertake programs for reducing the rates of child and maternal mortality within the next 5 years and reduce these rates to an acceptable level.
- ❖ Adopt satisfactory measures to ensure improved maternal and child health at the union level and install facilities for safe and clean child delivery in each village.
- ❖ To improve overall reproductive health resources and services.
- ❖ To ensure the presence of full-time doctors, nurses, and other officers/staff, provide and maintain necessary equipment and supplies at each of the Upazila Health Complexes and Union Health and Family Welfare Centers.
- ❖ To devise necessary ways and means for the people to make optimum usage of the available opportunities in government hospitals and health service systems and to ensure satisfactory quality management and cleanliness of service delivery at the hospitals.
- ❖ To formulate specific policies for medical colleges and private clinics and to introduce appropriate laws and regulations for the control and management of such institutions, including maintenance of service quality.
- ❖ To strengthen and expedite the family planning program with the objective of attaining the target of Replacement Level of Fertility.
- ❖ To explore ways to make the family planning program more acceptable, easily available, and effective among the extremely poor and low-income communities.
- ❖ To arrange special health services for the mentally retarded, the physically disabled, and elderly populations.
- ❖ To determine ways to make family planning and health management more accountable and cost-effective by equipping it with more skilled manpower.
- ❖ To introduce systems for treating all types of complicated diseases in the country and minimize the need for foreign travel for medical treatment.

The policy also identifies several priority areas for action, including maternal and child health, infectious disease control, non-communicable disease prevention and management, and health system strengthening.

To achieve these objectives in terms of the National Health Policy, the policy outlines a number of strategies, such as expanding the network of healthcare facilities, improving the training and education of healthcare professionals, equipment, specialist, fund, patients, strengthening healthcare financing mechanisms, and promoting public-private partnerships in healthcare service delivery.

### **5.7.2 National Urban Health Strategy – 2020**

The Local Government Division of the Ministry of LGRD&C recently formulated the ‘National Urban Health Strategy—2014’ to provide better health services to urban people, with special emphasis on urban poor groups (NUHS, 2014). The National Urban Health Strategy 2014 mentioned that the strategy is a continuous process and, hence, inspired modification and amendment of the plan to meet the

changing demands of the people. Allocation of Business entrusted HSD of MOHFW with the responsibility of formulating policy regarding health-related matters. Keeping this spirit, the HSD of MOHFW, in consultation with all relevant stakeholders, updates the urban health strategy as National Urban Health Strategy 2020 (NUHS,2020).

Strategies for urban health are:

**i. Coordination mechanisms must function at the ministry and local city corporation/municipality levels for effective coordination among the MOHFW, LGD/MOLGRDC, and city corporations/municipalities:**

- Increase the frequency of meetings for the Urban Health Coordination Committee (UHCC) and the Urban Health Working Group (UHWG).
- Dedicated technical assistance needs to be provided to the UHCC and UHWG for effective functioning
- City Corporations may form Standing Committees on Education, Health, Family Planning, and Health Safety Systems with the co-option of the respective Civil Surgeon and Deputy Director of Family Planning to support the design and implementation of the urban health system in the respective city corporation.
- Local DGHS (Civil Surgeon, Upazila Health and Family Planning Officer) and DGFP (Deputy Director—Family Planning and Upazila Family Planning Officer) may be co-opted. This health standing committee urban health system may be designed and implemented in respective municipality areas.
- The Civil Surgeon, Deputy Director of Family Planning, Upazila Health and Family Planning Officer, and Upazila Family Planning Officer should support the Committees in mapping the health facilities available from MOHFW and other government departments, city corporations, NGOs, and private sectors in their respective catchment areas.

**ii. Inadequate numbers and poor-quality public health facilities, particularly to provide PHC, may be improved through**

- Upgrade and relocate urban dispensaries, add a health workforce (like lab technicians), and extend service hours to serve slum and floating populations better.
- Assign roles to additional facilities, such as school health clinics, chest clinics, and maternity and child welfare centers, to provide primary health care (PHC). Dedicated efforts must be undertaken to publicize such services, particularly to slum people.
- Other DGHS and DGFP facilities located in urban areas (like Upazila Health Complex, district and general hospital, chest hospital, infectious diseases hospital, leprosy hospital, medical college hospital, specialized institute hospital, specialized hospital, maternity and child health training institute hospital, fertility services and training hospital, etc.) may start dedicated PHC center within its building through deploying additional human resources if required and logistics to increase the number of public health facilities providing PHC.
- After proper mapping, DGHS may start operating additional urban dispensaries, if required, from premises owned by the government or city corporation/municipality or by hiring such through deploying required health human resources and other required logistics.

- If posts belong to Facilities belonging to city corporations or other government departments in urban areas, they can be transferred within DGHS and the Directorate General of Nursing and Midwifery (DGNM) so that DGHS/DGNM recruits against those posts and deploys in those posts regularly. The optimum function of these facilities will also contribute to the increasing number of PHC centers.
- iii. **The healthcare needs of slum dwellers, working and floating/street populations can be better targeted through:**
- Providing PHCs close to their residence by operating satellite clinics from the nearby government facilities mentioned above. For that, dedicated human resources, logistics, and transport support are needed.
  - Alternately, mobile PHC centers may operate mounted on motorized vehicles. The floating/street population highly utilized mid-night/late-night clinics operated through mobile vans.
  - Slum dwellers, working and floating/street population may be issued with unique entitlement cards through which they can receive the PHC services free of charge from the government and city corporation facilities.
- iv. LGD of MOLGRDC may support city corporations/municipalities through required technical assistance, if needed, to develop and operate a system to identify the poor and issue unique entitlement cards to receive the PHC services free of charge from the government and city corporation facilities.
- v. **Better healthcare financing of city corporations/municipalities:**
- LGD of MOLGRDC may negotiate with the Ministries of Finance and Planning for increased allocation and separate revenue and development budgets, respectively, in city corporations and municipalities for health services and public health interventions
  - City corporations/municipalities may also take the initiative to mobilize funds for health services and public health interventions, particularly negotiating with the business entities within their territory.
- vi. **Addressing regulatory enforcement with the NGO/private health service providers**
- MOHFW needs to make a move to update the law regarding private clinics/ hospitals/ diagnostic facilities
  - MOHFW also needs to increase the capacity for law enforcement regarding private clinics/hospitals/ diagnostic facilities
  - The LGD of MOLGRDC needs to take the initiative, maybe through contracting, to capacitate city corporations and municipalities to comply with the legal requirements to register and renew NGO/private health service providers annually.
- vii. Displaying a service fee schedule can minimize market uncertainty and encourage early care-seeking. MOHFW needs to take the initiative to standardize and make mandatory the service fee structure of NGO/private providers.
- viii. HSD, MOHFW needs to take the initiative to bring all other public health facilities and NGO/private sector facilities regularly reporting to the MIS of DGHS through coordination and legal compliance so that comprehensive data supports the performance measurement of the different urban health systems in the city corporations and municipalities

- ix. HSD and MOHFW must develop a structured referral system in urban areas. After allocating catchment areas to the designated PHC centers, secondary and tertiary care facilities may only entertain referred cases.
- x. City corporations and municipalities, while designing and implementing their respective urban health systems in close collaboration with the DGHS/DGFP, need to ensure that assigned PHC centers provide care for non-communicable diseases and men.
- xi. With near universal knowledge of family planning and immunization, MOHFW, through DGHS and DGFP, may continue awareness raising through standard communication channels to maintain a high level of awareness. The supply side can be managed through the PHC outlets mentioned in various options. For awareness raising on nutrition and different public health interventions (TB, Dengue, Chigunmonia, HIV/AIDS, malaria, type II diabetic, hypertension, etc.), the DGHS may support respective city corporations/municipalities to carry on awareness campaigns and routine awareness activities by utilizing scouts, girls' guides, other student organizations, and NGOs working in the respective areas. The supply side can be managed through the PHC outlets mentioned in various options.
- xii. LGD of MOLGRDC needs to support city corporations and municipalities to coordinate with the entrusted agencies to improve education, water sanitation, environmental situations, and fewer accidents and injuries—all contributing to improved health outcomes for urban dwellers. HSD of MOHFW should take the necessary steps to approve the National Urban Health Strategy 2020.

## 5.8 Conclusion and Recommendations

Chapter Four of the working paper on Health Facilities in Nawabganj Upazila presents a comprehensive analysis of the current state of health services. The chapter covers various aspects, starting with an introduction to the significance of health facilities in any community, followed by an in-depth examination of Nawabganj Upazila's health profile. The existing health facilities, including public and private entities, are thoroughly evaluated, accompanied by a SWOT analysis to identify strengths, weaknesses, opportunities, and threats. It sheds light on the policies governing health facilities, focusing on Bangladesh's National Health Policy, last updated in 2011. This policy aims to improve the health status of the population by ensuring accessible, affordable, and quality healthcare services. Specific objectives include enhancing primary healthcare, reducing malnutrition rates, addressing child and maternal mortality, and strengthening family planning programs.

Moreover, the chapter delves into evaluating available medical services, highlighting areas such as pharmacies, diagnostic centers, maternal and child health centers, immunization centers, and drug treatment facilities. Findings underscore the need for improvements in healthcare infrastructure, emphasizing the importance of a well-balanced and accessible healthcare ecosystem. Lastly, policy guidelines are presented to address the poor quality of healthcare facilities. Strategies include enhancing coordination among relevant authorities, standardizing user fees, providing technical assistance for influential coordination committees, establishing public healthcare facilities close to residences, and implementing mobile clinics targeting specific populations. It emphasizes the multifaceted challenges and opportunities in Nawabganj Upazila's healthcare landscape. It calls for

strategic interventions, policy improvements, and a holistic approach to ensure quality and accessible healthcare services for the community's well-being.

However, some preliminary recommendations are suggested based on the health-related information in the upazila. These include:

- Invest in building and upgrading healthcare facilities in the upazila to ensure equitable access to medical services.
- Improve transportation infrastructure to facilitate easier access to healthcare facilities, especially for rural populations.
- Launching community awareness education programs on hygiene and disease prevention.
- Enhance the capacity of the Upazila Health Complex to manage emergency and outpatient cases.
- Give more stress on the quality of health services.
- Collection and analysis of existing health data to monitor disease prevalence and healthcare utilization.

## CHAPTER SIX: EDUCATION FACILITIES

### 6.1 Introduction

This working paper is a preliminary database and scenario about the education sector of Nawabganj Upazila that outlines the existing condition, scope, and a framework for further development of the sector. In case of master plan preparation for a Upazila, a working paper serves as a background study, source of information and new ideas on improvement of condition of the education. The working paper provides the starting point for analyzing the current situation of education facilities and services in the upazila.

Education is crucial for personal and social development, providing individuals with the knowledge, skills, and abilities needed to succeed. It helps to promote social and economic mobility, reduce poverty, and create opportunities for personal growth and fulfillment of future desires. Education also plays a critical role in building a knowledge-based society, create engaged citizenry and promoting social cohesion. Education is important for community development as it empowers individuals with knowledge and skills to contribute to the economy, participate in civic life, improve their standard of living, and turn themselves into human resources.

### 6.2 Approach and Methodology

This working paper is based on the data collected through primary and secondary sources. The primary data were extracted from the physical feature survey, socio-economic survey, PRA, and KIIs conducted for the study. However, more emphasis was placed on secondary data when preparing the working paper. The secondary data was extracted from the Population and Housing Census 2022 and 2011 and the Bangladesh Bureau of Educational Information and Statistics (BANBEIS). It provides information on such issues as the present level of education, existing institutions by categories, the number of students and teachers in every institution, and union-wise classification of facilities, and it analyzes the findings to propose some policies and improvements according to certified measures. It will help to prepare the master plan for the Upazila to the highest efficiency considering the educational sector for the plan.

### 6.3 Situation Analysis

The baseline analysis is a crucial step in assessing the current situation. It helps identify gaps, determine opportunities, and establish a framework for further development. When preparing a master plan for an Upazila, a working paper acts as a background study and as a source of information and ideas on specific issues. This section focuses on educational facilities in Nawabganj Upazila, which serve as the starting point for analyzing the current state of educational facilities and services.

#### 6.3.1 Literacy Rate

As per the BBS 2022, the current population of Nawabganj Upazila is 348786. Its population density is 1483 /sq km. The literacy rate of the population aged seven years and above is 79.27% (BBS, 2022).

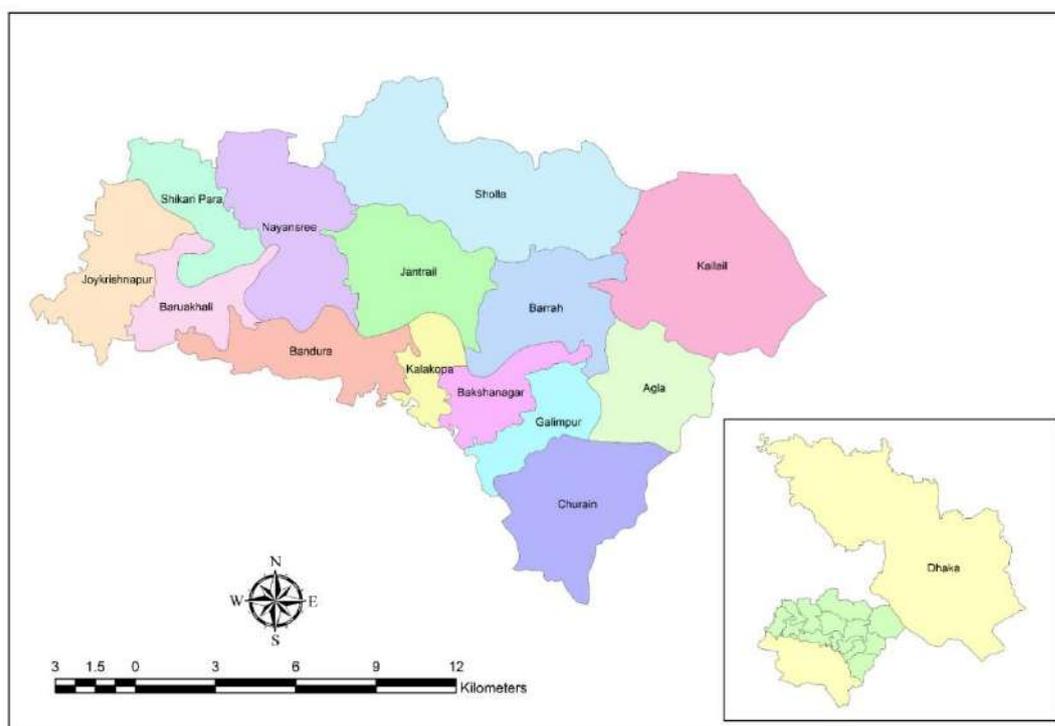
**Table 6-1: Population and literacy rate (7 years and above) in 1981, 1991, 2001, 2011 & 2022**

Nawabganj Upazila									
Population (000)					Literacy rate (%)				
1981	1991	2001	2011	2022	1981	1991	2001	2011	2022
250	269	297	319	348	26.5	34.5	54.5	57.8	79.3

Source: District Statistics 2011, Dhaka; Population and Housing Census 2022, District Report: Dhaka

There has been sequential upgradation of the literacy rate of the upazila. The average literacy rate of Nawabganj Upazila in 2011 was 57.80%, with males 57.7% and females 57.9% (BBS, 2011). In 2022, the literacy rate rose to 79.8% (BBS,2022). The upazila has one primary school for every 2509 population (2022), while nationally, there is one school for every 1380 population.

### Nawabganj Administrative Boundary



**Figure 6-1: Nawabganj Upazila Administrative Boundary**

The table below shows the literacy rate and school attendance information of the total population of the Nawabganj upazila. The literacy rate is calculated union-wise. According to the Population and Housing Census 2022, the average literacy rate of the upazila is 79.27% (BBS,2024). The literacy rate was 57.80% in 2011 (BBS,2013). Bandura union of the upazila shows Kalakopa Union having the highest (86.40%) literacy rate in the upazila, against. This union is the most urbanized part of the upazila. Joykrishnapur Union shares the lowest (74.32%) literacy rate.

**Table 6-2: Union-wise Literacy Rate of Nawabganj Upazila, 2022**

Union	Population	Literacy Rate (%)		
		Total	Male	Female
Agla	19185	78.59	79.01	78.23

<b>Bakshinagar</b>	22889	82.44	83.45	81.58
<b>Bandura</b>	30999	82.77	84.65	81.19
<b>Barrah</b>	28155	80.76	81.84	79.81
<b>Baruakhali</b>	18310	79.13	80.41	78.08
<b>Churain</b>	25942	81.66	82.77	80.73
<b>Galimpur</b>	14853	85.10	86.24	84.11
<b>Jantrail</b>	25027	76.51	78.40	74.95
<b>Joykrishnapur</b>	18874	74.32	75.29	73.48
<b>Kailail</b>	28858	75.55	77.09	74.24
<b>Kalakopa</b>	24177	86.40	87.67	85.23
<b>Nayanasree</b>	29830	80.04	81.32	79.04
<b>Shikaripara</b>	18974	75.05	75.71	74.52
<b>Sholla</b>	42713	74.50	76.75	72.53
<b>Total</b>	<b>348786</b>	<b>79.27</b>	<b>80.65</b>	<b>78.09</b>

Source: Population and Housing Census 2022, District Report: Dhaka

### 6.3.2 Available Education Facilities

Educational institutions in this upazila include six colleges, 45 secondary schools, 139 primary schools, and 76 madrasas. Bandura Holy Cross High School (1912) and Churain Tarini Bama High School (1923) are important education facilities. Upazila survey shows at least one primary school in every union.

Table 6-3: Existing Educational Facilities in Nawabganj Upazila

<b>Union</b>	<b>Kindergarten</b>	<b>Primary School</b>	<b>High School</b>	<b>College</b>	<b>Madrasa</b>
Agla	4	7	1	-	5
Bakshanagar	1	8	2	1	2
Bandura	2	10	5	-	10
Barrah	6	10	2	-	6
Baruakhali	3	9	1	-	5
Churain	3	8	3	1	5
Galimpur	4	4	2	1	9
Jantrail	1	13	2	1	3
Joykrishnapur	2	8	2	-	2
Kailail	3	13	6	-	6
Kolakopa	3	5	6	1	9
Nayansree	3	14	5	-	4
Shikaripara	4	9	2	1	2
Sholla	4	21	6	1	8
<b>Total</b>	<b>43</b>	<b>139</b>	<b>45</b>	<b>7</b>	<b>76</b>

Source: Physical feature survey, 2023

Information from 57 educational institutions, specifically the total number of students, the number of female students, and the total number of teachers, was collected from BANBEIS. Then, the teacher-student ratio was computed, which may benefit policymakers.

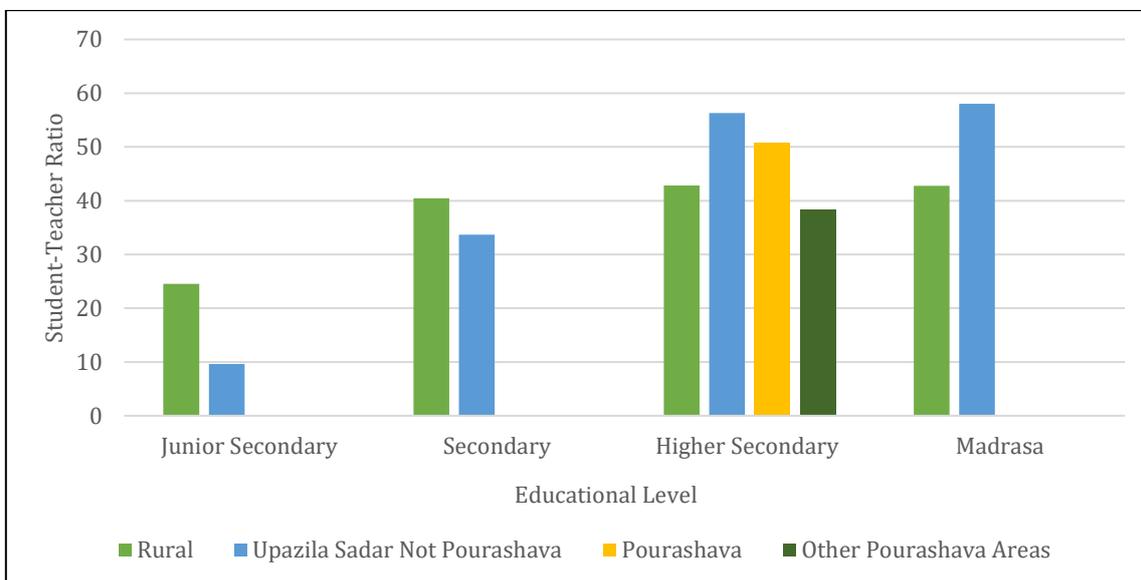


Figure 6-2: Average Number of Student Per Teacher in Different Education Levels Across Areas

Figure 6-2 indicates a comparative analysis of the student-teacher ratio across four distinct educational tiers within rural and urban contexts: Junior Secondary, Secondary, higher secondary, and Madrasa. Upazila Sadar exhibits substantial variation at higher educational levels, characterized by a noticeable increase in the student-teacher ratio in higher secondary institutions and Madrasas. In contrast to urban areas, the number of students per teacher across all educational levels is markedly lower, hovering at 40 students per teacher. Some gaps in the figure suggest that the data was unavailable or not reported for these specific combinations of education levels and geographic areas.

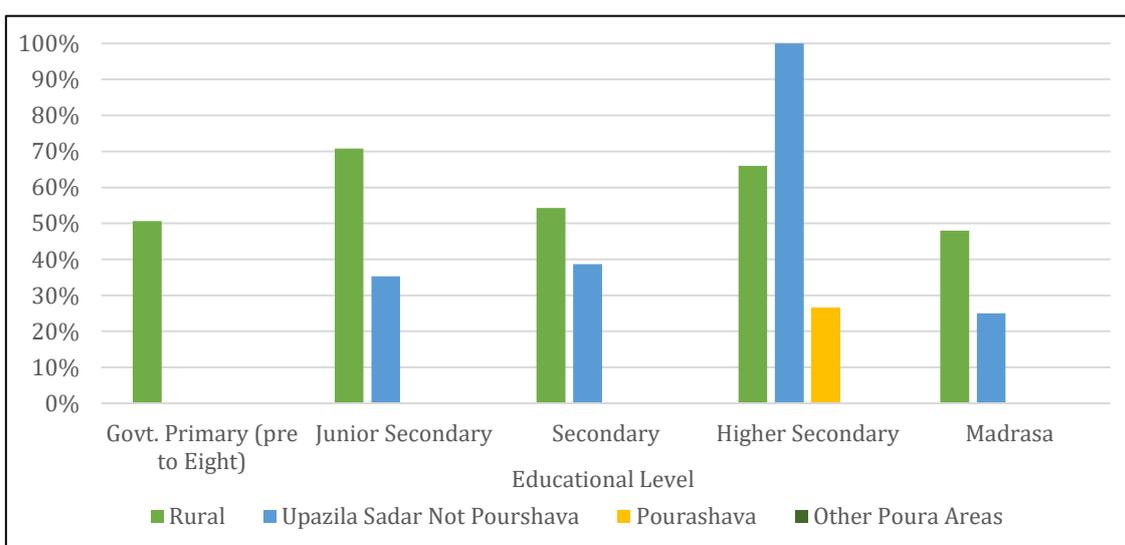


Figure 6-3: Percent of Female Students in Different Educational Levels Across Areas

Figure 6-3 provides a comparative analysis of the percentage of female students across four distinct educational tiers, Junior Secondary, Secondary, higher secondary, and Madrasa, within rural and urban contexts. The graph reveals that rural regions exhibit a substantial proportion of female students relative to other areas at most educational levels, with an approximate figure of 50% of female students. Data on Pourashava and Other Pourashava regions across the educational tiers is visibly absent, implying a lack of available information for those areas. The Upazila Sadar region, which reports a 100% enrollment of female students, indicates a girls' school.

### 5.3.2.1 Primary School

Nawabganj Upazila is in the Dhaka district of Bangladesh. Primary schools in this area are typically part of the formal education system and follow the curriculum set by the government. These schools are crucial in laying the foundation for a child's education.

Table 6-4: Union wise Primary School List

Serial No.	Union Name	Primary School	Serial No.	Union Name	Primary School
01	Agla	7	08	Jantrail	13
02	Bakshanagar	8	09	Joykrishnapur	8
03	Bandura	10	10	Kailail	13
04	Barrah	10	11	Kolakopa	5
05	Baruakhali	9	12	Nayanshree	14
06	Churain	8	13	Shikaripara	9
07	Galimpur	4	14	Sholla	21

Source: Physical feature survey, 2023

Information from 57 educational institutions, specifically the total number of students, the number of female students, and the total number of teachers, was collected from BANBEIS, which may benefit policymakers.

Table 6-5: Teacher, Student Ratio of Some Primary Schools of Nawabganj Upazila

Sl. No.	Name	Female Students	Total Student	Female Student (%)
1	Kumarbarilla Govt. Primary School	68	120	56.67
2	Gobindapur Govt. Primary School	150	243	61.73
3	Bandura Boys Govt Primary School	91	280	32.5
4	Radhakantopur Govt. Primary School	75	121	61.98
5	Bhanganita Govt. Primary School	26	52	50
10	Chandrakhula Govt. Primary School	94	179	52.51

Source. BANBEIS, 2022

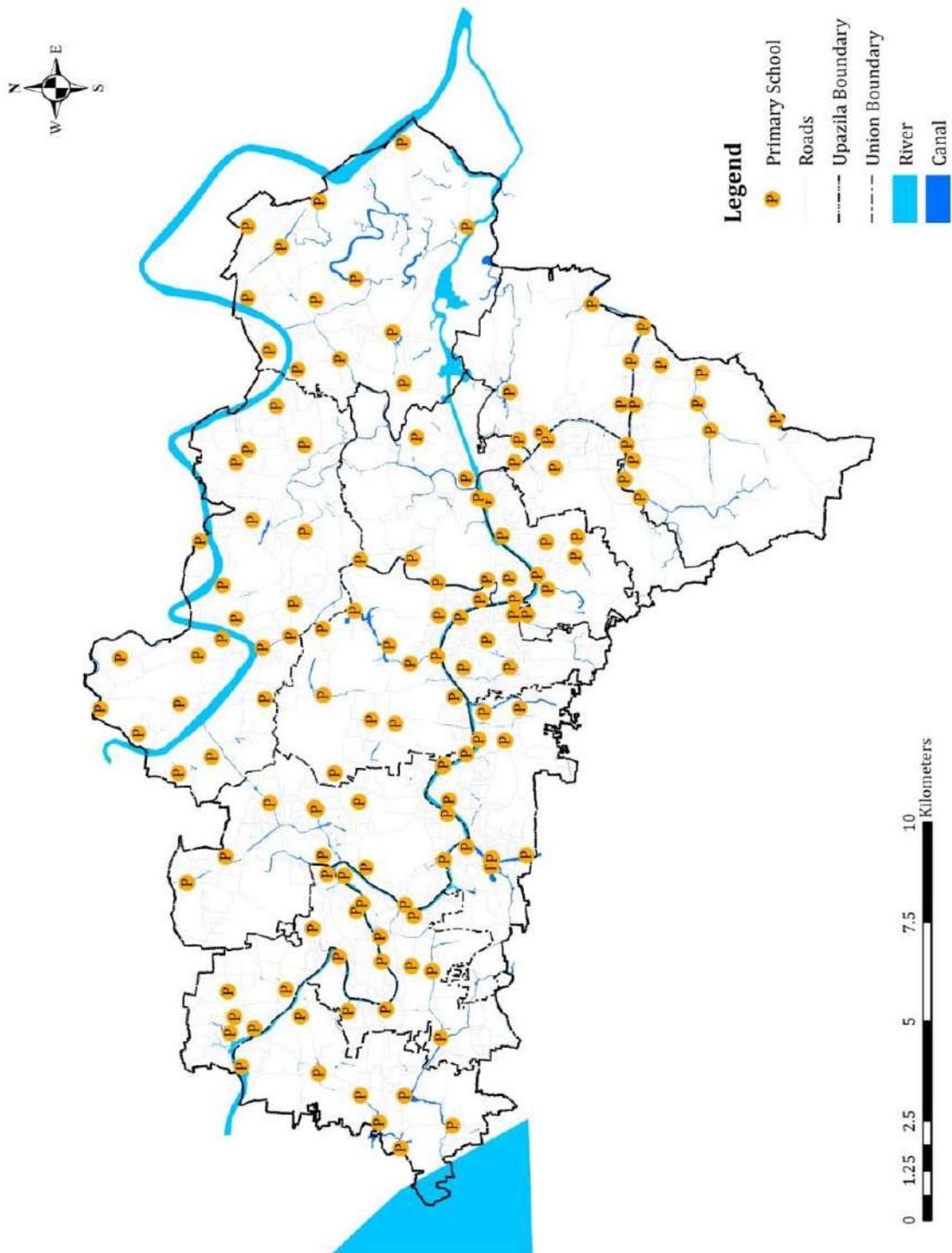


Figure 6-4: Location of Primary Schools of Nawabganj Upazila



Figure 6-5: Government Primary school in Nawabganj Upazila

### 5.3.2.2 Secondary School

Secondary education in Bangladesh generally follows a curriculum that includes a broader range of subjects than primary education. Secondary schools in Nawabganj Upazila, like in other parts of Bangladesh, typically have more advanced infrastructure than primary schools. They may consist of multiple buildings with specialized classrooms for various subjects, science laboratories, libraries, and other facilities. Students usually study Bangla, English, mathematics, science, social studies, and other elective subjects.

Table 6-6: Union wise High School List

Serial No.	Union Name	Primary School	Serial No.	Union Name	Primary School
01	Agla	1	08	Jantrail	2
02	Bakshanagar	2	09	Joykrishnapur	2
03	Bandura	5	10	Kailail	6
04	Barrah	2	11	Kolakopa	6
05	Baruakhali	1	12	Nayanshree	5
06	Churain	3	13	Shikaripara	2
07	Galimpur	2	14	Sholla	6

Source: Physical feature survey, 2023

Information from 57 educational institutions, specifically the total number of students, the number of female students, and the total number of teachers, was collected from BANBEIS, which may benefit policymakers.

Table 6-7: Teacher, Student ratio of some secondary schools of Nawabganj upazila

Sl. No.	Name	Teachers	Total Students	Female Students	Female Student (%)	Teacher-Student Ratio
1	Biam Laboratory School	17	98	17	17.35	1:6
2	Gobindapur High School	11	171	78	45.61	1:16
3	Anowara Begum Girls Junior Secondary School	11	179	179	100	1:16

4	Shikaripara Tarashankar Kalishankar Memorial High School	29	1320	624	47.27	1:46
5	Agla Chowkighata Janamangal High School	30	1353	562	41.54	1:19
6	Kalacopa K P High School	34	1451	806	55.54	1:24

Source: BANBEIS,2022

The teacher-student ratio in Shikaripara Tarashankar Kalishankar Memorial High School is 1:46, which means 46 students are served by one teacher. This ratio is very low, and demands that the number of teachers should be increased for quality education.



Figure 6-6: High schools in Nawabganj Upazila((Left)Baruakhali High School, (Right) Kokilperi High School)

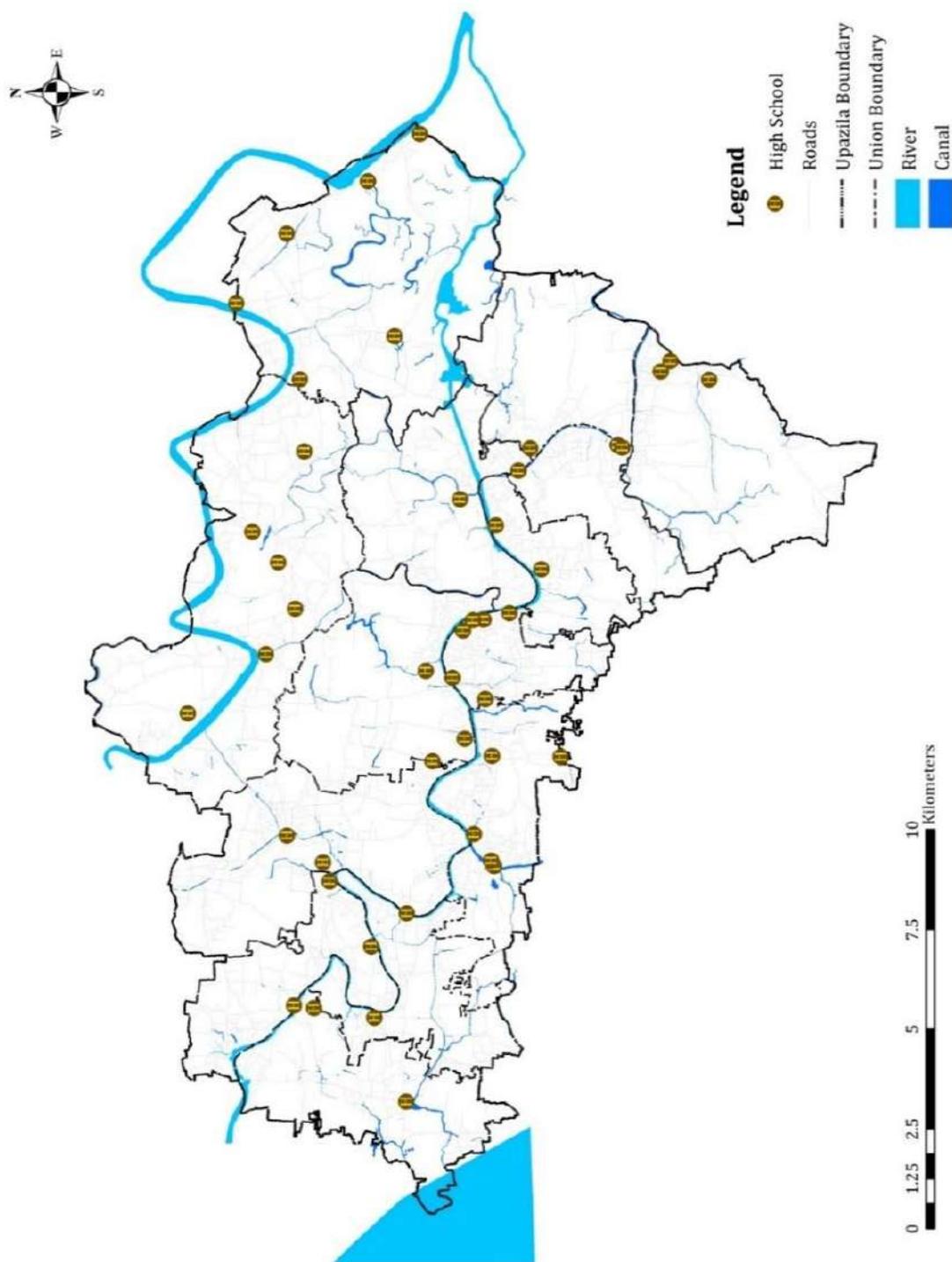


Figure 6-7: Location of High Schools in Nawabganj Upazila

### 5.3.2.3 College

Table 6-8: Union wise Education Facilities

Serial No.	Union Name	Primary School	Serial No.	Union Name	Primary School
01	Agla	-	08	Jantrail	1

02	Bakshanagar	1	09	Joykrishnapur	-
03	Bandura	-	10	Kailail	-
04	Barrah	-	11	Kolakopa	1
05	Baruakhali	-	12	Nayanshree	-
06	Churain	1	13	Shikaripara	1
07	Galimpur	1	14	Sholla	1

Source: Physical feature survey, 2023

### 6.3.3 Teacher-Student Ratio in Selected Education Facilities

Information from 57 educational institutions, specifically the total number of students, the number of female students, and the total number of teachers, was collected from BANBEIS, which may benefit policymakers.

Table 6-9: Teacher, Student ratio of some colleges of Nawabganj Upazila

Sl. No.	Name	Teachers	Total Students	Female Student	Female Student (%)	Teacher-Student Ratio
1	Paragram High School and College	7	616	338	54.87	1:88
2	St. Euphrasies Girls High School and College	47	1274	1274	100	1:27
3	Bandura Holy Cross School and College	31	1185	0	0	1:38
4	Sholla Higher Secondary School	25	1667	875	52.49	1:67
5	Nawabganj Govt. Pilot High School and College	19	965	257	26.63	1:51
6	P.K.B School and College	23	810	395	48.77	1:35
7	Nawabganj Pilot Uchcha Madyamic Balika Bidyalaya	35	1970	1970	100	1:56

Source: BANBEIS,2022

The teacher student's ratio in Paragram High School and College and Nawabganj Govt. Pilot High School and College are is 1:88 and 1: 67. The teacher-students ratio is very low. The number of teachers should be increased.



Bandura Holy Cross School & College



Nawabganj Pilot Girls High school & College

Figure 6-8: College in Nawabganj Upazila

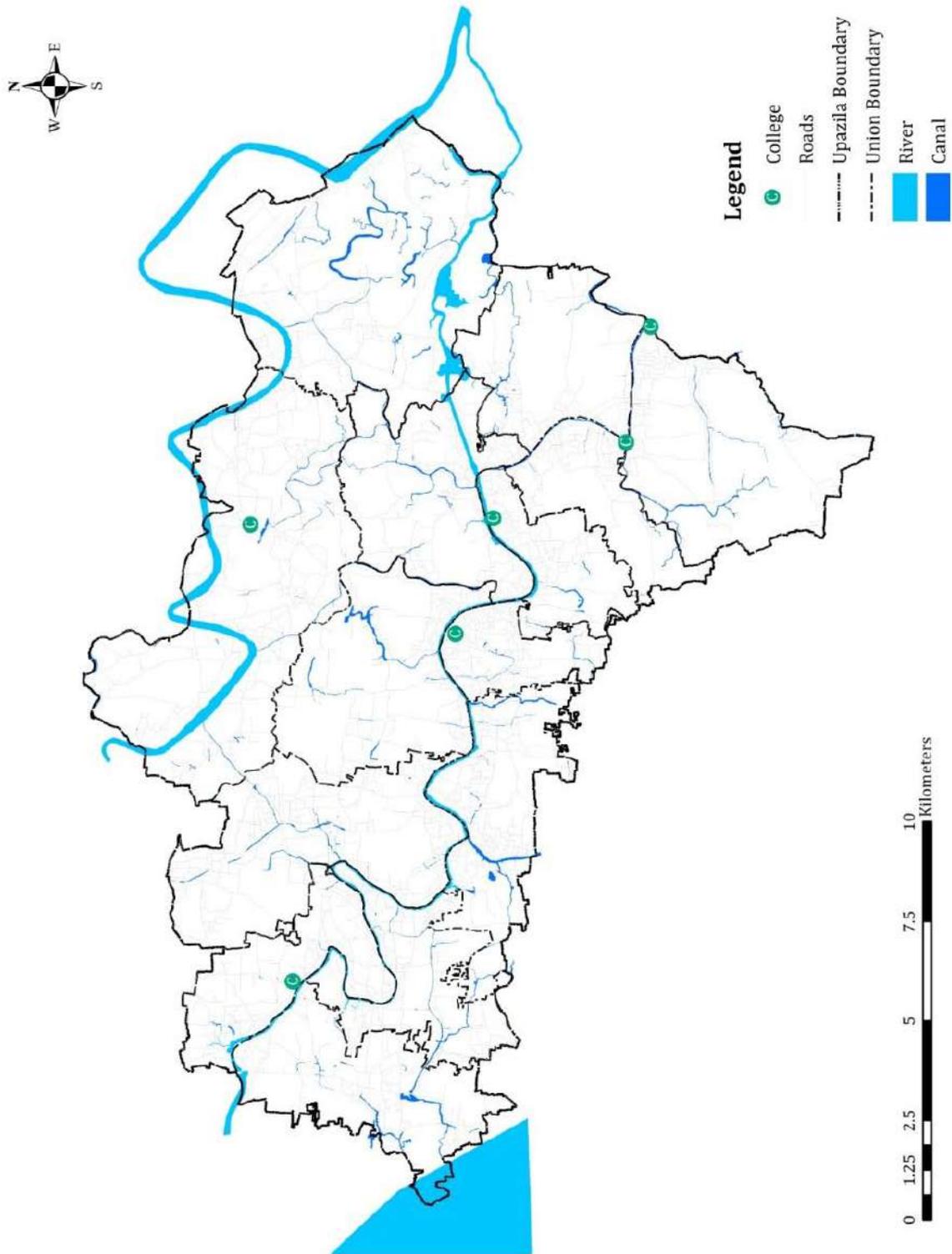


Figure 6-9: Location of Colleges in Nawabganj Upazila

## 6.4 Critical Issues of the Education Sector

Survey of the Upazila reveals the following facts about Upazila educational facilities.

**Positives:**

- There is at least one Primary School in every union of the Upazila.
- The level of Education is increasing, as data shows.
- The number of schools going children is increasing
- Upazila is giving attention to the development of education
- Results in the public exams are satisfactory

**Negatives:**

- Infrastructures are in poor condition.
- Not enough playgrounds in the schools.
- Teacher to student ratio is quite low in some schools
- Facilities need more financial support.
- Lack of basic facilities that should be there in the educational institutes.

### **6.4.1 Level of Education**

The socio-economic survey of households (2023) explains the level of education. The education level distribution data for Nawabganj Upazila show that the town's population exhibits a diverse range of educational backgrounds.

According to the socio-economic survey, most individuals have received a Primary education. This indicates that a significant portion of Nawabganj Upazila's residents have completed their primary schooling, which is a fundamental education level. In contrast, some individuals are categorized as Uneducated, signifying that a notable portion of the population may not have formal education, which could be an area of concern for literacy and skill development. The other educational categories include 8 Grade, SSC, HSC, and Graduate. These figures suggest a diverse mix of academic backgrounds, with a significant number of individuals achieving at least a secondary level of education.

In summary, this education data highlights the diverse educational landscape of Nawabganj Upazila. It emphasizes the need for continued efforts to promote literacy and access to education for those with lower educational attainment while also acknowledging the presence of individuals with higher levels of education in the community. Tailored educational programs and opportunities could further enhance the overall educational outcomes and skills development for the residents.

### **6.4.2 People's Perception of Education Facilities**

The findings from the community's perception of educational facilities in Nawabganj Upazila indicate several noteworthy observations. Firstly, most individuals believe that there is a significant lack of "Day Care" centers in the area for infants, which may highlight the need for more early childhood care and support options. Similarly, respondents also feel that very few or even no "KG Schools" are available in most areas, suggesting a potential gap in early childhood education services.

Conversely, most individuals seem to believe that there are plenty of "Primary Schools" in the area, indicating that the community perceives a sufficient availability of basic education

institutions. A similar sentiment is observed for “Secondary Schools,” with most respondents thinking there are many or plenty of such schools in Nawabganj Upazila.

On the other hand, respondents feel that there are very few or insufficient “Colleges” and “Universities, Higher Education Centers, and Training Centers” in the town, indicating a potential shortage of higher education opportunities and professional development resources.

Lastly, the perception of “Madrasa” facilities suggests that respondents feel there are very few or inadequate options for Islamic education in the area. These findings shed light on the community’s perceptions of the educational infrastructure in Nawabganj Upazila, highlighting areas where improvement and expansion may be needed, particularly in higher education and early childhood education services.

### **6.4.3 Youth’s Perception of Educational Facilities**

Youth-focused PRAs were conducted with students from schools and colleges in the Sholla, Kolakopa, and Galimpur unions of Nawabganj Upazila to grasp their needs and perspectives. The results from these three distinct PRAs reveal the following insights regarding educational facilities.

#### **Lack of Facilities Educational Institutions:**

- Scarcity of public libraries, vocational institutions, and science clubs in the locality.
- Absence of computer and language training centers.

#### **Declining Interest in Higher Education:**

- Interest in higher education is declining noticeably, especially among male students who prefer migrating abroad for employment and better livelihood.
- The burden of college fees, lack of facilities like canteens and auditoriums, and transportation problems deter students from pursuing higher education.

#### **Women’s Participation in Education:**

- Female students show a stronger inclination towards higher education.
- Early marriage among girls is a barrier to their education, driven by societal norms and expectations.
- Technical education for women, particularly in modern technologies, is necessary to equip them for future employment.

#### **Health and Safety Concerns Impacting Education:**

- Poor transportation infrastructure, high transport cost, and eve-teasing incidents negatively impact female students' access to education.
- Drug addiction and inadequate recreational facilities are also affecting students' focus on education.

### 6.4.4 Engagement and Insights from School Children

The findings from the PRA conducted with selected school children of Nawabganj Upazila indicate gaps in existing educational facilities.

- Scarcity of diversified educational facilities.
- Lack of public libraries, science museums, vocational institutions, English language centers, and science clubs.

## 6.5 SWOT Analysis of existing facilities

### Strengths:

- Sufficient number of institutions.
- Results are satisfactory.
- Most schools are within walkable distances.
- Almost every school has boundary wall, which is a sign of safety measure.
- Girls' attendance percentage at school is more than that of boys.

### Weaknesses:

- Poor Infrastructure.
- Lack of Playgrounds.
- The Teacher-student Ratio is low.
- Lack of technology-based education system

### Opportunities:

- Engagement of more qualified teachers can help upgrade the quality of educational.
- Options to add nearby playgrounds with the schools to help children's physical and mental growth.
- Improvement of road network will help to reach the schools easily.
- Teachers should be given more ICT training

### Threats

- Social safety problem.
- Lack of infrastructure.

## 6.6 Review of National Education Policy

The key objectives of the National Education Policy of Bangladesh are:

- To provide equitable access to quality education at all levels for all citizens of Bangladesh.
- To promote lifelong learning and education for all, including early childhood education, primary, secondary, higher secondary, technical, vocational, and tertiary education.
- To enhance the quality of education including curricula, pedagogy, teacher training, assessment, and monitoring.
- To develop the skills and knowledge necessary for a rapidly changing economy and society, including technology and innovation.

- To promote social values, civic responsibility, and national identity.
- To ensure that education is inclusive, participatory, and democratic.
- To strengthen governance, financing, and management of the education system.

An interview was conducted with the principal of a College and the Headmaster of a High School in Nawabganj. In the interviews, they described status of the existing condition of the educational in Nawabganj. According to them, everyone can access the education facility, but there is a lack of technical and vocational institutes. Though social values and civic responsibility is maintained in the facilities, Nawabganj needs more monitoring and financial assistance. Moreover, the arrangement of training programs for teachers and education programs using modern technology can help improve quality of education. They also emphasized that educational institutions are not adequately furnished. Some facilities such as drinking water, a library, a computer lab, a common room, play fields, etc., should be provided for ease and comfort of the students.

The NEP emphasizes the importance of early childhood education and aims to ensure universal access to pre-primary education. It also promotes the use of Information and Communication Technology (ICT) in education and recognizes the importance of Technical and Vocational Education and Training (TVET) to meet the country's workforce needs.

To achieve these objectives, the NEP outlines a number of strategies, such as

- expanding the number of educational institutions,
- improving the quality of teaching and learning,
- increasing the use of ICT in education,
- enhancing the capacity of teachers and education managers.
- The policy also emphasizes the importance of public-private partnerships to ensure adequate financing and management of the education system.

## 6.7 Conclusion and Recommendations

This working paper gives an overall first-hand impression about education in the upazila and analysis of the existing education facilities. For the preparation of the masterplan of Nawabganj Upazila, some recommendations and proposals are as follows:

- Focus on Women's Education and Higher Education
- Improve the infrastructure.
- Build a well-connected road network.
- Propose playgrounds where needed.
- To improve the quality of education, a Teacher's Training program is necessary.
- Propose a technical-based educational program.
- Provide more budgets where needed and monitor them as well.
- Adopt innovative ideas in extra-curricular activities

## CHAPTER SEVEN: AGRICULTURE INCLUDING FISHERY, LIVESTOCK AND FORESTRY

### 7.1 Introduction

Agriculture, fisheries, and livestock play vital roles in the economy and livelihood of rural communities in Bangladesh, with no exception for Nawabganj Upazila. With a population of over 348786, it is a bustling hub of economic activity, with agriculture, fisheries, and livestock significant contributors to its economy.

The fertile land and water resources of the Upazila have long been used for agricultural activities, with crops such as paddy, wheat, jute, vegetables, and fruits grown here. The region is also well-known for its fisheries industry, which is focused on freshwater fish. Additionally, livestock farming is a crucial component of the local economy, with dairy and poultry being the area's main types of livestock reared.

This report, part of volume III, “Working Papers,” aims to provide a comprehensive overview of agriculture, fisheries, and livestock in Nawabganj Upazila. It will cover the current state of the industries, their contribution to the local economy, challenges faced by farmers and fishers, and potential opportunities for growth and development. Figure 7-1 shows the location of the Nawabganj Upazila.



Source: Wikipedia, Dhaka.gov.bd, Google Earth

Figure 7-1: Map of Bangladesh, Dhaka district, Nawabganj Upazila

### 7.2 Methodology

**Literature review:** The consulting team conducted a comprehensive review of relevant literature, including academic publications, government reports, and other relevant sources, to gain an understanding of the agricultural condition of Nawabganj Upazila. A literature review was conducted from the UDD report, Upazila Information collected from the Upazila website, BBS data, LGED report, etc.

**Field study:** The consulting team visited Nawabganj Upazila, Dhaka, to collect primary data on agricultural conditions, including fisheries and livestock farming. The consultants used

structured questionnaires and interviewed farmers, local leaders, and agricultural experts to gather relevant information.

**Data analysis:** The data collected from the field survey, including quantitative and qualitative data, were analysed to identify trends, patterns, and challenges and get a clear picture of the agriculture, fishery, and livestock sector of Nawabganj Upazila.

**Recommendations:** Based on the data analysis, they identified key challenges and opportunities for the agricultural sector in Nawabganj Upazila and made recommendations for improving the agricultural condition, including fisheries and livestock farming, in the region.

**Validation:** The team validated their findings and recommendations by presenting them to local leaders, farmers, and agricultural experts in Nawabganj Upazila. The Team incorporated their feedback and made necessary revisions to our report.

## 7.2.1 Concept Note for Agriculture, Fishery and Livestock Survey

### 7.2.1.1 Data Collection

The relevant agriculture, fishery, and livestock data were gathered from both primary and secondary sources. Secondary data sources will include project-related documents, national agriculture policies, published research papers, and data from relevant government agencies. Primary data were collected from diverse stakeholders, including local government authorities, agricultural service providers, farmers, relevant institutions, businesses, and residents of different villages and urban areas in each union.

### 7.2.1.2 Methodology

The collection of agriculture-related data was carried out using a combination of quantitative and qualitative methods. Secondary data were analyzed to understand the existing agricultural landscape and policies. Primary data were gathered through surveys, interviews, focus group discussions (FGDs), and direct observations to gain insights into agriculture usage, challenges, and opportunities.

The agriculture, fishery, and livestock survey were conducted using questionnaire-based social tools and techniques, i.e., Key Informant Interview (KII), Rapid Rural Appraisal (RRP), etc., based on requirements to collect relevant data. KIIs will be conducted to collect institutional information, and four surveys, namely agriculture survey, fishery survey, and livestock survey, were conducted on agricultural farmers, fish farmers who cultivate fish on enclosed waterbodies, fishermen, and livestock and poultry farmers, agriculture value chain actors, inputs suppliers, etc. The major focus was on understanding their needs, access levels, challenges, and opportunities for enhancing agricultural services. The existing and planned projects and programs of the relevant institutions have been stocked to provide a better understanding of the situational phenomena of the respective Upazila in terms of agriculture. The major target people were farmers (agriculture, fishery, livestock) and fishermen. These participatory approaches helped in gathering views and opinions to understand real problems. In this regard, a sample size for agriculture farmers was determined using a statistical formula explained in the section below.

### 7.2.1.3 Determination of the Sample Size

The sample size for the agriculture sector is determined following the Cochran formula (Cochran, 1953) to ensure statistical relevance and accuracy.

$$n = p (1 - p) \left( \frac{Z}{E} \right)^2$$

[n = sample size, P= Proportion of beneficiaries = 0.50 (assumed 0.5 as there have equal chance of respondent having knowledge about the expected issue or not)

Z=1.645 (at 90% confidence level)

E = Standard error = 0.1 (or 10% is considered as standard margin of error)]

Regarding the agriculture survey, the formula initially provided an acceptable sample size of 67.6. After rounding up, this yields a sample size of 68. However, to avoid complications arising from fractional sample sizes during distribution, the sample size was adjusted to 70. In Nawabganj Upazila, composed of 14 unions, the union-wise sample size of farmers' households was modified accordingly. Specifically, the total sample size for agricultural farmers was set at 126, given the spatial distribution of villages. Since each union consists of three blocks and three samples will be collected from each block, this ensures a thorough representation of the agricultural sector.

For the fishery survey, samples were collected from two groups: fish cultivators and fishermen in Nawabganj Upazila. Applying the same formula, the sample size for fish cultivators was set at 70, with five fish farmers sampled from each of the 14 unions. However, for the fishermen's survey, the sample size was adjusted to reflect the geographical concentration of fishing activities. Fishing tends to be localized in areas of Nawabganj with access to rivers and water bodies such as the Ichamoti and Kaliganga rivers, as well as various khals, including Churain, Salakha, Ichamati, Bahra, and others. Given this, a small but more targeted approach was taken, with two fishermen sampled from each union, resulting in a total of 28 fishermen surveyed.

In the case of the livestock survey, although the calculated sample size of 70, based on Cochran's formula, was acceptable, the sampling approach was adjusted. To ensure a comprehensive representation of livestock farmers, increasing the sample size to nearly 100 or more was necessary. This adjustment was made to account for the need to survey a minimum of 10 farmers from each union, and the goal was also to include farms of varying sizes, with at least one small or medium and one large farm sampled from each village. This approach ensures that the data reflects the diversity and scale of livestock farming practices across Nawabganj Upazila.

### 7.2.1.4 Distribution of Sample Size

Table 7-1 shows the sample size distribution for various unions under the study upazila of UMPR-2. As the four surveys include agriculture farmers, fish farmers, fishermen, and livestock farmers, the determination of respondents will be carried out by the proportion of the total number of these different types of farmers' households in the respective upazila. Then, respondents will be distributed among all unions under the respective upazila. The farmer's household survey will be conducted according to the existing farmer's house within the study upazila. The union-wise sample size of farmers' households may be modified based on the location of villages to get better information.

