



12

Future Scenarios of Economic Development

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12.1 Introduction

The research reported in this book has, as its overarching focus, environmental change and its interaction with natural resource management and poverty alleviation in the Bangladesh delta region. It therefore undertakes bio-physical and socio-environmental modelling of change in the region to 2100 and 2050, respectively, framed by three socio-economic scenario narratives that describe alternative policy contexts to 2050. These narratives (see Appendix to Chap. 10) outline possible trends in land use, water management, international cooperation, disaster management, environmental management and quality of life and livelihoods. In order to enhance the usefulness of these scenarios for national stakeholder groups, including the Government of Bangladesh, this chapter provides further descriptive detail about the economic development paths implied by these scenarios. The policy levers available to national and regional administrations to influence the likelihood of

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individual development paths are also highlighted. Thus, this chapter serves to emphasise the high degree to which the direction of economic development and the extent to which environmental risks threaten this remains in the hands of policy makers in Bangladesh.

12.2 Principal Components of Macro-economic Change: Bangladesh and Delta

Figure 12.1 identifies the critical components of macro-economic performance in the delta and in Bangladesh that are included in the scenario analysis. The outer ring identifies components of the enabling conditions for macro-economic performance, whilst the inner ring identifies the direct aspects of macro-economic management. Macro-economic indicators, along with equity and poverty, are the key outcomes of the evolution of these enabling conditions over time. However, the arrows serve to highlight that the linkages to poverty and equity objectives may be

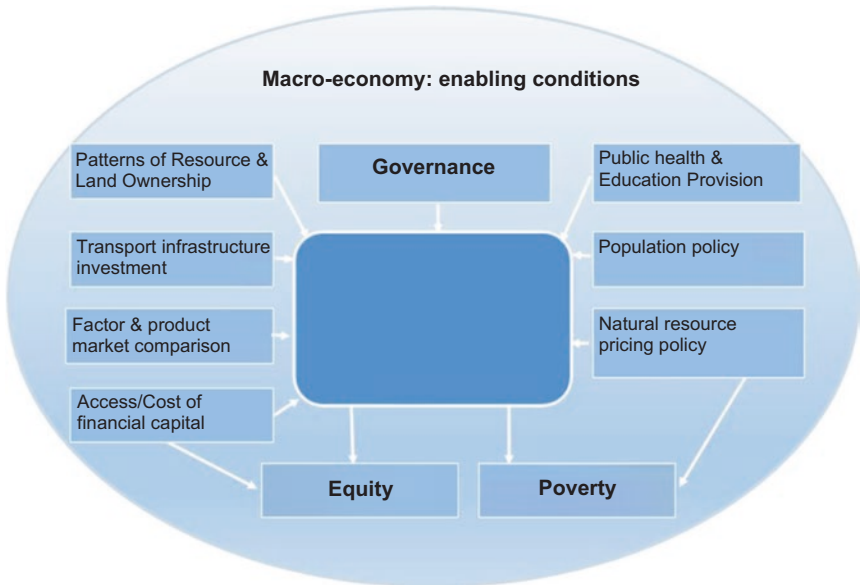


Fig. 12.1 Components of macro-economic development

influenced directly by the macro-economic enabling conditions, as well as through macro-economic performance. For example, implementation of natural resource pricing policy may result in resource ownership rights being distributed more equitably than currently, thereby reducing poverty, but without having immediate macro-economic consequences.

In the following subsections, a brief description of the ways in which these individual components help to determine patterns of macro-economic development is provided. How they relate specifically to the delta region is identified, and how in broad terms their development may evolve under the three descriptive scenarios to 2030 can be characterised. This period is adopted in accordance with the long-term planning horizons adopted by the Government of Bangladesh and development partners. Within these scenario characterisations, an indication of how the bio-physical changes identified in the integrated model (see Chap. 28), and the research more broadly, may interact with the components of macro-economic development is included. The characterisations of macro-economic components are developed on the basis of the experience and judgement and are informed primarily by the data compiled in the series of reports prepared as background input to the preparation of the Seventh Five-Year Plan for Bangladesh (GED 2015). Thus, whilst they are indicative, it is hoped that the wider stakeholder community would be able to provide further validation in the event that they are used to inform policy development.

