Jameel Observatory-CREWSnet

Reinvention Climate Change Adaptation

We are creating proactive, integrated decision-support tools and services that empower frontline vulnerable communities to prepare for climate impacts and minimize losses

Global Change Forum

Edward Wack

27, 28 March 2025

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JO-CREWSnet Framework

Integrate and deploy MIT strengths in climate science to understand future impacts and inform adaptation strategies

Climate Phenomena

- Heat waves, droughts, and flooding
- Cyclone intensity and frequency
- Sea level rise and salinity intrusion

Human System Impact Assessments

- Map and characterize current and future trends
- Identify likely impacts
  - Livelihoods and habitability
  - Threats to infrastructure

Informed Guidance

- Engage stakeholders at all levels
- Purpose-built systems for families, communities, civil society, government

Outcomes

- Implement adaptation strategies in vulnerable communities
- Evaluate initiatives and refine predictions for robust project implementations

Core Elements, DLCs and partners:	Climate science & forecasting techniques	Socio-economic & resource impact modeling	System integrator & decision support systems	Humanitarian & climate action programming	Impact evaluation & intervention guidance
	EAPS Earth, Atmospheric and Planetary Sciences	Center for Sustainability Science and Strategy	Lincoln Laboratory, Massachusetts Institute of Technology	brac	J-PAL Abdul Latif Jameel Poverty Action Lab

Jameel Observatory-Climate Resilience Early Warning System Network
DLC = Departments, Labs and Centers

Global Collaboration

Jakir Hossain
Hydrologist
Bangladesh Water Development Board

JAMEEL OBSERVATORY

Prof. Elfatih Eltahir

Civil and Environmental Engineering

heat stress, precipitation, & hydrology

Dr. Deborah Campbell & John Aldridge

LINCOLN LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

system integration & decision support technologies

Dr. Adam Schlosser

Center for Sustainability Science and Strategy

land use characterization & analysis

New Collaborators

Prof. Michael Steckler

groundwater hydrology, sedimentation & subsidence

COLUMBIA CLIMATE SCHOOL
LAMONT-DOHERTY EARTH OBSERVATORY

Prof. Mushfiq Mobarak

J-PAL
ABDUL LATIF JAMEEL POVERTY ACTION LAB

Y-RISE

economics in developing environments

Dr. Sai Ravela

cyclone severity and frequency; coastal inundation and salinity

EAPS
Earth, Atmospheric and Planetary Sciences

Dr. Laikath Ali, Tapas Chakraborty, Monir Khan

brac

climate change intervention programming

Dr. Sergey Paltsev

Center for Sustainability Science and Strategy

resource economic analysis

Annajmus Sakib
BRAC

Myisha Ahmad
BRAC

Yeonwoo Choi
MIT CEE

Katie Picchione
MIT LL

Jeff Liu
MIT LL

Xiang Gao
MIT JPSPGC

Islamul Haque
J-PAL/Yale

Claire Walsh
J-PAL/MIT

Austin Chadwick
Columbia

Ashley Toombs
BRAC

Shahanoor Kabir
BRAC

Angelo Gurgel
MIT JPSPGC

JPSPGC: Joint Program for the Science and Policy of Global Change
J-PAL: Jameel Poverty Action Lab

CGCS: MIT Center for Global Change Science
Y-RISE: Yale Research Initiative for Sustainable Economics

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Focus Areas of JO-CREWSnet

Climate Resilient Shelters & Structures

Improving resilience to intensifying cyclones and heat stress through modified and improved shelters/structures

Water Security

Improving access to potable water through rain harvesting and desalinization techniques

Agriculture & Livelihood Resilience

Assessment of climate impacts on land use and livelihood decisions

Flagship efforts map local climate hazards to specific adaptation strategies

Agriculture & Livelihood Resilience : Framework

Climate change continues to alter the agricultural landscape in southwest Bangladesh, and farmers, technologists, and policymakers require advanced guidance and capabilities for future adaptation decisions

