# QUICK SCAN BANGLADESH


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# INTRODUCTION

Within the framework of food security policy, the Ministry of Foreign Affairs of The Netherlands is implementing the programme 'Geodata for Agriculture and Water (G4AW) Facility'. The G4AW Facility aims to increase the agricultural sector output in G4AW partner countries. This is achieved by providing food producers with relevant information, advice and/or (financial) products through operational information chains using satellite data.

In the summer of 2014, a new call for tenders will be opened. In this call, the Ministry of Foreign Affairs of The Netherlands calls for good quality project proposals from viable partnerships.

**Goal of the Quick Scan**
The Quick Scan serves as input for preparing the country visit and the G4AW information and matchmaking workshop in Bangladesh. In the workshop the local context, constraints and challenges in agriculture will be discussed. Furthermore, the background and details of the G4AW Facility is provided and the development of partnerships is promoted.

This Quick Scan provides an up-to-date information assessment on agricultural and associated activities. It provides information from different perspectives and in a wider context (climate, water management). Additional, stakeholders from different types of organizations are identified and reported. The document is initially supporting the country visits and workshop, but the provided information can also contribute to the development of partnerships that are intending to bring forward a proposal in the second call of the G4AW Facility.

# 1 Assessment of Bangladesh with a focus on Agricultural issues

*Pressure on the agro-eco production systems caused by increased (overpopulation), climate changes and extreme weather conditions lead to a lack of natural local resilience. In this section, a general introduction as well as the most important challenges in the agro-eco systems in Bangladesh are given as well as an overview of (governmental) efforts to address the food security situation.*

Bangladesh is a rapidly developing country, envisaging to be middle income country in 2021, though currently dealing with complex problems on safety, (food) security, population pressure and prone to natural calamities like floods, cyclones, and droughts. Currently there is already a high pressure on the available land and water resources in the delta. Current population growth is approximately two million people per year. Due to population growth, economic development and climate change, the pressures will only increase in future. There is a high need within the Bangladesh delta to improve the living conditions through better water management and governance. However, to optimize short term interventions and investment and to prepare for future change, it is necessary to develop an integrated and holistic long term vision (DPT 2012).

## 1.1 Main challenges in Bangladeshi Agro-eco systems

**Political, climate change & climatological zones:** Early 2014 national elections were held, resulting in a contested preference for the ruling Awami League, closing a period of national strikes that economically and socially impacted the country in the months preceding the elections[1], Currently the political situation is stable.
Climate Change is expected to impact the country (higher peaks and lows in terms of water availability).
Bangladesh has its own climate change adaptation policy (BCCSAP). The BCCSAP 2009 consist an action plan based on six pillars: (a)food security, social protection and health, (b) comprehensive disaster management, (c) infrastructure, (d) research and knowledge management, (e) mitigation and low carbon development, and (f) capacity building and institutional strengthening. 44 programmes have be suggested under these six pillars, which will be implemented over next 20 - 25 years by different ministries and departments[2].

***Main issues of attention on food and water*:** Water shortage during dry season, especially in the Northwestern region, excessive water during flood season, especially in the central parts of the country, which both compromise agricultural productivity. Population growth puts additional pressure on increased agricultural production in the coming decades. At this moment, rice production almost equals national demand. Infrastructure for water management and agriculture is often insufficient or degraded. On national scale, investment plans are being formulated for river training and coastal management. In order to stimulate agricultural development in the southwest delta, the Blue Gold programme is executed by EKN to rehabilitate polder infrastructure and to develop business chains for agricultural production commodities.

***Climate Change Vulnerability:*** Bangladesh is vulnerable to disasters due to its geographical location and topography. It is a low lying, flat country and would be impacted by both riverine flooding and rising sea levels. Agriculture contributes to 20% of the country's GDP, but employs over 40% of the country's workforce (IFAD, 2012), meaning a huge number of people depend on agriculture for their livelihood. A study conducted by IFPRI3 (2013) has concluded that Bangladeshi farmers are already facing the effects of climate change. Results from the study indicate that of all climate change–related shocks, floods, water logging, and river erosion caused the largest

[1] http://en.wikipedia.org/wiki/Bangladeshi_general_election,_2014

[2] Further information at: http://www.moef.gov.bd

[3] http://www.ifpri.org/sites/default/files/publications/ifpridp01281.pdf

loss to rice production. Farmers in the survey lost around 12 percent of their harvest, on average, to some kind of shock, with about half of that attributable to flooding-related issues.

