Climate Change, Intimate Partner Violence, and the Moderating Effects of Climate Resilience Initiatives

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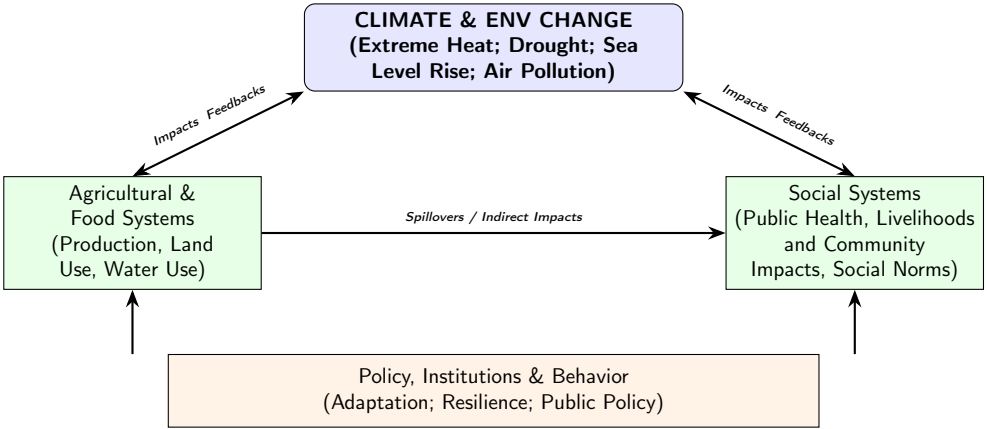
Research Program: A Conceptual Overview



Example Research Studies

- Climate change: Impact and adaptation for agri-food systems
  - Water institutions and land allocation (Ji and Cobourn, 2018 CJAE; Cobourn et al., 2022 AJAE; Browne and Ji, 2023 JEEM)
  - Climate expectations and decision-making (Ji and Cobourn, 2021 ERE)

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  - Environmental and climate implications of the clean energy transition (Ji et al. 2024, under review at JPAM)

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  - Environmental and climate implications of the clean energy transition (Ji et al. 2024, under review at JPAM)
- Climate change at the nexus: agri-food and social systems impacts
  - Saltwater intrusion, land use, and food security (Guimbeau et al., 2024 JEEM)
  - This paper

Introduction

- Increased frequency and severity of extreme and unexpected weather events - heatwaves, droughts and floods
  - Act as a "threat multiplier" through channels of lost income as well as intra-family dynamics (UN Women, 2022)
  - Intensifying susceptibilities to forced migration, conflicts, and gender-based violence

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- Climate change impacts are not gender neutral
  - Women disproportionately impacted in developing nations
    - Extensive involvement in agriculture
    - Existing political, social, and economic inequities
    - Gender-specific roles rooted in cultural norms

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    - Extensive involvement in agriculture
    - Existing political, social, and economic inequities
    - Gender-specific roles rooted in cultural norms
- Need for an assessment of the gender-differentiated impacts of climate change; how they manifest through existing inequalities

Coping with climate change

- Global challenge: How to respond to climate impacts

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- The growing role of climate finance
  - COP15 (2009 Copenhagen): target for $100 billion/year commitment by 2020
  - Climate finance for developing countries reached $118 billion in 2022 (OECD, 2024) Global Climate Finance 2013-2022
  - Justification: investing in resilience and adaptation prevents forced migration, loss of livelihoods, and social unrest

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  - Justification: investing in resilience and adaptation prevents forced migration, loss of livelihoods, and social unrest
- Critical need for evidence on the effectiveness of climate finance
  - Understanding which interventions work, for whom, and through what mechanisms is crucial
  - What social spillovers do climate finance initiatives have?

This paper: focus on Bangladesh

- One of the most vulnerable countries to climate change in the world
  - Nearly 40% of the population directly employed in agriculture
  - Potential loss of one third of its agricultural GDP by 2050
  - Multiple threats: drought (Li 2023), cyclones and floods (Patel 2024; Lane 2024), saltwater intrusion (Guimbeau et al. 2024)

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- Climate change exacerbates existing gender inequalities; potentially undermines hard-won achievements made in bridging gender gaps
  - Alarming incidence of IPV: 73% of ever-married women experiencing one or more forms of intimate partner violence at least once in their lifetime (Bangladesh Bureau of Statistics, 2016)
  - Over one-third of men aged between 15-49 agree that wife-beating is justified for several reasons (DHS, 2007)

This paper

We have two objectives in this paper:

1. Quantify the effects of climate shocks on women's attitudes towards intimate partner violence
   - Literature suggests that tolerance to IPV is strongly correlated with actual experience of IPV
   - We document the extent to which these effects diverge across existing socio-economic vulnerabilities

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   - We document the extent to which these effects diverge across existing socio-economic vulnerabilities

2. Evaluate whether nationally-led climate-resilience initiatives mitigate the negative impacts of climate shocks
   - The Bangladesh Climate Change Trust (BCCT) financed community-based projects that promote climate adaptation and resilience
   - We quantify the effectiveness of BCCT projects at attenuating the harmful impacts of climate shocks on women's wellbeing
   - We also examine potential mechanisms through which BCCT enhances climate resilience

Preview of results

- The impact of a higher frequency of dry months on tolerance of IPV is not statistically different from zero for the average Bangladeshi women
- But drought increases IPV tolerance for two groups of women
  1. Those who live in agriculture-dependent communities
  2. Those in the lowest three wealth quintiles, with effects stronger for poorest women

Preview of results

- Proximity to a BCCT project completely counteracts the effect of droughts in agricultural communities across all wealth strata
  - Positive but smaller attenuation effects for other development assistance projects
  - Active BCCT projects play a key role in improving women's welfare through access to media, transport facilities, electricity, and cash earnings

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- Resilience effects transmitted through protection to rainfed *aman* season agriculture
  - Proximity to BCCT buffers rainfed agricultural yield loss from droughts
  - Also mitigates the negative effects of drought on acreage of rainfed crops
  - No effects on yield and acreage of irrigated (*boro* season) crops

Contribution to the literature: Climate Impact

- Socio-economic impact of climate change in developing nations (Maccini and Yang 2009, Deschenes and Greenstone 2011, Geruso and Spears 2018, Banerjee and Maharaj 2020, Liu et al. 2023, Guimbeau et al. 2024)

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- Relatively scarce literature on linkages between climate and violence, especially gender-based violence in developing countries
  - Only two IPV papers in Burke et al. (2024)'s review and meta-analysis on climate and conflict
  - A growing stream of literature: Sekhri and Storeygard (2014 JDE, India); Sekhri and Hossain (2023 JAERE, India); Diaz and Saldarriaga (2023 JHE, Peru); Pavanello and Zappala (2024 WP, US); Aguilar-Gómez and Salazar-Díaz (2025 WP, Mexico);
  - Agriculture is an important mechanism in moderating the climate-violence relationship

Contribution to the literature: Climate adaptation

- Direct (costly) adaptation:
  - Crop switching (Burke and Emerick 2016; Cui 2020; Ji and Cobourn 2022; Guimbeau et al. 2024; Cui and Zhong 2024; Sumner et al. 2025)
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  - Access to healthcare (Mullins and White 2020; Evans et al. 2025)
- Our paper is one of the first to evaluate targeted public climate spending programs in the developing world

Relevance to Canada

- Vulnerability of agricultural and food systems
  - Droughts in the Prairies; extreme weather events in Ontario
  - Agricultural adaptation: crop switching; irrigation;
- Social implications of climate shocks
  - Impacts on mental health, wellbeing, and gender-based violence
- Co-benefits of climate adaptation and resilience building
  - Adapting within the food system can have wider social spillovers

Data

- 4 rounds of the Bangladesh Demographic and Household Survey (DHS) from 2007 to 2017
  - Samples of women aged 15-49
  - A pooled cross-sectional dataset,and use the geographic coordinates of each surveyed cluster across rounds to merge with the geo-coded climate data
  - Variables related to attitudes towards wife-beating, proxies for other dimensions of women's status
  - The domestic violence module is available only in the 2007 BDHS to measure the experience of spousal violence
    - This sample provides information on whether ever-married women had ever experienced physical or sexual abuse committed by their husbands

Location of BDHS clusters | Heatmap of IPV Tolerance

Data

- Weather data from EU's Copernicus Climate Change Service
  - Meteorological indicators from 1980 to obtain gridded monthly meteorological data at a spatial resolution of $0.1^0 x 0.1^0$
  - Temperature, precipitation, vapor pressure, wind speed, solar radiation flux
  - Nonlinear transformation into apparent (feels-like) temperature (LaPolo 2023)
  - We match the latitude-longitude of each sampled cluster over DHS rounds to the geo-coded weather data
    - We use inverse-distance matching to obtain local measures of climate through gridded climatic observations