Data is reviewed and derived from (i) existing short-medium-term projections made by the General Economics Division (GED), World Bank, Asian Development Bank and (ii) longer-term projections—Shared Socio-economic Pathways (SSPs)—created by the climate change research community. It is then compiled data to provide coherent outlines of three economic development paths consistent with the scenario narratives.

12.2.1 Current Macro-economic Context

Trends in gross national product (GNP) and GNP per capita both have a sharply rising profile since 2000. Economic growth has been a result of an expansion in the export sector, driven by clothing and overseas remittances, together with the growth of non-farm employment that has raised

agricultural productivity. Until the recent outbreak of political instability, further rapid growth seemed guaranteed, as low-cost manufacturing, as well as information technology (IT) and service industries, began rapid development. Though these trends will not be halted, uncertainties in the political environment may, for example, deter inward foreign direct investment in these sectors. The following subsections outline potential developments in the individual macro-economic enabling components over the longer term, to 2030.

12.2.2 Patterns of Resource and Land Ownership

The extent to which land has legal security and enforceability of ownership is important in determining whether and how an efficient market for land can operate. Security of ownership influences the form and extent of investment that an individual or business makes in their use of land. In general, it is expected that if ownership rights of land exist the individual/business will be willing to invest more resources in the land, on the assumption that they will be able to earn an income over a longer time period. Similarly, if a farmer owns rather than rents land they are likely to invest more resources in machinery that raise the productivity of the land, which increases income and over time allows for the repayment of the investment.

The role of insecure land ownership and access to land in determining the productivity of agriculture, aquaculture and mangroves is significant in the delta region. At present, unequal access to land and its ownership means that a large proportion of the rural population in the area have no incentive, or means, to invest in equipment that could increase yields and introduce more environmentally sustainable production practices. Hossain (2015) comments that “the diversity of ways by which land records is updated and the problems associated with each, give rise to numerous disputes in which the rich and powerful inevitably enjoy the upper hand.”

12.2.2.1 Future Scenarios: To 2030

Business As Usual The frequency of land ownership disputes slowly declines as the legal rules surrounding ownerships are made more transparent. Consequently, economic productivity rises—exacerbated by the

continuation of the trend towards urbanisation and industrial production. Responses to climate change risks are generally made on a piecemeal, reactive basis.

More Sustainable The institutional framework is rationalised so that the system for recording or registration of property rights is streamlined and so reduces the potential for land conflicts. Security of land-based assets for landless and other low-income groups is increased, raising the returns they can make. Pro-active responses to anticipated climate change risks to land availability and quality are introduced as a result of effective co-ordinated action by the state and other stakeholders.

Less Sustainable Existing vested interests continue to prevent significant reform of land ownership, resulting in ongoing time-consuming legal conflicts and the maintenance of the current inequalities in land ownership patterns. Degradation of productive land mass due to cyclones in the delta region results in exacerbated land conflicts.

12.2.3 Levels of Public Health and Education Provision

Additional to its social and cultural importance, the economic role of education is to increase the availability of human capital, including analytical and technical skills, knowledge and other expertise, to the economic productive process. Good nutrition, supported by good health-care, facilitates the benefits of education by allowing the population to wish to invest more in future prosperity without being concerned or limited by current health problems. Nutritional constraints in the delta region, as in Bangladesh more generally, place limits on the long-term health and longevity of the region, as agricultural production fails to keep pace with population growth. The two tables below provide an overview of recent trends in educational achievement levels and nutritional deficiency in Bangladesh. In both cases, over the decade 2000–2010, the data shows a gradual improvement. For example, in Table 12.1, the percentage of the population with no formal education is shown to fall from 40.3 to 38.7 per cent over the period. In Table 12.2, the percentage of the population with moderate

Table 12.1 Educational achievement levels in Bangladesh, 2000–2010 (percentage) (based on data from Sen and Rahman 2015)

Education level	Year		
	2000	2005	2010
No education	40.33	36.7	38.7
Classes i–v	21.72	21.84	29.93
Classes vi–viii	12.74	13.15	13.9
Classes ix–x	7.68	9.57	7.35
SSC/HSC/equivalent	12.08	14.45	8.36
Diploma	0.5	–	–
Bachelor	3.52	2.85	0.85
Masters	1.01	1.16	0.75
Agriculture	0.02	–	–
Engineering	0.18	0.12	0.07
Medical	0.14	0.15	0.09

Table 12.2 Bangladesh population with moderate and severe deficiency in calorie intake (percentage) (Joliffe et al. 2013)

Year	Moderate deficiency (<2122 kcal/ person/day)			Severe deficiency (<1805 kcal/ person/day)		
	Rural	Urban	National	Rural	Urban	National
2000	42.3	52.5	44.3	18.7	25.0	20.0
2005	39.5	43.2	40.4	17.9	24.4	19.5
2010	36.8	42.7	38.4	14.9	19.7	16.1

calorie deficiency falls from 44.3 to 38.4 per cent over the period, whilst the percentage with severe deficiency declines from 20 to 16.1 per cent.