***Manual Information Gathering and Estimation of Food Data:*** The goal of the National Food Policy is to ensure dependable, sustained food security for all people of the country at all times. This means proper planning and estimating food data to appropriate actions. Bangladesh currently uses administrative reporting system through extension workers. While the current system is inexpensive, this approach is subject to large non-sampling bias. The resulting estimates are usually unreliable containing an upwards bias. This also requires longer time to process and analyse and more often than not, results are not available in time for planning of advance actions by the government[4]. (FAO, 2014)

***Declining and Degrading Land Resources:*** even though population growth has fallen in recent years in Bangladesh, population density remains extremely high, putting enormous pressure on the countries' natural resources like arable land and water. A recent study[5] (Dey et al, 2012) reveals that the crop - man ratio in Bangladesh has fallen dramatically from 0.132 to less than 0.094 ha indicating per capita cultivable land reduction equals to 28.79 percent. Analysis also revealed that soil fertility declined 4.2 million hectare. Lack of control over resources (like unfettered urban sprawl) and non-sustainable land management practices are implied as direct causes of degradation.

***Decreasing Water Resources:*** In an article by Integrated Regional Information Network experts have warned rapid depletion of Bangladesh's underground water table could jeopardize food and water security for millions throughout the country[6] (IRIN, 2011). Similar views are echoed in a more recent study by BRAC. The study found that the key impediments to sustainability of groundwater use for irrigation has been identified as over exploitation of groundwater, increase of *boro* rice cultivation, excess water use in irrigation, depletion of surface water including river water level and discharge, reduction of wetland areas, below average rainfall have caused the groundwater level fall to the extent of not getting fully replenished in the recharge season, particularly in the northwest region of Bangladesh[7](BRAC, 2013).

***Salinization of Coastal Areas****:* Salinity is the single most significant problem in the South Western area of Bangladesh. Consequently, the area is also food deficit. Due to increasing degree of salinity and expansion of affected areas normal agricultural land use practices become more restricted especially since the past two devastating cyclones and storms inducing the level of salinity in the area. Since then, crop yields, cropping intensity, production levels since then decreased much more than other part of the country[8] (Islam et al, 2012).

**Arsenic Contamination**: Naturally-occurring arsenic contaminated water was first detected in Bangladesh in 1993, particularly in shallow aquifers. Around 29 percent of all of the sampled tube wells are found contaminated nationally. This has made groundwater unsafe for drinking. 30-35 million people are expected to be exposed to

[4] http://www.fao.org/fileadmin/templates/ess/documents/apcas25/sideevent/Concept_note.pdf
[5] http: http://katalyst.com.bd/docs/case_studies/Case%20Study%20Number%206_3rd%20version-%20-3-12-2012.pdf//fpd-bd.com/wp-content/uploads/2013/05/assessing-land_nep1.pdf
[6] http://www.irinnews.org/report/94454/bangladesh-invisible-hazard-of-groundwater-depletion
[7] http://www.nfpcsp.org/agridrupal/sites/default/files/ToR-2.pdf
[8] www.iao.florence.it/ojs/index.php/JAEID/article/download/91/84

Arsenic contamination[9]. Natural arsenic in groundwater can also effect irrigation of crops. Arsenic in irrigation water can result in soil pollution that in turn effects crop production and food safety.[10]