Evidence of Climate Change | Heatmap of Drought Presence

Data

- Additional datasets for climate vulnerability indices, pre-treatment geographic and socio-economic covariates at the sub-district level
- Bangladesh Climate Change Trust (BCCT)
  - We digitize the list of approved and finalized projects from the BCCT's official site on the Bangladesh National Portal
  - Information on project name, implementing agency, and projected costs
  - Starting dates, originally scheduled and actual end dates for most projects
  - Location data from the project title, supplementary documents on the portal, and from the Ministry of Environment, Forest, and Climate Change
  - We pinpoint the sub-district locations of 183 projects spread throughout Bangladesh with varying start and ending dates spanning from 2010 and 2020

Empirical strategy

$$\begin{aligned} y_{icdmt} =& \beta_1 drought_{cdmt-36} + \beta_2 wet_{cdmt-36} + \beta_3 heat_{cdmt-36} \\ &+ \gamma W_{cdmt} + \theta X_{icdmt} + \omega_{dm} + \mu_{dt} + \epsilon_{icdmt} \end{aligned} \tag{1}$$

- y_{icdmt}: =1 if the respondent agrees with at least one of the five justified reasons for wife-beating
- $drought_{cdmt-\mathbf{36}}$: the cumulative number of months over the past 3 years that rainfall realization was least **1 SD below** the historical monthly average
- $wet_{cdmt-\mathbf{36}}$: the cumulative number of months over the past 3 years that rainfall realization was least **1 SD above** the historical monthly average
- $heat_{cdmt-\mathbf{36}}$: the cumulative number of months over the 3 years that temperature realization was least **1 SD above** the historical monthly average
- W_{cdmt}: a vector of contemporaneous temperature (in bins) and rainfall measures
- X_{icdmt}: a vector of controls for individual and household characteristics: age, residency, education, age of cohabitation, religion, number of young children

Identifying assumptions

- Equation (1) also includes district-by-month and district-by-year fixed effects to account for temporal variations across districts including local seasonality and regional trends
- Assumption: Conditional on the controls for contemporaneous weather, location-specific seasonality, and on other variables in the model
  - There are no omitted variables that are correlated with both the number of dry months in the 3 years prior to the survey year and with women's attitudes towards IPV
  - Weather shocks are as good as random in this case

Main results: Droughts increase vulnerable women's acceptance of IPV

The effects of climate shocks on women's attitudes towards IPV

	Dependent Variable: Justifies IPV for at least one reason					
	Sample restricted to:					
	All	Agriculture-Dependent Communities	Non Agriculture-Dependent Communities	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	(1)	(2)	(3)	(4)	(5)	(6)
Number of dry months (past 3 years)	0.005	0.010**	-0.008	0.009**	0.011**	0.017**
(below 1 SD of historical average rainfall)	(0.004)	(0.005)	(0.008)	(0.004)	(0.005)	(0.007)
Number of wet months (past 3 years)	-0.003	-0.001	0.003	-0.006	-0.004	0.000
(above 1 SD of historical average rainfall)	(0.004)	(0.005)	(0.011)	(0.005)	(0.006)	(0.008)
Number of hot months (past 3 years)	-0.003	-0.004	-0.003	-0.004	-0.005	-0.006
(above 1 SD of historical average temperature)	(0.003)	(0.004)	(0.005)	(0.004)	(0.005)	(0.006)
Observations	47,885	23,108	22,608	27,085	17,703	8,657
R-squared	0.110	0.118	0.120	0.112	0.131	0.156
Individual and household controls	✓	✓	✓	✓	✓	✓
Weather controls	✓	✓	✓	✓	✓	✓

Robustness and other results

- Alternative specifications, population sorting, and additional controls
- Monsoon drought shocks and growing degree days
- Heterogeneous effects for the lowest wealth quintile: Heterogeneity by sociodemographics
  - We examine factors that could potentially mitigate the main effects
  - Sectoral area of residence, literacy status, and economic prosperity
- Effects by decade of birth Heterogeneity by birth cohort
  - We augment equation (1) with indicators for women's birth decades, and separate interaction terms for the frequency of dry months and each birth cohort
  - Women's acceptability of IPV across all birth decades are impacted by dry shocks
  - Effects are relatively more pronounced for women born in later cohorts in the poorest households

Robustness and other results

- We examine whether wealth and agriculture dependency compound each other when communities experience drought
  - We present results where the samples are partitioned based on both wealth strata and the share of employment in agriculture at the upazila (sub-district) level
  - We find that poorer women living in agriculture-dependent communities are even more likely to justify IPV when dry spells increase
- We examine whether intra-family employment structure plays a role in shaping the climate-IPV relationship
  - We consider households where the husband is employed in the agricultural sector
  - We also focus on samples by women's primary occupation and employment status
  - Results are evident mostly for unemployed women in agricultural households

Other results: Experience of IPV

Table 4: The effect of climate shocks on the experience of IPV

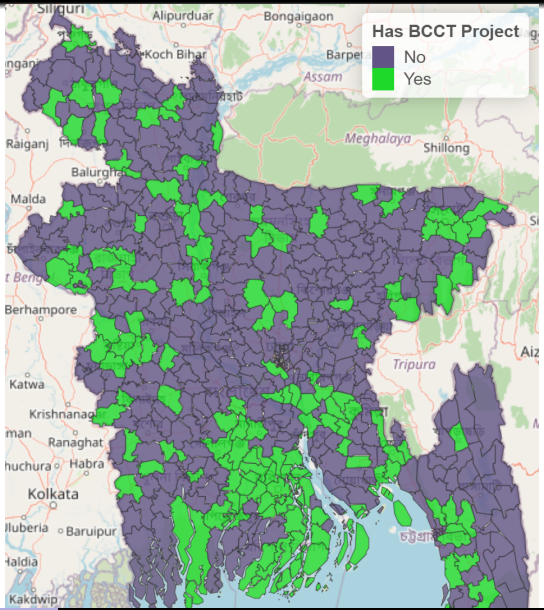
	Sample restricted to: women employed in agriculture			
	Form of domestic violence:			
	physical	sexual	either physical or sexual	both physical and sexual
	(1)	(2)	(3)	(4)
Number of dry months (past 3 years)	0.004	0.033***	0.021	0.015*
(below 1 SD of historical average rainfall)	(0.013)	(0.012)	(0.018)	(0.008)
Number of wet months (past 3 years)	0.020	-0.017	-0.001	0.005
(above 1 SD of historical average rainfall)	(0.016)	(0.013)	(0.018)	(0.010)
Number of hot months (past 3 years)	-0.028**	0.014	-0.014	0.000
(above 1 SD of historical average temperature)	(0.014)	(0.011)	(0.015)	(0.009)
Observations	589	589	589	589
R-squared	0.104	0.113	0.145	0.080

Other results: Agency indicators

Bangladesh Climate Change Trust

- Launched in 2008 and operational since 2010, $400 million funding
  - Domestic climate fund working with NGOs, ministries and the private sector
  - BCCRF (Bangladesh Climate Change Resilience Fund) - led by the World Bank, dissolved in 2016
- Wide project focus: sustainable agriculture, water management, disaster management, renewable energy, capacity building, etc.
  - Targets adoption of climate-tolerant technologies, biodiversity and environmental initiatives, and disaster response
  - Some of the projects directly target women

  Sample Information Table | Sample LLM based classification
- 183 projects coded between 2010-2020
  - Matched to subdistrict (*upazilla*) + year level


Has BCCT Project
No
Yes
Siliguri
Alipurduar
Bongaigaon
Koch Bihar
Barpeta
Assam
Meghalaya
Shillong
Raiganj
Balurghat
Malda
Berhampore
Tripura
Katwa
Krishnanagar
Ranaghat
Habra
Kolkata
Baruipur
Haldia
Kakdwip

Moderating Effects of BCCT: Methodology

- We extend our strategy to assess possible mitigative effects using the equation below:

$$y_{icsdmt} = \beta_1 \text{drought}_{csdmt} + \kappa\ \text{BCCTproject}_{sdmt} + \pi(\ \text{drought}_{csdmt} \times \text{BCCTproject}_{sdmt}) + \gamma \text{W}_{csdmt} + \theta \text{X}_{icsdmt} + \omega_{dm} + \mu_{dt} + \epsilon_{icsdmt} \quad (2)$$

