

# Climate modelling in Bangladesh

A model for capacity building in developing countries



“Collaborative research is the first step towards creating awareness and towards adaptation to strengthen the resilience of human, social and natural systems to the likely impact of climate change.”

Professor Dr. A.M.M. Safiullah  
Vice-Chancellor, BUET





Between January and June 2010, a project entitled 'Capacity Building in Climate Modelling in Bangladesh' took place in Dhaka, Bangladesh. This brochure offers an insight into the project; its objectives, how it was funded, the outcomes and the next steps that need to be taken. While the project was based in Bangladesh, its outcomes have implications for other developing countries looking to build capacity in climate change research and analysis.

## Background

With their limited resources, infrastructure and dependence on subsistence agriculture, developing countries are acutely vulnerable to the potential impacts of climate change — and none more so than Bangladesh.

The geographical location and topography of this poor but densely populated country means it is particularly at risk from the likely impacts of climate change. Here, flooding, salination of water and tropical cyclones are threats that regularly wreak devastation on the lives of its people. Climate change will only intensify such threats. Indeed, the Bangladesh government believes that the effects of climate change are already being experienced in the country.

The need for Bangladesh to develop adaptation strategies to cope with climate change is clear. In order to do this, however, it must first have an informed understanding of the climatic factors that influence human and natural systems in Bangladesh; what controls these factors; how they are likely to be affected by climate change; how those changes will affect food production or infrastructure and so on. This is where more research is desperately needed — not just for Bangladesh, but for all developing countries vulnerable to climate change.

In its Fourth Assessment Report, the IPCC states that our understanding of the likely future impacts of climate change is hampered by lack of knowledge about the nature of future changes, particularly at the regional scale, and identifies a clear need for more research at regional level.<sup>1</sup>

Without this level of accurate, local information, countries simply cannot plan adequately for the likely impacts of climate change. Yet most developing countries currently don't have the capacity to carry out such research. How can this issue be addressed?

The Capacity Building in Climate Modelling in Bangladesh project offers a model for how other developing countries could build their technical capacity with the help of external funding from international development organisations.

1. IPCC Fourth Assessment Report: Climate Change 2007.

# The project

The project was funded by UKaid from the Department for International Development (DFID), as part of its £75 million funding commitment to Bangladesh's Climate Change Strategy and Action Plan (BCCSAP).<sup>2</sup> One of the goals of the BCCSAP is to build technical capacity and promote research. This project is the first step towards achieving that goal.

The project is a collaboration between UKaid from DFID, the Met Office Hadley Centre and the Climate Change Cell at the Bangladesh University of Engineering and Technology (BUET). Its primary aim is to build in-country capacity to apply regional climate change models, interpret the outputs from those models and, therefore, provide policymakers with the data they need to plan for climate change.

2. Source BCCSAP: MoEF, 2009. Bangladesh Climate Change Strategy and Action Plan 2009. Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh. xviii + 76pp.



Photos: Bhaski Bhaskaran

“The UK recognises that climate change is the most critical developmental challenge facing Bangladesh today.”

Jim McAlpine, Senior Programme Manager, DFID

Twenty participants across several relevant organisations took part in this project, hosted by BUET. Over the course of two workshops, Met Office Hadley Centre scientists trained the participants in using PRECIS (Providing Regional Climates for Impact Studies), a regional climate modelling system that can be used anywhere in the world. Participants learnt how to install and run the software, how to generate current and future high resolution climate simulations, analyse and interpret results and apply those results to impacts studies.

As part of the project, UKaid funded a dedicated computer lab in which to run the models, which will continue to be used for climate modelling and as a training facility.

Together with the Met Office Hadley Centre scientists, the participants identified key issues that needed to be resolved, such as establishing the optimum domain sizes and terrain details for climate model simulations.

Dr. Claire Witham, Climate Services Consultant at the Met Office Hadley Centre and one of the scientists leading the workshops, was struck by the enthusiasm of the participants: “All the participants shared a genuine drive and commitment to work together and take the project forward.”

With the help of the Met Office Hadley Centre, the participants continue to support each other and share results through their own dedicated online forum and monthly meetings.