## 1.2 GOVERNMENTAL EFFORTS AND POLICY ON FOOD SECURITY

Bangladesh has made significant progress in increasing its food production since its birth in 1971. Consecutive governments believed food security to be an important factor contributing to its socio-economic stabilization and development and drafted policies accordingly. Despite the growth in food production and its availability, food insecurity is still a major problem as a large part of the population still lacks access to sufficient, safe and nutritious food. There are several polices currently in place which are relevant to food security. The National Food Policy (NFP), 2006 is Government's main policy document on food security. While previous versions of this policy focused exclusively on increasing national food production, the 2006 policy emphasizes the important linkages between availability, access, and nutrition outcomes, in line with the definition of food security adopted by the World Food Summit of 1996. The National Food Policy Plan of Action (2008-2015) provides programmatic guidance in implementing the National Food Policy. Bangladesh Country Investment Plan (CIP), 2011 is a fund mobilization and alignment tool to support the National Food Policy and Plan. The GoB publishes annually a monitoring report that tracks the implementation of its policies on food and nutrition security (NFP and Plan of Action, CIP). National Agricultural Policy, 2013 sets out the necessary steps in order to reach the country's agricultural development objectives in research and development, agricultural extension, fertilization and irrigation, as well as human resource development. National Agriculture Extension Policy, 2012 aims to provide efficient and effective decentralized demand responsive integrated extension services to all categories of farmers, producers and small & medium entrepreneur (SME) in agriculture.

Climate vulnerability is high in Bangladesh particularly to disasters (cyclones and flooding). Two thirds of its territory is less than 5 meters above sea level, making it one of the most flood-prone countries in the world[11] (IFAD, 2014) The Bangladesh Climate Change Strategy and Action Plan (BCCSAP) was launched at the beginning of 2009 under the supervision of the Ministry of Environment and Forest. One of the key pillars of this plan is food security, social protection and health. This provides a basic framework for climate related activities with 40 medium-term and long-term measures are financed by both the national Bangladesh Climate Change Trust Fund and the donor-funded Bangladesh Climate Change Resilience Fund. The National Water Management Plan, 1999 has considered the effect of climate change in estimating water demand in various regions of the country and mentions the impacts of climate change like increase water demand particularly in Ganges basin, prolonged foods and drainage congestions and negative impacts in coastal zone due to sea-level raise[12] (NGO Forum, 2009) which all has implications for food security of the country. The Water Act 2013 is designed for integrated development, management, extraction, distribution, usage, protection and conservation of water resources in Bangladesh.

The Government of Bangladesh is also working towards coordinating their work with Development Partners through the Local Consultative Group (LCG) mechanism with the mission of building and coordination on key

[9] http://www.dphe.gov.bd/index.php?option=com_content&view=article&id=96&Itemid=104

[10] http://www.un-igrac.org/dynamics/modules/SFIL0100/view.php?fil_Id=101

[11] http://www.ifad.org/operations/projects/regions/PI/factsheets/bd.pdf

[12] http://ngof.org/wdb_new/sites/default/files/final_PSU_CCMP.pdf, pp 7

policies, programmes and strategies within the context of agriculture, food security and nutrition, and rural development.

The main relevant government programmes are:

- Overall: the sixth Five Year Plan (FY 2011 – FY 2015) is the overall national strategic plan covering investments in different sectors. In addition, sectorial policy programmes exist
- Agriculture National policy/programmes & sector
- E.g.: Country Investment Plan for agriculture, food security and nutrition and FAO southern Delta Master Plan
- Water National policy/programmes & sector;
- National Water Management Plan is the overarching policy framework for water resources development. It has a time horizon of 25 years (up to 2025) and its implementation is monitored by WARPO. Several components/practical aspects of the NWMP are currently being updated (e.g. database with national water data).
- Several regionally oriented policy plans exist in various forms (investment plans, long term visions for the region under review, sector specific).
- Currently, the efforts to develop the Bangladesh Delta Plan 2100 are on-going with the consultants' team being deployed in close collaboration with the Government of Bangladesh.