- $BCCTproject_{sdmt}$ equals one when the respondent's cluster falls within a sub-district s that had at least one BCCT project at the time the DHS survey was conducted
- The coefficient of interest is π, the additional effect of dry shocks for respondents in sub-districts with active BCCT projects
- We are also interested in the net effect of drought on acceptance of IPV in sub-districts with active BCCT projects, $\beta + \pi$

Climate shocks, attitudes towards IPV and BCCT projects

Dependent Variable: Justifies IPV for at least one reason	Sample restricted to: Respondents in agriculture-dependent communities			
	(1)	(2)	(3)	(4)
Number of dry months (past 3 years) (below 1 SD of historical average rainfall)	0.011**	0.010**	0.011**	0.010*
	(0.005)	(0.005)	(0.005)	(0.005)
BCCT project (active before survey)	0.062*	0.061*		
	(0.036)	(0.036)		
Number of dry months x BCCT project	-0.018**	-0.018**		
	(0.008)	(0.008)		
Inactive BCCT project (active after survey)		-0.011		
		(0.037)		
Number of dry months x inactive BCCT project		0.002		
		(0.005)		
Number of BCCT projects			0.050*	0.048
			(0.030)	(0.030)
Number of dry months x num of BCCT projects			-0.015**	-0.015**
			(0.007)	(0.007)
Number of inactive BCCT projects				-0.024
				(0.026)
Number of dry months x num of inactive projects				0.002
				(0.004)
Joint test:				
num. of dry months + (num. of dry months x BCCT) = 0	-0.007	0.008	-0.005	-0.005
F-statistic	0.84	0.92	0.42	0.54
p-value	[0.360]	[0.337]	[0.516]	[0.540]
Observations	23,108	23,108	23,108	23,108
R-squared	0.118	0.118	0.118	0.118

Selection in project locations

- We might be worried that BCCT projects are not randomly allocated:

1. Funding might target areas that are more vulnerable (although anecdotally, equity is not an explicit criteria in funding allocation) Balance Table
2. BCCT funds might crowd-in or crowd-out other development assistance programs

Selection in project locations

- We address this by:
  - Leveraging the timing of BCCT project implementation: projects inactive at the time of the survey should not mitigate climate impact
  - Matching on observables: match women in BCCT-receiving subdistricts to otherwise similar women in non-receiving subdistricts
  - Explicitly control for the presence of other development aids: USAID, JICA, World Bank, Asian Development Bank, EU, India, UNDP, Islamic Development Bank, and DfID
  - Excluded 5 subdistricts that received BCCRF projects

Table 6: Climate shocks, attitudes towards IPV and BCCT projects

	Dependent Variable: Justifies IPV for at least one reason							
	Sample restricted to: Respondents in agriculture-dependent communities							
	All	Three lowest quintiles	Two lowest quintiles	Lowest quintile	All	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of dry months (past 3 years) (below 1 SD of historical average rainfall)	0.011**	0.010*	0.011*	0.022***	0.010**	0.009*	0.010	0.020**
	(0.005)	(0.005)	(0.006)	(0.008)	(0.005)	(0.005)	(0.006)	(0.008)
BCCT project (active before survey)	0.062*	0.077*	0.038	0.080	0.061*	0.075*	0.037	0.076
	(0.036)	(0.040)	(0.046)	(0.074)	(0.036)	(0.040)	(0.046)	(0.074)
Number of dry months x BCCT project	-0.018**	-0.020**	-0.020**	-0.035**	-0.018**	-0.020**	-0.020**	-0.035**
	(0.008)	(0.008)	(0.010)	(0.014)	(0.008)	(0.008)	(0.010)	(0.014)
Inactive BCCT project (active after survey)					-0.011	-0.034	-0.034	-0.094*
					(0.037)	(0.041)	(0.048)	(0.055)
No. of dry months x inactive BCCT project					0.002	0.005	0.005	0.012
					(0.005)	(0.006)	(0.007)	(0.009)
Joint test: No. of dry months + (No. of dry months x BCCT) = 0	-0.007	-0.010	-0.009	-0.013	-0.008	-0.011	-0.010	-0.015
F-statistic	0.839	1.306	0.820	0.781	0.921	1.507	0.973	1.022
p-value	[0.360]	[0.253]	[0.365]	[0.377]	[0.337]	[0.220]	[0.324]	[0.312]
Observations	23,108	16,954	11,889	6,145	23,108	16,954	11,889	6,145
R-squared	0.118	0.118	0.134	0.159	0.118	0.118	0.134	0.159

Climate shocks, attitudes towards IPV and aid projects: BCCT and Other Development Assistance

Dependent Variable: Justifies IPV for at least one reason						
	Sample restricted to: Respondents in agriculture-dependent communities					
	Three lowest quintiles (1)	Two lowest quintiles (2)	Lowest quintile (3)	Three lowest quintiles (4)	Two lowest quintiles (5)	Lowest quintile (6)
Panel A						
Number of dry months (past 3 years)	0.013**	0.013**	0.020**	0.014***	0.014**	0.022***
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.008)	(0.005)	(0.006)	(0.008)
Other development project (within 10 km)	0.044	0.032	-0.006	0.041	0.034	-0.006
(active before survey and ongoing)	(0.033)	(0.039)	(0.054)	(0.034)	(0.039)	(0.055)
Number of dry months x other development project	-0.009**	-0.008	-0.002	-0.009*	-0.009	-0.002
	(0.005)	(0.006)	(0.008)	(0.005)	(0.006)	(0.008)
BCCT project (active before survey and ongoing)				0.071*	0.033	0.080
				(0.040)	(0.046)	(0.074)
Number of dry months x BCCT project				-0.019**	-0.019**	-0.035**
				(0.008)	(0.010)	(0.014)
Observations	16,954	11,889	6,145	16,954	11,889	6,145
R-squared	0.118	0.134	0.158	0.118	0.134	0.159
Panel B						
Number of dry months (past 3 years)	0.009*	0.009	0.019**	0.010*	0.010	0.021**
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.008)	(0.005)	(0.006)	(0.008)
Number of other development projects (within 10 km)	0.001	-0.003	-0.003	0.001	-0.003	-0.003
(active before survey and ongoing)	(0.008)	(0.010)	(0.012)	(0.008)	(0.010)	(0.012)
Number of dry months x num of other dev. Projects	-0.000	0.001	0.001	-0.000	0.000	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Number of BCCT projects				0.055*	0.030	0.072
				(0.033)	(0.035)	(0.051)
Number of dry months x Num of BCCT projects				-0.016**	-0.016*	-0.030**
				(0.007)	(0.009)	(0.012)
Observations	16,954	11,889	6,145	16,954	11,889	6,145
R-squared	0.117	0.134	0.158	0.118	0.134	0.159

Additional robustness checks

- Control for a number of pre-BCCT covariates at the sub-district level
  - Geographical factors and economic variables
  - Climate vulnerability: composite index for crop yield susceptibility, measures of vulnerability related to natural disasters, fish harvest, road and rail infrastructure
- Include only those projects that were active at the time of the survey
- Exclude projects that were introduced most recently during the survey year

BCCT Robustness Checks

BCCT and agricultural resilience

- BCCT targets the adoption of climate-tolerant technologies, disaster response, and resilience
- We want to examine whether BCCT protects drought impacts on agriculture
- Additional panel data spanning 2000-2018 on:
  - Land use data from CLMS (300m resolution); differentiate between rainfed and irrigated agriculture
  - Crop yield proxy through NDVI differences between the start and end of the monsoon and dry seasons

Table 9: The Effects of BCCT Projects on Mitigating Agricultural Impacts of Drought Shocks

	Dependent Variable			
	% Rainfed Crop	% Irrigated Crop	Aman Season NDVI	Boro Season NDVI
	(1)	(2)	(3)	(4)
Panel A				
Number of dry months (past 3 years)	-0.0043*	-0.0102***	-0.0045**	0.0042*
(below 1 SD of historical average rainfall)	(0.0023)	(0.0031)	(0.0023)	(0.0025)
Active BCCT project	-0.0046	-0.0172	-0.0489***	-0.0308*
	(0.0121)	(0.0198)	(0.0186)	(0.0170)
Number of dry months (past 3 years)	0.0045*	-0.0019	0.0097**	0.0019
x Active BCCT project	(0.0025)	(0.0041)	(0.0040)	(0.0039)
Degree Days	✓	✓	✓	✓
Heat and wet months	✓	✓	✓	✓

Access to Information

- The increase in women's wellbeing near BCCT project sites may be prompted by the upswing in economic activities with subsequent impacts on IPV acceptance
- Active BCCT projects play significant roles in enhancing access to media, in earning cash, and in utilizing transport facilities
- These effects are generally more pronounced among the most vulnerable in the lowest wealth quintile