### NEXT STEPS

As a result of the training, Bangladesh now has the capacity to generate its own high resolution regional climate projections. Its climate research community also now has the capacity to develop detailed regional climate information from data that developed countries, such as the UK, are equipped to supply. The Met Office Hadley Centre hopes to continue to work with the Bangladesh climate research community to support its development of detailed climate information in the future. As Dr. Saiful Islam, Associate Professor at the Institute of Water and Flood Management at BUET points out, “This is just the beginning. We have to continue with this project and we need help from the Met Office Hadley Centre to develop local-level scenarios and impacts studies.”

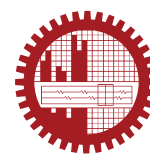
This may be the beginning for Bangladesh as it carries out its own Climate Change Strategy and Action Plan — but where Bangladesh leads, other developing countries may do well to follow. As Met Office Hadley Centre Climate Services Manager and Bangladesh project leader, Dr. Bhaski Bhaskaran states, “Because it’s believed that the effects of climate change are already happening in Bangladesh, the country is often described as a laboratory for testing adaptation measures. So lessons learned here can be applied to those countries that are less vulnerable now, but may be more vulnerable in future.”



This project is a prime example of how UKaid from DFID can help to support developing countries in managing the effects of climate change. The UKaid from DFID recognises the need for supporting such projects to address the threats of climate change to the world’s poor.



The Met Office is a world renowned centre of excellence in meteorological modelling, forecasting and climate prediction. Climate scientists at the Met Office Hadley Centre are recognised as an authoritative voice on climate change science. The Met Office is involved with the Voluntary Cooperation Programme (VCP) — managed by the World Meteorological Organization (WMO) — which helps to promote sustainable development and protect lives across the world. It works with national meteorological services in developing countries to expand their skills in providing weather and climate information and, in worst-case scenarios, to prepare for and respond to, natural disasters. It also supports training in different areas including weather and climate forecasting, applying statistics and managing people.



**Bangladesh University of Engineering and Technology**

Bangladesh University of Engineering and Technology (BUET) is one of the most prestigious institutions for higher studies in the country. Recently BUET established a Climate Change Study Cell in 2007 to focus on education, training and research on climate-related disasters. This cell is committed to conducting various activities such as facilitating research, organising short courses, workshops and seminars, providing advisory services to government and other relevant organisations.





Photo: Hassan Bipul/DFID

# Project highlights

## **WHY DOES BANGLADESH NEED THIS PROJECT?**

The geographical location of Bangladesh makes it the most vulnerable country in the world to tropical cyclones and their associated storm surges.<sup>3</sup> During both the pre- and post-monsoon seasons, the warm waters of the Bay of Bengal generate intense tropical storms which often tear through the country with devastating impact on the lives and livelihoods of the population, not to mention on the country's economic infrastructure.

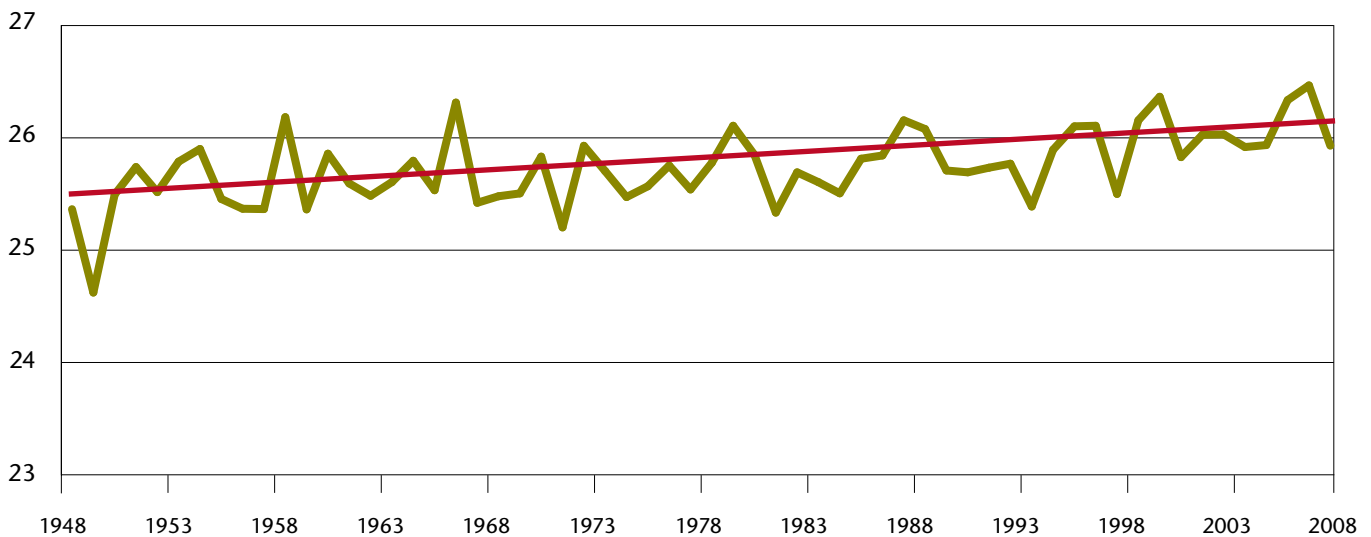
Cyclones aren't the only problem. Bangladesh is home to one of the world's largest river delta systems; it is also located at the heart of the active Asian monsoon region. This and the fact that about 60 percent of the country is just around five metres above sea level make it the sixth most vulnerable nation in the world to surface flooding.<sup>4</sup>