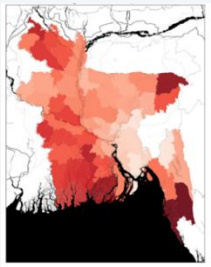
Climate Phenomena

- Heat extremes
- Changing precipitation
- Windspeed
- Flood inundation & salinity intrusion

Human System Impact Assessments

Project future climate trends and assess possible effects on crop viability or yields

In progress: addition of salinity trends to future crop performance estimates



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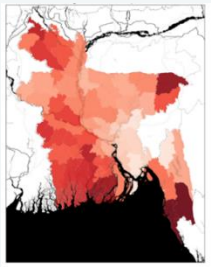

Informed Guidance

- For farmers on likely trends
- For agricultural technologists (and supporting research institutes) on capability gaps
- For government plans and policies:
  - National 5-Year Plan
  - National Adaptation Plan
  - Bangladesh Climate Change Strategy and Action Plan
  - Delta Plan 2100
  - …

Outcomes

- Implementation of effective climate resilient farming strategies
- Livelihoods saved
- Investment in and acceleration of new seeds and other agricultural technologies
- Updated government plans and policies
- Infrastructure investments

JO-CREWSnet framework is a unique vertical integration of MIT climate science, impact, and decision support strengths

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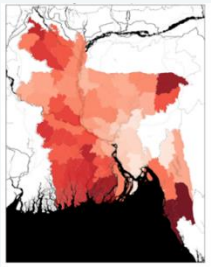

Formative Advanced Crop Calendar Workflow *(in progress)*

Select regions/field stations for focus (Keshabpur, Bardal, Munshiganj)

Make projections of climate stressors

MRCM & CTSM; Stressors include Temp., Precip., Heatwave, Drought, Waterlogging, Flooding, Salinity.

Identify relevant crops (or crop sequences) and their sensitivities to climate stressors.

Collaborative effort with BRAC Field Agriculturalists, Adam's group & Yeonwoo

Validate by reproducing current Hazard Calendars

Deliverable 1. Advanced Hazard Calendar that summarizes the annual cycle of climate stressors.

With visualization & decision-support aids

Deliverable 2. Susceptibility profiles for each crop that summarizes its sensitivity to climate stressors.

With visualization & decision-support aids

Predict each crop's success over the annual cycle based on projected climate stressors.

Validate by reproducing current Crop Calendars

Deliverable 3: Advanced Crop Calendar that summarizes projected yield/survival of each crop.

With visualization & decision-support aids

Share deliverables 1–3 with farmers through BRAC Adaptation Clinics

- **Actively collaborating with BRAC Field Agriculturalists in Keshabpur, Bardal, and Munshiganj**

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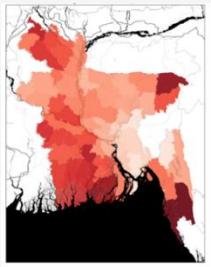

Agricultural Crop Calendars

AGRICULTURAL CALENDAR

CROP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CEREALS												
Aus (Local: Broadcasted)												
Aus (HYV: Transplant)												
Aus (HYV: Broadcasted)												
Aman (Local: Broadcasted)												
Aman (Local: Transplant)												
Aman (HYV: Transplant)												
Boro (Local: Transplant)												
Boro (HYV: Transplant)												
Wheat												
Maize												
TUBERS												
Potato												
PULSES												
Lentil												
Chickpea												
Mungbean												
Blackgram												

- Crop calendars are a widely used community agriculture tool
- Current implementations reflect the current state of practice, and are not climate proactive