Table 7-1: Union-wise Sample Size Taken for Agriculture, Fishery and Livestock Survey

District	Upazila	Union	Sample Size for Survey				
			Agriculture	Fishery	Livestock		
				Fish Farmer	Fisher man		
Dhaka	Nawabganj	Agla	9	5	2	10	
		Bakshanagar	9	5	2	10	
		Bandura	9	6	2	10	
		Barrah	9	5	2	10	
		Baruakhali	9	5	2	10	
		Churain	9	5	2	10	
		Galimpur	9	5	2	10	
		Jantrail	9	5	2	10	
		Joykrishnapur	9	5	2	10	
		Kailail	9	5	2	10	
		Kolakopa	9	5	2	10	
		Nayansree	9	5	2	10	
		Shikaripara	9	5	2	10	
		Sholla	9	5	2	10	
		<b>Total</b>		<b>126</b>	<b>70</b>	<b>32</b>	<b>141</b>

Methodology enabled us to gather comprehensive data on the agricultural condition of Nawabganj Upazila, analyze the findings, and provide recommendations for improving the agricultural sector, including fisheries and livestock farming, in the region. The methodology for the study for agriculture studies is shown in the chart below:

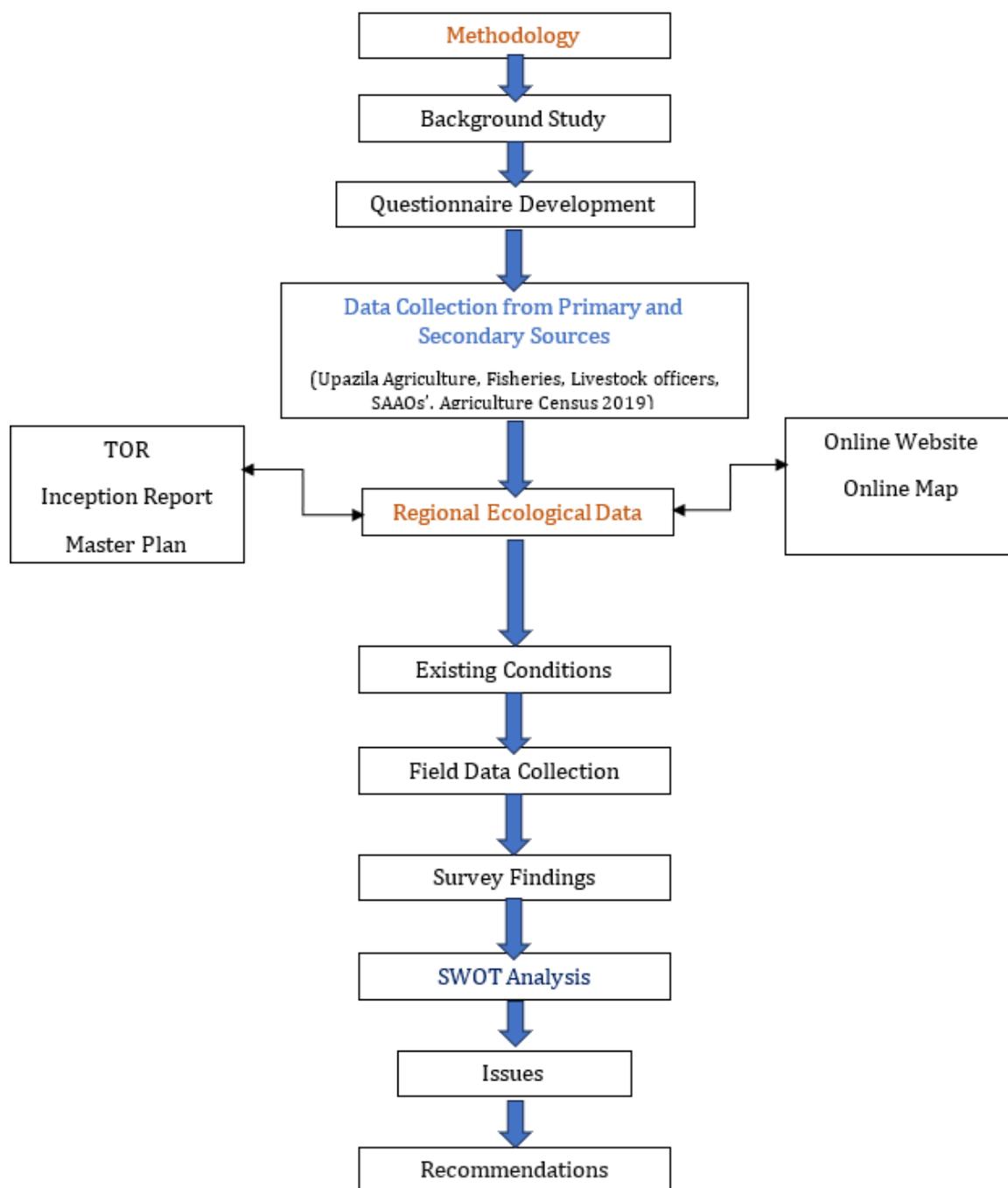


Figure 7-2: Methodology Flow Chart

### 7.3 Agro-Ecological Zones of Bangladesh

Diverse zones mark the agroecological landscape of Bangladesh, each presenting unique challenges and opportunities for agriculture. Nawabganj Upazila, according to the provided map, finds its place in agroecological zone 8, known as the Young Brahmaputra and Jamuna Floodplain. This region, extending across the northern parts of Bangladesh and India, is shaped by the intricate interplay of natural forces, particularly the Brahmaputra and Jamuna rivers. This discussion explores the characteristics of the Young Brahmaputra and Jamuna Floodplain,

shedding light on its geological formations, soil composition, and the implications of flooding on soil fertility and crop productivity.

The Young Brahmaputra and Jamuna Floodplain, with Nawabganj Upazila nestled within its boundaries, is a product of the continuous deposition of sediments carried by the Brahmaputra and Jamuna rivers. This agroecological zone encompasses an active floodplain with a sprawling area of approximately 3,190 square kilometers. The region is characterized by a dynamic landscape featuring a belt of unstable alluvial land along the Brahmaputra-Jamuna rivers. The constant ebb and flow of these water bodies lead to the perpetual formation and erosion of land, a testament to the ever-changing nature of the floodplain.

At the heart of the Young Brahmaputra and Jamuna Floodplain lies a mosaic of alluvial deposits, primarily comprising sand, silt, and clay. This amalgamation of soil components contributes to the fertility of the region's soil, creating an agriculturally conducive environment. The well-drained nature of the floodplain soil further enhances its suitability for various crops. This combination of fertile alluvial soil and adequate drainage forms the foundation for agricultural activities in the region.

The agricultural landscape in the Young Brahmaputra and Jamuna Floodplain is characterized by its suitability for diverse crops. Farmers in this region leverage the fertile soil to cultivate a variety of crops, benefiting from the nutrient-rich composition of the alluvial deposits. However, the region faces a significant challenge in the form of high levels of flooding. The Brahmaputra and Jamuna rivers, integral to the formation of this floodplain, periodically inundate the area, leading to erosion and nutrient loss. The repercussions of flooding can negatively impact soil fertility and crop productivity, posing a constant threat to the sustainability of agriculture in the region.

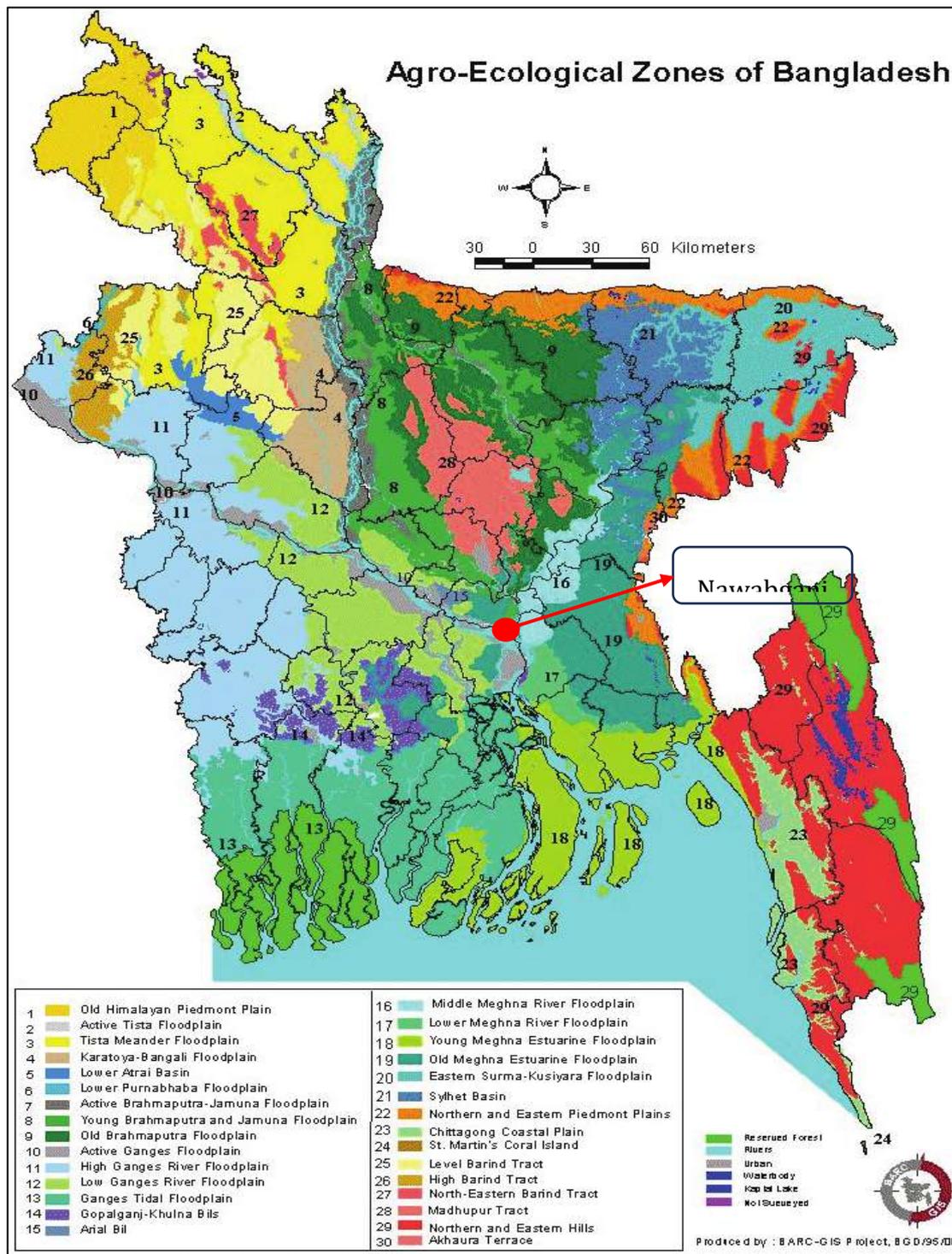


Figure 7-3: Agro-Ecological Zones of Bangladesh

## 7.4 Agriculture

Agriculture remains the backbone of Nawabganj’s economy, providing livelihoods for the vast majority of its population. The report also provides an overview of types of land, soil characteristics, cropping patterns, land ownership, and irrigation facilities and analyzes the current agricultural practices and challenges in the region.

### 7.4.1 Demographic Profile

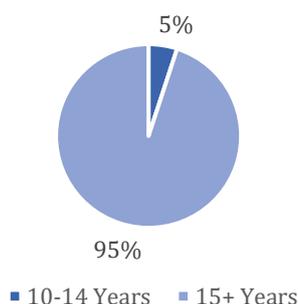
The table below presents a comprehensive breakdown of the population distribution across the various unions within Nawabganj Upazila based on the most recent census data available. Its purpose is to provide an overview of the demographic composition of Nawabganj Upazila, which can be essential for urban planning, resource allocation, and decision-making.

Table 7-2: Demographic profile of the Upazila

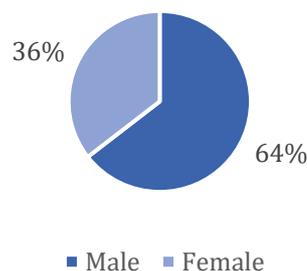
Union Name	Households	Average Household Size	Population		
			Male	Female	Sex Ratio
Agla	4971	3.71	9042	10143	0.89
Bakshanagar	5962	3.84	10675	12214	0.87
Bandura	7868	3.88	14337	16662	0.86
Barrah	7124	3.95	13393	14762	0.91
Baruakhali	5033	3.56	8338	9972	0.84
Churain,	6573	3.84	11969	13973	0.86
Galimpur	3811	3.83	6943	7910	0.88
Jantrail	6443	3.88	11532	13495	0.85
Joykrishnapur	5259	3.59	8814	10060	0.88
Kailail	7494	3.81	13420	15438	0.87
Kalakopa	6495	3.67	11621	12556	0.93
Nayansree	7698	3.87	13390	16440	0.81
Shikaripara	5068	3.76	8658	10316	0.84
Sholla	10895	3.91	20100	22613	0.89
	90694	3.81	162232	186554	0.87

Source: Population and Housing Census 2022, District Report: Dhaka

Persons Engaged in Agriculture  
(Age Distribution)



Persons Engaged in Agriculture  
(Gender Distribution)



Data Source: Agriculture Census 2019, District Report: Dhaka

Figure 7-4: Gender and Age Distribution of Persons Engaged in Agriculture in Nawabganj Upazila

The majority of the population in Nawabganj Upazila relies on agriculture as their primary source of income. Figure 7-4 illustrates two pie charts related to individuals engaged in agricultural works within Nawabganj Upazila, as derived from the Agriculture Census 2019. These diagrams indicate that agricultural activities in Nawabganj Upazila are predominantly conducted by

individuals aged 15 and above, with approximately 95% of this population participating in agricultural activities. Besides, the sector primarily relies on male labor (64%), underscoring the prevailing gender roles within the local agricultural economy.

### 7.4.2 Types of Land

Nawabganj upazila land types include high, medium-high, medium-low, low, and very low land. The total land area of Nawabganj Upazila is 17827 hectares. Of these, the high land area occupies 335 hectares, the medium-high land area holds 3500 hectares, and the medium-low area holds 9963 hectares. The amount of low land is 4029 hectares, and the very low land is missing here. The significant issue is that the amount of medium land is highest in Nawabganj upazila.

These are defined as follows: reference parameter: Low (0.3 m), Intermediate Low (0.5 m), Intermediate (1 m), Intermediate High (1.5 m) and High (2 m).

Table 7-3: Area of land types in Upazila

Land type	Land in hectare	Reference parameter
High land	335	Mean Sea Level (MSL)
Medium-high land	3500	
Medium-land	9963	
Low land	4029	
Very low land	-	
<b>Total</b>	<b>17827</b>	

Source: Field Survey 2024

### 7.4.3 Soil Characteristics

Nawabganj is an Agri-based area where the volume of production is higher than demand. This area is very crucial for our national economy. The climate of the district is moderate. The average temperature rises uniformly from February to April, reaching its maximum at around 38.06°C. The minimum temperature, which is usually recorded in January, is 15.98°C. The humidity level ranges from a minimum of 48 % in January to a maximum of 84% in July (source: Weather and Climate - The Global Historical Weather and Climate Data, 2023). The Ichamoti River passes through the middle of the Upazila, and the Kaliganga passes through the North-eastern border of the Upazila. This district region is occupied by the Padma floodplain in the south-west region. The floodplain deposits are mainly silty on the ridges and clay in the basins. The soil in the Padma floodplain is generally well structured and looks greenish-gray.

Sandy loam soil is a mixture of sand, silt, and clay particles, with a higher percentage of sand than silt and clay. It is well-draining, like sandy soil, but has a higher water-holding capacity due to the presence of silt and clay particles. Sandy loam soil is ideal for most crops as it provides adequate drainage, water retention, and nutrients. It is also easy to work with, making it suitable for a variety of agricultural practices. Clay soil is a type of soil that is made up of very fine particles, which tend to stick together, making it heavy and difficult to work with. Clay soil has a high-water retention capacity, which can lead to waterlogging and poor drainage if not managed correctly. Clay soil is rich in nutrients, but it can be challenging for plants to access these nutrients due to its compact structure. To improve plant growth in clay soil, it is essential to add organic matter, such as compost or manure, to increase soil structure and improve drainage.

### 7.4.4 Type of Crops and Agricultural Production

The agricultural sector in Nawabganj Upazila primarily focuses on producing rice, jute, vegetables, and fruits. Rice is the most important crop, and it is cultivated on a large scale in this area. The upazila area is 24710.88 hectares, and the cultivated land area is around 14323.39 hectares.

Table 7-4: Cultivated Land Area for Selected Crops in Nawabganj Upazila

Crops	Cultivated Land (Area in Hectares)
Aus	0.000
Aman	0.000
Boro	5313.932
Wheat	82.961
Maize	137.189
Jute	929.159
Pulse	613.504
Oil Seed	1947.349
Sugarcane	22.662
Potato	127.476

Source: Agriculture Census 2019, District Report: Dhaka

In Nawabganj Upazila, a variety of crops are cultivated across different lands. Boro occupies the largest cultivated land area with 5313.932 hectares, followed by oil seed with 1947.349 hectares, indicating their significance in local agriculture. Other prominent crops include jute, with 929.159 hectares, and pulse, with 613.504 hectares. Additionally, sugarcane, wheat, potato, and maize are cultivated across relatively smaller areas ranging from 22 to 137 hectares. Various types of fruits are also produced there according to the season, like mango, jackfruit, banana, papaya, guava, plum, lemon, coconut, betel nut, palm, wood nut, and kaiju nut. This distribution of cultivated land area reflects the diversity of agricultural practices in the region, catering to both staple food production and the cultivation of various cash crops.

Table 7-5: Agricultural Production

Agricultural situation	In metric ton
Total food crop production	49580
Yearly demand of food	48180
Food surplus	1400

Source: Upazila Agriculture Office

### 7.4.5 Cropping Pattern

Single, double, triple cropping and more than three cropping are the terms used to describe the number of times a particular piece of land is used for crop cultivation each year. Each cropping method has its benefits and drawbacks, and the choice of cropping method depends on various factors such as soil fertility, climate, market demand, and available resources.

Table 7-6: Cropping Pattern of Agricultural Lands in Nawabganj Upazila

Land Types (Show in map)	Hectares
Single	6237
Double	9328
Triple	2235
More than three	27

Source: Field Survey 2024

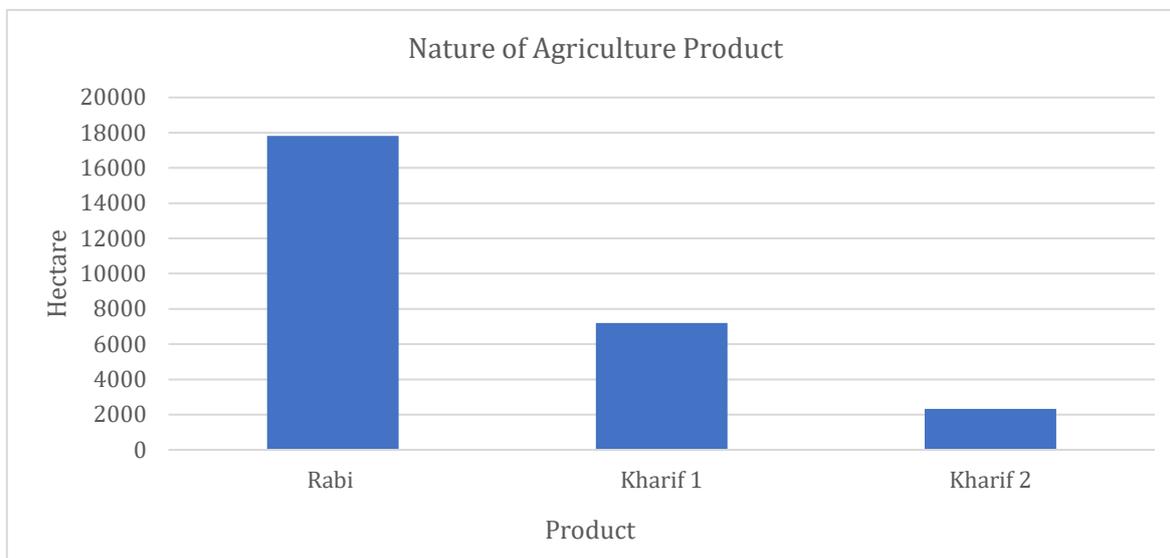
Single cropping involves cultivating a piece of land once a year, usually during the growing season. The main advantage of single cropping is that it is relatively easy to manage, as farmers only have to focus on one crop. However, it may not be the most efficient use of the land since it remains idle for the rest of the year. Single cropping is most suitable for areas with limited water resources and those with low agricultural productivity.

Double cropping, also known as multiple cropping, involves growing two crops in a single year on the same land. This method is common in areas with favorable growing conditions and high soil fertility. Double cropping helps maximize the use of the land and increase crop yield. Farmers can choose to grow two crops that complement each other, such as one that is harvested in the dry season and another in the wet season. Alternatively, they can grow two crops with different maturity periods, allowing for sequential harvesting. However, double cropping requires more intensive management and may put a strain on soil fertility if not done correctly.

Triple cropping involves growing three crops in a single year on the same land. This method is more common in tropical and subtropical regions with long growing seasons and high rainfall. Triple cropping helps maximize the productivity of the land and increase crop diversity. It also allows for better use of labor resources since farmers can work on different crops at different stages of growth. However, triple cropping requires even more intensive management and can lead to soil degradation and nutrient depletion if not done sustainably.

### 7.4.6 Harvesting Cycle

Rabi, Kharif 1, and Kharif 2 are the three major cropping seasons in Nawabganj Upazila, and each season is associated with different agricultural products. Rabi crops are grown in winter, typically from November to April. The word "Rabi" means "spring" in Arabic. The major Rabi crops include wheat, barley, peas, gram, mustard, and linseed. These crops require a cool climate and are sown at the beginning of the winter season. Rabi crops play a significant role in this area.



*Data Source: Upazila Agriculture Office*

**Figure 7-5: Nature of Agricultural Production**

Kharif 1 crops are grown during the monsoon season, typically from June to October. The major Kharif 1 crops include rice, maize, jowar, bajra, cotton, sugarcane, and groundnut. These crops require a warm and humid climate and are sown at the beginning of the monsoon season. Kharif 1 crops contribute significantly to the agricultural GDP of the country.

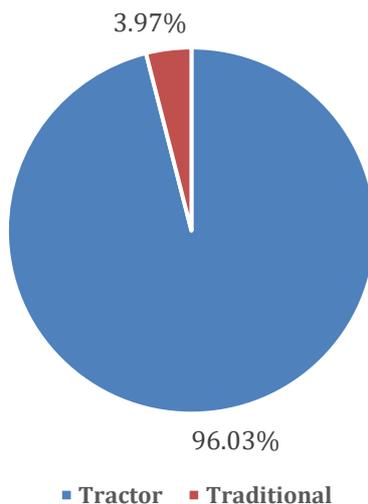
Kharif 2 crops are also grown during the monsoon season, typically from October to March. The major Kharif 2 crops include wheat, gram, mustard, and vegetables such as onion, garlic, and tomato. These crops are sown after the harvest of Kharif 1 crops and require a moderate climate. Kharif 2 crops are relatively less common than Rabi and Kharif 1 crops. Rabi crops, such as wheat and barley, are grown during the winter season, while Kharif 1 crops, such as rice and cotton, are grown during the monsoon season. Kharif 2 crops, such as wheat and mustard, are sown after the harvest of Kharif 1 crops and require a moderate climate. The crop choice depends on various factors such as climate, soil type, and market demand. Understanding the different cropping seasons and associated agricultural products is crucial for effectively planning and managing agricultural practices.

## 7.4.7 Agricultural Infrastructure

### 7.4.7.1 Technology

Farmers in Nawabganj Upazila use traditional farming techniques. However, there is a growing trend towards using modern farming practices such as high-yielding varieties of crops, irrigation facilities, and improved farming equipment.

Cultivation Method/Technology Used



Data Source: Agriculture Survey 2024, Nawabganj Upazila

Figure 7-6: Agricultural Infrastructure and Technology

Figure 7-6 presents the farming methods/technologies utilized by the farmers of Nawabganj Upazila and reveals a significant reliance on modern mechanization. Of 126 respondents, 96% of farmers use tractors, indicating widespread adoption of efficient agricultural technology. However, 3.97% of farmers still use traditional farming methods, reflecting either a preference for or necessity of manual labor and conventional tools in some regions of Kolakopa and Bakshanagar.

Number of Households Using Agricultural Equipment

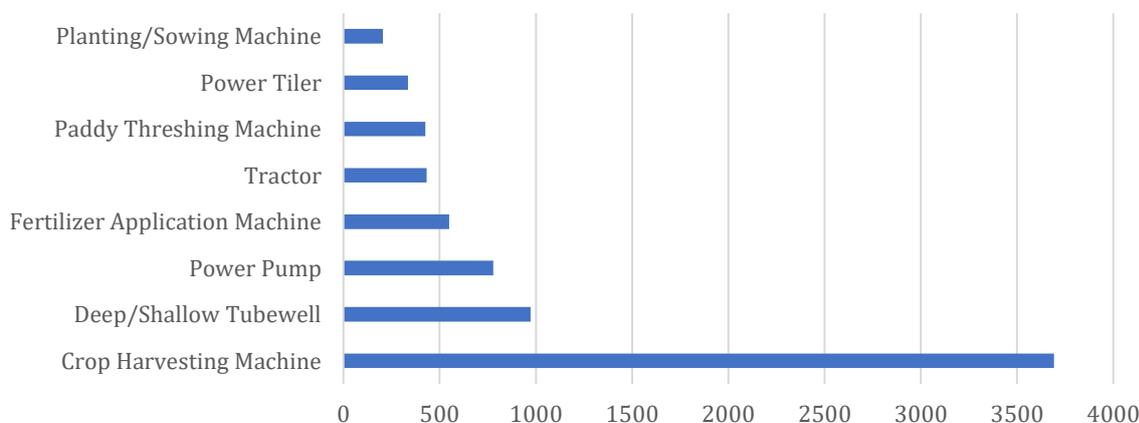


Figure 7-7: Farming Equipment Used in Agricultural Households

Data Source: Agriculture Census 2019, District Report: Dhaka

In addition to survey findings, the Agriculture Census 2019 statistics also revealed that agricultural mechanization in Nawabganj largely focuses on crop harvesting and water management. Figure 7-7 shows that mechanization in agriculture focuses mainly on harvesting and water management. The most widely used equipment, with over 3500 households using crop harvesting machines. Besides, approximately 1000 households use deep/shallow tube wells and around 800 use power pumps. Land preparation (tractors and power tillers) and fertilization equipment are used to a lesser extent than this equipment.

#### 7.4.7.2 Irrigation and Water Management

Irrigation systems are pivotal in ensuring a reliable water supply, enabling farmers to optimize crop yields, enhance land utilization, and support year-round farming.

Table 7-7: Source of Irrigation Water

Source	% Of Respondents
<b>Groundwater</b>	74.60%
<b>Deep Tube-well</b>	74.60%
<b>Surface Water</b>	25.40%
<b>Khal</b>	10.32%
<b>River</b>	2.38%
<b>Pond</b>	2.38%
<b>Beel</b>	10.32%

Source: Agriculture Survey 2024, Nawabganj Upazila

Table 7-7 reveals a clear preference for groundwater as the primary source of irrigation among the respondents, with 74.60% of farmers relying entirely on deep tube wells for their agricultural water needs. In contrast, only 25.40% of the farmers utilize surface water for irrigation, sourced from various natural water bodies. Among these surface water users, 10% responded to drawing water from khals and beels, making them the most common surface water sources. Rivers and ponds are fewer common sources, each utilized by just 2% of farmers. The predominance of deep tube wells as the primary irrigation source reflects a strong dependence on groundwater, while surface water sources, though utilized, play a secondary role. This calls for strategic planning in managing water resources to ensure sustainable agricultural practices and prevent groundwater depletion.

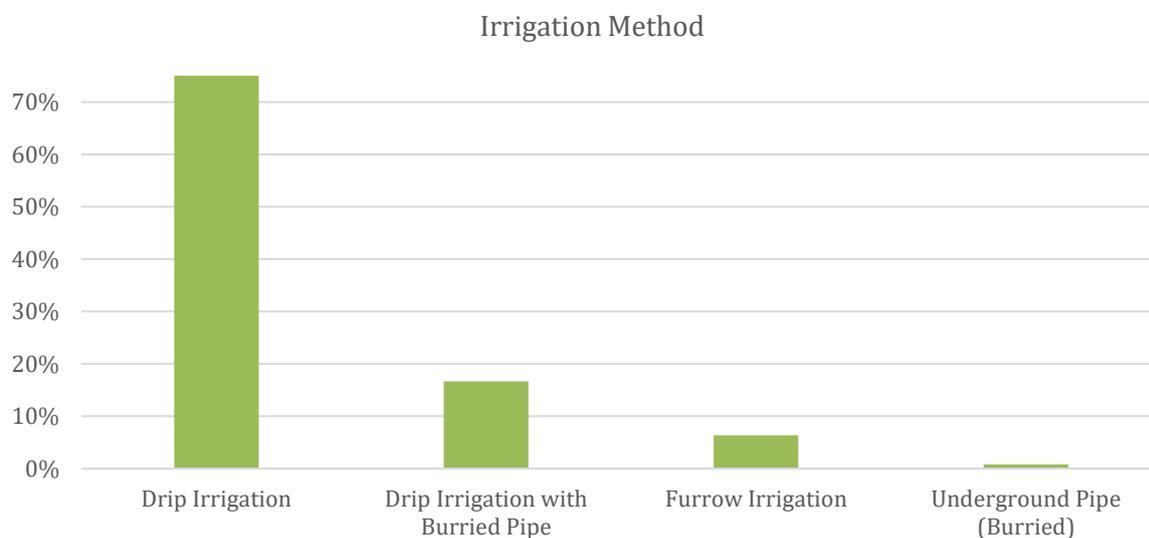
Table 7-8: Condition of Irrigation Facilities

Type	Number	Area of Land(hectare)
<b>Deep</b>	03	285
<b>Shallow</b>	2038	10186
<b>LLP</b>	45	455
<b>Total</b>	<b>2086</b>	<b>10926</b>

Source: Nawabganj Upazila briefly

The table reveals land distribution across three irrigation systems: deep irrigation (285 hectares), shallow irrigation (10,186 hectares), and low lift pump (LLP) irrigation (455 hectares). Deep irrigation suits crop with extensive roots, requiring adequate water supply. Shallow irrigation demands precise water management for limited-depth soil, benefiting short-duration crops. LLP

irrigation focuses on low-lying plains, which require effective drainage and benefit wet-tolerant crops like rice. Customizing irrigation methods based on land types enhances productivity while managing water challenges.



*Data Source: Agriculture Survey 2024, Nawabganj Upazila*

**Figure 7-8: Irrigation Methods Utilized by Farmers**

Figures 7-8 provides information on the irrigation methodologies employed by farmers, with deep irrigation emerging as the predominant technique. Specifically, 77.19% of farmers use drip irrigation practices; this suggests that farmers are inclined mainly towards water-efficient practices, as drip irrigation helps minimize water wastage by delivering water directly to plant roots. About 16.67% of farmers also implement drip irrigation via buried piping, a more effective strategy that mitigates water loss from evaporation or seepage. Although less prevalent than direct deep irrigation, this technique continues to cater to a notable segment of the farmers. Less prevalent methodologies encompass underground pipe irrigation (6.35%) and furrow irrigation (0.79%).

## 7.4.8 Agricultural Land Usage and Ownership

### 7.4.8.1 Land-usage

**Table 7-9: Use of Agricultural Land in Nawabganj Upazila**

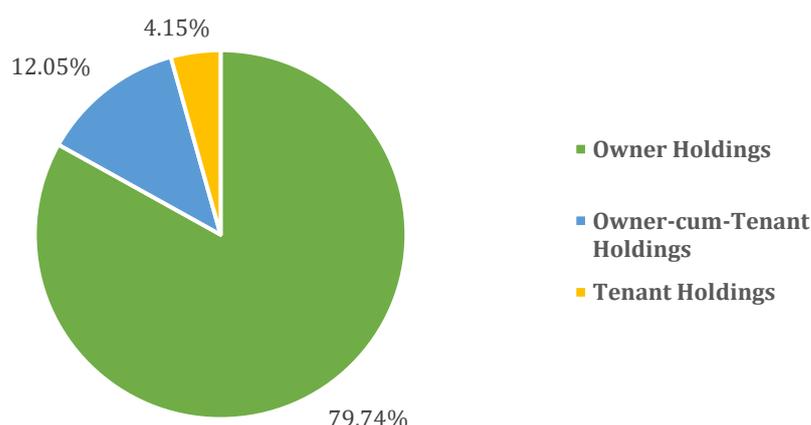
Type of Land	Area (in Acres)
<b>Owned Area</b>	14,235.23
<b>Operated Area</b>	14,359.47
<b>Homestead Area</b>	4,396.509
<b>Cultivated Area</b>	9,060.11
<b>Irrigated Area</b>	5,644.965
<b>Temporary Crops Gross Area</b>	11,307.74
<b>Intensity of Cropping</b>	132%

*Source: Agriculture Census 2019, District Report: Dhaka*

Table 7-9 reveals a dynamic landscape in the region, characterized by a total owned area of 14235.23 hectares. The operated area (14,359.47 hectares) slightly exceeds the owned area, suggesting that farmers may rent or lease additional land to cultivate crops and enhance production capacity. The cultivated area of 9,060.11 hectares indicates that not all available land is being actively farmed, which suggests that there is potential for increased agricultural utilization. Notably, 5,644.965 hectares, or approximately 62% of the cultivated area, are irrigated. The gross area dedicated to temporary crops is substantial at 11,307.74 hectares, highlighting the practice of multiple cropping cycles. This is further evidenced by an intensity of cropping at 132%, indicating that farmers, on average, are cultivating more than one crop per year per hectare of cultivated land.

### 7.4.8.2 Land Ownership

This section provides information on the structure of land tenure among agriculture-based holdings. The insights derived from the secondary source and survey data offer a deeper understanding of how land tenure impacts agricultural decision-making and development in the region.



Source: Agriculture Census 2019, District Report: Dhaka

Figure 7-9: Land Tenure Structure

The landholding data reveals that around 80% of holdings are under landowner. Additionally, 12% are classified as owner-cum-tenants, meaning they own part of the land they farm while renting or leasing additional land. This group likely seeks to expand its agricultural activities despite land ownership limitations, reflecting a desire to increase production. The remaining portion (4.15%) consists of tenant farmers who lease the land they cultivate.

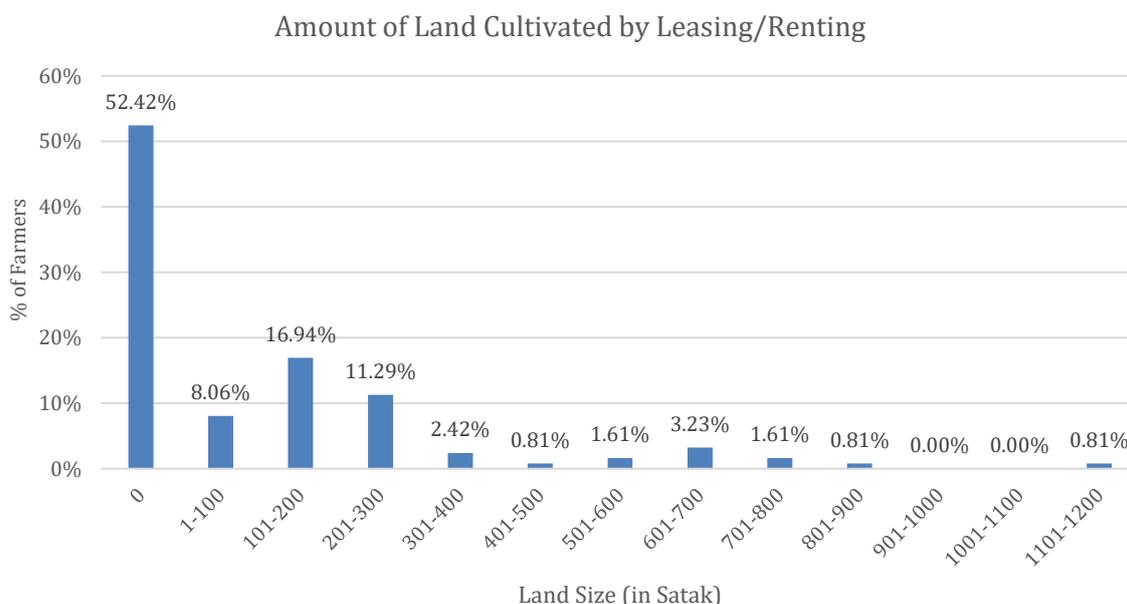
Table 7-10: Status of landownership of Agriculture-based family

Ownership Status (In hectare)	Number	Percentage of total
Landless <0.02	6634	26.00%
Marginal 0.02-.2	12012	47.08%
Low 0.2-1.0	6014	23.57%
Medium 1.0-3.0	750	2.94%
High >3.0	102	0.40%

Source: Upazila Agriculture Office

<b>Total</b>	<b>25512</b>	<b>100%</b>
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Table 7-10 further reveals information on the landowners within the Nawabganj Upazila. It shows that many farmers in Nawabganj are either landless or classified as marginal landowners. A notable share of farming households, approximately (73.08%), either lack land entirely (<0.02 hectares) or own very small plots of land (up to 0.2 hectares). Among these farmers, those classified as marginal landowners are the most prevalent. Only a limited fraction has medium-sized (1.0–3.0 hectares) or large (>3.0 hectares) plots, with only 0.40% owning large amounts, suggesting that large-scale and potentially more lucrative agricultural operations are uncommon within the Upazila.



*Source: Agriculture Survey 2024, Nawabganj Upazila*

**Figure 7-10: Amount of Land Cultivated by Leasing/Renting**

Figure 7-10 provides an overview of land leased by farmers, classified by plot size in Satak. Over half of the farmers do not lease any land. Among those who do, the majority lease plots within the 101-200 Satak and 201-300 Satak ranges (17.94% and 11.29%, respectively), highlighting a preference for smaller-size plots. The percentage of farmers leasing land over 300 Satak is very small, remaining below 4%, which suggests limited interest in medium to large plots. Interestingly, there is no representation in the 901-1000 Satak and 1001-1100 Satak categories, indicating a lack of large-scale land leases. Overall, this distribution highlights the trend of farmers opting for smaller leased plots.

### 7.4.9 Critical Issues

While the overall state of agriculture in Nawabganj Upazila appears satisfactory, a closer examination reveals a spectrum of challenges that persist annually. These challenges encompass various aspects of agricultural practices, ranging from environmental factors to infrastructural limitations. This academic discourse delineates the multifaceted problems faced by the

agricultural community in Nawabganj Upazila, providing insights into the hurdles that impede sustainable and thriving agricultural practices. Challenges in Nawabganj Upazila's Agriculture:

#### **7.4.9.1 Environmental Issues**

##### **Decline of Aona and Bhangabhita Canals:**

Aona Canal and Bhangabhita Canal, vital irrigation water sources for several agricultural lands east of Nawabganj Upazila, face a concerning decline. Their reduced functionality poses a significant challenge, impacting the irrigation capabilities of nearby agricultural plots.

##### **Persistent Waterlogging:**

Waterlogging poses a recurring challenge to agriculture in Nawabganj Upazila. Excessive water accumulation impedes crop growth, decreasing yields and financial losses for farmers.

##### **Declining Soil Fertility from Multiple Crops:**

Cultivating multiple crops in a single year contributes to a gradual decline in soil fertility. The strain on the soil's nutrient content necessitates careful management to ensure sustained agricultural productivity.

#### **7.4.9.2 Socioeconomic Challenges**

##### **Urbanization and Decreasing Agricultural Land:**

The encroachment of urbanization poses a threat to agricultural land availability. Most agricultural land in Nawabganj Upazila consists of moderately high land and medium land suitable for two or three crops. However, due to population growth, these fertile lands adjacent to roads are being converted into residential, infrastructure, industrial facilities, markets, and roads, leading to unplanned construction on agricultural lands across the Upazila. The rural economy has weakened as agriculture-based activities diminish. Furthermore, this threatens environmental balance and can lead to environmental degradation.

##### **Small Land Holdings per Farming Family:**

The limited land area allocated per farming family compounds the challenges faced by agricultural practitioners. The small land holdings are not suitable for commercial farming that leads to low profitability. The distribution of land among farmers highlights a strong inclination towards smaller land ownership, with a sharp decline in the percentage of farmers as the land size increases. Small landholdings restrict the scale of agricultural activities, hindering the potential for increased productivity.

##### **Crop Marketing:**

The lack of an organized market for selling farm-produced goods is a significant problem for the Upazila. The main characteristics of the agricultural product market in this region include weak infrastructure, a lack of cold chains, insufficient transport, storage, and processing facilities, poor local roads and communication systems, and the unfair practices of middlemen. Marginal and small farmers often face difficulties in marketing their products and do not receive fair prices due to the existence of trade syndicates. The poor state of Nawabganj's market and road infrastructure creates challenges in transporting and selling products. Improving road and

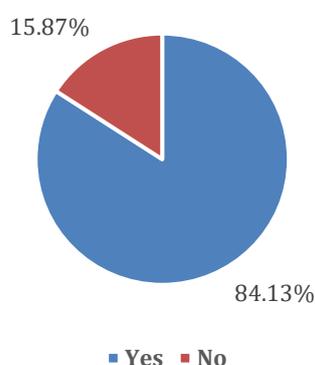
market infrastructure would enhance the supply chain for agricultural and other products, allowing farmers and traders to market their goods more easily and quickly, leading to increased income and a stronger local economy.

### 7.4.9.3 Infrastructure and Resource Management Issues

#### **Insufficient Storage Facilities and Crop Damage:**

Inadequate storage facilities expose crops to damage and spoilage. Proper storage is the most critical issue of post-harvest crop management, and its lack leaves agricultural produce vulnerable to the adverse effects of weather conditions and pests. Figure 7-11 indicates that approximately 84% of farmers recognized the necessity for storage facilities to accommodate perishable agricultural products.

Requirement of Storage Facilities



Source: Agriculture Survey 2024, Nawabganj Upazila

Figure 7-11: Storage Facility Requirement for Storage Of Grain/Perishable Vegetables

#### **Inadequate Irrigation System:**

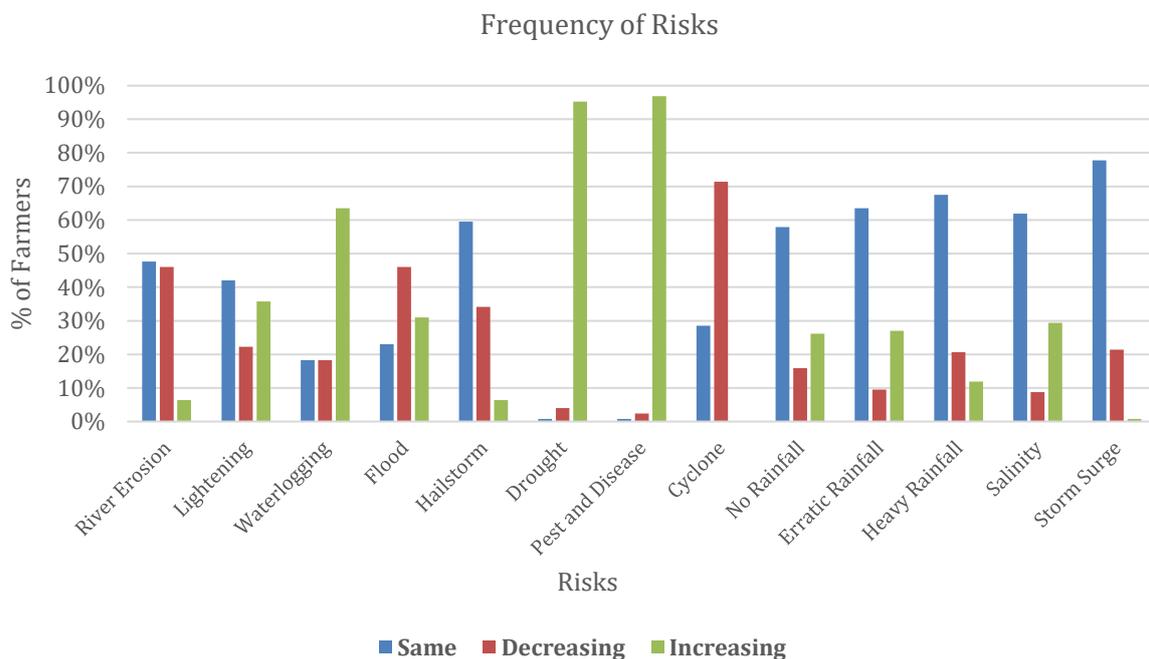
The lack of adequate irrigation infrastructure hampers the ability of farmers to optimize their agricultural output. The widespread use of deep tube wells as the main source of irrigation highlights a heavy reliance on groundwater. Over-extraction of groundwater can lead to rapid depletion of aquifers, causing long-term water shortages and making future irrigation unsustainable. Besides, deep irrigation systems require more energy and resources to pump water from greater depths, leading to higher operational costs for farmers, especially in areas where energy is expensive or scarce.

### 7.4.9.4 Disaster Risk and Climate Vulnerability

Nawabganj Upazila is susceptible to natural disasters like drought, heavy rainfall, and insecticide attacks. These unpredictable events pose significant crop risks and can result in substantial losses for the farming community.

Drought dries out the soil, depletes wells, and lowers groundwater levels. Other climate-related factors, such as high temperatures, strong winds, and low relative humidity, are often associated with drought. Various degrees of drought jeopardize the wide range of crops produced in the Rabi and pre-Kharif seasons. Besides, the intensity of rainfall during the monsoon season is changing

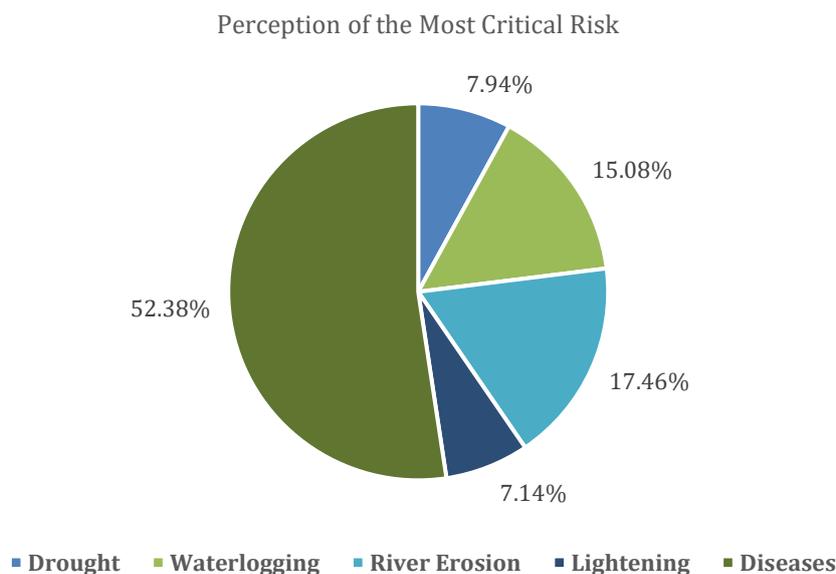
due to climate change, adversely affecting livelihoods, particularly farming families. Flooding during the monsoon is also common in flood-prone regions like Nawabganj, occasionally becoming extremely devastating. Silt accumulation in rivers and canals reduces drainage capacity, narrowing outlets and prolonging the duration of flooding. Major floods occur every 2-3 years, negatively impacting crops, livestock, and fish farming. Moreover, the primary cause of waterlogging is silt accumulation in rivers and canals. There is a significant lack of drainage infrastructure in Nawabganj. Limited drainage systems exist only in specific unions like Kolakopa, Boxanagar, Bandura, and Nayanshree, with outlets draining into the Ichamati River. Other unions lack such drainage systems. Poor drainage often results in waterlogging at various market locations during the rainy season.



Source: Agriculture Survey 2024, Nawabganj Upazila

Figure 7-12: Frequency of Risks

The bar graph illustrates the frequency of various agricultural risks as perceived by respondents, categorized into three groups: farmers who believe the risks are increasing, decreasing, and the same. Pest and disease are the most significant concern among respondents, with the highest percentage (97.83%) indicating that they believe the risk is increasing. Following pest and disease, drought risks also show a considerable number of respondents (95.24%) perceiving an increasing threat. A notable percentage of respondents (63.49%) perceive the frequency of waterlogging is increasing. Risks associated with lightning and flooding show a moderate percentage of respondents (around 30-40%). The risks associated with cyclones, no rainfall, erratic rainfall, heavy rainfall, salinity, and storm surges are relatively low, with most respondents indicating that these risks remain the same or are decreasing. This might reflect a perception that these are less frequent or severe issues in the current agricultural context.



*Source: Agriculture Survey 2024, Nawabganj Upazila*

**Figure 7-13: Perception of the Most Critical Risk**

The pie chart illustrates the five most significant risks faced by farmers in Nawabganj Upazila, including drought, waterlogging, river erosion, lightning, and diseases. The data reveals that the majority of farmers, accounting for about 52.38%, identify diseases as the most severe challenge impacting their agricultural activities. River erosion is also a significant concern, with 17.6% of farmers claiming it as their primary risk. Waterlogging poses a major threat for 15.08% of the farmers, while approximately 15% view lightning and drought as the most critical risks as well. These findings highlight that while diseases are the predominant issue, the impact of natural hazards such as waterlogging, river erosion, lightning, and drought cannot be overlooked in this region.

Nawabganj Upazila exhibits an overall satisfactory condition in agriculture; a nuanced analysis unveils a series of challenges that persistently impact the farming community. From the decline of crucial irrigation canals to the complex interplay of urbanization, waterlogging, and inadequate infrastructure, these challenges necessitate comprehensive strategies for mitigation and sustainable agricultural development. Addressing these issues requires a collaborative effort involving policymakers, agricultural experts, and local communities to ensure the resilience and prosperity of agriculture in Nawabganj Upazila.

#### **7.4.9.5 Inappropriate Agricultural Practices**

Most farmers adopt inappropriate high-yield technologies to produce more crops on limited land. As a result, many traditional crop varieties are becoming extinct or are on the verge of extinction. Additionally, monoculture practices severely degrade soil characteristics, gradually reducing soil fertility and productivity. Furthermore, the demand for land for non-agricultural uses is continually increasing.

**Improper Use of Fertilizers and Agrochemicals:** Unbalanced fertilizer usage affecting soil health and crop quality. In local contexts, urea is used indiscriminately at inconsistent levels,

while other fertilizers like TSP and MOP are applied at much lower levels than needed. Proper pest management is an essential component for increasing agricultural production. Although all types of pesticides are available, there is a noticeable lack of quality control. Consequently, excessive and indiscriminate use of highly toxic pesticides harms the quality of food crops and the environment.

**Use of Low-Quality Seeds:** Seed condition of seeds presents another significant barrier to increasing yields. The availability of quality seeds is far from satisfactory. Surveys indicate that only about 5% of the seeds used in this region are of good quality. Individuals involved in agricultural businesses agree that seed issues are largely responsible for quality stagnation or yield reduction. Farmers often use surplus seeds from previous harvests instead of renewing them. Additionally, many modern varieties are losing their vigor, reducing in reduced yields.

#### **7.4.9.6 Labor Unavailability**

Ensuring the availability of local agricultural labor is becoming increasingly difficult in the region, forcing farmers to rely on migrant workers. Labor is not always available during peak agricultural activities such as planting and harvesting. In this scenario, labor wages tend to increase significantly, varying by location. There is a global trend of increasing female participation in agriculture, and Bangladesh is no exception. More than half of the workforce consists of women, and their participation is gradually increasing. Most laborers in Nawabganj come from outside the area, particularly from northern regions.

## **7.5 Fishery**

### **7.5.1 Background**

Bangladesh's inland water fisheries are divided into two types: Inland open water (river and estuary, Sundarban, Beel, Kaptai Lake, flood land) and Inland closed water fisheries (pond and ditch, Baor, shrimp (freshwater shrimp), and fish farm).

In the rainy season, many young and old men and women in rural areas catch fish in the floodplains, public canals, rivers, etc. In addition, backyard pond culture uses holes dug when soil is taken for the construction of houses, roads, etc., and becomes active every year. Freshwater fish is an essential source of animal protein, accounting for around 60% of the total animal protein intake (Rifat et al., 2023). Moreover, freshwater fish, caught in public water and cultured, is also an essential source of cash income.

Land Area of Waterbody (in Acre)

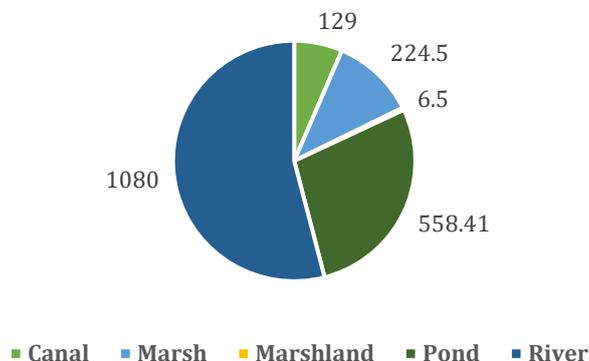


Figure 7-14: Land Area of Waterbody

Here, we can see that the river consumes the highest area of waterbodies in Nawabganj Upazila, then comes the pond and marsh, respectively. The waterbody of Nawabganj Upazila is categorized as river, canal, pond, marsh, marshland etc. The percentage of each waterbody area is shown below:

Table 7-11: Waterbodies of Nawabganj Upazila

Water Body	Area (Hectare)	Percentage (%)
Canal	129	26.00%
Marsh	224.5	47.08%
Marshland	6.5	23.57%
Pond	558.41	2.94%
River	1080	0.40%
<b>Total</b>	<b>1998.41</b>	<b>100%</b>

Source: Upazila Fishery Office

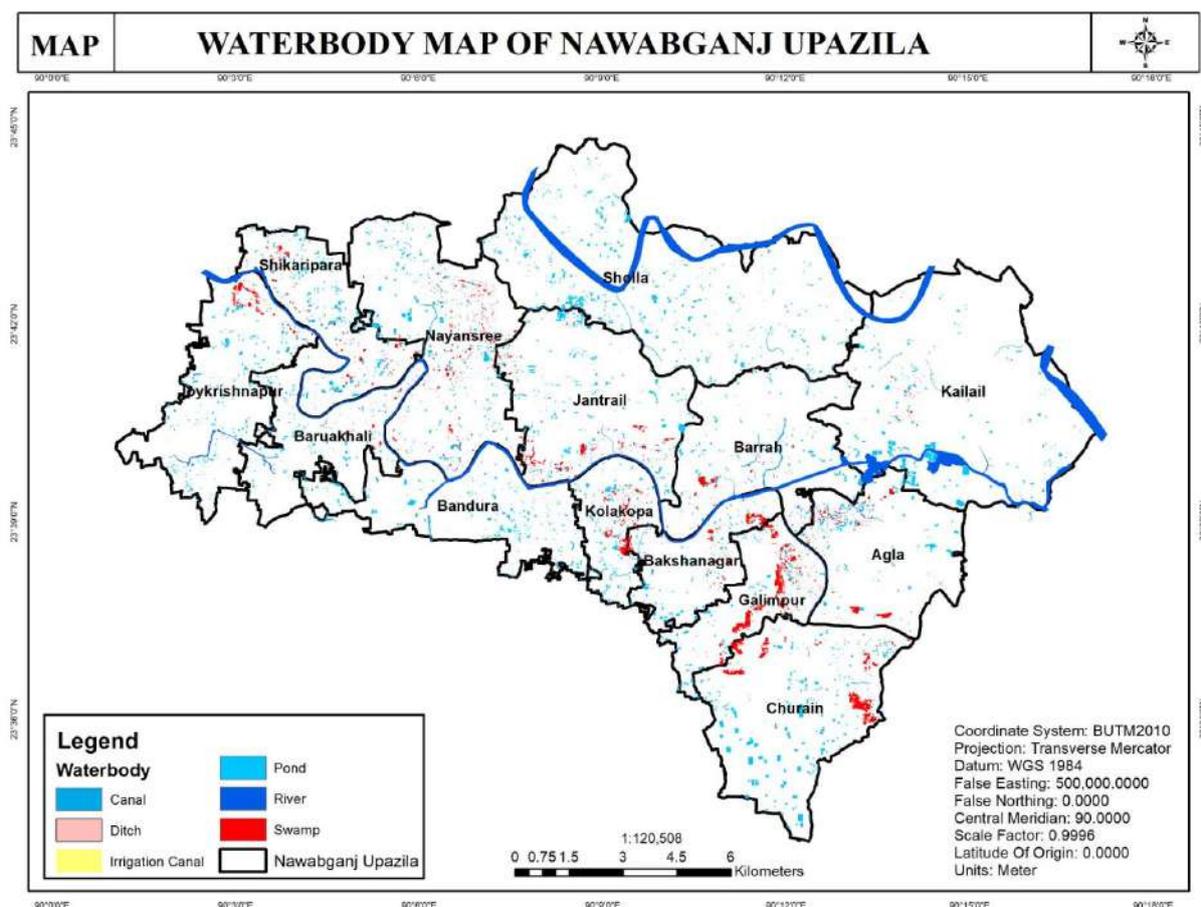


Figure 7-15: Condition of Waterbodies in Nawabganj Upazila

### 7.5.2 Aquatic Resources

This data set presents key figures related to aquatic resources and fish production. The information includes the number of ponds (1824), the absence of government seed production farms, the presence of non-government seed production farms (5), the existence of a fish sanctuary (1), annual fish demand (4887), and annual fish production (3817). These statistics signify a substantial reliance on ponds and non-government seed production for fish cultivation.

Table 7-12: Status of fisheries scenario in Nawabganj Upazila

Serial No	No of Pond	1824
1	Annual Fish Demand	4887
2	Annual Fish Production	3817
3	Govt. Seed Production Farm	0
4	Non-Govt. Seed Production Farm	5
5	Fish Sanctuary	1

Source: Upazila Fishery Office

The single fish sanctuary contributes to conservation efforts. Notably, there is a shortfall in meeting the annual fish demand, indicating potential opportunities for enhancing fish production

to meet local needs. But there is a heavy chance of seed production and exports throughout the country. As the overall seed of Dhaka district is harvested in the Nawabganj upazila.