“Because it’s believed that the effects of climate change are already happening in Bangladesh, the country is often described as a laboratory for testing adaptation measures.”

Dr. Bhaski Bhaskaran, Climate Services Manager, Met Office Hadley Centre

### Observed surface air temperatures for Bangladesh

Source: Bangladesh Met Department



Clearly, Bangladesh already faces several natural hazards. Climate change may intensify these hazards and thus pose a critical challenge to development initiatives in the country.

Indeed, according to the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) the adverse impacts of climate change are already being felt in Bangladesh in various sectors. Climate model projections suggest that already committed warming<sup>5</sup> will cause these impacts to continue over the next two or three decades, irrespective of what emissions strategy the world decides to follow.

Recent Studies (e.g., AVOID 2009) found that even the most aggressive emissions reduction policies will still leave around two thirds of the expected 21st century sea level.<sup>6</sup> This has serious implications for those countries with vulnerable coastline such as Bangladesh. Therefore, while it is important to reduce emissions and thus limit global warming, it is equally important for Bangladesh to devise adequate adaptation policies to manage the inevitable impacts of climate change.

This is where access to high quality, high resolution climate information is so important. Put simply, credible adaptation policies cannot be created without such information.

While climate change knowledge in Bangladesh is growing rapidly, there are currently very few regional climate studies that focus specifically on Bangladesh.

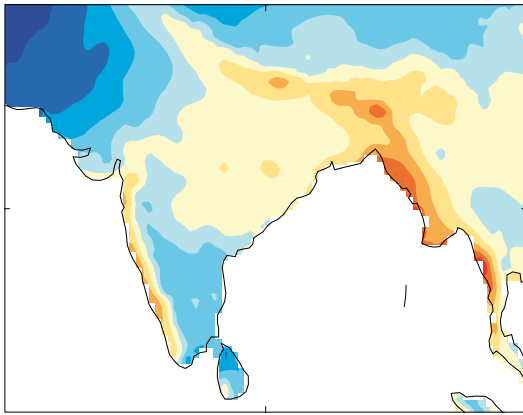
Current global climate models generally have horizontal grid resolutions of 150 km to 300 km, which is not sufficient to capture local variability. In contrast, the resolution of grid boxes in a regional climate model can be as high as 25 km.

The local scale detail that regional modelling provides can demonstrate significant changes compared with those projected by large-scale features in global models, particularly in areas of complex topography. Such detail provides important input for impacts models and assessments at national and regional levels, especially in the most vulnerable regions.

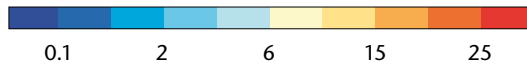
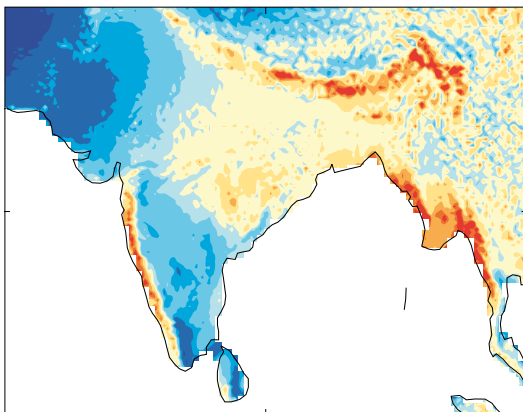
Bangladesh needs this level of detailed information to adequately pursue climate-resilient development. To help meet this need, UKaid from the Department for International Development (DFID) is working with the Met Office Hadley Centre to build in-country capacity in climate change modelling.

