Promoting Socially Inclusive and Sustainable Agricultural Intensification in West Bengal and Bangladesh (SIAGI)

Mapping high level institution, policies and programs towards socially inclusive and sustainable agricultural intensification in Bangladesh

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1. Introduction

1.1 Intensification definition by SIAGI

Intensification of agriculture by use of high-yielding crop varieties, better animal breeds and animal husbandry, aquaculture, fertilization, irrigation, and pesticides has contributed substantially to the tremendous increases in food production over the past 50 years. In aggregate terms, agricultural intensification is undeniably increasing food production and ensuring food demand is met. In broad terms it is also helping alleviate poverty. However, this has come at the cost of an increasing social dichotomy between more affluent land holders and socially disadvantaged groups such as landless or marginal smallholders, women-headed households, and tribal minorities. This is because affluent land holders and landlords are in a stronger position to capture the benefits of agricultural intensification. Consequently, these marginal groups are much more exposed to unintended consequences of agricultural intensification.

The aim of this project is to understand drivers, apply tools, develop opportunities and provide policy options to promote more socially inclusive and environmentally sustainable agricultural intensification in West Bengal and Bangladesh. This will be addressed through the following project objectives:

1. To understand how key social, institutional, economic and environmental factors affect livelihood risks, social exclusion, adverse incorporation and environmental degradation in agricultural intensification
2. To identify opportunities to manage risk and promote social inclusivity and equity under different agricultural development scenarios using scenario and trade-off analysis
3. To promote the development of socially inclusive, equitable and sustainable agricultural intensification policies and engagement processes

1.2 Purpose of the report

Agriculture is the major contributor of rural income for the population of Bangladesh and given greater importance in terms of support programs, policies and resource allocation. Though, several flagship policies, programs, mandated institutions are formulated for agricultural development of Bangladesh, there is always a question of their effective implementation. It is therefore, essential to identify the appropriate policy and institutional changes required to promote sustainable and inclusive agricultural intensification.

This paper thus presents a synthesis of the major policies and institutions relevant for SIAGI along with their strengths and weaknesses in promoting socially inclusive and sustainable agricultural intensification. While policies are framed at the national levels, institutions are working at different levels viz., national, district, upazila, union and/or village level. Understanding the key institutions, policies and implementation channels is important for SIAGI project to identify gaps and inform policies to plug key gaps for improving the sector.

The following sections review the relevant national policies and institutions that match with SIAGI's overall objective of promoting more socially inclusive and environmentally sustainable agricultural intensification.

2. Institutional mapping

This section attempts to map key institutions, its mandates and key roles in supporting development towards sustainable intensification and resilient agriculture. The ministries and concerned departments responsible for agriculture policy formulation, planning, monitoring and administration for sustainable agriculture development including ensuring food security and sustainable livelihood are listed under this category. The SIAGI project has identified three core institutions in Bangladesh whose policies and activities are closely associated in terms of project objectives. These are Ministry of Agriculture, Ministry of Water Resources and Ministry of Local Government, Rural Development & Co-operatives. A brief introduction to these institutions and their activities in relation to SIAGI objectives are discussed below.

2.1 Ministry of Agriculture

The Ministry of Agriculture (MOA) is one of the key ministries of the Government of the People's Republic of Bangladesh. The organizational structure of the Ministry of Agriculture is presented in Figure 1. It comprises seven wings with responsibilities of policy formulation, planning, monitoring and administration. There are also 15 agencies under the MOA for planning and implementation of the development programmes/projects and coordinate with donors and development partners for funding and technical assistance. Among these 15 agencies, this report has identified two key agencies that have the responsibility to promote agricultural intensification through technology innovation and transfer, coordinate agricultural research projects and implement agricultural policies. A brief overview of these agencies is discussed below.

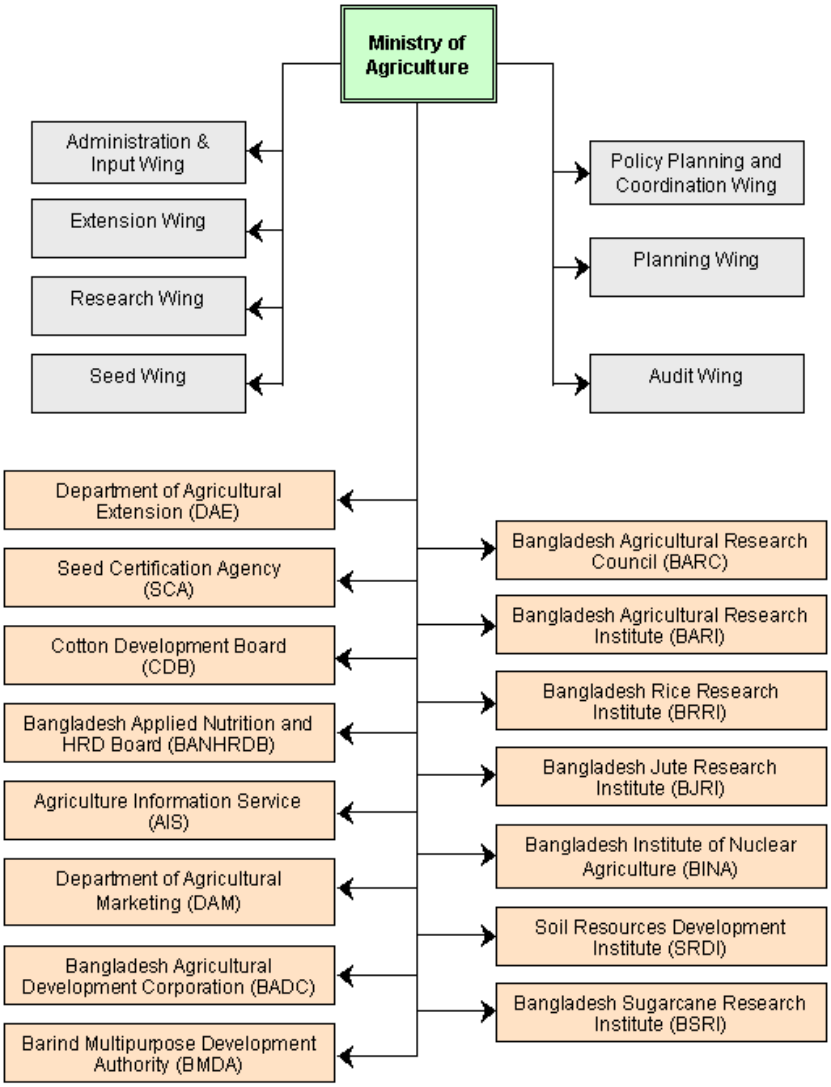

Figure 1: Organizational structure of Ministry of Agriculture.

