The Status of GBM Bangladesh Delta and Future Change in the Economy

Key messages

Services (including construction) are important economic activities in the GBM delta following agriculture. Safeguarding agricultural activities should be a top priority and appropriate adaptive and mitigating measures are needed.

Loss of livelihood in the GBM delta due to damage of natural resources and climate change may have deleterious impact on employment in particular and overall employment in general. Thus, protecting delta livelihood should be a top policy priority.

The delta is a net importer of several environmental metrics, embodied in goods and services bought from other regions, but net exporter of energy and CO2 emissions to the non-delta; thus, compensatory fiscal measures may be needed to address the disproportionate burden of environmental metrics.

Background

The DECCMA study intends to develop a tool that allows policy makers to understand how different climate scenarios affect the economic options in the delta and how these, in turn affect vulnerability and sustainability in the region. It tries to link economic factors to the availability of jobs and livelihoods in the delta and thereby to potential migration fluxes – all in the context of climate change and its effects on different economic activities. We want to achieve this by developing delta level input-output tables (IOT) and economic models based on IOT.

This study is conceptualized on two major objectives, Firstly, to gather socioeconomic and biophysical information to develop an environmentally extended input-output (IO) tables and models for Bangladesh applying the DECCMA definition of Delta (the coastal zone comprising 19 districts) and Non-Delta (rest of the country other than delta). Secondly, to examine the baseline outcomes on economic relations namely in the distribution of value added by regions (delta and non-Delta) and activities (57 activities according to GTAP classification); labor and gender embodiments in the final consumption of goods and services, both within the country (delta and non-Delta) and in the Rest of the world; and other environmental implications, such as the land and environmental embodiments and footprints. The study also examined other environmental implication, such as the land and environmental embodiments and footprints.

Bangladesh Delta Input-Output Table (IOT)

The general approach adopted for this study is an environmentally (the socioeconomics have already been captured) extended input-output model. This allows studying elements such as the labour, gender, land, environmental embodiments and footprints. To study the effects of alterations such as demand changes or climate change in these areas, require interdisciplinary knowledge and models. This one allows, for example with a classic model of Leontief demand (Leontief 1936, 1941, 1974; Miller and Blair 2009; Leontief 1970), to see how changes in domestic demand (households, government, and gross fixed capital) and external demand (exports) requires certain levels of labour and resources.

Developing regional tables and extensions of specific Deltaic areas, not matching the economic or political boundaries poses additional challenges, so the focuses are on the following aspects:

- Exploration and description of the structure of the economies studied.

- Information directed towards the larger or most important elements of the economies studied and the inclusion of boundaries on some flows.

- The choice of the departure matrix of a surrounding country or region, with an economy similar to the one under consideration and the analysis of the problem of zero location.

- When having to use neighboring or different scale IO data, identifying similarities rather than differences in regions economic structures.

- The (mis-)match between the political, economic and natural resources (in particular the hydrology defining the Deltas) boundaries and data.

The scheme generates the multiregional input-output table for the delta, the rest of the country and the world, is shown in Figure 1, where the set of red squares represent transactions of intermediate goods $Z = (z_{ij})$ and set of blue boxes represent the matrix and Y is the vector of final demand. T represents the Intermediate Domestic matrices, M the intermediate import matrices, y the final demand excluding exports of final goods and services to the other region, N the final demand of exports (or imports respectively for each region) of goods and services from the other region in the same country, e the column vectors of the exports of each of the regions to the Rest of the World (RW), m the row vectors of the imports of each of the regions from the RW, x the total gross output, and v the Value Added/Primary Input.