3. Source: UNDP (2004), A Global Report: Reducing Disaster Risk: A Challenge for Development [www.undp.org/bcpr](http://www.undp.org/bcpr)  
 4. Source: UNDP (2004), A Global Report: Reducing Disaster Risk: A Challenge for Development [www.undp.org/bcpr](http://www.undp.org/bcpr)  
 5. Committed warming refers to future warming the world is committed to as a consequence of the emissions we have already generated.  
 6. Source: AVOID, [www.avoid.uk.net](http://www.avoid.uk.net)

### Observed precipitation (mm/day)



### Simulated precipitation (mm/day)



Simulation of the climatological June – September precipitation using a 25 km horizontal resolution version of the Met Office regional climate model for 1980–86. The model reproduces observed climatological rainfall pattern with finer details over the mountainous regions. Observed precipitation for the same period is derived from a Climate Research Unit (CRU) precipitation dataset at 50 km resolution.

Source CRU: Mitchell, T.D, Jones, 2005 “An improved method of constructing a database of monthly climate observations and associated high-resolution grids” International Journal of Climatology vol 25,DOI:10.1002/joc.1181 693 – 712

“Now we have to get ourselves ready to fight climate change vulnerability. This workshop is the first step to do this research and identify our vulnerability to climate change.”

Mr. Nandan Mukherjee, Senior Professional, Center for Environmental and Geographic Information Services (CEGIS)

### ABOUT THE PROJECT

From January to June 2010, the Capacity Building in Climate Modelling in Bangladesh project took place to address some of the issues identified on the previous pages. The project joined the modelling experience of the Climate Change Cell at the Bangladesh University of Engineering and Technology with the climate models and science expertise of the Met Office Hadley Centre. A key component of the project was for Met Office Hadley Centre scientists to provide training to the Bangladesh climate research community on the science and applications of the Met Office Hadley Centre regional climate modelling system (PRECIS).

### PROJECT GOALS AND ACTIVITIES

- Set up a climate change modelling lab by procuring necessary hardware and software at BUET.
- Build capacity to understand climate change models and generate regional climate scenarios.
- Develop capacity to analyse and interpret output from climate models.
- Create awareness about climate change risks and facilitate incorporation of climatic risks in development planning.

The Met Office Hadley Centre’s regional climate modelling system (PRECIS) can be easily applied anywhere on Earth. It is used to generate detailed regional climate change projections at either 50 km or 25 km horizontal resolution. It is an ideal tool for capacity building in developing countries such as Bangladesh, as it contains a simple user interface that enables inexperienced users without the relevant wide-ranging technical expertise to set up and run a regional climate model. It also includes a visualisation and data processing package that allows users to display and process the model output for use in their impacts models. The high resolution of the regional climate model provides a level of detail relevant to many impact and vulnerability studies.

To facilitate high quality climate modelling in Bangladesh, a modern, dedicated climate change computer lab was funded as part of the project. This was set up within the Institute for Water and Flood Management at BUET and included all of the necessary hardware and software needed to run the PRECIS system and other programmes. Having such a facility enabled training workshops, run by Met Office Hadley Centre scientists, and associated activities on climate change modelling to take place during the project. In future it will be used to continue the regional climate modelling started during this project, as





“The vision of the Climate Change Study Cell is to establish itself as the premier knowledge centre on climate change risk and adaptation for Bangladesh.”

Dr. M Shah Alam Khan, Director, Institute of Flood and Water Management, BUET

well as to allow the use of these outputs in climate impacts models and to train more Bangladeshi scientists in climate modelling.

To meet the project’s objectives, comprehensive training in regional climate change models was carried out in Bangladesh.