# 2 ASSESSMENT OF STATUS AND PROBLEMS OF INFORMATION SUPPLY IN THE AGRICULTURAL SECTOR

*For food (and water) security programs, actual and accurate (spatial) information is crucial for land and crop production systems to provide quick indicators on the context (e.g. water availability), status (e.g. biomass, crop type, acreage, etc.) and trends (within and in between seasons, years) of local farming practices/performance. In this section, the main challenges in information supply in Bangladesh are summarized as well as the institutional capacity to support viable information services.*

## 2.1 MAIN CHALLENGES IN INFORMATION SUPPLY ENCOUNTERED IN AGRICULTURAL ACTIVITIES

Bangladesh's agriculture sector is confronted by several broader challenges. Some of the major challenges are:

- Agriculture sector in Bangladesh is facing a lot of uncertainty. Climate related shocks now mean uncertain precipitation, inconsistent temperature, sudden natural disasters like storms and floods. Climate change is also related to the lack of surface water (or replenishment of surface water) and hence the reason why framers depend more on groundwater for their irrigation needs. Salinization of coastal areas of the country is further worsening the productivity of the area. Another big issue of agriculture is the lack of timely and reliable data/information that can help planning, both for the government as well as the farmers.
- The issue now is what can be done to mitigate the climate related risks. To face the climate change and weather phenomenon in the country, the country and the farmers' needs to adapt. One mitigating measure is to have some kind of crop insurance. Agriculture or micro insurance can cover inherent risks in farming - disasters, pests/diseases leading to large-scale losses, increase in production costs, dynamics of farm prices, fluctuating incomes, restoring credit eligibility after a loss, alternatives to ad hoc relief in times of calamity. One problem of insurance in agriculture in Bangladesh is having unbiased assessment of the damage done to crops, raising conflicts between farmers in group micro insurance schemes[13]. What is needed in this case is an unbiased assessment for insurance purposes.
- Bangladesh farmers mostly operate in an information poor environment. This means that improved farm performance or particular opportunities are missed due to lack of access to timely information. Farming in an information-poor environment can also be costly. Whilst the search costs of reliable information are often high, the opportunity costs of decisions made in the absence of good quality information, or of being unable to access information altogether, are often higher. The need at farm-level for immediate access to agricultural information is very important, particularly as some issues (such as pest and disease) have a very short window within which a response is required[14] (Katalyst, 2012). Information and access to markets is also is a problem, as is inefficiencies in the value chain.
- Optimizing crop yield is about supplying the right amount of agricultural inputs (e.g. water, fertilizer, pesticides) at the right time and the right place. The yield of crops in Bangladesh can be increased substantially if the extension worker/farmer has direct and timely access to information on actual crop status,

[13] Interview with Mr. Sudhir Chandra Nath, Programme Head of Agriculture and Food Security, BRAC on 28th April, 2014

[14] http://katalyst.com.bd/docs/case_studies/Case%20Study%20Number%206_3rd%20version-%20-3-12-2012.pdf

so that input management can be adjusted accordingly.[15] The country might also be missing out the chance of practicing high input/high investment agriculture (like strawberries, flowers etc.), as they require more precise data.

- Timely and accurate information is also needed at GoB's policy level to estimate and forecast crop area and yield. This is of critical importance to policy makers for the planning and monitoring of food supply to ensure food security of the country.

## 2.2 Institutional capacity to support viable information services

The table below provides an overview of the selection of mobile applications in Bangladesh[16]:

| Selection of Mobile Applications in Bangladesh | |
|---|---|
| E-Purjee[1] | SMS-based purchase order that sugar mills all over the country send to sugarcane growers during crushing season; 200.000 users. |
| SMS for tubewells[2] | Application to monitor 30.000 rural tubewells. |
| Dial 10941[3] | IVR system for weather and disaster information; 100.000 callers in last three months; 30.000 callers during specific cyclone threat. |
| Aponjon[4] | Health information for mothers, 117.000 subscribers |
| DICOT | Diagnostic tool for health. Piloted in three locations, 1490 users in 10 months. Now expanding to 20 locations, distribution via franchise of Information Centres |
| E-Krishok[5] | Provide agricultural support and virtual marketplace, available online and at 350 franchise internet points (Batighar); 175.000 registered users. |

Table 1.1: Selection of mobile applications in Bangladesh

### 2.2.1 General information suppliers active in Agriculture domain

In Bangladesh extension services of the ministry of Agriculture (BARC, etc.) are the main information supplier in agriculture besides semi-private organisations (BRAC, CYMMIT, etc.),

### 2.2.2 Specific Agri-sector information supply and current mechanisms

In Bangladesh extension services of the ministry of agriculture and for example the BWDB (of ministry of Water) are the main organisations who have contact with farmers in the field from the government side. Important and well extended players are organization as BRAC who have large networks of advisors and colleagues in the field advising the farmers to improve their cropmanagement. Another important factor of farmer relations forms the NGO community (like CORDAID, Red Cross, etc.) who have direct contact with local communities in various ways (socio-economic, financial, living conditions, etc.). Institutes like CEGIS and IWM have also well connections with ministeries on information mechanisms (modeling, mapping, fieldmeasurements, etc.)