12.2.3.1 Future Scenarios: To 2030

Business As Usual The percentage of the population with no education declines to 35 per cent by 2030, whilst those with Bachelor or Master's Degrees increase to five per cent. The percentage of the population with severe calorific deficiency falls to eight per cent. Negative climate change-induced health impacts are restricted by reactive adaptation.

More Sustainable The percentage of the population with no education declines to 30 per cent by 2030, whilst those with Bachelor or Master's Degrees increase to seven per cent. The percentage of the population with

severe calorific deficiency falls to five per cent. Pro-active adaptation significantly limits any negative health effects of climate change in the delta region.

Less Sustainable The percentage of the population with no education declines to 36 per cent by 2030, whilst those with Bachelor or Master's Degrees increases to three per cent. The percentage of the population with severe calorific deficiency falls to 12 per cent. Health is negatively impacted by the effects of sea-level rise and increased storm frequency, unconstrained by sufficient adaptation.

12.2.4 Level of Transport Infrastructure Investment

The provision of transport infrastructure is a supply-side measure that helps to facilitate the development of trade and the operation of markets. Thus, Alam (2015) suggests that “the transport system is the key to the movement of goods and people and provides accessibility to the jobs, health, education, and other socio-economic services that are essential to the welfare of the people. Poor transport inhibits growth of cities and makes them dysfunctional. This may have depressing effect on national economic growth.” Recent transport infrastructure investments have demonstrated their importance in reducing transport costs of getting both labour and goods to local, national and international markets. For example, the joint KfW/ADB project in Jhenaidah, Kushtia, Meherpur and Chuadanga to develop rural feeder roads and unsurfaced roads leading to markets led to a fall in local transport costs of 10–15 per cent (KfW 2012). The lack of good quality transport links is judged to constrain economic development. At present, the transport sector comprises less than one per cent of gross domestic product (GDP) in Bangladesh, whilst infrastructure performance as a whole places the country in the 130th place in terms of global competitiveness.

12.2.4.1 Future Scenarios: To 2030

Business As Usual The historical baseline rate of transport sector growth has been around six and a half per cent, and the BAU scenario projects a similar rate to 2030. Whilst the majority of growth is in road infrastructure,

investment continues in rail infrastructure and the development of urban mass transit systems. Resilience to climate change in design specification is piece-meal.

More Sustainable The rate of transport sector growth averages at seven and a half per cent to 2030. This growth is balanced across both urban and rural areas and includes trans-national initiatives with neighbouring countries. Environmental regulation brings about a mix of transport modes such that rail increases in importance, and road vehicles adopt predominantly low emission models. The importance of climate change resilience is recognised in infrastructure design specification.

Less Sustainable The rate of transport sector growth averages at five and a half per cent to 2030 and is mainly limited to investment in urban roads that, to some extent, ameliorates congestion in these areas. Trans-national transport links are not prioritised. Design specification does not account for climate change impacts resulting in regular transport disruption as a consequence of storm damage.

12.2.5 Factor and Product Market Competition

Competitive factor and product markets ensure that prices in these markets reflect their costs but do not result in higher prices than necessary. For example, labour market prices are often a significant part of product market costs. Thus, competitive labour markets should result in lower product market costs. Similarly, competition in product prices serves to put downward pressure on prices, thereby benefitting the consumer. The delta region is increasingly dependent on national and international factor and product markets. Low-skilled labour supplies the increasingly urbanised manufacturing sector, whilst shrimp production is mainly exported and currently remains competitive in the global market. However, in both cases, competitiveness is won at the expense of ensuring sustainability. At present, competitive drivers—particularly in export-orientated production—dominate at the expense of labour working conditions and environmental sustainability. Export growth has been

mainly limited to the ready-made garment sector (Sattar 2015). Economic growth, fuelling growing household incomes, has served to reduce competitive advantage to a small degree.