Key activities included:

- an initial one-week training workshop led by the Met Office Hadley Centre;
- installation of the climate model by the participants at their own institutes, supported by technical assistance from the Met Office Hadley Centre and BUET;
- regional climate model runs by participants for agreed domains and time periods;
- joint analysis of model outputs;
- a final workshop to discuss outcomes and plan the next steps.

By the end of the project, participants were able to understand climate models and their limitations, had generated their own climate change scenarios for Bangladesh, and had analysed and interpreted the output from the models.

The computer lab, the dedicated Met Office climate scientists and enthusiastic participants formed the cornerstones for achieving the key objectives of this project.

In addition to the more practical side of the work, the project also aimed to increase the awareness of climate change risks among Bangladeshi policymakers and researchers. One of the key objectives is to enhance their understanding of how climate modelling could help in decision-making and development planning.

Consequently, participants from a wide range of Bangladeshi institutions and organisations were invited to take part in the project. These included Bangladesh government ministries, academic and research institutions, and civil society think tanks.

### ORGANISATIONS INVOLVED IN THE PROJECT

- Bangladesh Centre for Advanced Studies (BCAS)
- Bangladesh Meteorological Department (BMD)
- Bangladesh University of Engineering and Technology (BUET)
- Bangladesh Water Development Board (BWDB)
- Center for Environmental and Geographic Information Services (CEGIS)
- Center for Natural Resource Studies (CNRS)
- Department of Environment, Government of Bangladesh
- Institute of Water Modelling (IWM)
- Jahangir Nagar University
- Water Resources Planning Organization (WARPO)



# Training programme

## OVERVIEW

The Bangladesh climate research community needed training in climate change science and modelling so they could carry out their own climate change assessments. This training was provided by climate scientists from Met Office Hadley Centre via two workshops, both held in the capital city, Dhaka.

The aim of these workshops was to build in-country knowledge of regional climate modelling and to enable project participants to deliver results using these models. More than 20 participants from many different institutions in Bangladesh attended the workshops. Capacity building was achieved through a combination of lectures and practical sessions, and through the follow up work and modelling conducted by the participants.

## THE INITIAL TRAINING

The first workshop took place at BUET, at the start of the project. Over the course of a week, Met Office Hadley Centre scientists trained participants in the science of climate change and its application to impacts assessment. Participants learnt how to apply regional climate modelling to their own scientific questions and how to process climate model data.



Key topics covered included: the science of the climate system and climate change; regional climate modelling; designing climate model experiments; and the uncertainties involved in climate modelling. Participants also took part in hands-on sessions in the new computer lab, where they learnt how to install the PRECIS system, design and run their own climate model experiment and analyse model outputs.

During the workshop, each participant gave a presentation to the group, sharing their current work and plans for using climate modelling. The discussion time after these presentations enabled scientists from the many different participating institutions to explore common aims and develop ideas for future collaborations.



Participant

### Dr. Mohammad Asad Hussain

Assistant Professor, Institute of Water and Flood Management (IWFM), Bangladesh University of Engineering and Technology.

#### Why this training is important to me and my organisation

At our institute, we have established a Climate Change Study Cell (CCSC), for the study of climate change impact and adaptation. Regional climate modelling and impact assessment are the priorities of the CCSC. I am actively involved with the activities of the CCSC and expected to apply climate models in future studies and at the same time train professionals for climate model applications in Bangladesh. So training on PRECIS has been important for me and also for my institute.

#### Learning achievement

From the five-day intensive workshop I have learnt how to install and run PRECIS, got accustomed to the user interface, components of the regional climate model, how to select model domain, defining the lateral boundary conditions, selecting the emission scenarios, output data processing and many other necessary and relevant issues.

#### Future plans

At present I am working on '3-D Residual Flow Simulations in the Bay of Bengal considering future Climate Change induced Hydro-Meteorological Scenarios'. The overall objective of the research is to investigate the future residual flow scenario in the Bay of Bengal taking into consideration the changed hydrological as well as meteorological parameters. Predicted meteorological parameters obtained from PRECIS output for the region will be provided as the hydrodynamic model input. Assessments for discharges through different estuaries of the Bay of Bengal and SST predictions will also be used as model input. I would also like to develop a numerical model considering future sedimentation processes in the Meghna estuary, SLR and climatic conditions where PRECIS output would be important.



Participant

### Dr. Mohammed Abed Hossain

Assistant Professor, Institute of Water and Flood Management (IWFM), Bangladesh University of Engineering and Technology.