### 2.2.3 Other sectors (and role of information) important for the Agricultural sector

As mentioned earlier the Ministry of Water and their Bangladesh Water Development Board and their well extended network (regional offices).

[15] Nelen and Shurmaans, 2014. Satellites for Crops Bangladesh

[16] Source: http://bangladesh.nlembassy.org/binaries/content/assets/postenweb/b/bangladesh/netherlands-embassy-in-dhaka/import/wpp/grow-mobile-full-report.pdf

# 3 NEEDS ASSESSMENT OF IMPROVED ICT & INFORMATION SUPPLY IN THE AGRI SECTOR

In this section, an inventory of specific needs and problems in the information supply (and demand) in the Bangladeshi Agri sector is provided. The most important local stakeholders represented in the identified problem domains are selected (short list). Furthermore, additional stakeholders in related domains need to be selected (e.g. water domain, nature, industry, etc.).

## 3.1 NEEDS ASSESSMENT WITH A FOCUS ON POTENTIAL USE OF SPATIALLY BASED INFORMATION SERVICES

The main needs are:

- Requests for more information on short- and long-term expectancies for rainfall, fog and drought
- Requests for more information on agricultural inputs, such as fertilizer
- Requests for more accurate information on cyclones, as current forecasts are often wrong
- Request for customized information on cyclones, as many people do not understand the SODI (categorization of cyclones) and what it means for their activity of the day
- Request for more information on salinity levels and what it means for peoples' crops
- Request for support to people what they can do about cyclones and strong storms

## 3.2 PUBLIC AND PRIVATE PROBLEM STAKEHOLDERS AND INTERNATIONAL ORGANIZATIONS IN THE DOMAIN OF G4AW

The main stakeholders are listed in table 1.2 below.

| Name | Brief |
|---|---|
| Ministry of Agriculture (MOA) | This ministry addresses to the highest number of stakeholder in the country. The business scope ranges from crop development to agro-based industries with research on agriculture, agricultural engineering and agro-economics. |
| Department of Agriculture Extension (DAE) | DAE is responsible for 13,000 Extension workers throughout the country and according to farmers, one of the most trusted source of information. |
| Agriculture Information Services (AIS) | Working under MoA, AIS has the mandate to transfer agricultural technology through mass media like radio, television, documentary film and print media specially poster, folder, leaflet, booklet, newsletter, magazine, banner, festoon and so on. |
| Bangladesh Agriculture Research Council (BARC) | BARC is the official National Agricultural Research centre for Bangladesh with an emphasis on research for improving agriculture. BARC maintains large databases of both spatial and non-spatial information |
| Bangladesh Rice Research Institute (BRRI) | Is working towards radically changing rice production, replacement of the low-yielding traditional varieties and age old production practices of rice by high-yielding varieties and improved production technologies |
| Soil Resources Development Institute (SRDI) | Has an inventory of soils of Bangladesh and generates information for sustainable crop production through improved soil management. Works in soil conservation by managing hilly and saline soils |
| Access to Information (A2i) | A2i is the flagship initiative of the United Nations Development Program in Bangladesh. Under this project, the UNDP is facilitating the implementation of the Digital Bangladesh vision of the government. A2i is hosted by the Prime Minister's Office. Its mandate is to make policy interventions and initiate e-governance related activities at different level of the government. |
| Bangladesh Agriculture Development Corporation (BADC) | Works towards the production, procurement, transport, storage and distribution of essential agricultural inputs such as seed and fertilizers and providing irrigation facilities through utilization of surface and underground water to the farmers |
| Water Resources Planning Organization (WARPO) | Deals with national water resources planning |
| Space Research and Remote Sensing Organization (SPARRSO) | Under the Ministry of Defence, it applies space and remote sensing technology to monitor the natural resources, environment and natural hazards in the country.it as the focal point for space and remote sensing activities in the country to provide the government with relevant information in formulating national, regional and international policy concerning space science and remote sensing technology and their application in sustainable development |
| Bangladesh Institute of ICT in Development (BIID) | BIID is a Bangladesh based private, for profit company. BIID is a distinct inclusive business initiative to support development and promotion of Information and Communication Technology (ICT) based services. |
| BRAC | Largest NGO in the world. Around 8000 extension workers in the field. Currently working on a pilot project on how to use geo-data to in agriculture and transfer that information to farmers |
| CARE Bangladesh | One of the largest NGOs in the country with various projects in agriculture value chain |