12.2.5.1 Future Scenarios: To 2030

Business As Usual Economic growth may reduce competitive advantage in some export sectors, relative to neighbouring countries or regions. Market transparency, in terms of price comparison, increases with the spread of IT capabilities and capacity across the country.

More Sustainable Improved regulation of factor and product markets results in more transparency and reliability, whilst maintaining an absence of monopolistic markets. Improved transport infrastructure and resulting connectivity further enhances competition in the delta and nationally.

Less Sustainable Slow progress in transport connectivity continues to limit factor and product market competition, as do trade and non-trade barriers. Aggressive export strategies unsupported by market regulation result in further environmental degradation and consequent vulnerability to climate risks.

12.2.6 Access to, and Cost of, Financial Capital

Financial capital has a critical facilitative role in modern economies. Mansur (2015) states that “the financial sector is a vital part of an economy because of the role it plays in intermediating savings of the private and public sector to productive activities including investment.” Investment then results in an increased stock of capital in the economy. In the delta region, as in the rest of the country, access to financial resources will determine whether the poor are able to borrow money for the purpose of investing in equipment (e.g. IT hardware and software, manufacturing machinery, etc.) required to undertake effective business operations. The number of debit and credit accounts per 1,000 population

in Bangladesh increased from 242 to 333 and from 51 to 63, respectively, during the period from 2005 to 2010 but reflects a remaining lack of savings or access to finance across the population (Mujeri 2015). Whilst the money market is relatively well developed, capital, bond and insurance markets are insufficiently developed to allow long-term borrowing to be easily secured, thereby limiting the scale of longer-term investments in, for example, energy and transport infrastructure.

12.2.6.1 Future Scenarios: To 2030

Business As Usual Private savings and borrowings continue to grow: debit and credit accounts of 800 and 120 per 1,000 population, respectively, to 2030 give some impetus to the existing growth of small and medium-sized enterprises (SMEs) in the country. Confidence in the capital markets gradually returns following recent scandals relating to insider trading, though regulation remains rather weak and limits the extent of trading activity. Bond and insurance markets develop but are constrained by the weak regulatory regime. Investment into climate resilience continues to be piece-meal.

More Sustainable Regulatory reform across the financial sector encourages the growth of availability in financial capital across both poor and more affluent parts of the population. All individuals have savings accounts by 2030 and the majority have borrowing facilities. Small businesses are routinely able to achieve economies of scale as a consequence of their being able to facilitate expansion. Climate resilience is recognised as being a prerequisite for medium- to longer-term business sustainability and so appropriate investments in adaptation are made.

Less Sustainable The scale of all financial markets remains such that the vast majority of the population still have neither debit nor credit accounts by 2030. Public confidence in the regulatory regime remains low, limiting the scale of financial investments in the capital and bond markets. Investments in climate resilience are regarded as being of secondary importance so that operations remain vulnerable to storms.

12.2.7 Export Market Strategy

Demand for exports frequently represents a significant proportion of aggregate demand and so has implications for employment and household incomes throughout the economy. A potential constraint on economic growth is the balance of trade (exports minus imports). Thus, domestic demand for exports can be accommodated as long as export value is sufficient to offset this in the longer term. Economic development in the delta region is currently significantly orientated towards international markets such as shrimp and garments and therefore somewhat dependent on the income generated. This orientation does, however, mean that environmental degradation—and its negative effects on other farm and non-farm production—is substantial. Between the years 2000 and 2013, the export percentage of GDP has increased from 12 to 20 per cent, whilst the total value of exports has increased fourfold over the period. Export concentration in ready-made clothing garments is very high compared to other countries, though the number of countries exported to has increased from 60 to 111 between 2000 and 2013.

12.2.7.1 Future Scenarios: To 2030

Business As Usual Growth in exports as a percentage of GDP continues but starts to flatten out to 18 per cent by 2030. Gradual improvements in internal connectivity, together with investment in improved IT capacity facilitate this growth. Export concentration falls, though rather slowly, as more high-tech companies grow domestically and supply low-cost outsourcing to international companies.

More Sustainable Trade and non-trade barriers are substantially reduced in order to encourage a diversification in the range of goods and services exported; IT services provide a substantial focus of national export activities to 2030. Substantial investment in infrastructure results in a greater volume of low-cost manufacturing being exported to neighbouring countries. Resulting higher incomes and tax revenues are reflected in increased expenditures on climate resilience investments.