2.1.1 Department of Agricultural Extension (DAE)

The Department of Agricultural Extension (DAE) is the largest public sector extension service provider in Bangladesh. Its mission is to provide needs-based extension services to all categories of farmers and enable them to optimize their use of resources, in order to promote sustainable agricultural and socio-economic development. The core functions of DAE include increasing agricultural productivity, human resource development and technology transfer. DAE has contributed significantly to increased crop production, particularly in rice and wheat and to helping the country to attain self-sufficiency in food. The DAE is headed by one Director General (DG) with eight Directors for each of the following wings: administration and finance, crops, field service, horticulture, training, plant protection, plant quarantine, and lastly the planning, project implementation & Information and Communication Technology (ICT) wing. Under the field service wing, one Upazila Agriculture Officer, one Additional Agriculture Officer, two Agricultural Extension Officers, one Assistant Agricultural Extension Officer and one Sub-assistant Plant Protection

Officer are assigned to each upazila. Moreover, three Sub-assistant Agriculture Officers work closely with the farmers in each union. DAE has developed core agricultural policies for Bangladesh's agricultural development, which are:

1. National Agriculture Policy (NAP)-2013
2. Draft National Agricultural Extension Policy (NAEP)-2012
3. New Agricultural Extension Policy (NAEP)
4. National Agriculture Policy (NAP)
5. National Integrated Pest Management (IPM) Policy
6. National Seed Policy

The Department of Agriculture Extension (DAE) is responsible for carrying out extension activities at the grassroots level under the supervision of MOA. The DAE carries out its activities in the field with the help of its different wings. It aims to create effective linkages between the various research institutes and the farmers so that there is flow of technology to the farmers as well as identifying the farmer level problems to take to relevant research institutes for investigation and solution. It serves as liaison agency between farmers and other organizations, both public and private concern with the goal of overall socioeconomic development of rural people.

2.1.2. Bangladesh Agricultural Research Council (BARC)

The Bangladesh Agricultural Research Council (BARC) under the Ministry of Agriculture is at the apex of the National Agricultural Research System (NARS). It has the responsibility to strengthen the national agricultural research capability through planning and integration of resources. It is the umbrella under which the entire Bangladesh agricultural research effort is coordinated. This involves cooperative activities in several ministries of government: Agriculture, Forest and Environment, Fisheries and Livestock, Rural Development, Education, Industries, Commerce, Science and Technology, etc. BARC has the responsibility to coordinate research and foster inter-institute collaboration, monitor and review the research program of NARS institutes, to assist institutes for strengthening research capacities, to establish system-wide operational policies and standard management procedures, and to assure that each institute is optimally governed. Under the provision of BARC Act 2012, National Agricultural Research System (NARS) has been formed with BARC as the apex body and twelve agricultural research organizations are the constituent units. Among the thirteen research organizations including BARC, six are autonomous bodies under Ministry of Agriculture, three organizations (BFRI (Forest), SRDI and BCDB) are government departments

and the remainder are under other ministries. Table 1 presents the list of these research organizations that are coordinated by BARC.

Table 1: BARC coordinated research organizations

Organization	Status
Bangladesh Agricultural Research Institute (BARI)	Autonomous body under Ministry of Agriculture
Bangladesh Rice Research Institute (BRRI)	Autonomous body under Ministry of Agriculture
Bangladesh Jute Research Institute (BJRI)	Autonomous body under the Ministry of Agriculture
Bangladesh Institute of Nuclear Agriculture (BINA)	Autonomous body under the Ministry of Agriculture
Bangladesh Sugarcane Research Institute (BSRI)	Autonomous body under the Ministry of Agriculture
Soil Resources Development Institute (SRDI)	Government agency under the Ministry of Agriculture
Bangladesh Fisheries Research Institute (BFRI)	Autonomous body under the Ministry of Fisheries and Livestock
Bangladesh Livestock Research Institute (BLRI)	Autonomous body under the Ministry of Fisheries and Livestock
Bangladesh Forest Research Institute (BFRI)	Government Agency under the Ministry of Environment and Forests
Bangladesh Tea Research Institute (BTRI)	Autonomous body under Bangladesh Tea Board, Ministry of Commerce
Bangladesh Sericulture Research and Training Institute (BSRTI)	Autonomous body under the Ministry of Jute and Textiles
Bangladesh Cotton Development Board (BCDB)	Government Agency under the Ministry of Agriculture

2.2 Ministry of Water Resources

The Ministry of Water Resources is the apex body of the Government of the People's Republic of Bangladesh for development and management of all water resources of the country. It formulates policies, plans, strategies, guidelines, instructions and acts, rules, regulations, etc. relating to the development and management of water resources, and regulation and control of the institutions reporting to it. It prepares and implements development projects relating to flood control and drainage (FCD); flood control, drainage and irrigation (FCDI); riverbank erosion control; delta development and land reclamation; etc. and provides irrigation, drainage, flood protection, bank erosion protection, land reclamation facilities by constructing barrages, regulators, sluices, canals, cross-dams, embankments and sea-dykes along the banks of the rivers and the coast, etc.

There are two major implementing arms of the Ministry of Water Resources namely the Bangladesh Water Development Board (BWDB) and Water Resources Planning Organization (WARPO). Basically BWDB and WARPO work at the field level and their activities significantly influence the agricultural practices in all regions including coastal areas of Bangladesh. Their activities are discussed in further detail below. The Ministry has also research and coordinating institutions such as River Research Institute (RRI) responsible for physical and mathematical water modeling; Bangladesh Haor[1] and Wetland Development Board (BHWDB) for the development of haors and wetlands. The Joint Rivers Commission, Bangladesh acts as the secretariat of the Ministry for dealing with the sharing and management of the waters of the trans-boundary rivers. The Ministry has two public trust organizations such as Institute of Water Modelling for mathematical water modeling; and Center for Environmental and Geographic Information Services (CEGIS) for integrated environmental analysis using GIS, remote sensing (RS), database and IT. These organisations provide science and modelling to support the activities of implementing organizations of the Ministry of Water Resources. For example, IWM models are widely applied in Bangladesh to study river flow and floods, irrigation and drainage, morphology and sediment transport, salinity and water quality, off take dynamics, coastal and offshore hydraulics, marine environment and groundwater flow processes. Hydrodynamic models are also applied to support the planning of dredging at river beds, hydraulic design of bridges and river training works, cooling water studies for power plants, siltation at the port and harbours, coastal protection, land reclamation and navigation route maintenance, flood forecasting and warning and biodiversity conservation. On the other hand, CEGIS is aiming to become a center of excellence for providing advisory services, research, databases and training in multifarious fields including environment, geographic information system, remote sensing of a wide group of national and international organizations for purposes of enhanced efficiency in planning, implementation and monitoring of projects and programs.