| | |
|---|---|
| Centre for Environmental and Geographic Information Services (CEGIS) | scientifically independent organisation and performs integrated environmental analysis using technologies like GIS, RS, IT and databases |
| IFAD | working in Bangladesh for more than 30 years and has developed in-depth knowledge of the country's needs in the areas of infrastructure, inland fisheries, agriculture, markets, microfinance and gender |
| Institute of Water Modelling | The organization has GIS and Irrigation specialist as well as coastal zone related specialists |
| Food and Agriculture Organization (FAO) | Mandated to raise level of nutrition in the country as well as improve farm productivity. Currently working on developing an agro-ecological map using satellite data |
| World Bank | Has a huge portfolio in Bangladesh. National Agricultural Technology Project (USD 84.6mill) and Water Management Improvement Project (USD 136 mill) are big projects in the country. |
| World Food Program (WFP) | Working towards improving communities' resilience to natural disasters and the effects of climate change and strengthening agricultural production |
| GrameenPhone | Leading telecommunication company in the country. Running over 500 community information centres in around 450 Upazillas |
| Banglalink | 2nd largest telecom after GrameenPhone. Introduced a short code 7676, a Banglalink customer reaches a call centre, where staff provide answers and suggestions to queries related to agriculture, vegetable and fruit farming, poultry, livestock, fisheries, etc. |
| Syngenta | Leading agribusiness company |
| Lal Teer | The largest seed company in Bangladesh |
| Syngenta Bangladesh | Leading agribusiness company |
| ACI Agro business | Leading agribusiness company |

TABLE 1.2: OVERVIEW OF THE MAIN STAKEHOLDERS

## 3.3 ONGOING G4AW RELEVANT ACTIVITIES AND/OR PROJECTS IN BANGLADESH

Relevant activities and projects related to the G4AW program in Bangladesh are:

- **Bangladesh Delta Plan[17]:** The Bangladesh Delta Plan will provide a complete strategy for the development of the Delta project for the next 50 to 100 years. The Plan will be formulated by a consortium of Dutch and Bangladeshi organizations. The contract was signed in March 2014 and the consortium will now start writing a long-term strategic plan for the entire delta.
- **Challenge Program on Water and Food**[18]: CPWF focuses its efforts in the coastal salt-affected areas of the Ganges basin (Bangladesh and India) that are home to more than 40 million people, of which 60% of the population is poor and as much as 44% is extremely poor. The program goal is to reduce poverty and strengthen livelihood resilience through improved water governance and management in coastal areas of the Ganges basin.
- **Climate Change Impacts Vulnerability and Adaptation**: Sustaining Rice Production in Bangladesh- (Norwegian Ministry of Foreign Affairs) goal of the study is to develop an integrated framework to sustain and improve rice production under different climate change scenarios of Bangladesh. In order to assess the impact of climate change, future scenarios and projections of water availability for rice production for different climate scenarios are being developed. Crop model outputs/scenarios/GIS maps showing change in crop water requirement and rice productivity for present and future climate change scenarios (including salinity issues) will also be developed.
- **Strengthening Disaster Risk Management in the Agricultural Sector in Bangladesh (FAO):** The project focused on two main types of disasters, floods and drought, with the aim of leading to the development of a system that can be replicated in other high-risk flood and drought areas. Field activities will be conducted in two districts, namely the Dinajpur and Gaibandha Districts in the NW of Bangladesh. As part of this study, flood and drought hazard maps have been produced, utilizing innovative and nationally accepted models. Flood

[17] http://www.bangladeshdeltaplan.org/

[18] http://waterandfood.org/about/

hazard mapping has been yielded out of a model run with the latest scientific data available for flood modeling.