Less Sustainable Regulatory constraints and poor macro-economic management, combined with political instability and low investment in transport infrastructure, result in slow growth in exports and a lingering concentration of export value in clothing garments. The lack of environmental and social regulation in this industry exacerbates this tendency. Exports comprise 15 per cent of GDP by 2030.

12.2.8 Fiscal Strategy and Stability

The collection and use of tax revenues in Bangladesh are direct fiscal instruments with which to pursue redistributive objectives whilst supplying public goods (e.g. education, health, defence, etc.) to the general population. The balance between tax revenues and government expenditure determines the level of debt that the government has to service in future time periods. The levels of investment in developmental priorities such as education, health and transport infrastructure across the delta region are determined by the extent of tax revenue funds available together with the governmental ordering of these priorities. Historical trends in external debt and domestic debt are presented in Fig. 12.2. It shows that in the past 20 years external debt has been substituted for domestic debt as international donor organisations have targeted development priorities elsewhere, and the domestic government has become more confident of servicing shorter-term domestic debt.

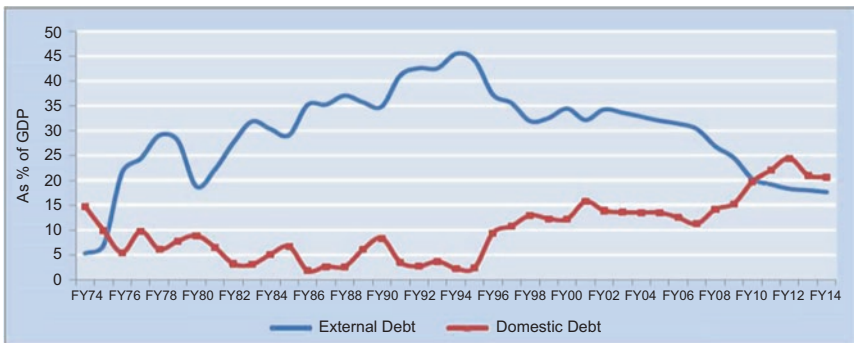


Fig. 12.2 Trends in external and domestic public debt, Bangladesh (1973–2014) (Reprinted with permission from Mansur 2015)

12.2.8.1 Future Scenarios: To 2030

Business As Usual A return to political stability in central government means that it is able to resume raising funds from the sale of government bonds, though resources remain limited. The fiscal deficit averages around five per cent to 2030. Tax revenue rises incrementally over the period as household incomes rise.

More Sustainable As with BAU, bond sales resume. As GDP rises at around seven and a half per cent per annum, resources raised through both bonds and taxes increased quickly; investment in tax collection processes ensures that revenue streams to government are reliable and much less vulnerable to corrupt practices. The fiscal deficit averages below five per cent to 2030.

Less Sustainable Ongoing political instability limits the extent that resources can be raised by bond sales. Growth of tax revenues is also constrained by inefficiencies in the tax collection system slower growth in GDP. The fiscal deficit averages above five per cent to 2030.

12.2.9 Natural Resource Management

Preservation of environmental quality ensures that land stays productive and water resources continue to be available both to consumers and producers. Maintenance of natural resources also ensures that their value is conserved for future users, including following generations. Sufficient control of environmental pollution serves to avoid damage to human health, ecosystems, crops and other productive resources. Ultimately, environmental quality and availability of resources dictate the extent of human activity.

Over-use of nitrogen and phosphorous-based fertilisers in agricultural production risks pollution to water courses with subsequent effects on the availability of clean water resources for human consumption and inputs to industrial production in the region. The external costs of salinity in inland aquaculture are often currently not sufficiently recognised in production decisions. In general, whilst there currently appears to be a

well-developed set of environmental regulations over all media, effective inspection and enforcement are often insufficiently implemented to achieve the objectives of the regulations.

12.2.9.1 Future Scenarios: To 2030

Business As Usual The effectiveness of environmental regulation slowly improves to 2030, though population pressure means that environmental degradation continues to reduce the productivity of natural resources. Climate change, particularly sea-level rise, exacerbates this pattern across the delta region.

More Sustainable Implementation of multi-lateral environmental agreements (MEAs) and domestic regulation is increased significantly to 2030. Land and water quality, as well as forest resource conservation, are all improved, with subsequent benefits for human welfare across the delta region and the country more generally.