The impact of BCCT and other active projects

	Sample restricted to: Respondents in agriculture-dependent communities							
	All	Three lowest quintiles	Two lowest quintiles	Lowest quintile	All	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	Dependent Variables:							
	Access to media				Microfinance program			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BCCT project (=1)	0.034**	0.023	0.031*	0.020	-0.054	-0.047	0.003	0.005
(active at survey)	(0.016)	(0.019)	(0.019)	(0.018)	-0.042	-0.053	-0.069	-0.096
Other development project (=1)	0.012	0.002	0.000	0.001	0.009	0.023	0.032*	0.046*
(active at survey)	(0.010)	(0.011)	(0.011)	(0.010)	-0.013	-0.016	-0.019	-0.027
Observations	23,265	17,073	11,988	6,203	14,608	10,626	7,358	3,731
R-squared	0.248	0.136	0.092	0.080	0.095	0.102	0.118	0.157
	Earns cash				Toilet facilities share			
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
BCCT project (=1)	0.044**	0.054**	0.061**	0.062	-0.008	-0.010	-0.038	-0.053
(active at survey)	(0.020)	(0.023)	(0.028)	(0.042)	(0.017)	(0.022)	(0.028)	(0.042)
Other development project (=1)	-0.005	0.005	0.004	-0.013	-0.005	0.002	-0.009	0.015
(active at survey)	(0.016)	(0.018)	(0.021)	(0.031)	(0.011)	(0.013)	(0.016)	(0.024)
Observations	8,947	7,037	5,131	2,733	22,400	16,220	11,195	5,614
R-squared	0.211	0.222	0.233	0.237	0.094	0.099	0.118	0.161
	Transport				Electricity			
	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
BCCT project (=1)	0.030*	0.049**	0.069***	0.092***	-0.011	-0.017	0.028	0.058**
(active at survey)	(0.017)	(0.020)	(0.023)	(0.030)	(0.015)	(0.019)	(0.022)	(0.025)
Other development project (=1)	0.014	-0.008	-0.013	-0.009	0.030***	0.023**	0.011	-0.023
(active at survey)	(0.010)	(0.012)	(0.014)	(0.017)	(0.010)	(0.012)	(0.013)	(0.014)
Observations	23,284	17,088	11,995	6,204	23,284	17,088	11,995	6,204
R-squared	0.232	0.211	0.207	0.222	0.337	0.310	0.348	0.331

Conclusion

- This paper empirically documents how climate-induced weather shocks can generate detrimental social spillovers along existing social, economic, and cultural inequalities in developing countries
- An increase in the frequency of dry months leads to a sizeable increase in tolerance of IPV among poor women and women living in agriculture-dependent areas
- The implementation of BCCT projects in communities reliant on agriculture eliminates the adverse impact of dry shocks on women's likelihood of accepting IPV
- Taken together, our research contributes to the literature by providing a comprehensive assessment of changing climate and women's agency, as well as effective ways to mitigate the climate-IPV relationship.

Ongoing and Future Research: Domestic/North American work

- Agricultural land use and productivity under climate and environmental change
  - Industry-specific impacts: field crops, dairy products
  - New opportunities: agri-voltaics; payment for ecosystem services

Ongoing and Future Research: Domestic/North American work

- Agricultural land use and productivity under climate and environmental change
  - Industry-specific impacts: field crops, dairy products
  - New opportunities: agri-voltaics; payment for ecosystem services
- Environmental pollution and ecosystem services
  - Valuing lake water quality and species (Weng et al., 2025, under review at JEEM)
  - Social impacts of forever chemicals (PFAS): impacts on educational outcomes (target journal: Journal of Human Resources); impacts on the housing market (target journal: JEEM)

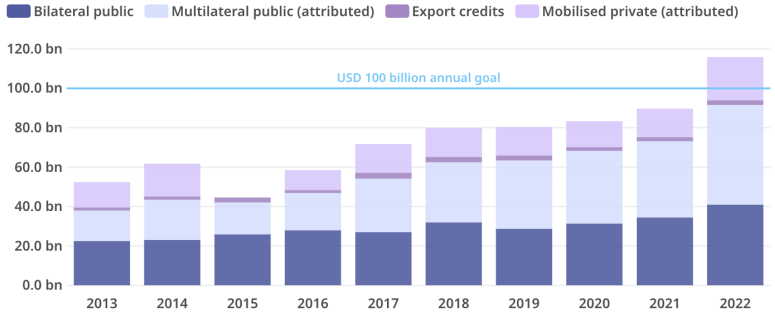
Ongoing and Future Research: International work

- Climate Change: Social-Ecological System Resilience & Human Well-being
  - Mangrove ecosystems in Indonesia: on mental health and cognitive outcomes (target journal: JDE/JEEM); on promoting conservation and restoration (grant proposal submitted for pilot study)
  - Saltwater intrusion and community wellbeing in Bangladesh (grant proposal submitted for RCT)

Appendix: Climate Finance Trends

Climate finance for developing countries

Amounts provided and mobilised by developed countries, billion USD



The gap in the private finance series in 2015 is due to the implementation of enhanced measurement methodologies. As a result, private flows for 2016-22 cannot be directly compared with private flows for 2013-14.
Source: OECD (2024), Climate Finance Provided and Mobilised by Developed Countries in 2013-2022.

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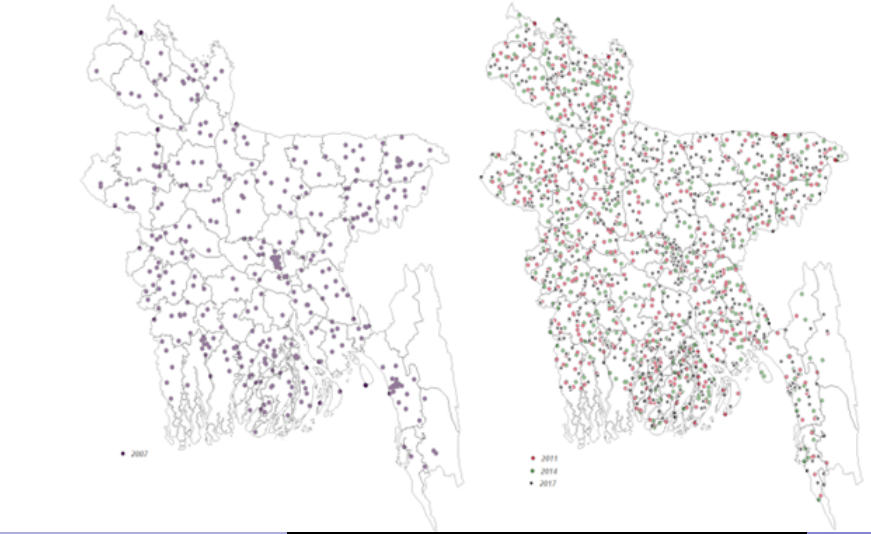
Location of BDHS Clusters



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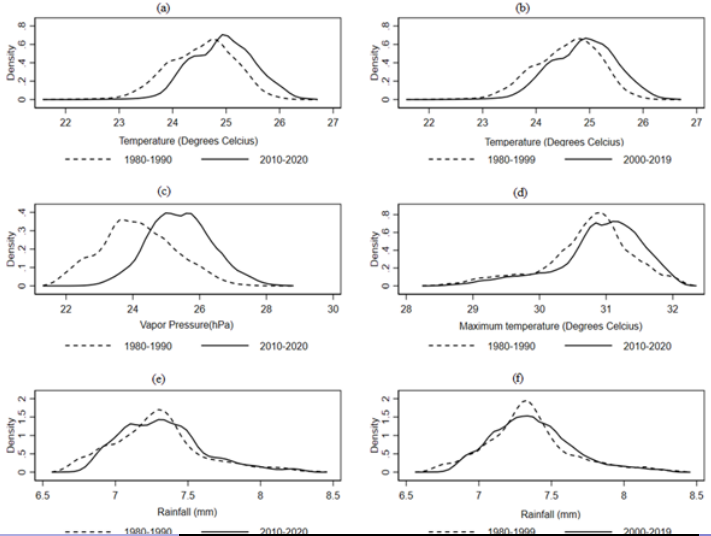
Kernel densities, 1980-2020