2.2.1 The Bangladesh Water Development Board (BWDB)

The Ministry, through its implementing arm -the Bangladesh Water Development Board (BWDB), implements the FCD/FCDI and other development projects. BWDB's missions include to: i) Develop and manage water resources projects ii) Manage and mitigate of river bank erosion, iii) Stake-holders participation in project planning, design and implementation, iv) Environment friendly development, and v) Promoting food production by surface water irrigation. The organization has long experience in implementing projects with its own institutional resources. There are planning, design, implementation and Operation & Maintenance (O&M) sections to implement these kinds of projects. It has also project

[1] Haor is a bowl-shaped large tectonic depression. It receives surface runoff water by rivers and lakes, and consequently, a haor becomes very extensive water body in the monsoon and dries up mostly in the post-monsoon period.

evaluation section, which monitors and evaluates the implementation status of projects. BWDB also collects, processes, stores and disseminates hydrological and hydraulic data and information through BWDB. It provides flood forecasting and warning information through Flood Forecasting and Warning Center (FFWC) of BWDB.

The Ministry prepared the Guidelines for Participatory Water Management (GPWM). This guideline is a synthesis of all the previous exercises and experiences of concerned implementing agencies in respect of participatory water management to be used by all agencies, stakeholders and management for efficient and balanced utilization of the scarce water resources. The implementing agencies include the Bangladesh Water Development Board (BWDB), Local Government Engineering Department (LGED) and Local Government Division (LGD) under the Ministry of Local Government, Rural Development and Cooperatives, Bangladesh Agricultural Development Corporation (BADC) and Department of Agricultural Extension (DAE) under the Ministry of Agriculture, Department of Fisheries (MOF) and Department of Livestock Services (DLS) under the Ministry of Fisheries and Livestock. The stakeholders on the other hand comprise local stakeholders, Water Management Organization (WMO), Local Government Institution (LGI), Non-Government Organizations (NGOs)/Community level self-help group, private sector service providers, implementing agencies and other public sector agencies. The institutional framework in which the local stakeholders are supposed to participate for water management is known as Water Management Organization (WMO) comprising Water Management Group (WMG), Water Management Association (WMA) and Water Management Federation (WMF). They have decision making power at all stages of local water resource management that concern them. The local government institutions' job is to provide supporting, facilitating and coordinating assistance to the concerned water management in respect of participatory water management at local level. According to the guideline, the NGOs/ self-help groups will carry out the participatory process and social mobilization activities on behalf of the implementing agencies or in their own interest. However, the actual implementation of this guideline is yet to be evaluated at grass-root level.

2.2.2 The Water Resources Planning Organization (WARPO)

WARPO aims to achieve sustainable water resources development in Bangladesh by pursuing Integrated Water Resources Management (IWRM). The Vision of WARPO is to become an apex organization in macro-level planning, - a center of excellence for the management and integrated development of water resources in the country, the central coordinating body for all relevant activities in the water sector, the custodian of National and Regional Water Resources Databases and Information systems and to act as Secretariat to ECNWRC for operationalizing Bangladesh Water Act (2013) and also other activities. The Water Resources Planning Organization (WARPO) prepared the National Water Policy, the Coastal Zone

Policy, the National Water Resources Database (NWRD), the National Water Management Plan (NWMP) and the Integrated Coastal Resources Database (ICRD).

2.3 Local government system in Bangladesh

The local government system in Bangladesh has evolved into a three-tier framework - union, upazila (thana) and district - first envisioned in the colonial-era Bengal Local Government Act of 1885. This has not meant, however, that the three-tier local government system is operating effectively. Local government is divided into rural, urban and hill districts, which all have similar functions. Urban authorities are single-tier and include ten city corporations and a number of town pourashavas. Rural local government has three tiers: 64 zila (district) parishads, 489 upazila (sub-district) parishads, and 4,552 union parishads. There are also three hill district parishads. The local government division within the Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C) is responsible for development and implementation of legislation regulating local government. The institution at the primary tier, the Union Parishad (UP), has had the most robust presence by virtue of institutional continuity as an elected body, since the 1970s. The body at the secondary level, the Upazila Parishad (UZP), has a shorter history since the 1980's as an elected body while an elected body at the district level is yet to appear. The three tiers of local government work to provide administrative, social welfare, public health, education, transport, housing, environment & sanitation, utilities, cultural and economic services to the local people. Their work can be categorized as self-responsibility service, joint responsibility service and discretionary service depending on the scope and extent of the project.

An important objective of the local government system has been to bring elected representatives, executive functionaries and service departments of the government under a uniform functional umbrella. To this end, laws were enacted to 'transfer' selected central government departments to the jurisdiction of the LGI at the relevant tier. The Local Government (Upazila Parishad) Act 1998 and subsequent amendment in 2011 placed 17 government departments (Figure 2) under the UZP and clear provision was made for compulsory reporting of activities by other departments not categorically transferred. Similarly, the Local Government (Union Parishad) Act 2009 made 13 field level extension officials of 7 ministries transferable to the UPs. Without the concern and integration of local government bodies, no development initiative can be undertaken in any of the administrative zone. Therefore, they play an important role in the development process of any region of the country. For example, in one of the SIAGI project sites, Sekundarkhali village under Amtali upazila of Barguna district, SIAGI has identified the water management problem as the key problem for agricultural intensification. Though there are some typical water management infrastructures in this village, i.e. peripheral embankments, drainage/ flushing sluices, drainage outlets, irrigation inlets etc., these are not working properly due to poor physical and management condition. The SIAGI project has

therefore proposed some physical interventions (e.g. canal re-excavation) in that area. The decision has evolved through consultation with the local community. However, to make it happen, the official approval and negotiations are essential with local government bodies, i.e. Union Parishad Chairman, Upazila Chairman and Upazila Nirbahi Officer. The SIAGI project is therefore closely working with the local government bodies to achieve its objectives.