Less Sustainable The existing range of environmental regulations remain only partially enforced, with adverse effects on a growing population resulting. Natural resources are further depleted and degraded, limiting their productivity and reducing their natural roles in soil quality conservation, water cycling and other regulatory functions.

12.2.10 Population Policy

The demographic transition model (DTM), an established means with which to view demographic change, suggests a well-defined link between such change and economic development (Thompson 1929). In the early stages of this transition, at low levels of economic development, whilst population growth can facilitate economies of scale and specialisation of labour it is now recognised that it can result in over-exploitation of natural resources and lower per capita incomes, with potential implications on longer-term economic growth. High population density in the delta region puts agricultural, aquacultural and forest resources under pressure, limiting

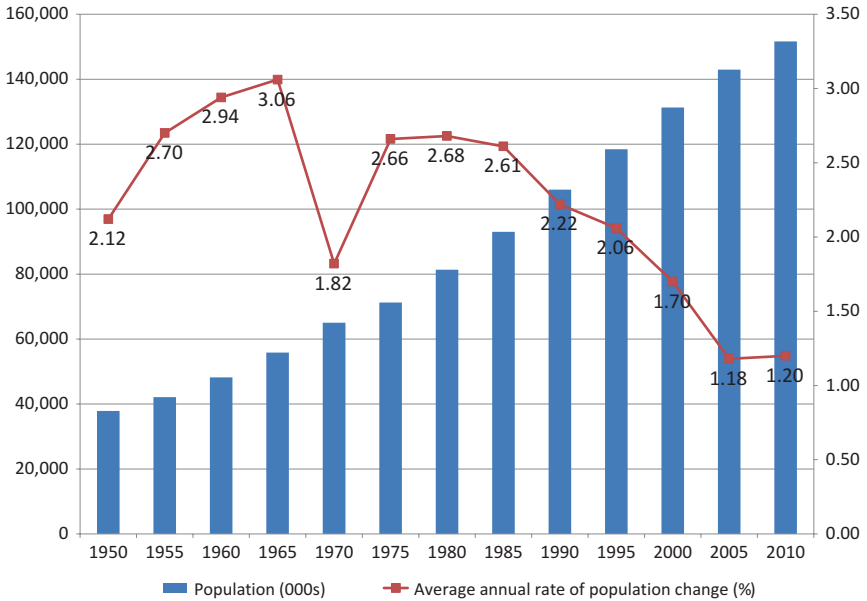


Fig. 12.3 Population numbers and growth in Bangladesh, 1901–2011 (based on data from UN 2015)

potential per capita allocations. Sea-level rise, having adverse impacts on the availability of land to live on, is likely to further exacerbate this pressure. Figure 12.3 shows that population annual growth rates are positive across Bangladesh, though they have slowed from around two per cent to less than one and a half per cent in the 25 years to 2011. Total population has increased from 130 million in 2001 to 150 million in 2011. Population density was 1,015/km² in 2011, which compares with 350/km² in India.

12.2.10.1 Future Scenarios: To 2030

National population projections prepared by Hayes and Jones (2015) for the Government of Bangladesh are presented in Fig. 12.4. Their three scenarios map directly on to the three developed scenarios as follows: High = Less Sustainable; Medium = Business As Usual; Low = More Sustainable.