Summary Statistics

Table 1: Summary statistics of selected variables

	Mean	Standard Deviation
Panel A: Empowerment indicators		
Attitudes towards DV	0.268	0.443
(=1 if agrees with at least one reason)		
Participates in no decision	0.168	0.374
Decision index	0.671	0.392
Freedom of movement	0.670	0.470
Control over own earnings	0.576	0.494
Panel B: Experience of domestic violence (DHS 2007 only)		
Physical	0.190	0.392
Sexual	0.107	0.309
Physical and/or sexual	0.240	0.427
Physical and sexual	0.057	0.231
Panel C: Weather-related variables		
Number of dry months	5.670	2.495
Number of wet months	4.420	1.734
Panel D: Women and household characteristics		
Respondent's current age	31.193	9.030
Husband's age	40.091	11.133
Rural (=1 if in rural area)	0.723	0.448
Women's education:		
Primary	0.307	0.461
Secondary	0.374	0.484
Tertiary	0.093	0.291
Husband's education:		
Primary	0.297	0.457
Secondary	0.288	0.453
Tertiary	0.142	0.349

Other results: Agency indicators

Table A6: The effects of climate shocks on other agency indicators

Sample restricted to: Agricultural households in the lowest quintile

	Dependent variable:			
	No participation in decision-making (1)	Decision-making index (2)	freedom of movement (3)	control over earnings (4)
Panel A (Agricultural households)				
Number of dry months (past 3 years)	0.018*	-0.014*	0.001	-0.023**
(below 1 SD of historical average rainfall)	(0.010)	(0.008)	(0.012)	(0.009)
Number of wet months (past 3 years)	0.014	-0.004	-0.020	-0.008
(above 1 SD of historical average rainfall)	(0.013)	(0.006)	(0.013)	(0.009)
Number of hot months (past 3 years)	0.027**	-0.007	0.019	-0.003
(above 1 SD of historical average temperature)	(0.013)	(0.006)	(0.012)	(0.007)
Observations	999	2,863	1,000	2,371
R-squared	0.162	0.121	0.203	0.095
Panel B (Women employed in agriculture)				
Number of dry months (past 3 years)	0.034***	-0.017**	0.018	-0.019*
(below 1 SD of historical average rainfall)	(0.013)	(0.008)	(0.014)	(0.010)
Number of wet months (past 3 years)	0.004	-0.001	-0.003	-0.004
(above 1 SD of historical average rainfall)	(0.018)	(0.007)	(0.014)	(0.010)
Number of hot months (past 3 years)	0.038**	-0.005	0.020	-0.006
(above 1 SD of historical average temperature)	(0.019)	(0.006)	(0.014)	(0.007)
Observations	735	2,514	736	2,060
R-squared	0.194	0.134	0.250	0.102

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Climate shocks and attitudes towards IPV: Heterogeneous effects

Dependent Variable: Justifies IPV for at least one reason						
	Sample restricted to: lowest quintile					
	Residence		Literacy		Prosperity	
	Rural	Urban	Literate	Illiterate	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Number of dry months (past 3 years)	0.019**	-0.011	0.016	0.018**	0.013	0.022***
(below 1 SD of historical average rainfall)	(0.008)	(0.032)	(0.012)	(0.008)	(0.014)	(0.008)
Number of wet months (past 3 years)	-0.002	-0.026	0.006	-0.004	-0.002	0.002
(above 1 SD of historical average rainfall)	(0.008)	(0.033)	(0.010)	(0.011)	(0.011)	(0.012)
Number of hot months (past 3 years)	-0.004	0.016	-0.006	-0.009	-0.006	-0.005
(above 1 SD of historical average temperature)	(0.006)	(0.036)	(0.008)	(0.008)	(0.014)	(0.008)
Observations	7,316	1,308	3,958	4,677	4,337	4,309
R-squared	0.160	0.281	0.205	0.181	0.171	0.159
Individual and household controls	✓	✓	✓	✓	✓	✓
Weather controls	✓	✓	✓	✓	✓	✓
District x Month of survey FE	✓	✓	✓	✓	✓	✓
District x Year of survey FE	✓	✓	✓	✓	✓	✓

Table A4: The effects of climate shocks, by cohort, on women's attitudes towards IPV

	Dependent Variable: Justifies IPV for at least one reason					
	Sample restricted to:					
	All	Agriculture Dependent Communities	Non Agriculture Dependent Communities	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	(1)	(2)	(3)	(4)	(5)	(6)
Number of dry months (past 3 years) (below 1 SD of historical average rainfall)	0.001	0.005	-0.009	-0.015	-0.031	-0.068**
	(0.014)	(0.019)	(0.022)	(0.018)	(0.020)	(0.031)
No. of dry months x birth cohort 1960s	0.002	-0.001	0.005	0.022	0.033	0.080**
	(0.014)	(0.020)	(0.021)	(0.018)	(0.020)	(0.031)
No. of dry months x birth cohort 1970s	0.005	0.006	0.001	0.022	0.041**	0.077**
	(0.013)	(0.019)	(0.021)	(0.017)	(0.020)	(0.030)
No. of dry months x birth cohort 1980s	0.005	0.004	0.003	0.024	0.044**	0.093***
	(0.013)	(0.019)	(0.021)	(0.017)	(0.020)	(0.030)
No. of dry months x birth cohort 1990s	0.004	0.006	-0.001	0.026	0.046**	0.082***
	(0.013)	(0.019)	(0.020)	(0.017)	(0.020)	(0.030)
Total effect for birth cohort 1960s	0.003	0.005	-0.005	0.008	0.002	0.012
p-value	[0.615]	[0.469]	[0.626]	[0.203]	[0.732]	[0.225]
Total effect for birth cohort 1970s	0.006	0.011**	-0.009	0.006	0.010	0.009
p-value	[0.233]	[0.036]	[0.311]	[0.171]	[0.100]	[0.252]
Total effect for birth cohort 1980s	0.005	0.009*	-0.007	0.010**	0.013**	0.025***
p-value	[0.233]	[0.076]	[0.440]	[0.043]	[0.020]	[0.002]
Total effect for birth cohort 1990s	0.004	0.012**	-0.010	0.011**	0.015**	0.015
p-value	[0.350]	[0.043]	[0.236]	[0.025]	[0.019]	[0.113]
Observations	27,085	17,703	8,657	27,085	17,703	8,657
R-squared	0.113	0.132	0.159	0.113	0.132	0.159
Cohort FE	✓	✓	✓	✓	✓	✓
Number of wet months x cohort	✓	✓	✓	✓	✓	✓
Number of hot months x cohort	✓	✓	✓	✓	✓	✓

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The heterogeneous effects of climate shocks in agriculture

	Dependent Variable: Justifies IPV for at least one reason			
	Sample restricted to:			
	All (1)	Three lowest quintiles (2)	Two lowest quintiles (3)	Lowest quintile (4)
Panel A: Sample restricted to >= median employment share in agriculture				
Number of dry months (past 3 years)	0.010**	0.010*	0.014**	0.031***
(below 1 SD of historical average rainfall)	(0.005)	(0.005)	(0.007)	(0.010)
Observations	23,108	12,971	8,521	4,165
R-squared	0.118	0.116	0.132	0.164
Panel B: Sample restricted to < median employment share in agriculture				
Number of dry months (past 3 years)	-0.008	0.005	0.007	0.010
(below 1 SD of historical average rainfall)	(0.008)	(0.010)	(0.011)	(0.013)
Observations	22,608	12,966	8,444	4,132
R-squared	0.120	0.133	0.165	0.195
Panel C: Considering climate vulnerability indices				
Number of dry months (past 3 years)	0.004	0.007	0.009	0.013*
(below 1 SD of historical average rainfall)	(0.004)	(0.005)	(0.006)	(0.008)
Agricultural vulnerability index (upper quartile)	-0.010	-0.056**	-0.051	-0.054
	(0.024)	(0.028)	(0.032)	(0.041)
Number of dry months x agricultural vul. index	0.004	0.008*	0.008*	0.011*
	(0.003)	(0.004)	(0.005)	(0.006)
Total effect for upper quartile vulnerability	0.008	0.015	0.017	0.024
F-statistic	2.25	8.12	7.20	8.60
p-value	[0.134]	[0.004]	[0.007]	[0.003]