Table 7-13: Types of Inland fish available

Serial no	Local Name	English name	Serial no	Local Name	English name
1	Bhetki/Koral	Barramundi/Seabass	12	Koi	Climbing Perch
2	Tengra	Striped dwarf catfish	13	Illish	Hilsha
3	Rui	Indian major carp	14	Taki	Spotted snakehead
4	Catla	Catla	15	Cheng	Asiatic snakehead
5	Mrigal	Mrigal	16	Aor	Long-whiskered catfish
6	Bele	Tank Goby	17	Shol	Banded snakehead
7	Magur	Air breathing Ctafish	18	Foli	Grey featherback
8	Rup Chanda	Chinese pomfret	19	Mola	Indian carplet
9	Bata	Bata labeo	20	Dhela	Cotio
10	Kachki	Ganga river sprat	21	Kalibaus	Black rohu
11	Potka	Gangaetic puffer fish	22	Pangus	River pungus

Source: Upazila Fishery Office

In Nawabganj Upazila, prawns, shrimp, and crabs are produced. Prawn is known as Golda chingri, Chatka chingri, and Gura chingri by their different sizes. Shrimps are of different types, mostly known as Bagda chingri, Chaka chingri, Chapra chingri, Horina chingri, and Chali chingri. Crabs are locally named Shela kakra, Zaji kakra, Sataru kakra, and Sagor kakra.

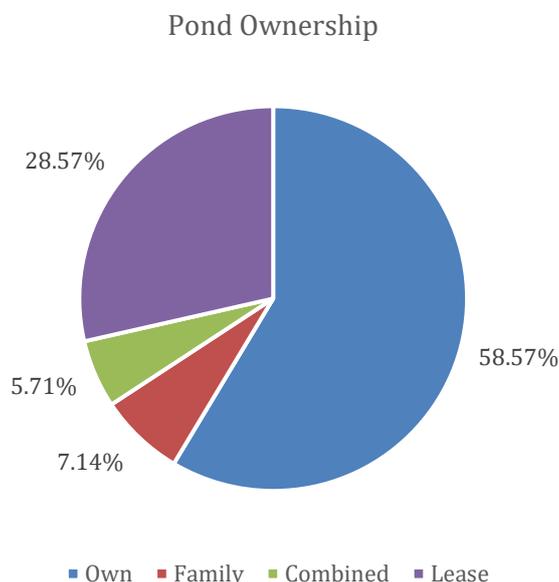
### 7.5.3 Situation Analysis

Fish cultivation, also known as aquaculture, has emerged as a significant economic activity crucial in feeding the growing population. As traditional fish stocks become increasingly depleted due to overfishing and environmental changes, aquaculture offers a sustainable alternative to meet the rising demand for fish. This practice involves farming various fish species in controlled environments, such as ponds, tanks, and cages, allowing efficient production tailored to specific market needs. This section provides an overview of aquaculture practice in Nawabganj Upazila, highlighting its current scenario, management of water resources, and challenges faced by the fish cultivators based on the fishery survey conducted in Upazila.

A comprehensive overview of the current status of aquaculture in the region, highlighting key aspects such as the farming systems in use—including traditional, semi-intensive, and intensive methods. It will also provide information on ownership patterns, existing practices, and the type of aquaculture techniques. An analysis of current production levels will also illustrate their contribution to the local economy.

**Ownership Pattern:** All fish farmers responded to using ponds for aquaculture. Overall, the distribution of pond ownership demonstrates a predominant trend toward individual ownership

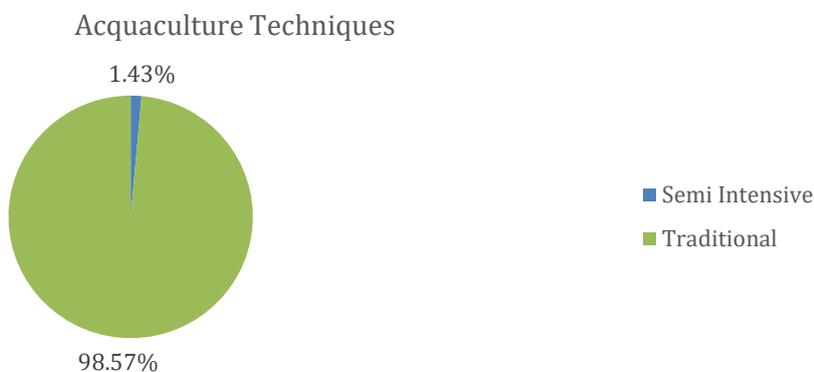
(58.57%), coupled with a notable segment of leased ponds (28.57%). A small fraction, 5.71% and 7.14%, operates under combined and family ownership.



Source: Fishery Survey 2024, Nawabganj Upazila

Figure 7-16: Ownership of Pond

**Type of Fish Cultivation Techniques:** Traditional fish farming is characterized by low input and output, often relying on natural water bodies and limited technological intervention. This method typically involves using small ponds or water bodies where fish are raised using minimal resources. While traditional practices are often less capital-intensive and require less technical knowledge, they can result in lower yields and are more vulnerable to environmental changes and disease outbreaks. In contrast, semi-intensive fish farming involves a more managed approach, integrating natural and artificial feed sources. This method optimizes fish growth by providing supplemental feeding and improved water management techniques.



Source: Fishery Survey 2024, Nawabganj Upazila

Figure 7-17: Type of Fish Cultivation Techniques

In the context of recent findings from Nawabganj Upazila, it is noteworthy that only 1.43% of fish farmers engage in semi-intensive fish farming, while an overwhelming 98.57% rely on traditional methods.

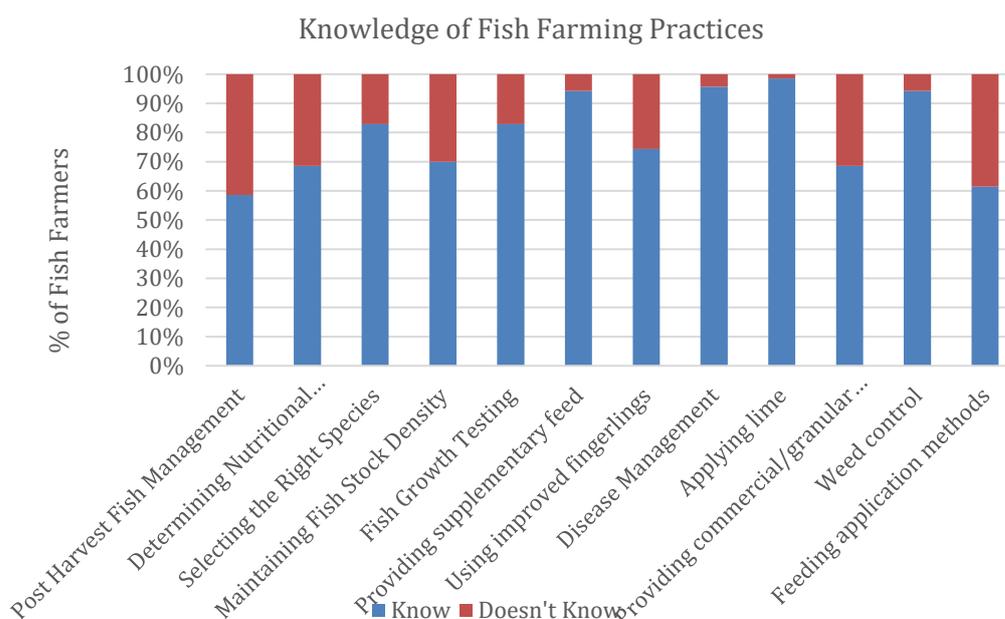
**Production Level:**

Table 7-14: Aquaculture Production Range

Production Level(kg/hectare/year)	% Of Fish Cultivators
0	2.86%
1-1000	37.14%
1001-2000	25.71%
2001-3000	12.86%
3001-4000	5.71%
4001-5000	5.71%
5001-6000	4.29%
6001-7000	2.86%
7001-8000	1.43%
>8000	5.71%

Source: Fishery Survey 2024, Nawabganj Upazila

The majority of fish farmers (almost two-thirds) are producing at low levels, below 2000 kg/hectare/year, suggesting potential barriers to productivity, such as technical inefficiencies. A small proportion of fish farmers (less than 6%) produce at a high level, indicating significant productivity variation across the aquaculture sector. The fish farmers typically consume a portion of the fish they cultivate, usually between 10 and 300 kg, while the remainder is sold at markets. Additionally, some cultivators give fish as souvenirs to others.



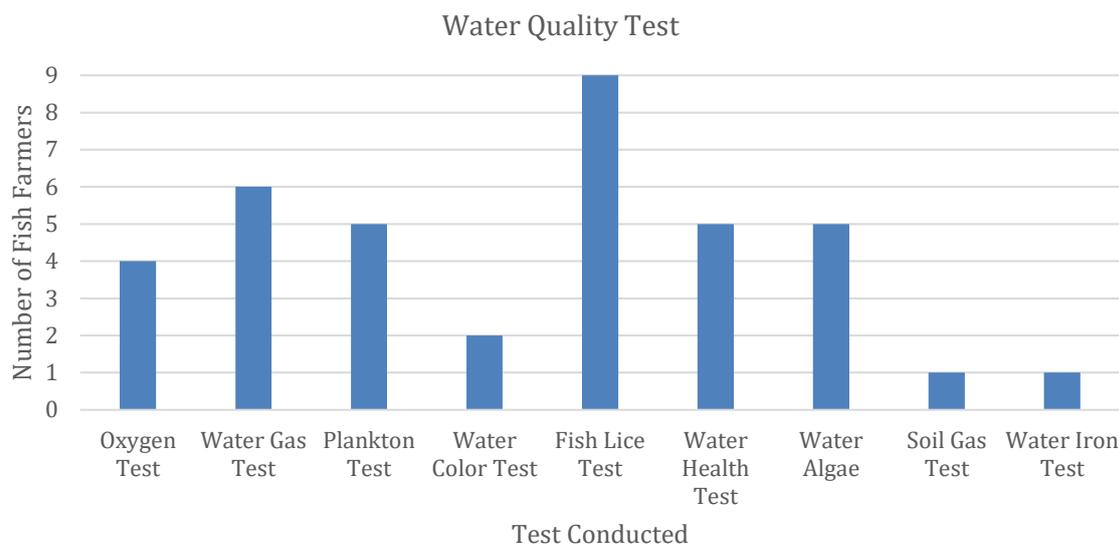
Source: Fishery Survey 2024, Nawabganj Upazila

Figure 7-18: Knowledge of Fish Farming Practices

**Fish Farming Practice:** Figure 7-18 presents insights into farmers' knowledge of various fish management practices, revealing a generally high level of awareness among farmers. Disease Management (95.71%) and Applying Lime (98.57%) demonstrate that farmers prioritize health management and understand the importance of maintaining water quality. Providing Supplemental Feed (94.29%) and Weed control (94.29%) indicates that farmers recognize its role in enhancing fish growth. However, Feeding Application Methods (61.43%) are comparatively lower, suggesting areas for potential improvement. The knowledge surrounding Selecting the Right Species (82.86%) and Maintaining Fish Stock Density (70.00%) indicates that farmers recognize the significance of these practices for optimal growth. Furthermore, a moderate level of understanding is evident in Determining Nutritional Adequacy through Water Color Testing (68.57%) and Fish Growth Testing (82.86%). While there is a solid foundational knowledge of essential management practices, targeted education on specific areas could enhance aquaculture practices, leading to better fish health, growth, and productivity.

**Post-Harvest Management:** The majority of farmers sell their harvested fish directly in local markets, with only 10% opting to take their produce to wholesale markets. These fish are sold at various bazaars across Nawabganj, including Komorganj Bazar, Galimpur Bazar, Gobindapur Bazar, Tikorpur Bazar, Rohitpur Bazar, Bagmara Bazar, Bandura Bazar, Shikari Para Bazar, Baruakhali Bazar, and Patiljhap (Dattakhand, Balukhand). Notably, one farmer was identified selling fish in Dhaka's Karwan Bazar. The fish are typically transported alive, ensuring freshness. Remarkably, 84.7% of the farmers reported never selling rotten fish. However, approximately 19% of farmers face challenges such as fish theft.

**Pond Management:** Water resources for aquaculture are mainly obtained from ponds, rivers, and groundwater systems. Managing these water bodies involves regularly monitoring key parameters such as temperature, pH, dissolved oxygen levels, and nutrient concentrations. The quality of the water plays a crucial role in determining the fish's health, growth, and productivity. Fish farmers in the region utilize enclosed ponds for fish cultivation, where water is available throughout the year. All the farmers interviewed lacked knowledge about monitoring their ponds' pH and DO levels. Regarding salinity awareness, only about 14% were knowledgeable on the subject. More than half of the farmers also asserted that their pond water was clean, whereas approximately 34% reported turbid pond water. The following figure illustrates the various tests conducted by fish farmers in the area. A large majority, around 71.43%, are unaware of or do not perform any tests on their pond water. The remaining 28.57% conduct the following tests, with the most commonly performed ones addressing direct threats to fish health, such as tests for fish lice. Tests for soil gas and water iron are rarely carried out.



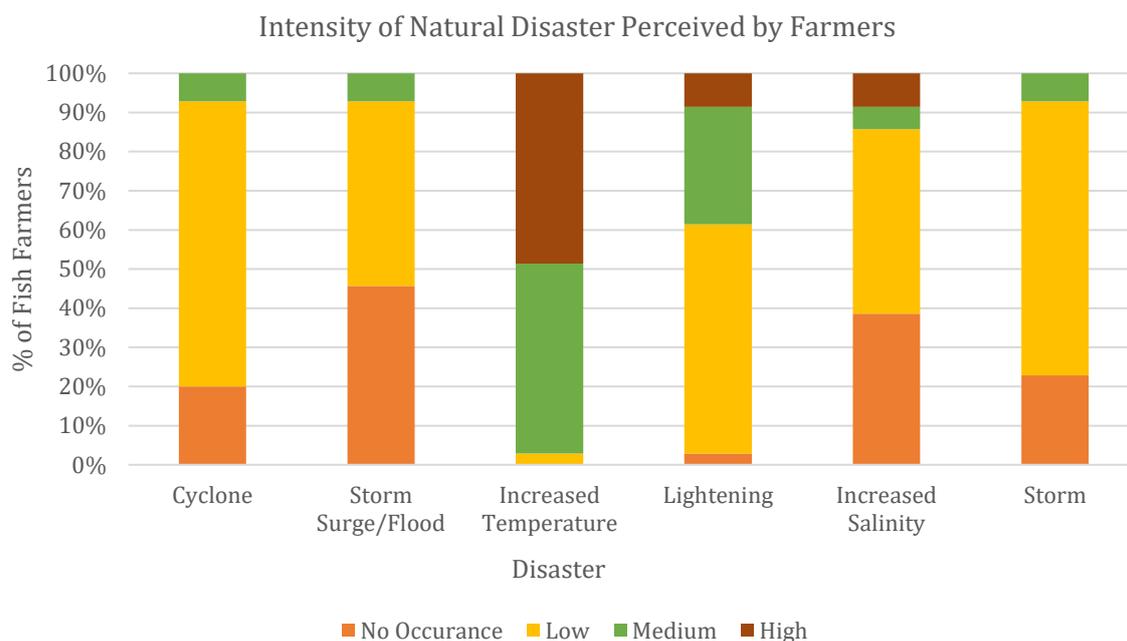
Source: Fishery Survey 2024, Nawabganj Upazila

Figure 7-19: Knowledge of Fish Farming Practices

## 7.5.4 Constraints in the Fishery Sector

### 7.5.4.1 Challenges Faced by Fish Cultivators

- Fish health is a major concern among farmers, with the risk of diseases being the most critical issue.
- Financial burdens such as high production costs, expensive seedlings, and costly fish food pose significant challenges.
- Weak market management and issues in the supply chain, including the lack of quality seedlings and fish feed and the low selling price of cultivated fish, further exacerbate the situation.
- Environmental factors like deteriorating water quality and pollution contribute to declining fish productivity.
- Farmers face additional financial constraints due to limited access to capital and loans.
- High seedling mortality and insufficient technological knowledge are key barriers affecting overall farming efficiency.
- Social and geographical concerns like theft, poison application, co-ownership, social instability, and distance to markets are less prominent but still affect a minority of farmers.



Source: Fishery Survey 2024, Nawabganj Upazila

Figure 7-20: Intensity of Natural Disaster Perceived by Farmers

- Increased temperature is perceived as a more serious problem, with nearly all the farmers experiencing it at medium to high intensity. Lightning, cyclones, and Kalboishaki storms are primarily felt at low intensity. Storm surges/floods and increased salinity are less frequent and of low to medium intensity.

#### 7.5.4.2 Challenges Faced by Fisherman

##### Supply Chain by Fish Management:

Despite significant recent growth in fish production, a business-friendly supply chain remains lagging. Due to long and complex marketing systems, producers are not receiving the correct price for their farm products, while consumers are paying higher prices. Although fish and fishery products are among the most perishable items, there is a lack of necessary physical facilities and infrastructure for post-harvest management of fish and fishery products in the upazila.

##### Market Condition:

The Fish Landing Center and Retail Market are perceived positively, with high percentages of Somewhat Good ratings.

The Wholesale Market requires immediate attention due to the high rate of "Bad" conditions. The Fish Market is viewed as generally acceptable but has areas that need improvement.

##### Threatened Fish Species:

Fishermen claim that koi, boal, Pabda, Chingri, Kheira, shing, Gojar, bele, koral, taki, rui, and katol are at risk. These vulnerable species were once abundant in Arial Beel, the Icchamoti River, Kailail, and Barrah Khal.

Siltation at the riverbed has led to significant changes in physical characteristics and ecosystems for several decades. This negatively impacts the livelihoods of people who depend on wetland resources. As silt accumulates, the connections at the mouths of rivers and canals also rise quickly, disconnecting rivers/canals from low-lying areas. Consequently, floodplains decrease, affecting aquatic life and resources, particularly fish stocks. As a result, migration routes for fish and other aquatic creatures are severely disrupted, leading to habitat loss and resource degradation. The beds of the Dhaleshwari, Ichamati, and Kaliganga rivers and canals have become silted, reducing the rivers' carrying capacity. Excess silt accumulation in the rivers leads to flooding during the rainy season, causing silt deposition in agricultural fields, lowlands, and adjacent wetlands. During the prolonged floods of 1988, 1998, 2002, and 2004, massive silt deposits were observed on agricultural land, damaging crops and reducing soil fertility.

Removing fish before they reach reproductive age disrupts the breeding process, leading to a decline in the continuous growth of fish species. Human-induced factors such as river sedimentation, blocked migration routes, overfishing, harmful fishing gear, pollution, and hydrological and climate change are responsible for decreased fish populations.

**Disaster Risk and Climate Vulnerability:**

- Storm surges, floods, and increased temperatures threaten the fishery sector. These factors can lead to habitat destruction, fish stock depletion, and long-term environmental changes that affect fisheries.
- Even though cyclones, storms, and heavy rainfall generally have low or medium impacts, their regular occurrences disrupt fishing operations and reduce overall productivity.
- The increased temperature is perceived to have a notable medium to high impact, highlighting climate change's growing influence on fish populations and fishing communities.

### 7.5.5 Critical Issues

According to the National Water Resources Management Program, there is no specific regional water resources program except a national level program for the Study Area.

- Lack of fish hatchery and training center.
- Water shortage at the time of summer.
- Poor fish marketing infrastructure.
- Lack of proper fish processing system.
- Canals are dying.

### 7.5.6 Government Policy for Fishery Development

The government's water policy serves as a guiding framework for various agencies and institutions involved in the water sector, with a specific focus on achieving targeted goals. This policy is designed to foster the development of crucial sectors, including fisheries, with a simultaneous emphasis on improving the livelihoods of the local population. Nawabganj Upazila, situated in Bangladesh, emerges as a prospective region for fisheries, given its abundant land resources. This discourse delves into the key components of the government's water policy and its implications for the development of fisheries in Nawabganj Upazila.

Table 7-15: Inland Prawn, Shrimp, and Crab

Prawn	Shrimp	Crabs
Golda chingri	Bagda chingri	Shela kakra
Chatka chingri	Chaka chingri	Zaji kakra
Gura chingri	Chapra chingri	Sataru kakra
	Horina chingri	Sagor kakra
	Chali chingri	

Source: Upazila Fishery Office

- **Preservation of Natural Aquatic Reservoirs and Water Channels**

A pivotal aspect of the government's water policy is the commitment to minimizing disruptions to natural aquatic and water channels. Recognizing the interconnectedness of ecosystems, the policy underscores the importance of preserving these channels to maintain ecological balance. This measure is particularly relevant to the fisheries sector, as disruptions to natural water flows can adversely affect fish habitats and migration patterns. By minimizing such disruptions, the policy aims to sustain the health of aquatic ecosystems, ensuring the continued prosperity of fisheries in the region.

- **Fish Migration and Breeding Considerations**

Aligned with preserving natural water channels, the government's water policy emphasizes the integration of fish-friendly measures into water development plans. It mandates that water development initiatives do not impede fish movement and significantly incorporate provisions in control structures to facilitate fish migration and breeding. This proactive approach aims to safeguard the natural life cycles of fish populations, contributing to sustainable fisheries management. The policy promotes biodiversity, resilience, and long-term viability within the fisheries sector by ensuring unimpeded fish migration and breeding.

Given its abundance of land resources, Nawabganj Upazila emerges as a highly prospective region for fisheries. The policy's commitment to preserving natural water channels and facilitating fish migration aligns with the region's potential for increased fish production. The ample land available in Nawabganj Upazila provides opportunities for sustainable aquaculture practices, allowing for the expansion of fisheries activities. This, in turn, contributes to economic development, improved nutrition, and increased employment opportunities for the local population.

## 7.6 Livestock and Poultry

The livestock and poultry subsector of agriculture has proven to be a promising and dynamic sector with enormous poverty-reduction potentials. It is a highly viable sector for creating jobs and income for landless people, unemployed youth, and destitute women. Understanding the dynamics of livestock and poultry farming, their current scenarios, and the associated challenges is vital for promoting sustainable agricultural practices, ensuring food safety, and improving livelihoods, particularly in rural areas that serve as key economic drivers.

## 7.6.1 Existing Scenario

### 7.6.1.1 Livestock

Climatic and topographic conditions are unsuitable for domestic animals, especially the high temperature, high humidity, and frequent flooding. Pasture lands are not abundantly available for cattle and goats. Water shortages and agricultural machinery development have recently caused unfavorable conditions for water buffalos. Due to the low feed efficiency, it has been difficult to enhance livestock farming in Bangladesh due to low food self-sufficiency. For these reasons, livestock farming has not been a priority area in the past. However, livestock is necessary to be developed in the future as an essential income source of farmers. Livestock can be a demand-driven product. As the national economy develops, the consumption of livestock will increase. This section provides an overview of existing livestock species in the Upazila, the scale of livestock farms and farm types, and livestock products (meat, milk, wool, etc.)

The following table below presents the inventory of total livestock of Nawabganj Upazila according to the Nawabganj Upazila at a glance.

Table 7-16: Overall Scenario of the Livestock Department of Nawabganj Upazila

<b>Department of livestock and veterinary hospital</b>	1
<b>Artificial reproduction center</b>	1

Source: Upazila Livestock Office

Table 7-17: Statistical data of livestock

<b>Name</b>	<b>Number</b>
<b>Cow</b>	57852
<b>Goat</b>	10485
<b>Ship</b>	1286
<b>Buffalo</b>	37
<b>Quail</b>	1252

Source: Upazila Livestock Office

Based on the livestock survey findings, most farmers engage in livestock and poultry farming, contributing between 20% to 60% to their total family income. These farmers can be classified into two main categories: smallholders and intensive commercial farmers. Approximately two-thirds of these livestock farmers are smallholders, while the remaining operate intensive, commercialized livestock farms.

**Livestock Farms and Farm Types:** Various types of commercial farms are prominent, including cattle fattening farms, goat farms, sheep farms, and dairy farms. The most popular are dairy farms, dairy and cattle fattening farms, and goat farms. Furthermore, more than one-third of these farmers have been engaged in livestock farming for over 20 years.

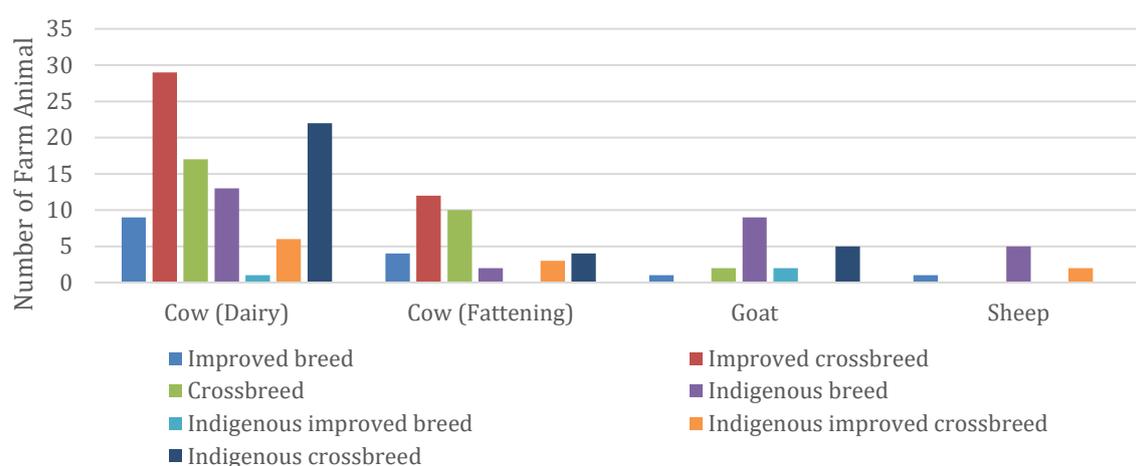
Table 7-18: Average Number of Livestock Owned by Farmers

<b>Farm Animals</b>	<b>Average Number</b>	<b>Number of Farmers</b>
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<b>Cow (Dairy Farm)</b>	1.309278	97
<b>Cow (Cattle Fattening)</b>	2.285714	35
<b>Goat</b>	4.526316	19
<b>Sheep</b>	14	8
<b>Buffalo</b>	0	0

Source: Livestock Survey 2024, Nawabganj Upazila

Categories of Livestock Breeds



Source: Livestock Survey 2024, Nawabganj Upazila

Figure 7-21: Categories of Livestock Breeds

Improved crossbreeds and indigenous crossbreeds dominate cow categories (dairy and fattening). Indigenous breeds are most common for goats and sheep. There are fewer improved breeds and indigenous improved crossbreeds across all categories.

**Livestock Products:** Most farmers receive moderate milk production levels, with the majority of their dairy cows producing between 7-12 liters of milk per day. While dairy farming is common, large-scale, high-output production is less prevalent. Only a small percentage of dairy farmers receive more than 19 liters of milk. Most of the milk produced is sold through home delivery services, while a portion is also supplied to restaurants. Regarding cattle fattening, most farmers sell 2 or 4 cattle (both goats and cows) per year. The pattern is similar for sheep, where 3-5 sheep are sold annually. This highlights that livestock farming is primarily conducted at a small to medium scale. The cattle are primarily sold at local markets, though some farmers also choose to sell in urban market areas. Additionally, a notable aspect of this trade is the presence of middlemen, who facilitate the sale of cattle from farmers to buyers, influencing the market dynamics in the livestock industry.

**Nutrition and Feeding Strategies:** Corn cultivation appears to be more well-known, with no farmers reporting a lack of knowledge. Approximately two-thirds of the farmers do not know TMR (Total Mixed Ratio). Half of the farmers also lack knowledge about obtaining assistance from

Community Interest Groups (CIG)/ Co-operatives to prepare animal feed. They are also unaware of grass cultivation collectively through the cooperative system.

### 7.6.1.2 Poultry

Table 7-19: Poultry Statistics

Name	Number
Hen	565527
Duck	35225
Turkey	715
Pigeon	33222
Quail	1252

Source: Upazila Livestock Office

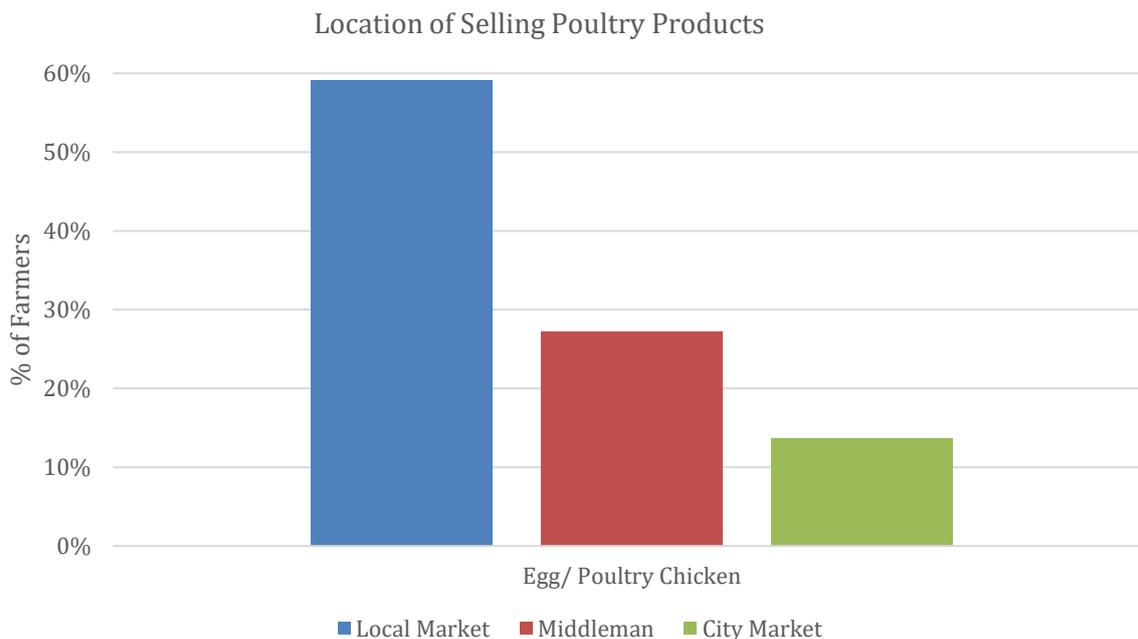
22 Poultry farmers interviewed can be classified into two main categories: smallholders and intensive commercial farmers. The following table provides information on the average number of four categories of poultry owned by the two types of farmers.

Table 7-20: Average Number of Poultry Owned by Farmers

Farm Animals	Small Holders	Intensive Commercial
Egg-laying hen	165	1151.875
Broiler Chicken	1135	-
Sonali Chicken	-	1350
Native Chicken	250	40
Others (Turkey)	8	-

Data Source: Livestock Survey 2024, Nawabganj Upazila

**Poultry Products:** A significant majority of farmers (over 59%) sell their eggs and poultry chickens in local markets, while nearly 27% rely on middlemen to sell their products, suggesting that intermediaries play an important role in the sales process. Markets located in urban areas are less frequently utilized as only about 14% of farmers sell their eggs and poultry chickens in city markets.

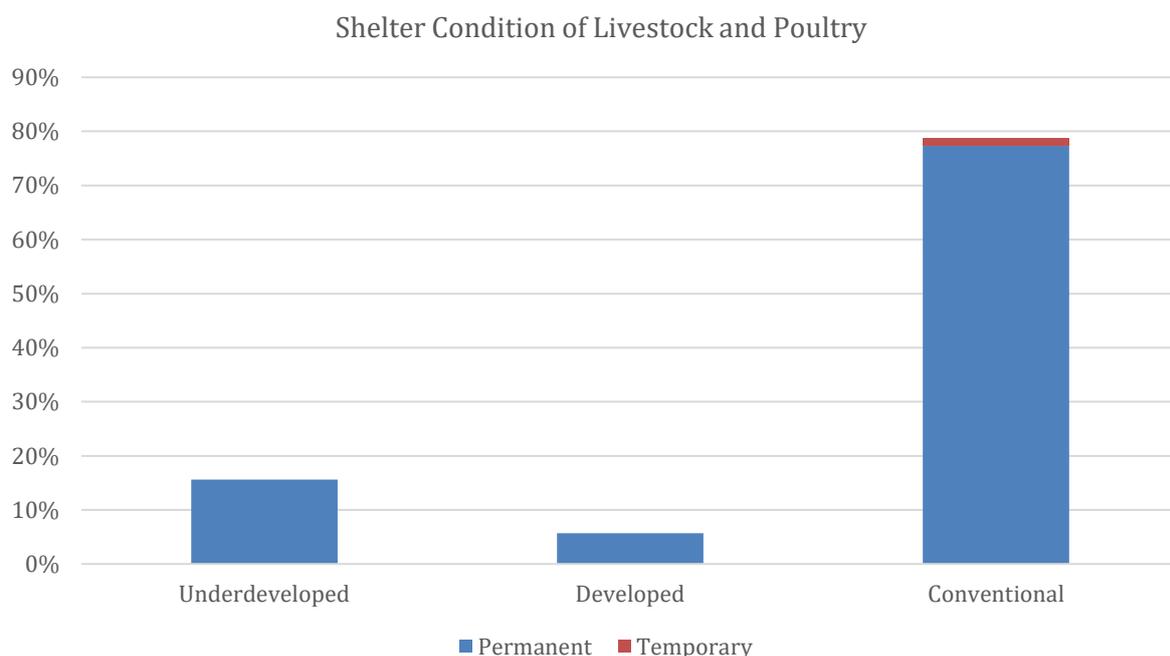


*Source: Livestock Survey 2024, Nawabganj Upazila*

**Figure 7-22: Location of Selling Poultry Products**

**Nutrition and Feeding Strategies:** The farmers lacked any understanding of how to effectively feed the poultry with assistance from Community Interest Groups (CIG)/Co-operatives, and most of them displayed little interest in it. Roughly 50-60% of poultry feed is comprised of corn, yet the farmers were also uninformed about corn cultivation. When inquired about their willingness to cultivate corn on their own accord and use unused or fallow land for this endeavor, around 40% expressed their interest.

**Shelter Condition:** Most of the farmers indicated that their livestock and poultry animals live in traditional shelter conditions. Only a small percentage (5.67%) classified their housing as developed, which points to a limited uptake of contemporary housing practices. Interestingly, within the developed category, all shelters are permanent. Furthermore, 15.60% of farmers also described their livestock and poultry shelters as underdeveloped, indicating that there are still areas in need of improvement. However, the majority of these shelters maintain effective biosecurity management.



Source: Livestock Survey 2024, Nawabganj Upazila

Figure 7-23: Shelter Condition of Livestock and Poultry

## 7.6.2 Health Management and Veterinary Care

Diseases: Livestock and poultry are affected by numerous ailments. The table below presents a list of common diseases.

Table 7-21: Prevailing Diseases among Livestock and Poultry

List of Prevailing Diseases
Torka (Anthrax)
Pneumonia
Diarrhea
Cold Issues (Fever, Cough)
Stomach Bloating
Gota (Pox)
Ranikhet
Gampura
Cough
Bronchitis
PRA
Stroke
Gas Problem
Heat Stroke
Sore Throat
Cholera

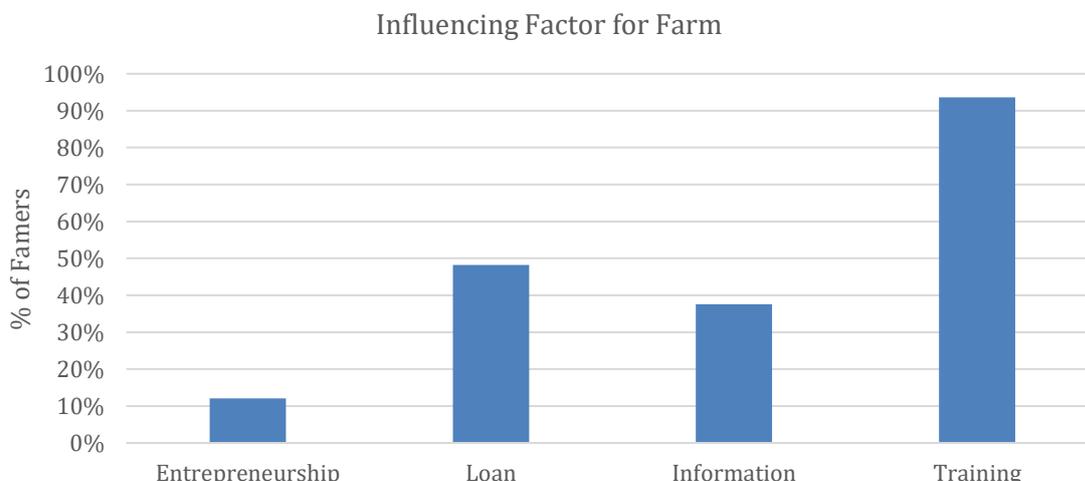
Source: Livestock Survey 2024, Nawabganj Upazila

Various treatments are administered to prevent or manage these diseases, including injections, vaccines, and medications. In certain cases, both medicines and vaccines are used as part of the treatment process and are provided as per the doctor's guidance. Proper care and treatment are essential, especially with the correct use of vaccines and vital medications in maintaining animal health. These resources are obtained from various upazila and local veterinary practitioners through dealers, local veterinary doctors, rural health workers, etc. Farmers face limited access to veterinary care, as most do not receive any assistance from veterinary professionals. A small fraction benefits from veterinary support, yet most assert that the aid received is insufficient.

Many farmers are unaware of the vaccines administered to their cattle and poultry; however, a few can identify the Injection, FMD, and PPR vaccines. Approximately 95% of the 141 farmers know and utilize parasite/anthelmintic treatments. Albend vets, injections, and tablets are frequently employed for treating animals, with some respondents indicating they use injections while others opt for both injections and tablets. There are mentions of Avinex and Benazol Vet as well. Injections and tablets boost the animals' appetite and strengthen their immune systems. A few individuals report occasionally spraying or administering medication orally to promote health. There is also an emphasis on enhancing feed consumption to ensure the animals stay healthy and well-nourished. Some farmers observe that the resistance to diseases improves due to these treatments.

**Health Services and Training:** Respondents benefit from various services, including artificial insemination and associated advice. They also receive health and medical care related to artificial insemination, management, and laboratory testing guidance. Additionally, many seek general health advice, medical care management, and consultation services to ensure their livestock's welfare. These services encompass guidance on management practices, with most farmers (61.70%) receiving them. Beyond these services, most recognized the availability of training opportunities in cattle and poultry management. Yet, only four individuals underwent training and gained benefits such as learning how to treat their cattle, enhance milk production, or fatten their cows.

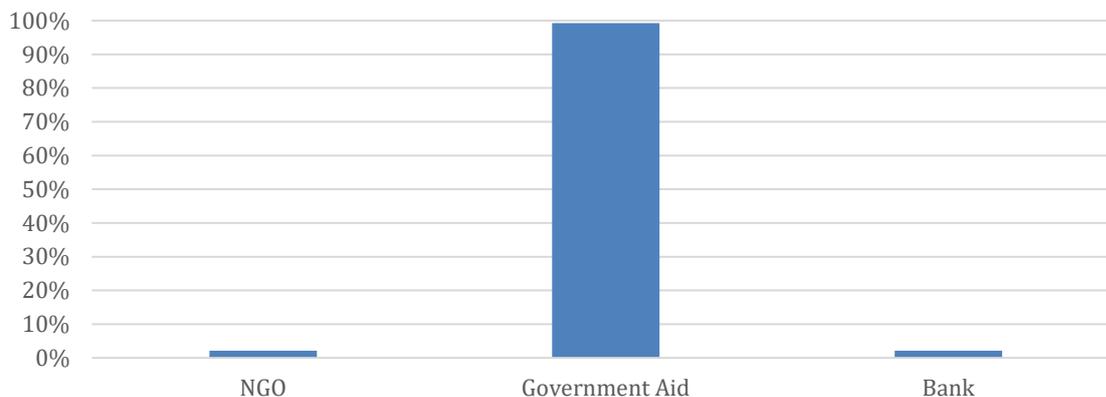
### 7.6.3 Assistance from Government and NGOs



Source: Livestock Survey 2024, Nawabganj Upazila

Figure 7-24: Influencing Factor for Farms

Figure 7-24 illustrates that over 90% of farmers view training as a key factor in enhancing their livestock and poultry operations. Half of the farmers also recognize the impact of loans, while nearly 40% acknowledge the significance of information. In comparison to these factors, entrepreneurship plays a lesser role. Regarding assistance from relevant stakeholders, farmers regard government support as the most effective option, as illustrated by Figure 7-25.



Source: Livestock Survey 2024, Nawabganj Upazila

Figure 7-25: Preferred Assistance from Government, Bank and NGOs

### 7.6.4 Critical Issues

The critical issues encompass the lack of cow grazing land, low feed efficiency, topographic conditions, inadequate animal health services, scarcity of feed and fodder, and hydrological problems.

#### **Lack of Cow Grazing Land and Low Feed Efficiency:**

The absence of ample cow grazing land exacerbates the challenges faced by livestock farmers. Coupled with this, there is a notable inefficiency in feed utilization, contributing to suboptimal growth, reproduction, and overall productivity among livestock.

#### **Topographic Conditions:**

The region's topographic conditions pose additional complexities for agricultural activities. The geographical landscape may present obstacles to efficient land use and cultivation, impacting the overall agricultural output.

#### **Inadequate Coverage of Animal Health Services:**

The inadequacy of veterinary services is a pressing concern. The ratio of veterinary surgeons to livestock and poultry is alarmingly low, with the majority of farmers situated outside the reach of veterinary care due to poor transport networks. Vaccination rates remain low, and private sector involvement needs to be improved by more policy support and extension services.

#### **Scarcity of Feed and Fodder:**

A critical obstacle to livestock development is the acute shortage of feeds and fodder. Livestock primarily rely on crop residues and by-products, yet supplementary and concentrate feeds are infrequently and inadequately provided. Adulteration and inferior quality of commercial feeds

further impact growth, reproduction, and productivity in dairy, poultry, and fish farming. Inadequate feed labeling and control exacerbate these challenges, threatening the health of livestock, fish, and humans.

### **Hydrological Problems:**

Nawabganj Upazila grapples with hydrological issues that hinder agricultural development. Regular inundation poses challenges to cropping intensity; local khal's suffer from siltation issues, causing drainage and irrigation problems. Drainage congestion, resulting from obstructed water flow, poses a significant impediment to land cultivation.

### **Disaster and Climate Vulnerability**

Global warming presents unique challenges for livestock and poultry, significantly affecting their health and productivity. One major concern is the increased risk of heat stress and heat stroke among animals due to elevated temperatures. Livestock, such as cattle, often exhibit signs of respiratory distress, panting excessively as they struggle to cope with the heat. This vulnerability can lead to various health issues, including a higher likelihood of heat stroke, which poses a serious threat to their well-being. The risk is not limited to larger animals; poultry, like chickens, can also suffer fatal consequences from heat stress, resulting in increased mortality rates during periods of extreme heat. As temperatures rise, the likelihood of heat-related illnesses in animals escalates, and inadequate recovery time from heat exposure can further exacerbate their health conditions. These challenges underscore the urgent need for effective management strategies to mitigate the impacts of global warming on livestock and poultry.

During severe cold weather, poultry is minimally affected, as confirmed by 90% of farmers. Nevertheless, a small number of people who are impacted experience cold-related illnesses such as fever, pneumonia, and PPR. Additionally, livestock and poultry are generally not significantly harmed by flooding. However, some reported that during floods, they struggle to obtain sufficient food.

## **7.7 SWOT Analysis**

SWOT analysis is a strategic planning tool used to evaluate the strengths, weaknesses, opportunities, and threats of a particular entity. In this case, a SWOT analysis is conducted for the agricultural condition including fisheries and livestock of Nawabganj Upazila.

**Table 7-22: SWOT Analysis**

<b>Strengths</b>	<b>Weakness</b>
<ul style="list-style-type: none"> <li>Nawabganj Upazila has a favorable geographical location, which provides access to natural resources such as rivers, wetlands, and fertile land for agricultural production.</li> <li>The area has a rich history of traditional farming practices and indigenous knowledge, which can be harnessed to promote sustainable agricultural practices.</li> </ul>	<ul style="list-style-type: none"> <li>Lack of access to finance and credit facilities impact on farmers' ability to invest in modern farming technologies and expand their operations.</li> <li>The farmers in Nawabganj Upazila face significant challenges in marketing their products due to the lack of proper storage and</li> </ul>

<ul style="list-style-type: none"> <li>• The region has a diverse range of agricultural products, including paddy, jute, wheat, vegetables, and fruits, which can be used to meet the local demand and generate income through export.</li> <li>• This area is occupied by the Padma floodplain. The floodplain deposits are mainly silty on the ridges and clay in the basins.</li> </ul>	<p>transportation facilities, leading to post-harvest losses.</p> <ul style="list-style-type: none"> <li>• The area is prone to natural disasters, such as droughts, which can severely impact crop production and livestock rearing.</li> <li>• The farmers lack access to modern veterinary services, which can lead to disease outbreaks and loss of livestock.</li> </ul>
<p><b>Opportunities</b></p>	<p><b>Threats</b></p>
<ul style="list-style-type: none"> <li>• There is a growing demand for organic and sustainably produced food products in both domestic and international markets, which presents an opportunity for the farmers in Nawabganj Upazila to diversify their products and increase their revenue.</li> <li>• The government of Bangladesh has introduced various initiatives, such as the Agriculture Extension Program and the Fisheries Development Program, which can help farmers in Nawabganj to access modern farming technologies and improve their marketing and distribution channels.</li> <li>• The growing population of Bangladesh presents an opportunity for the farmers in Nawabganj Upazila to increase their production and meet the rising demand for food products.</li> <li>• The region has significant potential for aquaculture, which can help diversify the local economy and provide a sustainable source of income for the farmers.</li> </ul>	<ul style="list-style-type: none"> <li>• Climate change and its impact on natural resources can severely affect agricultural production and lead to food insecurity.</li> <li>• The increasing use of chemical fertilizers and pesticides can lead to environmental degradation and health hazards for farmers and consumers.</li> <li>• The lack of proper storage and transportation facilities can lead to food waste and impact the local economy.</li> <li>• The farmers in Nawabganj Upazila face competition from imported agricultural products, which can affect the demand and price of their products.</li> </ul>

## 7.8 Recommendations

### 7.8.1 General recommendation

- **Promoting sustainable agricultural practices:** Encouraging farmers to adopt sustainable farming practices can lead to improved soil health, reduced use of pesticides and fertilizers, and improved crop yields. This can be achieved through government subsidies, training programs, and awareness campaigns.

- **Developing infrastructure:** Investing in rural infrastructure such as roads, irrigation systems, and cold storage facilities can improve market access for farmers and reduce post-harvest losses.
- **Strengthening extension services:** Providing farmers with timely and accurate information on farming practices, weather, and market trends can help them make informed decisions and improve their yields.
- **Supporting research and development:** Investing in agricultural research and development can lead to the development of new technologies, crop varieties, and livestock breeds that are more resilient to changing climatic conditions.
- **Providing financial assistance:** Providing farmers with access to credit, insurance, and other financial services can help them invest in their farms and manage risks associated with agricultural production.

## 7.8.2 Policy and Proposal

### 7.8.2.1 Enforcing Agricultural Land Use Only Policy

**Introduction:** Agricultural land is an essential resource for food production, livelihoods, and economic development. In many parts of the world, however, agricultural land is being converted to non-agricultural uses such as industrial, commercial, and residential developments. This can lead to food insecurity, loss of biodiversity, and environmental degradation. To address these issues, we propose enforcing an agricultural land use only policy to ensure that agricultural land is preserved for farming activities.

**Objectives:** The objectives of this proposal are to:

- 1) Preserve agricultural land for food production, biodiversity conservation, and environmental sustainability.
- 2) Prevent the conversion of agricultural land to non-agricultural uses such as industrial, commercial, and residential developments.
- 3) Encourage farmers to adopt sustainable agricultural practices to improve soil health, reduce pesticide and fertilizer use, and increase crop yields.
- 4) Promote food security and livelihoods for rural communities through the sustained production of crops and livestock.

**Methods:** To enforce an agricultural land use only policy, the following methods can be adopted:

- **Land use zoning:** The agricultural land can be identified and designated as agricultural zones through a land-use zoning plan. Any non-agricultural use of agricultural land will be strictly prohibited.
- **Strict land-use regulations:** Local and national governments can introduce strict land-use regulations and guidelines to prevent the conversion of agricultural land to non-agricultural uses. Penalties can be imposed on those who violate these regulations.

- **Land use monitoring:** Land use monitoring can be carried out regularly to identify any unauthorized land-use change. Satellite imagery and other remote sensing technologies can be used for this purpose.
- **Financial incentives:** Financial incentives can be offered to farmers who adopt sustainable farming practices and maintain their agricultural land. These incentives can be in the form of tax breaks, subsidies, and grants.
- **Public awareness:** Public awareness campaigns can be launched to promote the importance of preserving agricultural land for food production, biodiversity conservation, and environmental sustainability. The campaigns can target farmers, landowners, policymakers, and the general public.

**Conclusion:** Preserving agricultural land is crucial for ensuring food security, sustaining rural livelihoods, and protecting the environment. By enforcing an agricultural land use only policy, can preserve agricultural land for farming activities and prevent its conversion to non-agricultural uses. This policy can be achieved through a combination of land-use zoning, strict land-use regulations, land-use monitoring, financial incentives, and public awareness campaigns.

### 7.8.2.2 Promotion of Agroforestry

**Introduction:** Agroforestry is a sustainable land-use system that integrates trees with crops and/or livestock production on the same land. Agroforestry can improve soil health, enhance biodiversity, and increase crop yields. To promote agroforestry, propose the following policy:

**Objectives:** The objectives of this policy are to:

- 1) Promote sustainable land-use practices that enhance soil health and biodiversity.
- 2) Increase agricultural productivity and rural livelihoods through agroforestry.
- 3) Mitigate the effects of climate change by sequestering carbon in trees and soils.
- 4) Increase awareness of the benefits of agroforestry among farmers, policymakers, and the general public.

**Methods:** To promote agroforestry, the following methods can be adopted:

- **Technical support:** Technical support can be provided to farmers to help them implement agroforestry practices. This can include training on tree planting, maintenance, and pruning techniques.
- **Financial incentives:** Financial incentives can be offered to farmers who adopt agroforestry practices. This can include subsidies for tree planting and maintenance, tax credits, and access to low-interest loans.
- **Research and development:** Research and development can be conducted to identify the best agroforestry practices for different regions and crops. This can include identifying the best tree species to plant, the optimal spacing between trees and crops, and the best management practices.
- **Land tenure and access to markets:** Land tenure and access to markets can be improved to encourage farmers to invest in agroforestry. This can include land tenure reforms to

provide farmers with secure land tenure and improving access to markets for agroforestry products.

- **Public awareness:** Public awareness campaigns can be launched to promote the benefits of agroforestry among farmers, policymakers, and the general public. This can include disseminating information through social media, workshops, and other outreach programs.

## **Conclusion and Recommendations**

The proposed agroforestry policy represents a holistic approach aimed at fostering sustainable land-use practices and addressing multifaceted challenges. By integrating trees with crop and livestock production, the policy envisions a future where soil health is enhanced, biodiversity flourishes, and agricultural productivity sees a marked improvement. The outlined objectives underscore the policy's commitment to mitigating climate change effects through carbon sequestration while simultaneously promoting rural livelihoods. The suggested methods, encompassing technical support, financial incentives, research and development, improved land tenure, and heightened public awareness, collectively form a comprehensive strategy to propel the adoption of agroforestry practices. The success of this policy hinges on collaborative efforts between stakeholders, including farmers, policymakers, and the public. Technical support and financial incentives provide practical mechanisms for farmers to embrace agroforestry, while research and development ensure the adoption of region-specific and crop-appropriate practices. Addressing land tenure issues and improving market access serve as crucial catalysts for farmers' investments in agroforestry. Furthermore, the emphasis on public awareness seeks to create a widespread understanding of the benefits associated with agroforestry, fostering a supportive environment for its implementation. Overall, the proposed policy offers a roadmap for sustainable agriculture, aligning ecological, economic, and social goals to pave the way for a resilient and harmonious coexistence between agriculture and forestry.

### **7.8.2.3 Promotion of Sustainable Livestock Farming**

Livestock farming is an important sector of agriculture in Nawabganj Upazila, Dhaka, and contributes significantly to the economy and livelihoods of the people. However, traditional livestock farming practices are often unsustainable, leading to environmental degradation, soil erosion, and poor animal health. To address these issues, propose the promotion of sustainable livestock farming practices in Nawabganj Upazila, Dhaka.

**Objectives:** The objectives of this proposal are to:

- 1) Improve livestock health and productivity through the adoption of sustainable livestock farming practices.
- 2) Reduce the environmental impact of livestock farming through the promotion of sustainable grazing and feeding practices, and the reduction of greenhouse gas emissions.
- 3) Increase income and livelihoods for farmers through the production of high-quality livestock products.

- 4) Enhance food security in the region by increasing the availability of nutritious livestock products.

**Methods:** To promote sustainable livestock farming in Nawabganj Upazila, Dhaka, the following methods can be adopted:

- **Training and Education:** Farmers can be trained on sustainable livestock farming practices, such as improved feeding and grazing practices, animal welfare, disease management, and manure management.
- **Improved Breeding:** Farmers can be provided with access to high-quality breeding stock and genetic materials to improve the quality and productivity of their livestock.
- **Improved Feeding and Grazing Practices:** Farmers can be encouraged to adopt sustainable feeding and grazing practices, such as rotational grazing, silage production, and the use of legumes in animal feed.
- **Waste Management:** Farmers can be trained on sustainable manure management practices to reduce greenhouse gas emissions and improve soil health.
- **Market Linkages:** Farmers can be linked with markets to sell their high-quality livestock products, such as milk, meat, and eggs.

**Conclusion:** Promoting sustainable livestock farming practices in Nawabganj Upazila, Dhaka can help to improve livestock health and productivity, reduce environmental impacts, increase income and livelihoods for farmers, and enhance food security in the region.

#### 7.8.2.4 Management of Fishery

**Introduction:** Fisheries play an important role in the economy and food security of Nawabganj Upazila, Dhaka. However, the fisheries sector is facing several challenges, including overfishing, illegal fishing, and inadequate management systems. To address these challenges, propose strengthening fisheries management in Nawabganj Upazila, Dhaka.

**Objectives:** The objectives of this proposal are to:

- 1) Promote sustainable fisheries practices to ensure the long-term viability of fish stocks.
- 2) Improve the livelihoods of fishers through increased productivity and value addition.
- 3) Increase the availability of nutritious fish products to improve food security in the region.
- 4) Reduce the negative environmental impacts of fishing activities.

**Methods:** To strengthen fisheries management in Nawabganj Upazila, Dhaka, the following methods can be adopted:

- **Fisheries Management Planning:** A comprehensive fisheries management plan can be developed in consultation with fishers, government agencies, and other stakeholders to ensure sustainable fishing practices and the conservation of fish stocks.
- **Improved Fishing Techniques:** Fishers can be trained on improved fishing techniques, such as the use of sustainable gear, selective fishing, and fishing in designated areas to reduce bycatch and ensure sustainable fisheries.

- **Value Addition:** Fishers can be trained on post-harvest management practices, such as handling, storage, and processing, to add value to their catch and increase their income.
- **Strengthened Monitoring and Enforcement:** Fisheries management can be strengthened through increased monitoring and enforcement of fishing regulations to deter illegal fishing activities.
- **Market Linkages:** Fishers can be linked with markets to sell their high.

In summary, the agricultural sector in Nawabganj Upazila, Dhaka, stands as a diverse and pivotal component, profoundly influencing the local economy and residents' livelihoods. Benefiting from favourable natural resources like rivers and wetlands, the region supports thriving fisheries and livestock farming activities. Despite confronting challenges such as inadequate infrastructure, limited access to modern technology, and insufficient training and education, local farmers have showcased resilience and achieved commendable success in advancing their agricultural practices.

Fisheries are fundamental in providing protein for the community and significant contributions to the local economy. However, the imperative for sustainable management practices, including enhanced regulation of fishing activities, is underscored to avert overfishing and the depletion of fish stocks.

While contributing substantially to the local economy by generating income and employment opportunities, the livestock sector grapples with challenges like inadequate animal health services and limited access to quality feed and genetics. Consequently, further investments are recommended to foster the development of sustainable fisheries and livestock farming practices, improve technological access, and enhance training and education initiatives for farmers, thereby elevating their productivity and income levels. A conducive policy environment and establishing strategic public-private partnerships are deemed essential for fostering the sustained growth and development of the agricultural sector in Nawabganj Upazila.