#### Why this training is important to me and my organisation

This training allows me the freedom to generate future scenarios of my choosing that fit my research purpose. Capacity building in climate change modelling will help my institute to employ me in the generation of future climatic data that can be used for assessing future environmental problems with climate change.

#### Learning achievement

The most important aspect of this workshop for me had been clarification of the inherent complexities of a regional climate model, the uncertainties involved and the ways to handle the data issues for reliable uses of the model data.

#### Future plan

My immediate future plan involves the use of the regional model for the research project Climate Change Impact on the Fate and Toxicity of Pollutants in Water Resources Systems. The project aims to assess the existing level of pollution in rivers and adjacent soil-sediment systems and assess the future conditions under different climate change scenarios. These would allow decision-makers to devise adaptation measures or propose pre-emptive measures to avert environmental degradation.





Participant

## Mr. Md. Abdul Mannan

Meteorologist, Bangladesh  
Meteorological Department (BMD)

### Why this training is important to me and my organisation

Bangladesh Meteorological Department is mandated for collecting meteorological data from surface and upper air and issuing weather forecasts. It is also mandated for monitoring and forecasting weather and climate related hazards. For this purpose, a reliable and sophisticated model is required which can generate adequate future climate information for impact assessments. Providing Regional Climate and Impact Studies (PRECIS) is such a sophisticated model which has already been tested in many countries for generation of future scenarios. Therefore this training is very essential for me and my organisation.

### Learning achievement

I am more familiarised with the recent aspects of the model, its extensive utility and the analytical techniques to use the model data.

### Future plans

I will make the model more familiar in my organisation and create more users. Using the model, I will prepare future scenarios for impact assessments related to climate change issues which will be helpful for decision-makers to prepare the climate change action plan of Bangladesh.

“Through this workshop we will learn how to use the high quality climate change information that is essential for adaptation.”

Professor A.M.M. Safiullah,  
Vice-Chancellor, BUET



Photo: Raifur Rahman Raqu/DFID

At the workshop, participants agreed that it was a priority to decide on an appropriate model domain for Bangladesh that all participants could use. Different impacts models have different requirements and these were fully considered by the participants in selecting the domains before any climate simulations were initiated.

For example, precipitation modelling for Bangladesh needs the Asian monsoon to be fully represented — so a domain extending to the west of India may be necessary to fully capture this process. Alternatively, local scale hydrological modelling requires data at the highest possible resolution — so a smaller domain at a higher resolution is more appropriate. Participants considered all of the large scale climate features that are important for the weather and rainfall in Bangladesh to ensure that they were included in the climate scenarios.

The Met Office Hadley Centre gave advice on how to determine the appropriate climate model domain size and resolution. The participants were proactively involved in the decision to select four domain sizes over which to test the suitability of the regional climate model at two different resolutions (25 km and 50 km). Responsibility for

conducting these model runs was split between the participants and the Met Office Hadley Centre. The Met Office Hadley Centre provided the necessary lateral boundary condition data files needed to run the regional climate model and test runs were conducted for a baseline period of 1980–1989.

During the project the participants formed a new collaborative group with the Met Office Hadley Centre and BUET to enable close teamwork and the sharing of model results, ideas and knowledge. Ongoing activities started and conducted by this group include:

- a new online discussion forum for climate modellers in Bangladesh;
- a new website to report news and updates on the project and for participants to share information with each other and the Met Office Hadley Centre;
- dividing responsibility for conducting the high resolution model runs between different institutes in Bangladesh;
- monthly meetings of all Bangladeshi participants to discuss progress, share results and agree the next steps.

The Met Office Hadley Centre provided technical assistance and advice to this group throughout the project.



Dear Project Leaders,

Climate change is already a reality now and is happening faster than scientists predicted. Bangladesh is located along the Bay of Bengal and in the delta of the Ganges, Brahmaputra and Meghna, and density of population makes it perilously vulnerable to climate change. Hence, it's a big challenge for us to predict possible impacts of climate change and determine appropriate adaptation mechanisms. I am very happy to see the initiatives taken jointly by the Climate Change Study Cell (CCSC), BUET and the Met Office Hadley Centre, UK to build national capacity on climate change modelling. It is important to predict future scenarios for Bangladesh on a regional scale which can then be used to determine possible impacts on various sectors. Adaptation strategies and plans can be informed by these predictions at a regional level.