The effects of climate shocks: Robustness checks

	Dependent Variable: Justifies IPV for at least one reason					
	Sample restricted to:					
	All	Agriculture Dependent Communities	Non-Agriculture Dependent Communities	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Number of dry months (in logs)	0.028	0.064**	-0.087	0.048*	0.068**	0.115***
	(0.025)	(0.027)	(0.053)	(0.027)	(0.031)	(0.039)
Observations	47,885	23,108	22,608	27,085	17,703	8,657
R-squared	0.110	0.118	0.120	0.112	0.131	0.157
Panel B						
Number of dry months	0.018**	0.033***	-0.014	0.020**	0.024**	0.038***
	(0.008)	(0.009)	(0.016)	(0.009)	(0.009)	(0.014)
Years lived in same residence	0.001	0.001	0.000	0.001*	0.001	0.002*
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	17,214	8,461	7,970	9,856	6,534	3,253
R-squared	0.099	0.114	0.113	0.103	0.124	0.144
Panel C						
Number of dry months (second quartile)	0.035**	0.027*	-0.015	0.049***	0.045**	0.065**
	(0.015)	(0.015)	(0.024)	(0.015)	(0.018)	(0.025)
Number of dry months (third quartile)	0.033	0.053**	-0.025	0.048**	0.044*	0.103***
	(0.022)	(0.025)	(0.033)	(0.022)	(0.024)	(0.035)
Number of dry months (fourth quartile)	0.034	0.059**	-0.035	0.059**	0.072**	0.126***
	(0.028)	(0.029)	(0.046)	(0.026)	(0.033)	(0.046)
Observations	47,885	23,108	22,608	27,085	17,703	8,657
R-squared	0.111	0.118	0.120	0.113	0.131	0.157

The effects of climate shocks: Additional weather controls

	Dependent Variable: Justifies IPV for at least one reason					
	Sample restricted to:					
	All	Agriculture-Dependent Communities	Non-Agriculture-Dependent Communities	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	(1)	(2)	(3)	(4)	(5)	(6)
Number of dry months (past 3 years) (below 1 SD of historical average rainfall)	0.005	0.010**	-0.008	0.009**	0.011**	0.016**
	(0.004)	(0.005)	(0.008)	(0.004)	(0.005)	(0.007)
Number of wet months (past 3 years) (above 1 SD of historical average rainfall)	-0.004	-0.002	0.002	-0.007	-0.004	0.000
	(0.004)	(0.005)	(0.011)	(0.005)	(0.006)	(0.008)
Number of hot months (past 3 years) (above 1 SD of historical average temperature)	-0.002	-0.008*	-0.002	-0.004	-0.007	-0.009
	(0.003)	(0.004)	(0.005)	(0.004)	(0.005)	(0.007)
Solar radiation (past 3 years)	0.000	-0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wind speed (past 3 years)	0.028	-0.068	0.045	0.009	0.006	-0.030
	(0.036)	(0.042)	(0.069)	(0.040)	(0.044)	(0.050)
Vapor pressure (past 3 years)	-0.047**	-0.005	-0.053	-0.045*	-0.042	0.015
	(0.023)	(0.026)	(0.057)	(0.025)	(0.026)	(0.032)
Observations	47,885	23,108	22,608	27,085	17,703	8,657
R-squared	0.111	0.118	0.120	0.113	0.131	0.157

The effects of climate shocks on tolerance of IPV in agriculture

Dependent Variable: Justifies IPV for at least one reason

		Sample restricted to:		
	All	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	(1)	(2)	(3)	(4)
Panel A: Sample restricted to agricultural households				
Number of dry months (past 3 years)	0.016***	0.014**	0.019***	0.028***
(below 1 SD of historical average rainfall)	(0.006)	(0.006)	(0.007)	(0.010)
Observations	12,864	10,517	7,557	3,902
R-squared	0.127	0.132	0.154	0.198
Panel B: Sample restricted to other households				
Number of dry months (past 3 years)	-0.001	0.005	0.005	0.005
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.008)	(0.011)
Observations	34,435	16,293	9,970	4,637
R-squared	0.115	0.124	0.151	0.195
Panel C: Sample restricted to agricultural households and women are employed				
Number of dry months (past 3 years)	0.005	-0.001	0.001	0.034*
(below 1 SD of historical average rainfall)	(0.009)	(0.010)	(0.012)	(0.018)
Observations	4,698	3,991	2,941	1,543
R-squared	0.158	0.166	0.194	0.240
Panel D: Sample restricted to agricultural households and women are not employed				
Number of dry months (past 3 years)	0.018**	0.020***	0.026***	0.032**
(below 1 SD of historical average rainfall)	(0.007)	(0.008)	(0.010)	(0.016)
Observations	8,112	6,470	4,542	2,279
R-squared	0.142	0.151	0.174	0.220

Table A3: Climate shocks and attitudes towards IPV: Heterogeneous effects

Dependent Variable: Justifies IPV for at least one reason						
	Sample restricted to: lowest quintile					
	Residence		Literacy		Prosperity	
	Rural	Urban	Literate	Illiterate	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Number of dry months (past 3 years)	0.019**	-0.011	0.016	0.018**	0.013	0.022***
(below 1 SD of historical average rainfall)	(0.008)	(0.032)	(0.012)	(0.008)	(0.014)	(0.008)
Number of wet months (past 3 years)	-0.002	-0.026	0.006	-0.004	-0.002	0.002
(above 1 SD of historical average rainfall)	(0.008)	(0.033)	(0.010)	(0.011)	(0.011)	(0.012)
Number of hot months (past 3 years)	-0.004	0.016	-0.006	-0.009	-0.006	-0.005
(above 1 SD of historical average temperature)	(0.006)	(0.036)	(0.008)	(0.008)	(0.014)	(0.008)
Observations	7,316	1,308	3,958	4,677	4,337	4,309
R-squared	0.160	0.281	0.205	0.181	0.171	0.159
Individual and household controls	✓	✓	✓	✓	✓	✓
Weather controls	✓	✓	✓	✓	✓	✓
District x Month of survey FE	✓	✓	✓	✓	✓	✓
District x Year of survey FE	✓	✓	✓	✓	✓	✓

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Summary statistics for sub-districts with and without BCCT projects

	Non-BCCT		BCCT		
	Mean (1)	Std. Dev (2)	Mean (3)	Std. Dev (4)	Difference (5)
Social, economic, and geographic covariates					
Nightlight (in logs)	1.527	1.235	1.216	0.681	0.311***
NDVI (in logs)	8.448	0.175	8.461	0.212	-0.013
Ground slope	0.347	0.762	0.223	0.244	0.124**
Elevation	21.657	32.903	15.157	14.124	6.500**
Population density	7.287	1.345	6.964	0.482	0.323***
Distance to coast (km)	163.650	112.120	136.517	118.178	27.133*
Distance to roads (km)	2.290	2.138	2.413	2.392	-0.122
Travel time to cities (mins)	101.166	75.717	130.702	95.187	-29.536**
PM 2.5	39.571	6.229	38.021	5.995	1.549**
Share of employment in agriculture	53.838	26.200	54.857	17.799	-1.019
Share of employment in manufacturing	11.232	10.213	10.492	8.268	0.741
Share of employment in services	34.931	19.415	34.652	14.046	0.279
Households with access to electricity (%)	53.293	25.536	52.639	20.346	0.654
Population aged 15 to 64 years (%)	60.719	5.908	59.464	3.916	1.256**
Households with no access to toilet (%)	8.276	9.903	7.001	7.923	1.275
Climate change vulnerability indices					
Population affected by natural disasters	0.464	0.092	0.511	0.091	-0.048***
Heat stress	0.382	0.061	0.382	0.062	0.000
Land availability for livestock	0.364	0.048	0.382	0.047	-0.018***
Water availability	0.573	0.063	0.544	0.077	0.029***
Crop yield availability	0.532	0.046	0.529	0.048	0.003
Decrease in livestock & poultry health	0.647	0.041	0.631	0.046	0.016***
Land availability for agriculture	0.557	0.113	0.572	0.094	-0.015
Change in fish culture	0.250	0.100	0.297	0.084	-0.047***
Change in fish capture	0.290	0.108	0.331	0.093	-0.041***
Rail network vulnerability	0.335	0.127	0.365	0.113	-0.030*
Road network vulnerability	0.352	0.081	0.389	0.060	-0.037***

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Table A6: Climate shocks, attitudes towards IPV and BCCT projects

	Dependent Variable: Justifies IPV for at least one reason					
	Sample restricted to:					
	All	Agriculture-Dependent Communities	Non-Agriculture-Dependent Communities	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	(1)	(2)	(3)	(4)	(5)	(6)
Number of dry months (past 3 years) (below 1 SD of historical average rainfall)	0.005	0.011**	-0.009	0.009*	0.011**	0.017**
	(0.004)	(0.005)	(0.008)	(0.005)	(0.006)	(0.007)
BCCT project (active before survey)	-0.008	0.062*	-0.061	-0.019	-0.012	-0.014
	(0.028)	(0.036)	(0.065)	(0.035)	(0.041)	(0.057)
Number of dry months x BCCT project	-0.002	-0.018**	0.017	-0.001	-0.002	-0.005
	(0.005)	(0.008)	(0.015)	(0.006)	(0.008)	(0.011)
Observations	47,885	23,108	22,608	27,085	17,703	8,657
R-squared	0.111	0.118	0.120	0.113	0.131	0.157