## CHAPTER EIGHT: BIO-DIVERSITY INCLUDING FLORA AND FAUNA

### 8.1 Background

Biodiversity, short for biological diversity, refers to the variety of life on Earth at all levels of organization, including the diversity of species, ecosystems, and genetic diversity within species. It encompasses the variety of living organisms, the genetic differences within these organisms, and the ecosystems they form. Biodiversity is essential for the health and functioning of ecosystems and provides numerous benefits to human well-being (M. WOOD, 1997).

There are three main components of biodiversity: Species Diversity, Genetic Diversity, Ecosystem Diversity. Species Diversity refers to the variety of different species present in a particular region or ecosystem. It includes the number of species and their relative abundance. High species diversity is often associated with a healthier and more resilient ecosystem. Genetic Diversity involves the variety of genetic information within a species. It includes the diversity of genes, alleles, and genetic traits within populations. Genetic diversity is crucial for the adaptation and survival of species in changing environments. Ecosystems are dynamic communities of living organisms interacting with each other and their physical environment. Ecosystem diversity refers to the variety of ecosystems within a region. Different ecosystems, such as forests, grasslands, wetlands, and coral reefs, provide unique habitats and contribute to overall biodiversity.

Biodiversity is important for various reasons. It helps to increase ecological stability, enhance ecological value, support economically as well as cultural and recreational values. Diverse ecosystems are better able to resist and recover from disturbances, such as diseases, climate change, or natural disasters. Many human activities, such as agriculture, forestry, and fisheries, rely on diverse ecosystems. Biodiversity provides resources like food, medicine, and raw materials that are essential for human well-being and economic development.

Biodiversity is threatened by various human-induced and natural disturbances. These disturbances can negatively impact ecosystems, leading to the loss of species, disruption of habitats, and changes in overall biodiversity. The major reasons of disruption of biodiversity are climate change, environmental pollution, deforestation, habitat destruction, Overexploitation, invasive species, and species extinction which are the critical aspect of the on-going biodiversity crisis.

Many ecologists argue that we are currently experiencing the sixth mass extinction, asserting that humanity's impact on the environment is comparable to the five previous catastrophic events spanning the last 600 million years, during which as much as 95 percent of the Earth's species vanished. While this perspective is widely accepted, recent studies present varying and uncertain extinction rates (YaleEnvironment360).

The Millennium Ecosystem Assessment, which enlisted the expertise of over a thousand specialists, projected an extinction rate later calculated to be as high as 8,700 species annually, equivalent to 24 species per day. More recently, researchers associated with the U.N. Convention on Biological Diversity have stated that, on a daily basis, up to 150 species are lost, potentially amounting to as much as 10 percent over a decade (YaleEnvironment360).

## 8.2 Methodology

To assess the present state of ecology and biodiversity in Nawabganj Upazila, this study has extensively reviewed various documents and reports, utilizing them as secondary sources of information. The analysis has included important documents and reports, such as those from the International Union for Conservation of Nature (IUCN), the National Biodiversity Strategy and Action Plan of Bangladesh 2016-2021, and the EIA Report on Comprehensive Environmental & Social Impact Assessment (ESIA) for the establishment of the proposed Nawabganj Economic Zone by BEZA in 2021. In accordance with the project's terms of reference, the study also incorporates a field survey, information gathering from local residents, and interviews with key personnel, including officials from the Ministry of Fisheries and Livestock, the Division of Forest in Nawabganj Upazila.

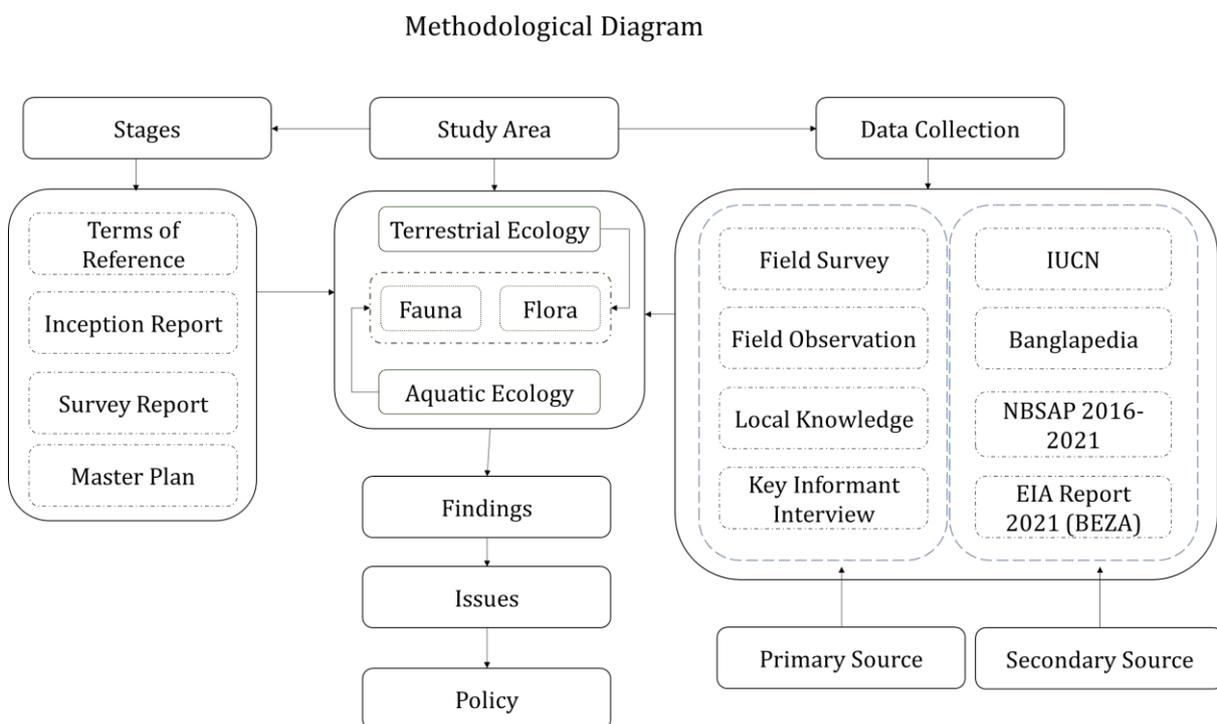


Figure 8-1: Methodological Diagram

## 8.3 Existing Ecology

### 8.3.1 Terrestrial Fauna

Various studies have documented a decreasing trend in the population of diverse faunal species. Approximately 23% of vertebrates in Bangladesh are encountering varying degrees of threats (Feeroz, 2014). According to the IUCN (2000), 57% of reptiles and 36% of mammals are facing threats. The same report identified 388 bird species in Bangladesh, with 19 classified as Critically Endangered, 18 as Threatened Endangered, and 4 as Vulnerable. Among the birds that have become extinct in Bangladesh, only one species (the Pink-headed Duck) has reached global extinction. The gradual depletion of habitat is contributing to the decline in both population and diversity of invertebrates in the country.

The Nawabganj Upazila, located in the Dhaka District, have a high level of biological and ecological diversity, hosting a wide array of terrestrial fauna that is locally abundant. The harmonious coexistence of both plant and animal life is crucial for safeguarding the area's biodiversity. Predominantly rural, this region serves as a habitat for a diverse range of birds, animals, and insects.



Figure 8-2: Scenario of terrestrial fauna (Photo courtesy: Internet and Field Survey)

Among them, the following species are commonly found in Nawabganj Upazila - *Apis indica* (Indian honeybee), *Chiroptera* (Bats), *Acridotheres tristis* (Common Myna), *Pycnonotus cafer* (Red-Vented Bulbul), *Copsychus saularis* (Magpie-Robin), *Psittacula krameri* (Rose-Ringed Parakeet), *Latrodectus katipo* (katipo spider), *Canis aureus* (golden jackal), Monitor lizards, and *Macaca arctoides* (stump-tailed macaque). These diverse species contribute to the ecological richness of the area.

Terrestrial birds in the study area are divided into two groups: those in floodplains and wetlands, and those in dry land habitats. Birds of prey, including the Brahminy Kite, herons, and Common Kingfisher, thrive in the region. Other common species like the Bronzed Drongo, Common Mynah, Barn Owl, and Blue Rock Pigeon are also present. Notably, the Brahminy Kite is classified as a threatened species by the IUCN-Bangladesh (2015).

### 8.3.2 Aquatic Fauna

The study area encompasses various wetland types, including rivers, khals/canals, beels, ditches, and ponds. Two distinct categories of wetlands have been identified: (i) Perennial wetlands, such as beels, khals, and homestead ponds, which retain water throughout the entire year. The water from these sources is commonly utilized for domestic needs and fish cultivation, making them favorable for aquatic fauna. The second type is (ii) Seasonal wetlands, characterized by water presence only during the rainy season, drying up in the dry season. The existence of these diverse wetland types provides a varied habitat for aquatic fauna. Below are listed the aquatic flora species found in the study area.

Table 8-1: List of Aquatic Faunal Species of Nawabganj Upazila

English Name	Scientific name	Family name	IUCN Status	Local Status
<b>Birds</b>				
White breasted Kingfisher	Halcyon smyrnensis	Alcedinidae	NO	Common
Common Kingfisher	Alcedo atthis	Alcedinidae	NO	Common
Brahminy Kite	Haliastur indus	Accipitridae	LC	Common
Little egret	Egretta garzetta	Ardeidae	LC	Common
Great egret	Casmerodius albus	Ardeidae	LC	Common
pond heron	Ardeola grayii	Ardeidae	LC	Common
Grey heron	Ardea cinerea	Ardeidae	LC	Common
Little cormorant	Phalacrocorax niger	Phalacrocoracidae	LC	Common
Black Kite	Milvus migrans	Accipitridae	NO	Common
<b>Reptiles</b>				
Bengal Monitor	Varanus bengalensis	Varanidar	NT	Common
Stripes Keelback	Amphiesma stolata	Natricidae	NO	Common
Olive Keelback	Atretium schistosum	Natricidae	NO	Common
Rat Snake	Ptyas mucosus	Coiubridae	LC	Common
Garden Lizard	Calotes versicolor	Agamidae	LC	Common
Checkered Keel back	Xenocrophis piscator	Colubridae	NO	Common
Smooth water snake	Enhydris enhydris	Homalopsidae	NO	Common
<b>Amphibians</b>				
Common Toad	Bufo melanosticus	Ranidae	NO	Common
Skipper Frog	Euphlyctis cyanophlyctis	Ranidae	NO	Common
Cricket frog	Rana limnocharis	Ranidae	NO	Common
Bull frog	Hoplobatrachus tigerinus	Ranidae	NO	Common
<b>Mammals</b>				
Ganges River Dolphin	Platanista gangetica	Platanistidae	EN	Common

Note: NO= Not Threatened; NT= Nearest Vulnerable, LC=Least Concern, EN= Endangered,

Source: Red list of Threatened Animals of Bangladesh (IUCN) 2015, EIA of Nawabganj 2021 and Field Survey 2023

### 8.3.3 Terrestrial Flora

In the terrestrial ecosystem of the Study area, floral distribution can be divided into four categories which are crop-field, homestead, roadside and river/canal side vegetations.

In the study area, maximum agricultural land was found as medium high land which are inundated during monsoon. Major crops found in this field are Auas, B. Aman and Boro paddy. Besides these, some vegetables and economically valued crops are also cultivated in the dry season. During the month November to February, Onion, Garlic, Coriander, Black Cumin are commonly found in this region.

In the homestead vegetation of the region, commonly planted tree species include Jackfruit (*Artocarpus heterophyllus*), American mahogany (*Swietenia mahagoni*), Banana (*Musa sp*), Gogon Shirish tree (*Albizia lebbek*), Indian nut palm (*Areca catechu*), Pomelo (*Citrus maxima*), Mallotus (*Trewia nudiflora*), Black Berry (*Rubus argutus*), Silk tree (*Albizia richardiana*), Jujube (*Ziziphus mauritiana*), and others. This vegetation serves as essential shelter for local wildlife. The area is also utilized for cultivating various vegetables and economically valuable crops. In addition to the cultivated varieties, different plant species, primarily weeds, thrive in the area, including *Echinochloa colonum*, *Centipeda orbicularis*, *Cheratopteris sp*, *Panicum repens*, *Amaranthus spinosus*, *Cyperus sp.*, *Ethulia conyzoides*, *Chenopodium ambrosoides*, and more. This type of vegetation creates a feeding habitat for numerous wildlife.

The vegetation alongside roads is primarily deliberate plantings, creating a well-established ecosystem. Commonly found in this region are introduced species such as West Indian mahogany (*Swietenia mahagoni*), Silk tree (*Albizia richardiana*), and Date palm (*Phoenix sylvestris*). Additionally, there is a presence of small-sized herbs and shrubs, including black nightshade (*Solanum nigrum*), Ivy gourd (*Coccinia grandis*), Taro (*Colocasia esculenta*), Makra (*Dactyloctenium aegyptium*), Fig tree (*Ficus hispida*), and Pink Morning Glory (*Ipomoea fistulosa*), frequently observed in the study area. In the area of Shikaripara Union and Bakshanagar Union of Nawabganj Upazila, the Eucalyptus (*Eucalyptus obliqua*) tree is also noticeable.

The vegetation along the sides of rivers, canals, and khals is characterized by the presence of local plant species such as Beachwood (*Gmelina arborea*), Bamboo (*Bamboosa sp*), Banana (*Musa sp*), and others. Some herbs and shrubs, including Wild Senna (*Senna hebecarpa*), Croton plant (*Codiaeum variegatum*), Mexican poppy (*Argemone Mexicana*), Chinese Spinach (*Amaranthus dubius*), are also observed in the vegetation along rivers, canals, and khals. These plant communities serve as crucial habitats for a diverse range of insects, reptiles, birds, and small mammals

### **8.3.4 Aquatic Fauna**

The wetlands within the project area play a crucial role in supporting the aquatic ecosystem by supplying essential nutrients. Both seasonal and perennial wetlands contribute to the flourishing of aquatic plant communities. Various types of aquatic flora were observed throughout the project area, including common submerged species like Tape grass (*Vallisneria spiralis*), Isotes, and Nitella. In this area, free-floating plants such as Water hyacinth (*Eichhornia crassipes*), Water cabbage (*Pistia stratiotes*), and Azola (*Azolla pinnata*) were identified. Rooted floating plant communities dominate both perennial and seasonal wetlands within the project area, with Water lily (*Nymphae nouchali*) being the most prevalent species. Sedges and meadow plants are abundant in seasonal wetlands, and notable plants in the project area include Knotweed (*Polygonum Sp*), Pink morning glory (*Ipomoea fistulosa*), *Salvinia auriculata*, and *Azolla pinnata*.

## CHAPTER NINE: HAZARD AND DISASTER

### 9.1 Introduction

Hazards and disasters pose threats to humans, the environment, and infrastructure. Hazards, whether natural or human-induced, may escalate into disasters without effective management. Disasters are catastrophic events resulting from significant damage, loss of life, or property destruction caused by hazards. Their impact extends to communities, nations, and the global economy, disrupting infrastructure, food and water supplies, and communication networks, often leading to social disorder. Climate change is a major hazard threatening humans, causing various risks like rising sea levels and extreme weather events. Hazards and disasters, with both immediate and long-term impacts, affect societies and the environment, leading to economic losses, infrastructure damage, and loss of life. Bangladesh, with high vulnerability due to natural hazards, faces yearly challenges in Nawabganj Upazila, including floods, cyclone, earthquake, extreme weather effect, arsenic, and riverbank erosion. This working paper addresses the hazard and disaster issues in Nawabganj Upazila, considering the socio-economic conditions and the significant impacts on lives and livelihoods.

### 9.2 Methodology

This research thoroughly reviewed a number of papers and reports, utilizing them as secondary sources of information, in order to assess the present state of hazard and disaster in Nawabganj Upazila. Important papers and records from the Bangladesh National Portal, local government agencies, and national disaster-related policies were all included in this study. The research also took into account the Comprehensive Environmental & Social Impact Assessment (ESIA) Report for the projected Nawabganj Economic Zone, which BEZA created in 2021. The study included a field survey in accordance with the project's guidelines.

Methodological Diagram

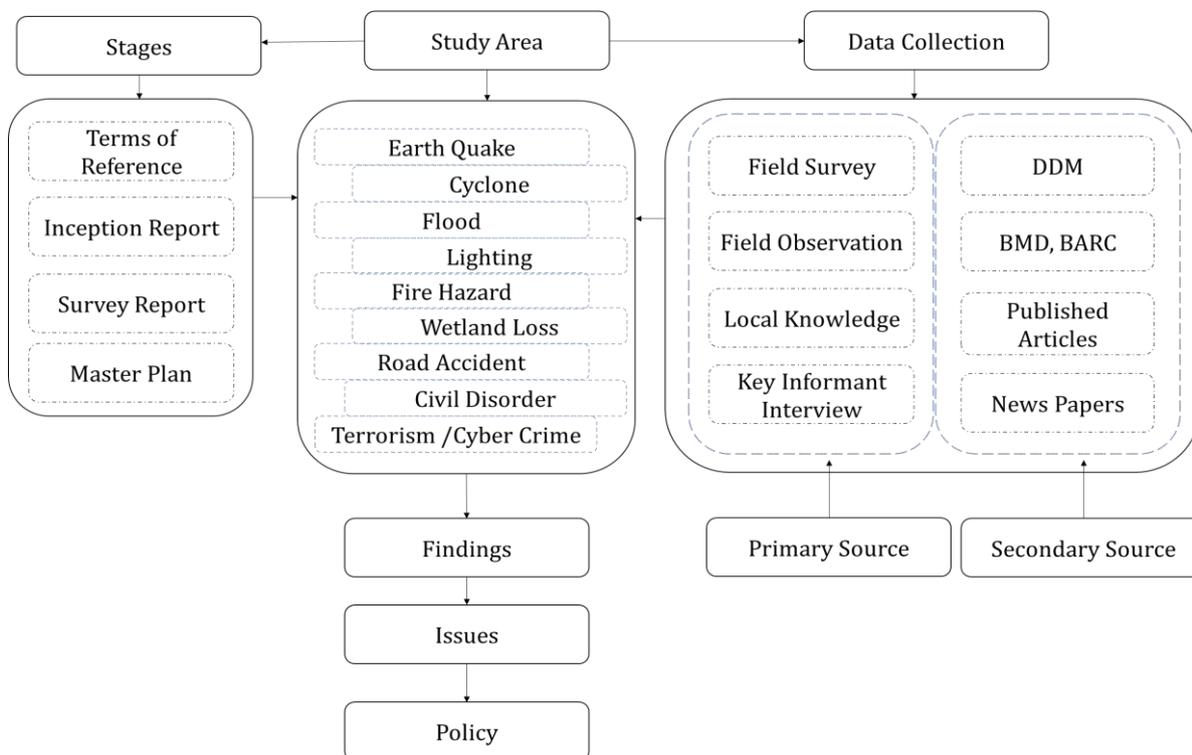


Figure 9-1: Methodological Flow Chart

## 9.3 Hazard

### 9.3.1 Hazard and its classification

Hazard is any substance, phenomenon or situation which has the potential to cause disruption or damage to people their property, their services, and their environment. Hazard is which has potential to occurrence of an event. A hazard is a potential source of harm. Substances, events, or circumstances can constitute hazards when their nature would allow them, even just theoretically, to cause damage to health, life, property, or any other interest of value.

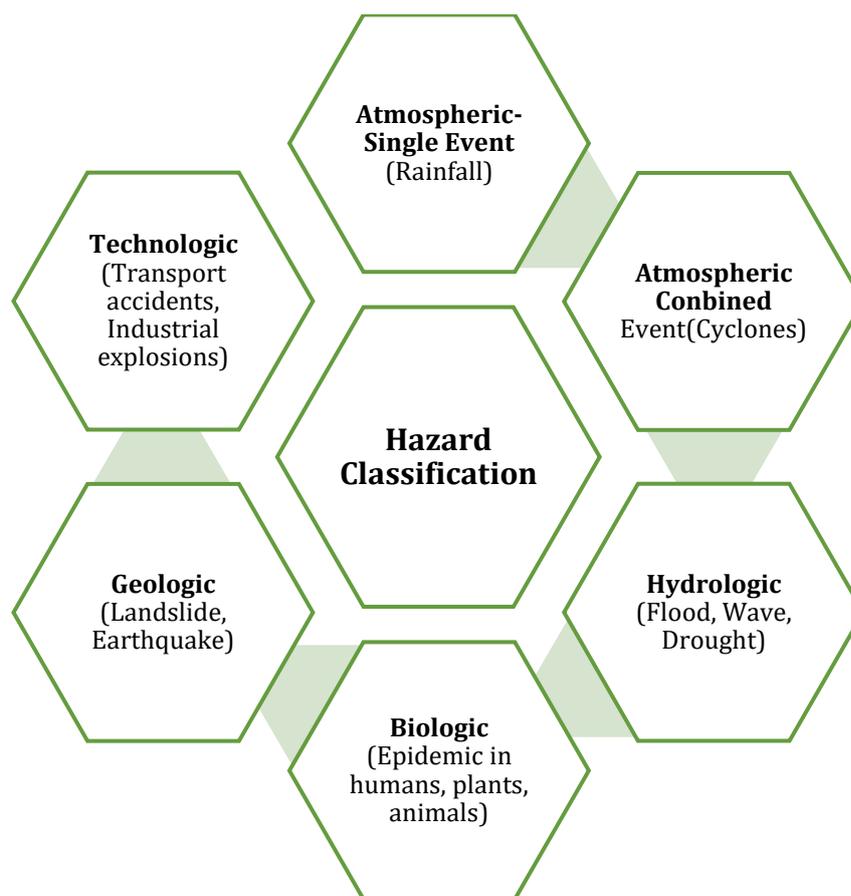


Figure 9-2: Classification of Hazard

The probability of that harm being realized in a specific incident, combined with the magnitude of potential harm, make up its risk, a term often used synonymously in colloquial speech. Hazards can be classified in several ways; they can be classified as natural, anthropogenic, technological, societal, secondary hazard or any combination. Secondary hazard refers to a result of other hazard events. For example, secondary hazards to an earthquake may be landslide, Tsunami, building collapse, interruption of power, water supply, transportation, communication.

- **Natural Hazard:** Natural hazard refers to all atmospheric, hydrologic, geologic (especially seismic and volcanic), and wildfire phenomena that, because of their location, severity, and frequency, have the potential to affect humans, their structures, or their activities adversely. A natural hazard involves human influence. If a physical occurrence like a volcanic eruption occurs without affecting humans, it is considered a natural phenomenon rather than a natural hazard. When a natural phenomenon takes place in a populated area, it becomes a hazardous event. If this event leads to an unacceptably high number of fatalities or extensive property damage, it is classified as a natural disaster. In regions devoid of human interests, natural phenomena are not considered hazards and do not result in disasters. This definition contradicts the common perception of natural

hazards as inevitable chaos caused solely by unrestrained natural forces. It shifts the attribution of cause from purely natural processes to the simultaneous presence of human activities and natural events.

- **Anthropogenic Hazard:** Hazards induced by human's stem from intentional actions, errors, or failures in systems. They may arise from accidents within human-built infrastructures or technologies, as well as deliberate human actions that result in destruction or loss of life. These human-caused hazards have the potential to inflict varying degrees of damage on individuals, communities, economies, supply chains, and the environment, ranging from moderate to severe.
- **Biologic Hazard:** Biological hazards encompass substances or agents of organic origin, as well as those transmitted through biological vectors. This includes pathogenic microorganisms, toxins, and bioactive substances, such as bacteria, viruses, parasites, venomous wildlife, insects, poisonous plants, and mosquitoes carrying disease-causing agents.
- **Environmental Hazard:** Environmental hazards cover chemical, natural, and biological elements, often arising from environmental degradation, as well as physical or chemical pollution in the air, water, and soil. However, certain processes and phenomena within this category are better described as drivers of hazard and risk rather than hazards themselves, such as soil degradation, deforestation, loss of biodiversity, salinization, and sea-level rise.
- **Geological Hazard:** Geological or geophysical hazards result from internal earth processes, including earthquakes, volcanic activity, emissions, and related geophysical phenomena like mass movements, landslides, rockslides, surface collapses, and debris or mud flows. Hydrometeorological factors play a crucial role in some of these processes. Categorizing tsunamis poses a challenge as they are triggered by undersea earthquakes and other geological events but essentially manifest as coastal water-related hazards in the oceanic context.
- **Hydrologic Hazard:** Hydrometeorological hazards arise from atmospheric, hydrological, or oceanographic conditions. Instances include tropical cyclones (known as typhoons and hurricanes), floods (including flash floods), droughts, heatwaves, cold spells, and coastal storm surges. Hydrometeorological conditions can also play a role in other hazards like landslides, wildland fires, locust plagues, epidemics, and in the transportation and dispersal of toxic substances and volcanic eruption materials.
- **Technological Hazard:** Technological hazards emanate from industrial or technological circumstances, risky procedures, infrastructure failures, or specific human activities. Examples encompass industrial pollution, nuclear radiation, toxic waste, dam failures, transport accidents, factory explosions, fires, and chemical spills. Additionally, technological hazards may directly result from the impacts of a natural hazard event.

### 9.3.2 Hazard Assessment and its characteristics

The evaluation of a hazard involves gauging the likelihood of its incidents at a particular level of intensity, within a designated timeframe and in a specific location. The examination of the characteristics of natural or human-made hazards encompasses understanding crucial aspects like the severity level, the scope of the impact zone, the duration of the impact, the speed at which the event unfolds, the predictability of the occurrence, and the interconnections between these elements. There are various ways to assess hazard like quantitative approach, qualitative approach, deterministic approach, probabilistic approach, and hazard zonation mapping.

### 9.3.3 Vulnerability

Vulnerability is a concept that encompasses economic, social, physical, or geographic factors and constraints, which hinder the ability to prepare for and cope with the impacts of hazards. It involves both susceptibilities, indicating the likelihood of being affected by external factors, and resilience, representing the capacity to quickly recover from difficulties. Vulnerability can be divided into two categories: hazard-specific and setting-specific.

- ✓ Hazard-specific refers to a feature that renders a particular element susceptible to the force or impact of a hazard. This category takes into account the geophysical and locational characteristics of the elements involved. By considering the current understanding of hazard distribution and frequency, a community or country can face threats from specific hazards.
- ✓ Setting-specific refers to the socio-economic structure of a given area, considering whether it is primarily rural or urban. Both rural and urban settings possess distinctive characteristics that can be shared or unique, influencing the overall vulnerability of the area.

### 9.3.4 Concept of Risk, Exposure and Sensitivity

#### 9.3.4.1 Risk

Risk is a combination of the interaction of hazard, exposure, and vulnerability, which can be represented by the three sides of a triangle. Risk is the probability that negative consequences may arise when hazards interact with vulnerable areas, people, property, environment. Risk is a concept which describes a potential set of consequences that may arise from a given set of circumstances.

#### 9.3.4.2 Exposure

Exposure is an external factor to a system which refers to the presence of people, assets, resources, or systems in areas that are susceptible to the adverse effects of a hazard. It represents the degree to which elements, such as populations, buildings, infrastructure, or natural resources, are subject to potential harm, damage, or loss due to the occurrence of a hazardous event, whether it be a natural disaster like floods or earthquakes, or human-made incidents such as industrial accidents. In essence, exposure quantifies the extent of vulnerability by identifying what and how much is at risk within a given area.

#### 9.3.4.3 Sensitivity

Sensitivity denotes the extent to which a system is influenced by exposure to risks. Analogous to immunity, if an individual doesn't contract the seasonal flu every time the weather changes (exposure), it implies a lower sensitivity to the changing weather. Sensitivity is an inherent quality of a system, specifically referring to the impact of local climate change and associated hazards on both the local biophysical and socio-economic systems. Systems with high sensitivity will experience more significant impacts compared to those with low sensitivity, even when exposed to the same level of climate change or hazards. Consequently, the greater the sensitivity of a system to climate change and related hazards, the higher its vulnerability to these factors.

Evaluating the sensitivity of a system involves examining the effects or damage incurred by the system due to climate change and associated hazards.

## 9.4 Disaster

A disaster is an event, natural or man-made, sudden, or progressive, that seriously disrupts the functioning of a society, causing human, material, or environmental losses of such severity that the affected community has to respond by taking exceptional measures.

- ✓ **Qualitative Definition:** A disaster is an overwhelming situation where the regular routines of life are abruptly interrupted, leading to a need for essential provisions such as protection, food, water, shelter, clothing, medical care, and social assistance to ensure the well-being of affected individuals (according to UNDRO- United Nations Disaster Relief Organization and the League of Red Cross and Red Crescent Societies)
- ✓ **Quantitative Definition:** Mr. Bindi V. Shah of London School of Economics made a global survey of disasters between 1947 and 1980 and suggested that the damage cost by a natural hazard may be termed as disaster if it satisfies one of the following conditions:
  - a) At least US\$ 3.6 million worth of damage
  - b) At least one hundred people dead
  - c) At least one hundred people injured

The damage caused by a disaster can be described as tangible loss and intangible loss. Tangible loss refers to measurable losses in monetary terms such as physical damage and economic loss, while intangible loss refers to losses that cannot be measured in monetary terms (impacts on health, cultural heritage, or the environment).

### 9.4.1 Existing Scenario of Disaster and Hazard

#### 9.4.1.1 Natural Riverbank Erosion

Riverbank erosion is the process where water flow removes soil and rock from a riverbank, leading to changes in river shape and course. Accretion, on the other hand, is the buildup of sediment in certain areas, leading to land formation along the riverbanks or within the river channel itself. Both processes are natural parts of a river's lifecycle but can be influenced by human activities such as deforestation, construction, and water management practice. River accretion and erosion are significant geographical processes affecting Bangladesh, a country characterized by its vast riverine system. The Ganges, Brahmaputra, and Meghna rivers, along with their numerous tributaries and distributaries, dominate the landscape of Bangladesh, making it highly susceptible to the impacts of river accretion and erosion.



**Figure 9-3: Riverbank Erosion (1992 -2023) (Padma River near Shikaripara Union Nawabganj)**  
 Nawabganj Upazila, positioned within Dhaka District, is adjacent to the rivers Padma, Kaliganga, and Ichamoti, the latter winding through the upazila itself. Due to climate change, there is a noticeable transformation in the morphology of the riverbanks within this upazila. **Figure 9-3 and Error! Reference source not found.** illustrate the river erosion scenarios of the Padma and Ichamoti Rivers, respectively, in the study area.



**Figure 9-4: Ichamoti River Erosion from 1992 to 2023**

The analysis of river morphological changes was conducted using remote sensing technologies, utilizing change detection tools in ENVI 5.3, which is specialized for analyzing remotely sensed data. To identify the morphological changes in the riverbank, Landsat 5 TM and Landsat 8 OLI imagery were used for the years 1992 and 2023, respectively. **Error! Reference source not**

**found.** shows that over the past 25 years, the river in Nawabganj Upazila has experienced accretion of 2.15 square kilometers and erosion of 2.77 square kilometers.

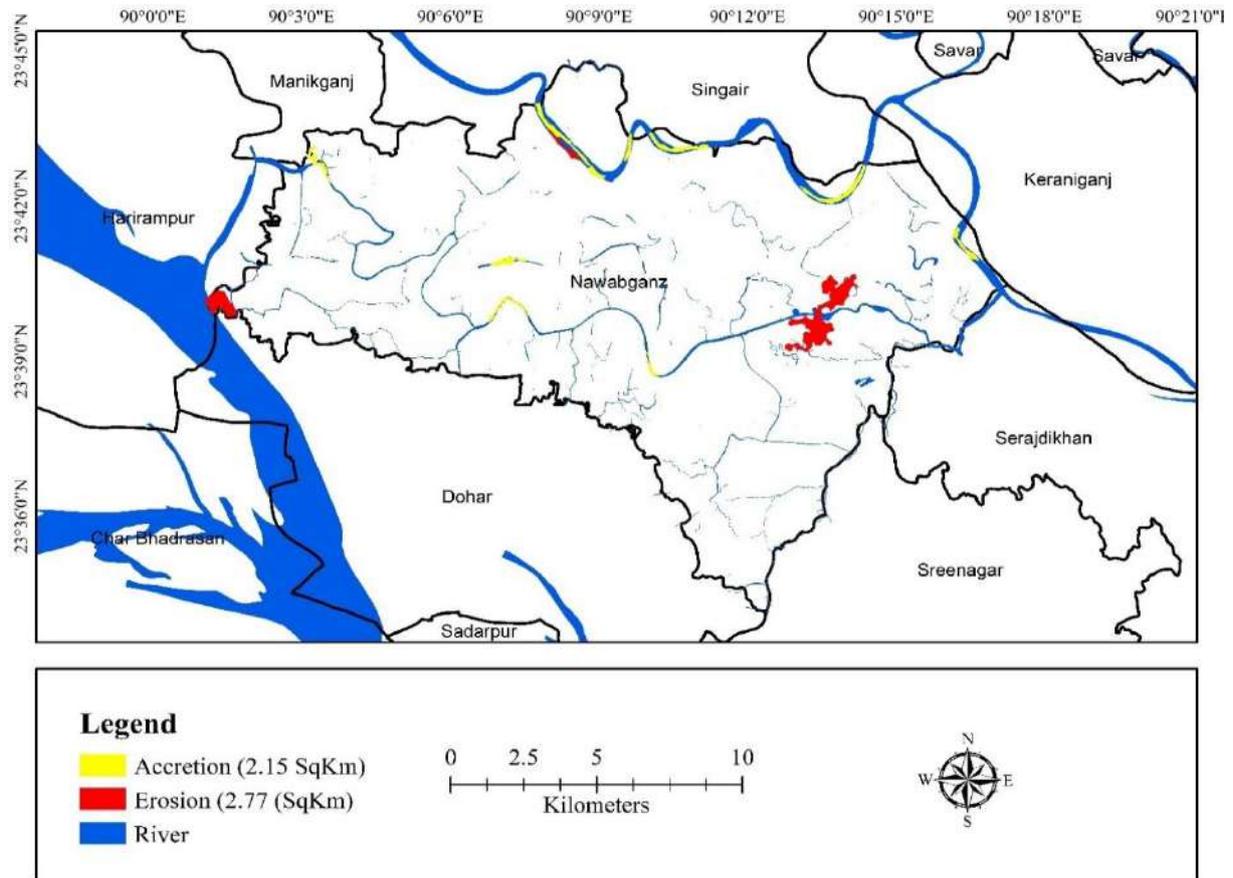


Figure 9-5: Riverbank Accretion and Erosion Scenario of river in Nawabganj Upazila (1992-2023)

#### 9.4.1.2 Earthquake

An earthquake is a natural event that takes place when there is an abrupt release of energy from the Earth's crust. This energy is conveyed through seismic waves, leading to ground vibrations that may result in structural and infrastructural harm, as well as potential loss of life. The intensity, duration, and occurrence of earthquakes vary based on factors like location, depth, and the specific fault type. Additionally, earthquakes have the potential to instigate other natural disasters like tsunamis and landslides. Bangladesh is a country located in a seismically active zone and is prone to earthquakes. Over the years, Bangladesh has experienced several significant earthquakes, with varying degrees of damage and loss of life.

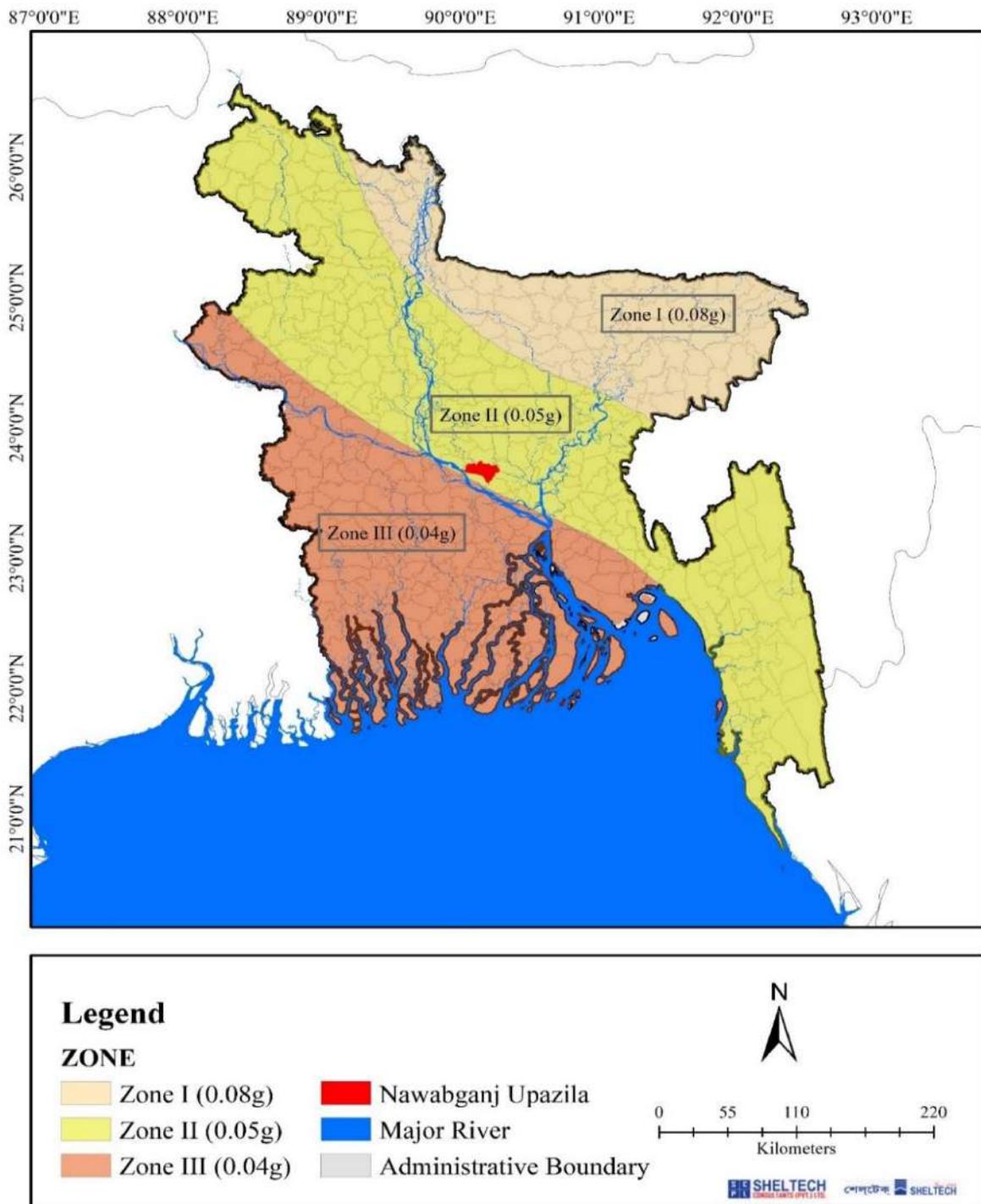


Figure 9-6: Bangladesh Seismic Zone

The **Figure 9-6** shows the seismic zones of Bangladesh. It explains that Nawabganj Upazila of Dhaka district exist in zone II. Understanding the causes and effects of earthquakes is essential for developing strategies to minimize their impact and improve earthquake preparedness and response. Seismologists use various tools and techniques to monitor and study earthquakes, including seismic sensors, GPS, and computer modeling. Earthquakes continue to be a significant threat to communities around the world, highlighting the need for ongoing research and

investment in earthquake mitigation and disaster management. The Bangladesh government has taken steps to increase earthquake preparedness and response, including the development of building codes and the establishment of an earthquake early warning system. However, there is still much work to be done to ensure that Bangladesh is fully prepared for the next major earthquake.

**Table 9-1: Major Earthquakes in Bangladesh**

<b>Year</b>	<b>Description</b>
<b>1548</b>	The first recorded earthquake was a terrible one. Sylhet and Chittagong were violently shaken, the earth opened in many places and threw up water and mud of a sulphureous smell.
<b>1642</b>	More severe damage occurred. Buildings were cracked but there was no loss of life.
<b>1663</b>	Severe earthquake in Assam, which continued for half an hour.
<b>1762</b>	The great earthquake of April 2, which raised the coast of Foul Island by 2.74m and the northwest coast of Chedua island by 6.71m above sea level and also caused a permanent submergence of 155.40 sq km near Chittagong. The earthquake proved very violent in Dhaka and along the eastern bank of the Meghna far as Chittagong. In Dhaka 500 persons lost their lives, the river and jheels were agitated and rose high above their usual levels and when they receded their banks were strewn with dead fish. A large river dried up, a tract of land sank and 200 people with all their cattle were lost. Two volcanoes were said to have opened in the Sitakunda hills. Location: Eastern part of Bangladesh, (22.0 N 92.0 E), Magnitude: 8.5
<b>1775</b>	Severe earthquake in Dhaka around April 10, but no loss of life.
<b>1812</b>	Severe earthquake in many places of Bangladesh around May 11.
<b>1865</b>	Terrible shock was felt, during the second earthquake occurred in the winter of 1865, although no serious damage occurred.
<b>1869</b>	Known as Cachar Earthquake. The steeple of the church was shattered, the walls of the courthouse and the circuit bungalow cracked and in the eastern part of the district the banks of many rivers caved in.
<b>1885</b>	Known as the Bengal Earthquake. Occurred on 14 July with 7.0 magnitude and the epicenter was at Manikganj. This event was generally associated with the deep-seated Jamuna Fault.
<b>1889</b>	Occurred on 10 January with 7.5 magnitudes and the epicenter at Jaintia Hills.
<b>1897</b>	Known as the Great India Earthquake with a magnitude of 8.7 and epicenter at Shillong Plateau. The great earthquake occurred on 12 June at 5.15 pm. This was due to the collapse of the masonry buildings. The tremor was felt throughout Bengal, from the south Lushai Hills on the east to Shahbad on the west. In Mymensingh, many public buildings of the district town, including the Justice House, were wrecked and very few of the two-storied brick-built houses belonging to ZAMINDAR survived. Heavy damage was done to the bridges on the Dhaka-Mymensingh railway and traffic was suspended for about a fortnight. The river communication of the district was seriously affected (BRAHMAPUTRA). Loss of life was not great, but loss of property was estimated at five million Rupees. Rajshahi suffered severe shocks, especially on the eastern side, and 15 persons died. In Dhaka damage to property was heavy. In Tippera masonry buildings and old temples suffered a lot.

Year	Description
1918	Known as the Sreemangal Earthquake. Occurred on 18 July with a magnitude of 7.6. Dhaka only minor effects were observed.
1930	Known as the Dhubri Earthquake. Occurred on 3 July with a magnitude of 7.1 and the epicenter at Dhubri, Assam.
1934	Known as the Bihar-Nepal Earthquake. Occurred on 15 January with a magnitude of 8.3 and the epicenter at Darbhanga of Bihar, India. The earthquake caused great damage in Bihar, Nepal and Uttar Pradesh but did not affect any part of Bangladesh. Another earthquake occurred on 3 July with a magnitude of 7.1 and the epicenter at Dhubri of Assam, India. The earthquake caused considerable damages in greater Rangpur district of Bangladesh.
1950	Known as the Assam Earthquake. Occurred on 15 August with a magnitude of 8.4 with the epicenter in Assam, India. The tremor was felt throughout Bangladesh but no damage was reported.
1997	Occurred on 22 November in Chittagong with a magnitude of 6.0. It caused minor damage around Chittagong town.
1999	Occurred on 22 July at Maheshkhali Island with the epicenter in the same place, a magnitude of 5.2. Severely felt around Maheshkhali island and the adjoining SEA. Houses cracked and, in some cases, collapsed.
2003	Occurred on 27 July at Kolabunia union of Barkal Upazila, Rangamati District with magnitude 5.1. The time was at 05:17:26.8 hours.
2011	The earthquake was felt most strongly in northern Bangladesh. The quake was also felt in Dhaka, Rangpur, Kurigram, Sylhet, Barisal, Faridpur, Jessore, Khulna, Pabna, Bogra, Comilla, Noakhali, and as far as Chittagong. Panicked people rushed out of their homes and offices, but the only damage seemed to be tilted and cracked buildings; no casualties were reported. Cell phone lines were also down for a few minutes during the quake. Location: Kanchenjunga Conservation Area, near the border of Nepal and the Indian state of Sikkim, Date: 18 Sep-2011, Magnitude: Mw=6.9, Duration: 30~40 sec. Depth=19,7 km

Source: Wikipedia; <http://en.banglapedia.org/index.php?title=Earthquake>; Accessed on June 6, 2016

The latest earthquake data was obtained from the BMD website. Bangladesh underwent numerous moderate to low-intensity earthquakes between 2014 and 2023, with most originating within the country. On average, these earthquakes measured about 4.3 on the Richter Scale. In 2023, the strongest earthquake on record occurred, measuring 5.50 in magnitude. Analysis of Bangladesh's seismic zone map, shown in **Error! Reference source not found.** and Figure 9-7, indicates that the majority of earthquakes have taken place in seismic zones I and II. Over the past 10 years, Bangladesh experienced 27 earthquakes, with 6 occurring in 2023 and 5 in 2020.

Table 9-2: Recent Earthquake in Bangladesh (2014-2023)

SL	Time	Location	Magnitude
1	2023-12-02 09:35:33 BST	9 km ENE of Ramganj, Bangladesh	5.5
2	2023-11-02 03:44:36 BST	26 km NW of Teknaf, Bangladesh	4.1
3	2023-09-17 12:49:48 BST	12 km W of Narsingdi, Bangladesh	4.2

SL	Time	Location	Magnitude
4	2023-07-05 03:47:28 BST	112 km ENE of Teknaf, Bangladesh	4.4
5	2023-05-05 05:57:09 BST	8 km WSW of Azimpur, Bangladesh	4.3
6	2023-02-25 16:39:46 BST	29 km NE of Teknaf, Bangladesh	4.2
7	2022-07-31 02:00:00 BST	27 km NE of Shibganj, Bangladesh	4.0
8	2021-08-09 21:48:30 BST	45 km S of Teknaf, Bangladesh	4.2
9	2021-02-25 00:16:46 BST	161 km SW of Teknaf, Bangladesh	4.5
10	2020-10-24 09:21:04 BST	33 km E of Khagrachhari, Bangladesh	4.4
11	2020-08-30 07:47:38 BST	33 km N of Khagrachhari, Bangladesh	4.9
12	2020-06-03 07:40:48 BST	41 km NNW of Baniachang, Bangladesh	4.2
13	2020-02-25 12:16:20 BST	25 km N of Sakhipur, Bangladesh	4.0
14	2020-01-27 13:10:39 BST	10 km SE of Jahedpur, Bangladesh	4.5
15	2019-05-06 20:18:26 BST	193 km SW of Teknaf, Bangladesh	4.9
16	2019-02-26 10:49:57 BST	20 km E of Mirzapur, Bangladesh	3.7
17	2018-01-30 20:15:16 BST	17 km NW of Sirajganj, Bangladesh	4.4
18	2017-07-25 15:09:01 BST	17 km NW of Lamchhari, Bangladesh	4.4
19	2017-04-18 20:01:34 BST	4 km NW of Chhatak, Bangladesh	4.5
20	2016-10-19 13:20:49 BST	33 km NNW of Baniachang, Bangladesh	4.4
21	2016-06-27 06:27:43 BST	24 km NE of Dalu Chhari, Bangladesh	4.7
22	2015-12-22 05:52:28 BST	3 km SE of Gafargaon, Bangladesh	4.0
23	2015-08-29 01:21:58 BST	20 km SW of Chilmari, Bangladesh	4.2
24	2015-04-08 07:43:47 BST	60 km SSW of Sarankhola, Bangladesh	4.6
25	2014-07-23 04:58:29 BST	14 km WNW of Nageswari, Bangladesh	4.2
26	2014-07-23 02:54:41 BST	4 km NNE of Nageswari, Bangladesh	4.3
27	2014-02-14 19:10:45 BST	21 km W of Sirajganj, Bangladesh	4.2

Source: Bangladesh Meteorological Department (BMD)( <https://shorturl.at/hFLY4>)

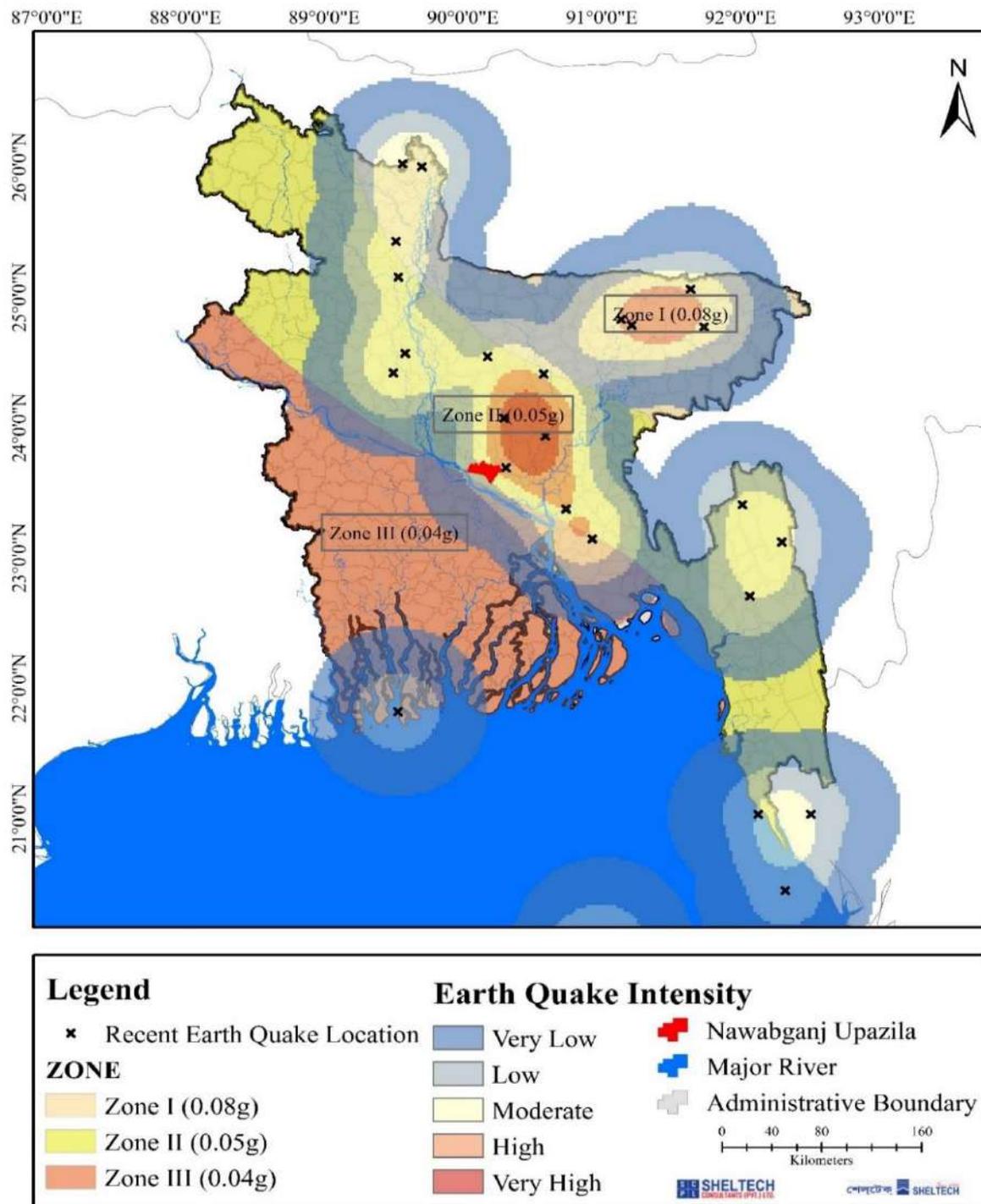


Figure 9-7: Recent Earthquake intensity and its spatial distribution (2014-2023)

**Figure 9-7** shows the earthquake intensity and its spatial distribution. According to the geographical position of Nawabganj upazila, the upazila is situated in seismic zone II, which has been experiencing several land shakings over the last 10 years. According to the earthquake intensity map Nawabganj Upazila lies within a region of high to moderate intensity.

### **9.4.1.3 Arsenic**

Arsenic, a naturally existing element, can be found in soil, water, and the atmosphere, being widely dispersed within the earth's crust. It serves various industrial purposes, including wood preservation, pesticide manufacturing, and semiconductor production. However, exposure to arsenic poses severe health risks, including cancer, skin abnormalities, and neurological impairments. Contamination of drinking water with arsenic presents a significant public health challenge, especially in areas like South and Southeast Asia, where elevated levels of naturally occurring arsenic in groundwater have been detected. In Bangladesh, for instance, millions of individuals are exposed to unsafe levels of arsenic in their drinking water, resulting in a major public health crisis.

There exists no level of arsenic exposure deemed safe, highlighting the crucial need to minimize human contact with this hazardous substance to safeguard health. Diverse tactics have been devised to combat arsenic contamination, encompassing the establishment of safe water supplies and the advancement of arsenic-removal methodologies. Nonetheless, effectively tackling arsenic contamination demands a comprehensive strategy incorporating education, community involvement, and policy reforms.

The arsenic pollution map **Figure 9-8** shows the arsenic-contaminated tube wells in Bangladesh. Nawabganj upazila is located adjacent to Doha upazila in the Dhaka district. According to observations by local residents, they are experiencing issues related to contamination of arsenic, iron, and chloride in their drinking water. With the assistance and cooperation of the Public Health and Engineering Department, these problems are gradually being addressed in Nawabganj upazila.

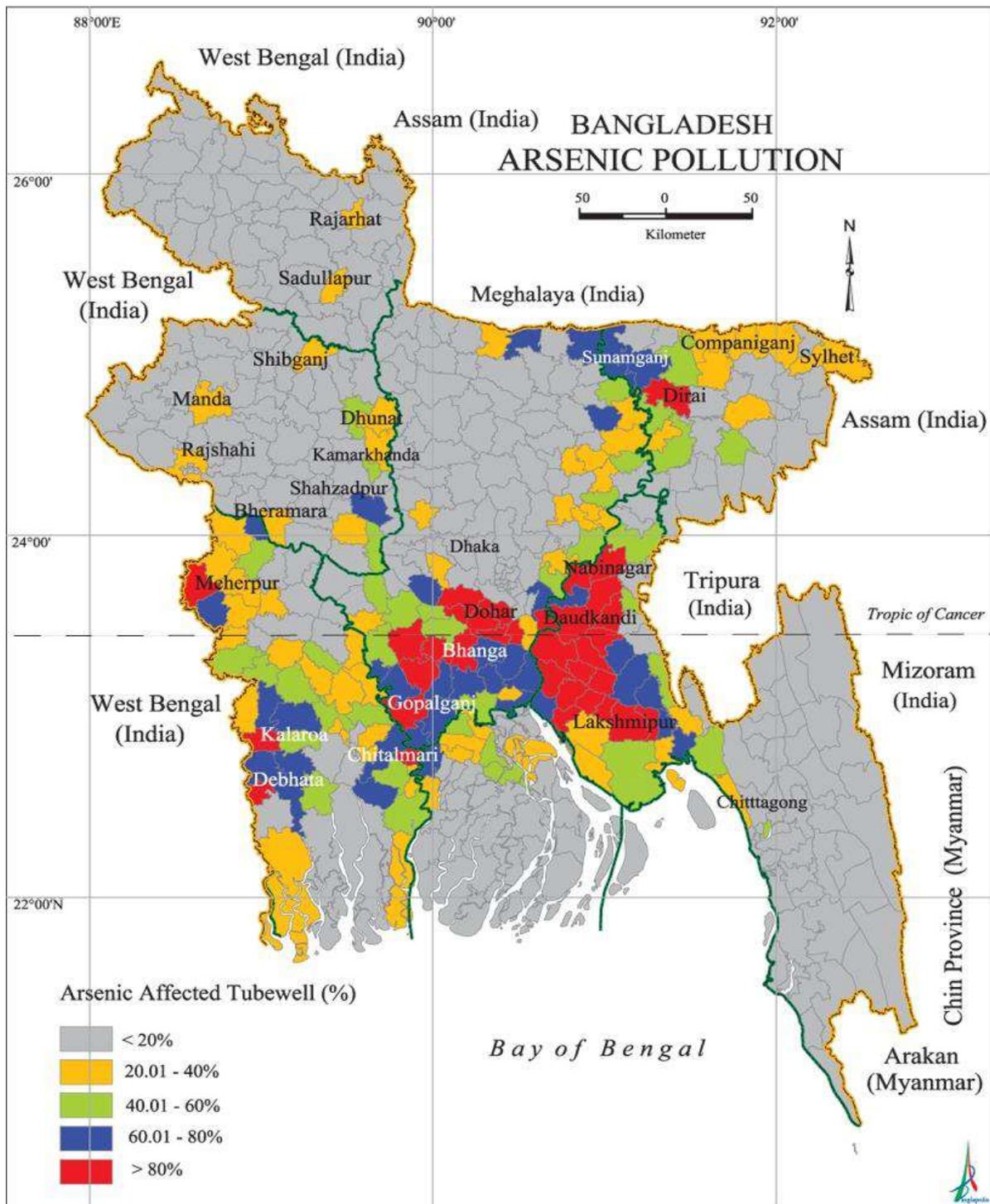


Figure 9-8: Arsenic Pollution map of Bangladesh

#### 9.4.1.4 Cyclone

Nawabganj Upazila, located in the Dhaka district of Bangladesh, has experienced its share of cyclones and associated weather events over the years. However, specific historical records detailing cyclones exclusively in Nawabganj Upazila might be limited. Cyclones are not

uncommon in Bangladesh, especially in coastal and low-lying areas. The country is prone to tropical cyclones originating in the Bay of Bengal, which can cause significant damage to infrastructure, agriculture, and human lives. While Nawabganj Upazila is not directly on the coast, it can still be affected by the aftermath of cyclones, such as heavy rainfall, strong winds, and flooding.