One of my colleagues, Ms Naima Khan, has been attending this workshop on behalf of my organisation. I was informed that this workshop empowered the Bangladesh climate modellers to carry out their own climate change assessments. The support received from the Met Office colleagues after the workshop to define the optimum regional model domain for Bangladesh and the adequate horizontal resolution has been helpful and relevant. The knowledge gained through this project will be applied for future research study on the livelihood changes of urban and rural people due to climate change.

I am glad to know that this capacity building training has been successful in enhancing the country's capacity in climate change modelling. We look forward to working with our Met Office and BUET colleagues in developing fine scale probabilistic climate predictions on shorter to longer timescales.

With best regards,

Dr. Atiq Rahman,  
Executive Director  
Bangladesh Centre for Advanced Studies



Participant

## Ms. Naima Ansar Khan

Research Officer; Climate Change and Natural Resource Management division; Bangladesh Centre for Advanced Studies (BCAS)

### Why this training is important to me and my organisation

This training was very much effective in capacity building both from a personal and organisational perspective. It also touched on the technology transfer field. As BCAS is one of the leading organisations within the climate change boundary, this training will play a vital role in fulfilling our organisational mission and vision through conducting different types of research in the climate change field.

### Learning achievement

The major contribution of this training was the demonstration of technological baseline among the workshop participants on both global and regional climate models. I have learnt:

1. How PRECIS works and why this model is required for us
2. What we can do with the PRECIS model. The important role of PRECIS in the climatic research field
3. How we can do further research on climate change related issues and make a link with other research findings
4. How, and under what types of issues, we can work with PRECIS from the viewpoint of adaptation, mitigation, flood forecasting etc.

### Future plans

In the adaptation field, we need to develop different types of policy for different climate-vulnerable groups and sectors. Bangladesh is an agricultural country and the major vulnerable sector to climate change is agriculture. My plan is to make some decisions for the agriculture sector in the coastal zone of Bangladesh based on sea-level rise followed by salinity intrusion data. The Decision Support System for Agro-technology Transfer (DSSAT) model will then be used to develop some technology-based policy. To run this DSSAT model we also need some other types of data such as soil data, surface and ground water availability data, cropping pattern etc.

First, I will validate climatic data from PRECIS and climatic data from observation. Then input those climatic data with some additional data such as soil data and vegetation type. The main outcomes will be the overall agro-climatic situation of that vulnerable area and predictions of the situation after 100 years. Through this research, it will also be possible to develop policies based on requirements.



Participant

## Ms. Sonia Binte Murshed

Lecturer, Institute of Water and Flood Management (IWF), Bangladesh University of Engineering and Technology (BUET)

### Why this training is important to me and my organisation

The training has helped me to do research on climate change modelling on a regional scale. As PRECIS is very useful in generating climate change projections, and as it provides a wide range of projections of possible future climates, I will be able to analyse the right scenario of climate change by using the regional climate model.

The climate change study cell at BUET plays a very important role by creating a knowledge base and producing trained personnel to face the challenges of the impending climate change risk. I hope to contribute to the activities of the cell.

### Learning achievement

My learning process of PRECIS is still going on, but through this project I learnt how to install LINUX SUSE and PRECIS software, as well as how to run the model. I also developed a preliminary concept of data processing and analysis.

### Future plan

My future plan is to build my capacity in climate modelling. I want to use PRECIS to predict various climatic parameters such as temperature and rainfall over Bangladesh. I would also like to find a correlation between global and local impact of climate change considering the effects of El Niño, La Niña, MJO, and ENSO.





“While it is important to reduce emissions to limit global warming, it is also equally important to design credible climate policies to inform adaptation options as we have already committed to a certain level of warming over the next few decades.”

Dr. Bhaski Bhaskaran, Climate Services Manager,  
Met Office Hadley Centre

# Looking ahead

In his speech at the inaugural session of the project Jim McAlpine, Senior Programme Manager for DFID, stressed the need for accurate and up-to-date information on the potential impacts of climate change on a regional or local scale. While the current project is enabling the Bangladeshi climate research community to carry out their own climate change assessments using the Met Office Hadley Centre regional climate model, there is a need for Upzila level<sup>7</sup> high-resolution climate information, taking into account various uncertainties in climate projections for decision-making.