Climate shocks, attitudes towards IPV and BCCT projects

Dependent Variable: Justifies IPV for at least one reason						
				Sample restricted to: lowest quintile		
	respondent works in agriculture	resp. or husband in agriculture	husband in agric. and resp. works in any sector	respondent works in agriculture	resp. or husband in agriculture	husband in agric. and resp. works in any sector
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Number of dry months (past 3 years) (below 1 SD of historical average rainfall)	0.026*	0.022*	0.040**	0.023	0.020	0.040**
	(0.014)	(0.013)	(0.018)	(0.014)	(0.013)	(0.019)
BCCT project (active before survey)	0.135*	0.111	0.146			
	(0.070)	(0.071)	(0.113)			
Number of dry months x BCCT project	-0.046***	-0.038***	-0.042**			
	(0.013)	(0.013)	(0.020)			
Number of BCCT projects				0.052	0.034	0.121
				(0.041)	(0.047)	(0.080)
Number of dry months x num of BCCT projects				-0.022**	-0.018*	-0.032*
				(0.010)	(0.010)	(0.017)
Joint test: num. of dry months + (num. of dry months x BCCT) = 0	-0.021	-0.016	-0.002	0.001	0.003	0.001
F-statistic	1.560	0.960	0.010	0.000	0.030	0.170
p-value	[0.212]	[0.328]	[0.937]	[0.952]	[0.859]	[0.677]
Observations	2,470	2,800	1,543	2,470	2,800	1,543
R-squared	0.194	0.199	0.241	0.193	0.198	0.241

Climate shocks, attitudes towards IPV and BCCT projects

Dependent Variable: Justifies IPV for at least one reason

	Sample restricted to: Respondents in agriculture-dependent communities		
	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	(1)	(2)	(3)
Panel A: With pre-BCCT covariates			
Number of dry months (past 3 years)	0.011**	0.012*	0.024***
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.009)
BCCT project (active before survey)	0.086**	0.045	0.110
	(0.041)	(0.045)	(0.070)
Number of dry months x BCCT project	-0.021**	-0.021**	-0.040***
	(0.009)	(0.010)	(0.014)
Observations	16,954	11,889	6,145
R-squared	0.120	0.136	0.161
Panel B: Only projects still active			
Number of dry months (past 3 years)	0.010*	0.010*	0.021**
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.008)
BCCT project (active at survey)	0.067	0.025	0.054
	(0.041)	(0.048)	(0.074)
Number of dry months x BCCT project	-0.020**	-0.021**	-0.033**
	(0.008)	(0.010)	(0.014)
Observations	16,954	11,889	6,145
R-squared	0.118	0.134	0.159
Panel C: No projects in survey year			
Number of dry months (past 3 years)	0.010**	0.011*	0.022***
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.008)
BCCT project (active before survey)	0.117***	0.092*	0.130
	(0.043)	(0.047)	(0.080)
Number of dry months x BCCT project	-0.027***	-0.029***	-0.043***
	(0.009)	(0.010)	(0.016)
Observations	16,954	11,889	6,145
R-squared	0.118	0.134	0.159

Climate shocks, attitudes towards IPV and BCCT projects: Nearest-neighbor matching estimator results

	Dependent Variable: Justifies IPV for at least one reason Sample restricted to: Respondents in agriculture-dependent communities			
	(1)	(2)	(3)	(4)
Number of dry months (past 3 years)	0.017	0.014	0.016	0.013
(below 1 SD of historical average rainfall)	(0.013)	(0.013)	(0.012)	(0.013)
BCCT project (active before survey)	-0.008	-0.020		
	(0.060)	(0.062)		
Number of dry months x BCCT project	-0.008	-0.006		
	(0.013)	(0.013)		
Inactive BCCT project (active after survey)		-0.090		
		(0.086)		
Number of dry months x inactive BCCT project		0.011		
		(0.012)		
Number of BCCT projects			0.000	-0.007
			(0.047)	(0.048)
Number of dry months x num of BCCT projects			-0.006	-0.005
			(0.011)	(0.011)
Number of inactive BCCT projects				-0.065
				(0.064)
Number of dry months x num of inactive projects				0.008
				(0.009)
Observations	4802	4802	4802	4802
R-squared	0.189	0.190	0.189	0.190

BCCRF's projects

Projects	Objectives	Achievements (end of reporting period, 2016)	Achievements in 2012
(1) The Emergency 2007 Cyclone Recovery and Restoration Project (ECRRP)	Improve climate resilience of coastal populations to tropical cyclones	Full implementation targets met by end of 2015. Construction of 61 cyclone shelters; 11.5 km of access road.	Approved in May 2011; grant of $25 million; activities to start in 2012
(2) The BCCRF Secretariat	To improve the Ministry's capacity to manage climate change activities through a secretariat	Project completed on schedule as planned.	Establishment approved in February 2011; grant of $0.2 million in November 2011
(3) The Community Climate Change Project (CCCP)	Increase climate change resilience of selected communities by enhancing capacity	41 NGO executed projects, all completed. All targets met or exceeded; involving community-based efforts.	Allocation of $12.5 million in June 2011; grant agreement signed in early 2012
(4) The Climate Resilient Participatory Afforestation and Reforestation Project (CRPARP)	Reduce forest degradation; increase forest coverage; build long-term resilience in selected coastal and hilly communities	17,500 ha of land restored or reforested; 2000 kms of strip plantations established; 3.6 million workdays of community jobs, more than 60, 000 direct beneficiaries.	Approved in April 2011; Grant agreement of $33.8 million signed in 2012; activities to begin shortly after
(5) The Rural Electrification and Renewable Energy Development Project II (RERED II)	Increase access to clean energy in rural areas; use of renewable energy; promote more efficient energy consumption	489 solar irrigation pumps; 35, 062 acres covered, and 11,453 farmers directly impacted; met 100% of coverage target	Approved in September 2012; grant of $10 million

Source: Authors' compilation from the official BCCRF Annual Reports, 2011-2016, Washington, D.C.: World Bank Group.

Climate shocks, attitudes towards IPV and BCCT Projects (Robustness)

Dependent Variable: Justifies IPV for at least one reason			
	Sample restricted to: Respondents in agriculture-dependent communities		
	Three lowest quintiles	Two lowest quintiles	Lowest quintile
	(1)	(2)	(3)
Number of dry months (past 3 years)	0.010*	0.011*	0.022***
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.008)
BCCT project (active before survey)	0.081*	0.045	0.042
	(0.048)	(0.054)	(0.080)
Number of dry months x BCCT project	-0.024**	-0.022**	-0.029**
	(0.009)	(0.011)	(0.015)
Joint test:			
num. of dry months + (num. of dry months x BCCT) = 0	-0.013	-0.011	-0.008
F-statistic	1.88	0.95	0.25
p-value	[0.171]	[0.331]	[0.619]
Observations	16,522	11,560	5,977
R-squared	0.119	0.135	0.160

Table A10: Climate shocks, attitudes towards IPV and BCCT projects

Dependent Variable: Justifies IPV for at least one reason

	Sample restricted to: Respondents in agriculture-dependent communities		
	Three lowest quintiles (1)	Two lowest quintiles (2)	Lowest quintile (3)
Panel A: With pre-BCCT covariates			
Number of dry months (past 3 years)	0.011**	0.012*	0.024***
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.009)
BCCT project (active before survey)	0.086**	0.045	0.110
	(0.041)	(0.045)	(0.070)
Number of dry months x BCCT project	-0.021**	-0.021**	-0.040***
	(0.009)	(0.010)	(0.014)
Observations	16,954	11,889	6,145
R-squared	0.120	0.136	0.161
Panel B: Only projects still active			
Number of dry months (past 3 years)	0.010*	0.010*	0.021**
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.008)
BCCT project (active at survey)	0.067	0.025	0.054
	(0.041)	(0.048)	(0.074)
Number of dry months x BCCT project	-0.020**	-0.021**	-0.033**
	(0.008)	(0.010)	(0.014)
Observations	16,954	11,889	6,145
R-squared	0.118	0.134	0.159
Panel C: No projects started in survey year			
Number of dry months (past 3 years)	0.010**	0.011*	0.022***
(below 1 SD of historical average rainfall)	(0.005)	(0.006)	(0.008)
BCCT project (active before survey)	0.117***	0.092*	0.130
	(0.043)	(0.047)	(0.080)
Number of dry months x BCCT project	-0.027***	-0.029***	-0.043***
	(0.009)	(0.010)	(0.016)
Observations	16,954	11,889	6,145
R-squared	0.118	0.134	0.159