Historically, Bangladesh has faced devastating cyclones, with notable events like the Bhola cyclone of 1970, which is considered one of the deadliest tropical cyclones on record. More recently, Cyclone Sidr in 2007 and Cyclone Aila in 2009 caused widespread destruction and loss of life in various parts of the country, including some inland areas like Nawabganj Upazila. Efforts to mitigate the impact of cyclones in Bangladesh include early warning systems, cyclone shelters, and community preparedness programs. These measures aim to reduce the vulnerability of people living in cyclone-prone areas, including those in Nawabganj Upazila, by providing timely information and safe havens during cyclonic events.

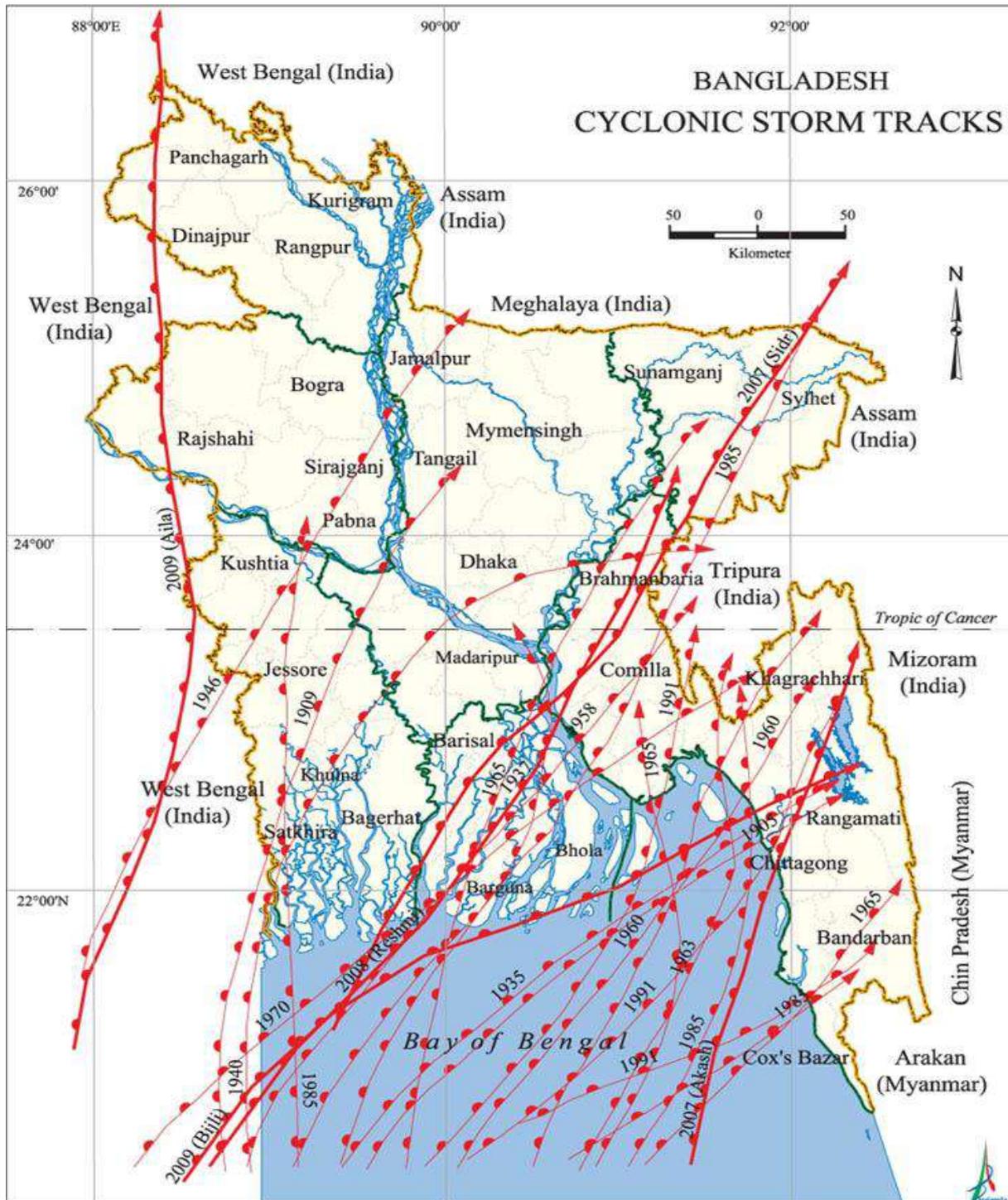


Figure 9-9: Cyclone Track of Bangladesh

#### 9.4.1.5 Flood

Flood-prone areas are locations with an elevated risk of flooding, influenced by factors like precipitation, terrain, drainage patterns, and proximity to water bodies. Understanding these zones is crucial as they can impact safety and pose a threat to properties within those areas.

Community flood maps serve as valuable tools, illustrating the probability and intensity of flooding across various regions. As per the Flood Prone Zone Map for Nawabganj Upazila, the majority of Nawabganj is not notably impacted by floods. **Figure 9-10** delineates the flood-prone zones within a specific region, using various colors to denote the extent of river flooding. Areas in green are susceptible to low river flooding, purple designates moderate river flooding, and red indicates locations with severe river flooding.

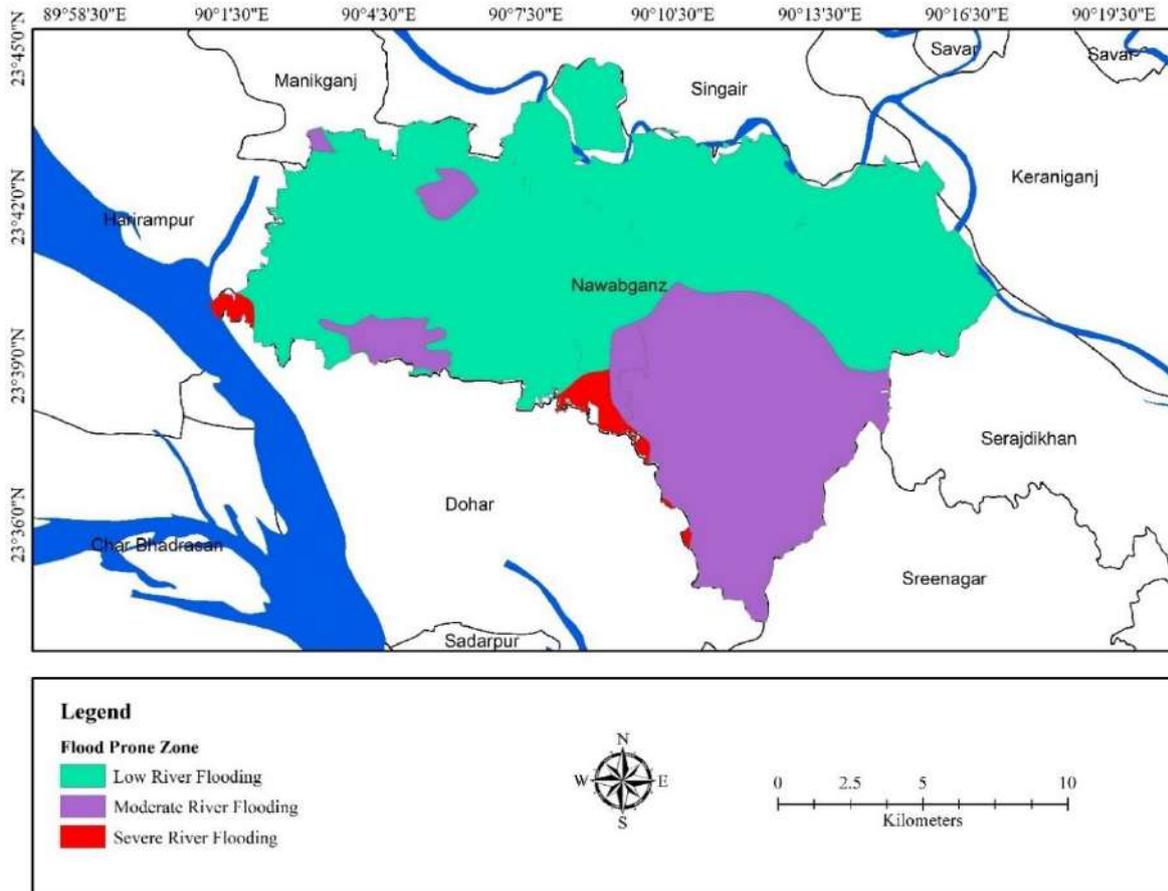
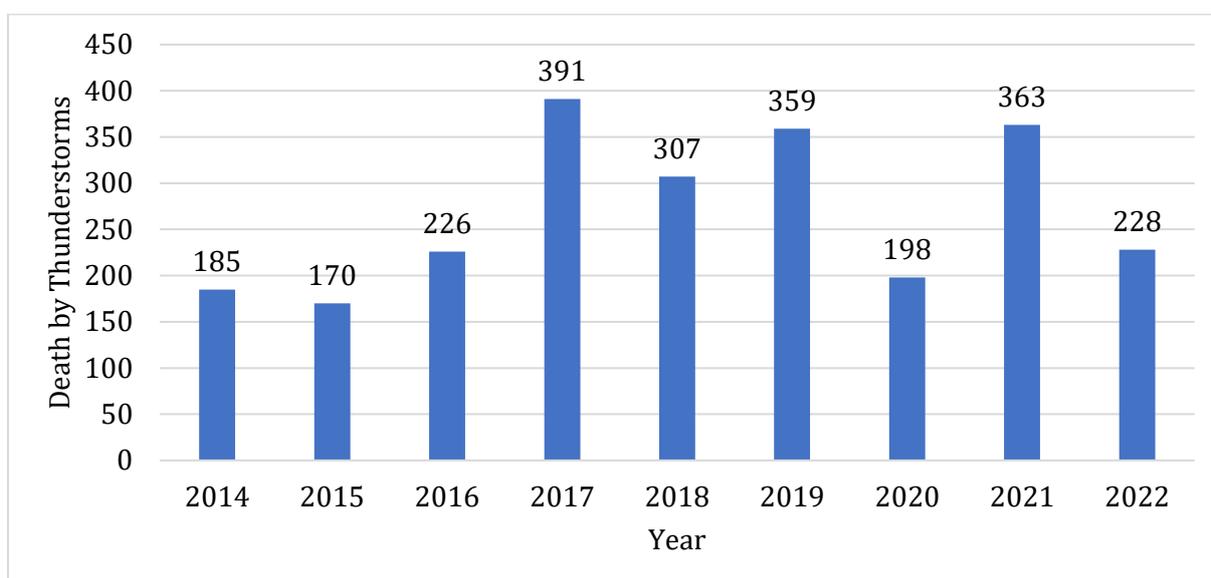


Figure 9-10: Flood Prone Area in Nawabganj Upazila



higher sea surface temperatures, contribute to the increased formation of cumulonimbus clouds, which are responsible for lightning and thunder during these storms. Recent reports highlight the devastating impact of thunderstorms in Bangladesh. For instance, a single day saw 17 fatalities due to lightning strikes in various districts, underscoring the lethal nature of these storms according to the report published by *bdnews24* on 7 June 2021. The Bangladesh Meteorological Department has issued warnings for more thunderstorms, indicating that the conditions are ripe for further severe weather events, which could lead to heavy rains and potentially more casualties.

The death toll from thunderstorms in Bangladesh is alarmingly high, with over 1,400 deaths recorded between 2010 and 2016. The rate of fatalities due to thunderstorms in the country is estimated to be as high as 0.9 per million population per year, which is significant when compared to the global range of 0.2 to 1.7 deaths per million. The increase in temperature and changes in rainfall patterns, partly due to climate change, have led to more frequent and severe thunderstorms (DM Watch, May 2023).



Source: Department of Disaster Management, Bangladesh

Figure 9-12: Frequency of Death by Lighting effect in Bangladesh

Bangladesh has seen a near-record number of deaths this year from a phenomenon that appears to be worsening with climate change: lightning strikes. So far this year, 261 people have died from lightning in the country, putting the South Asian nation on track to beat last year's 265 deaths.

Most lightning deaths usually occur during the warm months of March to July (Financial Express, 2021). The problem has prompted Bangladesh's government to add lightning strikes to the country's list of official types of disasters, which includes floods, cyclones and storm surges, earthquakes, drought and riverbank erosion, among others (NDTV World, 2016). The government of Bangladesh has taken steps to address the risks posed by thunderstorms, including declaring them a natural disaster in 2016 and implementing various measures such as planting palm trees and installing lightning rods. However, the challenge remains substantial, with the need for increased public education, improved meteorological warnings, and more effective lightning protection strategies to mitigate the impact of these deadly storms.

#### 9.4.1.7 Fire Hazard

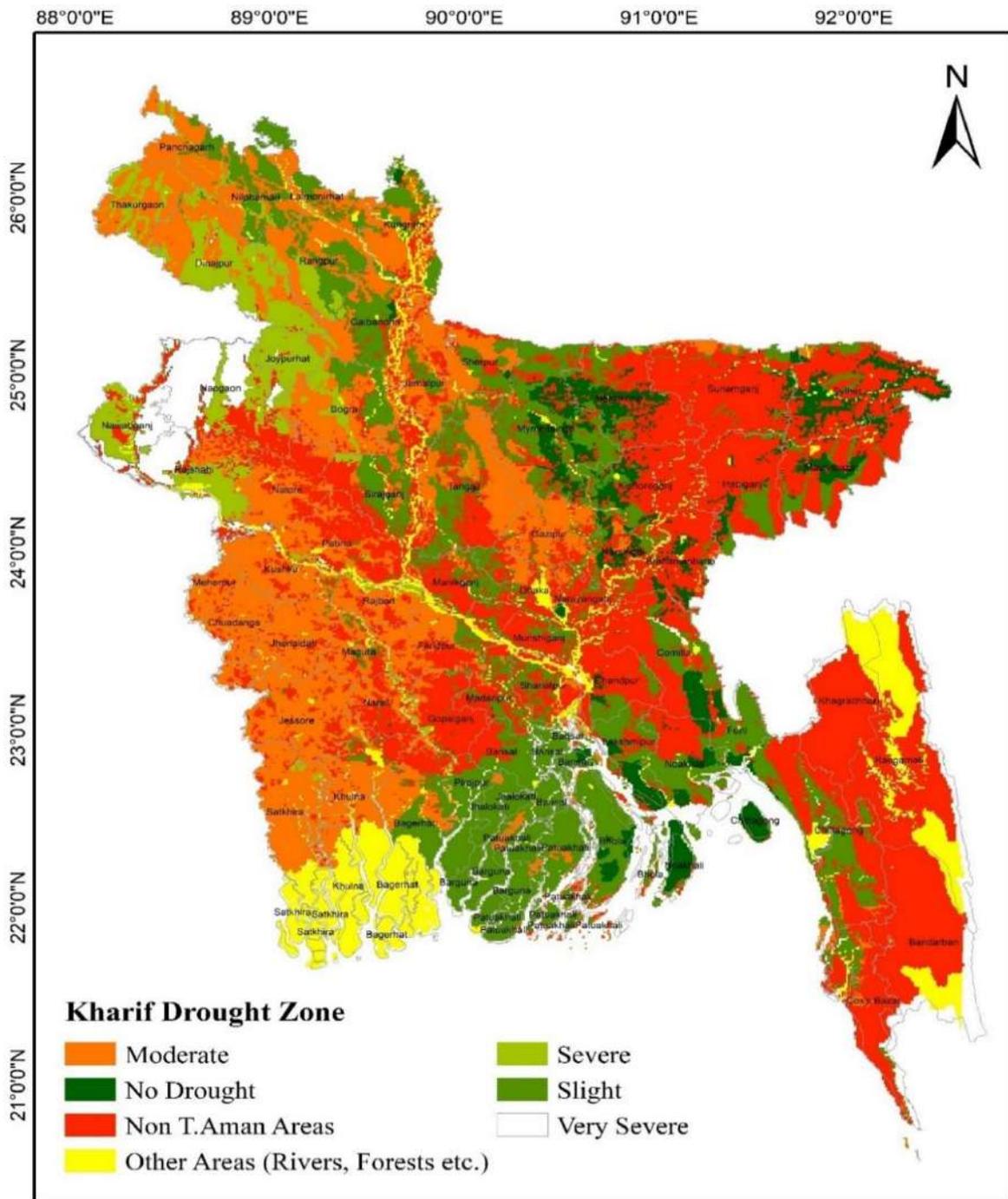
Fire safety in Bangladesh has been a significant concern, with numerous incidents highlighting the inadequacy of safety measures in place. Despite the presence of some indirect fire safety measures in commercial and industrial buildings, the lack of trained personnel to operate manual extinguishing equipment poses risks. The need for direct and automatic extinguishing systems is evident, yet their adoption is hindered by high costs. Moreover, non-compliance and mismanagement exacerbate the situation, with many buildings lacking proper emergency exits, and fire extinguishers often being expired or merely for show. Electrical short circuits are a major cause of fires, and there's a pressing need for better fire service reach and water access for firefighting. The overall scenario calls for stringent compliance, regular inspections, and mandatory fire drills to enhance fire safety standards.

In 2017, a total of 18,105 fires caused a loss of Tk257 crore. The fires injured 269 people and killed 45 others. According to information from the Fire Service and Civil Defense, there were approximately 21,601 fire occurrences in the nation in the year 2021. Additionally, the nation suffered an estimated financial loss of Tk218 crore as a result of these fire occurrences according to the report of "The Business Standard" published in June 2022. In five years, the number of fires increased by 4,117, or 22 percent. In the five years from 2016 to 2021, a total of 3,093 people were killed and 13,863 injured due to fire. According to the fire service, a total of 1,17,060 fires have been reported across the country in the last six years, of which 6,081 were in industries.

#### 9.4.1.8 Drought

Drought is a natural hazard that occurs when there is not enough rainfall or soil moisture for a long period of time, affecting the agriculture, environment, and livelihoods of the people. Bangladesh is a country that is vulnerable to drought, especially in the dry season (November to May). According to a national agricultural drought watch system, the current drought status of Bangladesh is moderate. A recent study has mapped the agricultural drought in Bangladesh using

geographic information system (GIS) and remote sensing techniques and found that the most drought-prone areas are in the north-western and south-western regions of the country.



Data Source: BARC

Figure 9-13: Kharif Drought Map of Bangladesh

#### **9.4.1.9 Water Logging**

Waterlogging occurs when excess water remains in any low-lying area for considerable period. Waterlogging in urban areas is menace and causes disruption in normal life. In rural areas waterlogging in crop fields disrupts crop production.

The remedy for waterlogging lies in proper drainage system which is mostly absent in urban areas of the country and Nawabganj is no exception.

#### **9.4.1.10 Wetland loss**

A region of land that is saturated or completely submerged in water is called a wetland. Wetlands are places where water either covers the soil or is present at or near the soil's surface year-round or for different parts of the year, including the growing season. Wetlands are ecologically varied and extremely productive ecosystems that sustain stream flows, improve water quality, manage erosion, store carbon, and serve as a habitat for at least one-third of all threatened and endangered species.

Wetlands filter sediment and absorb a variety of pollutants from surface waters, acting as natural water purifiers. This purifying action also improves groundwater supplies' quality in certain wetland settings. Along rivers and streams, wetlands absorb energy and retain water during storms, lowering the risk of flash floods and minimizing downstream flood damage. During dry spells, the gradual release of this stored water can help maintain stream flow.

Numerous species of amphibians, reptiles, birds, and mammals with special adaptations to aquatic conditions find home in wetlands. Wetlands are a common source of food and shelter for upland animals including deer, elk, and bears. Particularly important to many migratory bird species are wetlands. Certain kinds of wetlands are some of the planet's most productive ecosystems. With the exception of farmed sugar cane, no other agricultural crop can yield more plant material or store more energy per acre than a stand of cordgrass in a salt marsh. Plants, fish, and wildlife in estuaries and other downstream habitats depend on nutrients and plant debris flushed from some wetland systems during storms. Wetland loss occurs mostly in the wake urbanization when the land value starts rising with the urban invasion. Land owners, to gain from excess land values fills up the wetland and make the usable for urban activities.

But for Nawabganj the total wetland has rather increased as data on the whole upazila shows. This increase has been in the rural part of the upazila. Details presented below.

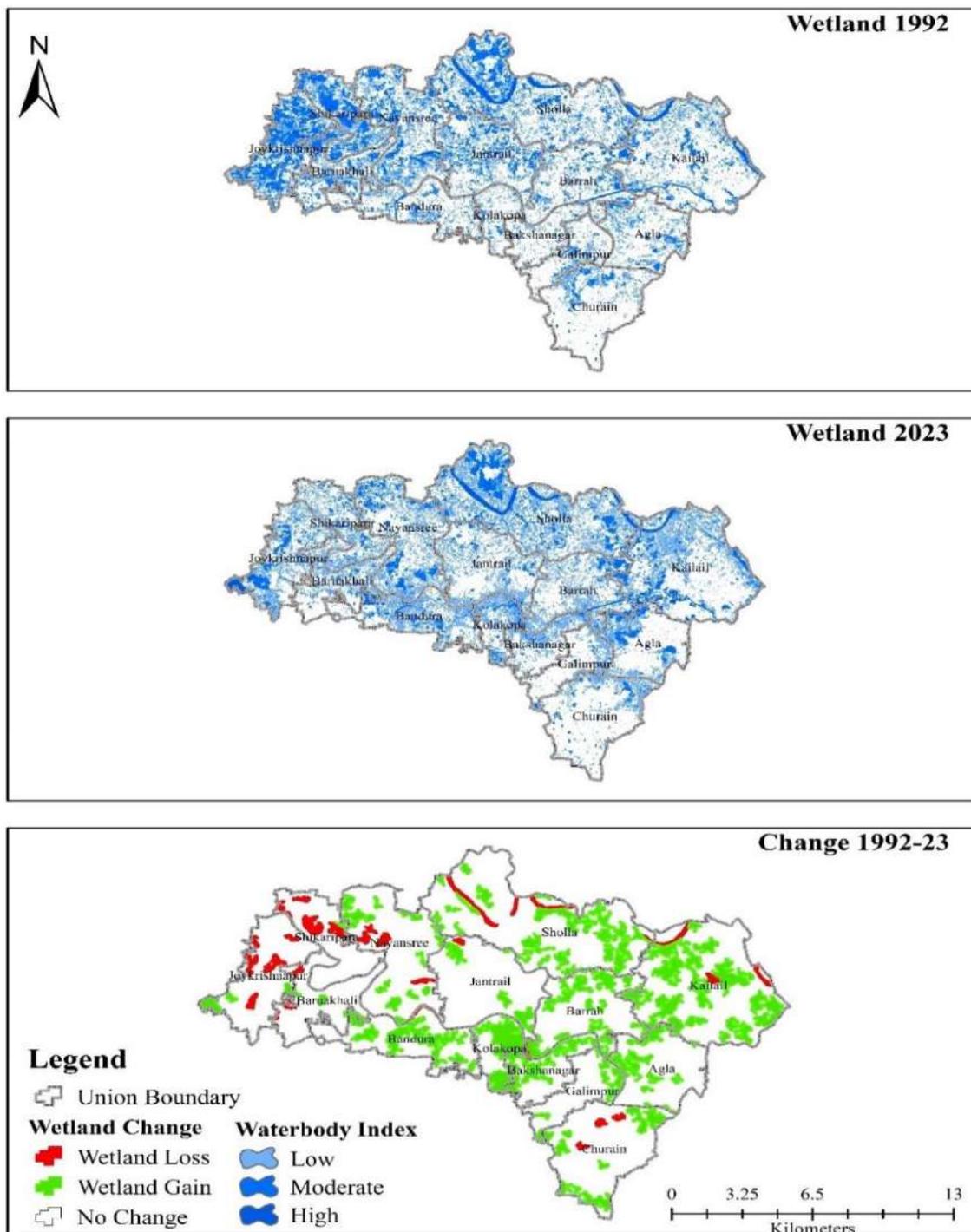


Figure 9-14: Wetland Change Scenario of Nawabganj Upazila from 1992-2023

The wetland change detection analysis was conducted by computing the NDWI (Normalized Difference Water Index) for the years 1992 and 2023. The NDWI algorithm makes use of the green and near-infrared (NIR) bands of Landsat imagery. The photos from Landsat 5 (TM) for the year 1992 and Landsat 8 (OLI) for the year 2023 were obtained from the USGS (United States Geological Survey). Both images were collected in the month of March to minimize the impact of seasonal variations.

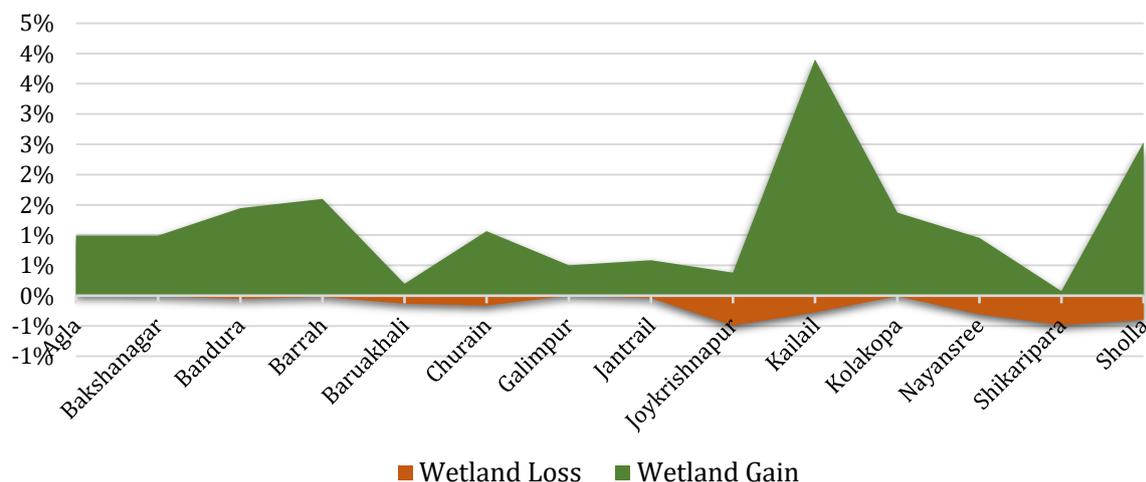


Figure 9-15: Graphical representation of wetland loss and gain in difference union of Nawabganj from 1992 to 2023

Table 9-3: Wetland loss and gain Scenario 1992 to 2023

Union Name	Wetland Loss		Wetland Gain		Unchanged	
	Area (SqKM)	%	Area (SqKM)	%	Area (Sq KM)	%
Agla	0.00	0.00%	2.45	0.99%	12.50	5.06%
Bakshanagar	0.03	0.01%	2.45	0.99%	6.06	2.45%
Bandura	0.14	0.05%	3.57	1.44%	11.00	4.45%
Barrah	0.06	0.02%	3.95	1.60%	13.17	5.33%
Baruakhali	0.32	0.13%	0.48	0.20%	11.10	4.50%
Churain	0.40	0.16%	2.64	1.07%	18.16	7.36%
Galimpur	0.00	0.00%	1.24	0.50%	7.95	3.22%
Jantrail	0.10	0.04%	1.45	0.59%	17.96	7.28%
Jaykrishnapur	1.22	0.49%	0.94	0.38%	14.06	5.69%
Kailail	0.67	0.27%	9.64	3.90%	24.52	9.93%
Kolakopa	0.02	0.01%	3.38	1.37%	3.20	1.30%
Nayansree	0.76	0.31%	2.36	0.96%	19.05	7.72%
Shikaripara	1.20	0.49%	0.19	0.08%	10.03	4.06%
Sholla	0.99	0.40%	6.24	2.53%	31.22	12.65%
<b>Total</b>	<b>5.91</b>	<b>2.39%</b>	<b>40.96</b>	<b>16.60%</b>	<b>199.97</b>	<b>81.01 %</b>

For the last thirty years, the wetland in Nawabganj Upazila has been consistently expanding. Over this specific timeframe, the wetland has undergone a growth of 16.16%, which is approximately equal to an expansion of nearly 41 square kilometers. The union areas of Kailail, Sholla, Barrah,

Bandura, and Kolakopa in Nawabganj Upazila play a prominent role in the spread of wetlands in the region. The Jaykrishnapur, Shikaripara, and Nayansree union have the most significant decline in wetland area.

#### 9.4.1.11 Road Accident

The Jatri Kalyan Samity reported that in 2022, a total of 10,858 fatalities and 12,875 injuries occurred due to 7,617 incidents involving road, rail, and waterway transportation across Bangladesh. Notably, road accidents were responsible for 9,951 deaths and 12,356 injuries out of 6,749 incidents, marking the highest toll in the past eight years. The year saw a 27.43% increase in road crash fatalities compared to 2021. Additionally, the report detailed 606 railway accidents resulting in 550 deaths and 201 injuries, and 262 waterway accidents causing 357 deaths, 318 injuries, and 743 people missing. The majority of accidents, 52.02%, occurred on regional highways, followed by 27.70% on national highways and 11.88% on feeder roads. In urban areas, 5.67% of accidents took place in the capital, 1.71% in Chittagong city, and 0.99% at rail crossings. The report attributed the high incidence of road crashes to factors such as reckless driving, poor road conditions, vehicle unfitness, driver inexperience, distracted driving, and a general lack of safety awareness among road users (dhakatribune.com).

The report noted a significant increase, ranging from fourfold to fivefold, in vehicle registrations over the past nine years, with a notable rise in motorcycles and easy bikes, which has been a factor in the growing number of road accidents. The unrestricted movement of motorcycles and three-wheelers on highways, despite governmental restrictions, was identified as a cause of accidents and casualties. Analyzing the types of vehicles involved in road crashes, the data showed that buses were involved in 16.15% of accidents, trucks, and vans in 24.84%, cars and minibuses in 5.91%, CNG-run auto-rickshaws in 5.39%, battery-operated rickshaws and easy bikes in 14.47%, and other vehicles like Nasimon, Karimon, Mahindra, tractors, and additional CNG-run auto-rickshaws accounted for 7.19% of the total (The Dairy Star).



Figure 9-16: Road Accident Scenario in Bangladesh (Source: The Daily Star)

#### **9.4.1.12 Civil Disorder**

Civil disorder refers to any instance where a group of three or more people engage in violent acts that pose a direct threat to or actually result in harm to others' property or person. It's important to distinguish this from civil disobedience, which involves non-violent protest against laws for ethical reasons. Under federal law, civil disorder constitutes a specific offense characterized by violent activities, unlike civil disobedience. The legal framework surrounding civil disorder outlines three main areas where offenses can occur, including instructing or demonstrating the use of weapons or destructive devices for riotous purposes, transporting, or creating such devices with the intent of using them in a disturbance, and any efforts to hinder, delay, or interfere with emergency or law enforcement personnel during a civil disorder situation.

Civil disorder in Bangladesh has taken various forms, from religious violence and land disputes to political unrest. The country witnessed protests against religious violence when Hindu temples were attacked, which led to some deaths and destruction of property. The incidents highlighted the need for communal harmony. Indigenous communities, making up a significant portion of the population, have faced attacks and land grabs, aggravating tensions with Bengali settlers and leading to violence and displacement. Political tensions have also escalated, with the police using excessive force against protesters and arresting hundreds of opposition party members, raising concerns about the democratic process and human rights in the country.

No incident of civil disorder has been reported in Nawabganj during recent anti-government protests all over the country.

#### **9.4.1.13 Terrorism**

The decline in terrorism in Bangladesh is notable, with authorities actively targeting militant groups like Jamaat-ul-Mujahideen (JMB), its offshoot Neo-JMB, and those affiliated with al-Qa'ida and ISIS. Despite reduced incidents, threats persist, including a high-profile prison break and operations against an al-Qa'ida inspired group in 2022. The government maintains a zero-tolerance policy towards terrorism, but there are concerns about human rights violations in the process. Extremism remains a challenge, with continued recruitment and small-scale attacks by Islamist groups. This issue is deeply rooted in Bangladesh's historical, political, and regional context, requiring efforts beyond security measures, such as promoting tolerance and engaging in interreligious dialogue. The terrorism landscape has evolved, with technology playing a significant role in recruitment and radicalization. Law enforcement is adapting with strategic plans to counter online terrorism, emphasizing the need for a broad approach that includes societal engagement and addressing radicalization's root causes to effectively mitigate the terrorism threat.

No incident of terrorism ever occurred in Nawabganj so far.

#### **9.4.1.14 Cyber Crime/Cyber Attacks**

In recent times, the significance of cyber security has grown, leading numerous nations to formulate their own national approaches to counteract cyberattacks. Despite this, information security and cyber security are frequently conflated. Cybersecurity includes not just information protection but also personal and societal protection.

The International Telecommunication Union (ITU) defines cyber security as a collection of instruments, guidelines, and procedures intended to safeguard people, businesses, and the cyber environment. Cyber assets encompass individuals, telecommunications systems, infrastructure, applications, services, and all data that is stored or transmitted, as well as connected computing devices. It continues by making the case that since cyber security safeguards people as well as society, it is a more comprehensive idea than information security. Cyberattacks have the potential to directly impact human safety by downing vital infrastructure, such transportation or electricity networks. Cyberattacks have the potential to seriously affect society by harming economies and reputations. Over the past ten years, there has been a notable increase in the global population of internet users. Unlike developed countries alone, this problem impacts all countries, developed and developing.

Every nation that uses technology extensively faces both advantages and disadvantages. Internet users have brought about a fundamental change in the way civilizations interact with information, technology, and one other. It represents a world that is becoming more integrated and dependent on digital platforms. One can converse, learn, work, and have fun on the internet, which has grown to be an essential tool for individuals, groups, and nations alike. International relations, trade, education, and social dynamics are all significantly impacted by this pervasive tendency. In order to successfully navigate the challenges of the digital era, stakeholders, politicians, and scholars must understand the mechanisms underlying the rise in internet usage.

#### **9.4.1.15 Technological Disaster**

Disasters related to technology or technology can be triggered by abrupt, powerful occurrences brought on by human activity. They stem from unsafe practices, malfunctioning infrastructure, technological or industrial settings, or particular human actions (UNGA, 2016). Technical systems have numerous interdependent components and are intricate. A single component failure in this system has the potential to trigger a chain reaction that could result in multiple failures and ultimately a catastrophe. The breadth of technological advancement is leading to an increase in technical risks. These comprise hazardous industrial processes and circumstances, all land, sea, and air transportation systems, offensive and defensive weaponry systems, and power plants.

Ching and Yee define a smartphone addict as someone whose excessive or uncontrolled preoccupations with smartphone use lead to neglect of other life areas. Alhazmi Alzahrani describes smartphone addiction as the overuse of smartphones to the extent that it disrupts daily life. While smartphones enhance our lives and are essential for daily tasks, their excessive use can result in 'smartphone addiction' (SA), a growing public health issue globally, particularly among youth. Studies on SA's impact on young adults are limited, especially in developing countries like Bangladesh, where a survey in 2023 found that 61.4% of young adults were addicted to smartphones.

## **9.5 Disaster Management**

Disaster Management involves organizing and managing resources and responsibilities to deal with all aspects of emergencies, particularly preparedness, response, and recovery, with the aim of lessening the impact of disasters. Effective disaster management relies on thorough integration of emergency plans at all levels of government and non-government involvement, including community participation.

❖ **Risk Reduction Fund**

Establish a national disaster risk reduction fund to support disaster preparedness and response efforts. The fund could be financed through a combination of government contributions, private sector donations, and international aid.

❖ **Comprehensive Risk Reduction Strategy**

Develop a comprehensive disaster risk reduction strategy that incorporates risk assessment, early warning systems, disaster preparedness measures, and post-disaster recovery and reconstruction.

❖ **Building Codes and Zoning Regulations**

Strengthen building codes and zoning regulations to ensure that new construction is built to withstand natural hazards such as earthquakes, floods, and cyclones. Retrofitting of existing structures may also be necessary.

❖ **Improve the capacity**

Improve the capacity of local government and communities to respond to disasters. This could involve training for emergency responders, establishing community-based disaster management committees, and providing resources for disaster preparedness.

❖ **Early Warning Systems**

Increase investment in early warning systems, including meteorological and hydrological monitoring, as well as warning dissemination mechanisms, such as public address systems and community-based alert systems.

## 9.6 Review of Relevant Rules and Regulations

Existing Rules and Regulation, Higher Level Plans		Relevant matters
<b>Sustainable Development Goals (SDGs)</b>	<b>Goal-13</b>	Strengthening resilience and adaptive capacity to climate-related disasters the climate Incorporating change measures into policies and plans the climate Building knowledge and capacity to cope with change the climate Above the changes UN framework Implementation of the Convention Develop procedures for capacity building in planning and management
<b>Bangladesh Delta Plan-2100</b>	<b>Delta</b>	the flood and ensuring security from climate change-related disasters of water increase safety and cost-effective water use; durable and ensuring integrated river management and estuarine management swamp and conservation of ecosystems and promotion of their beneficial use

	<p>of the country and building effective and equitable institutions in indigenous water resources management; Land and achieving maximum and integrated use of water resources.</p>
<b>The eighth Five Year Plan (2020-2025)</b>	<p>Adopting a sustainable development approach that is resilient to disasters and climate change that will ensure sustainable use of natural resources and successfully manage inevitable urbanization the city Three steps in management restructuring: (1) strengthening public-private partnerships to improve service quality; (2) capacity building of public institutions involved in urban service delivery; (3) Development of accountable urban government system with economic decentralization urgent Investment in civic amenities such as water supply, drainage, sewage, and waste management the poor Government subsidies on affordable housing for communities Institutional restructuring to develop strong local government institutions</p>
<b>Dhaka Strategic Plan (2016-2035)</b>	<p>Disaster and achieving fire resistance capability Compact development Building strong economic infrastructure and planned industrial zones Conservation of river channels, canal banks and wetlands</p>
<b>National Disaster Management Plan, 2010-2015</b>	<p>Roles and Responsibilities of Related Organizations in Emergency Operations and Risk Reduction - Disaster Management Regulatory Framework Provides a long-term strategic goal in disaster management One for disaster management planning by various organizations Also provides directions Management planning at various ministry and administrative levels, such as publication of District Disaster Management Plan, Upazila Disaster Management Plan, Union Disaster Management Plan and Municipality/City Corporation Disaster Management Plan Recommends inclusion of disaster component in various plans and development projects of various ministries NGO lays down civil society and the private sector their responsibilities and means for disaster management strategic goals and government implementation. Pre-disaster policy and post--disaster mitigation design</p>
<b>Bangladesh Water Act, 2013</b>	<p>No structure shall be constructed which interferes with the natural course of any creek or river without prior permission. Prioritization of water use in areas where water resources are in crisis is a significant step (water use only for consumption and domestic purposes will be considered a fundamental right).</p>

	<p>From the point of view of protection and conservation of water resources, surface Timely decisions for irrigation and water needs of urban areas should be made according to the law based on the availability of water, groundwater and rainwater.</p> <p>Prior permission shall be pending for river dredging to maintain navigability, land reclamation projects by filling wetlands, flood control and structures to prevent river erosion.</p> <p>Public hearings are a very good provision for proposed national water management plans.</p>
<b>the environment Conservation (Amendment) Act, 2010</b>	<p>Environmentally sensitive areas (Ecologically Critical Area) determination</p> <p>Regarding conducting activities in environmentally sensitive areas</p>
<b>National Urban Sector Policy, 2011 (Draft)</b>	<p>Integrating green infrastructure into communities</p> <p>Conservation of land resources in ecologically sensitive areas</p> <p>Conservation of open space in water drainage, future use, green belt and recreational facilities</p> <p>Wetland and floodplain management through land use control</p> <p>Circular waterways within the city as an alternative to the existing road system</p> <p>Cost of waste management Recycling medium in reduction</p> <p>Community Providing basic citizen benefits in the community Promotion of cooperatives and business, regional exchange system, informal credit system, community based environmental management</p>
<b>Coastal Zone Policy, 2005</b>	<p>A combination of all sectoral policies (land use, industry, fisheries etc.).</p> <p>Coastal Development and Jurisdiction of Coastal Zones</p> <p>Identify key stakeholders in coastal development and determine their role in the development process</p> <p>Supporting Development in Coastal Zones Amidst the Adverse Impacts of Climate Change</p>
<b>The climate Change Strategies and Action Plans, 2009</b>	<p>Low-income people and ensuring all basic amenities (food security, safe shelter, jobs, health) while protecting the most vulnerable in society, including women and children, from the effects of climate change</p> <p>Already Successful disaster management strategies must be used for increasingly frequent and deadly natural disasters.</p> <p>Existing structures (i.e., seawalls and river embankments) must be preserved and ensured to be functional</p> <p>Determining the proper location of critical infrastructure (cyclone shelters and drainage systems) to address climate change impacts.</p> <p>Determining future scenarios and timing of climate change impacts</p>

	<p>on economic and socio-economic sectors, guiding future investment strategies</p> <p>Bangladesh's engagement with global ongoing scientific thinking and ensuring best practice climate change management</p>
<b>National Waste Management Strategy, 2010</b>	<p>open pile, to completely eliminate waste discharge into rivers and floodplains</p> <p>Promote recycling through source segregation and create markets for recycled products</p> <p>To encourage recycling of waste</p> <p>Emphasis on waste avoidance/reduction through waste recycling and environmentally sound disposal of all types</p> <p>Using environment friendly raw materials</p> <p>Using hazardous waste materials to the minimum possible level</p>
<b>My Village is my town</b>	<p>Modern Provision of all amenities of the city (improved roads, communication, clean water, modern health care and treatment, quality education, improved sewage and waste management, increased electricity and fuel supply, computer and high-speed internet facilities, expansion of the market for quality consumer goods including electrical appliances).</p> <p>in the village Encouraging and supporting the installation of biogas plants and solar panels on group basis to increase and increase reliability of power and energy supply.</p> <p>the village Expanding rural mechanization services including machinery repair by setting up agricultural machinery service centers, workshops and training rural youth and agricultural entrepreneurs to provide productive employment.</p> <p>non-agricultural in addition to these services of the sector, providing necessary assistance including credit facilities to marginal and small entrepreneurs of the private sector to manufacture and market light machinery.</p>
<b>Land Use Policy, 2001</b>	<p>Land zoning for coastal areas of Bangladesh</p> <p>Optimum use of land and water resources based on effectiveness of land use planning</p> <p>Reservation of special land</p>
<b>Building Construction Rules, 1996</b>	<p>Construction of building height, parking management, light and air circulation system, roof, sunshade, emergency exit etc. and other emergency management.</p> <p>Land use policy for construction of buildings</p>

## CHAPTER TEN: ENVIRONMENT

### 10.1 Background

A physical feature study and a questionnaire survey were conducted to determine the current state of environmental issues in Nawabganj Upazila. In addition, data on Natural and build environment including air, water, soil has been gathered and presented. Other relevant information about environmental management has also been gathered and presented in the form of maps, tables, images, and other visual aids. The main objectives of conducting environmental management survey are:

- To find out the existing and potential environmental related problems that might affect the urban and rural area
- To establish a database for preparing environmental management plan for Nawabganj Upazila

### 10.2 Methodology

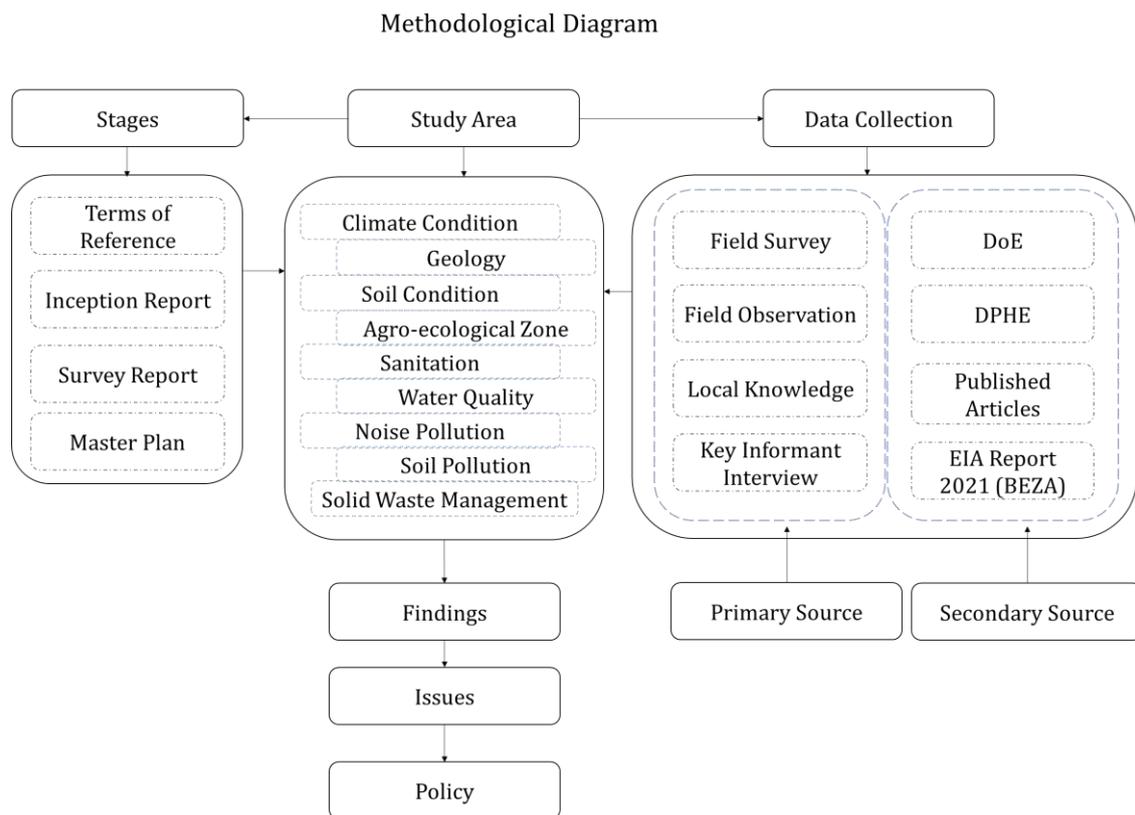


Figure 10-1: Methodology Flow Chart

This study has extensively examined a variety of documents and reports to assess the current environmental conditions and their components in Nawabganj Upazila. These documents, including significant ones such as those from the Bangladesh Meteorological Department, Department of Public Health, and Engineering (DPHE), Department of Environment (DoE), and

the 2021 EIA Report on Comprehensive Environmental & Social Impact Assessment (ESIA) for establishing the Nawabganj Economic Zone by BEZA, were utilized as secondary sources of information. Following the project's terms of reference, the study also integrates a field survey, collects information from local residents, and conducts interviews with key personnel, including officials in Nawabganj Upazila.

## 10.3 Review of Existing Environmental Condition

The environment is the surroundings or state in which abiotic, biotic, and anthropogenic components interact with one another. It comprises both the physical and natural surroundings that collectively provide the context in which life takes place. The environment consists of elements such as air, water, soil, climate, flora, and fauna, and their interactions. The abiotic component includes the atmosphere, hydrosphere, lithosphere, climate, and solar energy, among other things. The built environment serves as an example of anthropogenic environmental components.

### 10.3.1 Climate Condition

The long-term patterns of temperature, humidity, wind, precipitation, and other atmospheric characteristics in a certain location are referred to as the climate. Changes or disruptions to these characteristics have a substantial impact on different parts of the natural environment, including ecosystems, biodiversity, and human societies. (Abbass, Qasim, Song, Murshed, & Mahmood, 2022)

Indeed, Due to its geographical location, Bangladesh is considered one of the most at-risk countries when it comes to climate change. The nation faces annual challenges such as tropical cyclones, storm surges, coastal erosion, and the backwater effect due to the extreme climatic conditions prevalent in the region. Factors contributing to this vulnerability include the low-lying topography, frequent tropical cyclones with associated heavy rainfall, and the extensive coastline susceptible to erosion and rising sea levels (Ali, 1999). The interplay of these factors poses significant threats to the population, agriculture, and infrastructure of Bangladesh, necessitating a combination of adaptation and mitigation measures, such as early warning systems, sustainable land-use practices, and international collaboration to address the impacts of climate change and enhance resilience in the face of environmental challenges.

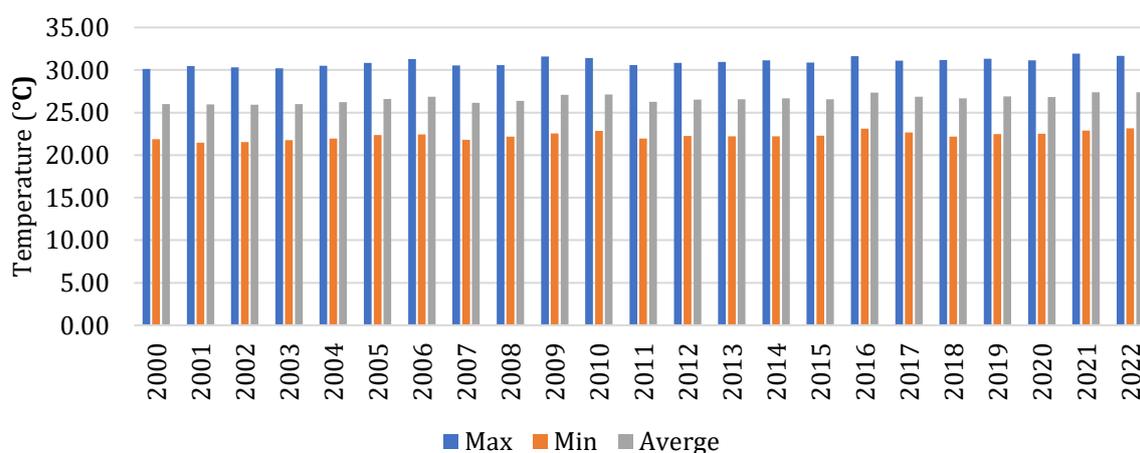
**Temperature:** As there is only one weather station in Nawabganj Upazila, which is located in Dhaka, the data will be the same for all places in Nawabganj Upazila. The data shows that the average maximum temperature in the study area was recorded as 31°C in July 2022, and the average minimum temperature was 20.25°C in January 2022 which is presented in **Error! Reference source not found.**

Table 10-1: Existing Climatic Condition in Nawabganj Upazila (Temperature-2022)

Month	Maximum (°C)	Minimum (°C)	Average (°C)
Jan	25.15	15.34	20.25
Feb	27.15	16.08	21.62
Mar	33.92	23.03	28.48
Apr	34.10	25.98	30.04
May	33.50	25.44	29.47

Month	Maximum (°C)	Minimum (°C)	Average (°C)
Jun	33.37	27.05	30.21
Jul	34.27	27.73	31.00
Aug	34.21	27.36	30.79
Sep	33.21	26.68	29.95
Oct	32.72	24.91	28.82
Nov	31.04	20.77	25.91
Dec	27.41	17.24	22.33

Source: Bangladesh Agricultural Research Council (BARC)



(Source: Bangladesh Agricultural Research Council (BARC))

Figure 10-2: Trend of Temperature over the last 20 years

According to temperature patterns documented over a 20-year period, it is clear that the average temperature in the research area is gradually rising (Figure 10-2). The average temperature in 2000 was 26°C, and by 2022, it had risen to 27.40°C. During this two-decade period, the average temperature increased by 1.40°C, showing a yearly increase of 0.07°C in the studied region.

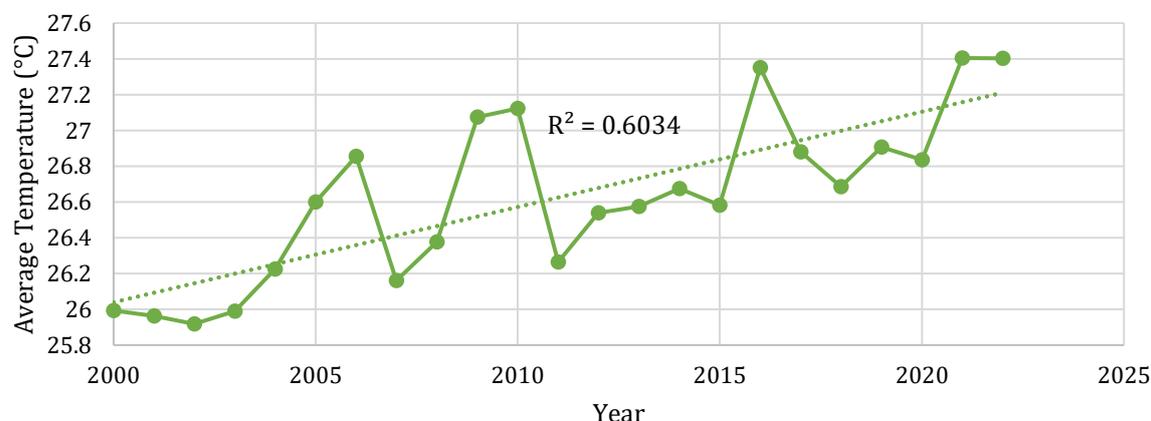
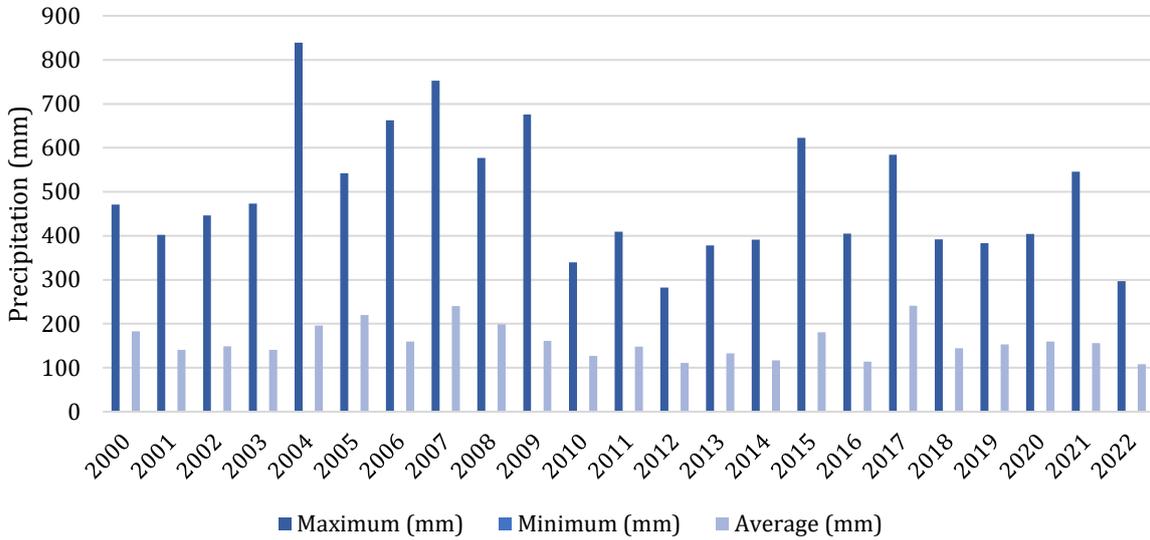


Figure 10-3: Average annual temperature trend at the study area from 2000 to 2022

**Precipitation:** With only one weather station situated in Nawabganj Upazila, specifically in Dhaka, the recorded data remains uniform across all locations in Nawabganj Upazila. The figures indicate that the average maximum rainfall in the study area reached 241.00 mm in 2017, while the average minimum rainfall stood at 108.42 mm in 2022, as illustrated in Figure 10-4.