- **Impacts of Sea Level Rise (SLR) on Land use Suitability and Adaptation Options in Khulna, Bagerhat and Satkhira districts of southwest region of Bangladesh (UNDP):** CEGIS has conducted a study on the 'Impacts of Sea Level Rise (SLR) on Land use Suitability and Adaptation Options' in Khulna, Bagerhat and Satkhira districts of southwest region of Bangladesh. The study has developed a framework for assessment of climate change induced SLR and its impacts on land suitability in the context of the southwest region of Bangladesh. For the impact analysis, the base condition of water system has been established using hydrological data. The land use and land cover maps have been produced using remote sensing data and field information. The existing land use and cover of the study area was classified using remote sensing data including the Sundarbans mangrove forest. Field investigations were conducted to estimate the production range for crops and shrimps under different salinity and flood regimes.
- **Development of Soil and Land Resource Information System (Soil Research Development Institute):** The objective of the project was to develop customized software and application tools using Visual Basic, MS Access and GIS incorporating base information from the *Upazila Nirdeshika* and to manage the existing geo-spatial database developed by Soil Resource Development Institute (SRDI). The Soil and Land Resource Information System) software will help the planners and users to interact between the spatial and attribute information as well as enable to map different geo-physical features and produce tables, charts and reports for each Upazila and district and Bangladesh as a whole.
- **Coastal Land Use Zoning of South West (Ministry of Environment and Forest):** The study is engaged in a land use zoning exercise for the region by examining the availability of various resources and their current use as well as the use that would be desirable for sustainable development of the region. Using soil data from SRDI and BARC and field data on surface water and ground water a land use suitability maps were produced for different crops including: T.Aman, Bagda, Golda, Jute and Rabi crops. Current land use practices have been determined from optical and RADAR satellite data.
- **Setting up GIS Facilities in Agriculture Division:** of the Planning Commission and e-Government Survey under Support to ICT Task Force Programme Project (Agriculture Division of Planning Commission)- The overall objective of the project was to assist the planners of different wings of the Agriculture Division of Planning Commission by setting up GIS facilities and developing a geo-spatial database system, by which information/data will be managed and exchanged for enhancing the efficiency of different wings of the division.
- **Weather Index-Based Crop Insurance:** of ADB financed by Japan Fund for Poverty Reduction- The objective of the project is to increase the resilience of farm households to climate and natural disaster risks. It is expected that through weather index-based crop insurance (WIBCI), farm income losses caused by climate and natural disaster risk will be reduced.[19]

## 3.4 REFERENCES TO PUBLIC DOMAIN PUBLICATIONS

- Bangladesh Delta Plan 2100 project document[20]
  - Bangladesh Delta Plan feasibility study
  - Bangladesh Delta Plan inception phase report

[19] http://www.adb.org/sites/default/files/projdocs/2013/46284-001-ban-gar.pdf

[20] http://www.bangladeshdeltaplan.org/

- Market Scan Bangladesh[21]
- Blue Gold inception report (available through NWP)
- Grow Mobile : mobile opportunities for water management and food security in Bangladesh[22]
- RICE: improving Food Security through Satellite Technology[23]
- Doing business in Bangladesh: the Nyenrode Water & Agro-food Trade Mission September 2013 [24]
- Identification mission K2K, Water Mondiaal Delta Alliance reconnaissance visit to Dhaka Bangladesh, 20 – 24 June 2010[25]
- FAO[26]

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[21] http://wptest.partnersvoorwater.nl/wp-content/uploads/2011/07/FINAL-REPORT-MarketScan-WaterSector.pdf
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# 4 Inventory of potential (chain) solutions directions using geo-ICT in local Agriculture issues