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জলবায়ু পরিবর্তন ট্রাস্ট ফান্ডের অর্থায়নে সমাপ্তকৃত প্রকল্পের তালিকাঃ

Serial No.	Project ID	Project Title	Implementing Agency	Approved Estimated Cost (TB)
1	2	জলবায়ু পরিবর্তনের বিরূপ প্রভাব মোকাবেলায় সারাদেশব্যাপী ব্যাপক বনায়নের লক্ষ্যে চারা উত্তোলন	Department of Forests	1,578.00
2	4	জলবায়ু পরিবর্তন মোকাবিলায় খরাপ্রবণ ও উপকূলীয়/ লবণাক্ত এলাকার জন্য টেকসই ফসল ব্যবস্থা উদ্ভাবন	Bangladesh Agricultural Research Institute (BARI)	600.00
3	5	Risk reduction and adaptive measures in the context of Climate Change impact on health sector in Bangladesh.	Health promotion and Climate Change unit, Ministry of Health and Family Welfare	1,811.66
4	6	জলবায়ু পরিবর্তন মোকাবেলায় উষ্ণতা এবং লবণাক্ত সহিষ্ণু বিভিন্ন ফসলের মিউটেন্টস/জাত বাছাই এবং চাষাবাদের পাইলটিং কর্মসূচী	Bangladesh Institute of Nuclear Agriculture (BINA)	488.00
5	7	Farm Productivity and Food security Enhancement of the Vulnerable Farmers in the Char Areas of Jamalpur and Sherpur Districts	Bangladesh Agricultural Research Institute (BARI)	107.60
6	8	খুলনা বিভাগের আইলা বিধ্বস্থ জেলাসমূহে ঘুর্ণিঝড় সহনীয় গৃহ নির্মাণ	Department of Relief and Rehabilitation	2,498.64
7	9	বরিশাল বিভাগের আইলা বিধ্বস্থ জেলাসমূহে ঘুর্ণিঝড় সহনীয় গৃহ নির্মাণ	Department of Relief and Rehabilitation	2,489.64
8	10	বরিশাল, খুলনা ও চট্টগ্রাম বিভাগের আইলা বিধ্বস্ত জেলাসমূহের চর এলাকায় ঘুর্ণিঝড় সহনীয় গৃহ নির্মাণ	Department of Relief and Rehabilitation	2,489.64
9	11	বুড়িগঙ্গা ও তুরাগ নদীতে সঞ্চিত পলিথিনসহ অন্যান্য বর্জ্য অপসারণ	Bangladesh Inland Water Development Authority	2,243.00
10	12	বাগমারা হতে (মোয়াকাটা লঞ্চঘাট, কচুয়া বাজার ও আলাজুড়ী হয়ে) দেপাড়া পর্যন্ত মরা বলেশ্বরী নদী খনন	Bangladesh Water Development Board	850.00
11	13	জলবায়ু পরিবর্তন ট্রাস্ট ফান্ডের অর্থায়নে চট্টগ্রাম জেলার রাংগুনিয়া ও বোয়ালখালী উপজেলায় পানি প্রবাহ সমস্যা সমাধান প্রকল্প	Local Government Engineering Department	500.00
12	14	চট্টগ্রাম জেলার রাঙ্গুনিয়া উপজেলাধীন কর্ণফুলী সেচ প্রকল্প (ইয়ামতি ইউনিট) এর আওতায় কর্ণফুলী নদীর বামতীরে সরঞ্জডাটা, ডানতীরে মরিয়ম নগর ও বেতাগী, এবং ইয়ামতি নদীর বামতীরে পশ্চিম শান্তি-নিকেতন ও ডানতীরে উপ্পর পার, পূর্ব সাহাইনগর-গোয়াজপাড়া ইত্যাদি ভাংগন কবলিত	Bangladesh Water Development Board	2,100.00

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Sample LLM-based classification of BCCT Projects

- Sustainable Agriculture:
  - Innovation of sustainable crop systems for drought-prone and coastal/saline areas to combat climate change
  - Farm Productivity and Food security Enhancement of the Vulnerable Farmers in the Char Areas of Jamalpur and Sherpur Districts
- Water Management:
  - Protective and infrastructure construction work in various erosion-prone parts of Karnaphuli, Halda, Ichamati rivers and Shilok canal and their branches in different upazilas of Chittagong district
  - Development of irrigation and communication systems in coastal areas of Mirsharai Upazila, Chittagong District, and upgrading of CDSP embankment in Muhuri accreted area
- Disaster Resilience:
  - Addition of brick walls and doors-windows around cyclone-resilient houses built in Aila-affected districts of Barisal and Khulna divisions

Sample LLM-based classification of BCCT Projects (Cont.)

- Renewable Energy
  - Electrification in local area (Upazila Complex) by using Solar Energy
  - Introduction of Solar Powered irrigation pump as well as Power management and Distribution system to mitigate energy Crisis and Climate Change
- Rural Livelihood Protection
  - Safe drinking water supply and social protection for women and children in adverse environments extremely threatened by climate change
  - Poverty alleviation and ensuring livelihood security through environmental conservation and management
- Urban Infrastructure:
  - Construction of RCC primary drain and installation of solar-powered street lights with poles in Hathazari municipal area to address climate change impacts.
  - Infrastructural development project in Nalchiti Pourashava to address climate change impacts.

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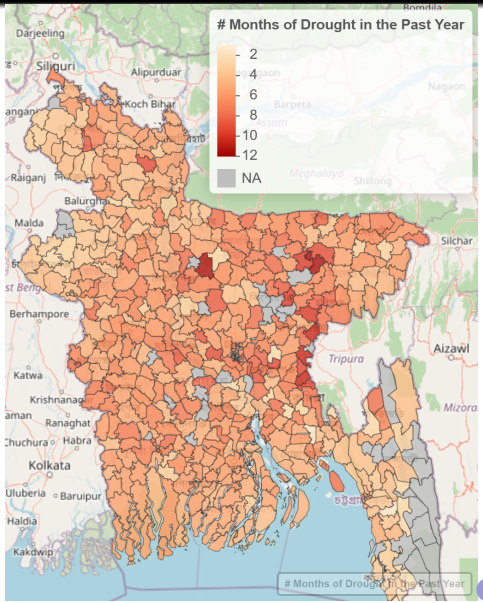
Months of Drought in the Past Year
2
4
6
8
10
12
NA
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Siliguri
Alipurduar
Koch Bihar
Raiganj
Balurghat
Malda
Berhampore
Katwa
Krishnanagar
Ranaghat
Chuchura
Habra
Kolkata
Uluberia
Baruipur
Haldia
Kakdwip
Barpeta
Nagaon
Meghalaya
Shillong
Silchar
Tripura
Aizawl
Mizora
Months of Drought in the Past Year

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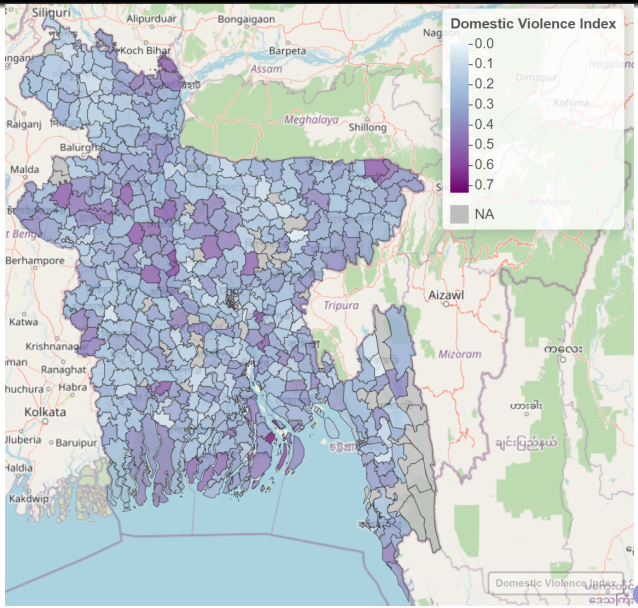
Domestic Violence Index
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0.2
0.3
0.4
0.5
0.6
0.7
NA
Siliguri
Alipurduar
Bongaigaon
Koch Bihar
Barpeta
Assam
Meghalaya
Shillong
Raiganj
Balurghat
Malda
Berhampore
Katwa
Krishnanagar
Ranaghat
Habra
Kolkata
Baruipur
Kakdwip
Tripura
Aizawl
Mizoram
Dimapur
Kohima
Manipur
Domestic Violence Index

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