Bangladesh Input-output table for Delta has been developed based on the Bangladesh IOT 2012 prepared for the Seventh Five Year Plan under the aegis of Bangladesh Planning Commission. The Bangladesh Delta IOT has 57 activities following the GTAP classification; four types of factors – capital; labour (skilled and unskilled); Natural resources and Land. Inclusion of natural resources is a new addition to the factor space used in the original IOT. Various data sets namely, National Accounts Data, Household Income Expenditure Survey (2010), and Labour Force Survey (2010) have been used to separate national estimates into Delta and Non-Delta regions.
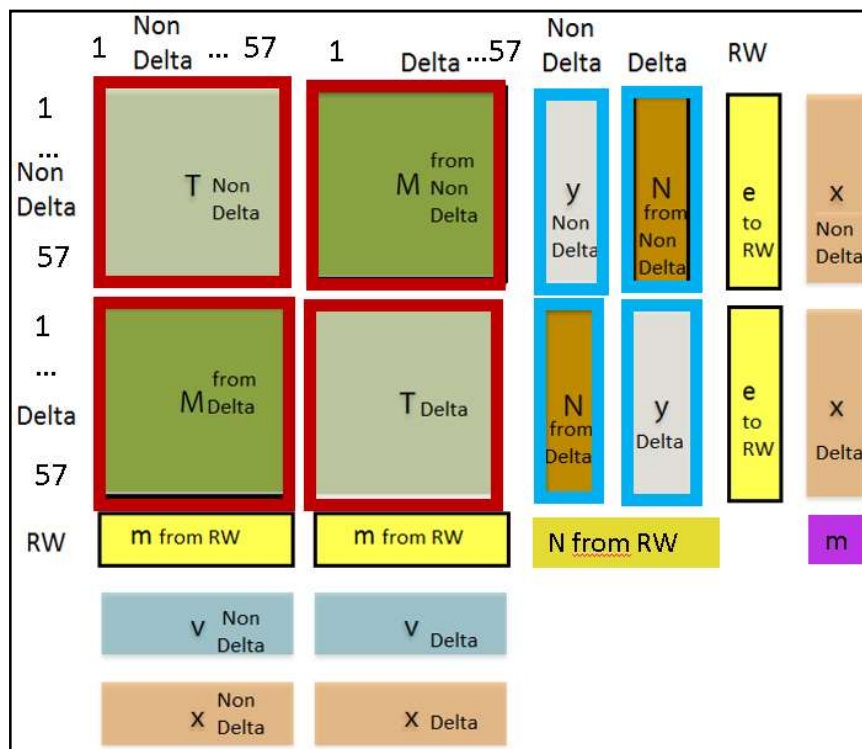

Figure 1: MRIO for the Delta and Non-Delta regions (Source: Adapted from Kanemoto et al. 2011; Lenzen et al. 2013).

Key findings from IOT

- One of the results indicates a strong importance of the agriculture sector in delta region, notably the fishing sector, which is relatively much bigger in the delta than in the rest of the country. Also, the construction, and the trade and transport activities were found to be relatively more important in the delta than in the rest of the country (non-delta).

- The majority share of employment in agriculture and manufactures and mining for delta region, is demanded by the delta region itself.

- The embodied employment of women in the delta is most present in agriculture. This is a very marked result with respect to all other DECCMA deltas. On the contrary, the share of embodied employment of women in the delta is less present in services.

- The dominance of unskilled work is observed in the delta embodied in the agriculture & forestry, services, manufactures & mining, and construction. Low share of skilled labour in the construction and agriculture & forestry is seen in both delta and non-delta regions.

- The majority share of employment for both male and female in delta and non-delta regions is covered by their respective labour force. Migration happens among both male and female employees. Share of migrated workforces in total employment is higher for delta region compared to the non-delta region. It is more notable for male workers.

- Although agricultural land use is clearly dominated by paddy rice (3000K hectares), this changes enormously when we look at the embodied agriculture land in the final demand of goods and services. In particular, the embodied land use in the processed rice and other

food products is particularly relevant, and also in sectors not directly using agricultural land the most, such as food industry and textile.

- The delta is a net importer of several environmental metrics, embodied in goods and services bought from other regions (higher than in exports), but net exporter of Energy and CO2 emissions to the non-delta.

Setting up alternative policy scenarios from Experts' Consultation Survey

Using the data from IOT and SAM, a dynamic CGE model is being developed to assess the impact of climate change on some specific economic variables such as production, prices, wages, employment, remittances, etc. With a view to setting up alternative policy scenarios for both the delta and country (non-delta) levels, a consultation survey was conducted with the experts from ministries/divisions, universities (both public and private), research organizations and international development organizations. Using the published survey data for the years 2000, 2010 and 2015, quantitative projections were made by them for the years 2020, 2030, 2040 and 2050 of several variables, including population (level/urban share), GDP growth (nominal/real), share of agriculture/industry/ services in GDP, level of labour wage, capital income share, enrolment in secondary/tertiary education, level of female enrolment, level of inequality, and agricultural land use quantities.

Key findings from Experts' Consultation Survey

- The country's population will increase for the period 2020-2050 while the population in delta region will show a downward trend for the same period (Figure 2). This insinuates that the changed climate and lack of employment opportunity would drive people from delta region to non-delta region.

- The contribution of agricultural sector to GDP at country level and delta level will decrease in the years 2020-2050 (Figure 3). Therefore, the share of industrial sector and services sector will increase in the coming years. Interestingly, the rate of decline of agricultural share at delta level will be lower than the contry level. It indicates that the economy of delta region will still depend greatly on agriculture for employment and income generation and hence, we will see less industrialization in delta region compared to non-delta region.

- The overall female participation in education will increase in the period 2020-2050 (Figure 4). The enrollment rate of delta region will be very similar to the rate for country level in 2050.

- The level of inequality will decrease over the period 2020-2050 for both country and delta levels (Figure 5). Though, we can see that the falling rate will be lower for country level compared to delta level. Therefore, we may see more inequality in non-delta region.