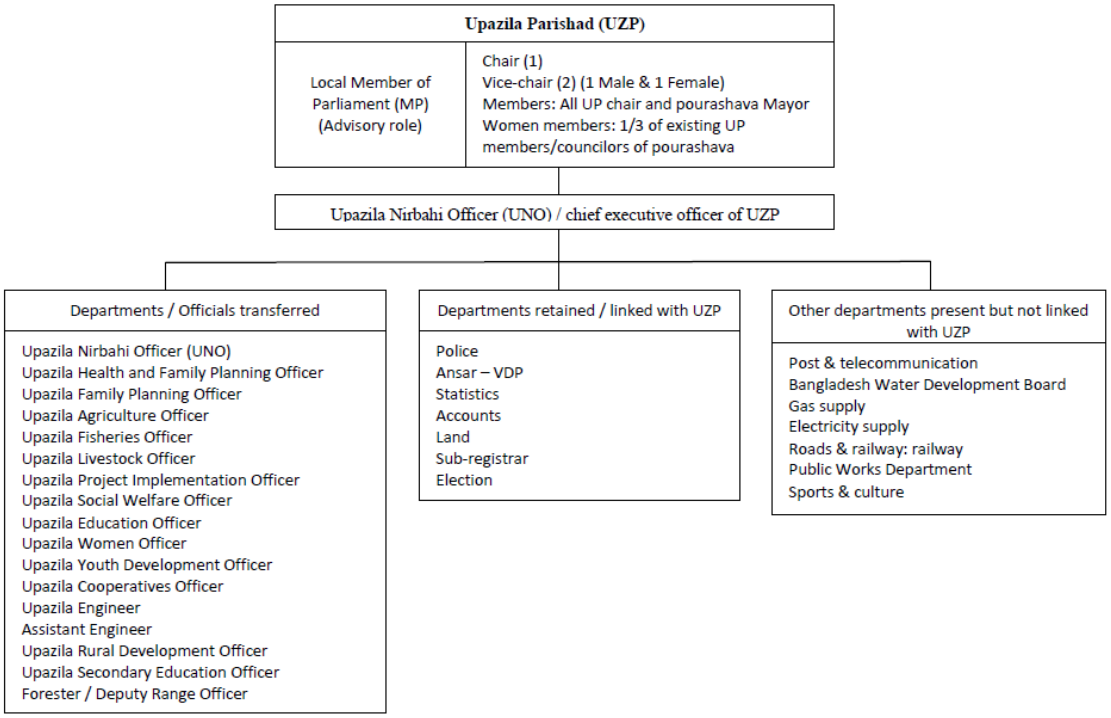

Figure 2: Organogram of Upazila Parishad (UZP).

2.4 Blue Gold Project

There are plenty of national and international projects currently working for the agricultural development in coastal Bangladesh. Among government research organizations, BARC, BARI, BRRI, BINA, BFRI, SRDI are working in the coastal belt of Bangladesh. The international research organizations such as IRRI, CIMMYT, WorldFish and WorldVeg are also conducting several research projects in that region. However, SIAGI has found strong similarities of mission and visions with government's Blue Gold project which started working in the coastal belt since 2013. An overview of Blue Gold project is stated in this section.

In Blue Gold project, water or "Blue Gold" is regarded as the basis for changing people's life. Turning water from a foe into a friend is the trigger for the socio-economic development in the polders of Bangladesh.

Overcoming water problems and implementing good water management practices through the approach of community participation is seen as the basis for further improving food production and establishing business opportunities, from which the communities will significantly benefit.

The Government of the Netherlands (GoN), a development partner of the Government of Bangladesh, since 1975, is supporting water management projects of Bangladesh Water Development Board (BWDB), for the development of sustainable and participatory water management systems and institutions throughout the country. The Government of Bangladesh (GoB) considers integrated water resources development as one of its priority activities as it will build community resilience against tidal and storm surge flooding and salinity intrusion without compromising with the ecosystem needs and allow the communities to utilize available water resources for productive use and human consumption. Participatory water management received a new impetus in Bangladesh with the adoption of National Water Policy in 1999. The participatory water resources management have been successfully introduced in the coastal region of Bangladesh since 2003 in line with the National water Policy and water resources development strategies of the GoB. The GoN in this effort became a partner and extended its support through several projects. These include the Integrated Planning for Sustainable Water Management (IPSWAM), the South West Area Integrated Water Resources Planning and Management Project (SWAIWRPMP), the Char Development and Settlement Project (CDSP) and the Water Management Improvement Project (WMIP). The GoB and GoN as a follow up project of IPSWAM concluded to initiate the “Blue Gold Program” to address poverty and improve human wellbeing using the water resources management as an entry point, with active involvement of rural communities. In the context of this program, water is termed as “Blue Gold” and considered as a fundamental resource for changing people’s living standard and supporting sustainable development of the coastal Bangladesh.

Blue Gold Program builds on the results and lessons learned in managing water resources from previous programs and projects in Bangladesh. The explicit objective of the Blue Gold Program is to reduce poverty in the coastal areas by enhancing productivity of crops, fisheries and livestock in an integrated way and increase people’s income by creating opportunities for improved processing and marketing of agricultural commodities with value chain development. The project started in January 2013 and will end in December 2018. Its operations are limited to selected polders of three coastal districts: Satkhira, Khulna and Patuakhali which are part of the South-west and South-central hydrological zones.

The rural communities will be the focal points of this Program. The Program will cooperate closely with the related Ministries, the Local Government institutions, knowledge institutes and private sector including the

NGOs. The Ministry of Water Resources, through Bangladesh Water Development Board (BWDB) is the lead implementing agency of this programme who will work closely with Department of Agricultural Extension (DAE), another implementing agency. The overall approach is innovative and therefore whenever needed, the program will strengthen the technical and strategic capacity of the Government officers along with their operational capacity in particular at local (Union, Upazila and District) level, concentrating on polder development in the three districts.

The essence of Blue Gold is to establish and empower community organizations/water management organizations (WMOs) to sustainably manage their water resources and to make these resources more productive. The Program aims to create strong cooperatives that will interact with public and private organizations that play a role in the development of the area. Participatory water resources management is the entry point and the initial driver of the community organization process. The explicit objective of Blue Gold is to reduce poverty of the people in the coastal areas by enhanced productivity of crops, fisheries and livestock and increasing incomes by improved processing and marketing of agricultural products including value chain development.

3. Synthesis of Agricultural Policies

There are several policies on agriculture and rural development in Bangladesh that are relevant to SIAGI. These can be classified in three sub-categories- crops, non-crops and cross cutting policies. About a half of the policy documents deal with crop sub-sector, these documents deal mainly with cereal crops, especially rice. The non-crop sub-sector, covering fishery, livestock and forestry, appear less prominently both in terms of coverage and focus. The crosscutting policies include those related to land, water, food and rural development (MoA, 2006). SIAGI needs to be well aware of these policies and see how the project objectives comply with the policy implications. The following sections review the key pieces of policy and legislation which apply to current project execution.