7. An Upzila is a sub-district of Bangladesh.



**LETTER FROM BANGLADESH GOVERNMENT SECRETARY  
DR. MIHIR KANTI MAZUMDAR**



Dear Project Leaders,

It is my immense pleasure to see the success of this capacity building project conducted by the Bangladesh University of Engineering and Technology (BUET) in collaboration with the Met Office Hadley Centre, UK and supported by UKaid from the Department for International Development (DFID). As we all know, Bangladesh is one of the most vulnerable countries to climate change. There are several environmental challenges currently faced by this nation such as surface flooding, tropical cyclones, degradation of land, wetland and water bodies, loss of forests, biodiversity loss, and salinity intrusion in coastal zones etc. Climate change will heighten the current environmental hazards and will pose a critical challenge to our development initiatives.

Recently, the Government of Bangladesh has approved the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009, which will be the main basis of our efforts to combat climate change over the next ten years. One of the six components of the BCCSAP is capacity building and institutional strengthening to enhance the capacity of government ministries and agencies, civil societies and the private sectors to meet the challenge of climate change.

In this context, I was informed by my colleagues that this current project supported by the UKaid from DFID has been very successful in enabling the Bangladesh climate researchers to carry out their own climate change assessments to contribute to BCCSAP. However, there is an increasing need for up-to-date accurate information on the potential impacts of climate change on a local scale at Upzila level.

I do understand that climate information based on a single realisation of the future is inadequate to manage climate related risks in development programmes. The probabilistic prediction of climate change similar to the UK Climate Projections programme, as outlined in this brochure, would be invaluable to inform our adaptation policy making. I very much hope the Met Office will be able to continue to work with the Bangladesh climate research community to develop and deliver probabilistic climate change projections on a local scale, taking into account uncertainty in prediction models and global emissions.

Dr. Mihir Kanti Mazumdar,  
Ministry of Environments and Forests  
Bangladesh



“The collaboration between BUET Climate Change Cell and the Met Office will address issues relating to integrated water resource management due to climate change.”

Dr. Saiful Islam, Associate Professor of Water and Flood Management, BUET.

### WHAT NEXT?

Predicting impacts of regional climate change (for example, at Upzila level) requires careful handling of uncertainties inherent in the various global and regional drivers that are responsible for climate change in Bangladesh. For example, the uncertainties of future greenhouse gas concentrations and the limitations of climate models are two key global factors that introduce uncertainty in regional predictions. The downscaling of global projections using dynamical or statistical methods introduces one more level of uncertainty. These uncertainties need to be accounted for in regional climate projections if these projections are to be used in decision-making processes.

When regional projections are produced using a single realisation of the future, they will capture only one possible future climate. Without any information about the likelihood of this one climate, the regional projections will not be enough to make key decisions. By effectively incorporating the uncertainties outlined above, it is possible to attach

probabilities to different levels of future climate change. For example, information on high-impact extreme dry monsoon seasons (however small the probability of their occurrence may be) will help decision-makers think about contingency measures. At the same time it will help them develop definite strategies for dealing with the more likely outcome of flooding seasons.

Providing this type of probabilistic climate information requires a good understanding of the drivers of Asian monsoon and how they will change in the future. The Met Office Hadley Centre has recently carried out an ensemble global climate projection experiment. It used 17 global climate models that were constructed by making different choices as to how key atmospheric processes are represented. Using these models, analysis of the varying behaviour of the monsoon and its drivers could be used to identify driving lateral boundary conditions for the optimum regional model domain identified in this project. It could also be used to produce projections for 20-year periods up to the end of the century at 25 km resolution for administrative regions and river basins.

Photos: Bhaski Bhaskaran



## KEY PROJECT STAFF

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**Bangladesh University  
of Engineering and  
Technology**



**Dr. Saiful Islam** — Project leader  
Coordinator of the Climate Change Study Cell,  
Institute of Water and Flood Management

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**Dr. Bhaski Bhaskaran** — Project leader  
Climate Services Manager



**Dr. Claire Witham**  
Climate Services Consultant



**Mr. David Hein-Griggs**  
Regional Modelling and PRECIS coordinator



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