KEY ACTIONS AGAINST CLIMATE CHANGE IN THE AGRICULTURE, ENERGY, AND WATER SECTORS IN BANGLADESH

Many Bangladeshis make their living from agriculture. Climate change alters water availability and temperature, requiring adaptation of agricultural practices. Photo: Forum urduworld, forum.urduworld.com/f48/bangladesh-332098/

→ Climate change threatens to jeopardize socio-economic development in Bangladesh. According to a national assessment of investment and financial flows (I&FF) completed in October 2011, about US$ 64 billion is needed through to 2030 for Bangladesh to implement priority actions to:

- Reduce emissions of greenhouse gases from the energy sector, and
- Adapt to the impacts of climate change in the agriculture and water sectors.

Almost two-thirds of these funds are needed to ensure food security in the agriculture sector, and a further US$ 13.69 billion is needed to ensure the availability of drinking water. Additionally, US$ 14.53 billion is needed to increase energy efficiency and to boost renewable energies.

Having completed the I&FF assessment, the government of Bangladesh is now well placed to discuss the costs of climate change in the international climate change negotiations. This work was conducted as part of the global UNDP project, *Capacity Development for Policy Makers to Address Climate Change,* in which 19 countries participated. The project is funded by the governments of Norway, Switzerland, and Finland, UNDP and the UN Foundation.

http://www.undpcc.org/en/bangladesh

Selection of key sectors

An adequate and reliable **energy** supply facilitates development and employment opportunities. In Bangladesh, improving the energy availability in the western part of the country will be necessary for balanced regional development. At the same time, energy is often not used efficiently, so energy efficiency increases can help in not only cutting GHG emissions, but also costs.

Domestic **agriculture** is critical for food security as it provides about 90% of the supplies of rice, as well as raw materials for industries such as rice milling, jute textiles, sugar, cigarettes, leather, tea, oil and paper. Agriculture is the largest employer in Bangladesh (45% of labour in 2005), and an important earner of foreign exchange (13% in 2007). Any disruption to agriculture by climate change therefore threatens food security, employment and the economy of Bangladesh.

Bangladesh is one of the most densely populated countries in the world, with many people's livelihoods dependent on agriculture. More than 80 per cent of **water** resources are used in the agriculture sector. Climate change is leading to more frequent erratic rainfall, extreme hydrological events like cyclones and storms as well as sea level rise, reducing crop yield, causing infrastructure damage and threatening livelihoods, particularly of poor people in the country.

Institutional arrangements

The project was implemented by the Ministry of Environment and Forests (MoEF), with the Ministry's Secretary acting as the National Focal Point for climate change and the project chairperson, providing policy guidance and maintaining oversight of the activities. The Joint Secretary for Development at the MoEF was the administrative project focal point for the national team leaders and the national project coordinator.

The Ministries of Agriculture, Water Resources and Power & Energy took the lead in their respective sectors. Other

ministries with cross-cutting linkages such as the Ministries of Disaster Management, Health, Food, Land, Fisheries & Livestock, Local Government, Communication, Science & Technology, Industries, Commerce, Finance, and Planning played key roles in the thematic areas. Consultative groups together with relevant civil society, NGOs, academia and think tanks, were also engaged.

Three multidisciplinary sectoral expert teams were established to carry out the I&FF assessments. Numerous national institutions provided data and other information for the assessments.

TERI, a regional centre of excellence based in India, and UNDP provided technical backstopping and training.

ASSESSMENT OF INVESTMENT AND FINANCIAL FLOWS

Objectives of the I&FF assessment

The overall objective of the I&FF assessment is to determine the extent and sources of funds needed to address climate change at the national level, and builds directly on national government strategies, plans and programmes. In essence, the assessment seeks to answer the question: *"From a development perspective, what can my country do to address climate change in selected key sectors, and what level of financial contributions will be needed to achieve these objectives?"*

In this context, the I&FF team examined the following questions:

- What are the main adaptation / mitigation measures for the selected sectors in the next 25 years?
- Who is investing in the sector / Who are the main stakeholders and sources?
- What changes / increase in I&FF will be needed in the sectors?
- What additional I&FF are needed to address climate change?

The I&FF assessment covered the time period 2005-2030, using a baseline scenario and an adaptation / mitigation scenario. Values are given in constant 2010 US$ (1US$ = 70 BDT). The assessment looks at the changes in I&FF needed for three different groups: households (families, individual farmers), corporations (private and NGOs), and the government.