3.1 National Agriculture Policy (NAP)-2013

The prime objective formulated by the National Agriculture Policy (NAP 2013) was to ensure food and nutrition security for all and to improve the quality of life of the rural people through increased productivity and agricultural diversification. In mentioning specific objectives, the document emphasized sustainability and profitability in agricultural production; research and extension; increasing productivity; employment and income generation; competitive farming through commercialization, adaptability to climate change, developing market, agro-processing and agro-based industries, and promoting export of agricultural products.

For judicious use of water resources in farming, the policy emphasized enhancing water use efficiency. It encouraged use of surface water and solar energy for irrigation, wherever possible. For water scarce areas it suggested using force mode pumps instead of suction mode pumps. In case of agricultural machinery, the policy suggested continuing import subsidies and encouraging innovation of climate sensitive technologies.

The NAP 2013 duly emphasized developing agricultural marketing system through improving infrastructure and establishing uninterrupted value chain between producers and consumers. The policy suggested establishing local level storage facilities and agro-processing industries. The document also mentioned the importance of women's involvement in different agricultural activities, particularly in homestead gardening, seed production, bee rearing, food processing and storage etc. It also suggested the elimination of wage discrimination between men and women in agriculture. However, appropriate research programmes will be needed to identify constraints with regard to women's participation in agricultural activities and then the necessary measures can be taken to remove those identified constraints. The identification of women's constraints in agriculture is still a potential gap for the 'Women in Agriculture' sub-component of NAP.

Similarly, the NAP 2013 recognized several weaknesses and threats which may hinder successful implementation of different programmes. The constraints include less developed market infrastructure, lack of diversification, high volume of post-harvest loss, financial constraints, limited availability of agricultural credit from formal sources, inadequacy of climate sensitive agricultural technologies and inadequate use of ICT technologies. The development of the sector is also threatened by factors like environmental hazards, deteriorating soil quality, continued reduction of arable land and water, loss of agricultural bio-diversity, excessive and unbalanced use of pesticides, and inadequate budgetary allocation especially for agricultural research.

3.2 The New Agricultural Extension Policy (NAEP)

The Department of Agricultural Extension has updated the New Agricultural Extension Policy (1996) within the National Agricultural Extension Policy (2012) addressing the key constraints, emerging issues and strategic shifts of agriculture sector. The policy concentrates on decentralized and demand-led extension to meet farmers' needs, emphasizes coordinated extension service delivery, and encourages effective research-extension-farmer linkages. The key to successful implementation of the policy lies in forging a broad–based understanding amongst extension providers, farmers and other stakeholders.

The NAEP is built on nine key principles:

1. Increasing production (horizontal and vertical) and productivity as a whole;
2. Cost effective efficient decentralized demand responsive extension services;
3. Targeting and mobilizing farmers group (FG) and their federations (FO);
4. Bottom-up planning and implementation;
5. Coordinated and integrated extension services through NAEP;
6. Development of agri-business and contract farming for export promotion;
7. Adaptation to climate change and development of specialized extension service for climatically distressed areas;
8. Broad based extension support (in-time input support and subsidies, credit, price enhancement etc.); and
9. Digitalized agricultural extension services (e-agriculture).

However, this policy lacks direction on implementing its proposed principles. There is no pathway for coordinating inter-ministerial and inter-departmental extension activities. One of the serious problems to implementing this policy through agricultural extension work in Bangladesh is the presence of several Ministries, who are directly involved in assisting the farmers without much cooperation with the Ministry of Agriculture. This creates management problems and confuses the farmers, NGOs, donor agencies and even the front line extension workers belonging to different Ministries. The absence of functional and active participation of local government is also a big problem in the extension system of the country. The role of local government could facilitate to a great extent the management process of agricultural extension and development activities. Moreover, the stakeholders are not aware of the NAEP and therefore there is a lack of understanding of NAEP.

3.3 Agriculture Sector Development Strategy: background paper for preparation of 7th Five Year Plan

The objective of this background paper is to assess the performance of the agriculture sector during the 6thFive Year Plan period and to identify the factors contributing to the nature of performance. This will help identify the opportunities and challenges for the future, especially for the 7th Plan period, and to propose policies and strategies to address the challenges and opportunities.

The most important achievement in the crop sub-sector during the 6th FYP period was reaching the level of self-sufficiency in rice production. Overall, production and yield of most of major crops maintained positive changes. A good number of new rice varieties have been developed, but none have so far proved to be promising enough to replace BRRI Dhan 28 and 29 in terms of farm level yield and adoption rate. Also, for most of the adopted crop varieties, high yield gap remains a matter of major concern. Success in genetic improvement for other non-rice crops, or for fisheries and livestock, has been limited to date.

The major challenges for Bangladesh agriculture are to: raise productivity and profitability, increase diversification of production in line with consumption diversification to promote nutrition and minimize trade imbalances, reduce instability of production, increase resource use efficiency, reduce loss of arable land, minimize yield gap, maintain food safety and quality, expand irrigation and farm mechanization, and develop resilience to climate change impacts.

One of the causes of relatively poor performance of agriculture is the poor rate of take up of new technologies. Public services such as research, education and extension are important to bring improvement in this area, obviously supported by the private sector input supply (seed, fertilizer, credit, etc). The challenge is to establish effective linkages between these public services and farmers who have to play a major role in testing and adapting technologies based on their local knowledge.

Another challenge is to sustain and further develop the capacity of agriculture to effectively respond to market signals – that is, to ensure that what is grown can be sold at remunerative prices, both to maximize rural income generating opportunities and optimize the use of limited natural resources. The small and marginal farmers need to be supported in producing diversified crop suitable for both markets and household consumption to improve their nutritional status. They also need to be supported in selling their products at remunerative prices by developing linkages with domestic and international markets. Strengthening the institutional capacity to address the complex production and marketing constraints with advanced knowledge and technological know-how is a priority.

The southern districts of Bangladesh have plenty of surface water, although one million hectares of land is affected by seasonal or permanent salinity. De-silting and deepening of existing canals together with use of energy efficient pumping system (e.g. axial flow pumps) can increase opportunities for agriculture. Since these districts are vulnerable to cyclone, the risk of crop failure is high. Drainage remains a sensitive topic, especially in certain parts of the country such as the south west. Drainage problems arise from silting up of the river system and also from man-made deliberate conversion of land for shrimp and fish farming by influential local individuals. Maintenance of drainage ditches may also be lacking. Coordination is urgently needed, as this is becoming a regular problem across much of the coastal zone. New institutional arrangements may need to be found to obtain the necessary collaboration. In addition to the drainage problems, salinity is a serious problem in many areas of the south and it is anticipated that the problem will be aggravated by sea level rise and reduced water flow through major rivers during dry months.