- The quantities for agricultural land use will decrease over the period and this result comes as an obvious. The increasing population and climate change will contribute to this at both delta and non-delta regions.
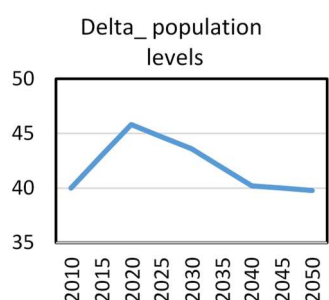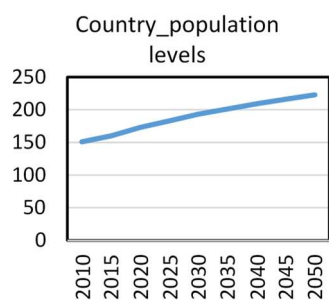

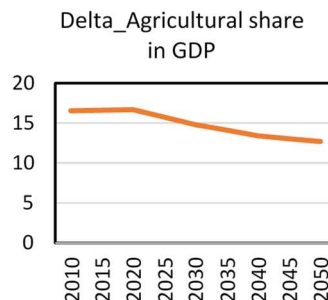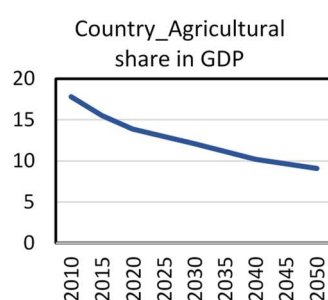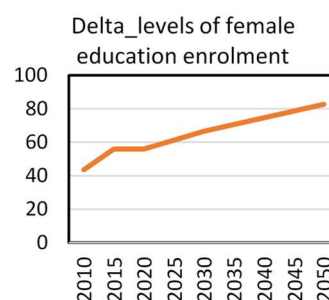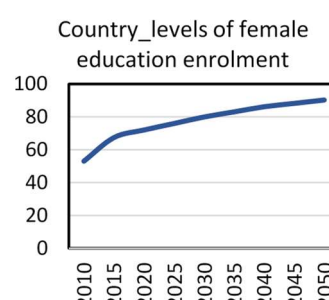Figure 2: Population levels in millions   Figure 3: Agricultural share in GDP (%)   Figure 4: Female education enrollment (%)

Country_levels of inequality

Country_agricultural land use

Delta_levels of inequality

Delta_ agricultural land use

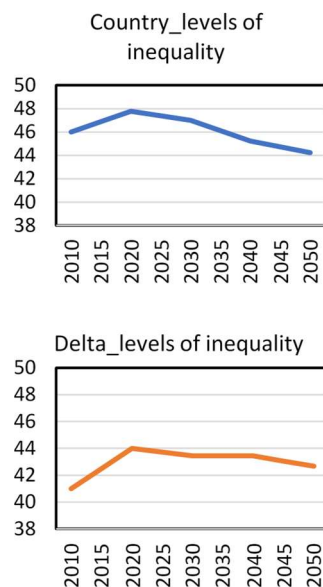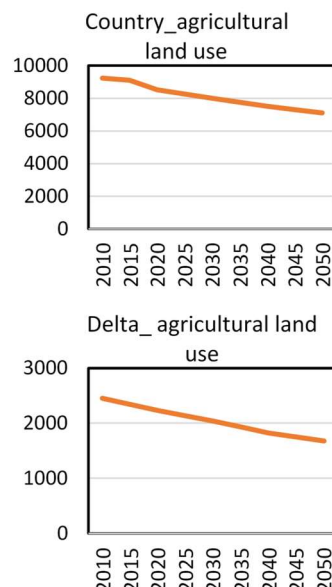Figure 5: Level of inequality (%)

Figure 6: Agricultural land use (1000 hectres)

Conclusions

- Services (including construction) turn out to be important economic activities in GBM delta following agriculture. Industrial activity (including Manufacturing and Mining) appears less significant in terms of income and employment generation in GBM delta. Thus, safeguarding agricultural activities should be a top priority in GBM delta and appropriate adaptive and mitigating measures are needed.

- Another key observation is the self-sufficiency in employment generation in Delta. More than 60% of the GBM delta employment has been used to satisfy the final demand needs of the delta. The pattern suggests that despite widespread believe that pull factor migration is dominant in Bangladesh the extent may not be substantial in relation to the total labour absorption in delta. Thus, loss of livelihood in GBM delta due to damage of natural resources and climate change may have deleterious impact on employment in GBM delta in particular and overall employment in general. Thus, protecting delta livelihood should be a top policy priority.

- Another important observation is that due to reliance on agriculture and services activities, the delta is a net importer of several environmental metrics, embodied in goods and services bought from other regions (higher than in exports), but net exporter of energy and CO_2 emissions to the non-delta. Thus, compensatory fiscal measures may be needed to address the disproportionate burden of environmental metrics.

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