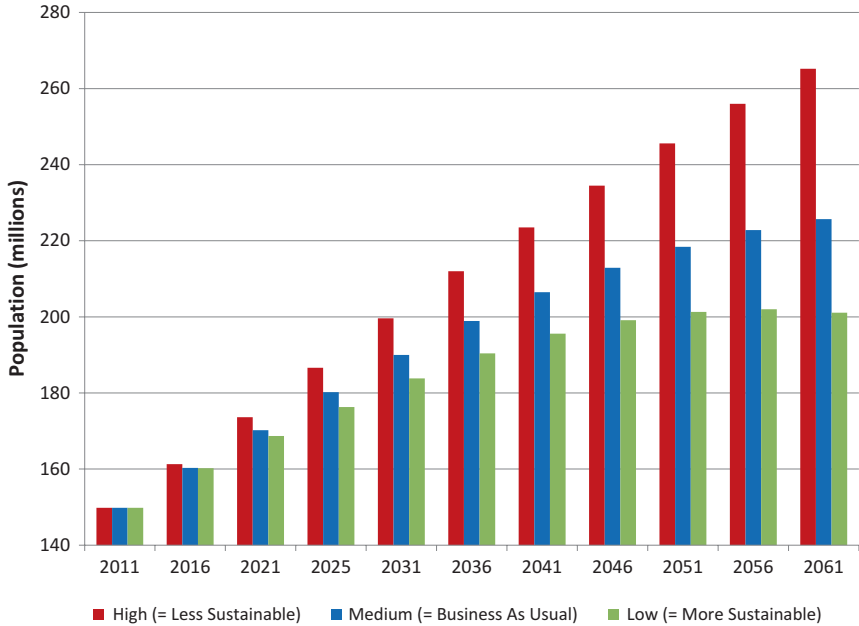


Fig. 12.4 Population projections for Bangladesh (based on data from Hayes and Jones 2015)

Business As Usual Continuing economic growth allows rural-urban migration to somewhat reduce the pressure on rural natural resources. Population growth continues to fall slowly as maternal health-care and education are more widely available across the delta region.

More Sustainable High economic growth results in a fall in fertility rates as government awareness campaigns regarding contraception are effective and as the social acceptability of child marriage declines. Declining rural population growth and further urban development results in a halt to the growth in landlessness.

Less Sustainable Ineffective government policies to reduce fertility rates result in population growth continuing at current rates. Sea-level rise results in reduced land available to inhabit and a consequent increase in

landlessness. Failure of farm and non-farm industry to absorb labour results in further rural-urban migration and an expansion of existing urban slum areas.

12.2.11 Governance

As summarised in Fig. 12.5, governance consists of a number of overriding aspects of government behaviour that affect how citizens, businesses and society more generally are able to function. Poor performance in aspects of governance tends to have a detrimental effect on the ability of economic agents (e.g. consumers and producers) to undertake economic activities, increasing their transaction costs and so reducing economic efficiency and competitiveness. As with Bangladesh as a whole, governance in the delta region is critical in determining the efficiency and effectiveness of economic activity. For example, high levels of corruption may lead to a distortion of the incentives that would otherwise exist to sustainably manage the resources of the Sundarbans. In a comparison of a variety of governance indicators for Bangladesh and two groups of countries, low-income countries¹ and lower middle-income countries (following Hasan et al. 2015), for four of the six indicators, Bangladesh ranks above the average for low-income countries in 2013 (Fig. 12.5). However, none of the indicators for Bangladesh exceeds the average for lower middle-income countries.

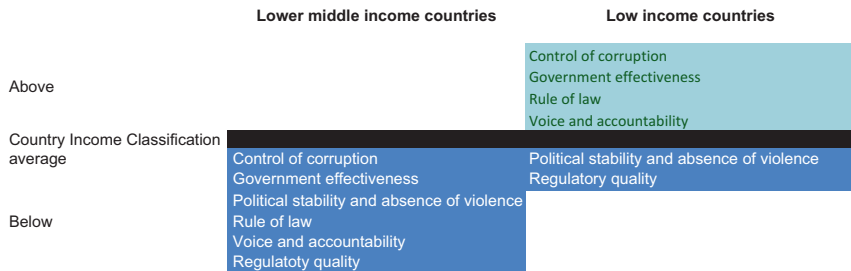


Fig. 12.5 Comparison of World-wide Governance Indicators between Bangladesh and country income groups—2013 (based on data from WGI 2016)

12.2.11.1 Future Scenarios: To 2030

Business As Usual GDP growth rates to 2030 ensure that Bangladesh moves in to the lower middle-income group of countries and governance indicators gradually improve. However, aspects of governance—including regulatory quality—remains below average, negatively impacting on, for example, effective environmental regulation.

More Sustainable The performance of all governance indicators improves to at least average levels for lower middle-income countries. Transaction costs are consequently significantly reduced, resulting in substantial inflow of capital investment from neighbouring countries and high-income countries.

Less Sustainable The performance of governance indicators improves only slowly to 2030 with periodic political instability a feature of the period. Environmental regulation remains of mixed effectiveness, resulting in a low level of pro-active adaptation to climate change. Transaction costs associated with poor governance continue to thwart a range of economically productive initiatives.