This background paper suggested that the overall goal under the 7th Five Year Plan would be to sustainably intensify and diversify agricultural production to meet the nutritional needs of the increasing population in the country. The strategic goals in this regard would be to:

i) Intensify production as needed to address the caloric requirements of an increasing population, diversify production as needed to ensure balanced nutrition for all and maximize rural incomes;

ii) Promote the sustainability of natural resource use for sustainable agricultural growth;

iii) Promote adaptation to climate change of agro-food systems to enhance resilience of agriculture based livelihood systems.

3.4 The National Food Policy (NFP) 2006

This policy provides strategic guidance to address the key challenges facing Bangladesh in achieving food security in all its dimensions. The three major objectives of NFP are: (i) adequate and stable supply of safe and nutritious food, (ii) increased purchasing power and access to food of people, and (iii) adequate nutrition for all individuals. Several activities and strategies were suggested for achieving the objectives. The NFP has taken into cognizance core development policies in its preparation, implementation and monitoring. To implement the objectives of the NFP, a Plan of Action (2008-2015) was developed along with 26 strategic areas of intervention and more than 300 action items to be undertaken in the short, medium and long term over the period 2008-2015. It also provided a set of guidelines for inter-ministerial coordination, sectoral planning and budgeting with a view to promoting implementation effectiveness. To this end, the Country Investment Plan (CIP) for Agriculture, Food Security and Nutrition laid out a coherent set of 12 priority programmes that have been anchored in the policy, programmatic and investment framework of Bangladesh. The total cost of the CIP is estimated at US$ 7.8 billion. The CIP also detailed a strong monitoring framework for effective implementation of food policy agenda in the country.

The SIAGI project has identified some CIP priority programmes closely similar to the project's aims and objectives, such as:

- Sustainable and diversified agriculture through integrated research and extension
- Improved water resource management and infrastructure for irrigation purposes
- Improved access to market, value addition in agriculture and non-farm incomes
- Community based nutrition programmes and services
- Orient food and nutrition actions through data

3.5 The National Water Policy, 1999

The National Water Policy (NWP) of 1999 was adopted to ensure efficient and equitable management of water resources, proper harnessing and development of surface and groundwater, availability of water to all concerned and institutional capacity building for water resource management. The Policy considers water as being essential for human development, socio-economic development, poverty alleviation and preservation of the natural environment.

The NWP has 16 components, which describes policy measures to be undertaken to achieve the above objectives. These policy measures include: (1) river basin management, (2) planning and management of water resources, (3) water rights allocation, (4) public and private involvement, (5) public water investment, (6) water supply and sanitation, (7) water and agriculture, (8) water and industry (9) water, fisheries and wildlife, (10) water and navigation, (11) water hydropower and recreation, (12) water for environment, (13) water for preservation of haors, baors, and beels,[2](14) economic and financial management, (15) research and information management, and (16) stakeholder participation.

The NWP, emphasizes among others, three interrelated issues such as water and agriculture, water, fish and wild life, and water for preservation of haors, baors and beels. One of the notable policy directions in the NWP was to encourage private sector development of groundwater for irrigation and also to emphasize surface water augmentation. In this respect, the government agrees to continue its support of private development of groundwater irrigation for promoting agricultural growth, alongside surface water development where feasible. But the clear direction of private sector engagement is not identified in the policy. An important step in this case could be boosting the private investment in the water sector; private agencies can provide investment and management resources that could increase efficiency of the water sector many-fold. Under ideal conditions, the government should assume responsibility for overall management of the resources for the benefit of society, undertake major development programs, and provide public services of purely public good nature. The private sector should invest in developing the commercial aspects of water system production and delivery. No matter what type of privatization measures are adopted, it is essential to provide proper policies for their success. In order to formulate appropriate policy, it is necessary to have a strong linkage between government research organizations and policy institutions so that actual needs can be reflected in the policy. Sometimes, it is not adequate to formulate a national policy only; regional assessment should also be taken into consideration. For example, in sustainable groundwater issue, the stated problems and the interest of the stakeholders are more likely

[2] Baor is a kind of Oxbow lake. It is an abandoned meander isolated from the main stream channel by deposition, and filled with water. Beel is a large surface water body that accumulates surface runoff water through internal drainage channels; these depressions are mostly topographic lows produced by erosions and are seen all over Bangladesh.

to be different in Northern Bangladesh and Southern Bangladesh given its natural resource endowments and associated social, political and institutional factors.

Clear policy enunciation by the government and enforcement principles will facilitate the development of an efficient water market. NGOs could have important roles to play in the development of private water markets and policy measures should facilitate this. Particularly, NGOs could assist in formation of water user groups, facilitate information exchange and even provide capital assistance to small entrepreneurs. NGOs could also contribute significantly to environmental activities, including educating the public, monitoring environmental hazards and mobilizing the people to undertake protection measures for water resources.

3.6 The Water Act 2013

The Water Act 2013 is based on the National Water Policy, and provides the legal framework for integrated development, management, abstraction, distribution, usage, protection and conservation of water resources in Bangladesh. The Act provides for the formation of a high-powered National Water Resources Council (henceforth termed as the Council) headed by the Prime Minister. An Executive Committee under the Ministry of Water Resources will implement the decisions taken by the Council.

As per this Act, all forms of water (e.g., surface water, ground water, sea water, rain water and atmospheric water) within the territory of Bangladesh belong to the government on behalf of the people. Private landowners will be able to use the surface water inside their property for all purposes in accordance with the Act. The Act addresses the water needs in irrigation and urban areas in the context of available surface water, groundwater, and rainwater. The management of water resources within the territory of the country in rivers, creeks, reservoirs, flood flow zone, and wetlands has been assigned to the Executive Committee under the Ministry of Water Resources.