(Source: Bangladesh Agricultural Research Council (BARC))

Figure 10-4: Trend of Precipitation over the last 20 years

The average annual precipitation in the study area reveals a decreasing trend during the 2000 to 2022 period, as illustrated in Figure 10-. In 2000, the average precipitation measured 182.75 mm, and by 2022, it had dropped to 108.2 mm. Over this two-decade timeframe, the average precipitation witnessed a decline of 74.55 mm, indicating an annual reduction of 3.72 mm in the study region.

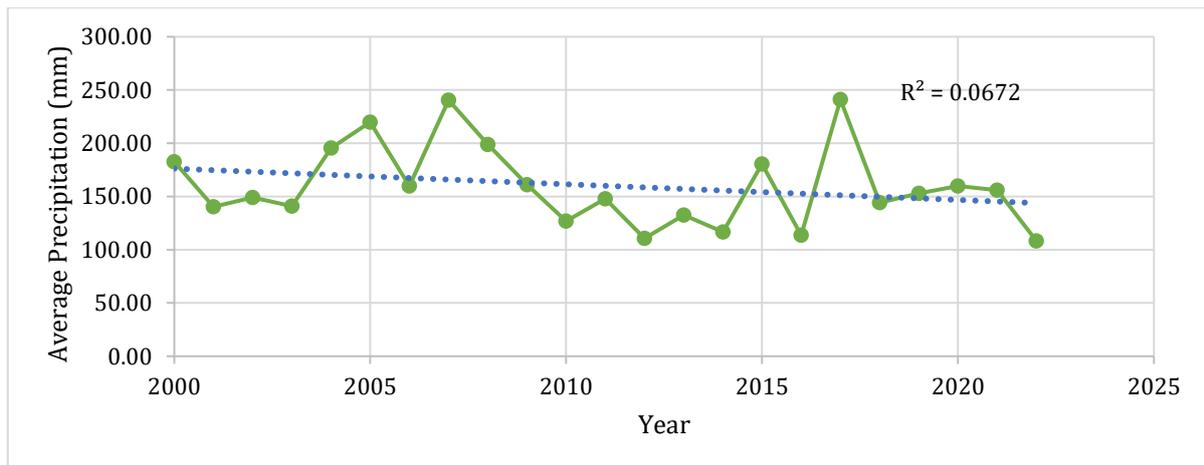
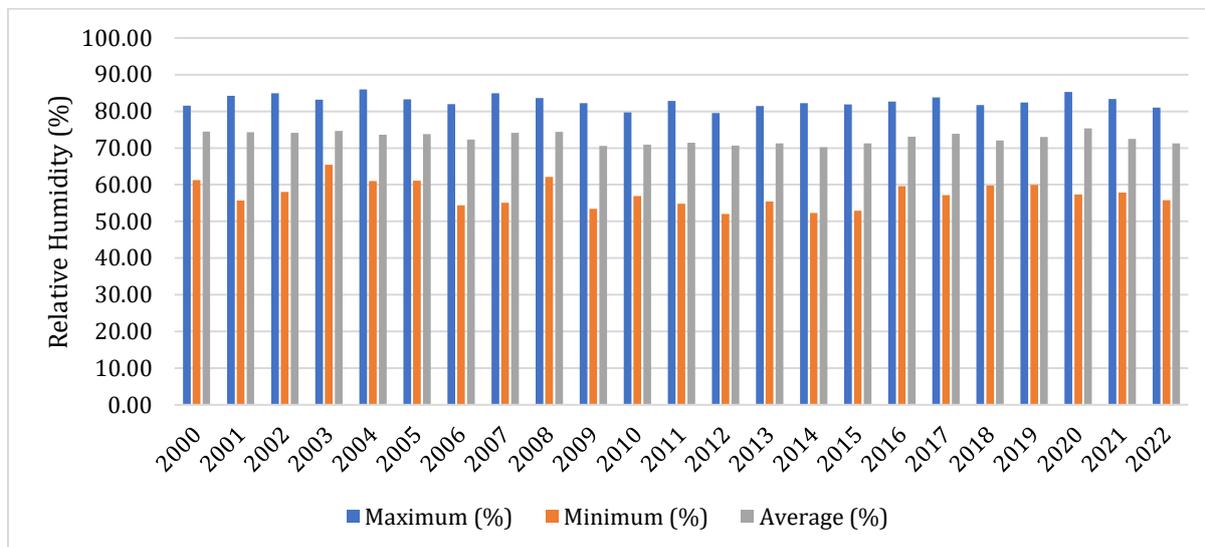


Figure 10-5: Average annual Precipitation trend at the study area from 2000 to 2022

**Humidity:** The average annual humidity in the study area reveals a decreasing trend during the 2000 to 2022 period, as illustrated in Figure 10-. In 2000, the average humidity measured

74.45%, and by 2022, it had dropped to 71.24%. Over this two-decade timeframe, the average humidity witnessed a decline of 3.21%.



(Source: Bangladesh Agricultural Research Council (BARC))

Figure 10-6: Trend of Humidity over the last 20 years

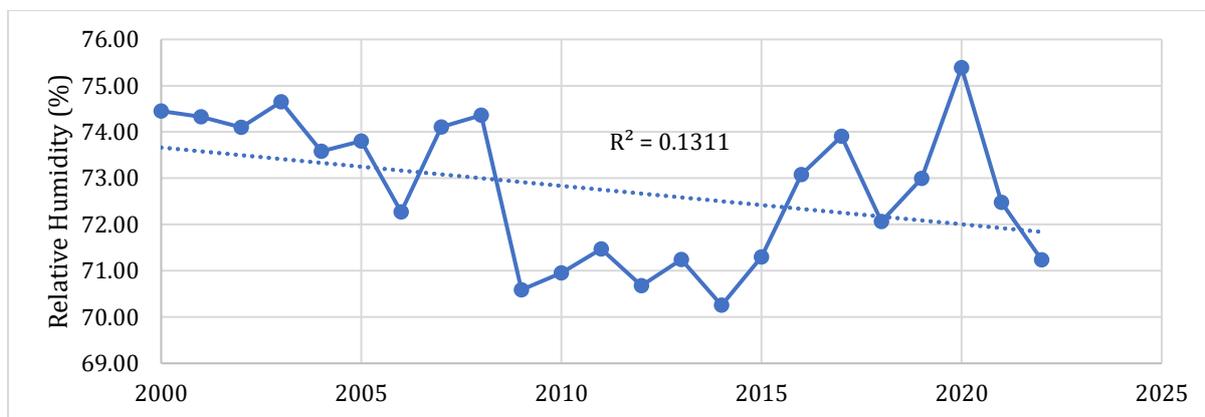
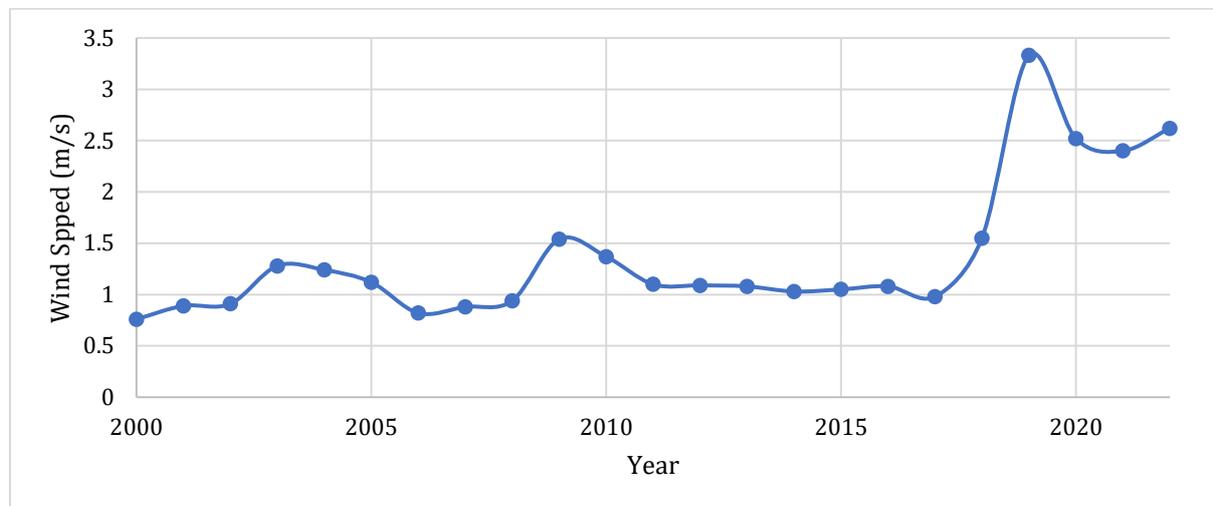


Figure 10-7: Average annual humidity trend at the study area from 2000 to 2022

In Nawabganj Upazila, there has been an observed upward trend in average temperatures over the past two decades, accompanied by decreasing average rainfall and relative humidity. This pattern, especially notable in nawabganj Upazila areas, can contribute to a higher incidence of heat-related illnesses and stress among the population. The reduced humidity, coupled with drier conditions, may elevate airborne dust and particulate matter, subsequently diminishing air quality and potentially impacting respiratory health.

**Wind Speed:** With just one weather station located in Nawabganj Upazila, specifically in Dhaka, the recorded data remains uniform across all areas in Nawabganj Upazila. Upon analyzing the wind speed in Nawabganj Upazila over a span of 20 years, it was observed that the minimum wind speed recorded was 0.76 m/s in 2000, while the maximum wind speed reached 3.33 m/s in 2019. The average wind speed in that locality is approximately 1.3 m/s. The usual wind speed in the

study area is being disturbed due to several cyclones such as Sidr, Fani, Bulbul, Amphan, Yaas, and Sitrang.



Source: Bangladesh Agriculture Research Council, BARC

Figure 10-8: Wind Speed Pattern of Nawabganj Upazila

### 10.3.2 Geology

The greater part of Bangladesh is covered by alluvium deposited by three mighty rivers, the Ganges, the Meghna and the Brahmaputra and their large number of tributaries. The Bangladesh part of the Bengal basin is divided into three main structural units. These are-

- Pre-Cambrian Platform or the Buried Indian Shield.
- The Deeper Basin (Bangia Foredeep)
- The Folded Flank of the Chittagong Trough. The Pre-Cambrian Platform is separated from the Deeper Basin by the Eocene Hinge

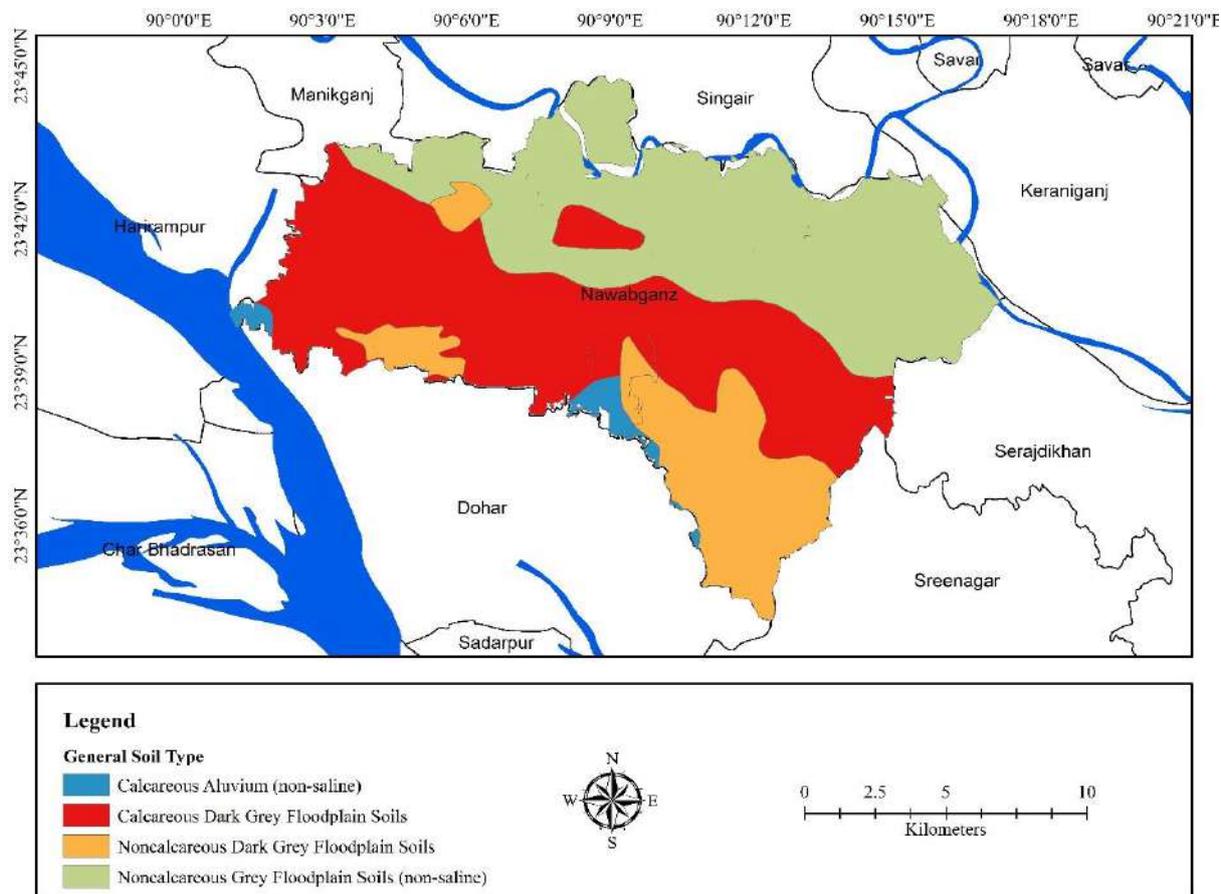
Based on geological, geophysical and drill well data of Petro Bangla, the Deeper Basin is subdivided into three big depressions. These are, Sylhet and Faridpur, and Chittagong, and two considerable uplifts, namely, the Barisal and Tripura. The Sylhet and Faridpur troughs are elliptical depressions almost adjacent to the Eocene Hinge belt and are identified geophysical by gravity minima. Both these troughs are filled up by enormous amount of Tertiary sediments. Madaripur including Nawabganj as a part of Greater Faridpur falls in Deeper Basin structure

### 10.3.3 Soil Condition

#### 10.3.3.1 General Soil Types

The soil of Nawabganj Upazila shows, complex admixture of calcareous sandy and clay alluvium, with some shallowly developed brown loamy soils on ridges and dark grey clay in depressions on older alluvial areas. The proportion of sandy, silty and clay alluvium shows place to place variation. It also changes from year to year. Organic matter content in the cultivated layer ranges from less than about 1.5 percent in brown ridge soils to 2-5 percent in most dark grey soils and more than 5 percent in some basin centers soils which stay wet for most or all of the dry season. Organic matter contents are low, especially in sands and the soil reaction is moderately alkaline.

Though there are seven general soil types, only three cover significant areas. Low Ganges River Floodplain has predominantly developed calcareous soils. The general soil pattern is olive-brown silt loams and silty clay loams on the highest parts of the floodplain ridges and dark grey silty clay loams to heavy loams to heavy clays on lower areas. Basin clays are found relatively more extensive. Brown and dark grey ridge soils are calcareous and moderately alkaline. Basin clays



usually have a strongly or very strongly acid cultivated layer overlying a slightly acid to neutral subsoil (Development Plan for Nawabganj Upazila 2013-2033).

*Source: Bangladesh Agriculture Research Council*

**Figure 10-9: General Soil Type Map of Nawabganj**

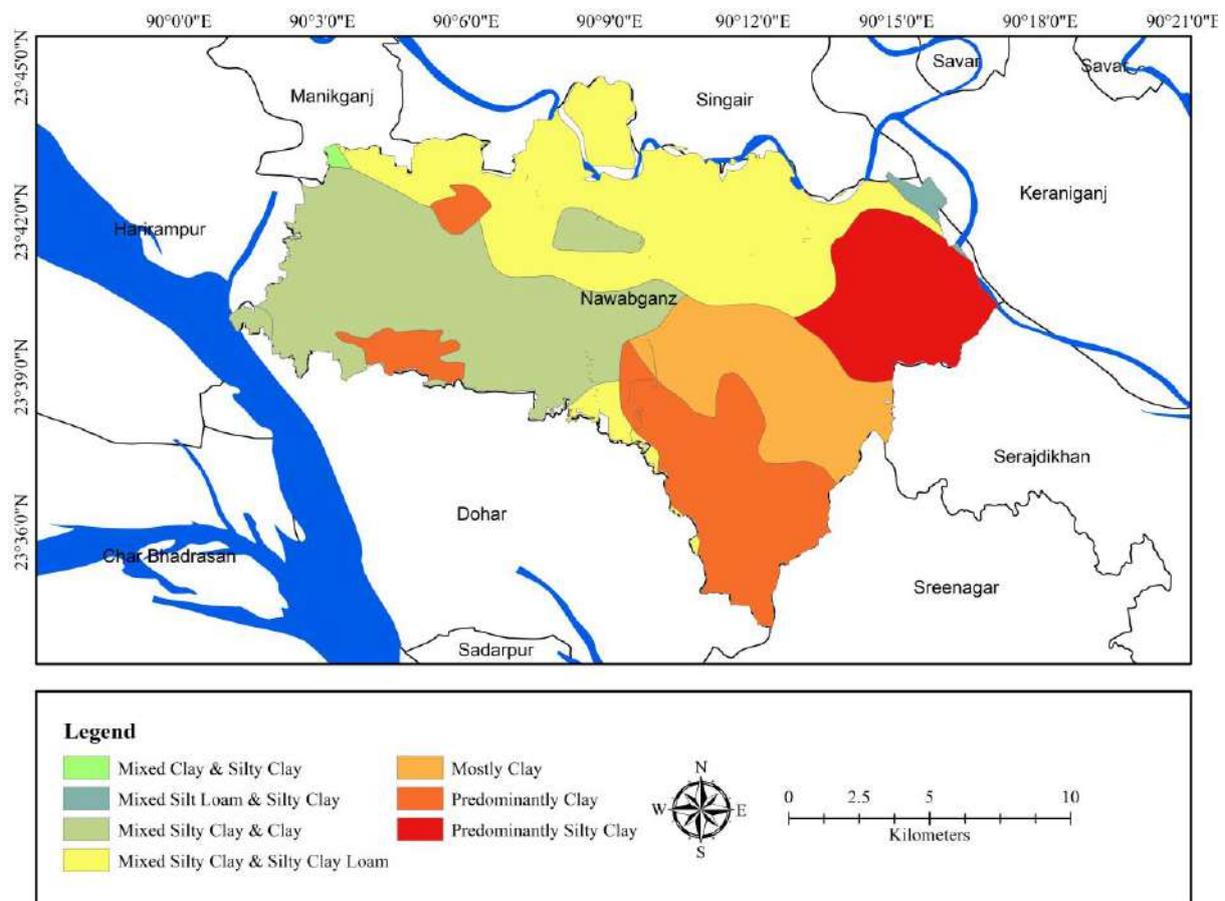
The soil in Nawabganj Upazila is comprised of four types: Calcareous Alluvium (non-saline), Calcareous Dark Grey Floodplain Soils, Non-calcareous Grey Floodplain Soils (non-saline), and Non-calcareous Dark Grey Floodplain Soils. The majority of the area's soil is formed by Calcareous Dark Grey Floodplain Soils and Non-calcareous Grey Floodplain Soils (non-saline), constituting around 40.46% (98.94 sq km) and 40.70% (99.73 sq km) of the region, respectively. This general soil type information is collected from the website of the Bangladesh Agriculture Research Council (BARC). In the study area, 17.09% (41.79 sq km) is covered by Non-calcareous Dark Grey Floodplain Soils, while the remaining portion is covered by Calcareous Alluvium (non-saline), accounting for about 1.76% (4.30 sq km)

**Calcareous Alluvium (non-saline)** refers to a type of soil characterized by the presence of calcium carbonate (calcareous) and formed by the deposition of alluvial materials. Alluvium generally refers to the loose, unconsolidated soil and sediment deposited by rivers, streams, or other flowing waters. The term "non-saline" indicates that this type of alluvium does not contain significant amounts of salt.

**Calcareous Dark Grey Floodplain Soils** refers to a specific type of soil found in floodplain areas that is characterized by its dark grey color and the presence of calcium carbonate (calcareous). These are soils found in floodplain areas, which are the flat, low-lying areas adjacent to rivers and streams. Floodplain soils are often fertile due to the periodic deposition of nutrient-rich sediment during floods. Calcareous Dark Grey Floodplain Soils is essential for agricultural planning and land use. The presence of calcium carbonates can influence soil chemistry, and the soil's location in a floodplain can impact its nutrient content and water retention properties. Farmers and land managers need this information to make informed decisions about crop selection, irrigation practices, and soil amendments.

**Non-calcareous Dark Grey Floodplain Soils (Non-Saline)** is a type of soil found in floodplain areas that is characterized by its dark grey color and the absence of significant amounts of calcium carbonate (non-calcareous) and also absence of sufficient amount of saline.

### 10.3.3.2 Topsoil Texture



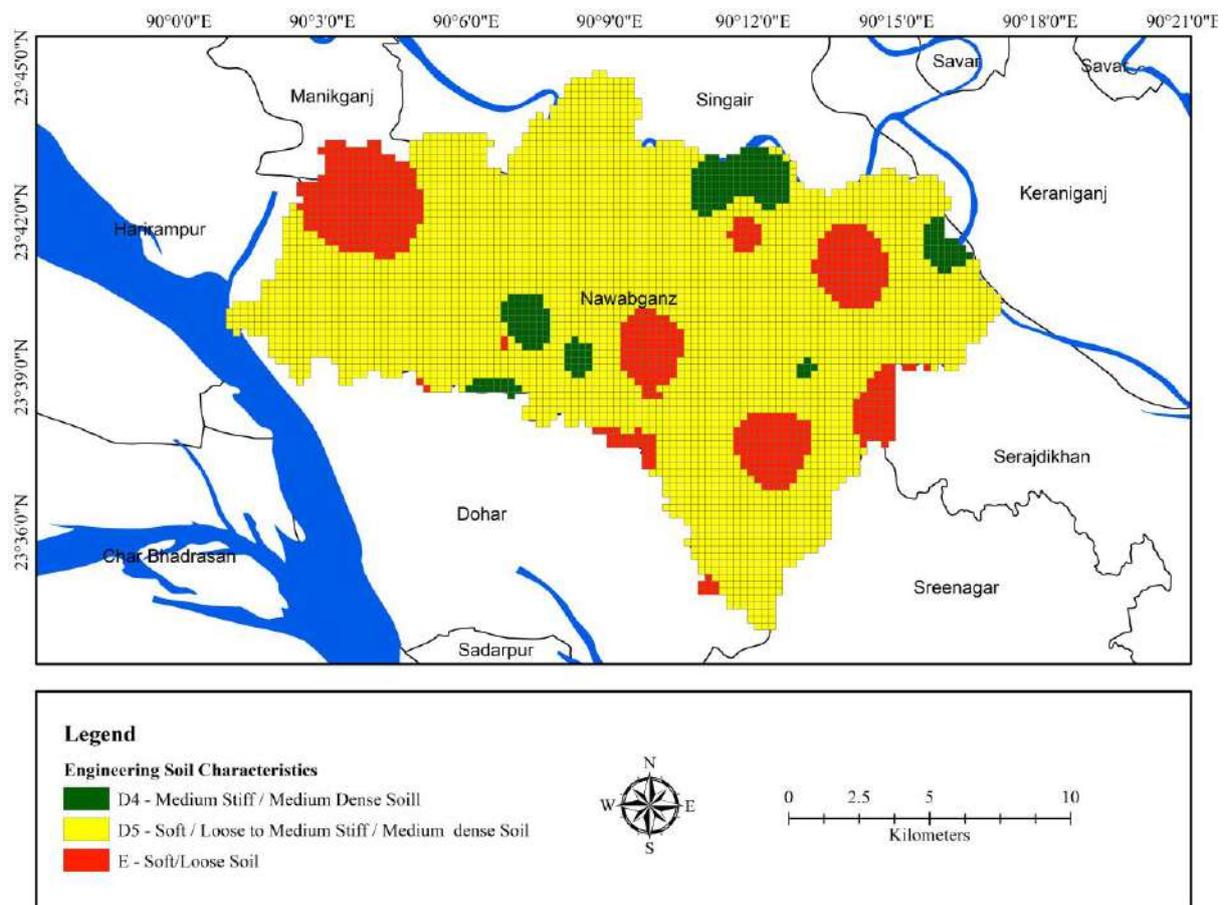
Source: Bangladesh Agriculture Research Council

Figure 10-10: Topsoil Texture Map of Nawabganj

The top-soil texture of the study area’s soil consists of mixed silty clay, silty clay loam, clay, predominantly silty clay, predominantly clay. Among them 26.42 % (64.61 sq km) soil is formed by the mixed silty clay & silty clay loam, 25.97% (63.5 sq km) area is covered by the Mixed Silty Clay & Clay.

**10.3.3.3 Engineering Soil Characteristics (Geotechnical)**

The engineering soil characteristics map reveals that Nawabganj Upazila is comprised of three distinct soil types: medium dense soil, loose to medium dense soil, and loose or soft soil. Medium dense soil, characterized by moderate density, presents a balance between permeability and compaction, making it a key consideration for engineers in construction design. The loose to medium dense soil category suggests a range of densities that can impact load-bearing capacity, stability, and settling, prompting careful consideration in foundation design and potential stabilization measures. In areas with loose or soft soil, additional attention is necessary, and engineers must meticulously plan foundation designs, implement stabilization techniques, and address potential settlement challenges.



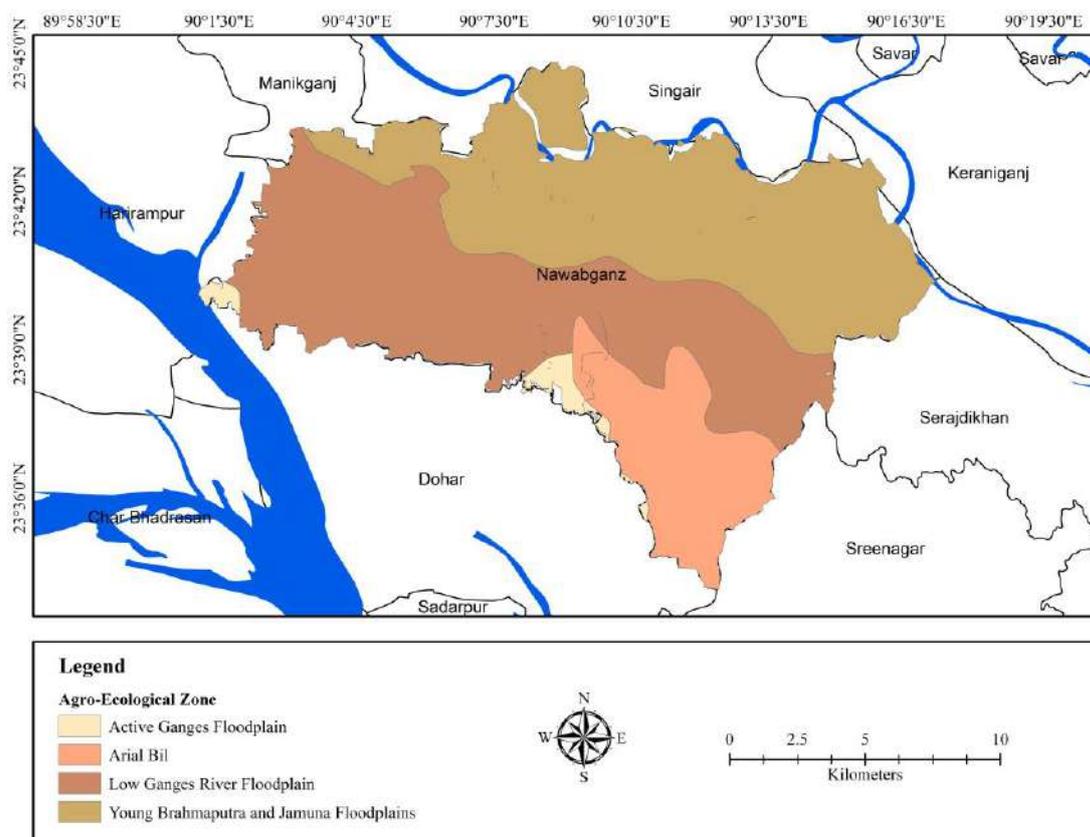
*Source: Development Plan of Nawabganj Upazila (2013-2033) and Geological Survey of Nawabganj Upazila 2016*

Figure 10-11: Engineering Soil Characteristics of Nawabganj Upazila

### **10.3.4 Agro-Ecological Region**

Agro-Ecological Region is a geographical area distinguished by a distinct combination of climate, soil, and other environmental elements influencing agriculture methods and productivity. These regions are defined by the distinct ecological circumstances that influence agricultural operations, such as crop types that can be cultivated, appropriateness for animal rearing, and other agricultural techniques. The word is frequently used in the context of sustainable agriculture and land-use planning, where understanding a region's agro-ecological characteristics is critical for making informed crop selection, water management, and conservation practices decisions. For example, based on its climate, an agro-ecological region may be defined as desert, humid, tropical, temperate, or other, and this categorization can help farmers and policymakers choose appropriate agricultural practices.

Agroecological Zone land areas recognized on the basis of hydrology, physiography, soil types, tidal activity, cropping patterns, and seasons. In fact, an agroecological zone indicates an area characterized by homogeneous agricultural and ecological characteristics. This homogeneity is more prominent in the sub region and unit levels. The agroecological zones of Bangladesh have been identified on the basis of four elements such as physiography, soils, land levels in relation to flooding and agroclimatology. Bangladesh has been tentatively divided into 30 agroecological zones. These 30 zones have been subdivided into 88 agroecological sub-regions, which have been further subdivided into 535 agroecological units.



Source: Bangladesh Agriculture Research Council

Figure 10-12: Agro-Ecological Zone of Nawabganj Upazila

The Nawabganj upazila is situated in four agro-ecological zones such as Active Ganges Floodplain, Arial Bil, Low Ganges River Floodplain and Young Brahmaputra and Jamuna Floodplains. The Young Brahmaputra and Jamuna floodplain is a vast area of low-lying land that is situated along the Brahmaputra and Jamuna rivers in northeastern India and Bangladesh. This floodplain is characterized by its fertile alluvial soil, which is regularly replenished by the annual floods that occur during the monsoon season. The floods bring nutrient-rich sediment from the upstream areas, which helps to rejuvenate the soil and makes it highly productive for agriculture. The floodplain supports a variety of crops, including rice, wheat, jute, and sugarcane, as well as various fruits and vegetables. However, the annual floods can also cause extensive damage to crop and infrastructure, and the floodplain is also prone to erosion, landslides, and soil degradation.

The active Ganges Floodplain region consists of unstable alluvial terrain within and next to the Ganges River. It features uneven terrain with large and small ridges and depressions broken up by cut-off and active canals. The alluvium in the area is a complicated combination of calcareous sandy, silty, and clayey alluvium. The most common soil types are calcareous, alluvium, and calcareous brown floodplain soils. Soils have a low organic matter content and a mildly alkaline response. The overall fertility level is medium, although nitrogen is insufficient.

Arial Beel region occupies a low-lying basin between the Ganges and Dhale-shwari rivers in the south of the former greater Dhaka district. It has much in common with the lower Atrai Basin and the Gopalganj-Khulna Beels. The soil of this area are dark grey, acidic heavy clays. Non-calcareous

dark grey floodplain soil is the chief general soil type. Organic matter content generally exceeds two percent in the top subsoil. Available moisture holding capacity is inherently low. General fertility level is medium to high.

Lower Ganges River Floodplain region comprises the eastern half of the Ganges River floodplain which is low-lying. The area has a typical meander floodplain landscape of broad ridges and basins. Soils of this region are silt loams and silty clay loams on the ridges and silty clay loam to heavy clays on lower sites. General soil types predominantly include calcareous dark grey and calcareous brown floodplain soils. Organic matter content is low in ridges and moderate in the basins. General fertility level is medium.

### 10.3.5 Flood Affected Area

Floods struck the Nawabganj Upazila in 1998, 2004, and 2007. The unions of Joy Krishnapur, Churina, and Galimpur in Nawabganj Upazila were partially inundated in July 2020, with water levels rising over hundreds of houses.

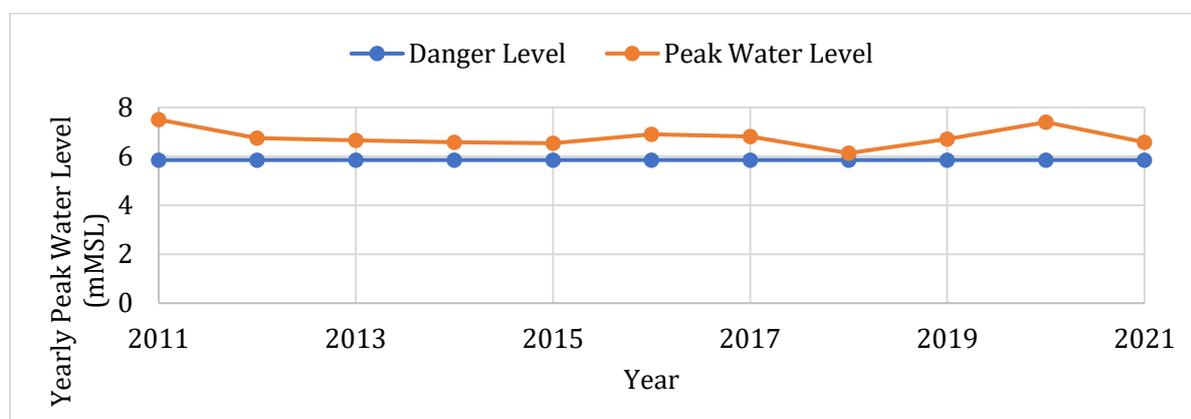


Figure 10-13: Yearly Peak River Water Level of Station Bhagyakul (Padma River) near Nawabganj Upazila (Annual Flood Report 2011 to 2021, BMD)

The Kaliganga and Padma rivers sometimes dangerously overflow (NEWAGE Bangladesh, 2020). In 2020 flood submerged 28 square kilometers of Nawabganj, affecting 71,901 people. It damaged crops on 34 hectares. Nawabganj Upazila is surrounded by three rivers, namely Kaliganga, Ichamati, and the Padma River. According to the Flood Forecasting & Warning Centre of the Bangladesh Water Development Board (BWDB), there are two water level measuring stations near Nawabganj Upazila.

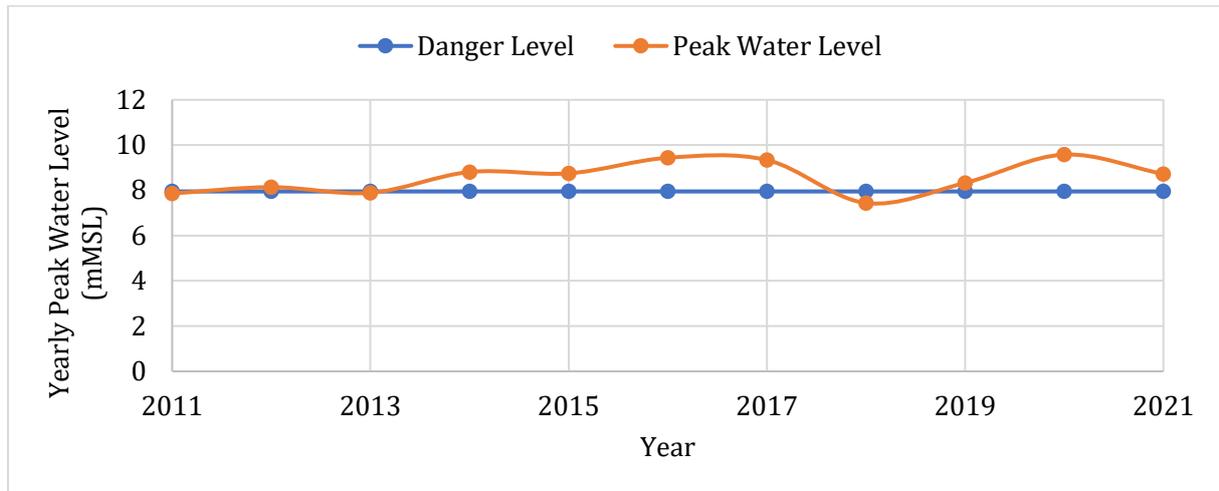


Figure 10-14: Yearly Peak River Water Level of Station Taragat (Kaliganga River) near Nawabganj Upazila (Annual Flood Report 2011 to 2021, BMD)

The recorded risk threshold for the Padma River is 5.85 meters above mean sea level (mMSL), and the danger level for the Kaliganga River is approximately 7.95 mMSL. However, there is no nearby water level measuring station for the Ichamoti River in Nawabganj Upazila, which could present a challenge in monitoring and predicting water levels for this particular river. Figure 10- and Figure 10- depict the annual peak water level trends for the Padma and Kaliganga Rivers, respectively. The water level trend for the Padma River indicates that most of the time, it exceeds the danger level.

Flood-prone areas are locations with an elevated risk of flooding, influenced by factors like precipitation, terrain, drainage patterns, and proximity to water bodies. Understanding these zones is crucial as they can impact safety and pose a threat to properties within those areas. Community flood maps serve as valuable tools, illustrating the probability and intensity of flooding across various regions. As per the Flood Prone Zone Map for Nawabganj Upazila, the majority of Nawabganj is not notably impacted by floods. Figure 10- delineates the flood-prone zones within a specific region, using various colors to denote the extent of river flooding. Areas in green are susceptible to low river flooding, purple designates moderate river flooding, and red indicates locations with severe river flooding.

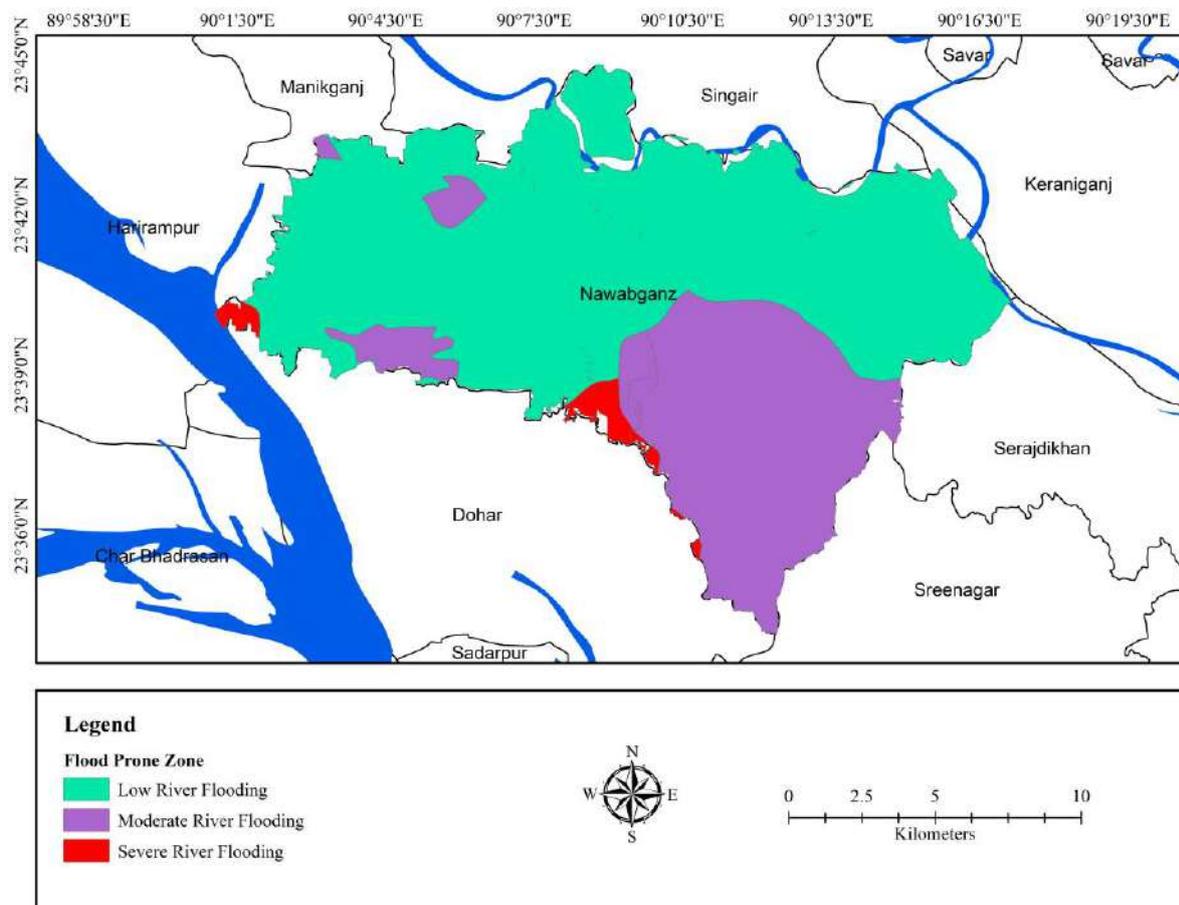


Figure 10-15: Flood Prone Zone of Nawabganj Upazila

### 10.3.6 Environmental Pollution

#### 10.3.6.1 Groundwater Condition

Groundwater samples were gathered from three distinct locations in and around Nawabganj Upazila. The table below displays the tested parameters along with their respective values and the corresponding Bangladesh standards. GW-1 and GW-3 represent the Community Tube well locations, while GW-2 represents the School Tube well. Groundwater in the project area underwent an analysis to evaluate mineral presence and salinity conditions, with a focus on Chloride and Fluoride. Chloride concentrations in the project area remained relatively stable across the two monitoring seasons, ranging from 48 mg/l to 66 mg/l, all well below the maximum standard set by Bangladesh (250 mg/l).

Although Fluoride is naturally found in various foods and utilized for dental benefits in medical applications, excessive consumption of fluoride ions beyond 1.5 mg/l can result in dental and skeletal fluorosis, brain damage, thyroid issues, and an elevated risk of kidney diseases. The Environmental Conservation Rules of 2023 recommend an even lower fluoride concentration (1.0 mg/l) for drinking water. Importantly, at all sampled locations, fluoride values were below the detection limit (0.1 mg/l). To assess metal contamination in the groundwater surrounding the project area, four parameters were examined: Iron, Manganese, Arsenic, and Zinc. Iron, a

natural component of groundwater, demonstrated minimal seasonal and spatial variations, with concentrations ranging from 0.12 mg/l to 0.25 mg/l across all samples. Notably, the Environmental Conservation Rules of 2023 recommend a drinking water iron concentration range of 0.3 – 1.0 mg/l, indicating that the project area does not face issues related to iron contamination. Manganese, which is abundantly present in the Earth's crust and often found in association with iron, was also part of the assessment.

Table 10-2: Ground Water Quality Status of Nawabganj Upazila

Parameters	Unit	Concentrations present at monitoring locations						Bangladesh Standard for Drinking Water
		GW-1		GW-2		GW-3		
		Monsoon	Post-Monsoon	Monsoon	Post-Monsoon	Monsoon	Post-Monsoon	
Temperature	°C	26.7	28.5	26.8	28.2	27.1	28.1	20-30
pH	-	6.56	6.58	6.76	6.79	6.96	6.79	6.5-8.5
Electrical Conductivity (EC)	µs/cm	624	598	712	689	665	633	-
Dissolved Oxygen (DO)	mg/l	4.9	5.5	2.3	6	4.2	5.1	≥5.0
Chemical Oxygen Demand (COD)	mg/l	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	25
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	≤3
Nitrate (NO <sub>3</sub> )	mg/l	2.6	3.1	2.1	10	1.6	1.8	45
Nitrite (NO <sub>2</sub> )	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
Sulphate (SO <sub>4</sub> )	mg/l	35	41	23	29	29	35	250
Phosphate (PO <sub>4</sub> )	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	6
Chloride (Cl)	mg/l	55	48	66	59	52	48	250
Fluoride (F)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.0
Iron (Fe)	mg/l	0.18	0.23	0.12	0.18	0.25	0.25	0.3 – 1.0
Manganese (Mn)	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.4
Arsenic (As)	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.05
Zinc (Zn)	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	5.0
Oil and Grease	mg/l	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	0.01
E-Coli	number /100 ml	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	0

Source: Environmental Impact Assessment Report for Nawabganj Economical Zone

### 10.3.6.2 Surface Water Condition

Five parameters were analyzed in order to examine the physio-chemical characteristics of surface water in and around Nawabganj Upazila such as pH, temperature, turbidity, dissolved solids, suspended solids. pH serves as an indicator of the acidity of water, with values above 7 indicating alkalinity and values below 7 indicating acidity. The analysis revealed pH values ranging from 6.56 to 7.38 during the monsoon and from 6.76 to 7.52 in the post-monsoon period. These values fall within the standard limits for surface water (6.5 – 8.5). Nonetheless, water samples with a pH below 7 suggest that the water is slightly acidic.

Table 10-3: Surface Water Quality of Surrounding River of Nawabganj Upazila

Parameters	Unit	Dheleshwari River		Ichamoti River		Bangladesh Standard for Surface Water
		Monsoon	Post Monsoon	Monsoon	Post Monsoon	
pH	-	6.56	6.88	6.73	6.76	6-9
Temperature	°C	32.2	-	32.8	-	-
Turbidity	NTU	52	44	72	55	-
Total Dissolved Solids (TDS)	mg/l	195	189	188	190	1000
Total Suspended Solids (TSS)	mg/l	95	73	86	82	-
Dissolved Oxygen (DO)	mg/l	5.4	5.6	5.2	5.3	≥5.0

Parameters	Unit	Dheleshwari River		Ichamoti River		Bangladesh Standard for Surface Water
		Monsoon	Post Monsoon	Monsoon	Post Monsoon	
Chemical Oxygen Demand (COD)	mg/l	<4.0	<4.0	<4.0	<4.0	50
Biochemical Oxygen Demand (BOD5)	mg/l	<2.0	<2.0	<2.0	<2.0	≤6
Lead (Pb)	mg/l	<0.005	<0.005	<0.005	<0.005	0.1
Chromium (Cr)	mg/l	<0.01	<0.01	<0.01	<0.01	0.05
Mercury (Hg)	mg/l	<0.001	<0.001	<0.001	<0.001	0.004
Oil and Grease	mg/l	<1.4	<1.4	<1.4	<1.4	≤10

Source: Environmental Impact Assessment Report for Nawabganj Economical Zone

Water turbidity, caused by solid particles in dissolved and suspended forms, can obscure water clarity, impede sunlight penetration, and negatively impact benthic species. This reduction in sunlight also lowers phytoplankton photosynthesis, contributing to low oxygen conditions in the water column.

To assess the oxygen conditions in surface water, the study examined parameters including Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), and Chemical Oxygen Demand (COD). Dissolved Oxygen quantifies the oxygen content, while BOD and COD indicate the oxygen deficiency in surface water. Aquatic organisms rely on oxygen for respiration. Inadequate oxygen levels, known as hypoxia, or complete absence of oxygen, termed anoxia, can arise when excessive organic materials, such as large algal blooms, undergo decomposition by microorganisms. Microorganisms consume DO in water through oxidation. BOD and COD represent the oxygen needed for microorganisms to decompose and the oxygen required for the complete decomposition of all organic matter in the water, respectively (UNEP/WHO, 1996). Reduced DO, along with elevated BOD and COD concentrations, can disrupt aquatic health and impact the composition of aquatic fauna.

The data in the preceding table indicates that during the post-monsoon period, Dissolved Oxygen (DO) values range slightly higher, varying between 5.2 mg/l and 5.8 mg/l, compared to the monsoon period where they range from 4.9 mg/l to 5.5 mg/l. The minimum acceptable DO level for surface water is 5 mg/l, below which the aquatic ecosystem can experience severe consequences. Additionally, both Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) values were found to be within acceptable limits for surface water in both monitoring seasons. BOD and COD concentrations were below 2 mg/l and 4 mg/l, respectively, while the maximum permissible levels for fisheries are 10 mg/l and 25 mg/l, respectively.

Table 10-4: Surface Water Quality of Kaliganga River

Parameters	2015	2016	Bangladesh Standard for Surface Water
pH	7.00-7.34	6.36-7.69	6-9
DO	3.3-7.5 mg/L	6.2-7.7 mg/L	≤5 mg/l

BOD	1.2-5.0 mg/L	1.2-3.2 mg/L	≤6 mg/l
TDS	57.1-250 mg/L	42-276 mg/L	1000 mg/l
SS	6.0-22.0 mg/L	8.0-38.0 mg/L	25 mg/l
Chloride	1.06-12.7 mg/L	4.0-8.99 mg/L	250 mg/l
Alkalinity	16.6-58 mg/L	18.0-56 mg/L	-
Electrical Conductivity	135.4-480 umhos/cm	84-513 umhos/cm	-

Source: Surface and Ground Water Quality Report 2016, Department of Environment (DoE)

### 10.3.6.3 Air Quality

Increased concentrations of particulate matter and gaseous pollutants can have harmful effects on ecology and human health. The assessment of air quality is based on the examination of the Environmental Impact Assessment (EIA) report, particularly the Comprehensive Environmental & Social Impact Assessment (ESIA), for the Nawabganj Economic Zone proposed by BEZA in 2021. With multiple development projects currently underway in Nawabganj upazila, it is imperative to closely observe and assess the air quality in this region. This study considers the major air pollutants are- PM10, PM2.5, SO2, NO2, CO, O3, Suspended Particulate Matter (SPM), Volatile Organic Component (VOC).

Table 10-5: Air Quality Monitoring - Wet and Dry Season in Nawabganj Upazila

Criteria Pollutants	Unit	Wet Season	Dry Season	ECR,2023	WHO, 2021
PM10	(µg/m <sup>3</sup> )	70.20	76.63	150	45
PM2.5	(µg/m <sup>3</sup> )	40.47	39.47	65	15
SPM	(µg/m <sup>3</sup> )	110.80	103.10	-	-
SO2	(µg/m <sup>3</sup> )	7.60	7.50	80	40
NO2	(µg/m <sup>3</sup> )	27.20	26.90	80	10
CO	mg/m <sup>3</sup>	0.59	0.55	5	-
O3	-	20.77	<20	180	-
VOCs	mg/m <sup>3</sup>	<4.2	<4.2	-	-

Source: Environmental Impact Assessment Report for Nawabganj Economical Zone

Based on the air quality monitoring findings presented in the tables above, it is clear that all the parameters fall within the permissible limits set by ECR, 2023, during both dry and wet seasons. However, when compared to the guidelines of WHO, 2021, it has been noted that concentrations of particulate matters (PM2.5 and PM10) and NO2 (µg/m<sup>3</sup>) exceeded the recommended levels in both dry and wet seasons. In general, the air quality is comparatively poorer during the winter season than in the monsoon period. Various factors, such as the transport of air pollutants by wind beyond the designated airshed, ongoing local construction activities, wind erosion, emissions from nearby power plants, emissions from both paved and unpaved roads, vehicular and residential areas, as well as rainfall washout, could play significant roles in contributing to heightened air pollution within the project airshed.

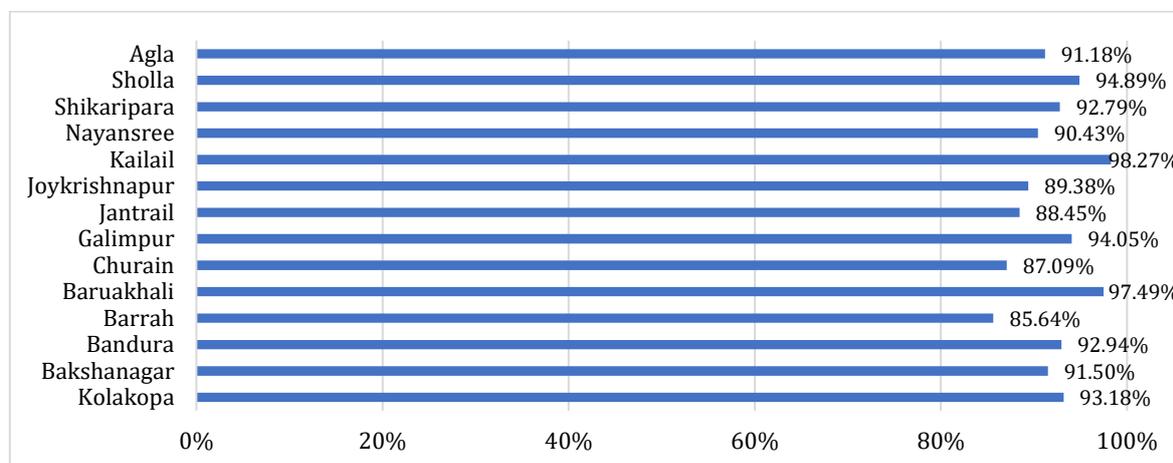
### 10.3.6.4 Noise Pollution

The intended project site is an agricultural expanse situated in proximity to the Dhaleshwari River on the east and bordered by the Ichamoti River on the north and northwest. The primary sources of elevated background noise in the area stem from the nearby Power Plant, vehicular activities along the paved road network, the bus stop, local market, and educational institutions. As per the Environmental Impact Assessment (EIA) report of Nawabganj Economic Zone, it asserts that the noise levels in the region are within the permissible limits outlined in the Noise Pollution Control Rules of 2006.

### 10.3.6.5 Sanitation

Sanitation encompasses the conditions and practices aimed at preserving health and preventing the transmission of diseases. It primarily involves ensuring the availability of clean drinking water and the secure disposal of human and animal waste. According to the World Health Organization, sanitation is defined as the provision of facilities and services for the safe handling of human excreta. This includes processes from toilet usage to containment, storage, on-site treatment, and conveyance, to eventual safe end-use or disposal.

**Sanitation Coverage :** The sanitation coverage of Nawabganj Upazila is approximately 91.95% on average. This means that almost 92% of the households in the Upazila have access to and use sanitary latrines or toilet facilities. The statement implies that sanitation coverage is determined by the percentage of households with access to sanitary latrines. Sanitary latrines contribute to maintaining a clean and hygienic environment, reducing the risk of diseases related to poor sanitation. The data was collected from the Department of Public Health and Engineering (DPHE).

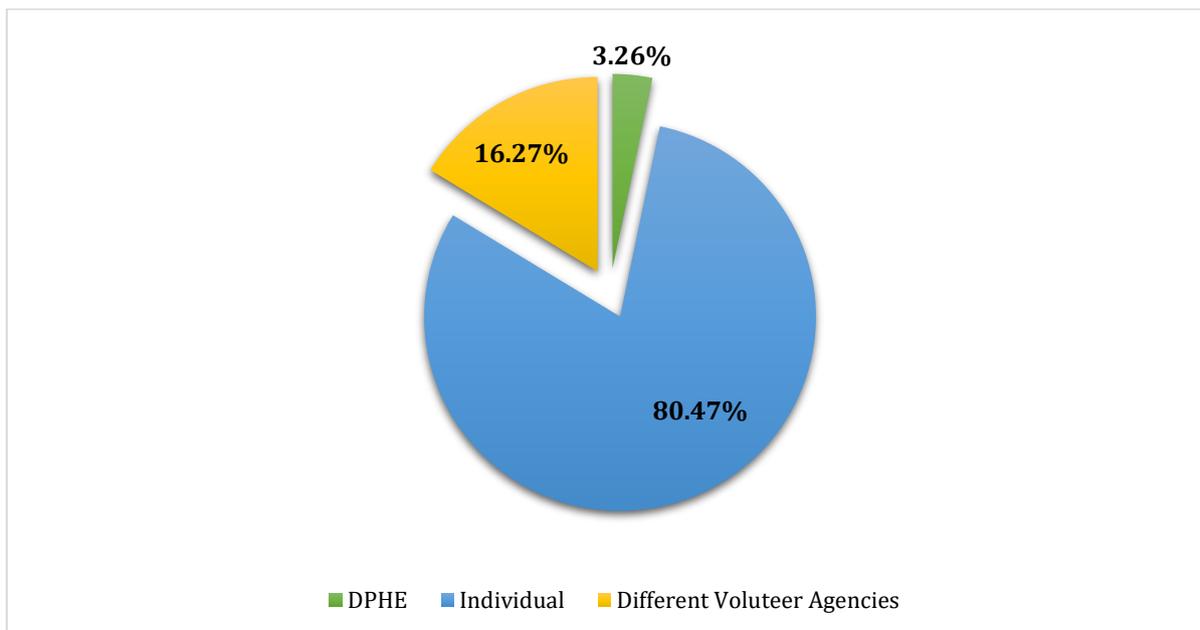


Source: Department of Public Health and Engineering

Figure 10-16: Union-wise Sanitation Coverage Status of Nawabganj Upazila

There is variation in sanitation coverage among the different unions within Nawabganj Upazila. Among the 14 unions, the Kailail union has the highest sanitation coverage rate, indicating that a larger proportion of households in this union have access to sanitary facilities. Conversely, the Barrah union has the lowest sanitation coverage, suggesting that fewer households in this union have access to proper sanitation facilities.