## 4.1 Base solution directions in Bangladesh tailored to local Agricultural practices

### 4.1.1 Actual Agri-spatial information services

Important actual solutions for challenges in the information services improvement are listed below

- Improve data dissemination: Requests for more (accurate) information on short- and long-term expectancies for rainfall, fog and drought; on agricultural inputs, such as fertilizer; on cyclones
- (current forecasts are often wrong); customization of information (many people do not understand information, e.g. categorization of cyclones SODI); on salinity levels and impact on peoples' crops
- Use Mobile applications for dissemination of my organizations' data and knowledge: Among them
- various kinds of weather, disaster forecasts, salinity maps, advice on how to improve food production, how to improve fish farming, data from organizations' meteo-stations etc.
- Offer market information outside farmer and fishers' usual circle (middleman on the market).
- Suggestion for Blue Gold to approach this more widely, showing prices of local, regional and even
- Dhaka prices in the same overview.
- Use mobile applications to facilitate horizontal learning and interactive training, for instance via blogs,
- videos, games, SMS, supported by the water management organizations.
- Offer interactive community maps, showing all that is relevant for the community, collected from
- Different organizations added on with community's own observations. This includes real-time, crowd sourced information for instance on infrastructure, disaster information, flood scenarios etc.

### 4.1.2 Farm insurance and risk prevention strategies

Recent developments with BRAC and the Dutch embassy and the Water Mondiaal programme[27] several pilots are started to investigate the role of remote sensing in early warning mechanisms[28] and reducing risks in cropmanagement.. In 2014 and 2015 these demonstration pilots will prove the added value of remote sensing in combination with existing information mechanisms (at FFWC and BRAC).

[27] https://www.tenderned.nl/tenderned-web/aankondiging/detail/samenvatting/akid/e643c6c21fb7105e33fa209e2960ab9c/cid/266257
[28] https://www.tenderned.nl/tenderned-web/aankondiging/detail/samenvatting/akid/64034848ecfcea87232a7d6a23fac9bc/cid/50150

## 4.2 Differentiation of spatial solutions tailored to Agricultural practices/sector in Bangladesh

Interesting recent studies are undertaken by Deltares and HKV with repsect to improvement in information and communication in the agriculture and water sector.[29] Some quote of their conclusions: "Except for the weather app of BMD (developed by Nokia) there are no mature (scaled-up) applications with the interviewed organisations in Bangladesh. The overall IT capacity seems low with most of the interviewed organisations. Only BRAC has significant capacity for web-development and they are pushing hard for it. On the basis of the results of the interviews, there seems to be potential for mobile applications to support food security and/ or water management practices."

Directions for G4AW (high lights) solutions to agricultural issues as input to mission process

- Monitoring Waterdistribution
- Monitoring Drought on several places inBangladesh near india and East of bangladesh Monitoring river morphology, braided river system (foodsecurity) is dynamic and has direct impact on agricultura activity on the shore regions of rivers and on the temporary populated islands in the rivers (chars)
- Monitoring Blue Gold project, water quantity and quality (polder systems are affected by seawater & saltintrusion), effect on production system
- Monitoring Shrimpfarms and impacts from coastal storms and sea water flooding (surges)
- Cyclones (stormsurges) and early warning systems see IWM
- Early warning system on highwater (floodplain) see also FFWC /BWDB (and FEWS project Deltares)
- Highwater (flooddepth, duration and flood extent) in regular and extreme floodsituations and their impact on agriculture cropping systems
- Rice monitoring (Satelite for Crops)
- Monitoring Transport and logistics (on dikeroads in de floodplain) during high water or extreme floods for evacuation or minimizing harvest losses or effective routing to storage facilities to safeguard local harvest
- Monitoring fish Pondf (or permanent lakes or beels), dry season shortage of animal protein
- Natural Arsenic in groundwater threatens daily use but also irrigation of crops (Sweet water solution is needed, monitoring water), effect on crops can not be seen from sat but water balans and distribution indirectly prevents from using the wrong ground water reseroirs

[29] Study to the potential of mobile applications for water management and food security, 8-15 jan 2013