3.7 National Water Management Plan, 2001 (Approved in 2004)

The National Water Management Plan (NWMP) 2001, approved by the National Water Resources Council in 2004, envisions establishing an integrated approach to the development, management and use of water resources in Bangladesh over a period of 25 years. The short term (2000-2005) is considered a firm plan, the medium term (2006-2010) an indicative plan, and the long term (2011-2025) a perspective plan. According to NWMP 2004, only nine percent of groundwater is required for water supply, 12 percent for the environment, and 79 percent for agriculture. According to the NWMP, demand for irrigation is expected to increase by 25% between 2000 and 2025. Innovations in mechanical irrigation have led to a

rapid expansion of irrigated agriculture in Bangladesh. Extraction of irrigation water is not effectively controlled. As a result of limited viability of groundwater, and the absence of an integrated strategy, the organizations involved in groundwater management do not have adequate capacity and many groundwater management tasks are not being carried out . This calls for urgent radical reform and upgradation of groundwater management. A shift away from reliance on groundwater towards surface water in agriculture needs to be promoted. This will enable safer agricultural water to be sourced from surface sources and safer drinking water to be sourced from the deeper groundwater aquifers. The Perspective Plan, set the goals for the future and draw the course of action to achieve these goals by 2025 based on the overview of the short and medium term plans.

Water Resources Planning Organization (WARPO) has been assigned to monitor the national water management plan. NWMP has been prepared to provide a framework at national and regional level within which line agencies, local government and other stakeholders may plan and implement their own activities and projects in a coordinated manner, consistent with overall national and sectoral objectives.
The major programs in the Plan have been organized under eight sub-sectoral clusters: i) Institutional Development, ii) Enabling Environment, iii) Main River, iv) Towns and Rural Areas, v) Major Cities; vi) Disaster Management; vii) Agriculture and Water Management, and viii) Environment and Aquatic Resources. Each cluster comprises of a number of individual programs, and a total of 84 sub-sectoral programs have been identified and presented in the investment portfolio. Most of the programs are likely to be implemented in coastal areas.

Under Institutional Development, it is assumed that sound institutional principles are to be followed to separate policy, planning, and regulatory functions from implementation and operational functions at each level of government, whilst at the same time holding each institution accountable for financial and operational performance. Activities at zila (district) level and below are supposed to be carried out by a mix of Local Government Institutions (LGIs), Community-based Organizations (CBOs) and the private sector. The plan aims to create an enabling environment consistent with the institutional principles and other policy objectives. For example, dry season scarcity of water is a major impediment which adversely affects drinking and domestic water supply, fisheries, forestry, navigation, irrigation, industries and the entire natural environment in large areas of Bangladesh. The country's dry season irrigation is heavily dependent on groundwater. The government recognizes that over-dependence on groundwater is not wise. Increased emphasis must be given to harness and develop the surface water resources so that in the long run a balance can be struck between the use of surface and groundwater. The plan therefore suggests taking steps to develop the water resources of not only the main rivers, but also of the other surface water bodies.

3.8 National Women Development Policy 2011

The National Women Development Policy was formulated for the first time in 1997. The main objective of this policy was to promote the cause of women in society, in recognition that they had long suffered abuse and neglect. The set of objectives related to agriculture are:

i) Women and Farming:

1. The role of agriculture in the agro-based economy in achieving food security, employment and economic growth is important. The direct and indirect labor in agriculture and participation of women is recognized worldwide. So the role of women's labor as farm hands and their contribution to the national economy needs recognition.

2. To extend all kinds of support and assistance in eliminating bottlenecks created due to climate change and disaster.

3. To take initiative to ensure equal wages for the same job and to remove wages discrimination to women in agriculture.

4. To take steps to ensure the farming women have equal opportunities to access agricultural inputs like fertilizer, seed, farmer's card and credit facilities etc.

ii) Women and the Environment:

1. In recognition of the contribution of women in the management of natural resources conservation and a safer environment to give them opportunity of equal participation in environment preservation policy and programs reflecting a women perspective.

2. To ensure participation of women in decision-making regarding environment management and pollution control and program implementation.

3. To encourage women in farming, fisheries, cattle rearing and afforestation and give them equal opportunity.

iii) Institutional arrangements and strategies

The policy suggests that at district and upazila levels, the activity/program of the district level administration, Zila Parishad, Municipality, Local Government, office of the concerned ministry shall be co-ordinated and progress of women development program reviewed for advancement and empowerment of the women. District Women Affairs Officer and Upazila Women Affairs Officer in co-ordination with other concerned officials shall discharge their responsibilities in implementation of all the programs undertaken for the development of women. At the grassroots levels i.e. in village and union the women shall be

organized as self-sustained group. To strengthen these groups, they shall be transformed into a registered organization under different government organizations. They shall tap resources from the GO and NGO sources, banks, other financial institutions. An intimate relationship of these organization with Union Parishad, Upazila Parishad, Zila Parishad, Municipality and City Corporation shall be established and their activity co-ordinated. Over and above, the inclusion of local development perspectives of all the grassroots organizations shall be encouraged and assistance given. The effectiveness of this process is yet to be evaluated in practice.

3.9 Master Plan for Agricultural Development in the Southern Region of Bangladesh

The Master Plan has been prepared by the Ministry of Agriculture in collaboration with the Ministry of Fisheries & Livestock and Ministry of Water Resources, and with technical assistance from the Food and Agriculture Organization of the United Nations (FAO). The Master Plan covers the period from 2012 to 2021. Total investment for the 26 programmes is determined as BDT 578,026 million for ten years.

The objective of the Master Plan is to provide a road map for integrated agricultural development in the coastal districts of Bangladesh, aiming at sustainable food security, poverty reduction and livelihood development for the poor. The Plan particularly focuses on, among others, the following:

a. increasing agricultural productivity;

b. improving water management and rejuvenating productivity of degraded lands;

c. developing climate resilient infrastructure and improving surface water irrigation system;

d. improving productivity of brackish water shrimp and capture fisheries; and

e. promoting smallholder poultry and dairy development.

It is expected that the combined outcome of all these interventions will lead to enhanced productivity, balanced growth, value chain management, increased employment and increased access to food and nutrition through appropriate institutional arrangements and sustainable resource management. The Master Plan is vertically and horizontally linked with a host of government policies and plans that substantiates the government's declared objective for sustainable development along with economic growth and poverty reduction including those discuseed earlier in this report.

4. Policy synthesis in relevance to SIAGI project

This section attempts to establish the potential linkages of the existing policies at the sector and sub-sector levels that are relevant for SIAGI. A brief summary of the key institutional and policy issues that need to be

considered by SIAGI would be useful to draw the attention on some issues that we need to be aware of. The sub-sectoral policy components in sustainable inclusive agricultural intensification and their effectiveness in the study regions would be a issue for SIAGI to examine. The common concern of all these policies is the coordination amongst the ministries and agencies in the design, approval and implementation of projects.If an effective coordination process can be developed then these policies could work for what they aimed for.The potential for theinterventions of these policy can be assessed based on the relative situation in the study villages and the existing gap between national and regional context. A policy matrix of reviewd policies in line with SIAGI's objectives is presented in Table 2 .