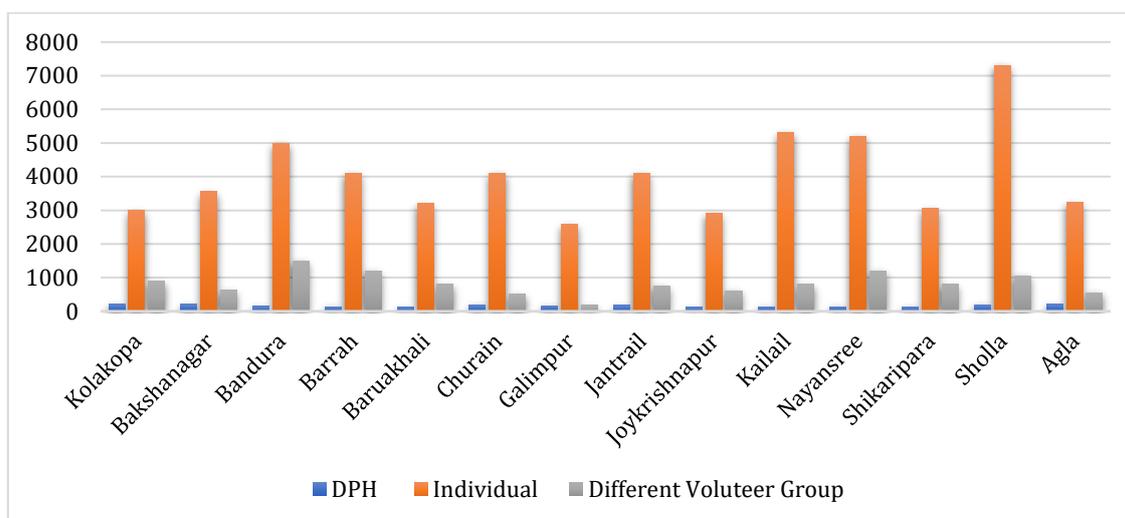
**Sanitary Latrine Provider:** The majority of latrines, approximately 80.47%, in Nawabganj Upazila were set up by the house owners themselves. This implies that most families take the initiative and invest in constructing their own latrine facilities, contributing to personal hygiene and sanitation. A significant portion, about 16.27%, of latrines are established by different volunteer agencies, including non-governmental organizations (NGOs) or community organizations. This indicates the involvement of external entities in promoting sanitation practices and providing resources for latrine construction.



Source: DPHE

Figure 10-17: Status of Sanitary equipment provider in Nawabganj

Despite being the Department of Public Health Engineering (DPHE), only a small percentage, specifically 3.26%, of latrines are constructed directly by DPHE. This might suggest a relatively smaller role of the government agency in comparison to individual households and volunteer organizations in implementing sanitation infrastructure in Nawabganj Upazila Union Wise Sanitation Latrine Distribution Status.



Source: Department of Public Health and Engineering

Figure 10-18: Union Wise Sanitation Latrine Distribution Status

## 10.4 Carbon Footprint Assessment

### 10.4.1 Data Collection

The methodology of the research was designed based on the spatial and attribute data collected from Landsat imageries and direct field survey respectively. The carbon footprint data was acquired through the implementation of a field survey that utilized questionnaires to gather information at the level of citizen's consumption. While the spatial data was collected through remote sensing technology. The origin of carbon footprint was categorized into numerous categories and subcategories, including food consumption, goods consumption, shelter, mobility, and services presented in **Table 10-6**.

The Land Use and Land Cover data was derived by classifying satellite images obtained from USGS Earth Explorer. Built-up, Vegetation, Cropland, Waterbody, and Barren soil were considered as elements of biocapacity and derived by supervised image classification techniques.

Table 10-6: List of variables performed to estimate carbon Footprint

Footprint Source	Category	Subcategory
Food Consumption	Meat	Poultry
		Beef
		Mutton
	Dairy	Cheese
		Milk Powder
		Condensed Milk
		Fluid Milk
		Butter
	Fruits &Vegetables	Fruits
		Vegetable

Footprint Source	Category	Subcategory
	Cereal	Rice
		Pulse
		Flour & Malt
		Bread
	Confectionary	Bakery
		Snack
		Ice Cream & Frozen Food
		Noodles
	Drinks	Soft Drinks
		Coffee and Tea
		Juice
	Others	Oil
		Eggs
Goods Consumption	Furnishing and Equipment	Paper and Printing
		Paint and Adhesive
		Cleaning and Chemical
		Furniture
		Medicine
	Housekeeping	Light
		Electric Spare parts
		Battery
		Electric Equipment
	Others	Tobacco
		Clothing
Shelter	Electricity Consumption	-
	Waste Generation	-
	Water Usages	-
	Gas Consumption	-
	Built-up (Residence)	-
Mobility	Diesel	-
	Octane	-
	Petrol	-
	Transportation-Asphalt Use	-
Services	Education	Education
	Health	Health
	Art and Entertainment	Art and Entertainment
	Hotel and Foods	Hotel and Foods
	Technical	Professional Personnel
		Technical
	Administrative	Management and Administrative
Waste Collection		

Footprint Source	Category	Subcategory
		Government Payment

### 10.4.2 Carbon Footprint Assessment Method

Component-Based Approach A "bottom-up" methodological approach is taken in this study to derive footprint value, and this technique is embodied in the model. By using this method, one can evaluate the ecological impact of the production of food, waste, gas, water, fuel, and electricity. The environmental footprint estimates are pre-calculated using data that is fitted to the region that is being considered for such activities in this model. **Table 10-7** and **Table 10-8** represent the model variables and associated co-efficient values. This model is more sensitive to alterations in the underlying data than other models. (Simmons, Lewis, & Barrett , 2000) (Khan & Uddin, 2018) (Shakil, Kuhu, Rahman, & Islam, 2014).

$$E_i = \frac{(TC_i \times CEF_i)}{S_i} \times EqF \dots \dots \dots (1)$$

Where,  $E_i$ = Emission of item Consumptions in global hectare,  $TC_i$ = Total Consumptions of items,  $CEF$ = Carbon Emission Factor,  $S_i$ = Sequestration of items,  $EqF$ =Equivalency Factor

Table 10-7: Carbon Emission coefficient for different carbon footprint components

Carbon Footprint Components	Carbon Emission Factor		Sequestration		Acre to hectare	Equivalency Factor	
	Coefficient	Unit	Coefficient	Unit		Coefficient	Unit
Electricity Consumption	0.69	Tons CO <sub>2</sub> / MWh	1.6175	tons CO <sub>2</sub> /acre/year	0.4047	1.26	Gha/hectare
Natural Gas Consumption	0.00496	tons CO <sub>2</sub> / cubic meter gas					
Water Consumption	0.1	tons CO <sub>2</sub> / million-liter water					
Waste Generation	0.449	tons CO <sub>2</sub> / tons of waste					
Fuel Consumption	-	-					
CNG	0.053	kg CO <sub>2</sub> / cubic feet					
Diesel	2.676	kg CO <sub>2</sub> /liter					
Octane	2.939	kg CO <sub>2</sub> /liter					
Petrol	2.272	kg CO <sub>2</sub> /liter					

$$E_i = ACM_i \times TCM_i \times S_i \times AH_i \times EqF \dots \dots \dots (2)$$

Where,  $E_i$ = Emission of item Consumptions in global hectare,  $ACM_i$ = Annual Cost of i items in Millions USD,  $TCM_i$ = Tons of Carbon Emission coefficient per Million Consumption in USD,  $S_i$ =

Sequestration of i item (1.6175 tons CO<sub>2</sub>/acre/year),  $AH_i = 0.4047$  Annual Hectare,  $EqF =$ Equivalency Factor (1.26 Gha/hectare)

Table 10-8: List of Carbon Emission co-efficient in per million consumptions in USD (Khan & Uddin, 2018)

Source	Category	Subcategory	Tons of CO <sub>2</sub> / Million USD (TCM)
Food Consumption	Meat	Poultry	668.1
		Beef	735.7
		Mutton	735.7
	Dairy	Cheese	689.8
		Milk Powder	608.4
		Condensed Milk	608.4
		Fluid Milk	665.6
	Fruits &Vegetables	Butter	665.6
		Fruits	722.2
		Vegetable	722.2
		Cereal	Rice
	Pulse		1092
	Flour & Malt		1045.3
	Bread		479.8
	Confectionary	Bakery	479.8
		Snack	530
		Ice Cream & Frozen Food	616
		Noodles	530
	Drinks	Soft Drinks	543.6
		Coffee and Tea	678.2
Juice		311.2	
Others	Oil	1113.3	
	Eggs	558.2	
Goods Consumption	Furnishing and Equipment	Paper and Printing	827.9
		Paint and Adhesive	912.85
		Cleaning and Chemical	451.85
		Furniture	401.35
		Medicine	265.3
	Housekeeping	Light	378.1
		Electric Spare parts	416.7
		Battery	376.5
		Electric Equipment	517.3
	Others	Tobacco	236.2
		Clothing	591.36

Source	Category	Subcategory	Tons of CO2/ Million USD (TCM)
		Others	546.6
Service Activities	Education	Education	481.245
	Health	Health	215.43
	Entertainment	Art and Entertainment	392.133
		Hotel and Foods	442.2
	Technical	Professional Personnel	104.32
		Technical	166.283
	Administrative	Management and Administrative	389.1
		Waste Collection	327.3
		Government Payment	460

## 10.5 Biocapacity Assessment

Biocapacity (BC) refers to an environment's capacity to produce useful biological materials for humans and to absorb the waste generated by them, including CO2 emissions from burning fossil fuels. The contributing land types to biocapacity can include areas like farmland, forests or other plant-covered land, bodies of water, pastureland or meadows, and developed land (Mancini, et al., 2015) (Monfreda, Wackernagel, & Deumling, 2014) (Labib, Neema, Rahaman, Patwary, & Shakil, 2018).

$$BC = \sum A_i \times YF_i \times EQF_i \dots \dots \dots (3)$$

Where, BC represents Biocapacity (in global hectare, gha),  $A_i$  is Area of  $i$  land cover type in hectare,  $YF_i$  is Yield factor  $i$  type land cover type,  $EQF_i$  is Equivalency factor for  $i$  type land cover. The value of Yield factor and Equivalency factor are presented in **Table 10-9**

Table 10-9: Yield and Equivalency Factor according to Land Cover Types

Land Cover Type	Yield Factor	Equivalency Factor
<b>Crop Land</b>	2.01	2.52
<b>Forest/ Vegetation</b>	0.35	1.29
<b>Grazing Land</b>	1.90	0.37
<b>Waterbody</b>	3.39	0.37
<b>Built-up Land</b>	2.01	2.51

## 10.6 Ecological Deficit Assessment

An ecological deficit arises when a population's ecological footprint surpasses the biocapacity of the region it occupies (Scotti, Bondavalli, & Bodin, 2009)

$$Ecological\ Deficit\ (Gha) = Biocapacity(Gha) - EF_{consumption}(Gha) \dots \dots \dots (4)$$

## 10.7 Ecosystem Service Value (ESV) Assessment

To assess the ecosystem service value based on land use and land cover that was derived through classifying Landsat images. The valuation was calculated by performing following equation (Morshed, Fattah, & Morshed, 2021).

$$ESVi = \sum A_i \times VC_i \dots \dots \dots (5)$$

Table 10-10: Global ESVs per unit area for different ES functions of each LULC types

Ecosystem Services	Sub-types	ESV Coefficient for each LULC (US\$/Hm2/Year)				
		Agriculture	Vegetation	Vacant land	Waterbody	Built-up area
Provisioning	Climate Regulation	76.58	337.96	7.6	120.46	0
	Food Production	78.94	27.4	1.17	30.99	0
	Gas Regulation	56.84	358.72	3.51	29.82	0
	Raw materials	30.79	247.45	2.34	20.47	0
Regulating	Hydrological Regulation	60.79	339.62	4.09	1097.61	0
	Waste Treatment	109.73	142.82	15.2	868.38	0
Supporting	Biodiversity Production	80.52	374.5	23.39	200.57	0
	Soil Conservation	116.05	333.81	9.94	23.98	0
Cultural	Recreation and Culture	13.42	172.72	14.03	259.64	0

## 10.8 Review of Existing Environmental Policy

### 10.8.1 Environmental Conservation (Amendment Act, 2010)

Bangladesh Environment Conservation Act (ECA) is set of laws enacted by the government of Bangladesh in 1995 to conserve the nation's environment, its main goals are to "provide for conservation of the environment, improvement of environmental standards and control and mitigation of environmental pollution." (Bangladesh Environment Conservation Act, 1995)

It is the main legislative framework of the country for regulating the environmental degradation, pollution, and conservation in Bangladesh, which repealed the earlier Environment Pollution Control Ordinance, 1977. Section 12 of ECA, 1995 stipulates that no industrial unit or project shall be established or undertaken without obtaining environmental clearance from the Director General (DG), Department of Environment. Environment Conservation Rules (ECR), 1997 promulgated under the ECA, 1995 (Clause 2(f) of Section 20). These rules set up the National Quality Standards for air, water, emission, noise, vehicular exhaust, etc. Categorization of industrial and development projects into Green, Amber and Red is also performed under these rules. The requirements of IEE/EIA for new industrial/development projects and EMP for existing projects came into enforcement under the ECR, 1997.

**Relevance of the act to the present plan:** This act is vital for preserving the Nawabganj upazila's environment. Though the enforcement agency of the act is the Department of Environment, it helps ensuring environmental sanctity of this upazilas. The recent Master Plan has heavily drawn

its recommendations based on the provisions of the Act. Particularly, recommendations of preservation of water bodies, ecological balance, hill cutting are based on the provision.

## **10.8.2 Environmental Management Plan**

### **10.8.2.1 Solid Waste Management Plan**

Waste management refers to the collection, transportation, processing, or disposal of waste materials, as well as their management and monitoring. The phrase usually refers to materials created by human activity, and the procedure is usually carried out to minimize their impact on human health, the environment, or aesthetics. Waste management addresses all materials, whether solid, liquid, gaseous, or radioactive, as a unified class and attempts to limit their detrimental environmental impacts using various approaches.

**Proposed Solid waste Management Procedure:** Waste management especially MSW management in Bangladesh is regarded as a neglected issue due to lack of motivation and consciousness of residents, ineffective policy implementation, and funding constraints. In the days ahead, rate solid waste generation will continue to increase as urban dwellers, factory/industry, and consumption of electronic goods continues to grow rapidly. In such a situation, for the sustainable management of solid waste, the following issues need to be addressed:

- Awareness raising programs regarding waste disposal, and the benefits of recycling and reuse should be adopted through mass and social media
- Budget allocation for solid waste management should be increased
- Adopt more projects/programs on solid waste management in collaboration with NGOs, donors, and other international organizations
- The Upazila authority should establish a definite waste disposal point in every urban community and collect the waste from that point every day
- For industrial waste and e-waste, the extended producer responsibility (EPR) principle should be strictly enforced in line with the environmental conservation act
- Establish sewage and industrial waste treatment plants in city or municipal area

### **10.8.2.2 National 3R Strategy for Waste Management, 2010**

The National 3R Strategy for Waste Management, 2010 was drawn up by the Department of Environment, Ministry of Environment and Forest. The 3Rs denote in hierarchy, in order of importance - '**reduce**' followed by '**reuse**' and then '**recycle**' waste as a way to its management. The aim of 3R strategy is to achieve complete elimination of waste disposal on open dumps, rivers, flood plains by 2015 and promote recycling of waste through mandatory segregation of waste at source as well as create a market for recycled products and provide incentives for recycling of waste.

#### **Strategies for Promotion of 3R**

The main features of the National Strategy promoting 3R are:

- Prioritizing waste avoidance/reduction over recycling, and recycling over all other forms environmentally sound disposal
- Reusing non-avoidable waste as far as possible

- Promoting environment friendly raw materials
- Maintaining content of hazardous content in the waste at the lowest possible level
- Guaranteeing an environmentally sound residual waste treatment and disposal as basic prerequisite for human existence, environmental conservation and protect biodiversity.

The projects implemented as part of the National 3R strategy are worthy “Promotion of Source Separation of Waste” and “64 District Composting Project in Bangladesh”. Preservation of water bodies, ecological balance, hill cutting are based on the provision.

## **CHAPTER ELEVEN: LEGAL AND INSTITUTIONAL FRAMEWORK FOR IMPLEMENTATION OF THE UPAZILA MASTER PLAN**

### **11.1 Introduction**

Before the preparation of any master plan for any area, it is crucial to evaluate the relevant governmental policies, laws, and regulations that directly and indirectly influence its creation and implementation, especially in an urban region. The consultants have reviewed both the national and international policies, rules, and regulations, as well as the strategies, targets and report in order to prepare the upazila master plan. Besides, the institutional capacity of the upazila has been evaluated. Relevant sections of the documents are provided below.

### **11.2 Objective**

National development strategies and regional planning initiatives are often integrated into the legal framework. This ensures the master plan aligns with broader goals. Three main objectives of reviewing legal and institutional framework for implementation of the upazila master plan are

1. To establish the mandate for creating master plans.
2. To provide clear legal backing and empower relevant authorities to take concrete actions outlined in the master plan. This translates the vision into tangible projects.
3. To create a link between legal framework and master plan.

By achieving these objectives, the legal and institutional framework creates an enabling environment for the successful implementation of the upazila master plan, leading to a more prosperous and equitable future for the region.

### **11.3 Upazila Parishad (Amended) Act, 2011**

Ordinance 1982, Thana Parishad was constituted at the thana level. Subsequently by amending the said Ordinance in 1983 Thana Parishad was renamed as Upazila Parishad. The said amended Ordinance was repealed by the Local government (Upazila Parishad and Upazila Administration Reorganization) (repeal) Ordinance 1991. Subsequently the Awami League government enacted the Upazila Parishad Act 1998. But no election was held under that Act for reconstituting Upazila Parishad. In the year 2007, the Non-party Caretaker Government (NCG) constituted a 'Committee for strengthening and making the local government bodies more dynamic'. In pursuance of the recommendation of the said committee the NCG promulgated the Local Government (Upazila Parishad) Ordinance 2008. The said Ordinance repealed the Upazila Parishad Act 1998 and incorporated certain provisions for giving more power to the Upazila Parishad than given under the repealed Act of 1998. The said Ordinance was again repealed by the Upazila Parishad (Reintroduction of the Repealed Act and Amendment) Act 2009. By this Act the provision of the Upazila Parishad Act 1998 was revived with certain amendments.

Under the 1998 Act each thana area was declared a upazila and part of the Republic. In addition to that, member of the Jatiya Sangsad elected from the constituency falling within the territorial

limits of the Upazila was made an advisor to that Upazila Parishad which was required to obtain the advice of the member of Jatiya Sangsad. Now, under the Act of 2009, advice of the member of the Jatiya Sangsad is to be obtained in the management of the affairs of the Upazila Parishad and he is to be kept informed of matters in respect of any communication by the Upazila Parishad with the government. It also provides that upazila parishad is to be constituted with an elected chairman and two elected vice chairmen of which one shall be a woman; chairmen of Union Parishads falling within the upazila area, Mayor of the pourashava, if any, falling within the upazila area and one-third of women members elected from the reserved seats of the union parishads falling within the upazila area as members. It also provides that the executive authority of the upazila parishad is to be exercised by the chairman, vice chairman, members or through any other officer as authorized by the Upazila Parishad, and the Upazila Nirbahi Officer (UNO) is to be the secretary of the upazila parishad. In the said Act of 2009, there is also provision for removal of the chairman, vice chairman and member through a vote of no-confidence passed by the majority of four-fifth members. It also provides that government shall have general power of control and supervision over the Upazila Parishad, and the Upazila Parishad has been empowered to impose tax on certain specified subjects to defray its expenses and also appointing its officers and employees.

## **11.4 Upazila Parishad**

The districts are divided into sub-districts called 'upazila'. Bangladesh has 495 upazilas. The upazilas are the second lowest tier of the administration in Bangladesh.

Upazilas were formerly known as thanas which literally means police station control area. Despite the meaning, thanas functioned much as an administrative and geographic region, such as today's upazilas. In 1982 thanas were re-termed to as upazilas with provisions for semi-autonomous local governance. This system was reverted to the thana system in 1992. Later in 1999 geographic regions under administrations of thanas were converted into upazilas again.

### **11.4.1 Organization Structure**

According to the latest version of the Upazila Parishad Act 1998 (Amended in 2009 and 2011) following is the structure of Upazila Parishad.

1. A Chairman
2. Two Vice Chairpersons (One woman)
3. Members(ex-officio)
4. Chairmen of all Union Parishads under the Upazila
5. Mayors of all Pourashavas, if there are any.
6. Three women members
7. Women members of the reserved seats.
8. Official members,
9. Chairman of the Upazila Central Co-operative Association within the Upazila and
10. One nominated member.

The local Parliament member serves as the adviser of the parishad.

Chairman and two Vice Chairpersons, including one female, are directly elected by the local people.

One-third of the total women members from reserved seats of Union Parishad, under an Upazila, are the Upazila Parishad members. The women members of the reserved seats of the Union Parishad elect them. The Upazila Parishad Chairman and Vice-chairpersons will have to resign from their party positions if they hold any. The Vice-Chairpersons will elect a two-member Chairman panel who will serve as the Chairman if the elected Chairman fails to carry out his/her duty for absence, illness or any other reason. Upon suggestion of the Local Government Commission, the government can suspend any Chairmen, Vice-Chairperson and women members temporarily if their work goes against the parishad's interest or seems "unexpected" from administrative point of view.

### **11.4.2 Standing Committee**

Standing committees are formed to perform the activities of the Upazila Parishad smoothly, covering the following themes:

1. Law and order;
2. Health and family planning; 3) Agriculture, fisheries, livestock, irrigation, and environment;
3. Education;
4. Social welfare, women, and child development;
5. Sports, culture, and youth development;
6. Communication and development of infrastructure;
7. Establishment, finance, and accounts; and;
8. Audit and evaluation.

Apart from above standing committees, the Upazila Parishad can form additional standing committees in accordance with the Upazila Parishad Act. All decisions of the standing committees are to be discussed in the general meeting of the Parishad.

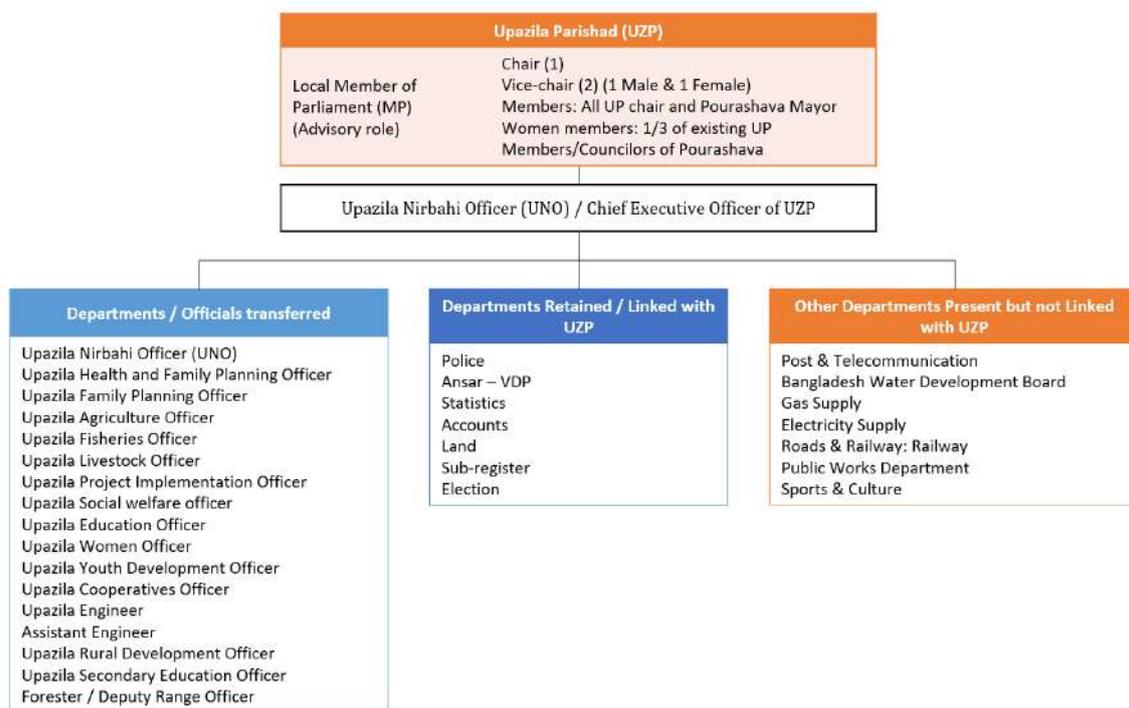


Figure 11-1: Members of Upazila Parishad

### 11.4.3 Functions

There are 20 functions for the Upazila Parishad as determined by the Act.

Table 11-1: Functions of Upazila Parishad

Sector	Function
Administration and Finance	<ol style="list-style-type: none"> <li>1. <b><u>Preparation of the development plan for 5 years and also for different durations.</u></b></li> <li>2. Coordination and supervision of Officers from NBDs</li> <li>3. Coordinate, support and monitor Union Parishad development activities, Extend cooperation with other organizations</li> <li>4. Promotion of e-governance</li> <li>5. Other tasks directed by the government</li> </ol>
Law and Order	<ol style="list-style-type: none"> <li>6. Discussions with police department and submission of reports on law and order in Upazila</li> <li>7. Raise awareness and take preventive actions against terrorism, crime, drug abuse</li> <li>8. Coordination of disaster management activities</li> </ol>
Infrastructure Development	<ol style="list-style-type: none"> <li>9. Construction and maintenance of inter-Union roads</li> <li>10. Implementation of small-scale water resources project</li> </ol>
Rural Development	<ol style="list-style-type: none"> <li>11. Support and coordination of the activities of cooperative societies and NGOs</li> </ol>
Agriculture	<ol style="list-style-type: none"> <li>12. Undertake activities to improve agriculture, livestock, fisheries and forestry</li> </ol>
Education	<ol style="list-style-type: none"> <li>13. (a) Raise awareness of the importance of education (b) Supervision of activities and institutions with a view to improve secondary level education system</li> </ol>
Health	<ol style="list-style-type: none"> <li>14. Provision of public health, nutrition and family planning services</li> </ol>
Water Supply and Sanitation	<ol style="list-style-type: none"> <li>15. Improvement of sanitation and sewerage system, supply of safe drinking water</li> </ol>
Culture, Youth and Sports	<ol style="list-style-type: none"> <li>16. Implement the activities for women, children, social welfare and youth, sports and culture</li> </ol>
Social Welfare	<ol style="list-style-type: none"> <li>17. Creation of self-employment to reduce poverty</li> <li>18. Raise awareness against offences over woman and child abuse</li> </ol>
Environment and Forestry	<ol style="list-style-type: none"> <li>19. Undertake social forestry programs for environment conservation and improvement</li> </ol>
Commerce and Trade	<ol style="list-style-type: none"> <li>20. Implementation of activities to establish and promote small and cottage industries</li> </ol>

#### 11.4.4 Formulation Development Plan

**Section 42(1)** of the Upazila Parishad Act 1998 empowers Upazila Parishad to undertake and execute development plans of different terms including Five Year Plan.

During preparation of development plan, the Parishad can take into account opinions of the Union Parishad within the upazila, any organization actively engaged in the development of the upazila or any particular person.

The area of planning must be within its jurisdiction and according to the available fund. However, before undertaking any such plan prior approval is needed from the government. The Parishad

may take advice from City Corporation, Upazila Parishad, Pourashava Union Parishad or any person during preparation of any such plan.

**(2)** The plan will take into account the following issues:

- a. How the planning project will be funded, who will supervise and implement the project.
- b. Who will execute the plan.
- c. Other necessary issues related to the project.

**(3)** After preparation of every development plan, the Upazila Parishad (after taking opinion of the concerned Parliament Member) will submit one of its copies to the government. It can publish the plan for seeking public opinion and, in cases. consider their opinion for appropriate action.

### **11.4.5 Development Control**

- In 2017, a government notification granted Upazila Parishad the authority to regulate building construction within the upazila by approving building designs.
- Upazila Parishad is responsible for approving designs of proposed buildings within the Upazila areas outside the Pourashava boundary.
- There is an 11-member committee responsible for reviewing and approving applications for building design approval. The committee is chaired by the Upazila Chairman, and the Upazila Engineer serves as the Secretary. Other members include the Union Chairman, and representatives from IEB, BIP, and IAB. The committee has the authority to approve building designs up to 7 stories. Building designs beyond 7 stories are approved by another committee headed by the DC.
- The Building Plan Committee rarely conducts field inspections.

## **11.5 Union Parishad**

### **11.5.1 Organization Structure**

Union Parishad was created during the British era, and have since been continuously functioning as the basic unit of the local administrative body in rural areas. "Union Parishad Act 1983," the basis of Union Parishad formation, was amended several times. The last amendment was made in 2009.

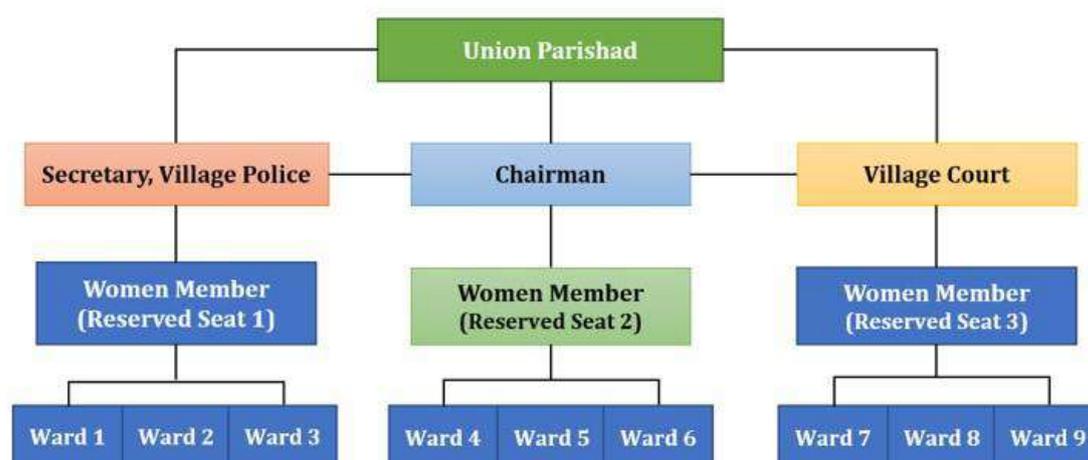


Figure 11-2: Organization Structure of Upazila Parishad

The Local Government (Union Parishad) Act 2009, determines Union Parishads' constitution, composition, elections, powers, functions, funding, financial management, and other matters. In addition, it determines the constitution and function of Wards, which are the lower-level units under the Union Parishad.

Union Parishad is composed of a Chairman and Members from Wards. Three members seats are reserved for woman. Chairman and members are all elected by adult franchise.

### 11.5.2 Function

There are 35 functions for the Union Parishad's determined in the Acts as summarized below.

Table 11-2: Functions of Union Parishad

Sector	Function
<b>Administration and Finance</b>	Preparation of the Five-Year Plan Assessment and raise tax, fee, toll, levy, etc. Registration of birth and death Promotion of e-governance Extend cooperation with other organizations Any other tasks as directed by the government
<b>Law and Order</b>	Maintaining law and order by undertaking necessary measures Prohibition of unauthorized admission to public streets, highways and public places and abatement of nuisances Protection of public streets, highways Taking measures to prevent fire, flood, hailstorm, earthquake or other natural disasters and to support government Undertaking measures and facilities for the security of Union inhabitants
<b>Infrastructure Development</b>	Development, protection and maintenance of rural infrastructure Lighting the Union Parishad roads and public places Operation and maintenance of burial grounds, burning places, public meeting places and other Government property Regulation of housing, building construction, and dangerous building structures
<b>Rural Development</b>	Development and encouragement of cooperative movement and rural crafts

Sector	Function
<b>Agriculture</b>	Agriculture, fishery and livestock and other economic development Undertake measures for additional food production
<b>Education</b>	Related with education, primary and mass education
<b>Health</b>	Implementation of activities relating to health and family planning Undertake necessary measures for epidemic control and disaster management Provision of first-aid centers
<b>Water Supply and Sanitation</b>	Collection, removal and management of dung and garbage Management and maintenance of wells, water pumps, tanks, ponds and other sources of water supply Preventing the contamination of sources of water-supply for drinking and prohibition of the use of water of wells, ponds or other sources dangerous to public health Prohibition and regulation of bathing, washing of clothes and watering of animals at or near wells for drinking water, ponds or other sources of water-supply Prohibition and regulation on the steeping of hemp, jute or other trees in or near to ponds or other sources of water-supply Prohibition and regulation of dyeing or tanning
<b>Culture, Youth and Sports</b>	Assistance in games and sports, social development, cultural activities, etc. Maintenance of public places, open spaces, gardens and play grounds
<b>Social Welfare</b>	Actions for resolution of family conflicts, and women and child welfare Registration and support of widows, orphans, poor and destitute
<b>Environment and Forestry</b>	Environmental development and conservation Tree plantation and protection of trees Regulation on excavation of earth, stones or other materials in residential areas Regulation on establishment of brick and other kilns and pottery facilities in residential areas
<b>Commerce and Trade</b>	Regulation on offensive and unsafe trade

## 11.6 Urban Management Policy Statement, 1999

### 11.6.1 Background

Rapid urbanization in Bangladesh necessitates increased investment and improvements in urban public service delivery, in the eleven major metropolitan centers — Dhaka, Chittagong, Khulna, Sylhet, Rajshahi, Mymensingh, Barisal, Rangpur, Cumilla, Narayanganj and Gazipur — as well as in smaller towns. The government is committed to improving the quality of life in cities and urban centers, particularly for the poor; so that service delivery is proportionate with population density so that these urban areas can become sources of opportunity, commerce, and economic growth forecasted in the 8<sup>th</sup> FYP.

### 11.6.2 Overview

Urban population of Bangladesh rose at a pace of nearly 5.4 percent per year between 1981 and 1990 (more than double the average yearly population growth rate of about 2.4 percent) and is currently rising at about 4.2 percent. As a result, there are significant to extreme shortages in urban infrastructure and services, such as water supply, sanitation, solid waste collection,

drainage, and transportation. Bangladesh's urban sector consists of twelve city corporations and over 200 subsidiary towns or municipalities, known as Pourashavas, which are the country's primary urban institutions. Decentralization can improve the efficiency of government spending by allowing local governments to be more responsive to local needs and preferences.

While decentralization is a long-term aim, certain policies must be implemented immediately in order to improve the management and delivery of urban services. These are primarily focused on increasing Pourashavas' technical, financial, and management capacity to plan, create, and implement long-term programs and projects with strong civic participation. These must come before any long-term decentralization attempts, as political devolution without local capacity to absorb the increased fiscal and political power could lead to waste and infrastructure shortages. The Bangladeshi government has issued an Urban Management Policy Statement, which serves as a basic policy framework for guiding and sustaining the gradual decentralization process. The goal of this policy statement is to enhance and build upon the existing policy.

### 11.6.3 Objectives

The principal objective of an urban management policy is to ensure that investment choices and methods pertaining to urban services balance considerations of equity and efficiency to produce sustainable gains. Specific operational objectives of the Government for improving urban management are:

- To promote long term capital investment planning by Pourashavas and city corporations, wherein specific investments are linked to an overall capital investment program;
- To improve the fiscal discipline — including budgeting and accounting processes — of Pourashavas and city corporations,
- To rationalize the inter-governmental revenue sharing mechanism to induce local effort and better reflect demand for resources;
- To improve tax efforts by Pourashavas and city corporations:
- To improve municipal access to long term infrastructure financing on a demand driven basis:
- To enhance private sector participation in the management and delivery of urban services;
- To improve community participation in the prioritization of investment as well as in specific operations and maintenance (O&M) activities;
- To provide all necessary technical assistance to Pourashavas and city corporations.

### 11.6.4 Policy Principles

Based on local and international experiences, the following principles have been adopted as the basis of policy formulation:

- Physical investments by municipalities will focus on the entire range of municipal services leading to the improvement of public health, well-being of people and economic development;
- Infrastructure deficits should be addressed on a priority basis with emphasis on maintenance and extension of coverage to the slums and poorer communities;

- Steps should be taken to gradually reduce grant dependency of Pourashavas and city corporations;
- Community and civic group participation in the prioritization of municipal investments should be emphasized. Community participation should be encouraged both in the long-term capital investment planning exercises as well as for specific subprojects with a view to ascertaining demand and ensuring long-term sustainability.
- The Government will promote an enabling environment for the private sector to participate and contribute to sector development both in terms of service delivery as well as provision of technical assistance.
- It will be ensured that all municipal investments and development activities are considered within broader environmental considerations.
- Municipal capacity building and urban management shall be approached within the context of the overall goal of democratic decentralization.

### 11.6.5 Policies

**Municipal Services:** Pourashavas and city corporations shall provide and maintain the following services to their constituents: (i) Water supply, (ii) storm water drainage (iii) solid waste disposal, (iv) public sanitation. (v) roads and traffic control systems, (vi) public markets, (vii) public transport terminals. (viii) recreational parks and reserves, (ix) community centres, (x) street lighting, etc.

**Public Investment Programs:** Municipalities shall develop Public Investment Programs (PIP), which will reflect the priority infrastructure needs and appropriate fiscal practices needed to accomplish these. A PIP prototype to be used by all municipalities shall be developed to facilitate this process.

**Transparent Capita Budgeting Process:** The capital budgeting process by municipalities and project selection shall be made transparent. For capital investment projects financed with central government funds, municipalities shall be made, wherever feasible, participants in the design and implementation of such projects.

**Land Use:** Land use plans shall be prepared by Pourashavas and city corporations in consultations with local communities and shall be periodically updated. Such plan shall form the basis for all property and land development and the assessment of taxes. Each Pourashava and City Corporation shall endeavor to appoint a full-time qualified Urban Planner to its staff for this purpose, and until such appointment is executed, such services shall be contracted out.

**Focus on Slum and Poor Communities:** Pourashavas and city corporations shall provide services in slums, including provisions of water, drainage, footpaths, sanitation, solid waste disposal and street lighting Self-help shall be the basis of such development with Pourashavas and city corporations providing necessary facilitation including trained community and health workers. Income generation especially for women shall be a major objective of all slum improvement programs.

**Uniform Municipal Financial Policy:** All external financing extended directly to either Pourashavas or City Corporations by multilateral or bilateral sources or lent via the MDF for municipal investments shall be provided on comparable terms.

**Double Entry Accounting System:** Pourashava and city corporations will adopt as early as possible a double entry accounting system on a cash basis. Training and technical assistance shall be provided on a priority basis to facilitate computerization in the transition to double entry accounting.

**Own Source Revenues:** Pourashavas and city corporations shall generate sufficient revenues from their own sources to meet, at a minimum, all of their operating expenses.

**Intergovernmental Revenue Transfer System:** The Government shall review in consultation with municipalities the current intergovernmental revenue transfer system and make appropriate changes to make it transparent, rational, and predictable and to some extent performance based.

**Private Sector Participation:** Pourashavas and city corporations shall endeavor to contract out service provision in whole or in part to private providers in areas such as solid waste disposal, public sanitation, and road maintenance. Finally, the Government shall formulate and issue a comprehensive privatization policy statement clarifying and providing for a conducive legal and regulatory framework for private participation in all sectors, including the municipal sector.

**Community Participation and Public Consultation:** Pourashavas and City Corporation shall conduct periodic public meetings to advise their constituents regarding their activities as well as to engage the public in consultations regarding investment choices, decisions, and priorities. As part of this increased transparency, Municipalities shall follow an open public record policy. Additionally, municipalities shall ensure that communities will actively participate in planning, implementation, and operation and maintenance municipal services.

**Role of Women:** Maximizing the participation of women shall be accorded high priority.

## 11.6.6 Housing Policy, 2004

### 11.6.6.1 Introduction

Housing, like food and clothing, is a basic human requirement. It ensures the people's safety and social standing. It also provides living amenities for humans, laying the groundwork for them to work and earn money. In both urban and rural parts of Bangladesh, there is now a severe housing shortage. The Bangladeshi government is well aware of the issue. To address the housing crisis, the government has taken a number of actions, including involving the public and private sectors in the housing sector, particularly for the lower and lower middle-income groups, providing shelter for homeless persons, and so on. Housing, in reality, is seen by the government as an attempt to promote human settlements, culture, and the economy of the country. In accordance with a United Nations decision made in 1988 to offer housing for everyone by the year 2000 AD and to achieve such a goal as a strategy, UN member states were asked to develop their own housing policies. Furthermore, all United Nations member states have been asked to put the recommendations of the 1992 Rio de Janeiro Conference on Environment and Development on human settlements development into action. The national housing policy was developed in response to the above-mentioned proposals and the government's Fifth Five Year Plan (1997-2002).

### 11.6.6.2 Objectives

The following are the main objectives of the housing policy:

- Ensure housing for all people of all walks living in the urban and rural areas especially for the lower and medium income group of people. In this context, preferences will be given to female headed households, socially disadvantaged people, and homeless people
- Arrange land for the lower and medium income group of people within their affordable limits
- In this context, earn profit through providing land to the richer section of people and provide subsidy to the lower income people
- Evolve strategies to reduce the development of slums and squatters here and there and transfer those settlements in suitable places ensuring healthy environment
- Resettlements for the people affected by disasters and fire
- Development of economic institutional facilities for encouraging and engaging personal savings for the housing purposes
- Evolve and making efforts for development and use of alternative and sustainable building materials based on the locally available forest resources such as wood, bamboo, straw, etc.
- Prepare appropriate institutional and legal framework which are easier for the housing development.
- Ensure to maintain and develop the local entity/character, quality, and environmental condition of the existing residential area
- amend and incorporate new strategies in the existing housing policy so as to address the newly emerging problems and issues to the housing in the country
- make efforts to keep housing cost and rent within the tolerable limit of the people
- reduce the migration of the rural people in the urban areas through creating employment opportunities
- encourage people to construct houses through keeping limit to imposing property taxes
- Evolve new strategies and techniques for the housing development to ensure better environment in the housing areas.

### 11.6.6.3 Policies

To achieve the above objectives, the strategy of the government is to act as a promoter and facilitator and also as a provider to a limited extent. The salient features of the housing strategy envisaged in the National Housing Policy are:

- The role of the government in housing will be to supply serviced land at reasonable price and to help create and promote housing financing institution
- Efforts will be made to increase affordability of the disadvantaged and the low-income groups through providing credit for income generation
- Improvement and rehabilitation of the existing housing stock will be given priority by the government alongside new housing
- Encroachment on public land and unauthorized constructions will be discouraged
- Facilities incremental house building and ensure wider application resources

- Conservation of the natural environment and preservation of cultural heritage in new housing projects

## **11.6.7 Population Policy, 2004**

### **11.6.7.1 Introduction**

Bangladesh's constitution places a strong emphasis on socioeconomic development for all inhabitants. According to Articles 15, 16, 17, and 18 of the Constitution, the state is responsible for providing basic needs such as health, education, food, and security to its population. The government had implemented a wide range of public policies in order to make these constitutional ambitions a reality. The government created a Population Policy Outline in 1976, recognizing the importance of population and development, and had designated the population problem as a national priority. The Policy stands out as one of the government's most notable accomplishments. This policy focus has been mirrored in all subsequent 5-year plans and programs since 1976. As a result, the percentage of people who utilize family planning methods has risen from 8% in the mid-1970s to 54% in 1999-2000. The total fertility rate (TFR) has lowered from 6.3 to 3.32, allowing the population growth rate to be reduced from 3% in the mid-1970s to 1.47 percent by the year 2000. However, the environment needed to improve the general public's quality of life has yet to be created. High population growth continues to be a roadblock to national progress. In 2002, Bangladesh's population was estimated to be over 129.3 million people. In the Interim Poverty Reduction Strategy Paper (IPRSP) document: A National Strategy for Economic Growth, Poverty Reduction, and Social Development, the government just established its development strategy. Upholding human rights and focusing decisions made at the International Conference on Education in Jomtien in 1993, the International Conference on Population and Development (ICPD) in 1994, the International Conference on Women and Children in Beijing in 1995, the Millennium Development Goals (MDGs) of the Millennium Summit in New York in 2000, and other relevant decisions taken in international forums have begun to update the existing national population policy.

### **11.6.7.2 Major Objectives**

The objectives of the National Population Policy are to improve the status of family planning, maternal and child health including reproductive health services and to improve the living standard of the people of Bangladesh through making a desirable balance between population and development in the context of Millennium Development Goals (MDGs) and Interim Poverty Reduction Strategy Paper (IPRSP): A National Strategy for Economic Growth, Poverty Reduction and Social Development. The following major policy objectives will help address the future challenges:

- Reduce Total Fertility Rate (TFR) and increase the use of family planning methods among eligible couples through raising awareness of family planning;
- Attain NRR equal to one by the year 2010 so as to stabilize population around 2060; 3.3 Ensure adequate availability and access of Reproductive Health Services, especially family planning services to all including information, counseling and services for adolescents;
- Improve maternal health with emphasis on reduction of maternal mortality;
- Reduce RTIs/STIs and prevent spread of HIV/AIDS
- Reduce infant and under five mortality rates;

- Reduce maternal and child malnutrition;
- Promote and actively support programs for elimination of gender disparity in education, health and nutrition;
- Ensure Early Childhood Development (ECD) program;
- Ensure and support gender equity and empower women;
- Develop the human resource capacity of planners, managers and service providers, including improved data collection, research and dissemination;
- Actively support measures to provide food and social security and shelter for the disadvantaged including the elderly, destitute, physically and mentally retarded persons;
- Actively support measures to regulate and reduce rural to urban migration;
- Support measures for environmental sustainability with emphasis on access to safe drinking water;
- Support poverty alleviating strategies and conducive environment for improved quality of life;
- Ensure coordination among relevant Ministries in strengthening population and development linkages and making their respective mandates and implementation strategies more population focused;

### 11.6.7.3 Strategies

Urban population in Bangladesh is increasing at the rate of 4.0 percent per annum, largely attributable to rural-urban migration. This high growth rate is putting tremendous pressures on urban facilities and civil services, including law and order. Hence, the following strategies will be adopted to slow down the growth of urban population:

- Slow down the rate of migration from rural areas to Dhaka and other major cities. To this end, there is a need to mitigate the push factors from rural areas by ensuring rural employment opportunities in agriculture and agro-based industries. Simultaneously satellite towns and growth centers should be established with adequate facilities to provide alternative destinations to rural migrants. Roads and communication systems should be linked with the growth centers; along with health, education, housing, and other welfare services created in those places. Headquarters of important Government and non-Government Organizations, educational institutions and industrial units may also be shifted or relocated to other cities;
- Relax rules relating to going abroad of skilled workers and make provision for dual citizenship;
- Impart education and skill training to the young men and women to become competent and skillful to handle many new and emerging fields in the cities and towns;
- Create skilled manpower for overseas employment;

Ensure coordinated and planned development of the towns and cities keeping in view the future growth of population and prevent the growth of urban slums through vigilance of administration, municipalities and law enforcing agencies, which may slow down the rate of population growth in urban areas.

## **11.6.8 National Agriculture Policy, 1999**

### **11.6.8.1 Introduction**

Bangladesh's economy is mostly based on agriculture. Approximately 84 percent of the population lives in rural areas and is involved in a variety of agricultural activities, either directly or indirectly. Agriculture accounts for around 32% of the country's GDP, with the crop industry accounting for about 23% of that. Agriculture employs over 63 percent of the workforce, with agricultural production accounting for about 57 percent. Nawabganj Upazila is also dependent on agricultural production and most of the population is engaged in agriculture directly.

The scope of modern agriculture has been greatly expanded. Although agriculture was originally defined as the cultivation of land for the sole purpose of producing crops, it is now widely accepted that any applied activity involving the production, development, preservation, processing, marketing, and extension of not only crops but also other agricultural commodities such as fish, meat, eggs, forest products, and so on, falls under the umbrella of agriculture. Crop production, animal husbandry, fishing, forestry, and other aspects of agriculture are included in the above concept. Crops, on the other hand, are without a doubt Bangladesh's largest and most important agricultural industry.

By establishing agriculture as a profitable sector in Bangladesh, it is possible to alleviate rural poverty and enhance the living standards of ordinary people. As a result, the agricultural production system must be reorganized and developed into a more dynamic and commercially viable sector. In this context, the National Agriculture Policy's main purpose is to modernize and diversify the crop sector, or the overall agricultural system, by launching and implementing a well-organized and well-coordinated development plan.

### **11.6.8.2 Objectives**

The overall objective of the National Agriculture Policy is to make the nation self-sufficient in food through increasing production of all crops including cereals and ensure a dependable food security system for all. The specific objectives of the National Agriculture Policy are to:

- To ensure a profitable and sustainable agricultural production system and raise the purchasing power by increasing real income of the farmers;
- To preserve and develop land productivity;
- To reduce excessive dependence on any single crop to minimize the risk;
- To increase production and supplies of more nutritious food crops and thereby ensuring food security and improving nutritional status;
- To preserve existing biodiversity of different crops;
- To take up programs for the introduction, utilization and extension of bio-technology;
- To take necessary steps to ensure environmental protection as well as 'environment-friendly sustainable agriculture' through increased use of organic manure and strengthening of the Integrated Pest Management (IPM) program;
- To take appropriate steps to develop an efficient irrigation system and encourage farmers in providing supplementary irrigation during drought with a view to increasing cropping intensity and yield;

- To establish agriculture as a diversified and sustainable income generating sector through strengthening of 'Farming System' based agricultural production and agro-forestry programs;
- To take effective steps to ensure input supplies to the farmers at fair prices in a competitive market and remove difficulties at the farmers' level which have arisen out of the privatization of input distribution system;
- To develop marketing system to ensure fair prices of agricultural commodities;
- To introduce an appropriate institutional system of providing credit to ensure the availability of agricultural credit in time;
- To produce and supply of agricultural commodities as required by the industrial sector;
- To reduce imports of agricultural commodities and find out newer opportunities for increasing exports as well;
- To create opportunities for establishing agro-processing and agro-based industries;
- To protect interests of the small, marginal and tenant farmers;
- To update the agricultural system in the light of the Agreement on Agriculture under WTO, SAFTA and other international treaties by protecting the national interests; and
- To Develop contingency management system to combat natural disasters.

In line with the above-mentioned objectives, the Government has the primary responsibility of ensuring optimum use of land. Although land is privately owned property in general, its use has to be compatible with the overall social goals and utility. Moreover, it is important to consider that the interests of small arid marginal farmers and the sharecroppers are protected, as they constitute the majority of farmers.

### **11.6.8.3 Steps and Strategies**

The following steps will be taken to ensure planned utilization of land for crop production:

- Land zoning program will be taken up by the Soil Resources Development Institute (SRDI) on a priority basis. Integrated approach of SRDI will be further strengthened for this purpose.
- To ensure maximum utilization of land, bottom-up planning through people's participation and its implementation will be started from the mouza or village level.
- In most areas the same land is suitable for more than one crop. Therefore, farmers will be encouraged to grow more profitable crops as an alternative to only rice-rice cropping pattern.
- Fertile agricultural land is going out of cultivation due to its use for non-agricultural purposes such as private construction, house building, brickfield, etc. Appropriate measures will be taken to stop this trend in the light of the Land Policy of the government.
- Maximum utilization of land will be ensured through promotion of inter-cropping with the main crops
- Acquisition of land in excess of requirement for non-agricultural purposes will be discouraged.
- Programs will be taken up to motivate the landowners not to keep their land unused without any acceptable reason.

Appropriate measures will be taken in the light of the Land Policy so that the interests of small and marginal farmers and the sharecroppers are protected and that the agricultural land is not kept fallow for a long period.

## **11.6.9 Industrial Policy, 2005**

### **11.6.9.1 Introduction**

Bangladesh is a developing country, and the present government is striving relentlessly to attain rapid economic development in the country. Many programs taken so far have been carried out successfully. Despite a lack of resources faced by the Government, development programs in the key sectors have continued. At the same time, considering the importance of the private sector, an all-out support is being provided to initiatives taken in this sector. As a result, a new kind of dynamism is under way in both the public and private sectors. In this backdrop, it is essential to examine various aspects of industrialization and its impacts on overall economic activities. Given the present environment of global competition, the private sector is playing an important role in the industrialization of the country. Therefore, the Government in the Ministry of Industries has taken the role of a facilitator. Faced with the challenges of the free-market economy and globalization, the government has accepted private ownership and management of industrial enterprises as one of the major guiding forces in achieving economic growth. Besides this, the government has also brought about many constructive and timely reforms in the running of businesses, and liberalized trade so that private entrepreneurs can seize opportunities of establishing and running industrial enterprises profitably and freely.

In the meantime, quite a number of publicly managed industrial enterprises have already been sold out and transferred to private ownership. In order to establish economically prospective industries in industrial sub-sectors, there are plans to set up industrial parks and special economic zones so that huge amounts of unused and abandoned land can be utilized. All this is aimed at fostering industrialization and economic development and generating employment opportunities in the country. To reduce poverty and generate employment opportunities, more efforts are needed to establish agro-based industries as well as to raise agricultural production. This will ensure the protection and fair price of agricultural products and employment of a huge number of unemployed people. In order to create further employment opportunities beyond the agricultural sector, initiatives should be taken to set up small, medium, and large industries across the country. If these types of industries are set up in a planned way, then unemployment rates will decline, and poverty alleviation will be accelerated. With these objectives in mind, the Industrial Policy has been radically reshaped.

The industrial sector is likely to grow rapidly over the next decade raising its contribution to the country's GDP to 30 to 35 percent, and the workforce in this sector is expected to increase to 35 percent of national employment need. In order to attain this growth in this sector, special importance has been given to the Industrial Policy on agro-based and agro - processing industries and on steps to overcome possible adverse conditions in the export-oriented garment sector. Importance has also been given on considering the SMEs and cottage industries as one of the major driving forces, providing assistance to women entrepreneurs on a priority basis, setting up special economic zones in different parts of the country, improving the quality of industrial

products to world standard, marketing of goods at competitive prices, and enhancing productivity in the industrial sector.

To this end, it can be hoped that the guidelines contained in the new Industrial Policy will help expand planned industrialization in the country, bring about sustainable and continuous industrial growth, and overcome the past failures of industrialization to a great extent. As a result, a sound and prospective foundation of economic development will be established. This will help bring about poverty alleviation, create further employment opportunities, reduce unemployment instances, improve living standards of people, and achieve overall economic growth in the country.