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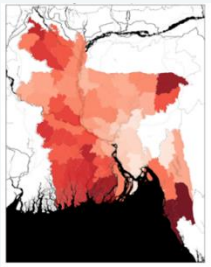
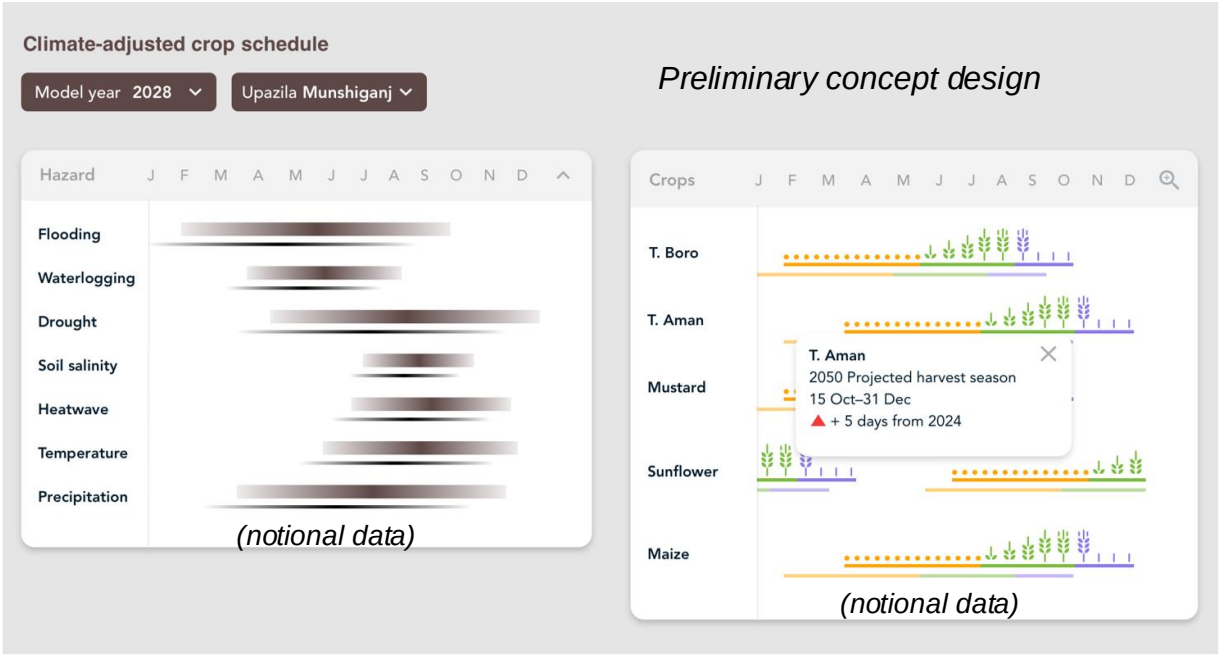


Advanced Crop Calendar Concept



- **Concept integrates JO-CREWSnet climate hazard and crop risk projections into a community accessible tool**
- **Accessible through Adaptation Clinic and modernized delivery platforms**

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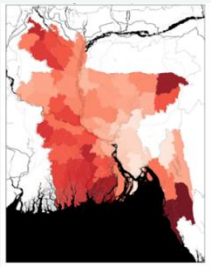

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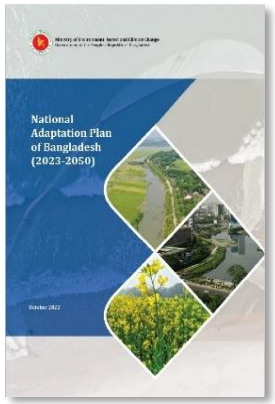
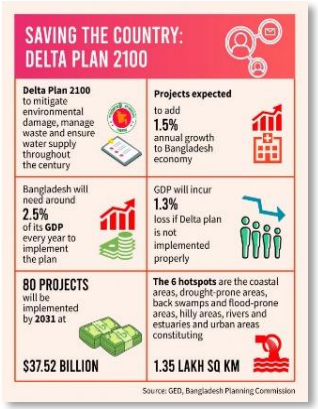
BRAC Adaptation Clinic: incorporation of new data and decision tools





Nation- and region-scale adaptation roadmaps