For the energy sector (mitigation of greenhouse gas emissions)

The national team estimated that US$ 14.53 billion is needed to reduce emissions of greenhouse gases in the energy sector for the following key measures:

- Professionalizing transport on highways, mass transit, railway, and waterways through traffic management and shift from road to railway & waterways (US$ 0.23 billion);
- Exploiting primary energy more efficiently, including natural gas production & transmission, coal production, production of brick kilns and gas boilers (US$ -5.13 billion, a net saving);
- Improving the power generation of gas-fired, coal-fired power plants and diesel power plants; wind turbine and solar photovoltaic power plants, plus conversion from gas to combined cycle, addition of carbon capture and storate to gas-combined cycle (US$ 19.22 billion); and
- Enhancing transmission and distribution of energy, and reducing energy losses (US$ 0.22 billion).

For the agriculture sector (adaptation to the impacts of climate change)

The nationale team estimated that US$ 39.67 billion is needed to adapt to climate change in the agriculture sector through the following 17 measures:

- Awareness raising: Media programmes (US$0.03 billion);
- Infrastructure development: Construct and repair roads / embankments (US$ 1.18 billion);
- Disaster preparedness: Cyclone shelters, training and awareness (US$ 0.60 billion);
- Disaster rehabilitation: Distribution of seeds, fertilizers, saplings (US$ 4.01 billion);
- Technology generation, knowledge management: Climate resilient cultivars (US$ 0.17 billion);
- Agricultural extensions: Dissemination of salt /drought tolerant varieties of crops (US$ 1.49 billion);
- Livestock development: Expansion of veterinary health services (US$ 0.66 billion);
- Fisheries development: Management of water reservoirs (US$ 0.82 billion);
- Food and nutrition security: Ensuring food availability and utilisation (US$ 1.92 billion);
- Wetland conservation: Development of mangroves (US$ 0.82 billion);
- Biodiversity management: Promotion of improved biodiversity management (US$ 0.43 billion);
- Reducing emissions from agriculture: Adjust tillage practices (US$ 0.89 billion);
- Agro-processing development: Reduction of post harvest loss minimization (US$ 0.76 billion);
- Market infrastructure development: Development of quality control measures (US$ 6.63 billion);
- Irrigation and water management: Improved distribution systems (US$ 5.78 billion);
- Agro-forestry: Training on nursery and plantation (US$ 0.28 billion); and
- Coastal zone management: Polder management (US$ 2.58 billion).

It is to be noted that in the agriculture assessment, only government expenditures were analyzed, not those from corporations or households.

For the water sector (adaptation to the impacts of climate change)

The national team estimated that US$ 13.69 billion is required to make investments in the following measures:

- Coastal protection: Development of coastal green belts against storm surges (US$ 3.14 billion);
- Erosion control and dredging: Construction of river training works (US$ 0.43 billion);
- Flood protection and management: Improved flood forecasting system (US$ 3.54 billion);
- Irrigation and drought management: Improved water distribution networks (US$ 2.96 billion);
- Urban drainage: Construction of adequate sewers in new urban areas (US$ 1.64 billion); and
- Water supply and sanitation: Harvesting rainwater; recycling and reusing water (US$ 1.99 billion).

POLICY IMPLICATIONS FROM THE I&FF ASSESSMENT

For the energy sector (mitigation of greenhouse gas emissions)

- Improve generation efficiency, reduce transmission losses, and reduce costs of producing and transmitting electricity to end users to decrease tariffs.
- There are enormous possibilities to make the power sector less carbon-intensive from all sides of the electricity cycle: generation, transmission, distribution and consumption.
- Foster renewable energy-based electricity and energy conservation measures, introduction of clean technologies and production efficiency to reduce CO_2 emissions and reduce need for fossil fuels.
- Increase energy use efficiency to: (i) improve energy security; (ii) reduce costs; and (iii) mitigate environmental externalities. Cost reductions will make projects more attractive and improve the potential for further investments in low carbon technologies.

For the agriculture sector (adaptation to the impacts of climate change)

- Develop a policy and plan on the capacity, coordination and prioritization of governmental programme activities in order to enhance the effectiveness of climate change funds from different sources, including the Government of Bangladesh and its partners.
- Consider a unified management system for the different existing funds including the Bangladesh Climate Change Resilience Fund and the pilot program for climate resilience.

SUMMARY TABLES OF INCREMENTAL INVESTMENT COSTS

Table: Cumulative discounted IF and FF for all investments in each sector, by investment entity and funding source. Incremental cumulative (2005-2030) discounted sectoral investments (million 2010 US$).