### **11.6.9.2 Objectives**

- One of the foremost objectives of the Industrial Policy 2005 is to set up planned industries considering the real domestic demand, prospect of exporting goods abroad, and discouraging unplanned industries in the light of past experience.
- Accept private initiatives as the main driving force of economic development and uphold the government's facilitating role in creating a favorable atmosphere in order to augment private investments in the country's industrialization, given the background of a free-market economy and globalization.
- Arrange for state-owned industrial enterprises to be sold/transferred/leased or administered in any other way by the Privatization Commission or concerned ministries in order to accelerate the privatization process.
- Take necessary initiatives to set up industries with private entrepreneurships, and where that is feasible, establish industries on state initiative in those sectors that are considered very important and essential because of national interest, where private entrepreneurs are not forthcoming.
- Catering the needs for local and foreign market and also for consumer satisfaction of the local products; measures to be undertaken (a) produce world class quality products, (b) diversification of goods, (c) introduce cost-effective management in the production system, (d) more value addition in the industrial sector, and (e) provide support for enhancing productivity by using continuous, appropriate, and advanced technology.
- Provide assistance to augment the industrial sector's contributions to the GDP of the national economy, meet the general demands of local consumers and earn more foreign exchange so that local industrial entrepreneurs can attain further capacity to establish industries, and industrial goods can have access to the overseas market on a competitive basis
- Provide inspiration for the speedy expansion of cottage industries and SMEs and for further investment in these sectors so that new employment opportunities are generated, unemployment reduced, and poverty alleviation program made in the country.
- Prioritize the expansion and development of agro-based and agricultural processing industries, and assist in the expansion of poultry, dairy and goat-sheep industry as agricultural industries.
- Provide women entrepreneurs with all necessary assistance in establishing industries in various sectors.

- Increase productivity at enterprise level; produce high value-added products step by step through development and application of appropriate technology and increase export through export diversification.
- Provide all necessary assistance for producing environmentally friendly products with the objective for creating a pollution-free environment in the industrial sector.
- Expand the local market and establish more backward linkage industries in order to accelerate the export of high value-added garments produced in the export-oriented garment industries and other relevant industrial sub- sectors.
- Further, enrich the industrial sector with the proper utilization of the country's various natural and mineral resources.

## **11.6.10 National Health Policy, 2000**

### **11.6.10.1 Introduction**

The Ministry of Health and Family Welfare constituted a committee in 1996 for preparation of a Health Policy with members drawn from technocrats, bureaucrats, civil society, and professional bodies.

### **11.6.10.2 Objectives**

- First: To make necessary basic medical utilities reach people of all strata as per Section 15(A) of the Bangladesh Constitution and develop the health and nutrition status of the people as per Section 18(A) of the Bangladesh Constitution.
- Second: To develop a system to ensure easy and sustained availability of health services for the people, especially communities in both rural and urban areas
- Third: To ensure optimum quality, acceptance and availability of primary health care, and governmental medical services at the Upazila and Union levels.
- Fourth: To reduce the intensity of malnutrition among people, especially children and mothers; and implement effective and integrated programs for improving nutrition status of all segments of the population.
- Fifth: To undertake programs for reducing the rates of child and maternal mortality within the next 5 years and reduce these rates to be acceptable level;
- Sixth: To adopt satisfactory measures for ensuring improved maternal and child health at the union level and install facilities for safe and clean child delivery in each village;
- Seventh: To improve overall reproductive health resources and services;
- Eighth: To ensure the presence of full-time doctors, nurses and other officers/staff, provide and maintain necessary equipment and supplies at each of the Upazila Health Complexes and Union Health and Family Welfare Centers;
- Ninth: To devise necessary ways and means for the people to make optimum usage of the available opportunities in government hospitals and health service system, and to ensure satisfactory quality management, cleanliness of service delivery at the hospitals;
- Tenth: To formulate specific policies for medical colleges and private clinics, and to introduce appropriate laws and regulations for the control and management of such institutions including maintenance of service quality;
- Eleventh: To strengthen and expedite the family planning program with the objective of attaining the target of Replacement Level of Fertility;

- Twelfth: To explore ways to make the family planning program more acceptable, easily available and effective among the extremely poor and low-income communities;
- Thirteenth: To arrange special health services for mentally retarded, the physically disabled and for elderly populations;
- Fourteenth: To determine ways to make family planning and health management more accountable and cost-effective by equipping it with more skilled manpower;
- Fifteenth: To introduce systems for treatment of all types of complicated diseases in the country and minimize the need for foreign travel for medical treatment.

### **11.6.11 Draft National Urban Sector Policy 2011**

#### **11.6.11.1 Introduction**

It is a matter of long-outstanding subject that realized by the concerned professional that urbanization and other related issues of the urban sector need a strong policy support so as to deal with the problems of rapid urban growth in Bangladesh. It was only in the year 2005 that the Government of Bangladesh through its Local Government Engineering Department (LGED), Ministry of Local Government, Rural Development and Cooperatives took initiative and formed a Committee for Urban Local Governance (CULG) and a Sub-Committee for preparation of the National Urban Sector Policy with Professor Nazrul Islam, Chairman of Center for Urban Studies (CUS) as its Convener. The Committee consisted of 16 members who worked for almost a year and formulated a draft policy report. On this draft policy report, a number of consultation meetings were held with different stakeholders. Additions/modifications were done in the draft report. However, it requires now formal approval by the Government which is still in draft form.

#### **11.6.11.2 Background of the Policy**

In Bangladesh, cities and towns are playing a crucial role in the national development despite the adverse socio economic and environmental consequences resulting from rapid growth of these urban centers. At present urban dwellers constitute about 26 percent of the total populations of the country, but their contribution to GDP is more than 45 percent indicating that the productivity in urban areas is much higher than that in rural areas. Such gains in productivity, however, cannot be sustained if appropriate steps are not taken to combat negative consequences of urbanization. In other words, there is need for sustainable urbanization so as to achieve sustainable development. Sustainable urbanization' is a dynamic, multi-dimensional process. Most crucially, it includes not only environmental but also social, economic, cultural, and political-institutional sustainability. Even at 26 percent level of urbanization the total urban population of Bangladesh is already over 36 million and this population is growing at a very rapid rate of nearly 4 percent per annum while the capital and premier city, Dhaka and the port city, Chittagong are growing even faster. Urbanization in Bangladesh is also characterized by a spatially unbalanced pattern.

#### **11.6.11.3 Future Vision of the Policy**

The National Urban Policy envisions strengthening the beneficial aspects of urbanization and at the same time effectively dealing with its negative consequences so as to achieve sustainable urbanization, keeping in view the multi-dimensional nature of the urbanization process. The policy also envisions a decentralized and participatory process of urban development in which the central governments, the local government, the private sector, the civil society, and the people

all have their roles to play. The policy, therefore, should cover spatial, economic, social, cultural, aesthetic and environmental aspects of urban life directed towards achieving an urban reality that can ensure freedom from hunger and poverty; capacity to live a healthy life; access to education, shelter, and basic services, and a secure and livable environment at home and at the workplace. The policy will be gender sensitive and friendly to children, the aged and the disadvantaged.

#### **11.6.11.4 Objectives of the Policy**

The major objectives of National Urban Sector Policy for Bangladesh, therefore, will be to

- To ensure regionally balanced urbanization through decentralized development and hierarchically structured urban system;
- To facilitate economic development, generation, reduction of inequality eradication through appropriate frameworks and infrastructure provisions;
- To ensure optimum utilization of land resources and meet increased demand for housing and urban services through public-private and other partnerships;
- To protect, preserve and enhance the urban environment, particularly water bodies;
- To devolve authority at the local urban level and strengthen local governments through appropriate powers, resources and capabilities so that these can take effective responsibility for a wide range of planning, infrastructure provision, service delivery and regulatory functions;
- To involve all sectors of the community, including women and the poor, in participatory decision-making and implementation processes;
- To ensure social justice and inclusion by measures designed to increase the security of poor people through their access to varied livelihood opportunities, secure tenure and basic affordable services;
- To take into account particular needs of women, men, children, youth, the elderly and the disabled in developing policy responses and implementation;
- To assure health, safety and security of all citizens through multifaceted initiatives to reduce crime and violence;
- To protect, preserve and enhance the historical and cultural heritage of cities and enhance their aesthetic beauty;
- To develop and implement urban management strategies and governance arrangements for enhancing complementary roles of urban and rural areas in sustainable development; and,
- To ensure good governance by enhancing transparency and establishing accountability.

#### **11.6.11.5 Major Dimensions of the Policy**

Effective responses to the challenges posed by rapid urbanization and fulfilling the stated objectives will require giving priorities to the following dimensions while formulating the National Urban Sector Policy: (i) Patterns and process of urbanization; (ii) Local urban planning; (iii) Local economic development and employment; (iv) Urban local finance and resource mobilization; (v) Urban land management; (vi) Urban housing; (vii) Urban poverty and slum improvement; (viii) Urban environmental management; (ix) Infrastructure and services; (x) Urban transportation; (xi) Health and education; (xii) Social structure; (xiii) Gender concerns; (xiv) Urban children, aged, the disabled and The scavengers; (xv) Urban Recreation, Playground,

Park, Open Spaces and Graveyards; (xvi) Cultural and aesthetic development; xvii) Rural-urban linkage; (xviii) Law and order; (xix) Legislation; (xx) Urban Governance and (xxi) Urban Research, Training and Information.

#### **11.6.11.6 Conclusion**

In fact, the above-mentioned draft national urban policy has covered a number of wide-ranging issues which are needed to address the problems and issues related to urban growth and development of Bangladesh. It is of urgent need that the present Government should take all the initiatives to adopt and implement the policy so that the urban issues and concerns are duly addressed in the country.

### **11.6.12 National Land Use Policy, 2001**

#### **11.6.12.1 Introduction**

Bangladesh is an agrarian country. The source of one-third of the GDP of Bangladesh is agriculture and two-thirds of the people of the country live on agriculture. Therefore, the importance of land and water resources is vital. The land is the natural basic resource which supplies food, industrial raw-materials, elements of ensuring health condition, etc. About 130 million people live 14.4 million hectares of land resulting average land occupation by a person is about 27 decimals and cultivable land of 17 decimals. The size of land possessing per capita is decreasing day by day. In conformity to economic development, the rate of urbanization is increasing, industrial development is taking place, infrastructure such as roads, hospitals, and educational institutions are coming up. As a result, the land under agriculture is diminishing. The land area under agriculture was 20.2 million acres in 1983-84 has reduced to 17.5 million acres in 1997.

In fact, the best use of the land and water resources depends on the effective land use plan. Land, water resource and environment altogether play a vital in creating indigenous resources. This is immense importance of having a definite policy through which the use of limited land resources can be ensured.

#### **11.6.12.2 Objectives of the Policy**

- To arrest the existing reduction of land used for various purposes so as to ensure the availability of agricultural land to be used for food production;
- To ensure effective control of land use through introducing land zoning in the country based on regional natural potentiality so as to deal with the problem of unplanned residential, industrial and commercial developments;
- To ensure optimum use of *haor* or land rose from the sea or char land targeting resettlements of the landless people;
- To protect government *khas* land for using those land for the future developmental purposes;
- To ensure conformity of land uses with that of the natural environment;
- To use the land optimally in reducing poverty and creating employment opportunities so that eventually the number of landless people is reduced;
- To control land pollution;
- To encourage construction of multi-storied building by the government and private organizations so that modest land is used.

### 11.6.12.3 Main Components of the Policy

- Use as much as required for agriculture purposes and land use cannot be changed with permission of the appropriate authority
- Ensure use of land owned by the landlord absentee
- Keep limit the process of division of agricultural land into small pieces
- Identification of zones for land uses by all city corporations and pourashavas and other places of upazilas
- Preparation of maps for the identified zones
- Provision of assistance by the revenue office of district administration in preparing zoning maps by the local government organizations
- No alteration of land use zoning approved by the authority without any definite valid reasons and bindings
- Existence of zoning law in the country; abide this law to implement the zoning map prepared by the local government organizations
- Encouragement to construct model house and planned residential areas in the rural areas
- Encouragement to construct multi-storied buildings instead of single storied in the rural and urban areas so as to ensure optimum use land for residential purposes
- Identification of the forest land by the Ministry of Forest and Environment
- Undertake measures for protection, maintenance, and expansion of the existing forest land
- Encouragement for development of the social forestry
- Keep open the exiting water bodies and those are not to be filled in. Entrust the responsibility of maintaining small ponds by the owners and large water bodies such as rivers, channels, *haor*, *baor* and *beel* by the community people and the Government. To this effect, these water bodies are to be re-excavated regularly
- Use of embankments for controlling flood as roads as far as possible
- Planned tree plantation on the embankments
- Use ditches and other water bodies for fish production and rearing ducks created during cutting of earth for constructing embankments. Not to dig new land as much as possible during constructing embankments rather re-excavate the existing filled in water bodies
- Ensure not to create waterlogging by constructing embankments
- No acquisition of land for the purpose of road construction other than/except national highways, regional and district to Upazila roads, Upazila to Upazila connecting roads. Avoid human settlements and fertile agricultural land to acquire land wherever land acquisition is of utmost need. Constructs inter and intra village roads in planned manner
- Construct/establish industries in the designated places keeping view on the availability of support services for industrialization
- Construct industries of special types in the areas delineated for such purposes
- Not to pollute/infect land or environment through discharging waste from the industries and follow strictly to treat industrial waste
- Construct service roads along the main roads of the country so as to ensure safe movement of traffic as well as set aside 10 feet to 20 feet of land for plantation trees on both sides of roads

- Discourage construction of small and cottage industries within 10 kilometers of radius if industries are accommodated within the BSCIC industrial area
- Identification and ensuring land use suitable for tea gardens and rubber plantations through surveys and investigations. No other use of land as designated for tea garden purposes
- Inclusion of districts under Chittagong Hill Tracts for conducting surveys for land uses
- Protection of social rights of possessing land by the indigenous people living in the different parts of the country following their traditional laws

### **11.6.13 Forest Policy, 1994**

#### **11.6.13.1 Introduction**

The first formal forest policy for the undivided India was promulgated in 1894, which was the basic guidelines for the formulation of Acts and Rules, for the management of forests in the country and latest one in 1994. Prior to this policy” Charter of Indian Forests “was made in 1855 by the Government of British India for conserving forests in India including this tract, Bangladesh. Prior to this charter, there were only scanty regulations regarding the felling of trees for revenue.

#### **11.6.13.2 Objectives**

- To meet the basic needs of the present and future generations and also to ensure greater contribution of the forestry sector in the economic development, about 20% of the total area of the country will be afforested by taking up various afforestation programs
- By creating employment opportunities, strengthening the rural and national economy, the scope for poverty alleviation and trees and forest based rural development sectors will be extended and consolidated
- Biodiversity of the existing degraded forests will be enriched by conserving the remaining natural habitat birds and animals
- Agricultural sector will be strengthened by extending assistance to the sectors related with forest development.
- National responsibilities and commitments will be fulfilled by implementing various international efforts and government ratified agreements relating to global warming, decertification and control of trade and commerce of wild birds and animals.
- Through the participation of the local people, illegal occupation of the forest lands, illegal tree felling and hunting of the wild animals will be prevented
- Effective use and utilization of the forest goods at various stages of processing will be encouraged
- Implementation of the afforestation programs - on both public and private lands will be provided with encouragement and assistance.

#### **11.6.13.3 Policy Statements**

- Attempts will be made to bring about 20% of the country's land under the afforestation programs of the government and private sector by year 2015
- Because of limited amount of forest land, effective measures will be taken for afforestation in rural areas, in the newly accreted char and in the denuded Unclassed State Forest

- Private initiatives will be encouraged to implement programs of tree plantation and afforestation on fallow and hinter land, the banks of the ponds and homestead lands
- Tree plantation on the courtyards of rural organizations such as Union Parishad, School, *Eidgah*, *Mosque-Moktob*, Temple, Club, Orphanage home, *Madrassa*
- Massive afforestation on either side of land surrounding road, rail, dam and *khas* tank through the partnership of the local people
- Protected area i.e. National Parks, Wildlife Sanctuaries and Game Reserves' area will be increased by 10 per cent of the reserved forest land by the year 2015
- Inaccessible areas such as slopes of the hills, fragile watersheds, swamps, etc. will be identified and kept as protected forests.
- Women will be encouraged to participate in homestead and farm forestry, and participatory afforestation programs.
- Forest resource based labor-intensive small and cottage scale industries will be encouraged in the rural areas.
- Ecotourism, related to forest and wildlife, is recognized as forestry related activity, which will be promoted taking into consideration the carrying capacity of nature
- Forest Department will be strengthened in order to achieve the goal and objectives of National Forestry Policy. A new department called "Department of Social Forestry" will be established.

### **11.6.14 Water Conservation Act, 2000**

#### **11.6.14.1 Particular Features of the Act**

This act is applicable for all playgrounds, open space, play field and natural water body of Metropolitan city, Divisional town, District town and all other Pourashava area. Some Definitions, Specifications and Compensation of illegal encroachments related to these features are mentioned in this Act.

The Act has been formed considering specific features. The illegal development activities need to be controlled to keep those features as it is. This is crucial to preserve the natural environment. The Definitions of specific features are:

- i. Land of Natural Trees/Park-it means that identified Natural land of trees/ park in Master plan or any land Survey design or any place proclaimed by Government, Government gazette
- ii. Open space- it means that identified open space which is proclaimed by Government, Government gazette or which is used as *Eidgah* or other relevant use by public for a long time.
- iii. Playground-it means that place which is used for Sports or to display any athletic games or any place identified as playground in Master plan
- iv. Natural Water body- it means the Natural Streams (River, khal, Beel, Large Pond/ Lake, Waterfall or water bodies which is identified in Master Plan or any place as flood flow area, rainwater or other natural drainage water reservoir area proclaimed by Government, Local Government, or any organization

Changes in the category of features - it means the changes of any features from those conditions which are as identified or defined in Master Plan or Government Gazette by land deposition, pucca, semi-pucca or katcha structures and any type of building construction.

#### **11.6.14.2 Major Features of the Act**

The major specifications in the Act are:

- i. Change in the category of features is strictly prohibited. According to this law, the categories of these features cannot be changed as identified or used for any other purpose or transferred to others for the purpose of rent, lease etc.
- ii. In addition, if the natural characters of any Land are destroyed by cutting trees, then it will be also considered as changes in the category of features.
- iii. If the owners want to change the category of features, it is required to the authority showing the proper reasons that
  - a. Either the changes would hinder the purpose of Master plan or not. If it causes then what would be the amount of loss
  - b. Either the changes cause any negative impact on the environment or not
  - c. Either the changes cause any negative impact on the inhabitants or not
- iv. If any person or Company violate this law by doing any construction work or building any structure which may destroy any features then the development activities or constructed structures will be forfeited.

#### **11.6.15 Building Construction Act 1952**

The Act provided regulations regarding setbacks, building heights etc. in urban areas. The act also provided for prevention of haphazard construction of buildings and excavation of tanks which are likely to interfere with the planning of certain areas in Bangladesh and enables government to make any substantial rules for carrying out the purposes of the act.

##### **11.6.15.1 Definitions**

“Building” includes a house, out-house, hut, wall, and any other structure whether of masonry, bricks, corrugated iron sheets, metal, tiles, wood, bamboos, mud, leaves, grass, thatch, or any other material whatsoever.

“Master plan” means the master plan prepared and approved under any law for the time being in force for the utilization of any land anywhere in Bangladesh.

“Owner” in relation to a building or tank means the person at whose expense such building or tank is constructed or excavated or who has the right to transfer the same, and includes his heirs, assigns and legal representatives.

“Tank” includes ditch, drain, well and channel.

##### **11.6.15.2 Restriction on Improper Use of Land and Buildings**

No owner or occupier of a building shall, without obtaining previous permission from the Authorized Officer, as the case may be, uses the building for a purpose other than that mentioned

in the sanction. When the Authorized Officer is satisfied that the existing use of any land or building does not conform the scheme of land utilization indicated in the Master Plan, the Authorized Officer may, by an order in writing, direct the owner, occupier, or the person in charge of the land or building to discontinue such use and, in the case of a building also to remove or dismantle such building. Provided, however, that the owner, occupier, or the person in charge of the land or building shall be given six months' time before effect is given to the order of discontinuance of such use and twelve months' time before effect is given to the order of removal or dismantlement of the building. Provided further that no existing or further use of any land or building for combined residential and commercial purpose shall be discontinued or prohibited unless, in any particular case, such use militates against the dominant character of the scheme of land utilization as indicated in the Master Plan and constitutes a nuisance generally to the zone and particularly to the neighborhood in which the land or building is situated.

### **11.6.15.3 Removal of Buildings**

If any person fails to comply with any direction for removal of any building given to him under section 4 or sub-section (1) of section 5 of the Act, within the period fixed therefore, the Authorized Officer may cause the temporary building or the building under construction, as the case may be, to be removed at his own expenses in which case such person shall not be any more entitled to any compensation.

## **11.6.16 Bangladesh National Building Code (BNBC)**

In order to ensure optimum return of substantial portion of national resource invested in building construction, in both public and private sectors and to achieve satisfactory performance of any building, construction needs to be controlled and regulated. These instruments needed updating, rationalization, and unification. It was therefore felt that a comprehensive building code would serve the purpose of a uniform national standard. The work to develop the Code began in 1992 and was completed by the end of 1993.

### **11.6.16.1 Purpose**

The purpose of the Code is to establish minimum standards for design, construction, quality of materials, use and occupancy, location, and maintenance of buildings within Bangladesh in order to safeguard, within achievable limits, life, limb, health, property, and public welfare.

### **11.6.16.2 Scope**

The provisions of the code shall apply to the design, construction or occupancy, alteration, moving, demolition, repair of any building or structure and to any appurtenances installed there in or connected or attached there to, except such matters as are otherwise provided in other ordinances and statues controlling and regulating buildings. It is stated that the provisions of the code are applicable to all persons of Bangladesh.

### **11.6.16.3 Updating BNBC**

BNBC needs to update due to lack of consideration of some issues. BNBC of 1993 came into effect with a gazette notification issued on November 15, 2006. It has been made mandatory to comply with any building construction under the Building Construction Act of 1952 to ensure accountability in the management of overall building construction and safety of the buildings. As

per section 2.1 of chapter 2 of part 1 of the BNBC 1993 the Government is under obligation to establish a new or designate an existing agency responsible for the enforcement of this Code with a given area of jurisdiction. However, the Government is yet to set up any Code Enforcement Authority. Thus, absence of regulatory authority to care for all safety aspects of building as per BNBC is major concern. The BNBC 1993 has dealt only with construction, structure, material, geotechnical, seismic aspects, etc. of development. The BNBC has left out the planning aspects of development as is evidence from section (f). All these planning and development factors need to be incorporated BNBC, if it is to produce a safe and livable environment at all.

### **11.6.17 Master Plans (RAJUK, RDA, KDA, CDA Master Plan)**

The existing master plans such as RDA, KDA, and CDA etc. have also been reviewed to get an idea. The planning and development controls, however, practiced in urban areas from late fifties are structured on master plan concept. At present master plan prepared under the framework of Strategic and Structural Plan, has been set out to serve as a land-use zoning together with development of urban infrastructure and services. The plan will serve as a basis for development control and overall development of the city. However, for execution of development schemes, detailed plans are to be prepared for the Detailed Area Planning Zones, under a separate planning program in future. Table 11.1 shows the review of previous Master Plans of RAJUK, RDA, KDA and CDA.

### **11.6.18 Sustainable Development Goals (SDG)**

#### **Objective-11**

- Support economic, urban, and environmental connectivity through strong national and regional planning in cities, peri-urban and rural areas
- Building a sustainable society and economy
- Creation of career and business opportunities
- Invest in building safe, affordable, and sustainable public transport systems for all
- Creation of green public space
- Safe and affordable housing
- To improve urban planning and management
- Participatory and inclusive planning
- Strive to preserve cultural and natural heritage.

#### **Objective-13**

- Strengthening resilience and adaptive capacity to climate related disasters
- Incorporating climate change measures into policies and plans
- Knowledge and capacity building to deal with climate change
- Implementation of the UN Framework Convention on Climate Change
- Development of methods for capacity building of planning and management.

#### **Objective-14**

- Sustainable fishing
- Protecting and restoring ecosystems

#### **Objective-15**

- Reforestation and restoration of damaged forests
- Restoration of damaged land
- Conservation and restoration of terrestrial and freshwater
- Ecosystems
- Protecting biodiversity and natural sanctuary

### **11.6.19 Bangladesh Delta Plan- 2100**

- Ensuring security from floods and climate change related disasters;
- Enhancing water security and cost-effective water use;
- Ensuring sustainable and integrated river management and estuarine management;
- Conserving wetlands and ecosystems and promoting their beneficial use;
- Building effective and equitable institutions for national and sub-national water resource management;
- Achieve maximum and integrated use of land and water resources as well.

### **11.6.20 Bangladesh Perspective Plan (2021-2041)**

- Reducing income inequality to alleviate urban poverty;
- Sustainable agricultural systems in urban future food and nutrition security;
- Urban transition (Urban Transition), good governance reforms, information technology and scientific research, environmental management for the blue economy etc.;
- Construction of efficient and sustainable transport and communication infrastructure;
- Creation of digital city through development of information technology.
- To accelerate inclusive growth through macroeconomic management in a sustainable manner;
- Sustainable human development;
- Industrialization and trade sustain dynamic growth in competitive markets and reach 1-2% growth.

### **11.6.21 Eight Five Year Plan (2020-2025)**

- Adopting a comprehensive inclusive strategy to enable every citizen to participate in and benefit from development activities; helping poor and vulnerable groups under social security;
- Adopt a sustainable development approach resilient to disasters and climate change that will ensure sustainable use of natural resources and successfully manage inevitable urbanization;
- Institutional development to manage the economy for transition to an upper middle-income country;
- Achieving the Sustainable Development Goals and adapting to the impact of transition from least developed country;
- Relating urbanization to growth in economic activity;
- Three steps in restructuring urban management:
  - (1) Strengthening public-private partnerships to improve service quality;
  - (2) Capacity building of public institutions involved in urban service delivery;

- (3) Development of accountable urban government system with economic decentralization;
- Investment in essential civic amenities such as water supply, drainage, sewage and waste management;
  - Government subsidy on affordable housing for poor people;
  - Institutional restructuring to develop strong local government institutions.

### **11.6.22 Dhaka Structure Plan (2016-2035)**

- Establishment of urban centers at various levels, decentralization of civic amenities and employment;
- Establishing regional connectivity with core cities through rapid transport system;
- Affordable housing;
- Development of Green and Blue Urban Corridor;
- Improving connectivity between parks, open spaces and roads;
- Ensuring clean environment including waste management;
- Acquiring disaster and fire prevention capabilities;
- Compact development;
- Construction of strong economic infrastructure and planned industrial zones;
- Conservation of river channels, canal banks and wetlands.

### **11.6.23 National Disaster Management Plan, 2010-2015**

- Roles and Responsibilities of Related Organizations in Emergency Operations and Risk Reduction;
- Disaster Management Regulatory Framework;
- Provides a long-term strategic goal in disaster and its management;
- To provide a direction for disaster management planning by various agencies;
- Publication of management plans at various ministry and administrative levels, such as District Disaster Management Plan, Upazila Disaster Management Plan, Union Disaster Management Plan and Municipal/City Corporation Disaster Management Plan;
- To recommend inclusion of disaster component in various plans and development projects of various ministries;
- Assigning NGOs, civil society and the private sector their responsibilities and means for disaster management strategic goals and government implementation;
- Pre-disaster policy and post-disaster mitigation design formulation.

### **11.6.24 Local Government (Paurashava) Act 2009**

- Conducting surveys on municipal history, statistics, public services and other matters;
- Development and enlargement of any area included in the municipality;
- Enactment of restrictions and regulations relating to municipal area development, building construction, reconstruction.

### **11.6.25 The Playgrounds, Open Parks, and Natural Reservoirs Conservation Act, 2000**

Applicable for all municipal areas of the country including the municipal areas of metropolitan cities, divisional cities, and district towns

- No structure shall be built which disturbs the natural course of any creek or river without prior permission;
- Prioritization of water use in areas where water resources are in crisis is a significant step (use of water only for consumption and domestic purposes will be considered a fundamental right);
- From the point of view of protection and conservation of water resources, timely decisions should be taken according to the law for irrigation and water demand of urban areas based on the availability of surface water, ground water and rain water;
- Prior permission shall be pending for dredging of rivers to maintain navigability, land reclamation projects by filling wetlands, construction of structures to control floods and prevent river erosion;
- Public hearing is a very good provision for the proposed National Water Management Plan.

### **11.6.26 Environment (Conservation) Act, 2010**

- Inclusion of green infrastructure in communities;
- Conservation of land resources in ecologically sensitive areas;
- Conservation of open space for water drainage, future use, green belt and recreational facilities;
- Agricultural land management and control of excess Urban Sprawl;
- Management of wetlands and floodplains through land use regulation;
- Circular waterways within the city as an alternative to the existing road system;
- Compact and mixed land use development for non-motorized transport and pedestrian coordination;
- Attention to traffic rules and management for rickshaws and bi-cycles;
- Recycling means reducing costs in waste management
- Providing community based civic amenities;
- Housing for people of all classes and incomes;
- Compulsory education system, women education and technical training of women;
- Provision of free primary medical facilities to underprivileged communities; special focus on women and children;
- Development of cooperatives and businesses in the community, regional exchange system, informal credit system, community based environmental management.

### **11.6.27 Climate Change Strategy and Action Plan, 2009**

- Ensuring all basic amenities (food security, safe housing, jobs, health) while protecting low-income people and the most vulnerable in society, including women and children, from the effects of climate change;

- Already successful disaster management strategies should be used for increasing and deadly natural disasters;
- Existing structures (i.e., seashore and river embankments) should be preserved and ensured to be functional;
- Correct location of critical infrastructure (cyclone shelters and drainage systems) to address climate change impacts;
- Determining the future situation and timing of climate change impacts on economic and socio-economic sectors, guiding future investment strategies;
- Bangladesh's engagement with global ongoing scientific thinking and ensuring best practice climate change management;
- Capacity building and institutional strengthening.

### **11.6.28 National Waste Management Strategy, 2010**

- Complete elimination of waste disposal in open dumps, rivers and floodplains;
- Promote recycling through source segregation and create markets for recycled products;
- To encourage recycling of waste;
- Emphasis on waste avoidance/reduction through waste recycling and environmentally sound disposal of all types;
- Using environment friendly raw materials;
- Using hazardous waste materials to the minimum possible level.

### **11.6.29 Land Acquisition and Resettlement Policies**

Resettlement objectives regarding the principles and guidelines for land acquisition and resettlement are primarily aimed at avoiding or minimizing, to the extent possible, the hardships and impoverishment that land acquisition and displacement may cause, and mitigating any adverse impacts thereof at the household, group, neighborhood and urban levels. All decisions regarding design of the development works will be made, to the extent feasible, to minimize land acquisition, displacement and disruption of livelihood of the poor, and vulnerable urban people.

#### **Bangladesh Resettlement Policy**

The first law on land acquisition in the sub-continent was promulgated in 1870. It was amended by the Land Acquisition Act, 1894 (Act I of 1894). While the land acquisition Act of 1894 is remained enforced, the East Bengal (Emergency) Requisition of Property Act was promulgated in 1948 after the partition of India and this Act was extended from time to time and finally modified by the Ordinance No. II of 1982, namely, 'The Acquisition and Requisition of Immovable Property Ordinance, 1982'. This ordinance provided certain safeguards for the owners as far as payment of compensation is concerned and also against wastage and misuse of lands.

Therefore, Bangladesh Resettlement Policy is based on the Acquisition and Requisition of Immovable Property Ordinance of 1982 (ARIPPO), and some provisions of which were subsequently amended in 1993 and 1994. The ordinance is the only law that governs all cases of acquisition and requisition by the Government of immovable property (land, crops and structures) for any public purpose or in the public interest. It may be mention that some rules have also been framed under these Ordinance and Act to facilitate the operation of different provisions related to land acquisition.

Presently, the owners are compensated with money by the DC for acquired property on the basis of its registered market value. The market value of the property (land, structure, pond, etc.) is assessed on the basis of average recorded value for preceding 12 months together with a sum of 50% premium on the market value. This value is known as Cash Compensation by Law (CCL). This law does not permit the affected persons to take the salvageable materials for which they are being compensated. In most cases, the compensation does not constitute the market or replacement value of the property acquired.

Under the 1982 Act, the government is obliged to pay compensation only for the assets under acquisition and then handover them to the requiring body. The ordinance does not cover project-affected people like non-titled people or without ownership records such as informal settlers or squatters. So, the government has neither any obligation to resettle the affected person nor any provision to restoring their income. But if someone lives in a private homestead with formal permission, compensation is generally paid to the owner for the structure only and not for the land. Under the provisions of the Land Acquisition Act 1994 the government is liable to compensate the project-affected persons of the following types:

- Compensation for loss of land by owners only;
- Compensation for houses and structures affected;
- Compensation for loss of crops, trees and perennial; and
- Compensation to sharecroppers, if applicable.

### **11.6.30 My Village My Town Project Report, 2023**

- Promotion of all amenities of a modern city in rural areas (improved roads, communication, clean water, modern health care and medical care, quality education, improved sewage and waste management, increased electricity and fuel supply, computer and high-speed internet facilities, market for quality consumer goods including electrical appliances);
- Encouraging and supporting the installation of biogas plants and solar panels on group basis to increase and increase the reliability of electricity and energy supply in villages;
- Expanding rural mechanization services including machinery repair by setting up agricultural machinery service centers and workshops at the village level and providing productive employment by training rural youth and agricultural entrepreneurs through these;
- In addition to these services in the non-agricultural sector, providing necessary assistance including credit facilities to the marginal and small entrepreneurs of the private sector to manufacture and market light machinery.

### **11.6.31 National Housing Policy 2016**

A policy is a set of ideas or plans that are used to guide decisions and accomplish rational outcomes. Bangladesh's government takes many policies for the development of its citizens. The national housing policy is one kind of policy that is undertaken by the Bangladesh government to provide affordable and sustainable housing to all of its citizens. Because the government believes that housing is a basic right of people. Housing is seemed to be a shelter, security, social status

and source of income to the people. Besides, for ensuring standard livelihood through planned economic development to manage housing for all is the constitutional responsibility of the Bangladesh Government.

The government is concerned about existing housing crisis in both urban and rural areas. "None should be homeless" is the motto of the government. In order to address the housing deficit, the government is playing a proactive role by adopting appropriate planning and management approaches to guarantee access to affordable housing for everyone.

The government itself has realized the importance of appropriate policy for ensuring housing for all as well and therefore it has mentioned the following necessities of housing in the last reviewed policy in 2016:

### **11.6.31.1 Vision**

To ensure accessibility of people from all strata of society to suitable housing, and to improve housing and settlements towards sustainable development, equitable living standard, improvement of working environment and access of all to basic services and amenities considering health, security and affordable price to uphold equal right of all citizens.

### **11.6.31.2 Objectives**

On the basis of the necessities, the national housing policy has followed some objectives. These are as follows:

- a) To provide guidelines from the political, economic, social, environmental, technical, moral and psychological viewpoint to ensure suitable housing for all.
- b) To implement the goals of housing development in the line of religious and cultural norms and values.
- c) To reflect manifestation of declarations concerning housing from National Constitutions, charters of United Nation, international acts and human rights.
  - 1) To ensure equal access of all in housing facilities irrespective of nationality, religion, language and dogma.
  - 2) To have sustainable human settlement development.
  - 3) To ensure economic growth, social development, conservation of environment, equitable distribution of housing, optimum utilization of resources, protection of biodiversity and cultural diversity and wellbeing and conservation of right of present and future generation.
  - 4) Enhancement of living standard by consideration of infrastructural and spatial characteristics of rural and urban areas, arrangement, aesthetics, nature of land use, density of population, communication system and residential and civic amenities.
  - 5) Conservation of buildings, local environment and ambiance having archeological, historic, religious, architectural and cultural importance.
  - 6) To recognize and strengthen the status of family as a basic unit of the society.

- 7) To ensure availability of appropriate housing and basic service facilities through participation and involvement of public, private and voluntary agencies, community-based organization, cooperatives, NGOs, individuals and community.
- 8) Accommodating underprivileged, neglected and distressed population of the society.
- 9) Adopting specific housing facilities for working women.
- 10) Optimum filmization of land in housing sector needs to be guaranteed through proper land management in order to improve the socio-economic condition of the country.
- 11) Provision of expert consultation in order to undertake income generating activities for low- and middle-income people with the objective to include them in the planned housing system and for socio-economic enhancement.
- 12) In this modern era of globalization, information technology needs to be used efficient in housing industry to endow the beneficiaries with social safety measures through planned housing.
- 13) Development of a cooperative based society by conglomeration of population through creation of cooperatives and to address housing need of mass population with minimum use of land and other basic needs.
- 14) Institutional. technological and financial support in housing in disaster prone areas to reduce disaster risk.

So, in the context of Bangladesh housing policy has a vital role to solve the problem. Though the policy has many strengths like decentralization of housing and manpower development, rural housing, sum and squatters' settlements, reconstruction housing and rehabilitation in disaster-prone areas, housing for vulnerable, woman-headed family and old citizens, etc. that are the very impressive side of this policy. But this policy does not persuade an integrated, sustainable system and cannot meet the challenge of housing for all. And thus, for being sustainable and pragmatic, the policy should be more local people, local technology as well as natural resource-oriented which might ensure housing for all.

### **11.6.31.3 Proposed Strategies and Monitoring of Policy Implementation and Assessment**

Government will adopt following strategies when needed to attain the mentioned goals and objectives:

- Consider housing as an exclusive sector in the national development plan and endow it with suitable priority.
- Acquisition of resource in conformity with national development policy and programs, increase of employment opportunity, poverty reduction and through social integration all the measures related to housing to be maintained in harmony with housing policy.
- Gradual hand over of housing activities from public to private sector with the concept of planned housing development under the responsibility of people and private sector and provision of support to strengthen private ventures and reform of taxation system to encourage people towards housing.
- The process of right to land and legal transfer of ownership to be made easy, transparent and accessible to all.

### **11.6.32 Road Master Plan 2009**

This master plan is a guiding document for the Road Sector Investment Priority Programs. This plan provides a physical plan of new road construction, rehabilitation and maintenance of roads over the next 20 years. This plan includes design standards considering future scenarios such as population growth, economic growth and vehicle growth. This Plan will be considered during preparation of Master Plan.

### **11.6.33 Railway Master Plan, 2016-2045**

Railway master plan provides measures to rehabilitate, modernize, improve and expand railway infrastructure, improve efficiency and operational capacity. Aims to allow the railways to play a greater role in the overall transport sector with a view to contributing to economic and social development. Railway Master Plan aims to conduct integrate railway network through a multimodal approach and Increase railway efficiency with interventions to make best use of assets. This Plan will be considered during preparation of Master Plan.

### **11.6.34 National Land Use Policy, 2011**

Bangladesh Land use Policy was prepared and notified in the year 2001. Aligning the preparation of Upazila Master Plans (UMPs) with the National Land Use Policy, 2011, is crucial for ensuring sustainable and integrated land use planning in Bangladesh. The National Land Use Policy aims to optimize land use for various purposes, including agriculture, forestry, housing, infrastructure, and environmental protection. By incorporating the principles and guidelines of the National Land Use Policy into UMPs, local authorities can ensure that land use decisions at the Upazila level are consistent with national goals and objectives. The objectives of the Land use Policy are to:

- Prohibit the recent practice on conversion of agriculture land into non-agricultural use to ensure food security for the people.
- Impose zoning provision to control the better use of land according to the nature of land located in different regions.
- Rehabilitation of landless people on the alluvion lands alleviated from river, Haor or sea.
- Preserve Khas land for future physical development activities.
- Confirm land uses in relation with the existing natural environment.
- Use of land in favor of job creation, landlessness and poverty alleviation.
- Control land pollution.
- Construction of multi-storied building with accommodation of various purposes in public and private sector for ensuring minimum land coverage.

Following the National Land Use Policy, 2011 in creating the Upazila master plan, the following are some significant areas of alignment.

1. Protecting Agricultural Land: To identify and protect prime agricultural land, ensuring that it is not diverted for non-agricultural purposes. This will safeguard food security and support the livelihoods of farmers.
2. Promoting Sustainable Urban Development: To plan for compact and contiguous urban development, minimizing land consumption and promoting efficient infrastructure utilization. This will reduce urban sprawl and its associated environmental impacts.

3. **Preserving Environmental Areas:** Identify and protect environmentally sensitive areas, including forests, wetlands, and water bodies. This will conserve biodiversity and maintain ecological functions.
4. **Ensuring Infrastructure Development:** Integrate land use planning with infrastructure development, ensuring that transportation networks, utilities, and public facilities are aligned with land use patterns. This will promote efficient and sustainable infrastructure development.
5. **Promoting Public Participation:** involve stakeholders, including local communities, landholders, and civil society organizations, in the land use planning process. This will ensure that land use decisions reflect the needs and aspirations of local communities.

By aligning Upazila Master Plans with the National Land Use Policy, 2011, Bangladesh can achieve a more sustainable and integrated approach to land use planning, ensuring that land resources are utilized effectively and equitably for the benefit of present and future generations.

### **11.6.35 National Environment Policy, 2018**

The National Environment Policy (NEP) 2018 of Bangladesh provides a comprehensive framework for sustainable development and environmental protection. The following policy outlines would be followed during preparation of environmental management plan under the Upazila Master plan:

- **Ensuring environmental sustainability:** The policy emphasizes the need to integrate environmental considerations into Upazila master plans to ensure that development activities are conducted in an environmentally friendly manner. This includes minimizing pollution, conserving natural resources, and promoting sustainable land use practices.
- **Protecting and conserving environment:** The policy recognizes the importance of conserving Upazila's natural resources, including forests, wetlands, and waterways. It calls for the implementation of measures to protect these resources from degradation and promote their sustainable use.
- **Mitigating the impacts of climate change:** Bangladesh is highly vulnerable to the impacts of climate change, such as floods, droughts, and sea-level rise. The policy emphasizes the need to build resilience to climate change in Upazilas by implementing adaptation measures such as constructing flood control infrastructure, diversifying livelihoods, and promoting climate-smart agriculture.
- **Promoting environmental awareness and education:** The policy recognizes the importance of raising environmental awareness among Upazila residents to promote sustainable behavior and practices. It calls for the implementation of environmental education programs, public awareness campaigns, and community engagement initiatives.
- **Strengthening environmental governance at the Upazila level:** The policy emphasizes the need to strengthen environmental governance at the Upazila level to ensure effective implementation of environmental policies and plans. This includes providing adequate resources and training to Upazila officials and empowering them to make informed environmental decisions.

Incorporating the principles and objectives of the National Environment Policy 2018 into Upazila master plans can help to ensure that Upazila development is environmentally sustainable and contributes to the overall well-being of Upazila residents. By prioritizing environmental protection and conservation, Upazila master plans can help to mitigate the impacts of climate change, promote sustainable land use practices, and protect Upazila's natural resources for future generations.

### **11.6.36 National Integrated Multi-Modal Transport Policy, 2013**

National Integrated Multimodal Transport Policy (2013) was formulated by Road & highways Department (RHD), Bangladesh Bridge Authority (BBA). The objective of this policy is to take the advantage of Bangladesh's geographical position to continue trading through an efficient transport system. Also reducing worst environmental effects of transport is another major activity of this policy. This Policy will be considered during preparation of the Master Plan.

### **11.6.37 National Land Transport Policy, 2004**

The Land transport policy was formulated by Road and Highway division of Ministry of Road Transport and Bridges. This policy will provide safe and dependable transport by improving the regulatory framework. Some of the main activities of this policy is to construction of the Padma bridge, developing Dhaka Chittagong highway and developing connection between Dhaka and Mongla Port. This policy has also encouraged roadside plantation, international land transport links fixing load limits of various vehicles. This Policy will be considered during preparation of the Master Plan.

### **11.6.38 The Land Zoning and Protection Act, 2024 (Draft)**

#### **11.6.38.1 Introduction**

Due to the pressure of an expanding population, unplanned urbanization, the building of residential homes, commercial buildings, roads, and natural causes are constantly changing the nature and classification of land. As a result, a significant portion of the nation is losing its forests, hills, mountains, and water bodies. The ecology is being negatively impacted by the steadily declining amount of agricultural land used for crop cultivation; WHEREAS, state regulation of optimal land use through planned zoning should be ensured; Since, in order to prevent unplanned urbanization, housing, construction of houses, development activities, construction of industries and roads, to maintain the nature of the land and to preserve the environment and continue the production of food crops, agricultural land, wetlands, hills, mountains and water bodies should be replaced by agricultural land, forest land. It is expedient and necessary to ensure planned and optimal use of land including protection of hills, rivers, canals and water bodies.

#### **11.6.38.2 Major Dimensions of the Policy**

- Preparation of land zoning map:

(a) Notwithstanding anything to the contrary in any other law for the time being in force, a specific geographical area shall be determined based on land use zone by analyzing the images captured through advanced technology and if necessary, by field inspection. (Zoning Map) will be formulated and considering the land use characteristics, location and topography, the existing land will be divided into required classes by delineating the existing

land into different regions and publish the zoning map and details through gazette notification.

(b) Zoning of all land in Bangladesh shall be done and land zoning map shall be approved by Ministry of Land.

- Classification of land zoning: For the purpose of land zoning, land shall be divided into the following categories:
  - a. Arable
  - b. Residential
  - c. Commercial
  - d. Wetlands
  - e. river
  - f. Forest
  - g. Hills
  - h. Roads
  - i. Industry
  - j. Religious places

Wetlands may include hoars, baors, ponds, beels, dighis, lakes, matials, nalas, nayanjuli, ponds, rifts, drains, springs and similar wetlands;

- **Updating:** The Government shall mark the change of land and update the zoning map in the manner prescribed by the rules.
- **Formulation of Land Use and Zoning Plans:** Following the Land Zoning Act formulated by the Ministry of Lands, each Ministries/Departments will formulate their Master Plans.
- **Establishment of Land Zoning Department:** The Government shall constitute a unit under the Ministry of Lands for the implementation, control, monitoring and updating of land zoning activities.
- **Agricultural land protection:** All agricultural land shall be protected by this Act and its use class shall not be changed without the approval of the competent authority, moreover;
  - a) three or more crops of land shall in no case be used for any purpose other than agriculture;
  - b) one or two crop lands shall also be used as agricultural land; However, it shall be relax able subject to the approval of the Head of Government. However, it may be used for other purposes with the permission of the Government or the Head of Government for setting up development projects or industries or for any other special needs;

Government, in the interest of food security of the country, uses land zoning in coordination with the Ministry of Agriculture to reserve any region or area of the country as an 'Exclusive Agricultural Zone'.

- Protection of land other than agricultural land: All agricultural land shall be protected by this Act and its use class shall not be changed without the approval of the competent authority, moreover;
  - a) three or more cultivated lands shall in no case be used for any purpose other than agriculture;
  - b) one or two crop lands shall also be used as agricultural land; However, development projects or establishment of industrial plants or other

The land shall not be used for any purpose other than with the approval of the Head of Government.

### **11.6.39 The Vehicle Act (1927) and the Motor Vehicles Ordinance (1983)**

This act aims for the better control of horse-drawn vehicles in certain areas in Bangladesh. Vehicle act regulates law relating to motor vehicles in Bangladesh. Aim of this ordinance is to Survey Report Preparation of Master Plan for Atpara Upazila 168 minimize vehicular exhaust emissions, air and noise pollution including road safety. This rules and regulations under the act will be considered during preparation of the Master Plan.

### **11.6.40 The National River Conservation Commission Act, 2013**

The law was enacted to prevent illegal grabbing of rivers, pollution of water and environment, river pollution caused by industries, construction of illegal structures and various irregularities and to restore the normal flow of rivers, proper maintenance of rivers and make them navigable. Functions of the Commission –

- To make recommendations to the government to free the river from illegal occupation and prevent re-encroachment
- To provide recommendations to the government regarding the eviction of illegal structures established on the banks of rivers
- Provide recommendations to the government to keep the river water pollution free
- To make recommendations to the government on dredging of extinct or nearly dead rivers
- Provide recommendations to the government to ensure sustainable management of the river's ecological balance
- To provide necessary advice to the government to take public awareness raising activities to protect the river

### **11.6.41 Coast Guard Act 2016**

This act provides the control of pollution discharges and protection of the surrounding environment. This rules and regulations under the act will be considered during preparation of the Upazila Master Plan.

### **11.6.42 Waste Management of Electrical and Electronic Products (E-Waste) Rules, 2019**

Application: These rules apply to all manufacturers, traders or shopkeepers, stockiest, transporters, repairers, collection center operators, shredders, recyclers, auctioneers, exporters, consumers or large users of electrical and electronic products as specified in Schedule-1 manufacturing, marketing, purchasing, Sales, Imports, Exports, Stocks, Applies to those involved in storage, disposal, repair, processing and transportation for research in laboratories or all activities related thereto. Nothing in these rules shall apply to the following cases.

DUTIES OF COLLECTION CENTRE - Subject to the provisions of these rules any person who operates a collection center individually or institutionally or jointly shall have the following responsibilities-

- 1) Obtain approval from the Department of Environment as per Rule-12 of these Rules and provide the details of the collection center such as address, telephone and helpline number, email etc. to the public shall ensure environmentally safe storage of the collected e-waste before sending it to a manufacturer, assembler or repairer or registered shredder or recycler;
- 2) Ensure safe transportation of e-waste;
- 3) Ensure that no harm is caused to the environment and surroundings during the collection and storage of e-waste;
- 4) Maintain e-waste management records in accordance with Form-1 prescribed in these rules and will present for the observation of the authorities.
- 5) shall submit the annual report regarding e-waste to the Directorate of Environment within or before 60 days of the end of each financial year in accordance with the prescribed Form-2 of these rules;

Responsibility of individual consumer or large user/institutional consumer. Subject to the provisions of these rules, the consumer or large user/institutional consumer shall perform the following responsibilities –

- 1) Individual consumers or large users or organizations of electrical and electronic products shall deposit their e-waste at any specific shopkeeper or trader or hoarder or any collection center;
- 2) Large users/institutions of electrical and electronic products shall ensure that their e-waste is sold in auction or by a designated dealer or an authorized collection center or a repairer or a registered shredder or a recycler or a collector or manufacturer for obtaining repair facilities. submitted to;
- 3) Large users/institutional consumers shall maintain e-waste management records in accordance with Form-I prescribed in these rules and present them for inspection by the appropriate authorities;
- 4) Large users/institutional consumers shall submit annual report regarding e-waste to the Directorate of Environment on or before 60 days of the end of every financial year as per prescribed Form-II of these rules.

E-waste storage system. –

- 1) Every manufacturer, trader or shopkeeper, collection center, shredder, repairer and recycler shall store their e-waste for not more than 180 days and shall collect and store all information relating to the collection, sale, transfer, storage and segregation of e-waste and the Department of Environment It will be presented for investigation by Eco-friendly methods should be adopted during the storage of the said e-waste;

However, the Department of Environment may extend the storage period of e-waste in the following cases-

- a. Based on the annual stockpile capacity of shredders and recyclers, the time may be extended up to a maximum of 90 more days.
- b. Where specific time is required for environmentally friendly recycling of e-waste, the time may be extended.

2) Storer shall keep adequate fire extinguishing system in place of storage.

3) Take precautionary measures to ensure that e-waste does not mix with soil, water, air and environment.

Standards for the use of hazardous substances in the manufacture of electrical and electronic products.

- 1) Every manufacturer of electrical and electronic products shall follow the standards specified in schedule-4 of these rules in respect of use of hazardous substances in the manufacture of their products. The program to reduce the use of hazardous substances in the production of electrical and electronic products should be completed within 5 years from the date of effective date of these rules. However, the government can extend this period if necessary.
- 2) In the case of reducing the use of hazardous substances in electrical and electronic products, all the information related to the reduction, i.e. which hazardous substances have been reduced and which hazardous substances are present, should be added in the product information booklet.
- 3) Permission to import or market electrical and electronic products shall be granted only to those who have followed the standards set out in Schedule-4 attached to these rules in respect of the use of hazardous substances in the manufacture of electrical and electronic products.
- 4) Every manufacturer of electrical and electronic products shall furnish a written statement or bond agreeing to fulfill the conditions required in Schedule 4 of these Rules.

Responsibilities of e-waste generators, collection centers, transporters, shredders, repairers and recyclers. –

1) E-waste manufacturers, collection centers, transporters, shredders, repairers and recyclers shall be responsible for any damage to the environment or public health based on the responsibilities set out earlier in these rules. The compensation shall also cover the health protection of the affected persons and those engaged in the destruction and management of e-waste.

2) E-waste producers, collection centers, transporters, shredders, repairers and recyclers who are liable under the provisions of 23(1) shall notify the Environment Department of the damage caused and shall make such environmental compensation at their own expense or restore the destroyed environmental material. will take action.

3) The consumer shall be responsible for depositing the e-waste at the registered dealer or collection center and failure to discharge such responsibility shall be liable to pay penalty prescribed by law for violation of other provisions of these rules.

### **11.6.43 National 3R (Reduce, Reuse and Recycle) Strategy for solid waste management**

The 3R concept, which stands for Reduce, Reuse, and Recycle, is a waste management strategy that aims to minimize the amount of waste generated and maximize the use of resources. This concept has been widely promoted as a sustainable approach to waste management, and it is increasingly being incorporated into local development plans, including Upazila Master Plans in Bangladesh.

#### **Reduce**

The first R, Reduce, is the most important step in waste management. It refers to the actions we can take to minimize the amount of waste we generate in the first place. This can be achieved by making conscious choices about our consumption habits, such as:

- Choosing products with minimal packaging.
- Buying reusable items instead of disposable ones.
- Composting food scraps and yard waste.
- Fixing broken items instead of throwing them away.

#### **Reuse**

The second R, Reuse, refers to the practice of using items again and again for their original purpose or for a new purpose. This can significantly reduce the amount of waste going to landfills and conserve resources. Examples of reuse include:

- Using reusable shopping bags, water bottles, and food containers.
- Donating used clothing, furniture, and other items to charity.
- Finding new uses for old items, such as turning old jars into storage containers.

#### **Recycle**

The third R, Recycle, refers to the process of converting waste materials into new products. This requires collecting recyclable materials, such as paper, plastic, metal, and glass, and processing them into new materials that can be used to make new products. Recycling can save energy, reduce pollution, and conserve resources.

The 3R concept offers a number of benefits for individuals, communities, and the environment. Some of the key benefits include:

- **Reduced waste generation:** By reducing, reusing, and recycling, we can significantly reduce the amount of waste going to landfills. This can conserve landfill space and reduce the environmental impact of waste disposal.
- **Conservation of resources:** By using materials more efficiently, we can conserve natural resources such as trees, water, and minerals. This can help to protect the environment and ensure that resources are available for future generations.
- **Reduced pollution:** Waste generation and disposal are often associated with air and water pollution. By reducing, reusing, and recycling, we can help to reduce pollution and protect the environment.

- **Economic benefits:** The 3R concept can create jobs in waste collection, sorting, recycling, and remanufacturing. This can boost the economy and create opportunities for green jobs.
- **Empowerment:** By adopting the 3R concept, we can take control of our waste and make a positive impact on the environment. This can empower individuals and communities to make a difference.

The 3R concept is a simple yet powerful approach to waste management. By reducing, reusing, and recycling, we can minimize our environmental impact, conserve resources, and create a more sustainable future.

#### **11.6.44 Road Design Standards (Rural Road), 2005**

Road design standard has been prepared with geometric design of roads and bridges and pavement design configuration defined in the national Road Design Standards and this will have served as hand book on road pavement and will argument the efficiency of LGED.

### **11.7 Conclusion and Recommendation**

#### **Land and Housing Development**

The formulation and implementation of the master plan for land and housing development encompass a comprehensive array of policies and regulations aimed at addressing various aspects crucial for sustainable urban growth.

- Housing Policy, 2016
- Draft National Urban Sector Policy
- Population Policy, 2004
- Building Construction Act, 1952
- Existing Master Plans

#### **Disaster Management**

Moreover, the inclusion of policies pertaining to disaster management, environment protection, and resource conservation underscores a holistic approach towards urban planning.

- Bangladesh National Building Code (BNBC)
- Housing Policy, 2016
- National Agriculture Policy, 1999
- Forest Policy, 1994
- National Health Policy, 2000
- Existing Master Plans

#### **Environment Protection**

The emphasis on environment protection through policies like:

- Urban Management Policy Statement, 1999
- Industrial Policy, 2005
- Housing Policy, 2004
- Population Policy, 2004

- National Agriculture Policy, 1999
- Draft National Urban Sector Policy
- National Land Use Policy, 2001
- Water Conservation Act, 2000
- Bangladesh National Building Code (BNBC)
- Existing Master Plans

### **Master Plan Preparation**

- National Land Use Policy, 2001
- Water Conservation Act, 2000
- National Tourism Policy, 1992
- Existing Master Plans

Effective implementation and monitoring mechanisms will be crucial to realizing the objectives outlined in the master plan and ensuring the well-being of current and future generations.

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