Table 2: Policy Matrix in line with SIAGI

Sub-sector Policies	**Target/Interventions**	**Implementing organizations**	**Strength**	**Constraints/ opportunities for SIAGI intervention**
National Agricultural Policy 2013	Climate adaptable sustainable agriculture, sustainable land and water management, agricultural diversification, high value crop production, smooth input supply, fair output price, protect interests of the small, marginal and tenant farmers.	Ministry of Agriculture	Sufficient institutional capacity upto local level, trained manpower, input supply network, quality research and extension services, agricultural subsidy.	Salinity in soil, heavy, cracking basin clays, limited surface & ground water supply for irrigation,weak marketing system of agaricultural products, post-harvest loss, lack of capital, absence of farmers' group, limited credit facility, lack of coordination between public and private organizations.
National Agricultural Extension Policy 2012	Mobilize, build and develop farmer groups and organizations, targeting the tiny, marginal and small holders, adress value chain constraints, differenciated approach to suit local demands, capacity building of extension personnel.	Ministry of Agriculture	Countrywide coverage, completely service based, qualified and experienced staff, trustworthy to farmers, use of mass media.	Big land ownership, lack of proper land use regulation, male biased, difficult communication system, very short value chain and limited market information, poor embankement, absence of demand-based crop varieties, limited accountability.
National Food Policy 2006	Ensure a dependable food security system through adequate and stable supply of safe and nutritious food,	Ministry of Food and Disaster Management	Detail plan of action, emphasis on long term food production plan considering regional land productivity and suitability, efficient use of water	Too many responsible actors, lack of coordination between public

	enhance purchasing power of the people for increased food accessibility, andensure adequate nutrition for all (especially women and children).		resources, available inputs, credits, balanced diet	and private sectors, lack of commitments of public sector agencies, agricultural production and marketing risk.
National Water Policy 1999	Groundwater development for irrigation by both the public and the privatesectors, improve efficiency of surface and groundwater irrigation, strengthen monitoring organisations for use of groundwater and surface water irrigation.	The Ministry of Water Resources (BWDB, WARPO, Executive Committee ofthe National Water Resources Council (ECNWRC)), LGED, Union Parishad.	Recognized the socio-economicequity dimensions of water, encouragesprivateinvestments in the water sector, practically address the multifaceted uses of water in the country	Lack of cross-sectoral guidelines for multiple water uses in rural areas, urban focus, limited water governance to the polders andsluice gates, lack of coordination among Ministry of Water Resource, Department of Fisheries and Department of Agricultural Extension.
National Women Development Policy 2011	Remove wages discrimination to women in agriculture, equal access to inputs, ensure right to nutrition, to educate and train in nutrition, ensure safe drinking water and sewerage system, encourage women in farming, fisheries, cattle rearing and afforestation and give them equal opportunity.	Ministry of Women and Children Affairs	Extensive inventory of development plans and state obligations, advocates women's participation, advancing their capabilities, recognizing their contributions, addresses special needs of older women, women with disabilities, women from indigenous and marginalized communities	Translating the policy intent into action plan, weak institutions and bureaucratic resistance, lack of bridging with other ministries, lack of engagement between government agencies and women's groups, lack of awareness about the policy.

All of these policies emphasize efficient use of land, labour, water and other natural resources with special emphasis on women participation and environmental protection. However, there are some inconsistencies or inadequacies in the sub-sectoral policies. For example, the policy documents mention diversification and commercialization of agriculture as a common objective, but very little understanding is given with respect to relative profitability of competing crops, physical and location specific conditions for non-crop enterprises, supply chain of high value products and provision for processing, storage and marketing activities. Another drawback of these policies is that all critical planning, policymaking and decision-making functions and authorities are located in the apex level offices. Lower level offices are basically responsible

for implementing the plans and policies made at the top-level. Although the policies broadly mention increased role for the private sector, there is seldom any clear direction as to how and where the growing private sector and NGO have the opportunities and where they can support to play more active role. The common concern of all these policies is the coordination amongst the ministries and agencies in the design, approval and implementation of projects. If an effective coordination process can be developed then these policies could work for what they aimed for. Also, the relevant ministries should work on harmonizing the remaining inconsistencies in existing policies towards a coherent development plan for the agriculture sector in the coastal zone of Bangladesh.

In the study regions, in case of water resource management, it is evident that polders in the Southern regions have conflicts and contentions around economic interests of groups with different types of land endowment and conflicting land use, e.g. conflict between shrimp growers and rice farmers. Some people occupy canals as they make earthen-cross dam on the canals for aquaculture. As a result, the canals lose much of their drainage function and farmers in adjacent areas loose access to water of the canals for irrigation. Although BWDB is legitimately concerned about water management, it is also important and relevant for other agencies that deal with public welfare and development to be involved in water management. Inter-agency relationship does not flow automatically. Moreover, within organizational structure of BWDB, there are few positions of environment, forestry and fisheries professionals as "Research Officer" all of whom are posted in BWDB head office in Dhaka. There is no such professional position in Zone/Circle/Division office at local level, who can implement and monitor the 'Environmental Management Plan (EMP)' of any project. Unless inter-agency partnership is clearly spelled out in administrative arrangements, such services hardly work for polder community. In this respect, community participation in water management is a key issue and is being attempted in selected polders through BWDB's Water Management Association (WMA). While BWDB is the lead agency for water management, without strong coordination with Local Government Division, the actions cannot be undertaken. NGO can work as an exogenous body for local technical assistance.

There is little evidence of agricultural intensification in the study regions despite the potential for improving crop intensity, crop yields and sustainability. The major crop sector policy documents mainly focus on food production, especially rice production, giving lesser attention to non-cereal crops i.e. vegetables, fruits and flowers. The study regions appear to have high potential for high value horticultural crops that require less land and water. Crop diversification can be another option to intensify the agricultural production. A large proportion of populations in the study regions belong to landless, marginal, and small farmers. Moreover, nearly half of the population are women. It is a challenge to engage this large population in the agricultural production system. A comprehensive framework is needed to ensure the inclusion of marginalized groups

The value chains in agricultural products in the study regions are very weak which need to be developed to promote sustainable agriculture. Some of the existing social, political and environmental factors are the main barriers to achieve the overall agricultural development of these regions. Identification of these factors can lead to design appropriate policy framework for the study regions and a complete conceptual framework can assist to initialize this process. Given the overall objectives of the SIAGI project and the relevant policy reviews, it can be said that the SIAGI has some potential to intervene at regional level and to contribute in developing a comprehensive plan for socially inclusive and sustainable agricultural intensification in coastal Bangladesh.