12.2.12 Macro-Economic Policy Levers

Table 12.3 indicates macro-economic policy levers that may be used to bring about changes in the macro-economic enabling factors. It is intended that the information in the table is used as an initial stimulus in thinking about pursuing macro-economic objectives that then influence poverty in the delta region. It is, of course, recognised that analysis of poverty alleviation strategies has been undertaken in considerable depth in a number of recent government reports, most notably Sen and Ali (2015); here, a link between that body of work and the scenario-based work undertaken in the current reported research is developed. Thus, it is anticipated that the connection between macro-economic planning, poverty alleviation and bio-physical changes resulting, inter alia from climate change, in the delta region can be directly made.

Table 12.3 Macro-economic enabling factors and policy levers

Macro-economic enabling factor	Policy levers	Application at delta region scale
Patterns of resource and land ownership	Land law reform and implementation	National level reform, perhaps implemented by district authorities
Levels of public health and education provision	Public expenditure	Determined at national level; spend distribution informed by “lagging regions” equity analysis (Khondker and Mahzab 2015)
Level of transport infrastructure investment	Public expenditure	Determined at national level; spend distribution informed by “lagging regions” equity analysis (Khondker and Mahzab 2015)
Factor and product market competition	Consumer market regulation; employment legislation and effective implementation	National level policies
Access to—and cost of—financial capital	Financial market regulation and effective implementation	National level reform, perhaps implemented by district authorities
Export market strategy	Public support to new industries; exchange rate policy	National level policies
Fiscal strategy and stability	Public expenditure and tax policy	National level policies; spend and tax levels informed by “lagging regions” equity analysis (Khondker and Mahzab 2015)
Natural resource management policy	Government regulation and effective implementation	National level policies, perhaps implemented by district authorities
Population policy	Public information and incentives	National level policies, perhaps implemented by district authorities
Governance	Reform of regulatory regimes	National level reform

12.3 Quantified Future Trends for Economic Input Variables to 2030

Quantitative trends for key input variables were derived, constructed on the interpretation of the three scenarios. Thus, the dataset presented in Table 12.4 is based on collective judgement of how the scenario portraits above might affect the variables in question. The values are generated based on knowledge of the dimension of changes that had occurred in these variables in the past decade; this effectively bounded the scale of changes. Consequently, the estimates are considered to be conservative; in any case, they should be seen as indicative only.

12.4 Conclusions

Using the expertise within the project, the main macro-economic factors likely to determine future economic development paths in Bangladesh's delta region and the wider country have been identified. For each of these factors, possible patterns of change are sketched in narrative terms, and the means with which the Government of Bangladesh can influence them are highlighted. The analysis serves to emphasise that local and national administrations in Bangladesh have a range of economic, and other, policy instruments at their disposal to ensure that economic development follows a path that significantly reduces the vulnerability of the population to climate, and other environmental, change.

In a future phase of research, it would be valuable for the relationships between macro-economic factors to be quantified in such a way that advisors to the Government of Bangladesh could undertake simulations that allow testing for the robustness of alternative macro-economic policies. In this way, the inherent trade-offs between these factors could be made explicit and encouraging an informed discussion as to the merits of alternative policy options.

Table 12.4 Percentage change in economic input variables 2015–2030

Economic input variable	Unit	Future scenario		
		Business As Usual	More Sustainable	Less Sustainable
Cost of different fertiliser types	BDT ^a /kg	+10	+20	0
Cost of pesticide for each agriculture crop	BDT/ha	+10	+20	0
Cost of feed for each aquaculture crop	BDT/ha	+10	0	+20
Cost of seed for agriculture crops	BDT/kg	+10	+20	0
Cost of post larvae or fishling for aquaculture products	BDT/individual	+10	0	+20
Daily wage (without food)	BDT/day	+10	+30	0
Cost of diesel	BDT/gallon	+10	+20	0
Employment rate	Per cent population	+10	+30	0
Literacy rate	Per cent population	+4	+8	+2
Children in school	Per cent population	+5	+10	+2
Travel time to major cities	Hours	–30	–50	–10
Remittances	BDT/month	+30	+40	+20
Income from manufacturing, services and livestock/poultry sectors	BDT/month	+110	+165	+65
Household expenses	BDT/month	+10	+30	0
Purchase power parity (PPP) exchange rate for Bangladesh		0	0	0
USD/BDT exchange rate		0	0	0

^aBangladeshi taka

Note

1. As defined by the World Bank.

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