Investment category	Funding source		Mitigation			Adaptation					
			Energy			Agriculture			Water		
			ΔIF	ΔFF	ΔO&M	ΔIF	ΔFF	ΔO&M	ΔIF	ΔFF	ΔO&M
Households	Total		-	-	-	-	-	-	6.00	38.00	9,719.00
Corporations	National	Total	-	-	-	-	-	-	-	-	-
	Foreign	ODA	-	-	-	-	-	-	-	-	-
	Total		7,546.10	-	397.32	-	-	-	-	7,071.00	-
Government	National	National Budget	-	-	-	-	-	-	-	-	-
	Foreign	Loan	-	-	-	-	-	-	-	-	-
		Bilateral ODA	-	-	-	-	-	-	-	-	-
		Multilateral ODA	-	-	-	-	-	-	-	-	-
		Total foreign source	-	-	-	-	-	-	-	-	-
	Total		5,605.50	-	984.64	27,700.10	5,361.50	6,613.20	743.00	4,956.00	3,315.00
Total			13,152.60	-	1,381.96	27,700.10	5,361.50	6,613.20	749.00	12,065.00	13,034.00

IF = Investment Flows, FF = Financial Flows, O&M = Operation and Maintenance Costs
ΔI&FF = Incremental changes of Investment and Financial Flows, ΔO&M = Incremental changes of Operation and Maintenance Costs
Negative values mean net savings
Source: National I&FF assessment

- Strengthen the capacity of the Ministry of Environment and Forest (MoEF) to effectively manage a large number of stakeholders and different sources of funds; to coordinate multiple climate change activities effectively; to prioritise programme activities according to Bangladesh's Climate Change Strategy and Action Plan; and to mainstream climate change activities among different departments.

For the water sector (adaptation to the impacts of climate change)

- The National Water Policy from 1999 needs to be updated to integrate climate change concerns, and to introduce legal bindings to enforce its policy recommendations.
- Integrate climate change concerns into the National Water Act to help mainstreaming of climate change into the development agenda.
- The Water Resources Planning Organization has been playing a pivotal role for planning and should work jointly with the Climate Change Unit to coordinate and monitor activities.
- Create an enabling environment for using renewable energy alternatives through the proposed tax-free purchase of equipment, and value added tax (VAT) exemption on imports for these goods. Moreover, the industrial sector will receive a tax break for approved Research and Development expenditure to innovate and promote energy efficient technology.

Table 2: Annual IF and FF for all investments in each sector. Annual sectoral investments (million 2005 US$)

Year	Mitigation			Adaptation					
	Energy			Agriculture			Water		
	ΔIF	ΔFF	ΔO&M	ΔIF	ΔFF	ΔO&M	ΔIF	ΔFF	ΔO&M
2010	333.60	-	-340.56	-	-	-	643.90	61.80	149.20
2011	434.13	-	-333.57	-	-	-	726.70	72.70	395.50
2012	643.04	-	-323.55	1,117.40	216.20	266.70	1,072.40	82.00	523.80
2013	1,053.00	-	-301.62	1,149.70	222.50	274.40	1,126.00	84.70	740.30
2014	1,364.93	-	-283.15	1,183.70	229.00	282.50	1,182.40	87.30	834.10
2015	750.53	-	-101.30	1,216.80	235.40	290.40	1,168.50	93.70	898.50
2016	743.51	-	-36.62	1,253.20	242.40	299.10	1,219.70	97.00	974.30
2017	806.18	-	20.60	1,286.50	248.90	307.10	1,269.90	95.10	1,052.60
2018	677.08	-	76.99	1,324.30	256.20	316.10	1,333.40	99.90	1,103.70
2019	647.15	-	120.74	1,361.80	263.50	325.00	1,400.00	104.90	1,157.10
2020	619.31	-	158.75	1,401.20	271.10	334.40	908.50	27.00	1,158.90
2021	593.46	-	191.52	1,440.60	278.70	343.80	910.90	20.90	1,229.40
2022	569.60	-	219.50	1,482.40	286.80	353.80	929.30	21.90	1,283.20
2023	547.60	-	243.11	1,524.30	294.90	363.80	945.30	23.00	1,336.90
2024	527.49	-	262.75	1,566.50	303.10	373.90	786.70	13.80	1,444.20
2025	509.17	-	278.76	1,612.00	311.90	384.70	758.40	10.60	1,488.00
2026	492.64	-	291.51	1,658.20	320.80	395.80	796.30	11.10	1,562.20
2027	477.87	-	301.27	1,705.20	329.90	407.00	385.40	9.70	1,588.80
2028	464.84	-	308.36	1,753.20	339.20	418.40	404.70	10.20	1,668.30
2029	453.53	-	313.00	1,806.60	349.50	431.20	391.40	10.70	1,623.90
2030	443.96	-	315.48	1,857.30	359.40	443.30	411.50	11.20	1,705.00
Total	13,152.60	-	1,381.96	27,700.90	5,359.70	6,611.40	18,771.30	1,049.20	23,917.90

IF = Investment Flows, FF = Financial Flows, O&M = Operation and Maintenance Costs ΔI&FF = Incremental changes of Investment and Financial Flows, ΔO&M = Incremental changes of Operation and Maintenance Costs Negative values mean net savings Source: National I&FF assessment

Knowledge platform

The project website www.undpcc.org contains information on activities in Bangladesh, the I&FF methodology, and many other resources in English, French, Spanish and Russian.

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More information on activities in Bangladesh

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