The 1970 Bhola Cyclone and the Birth of Bangladesh

Sultan Mehmood Mushfiq Mobarak

The New Economic School, Moscow

Yale University

November 15, 2024

The 1970 Bhola Cyclone and the Birth of Bangladesh

Sultan Mehmood
The New Economic School

Mushfiq Mobarak*
Yale University

December 9, 2024

Abstract

The November 1970 Bhola cyclone in East Pakistan, with a death toll of 300,000–500,000, remains the deadliest cyclone ever recorded. We combine satellite data from a NASA mission operational briefly in 1970 with newly digitized archival records of subdistrict-level voting behavior in the December 1970 Pakistan general election, cyclone relief provision, and conflict activities during the 1971 Bangladesh War of Independence. By linking spatial variation in storm intensity to these political and conflict outcomes, we document how the cyclone's devastation—and the stark inadequacy of the Pakistani government's response—shifted electoral support toward the independence movement, ultimately leading to the creation of Bangladesh. Our analysis highlights the intersection of environmental shocks and state capacity in shaping pivotal moments of political change. We find heightened political activism and support for the separatist Awami League in cyclone-affected areas in elections held one month after the cyclone, especially in the subset of those districts where the government failed to provide relief. Pakistan's government reacted to those election results by postponing the convening of the National Assembly and commenced military operations in March 1971. We show that those same cyclone-affected districts are disproportionately represented in an archived list of birthplaces of Bangladeshi "Insurgents" who fought in the ensuing Liberation War. Strikingly, the cyclone-affected regions are also over-represented in the birthplaces of Bengali intellectuals (professors, journalists, physicians) murdered by the Pakistan army in December 1971 in retaliation. Our statistical evidence using large-sample geospatial data supports historical accounts of the role the cyclone (and the Pakistani state's indifferent response to it) played in the formation of Bangladesh. Events like large-scale natural disasters can reveal the characteristics of leadership by giving citizens an opportunity to observe their response. In this case, it appears to have accentuated a movement that had sought greater economic and political autonomy for East Pakistan. The heightened sense of loss and betrayal crystallized into greater participation in political protests and conflict in cyclone-affected regions. Disasters thus also create focal points that allow people to coordinate political activities. These factors catalyzed pre-existing separatist sentiments into an independence movement but also made them targets for repressive counter-measures taken by the Pakistani state. Our results outline the detailed mechanisms by which a climatic shock translates into violence and conflict, a statistical regularity observed across vast swaths of conflict data (Hsiang et al., 2013).

"The cyclone was the real reason for the final break."—Chief USAID Relief Officer, Eric Griffel

Blood (1989)

.

"Only a crisis—actual or perceived—produces real change."

Friedman (1982)

.

"Sometimes it takes a natural disaster to reveal a social disaster."

Wallis (2005)

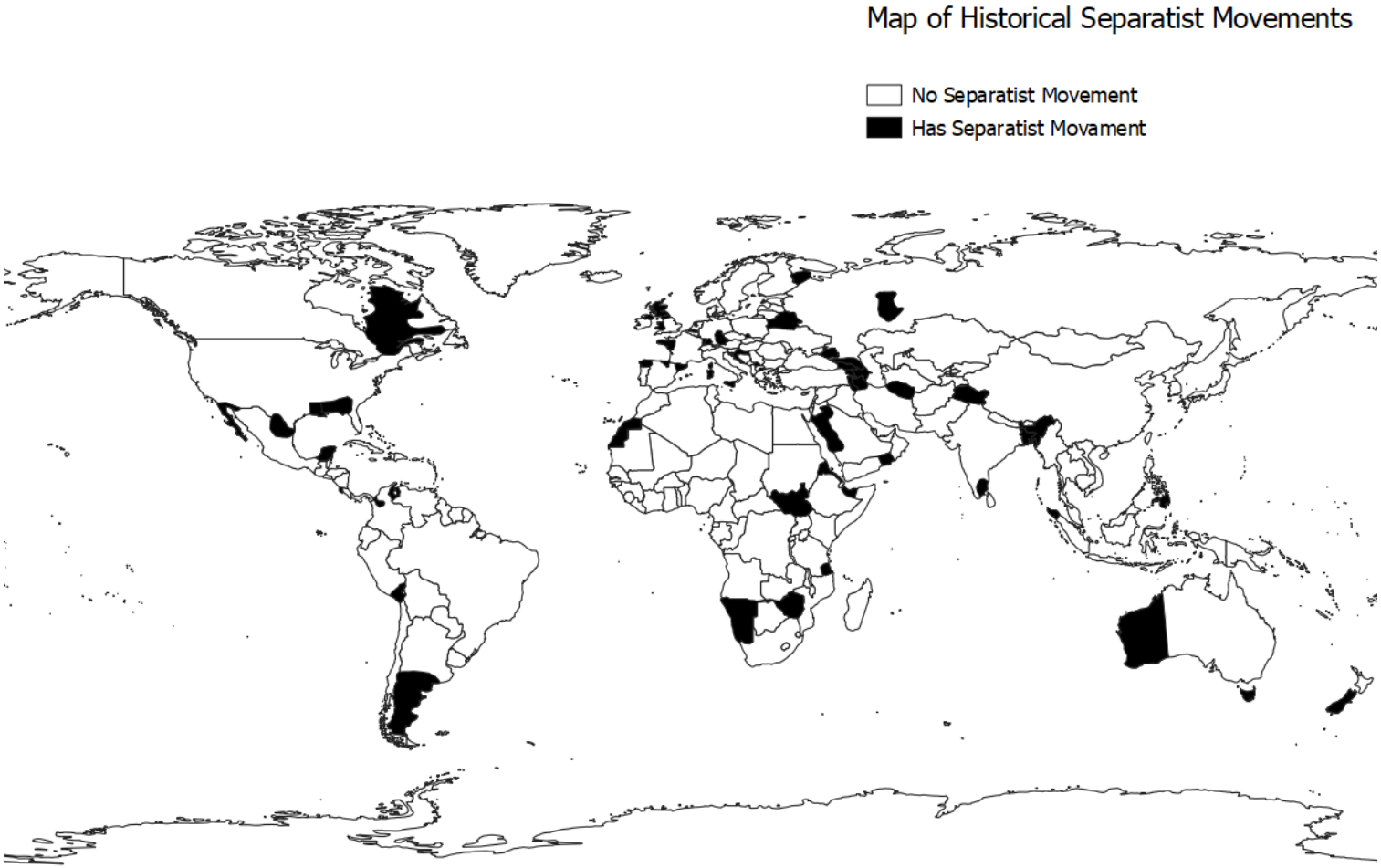
.

*We thank seminar participants at UC Berkeley, Yale School of Management, Harvard/MIT/Brown South Asia seminar, Ashutosh Varshney, Feyaad Ali, Martha Chen for their comments and feedback. Georgiy Marinichev and Aleksandra Vasileva provided excellent research assistance. We also thank Ali Bakhtawar for convincing NOAA to share their ITOS-1 satellite data.

Motivation I: When do Separatist Movements Create New Nation-States?

- Of the over 400 major revolutionary attempts in the 20^{th} century, a mere 125 succeeded in achieving their primary objectives.
- Even more exceptional, only 34 of these revolutions led to the creation of a new nation-state (Grinin and Korotayev, 2020).

Separatists Movements Around the World

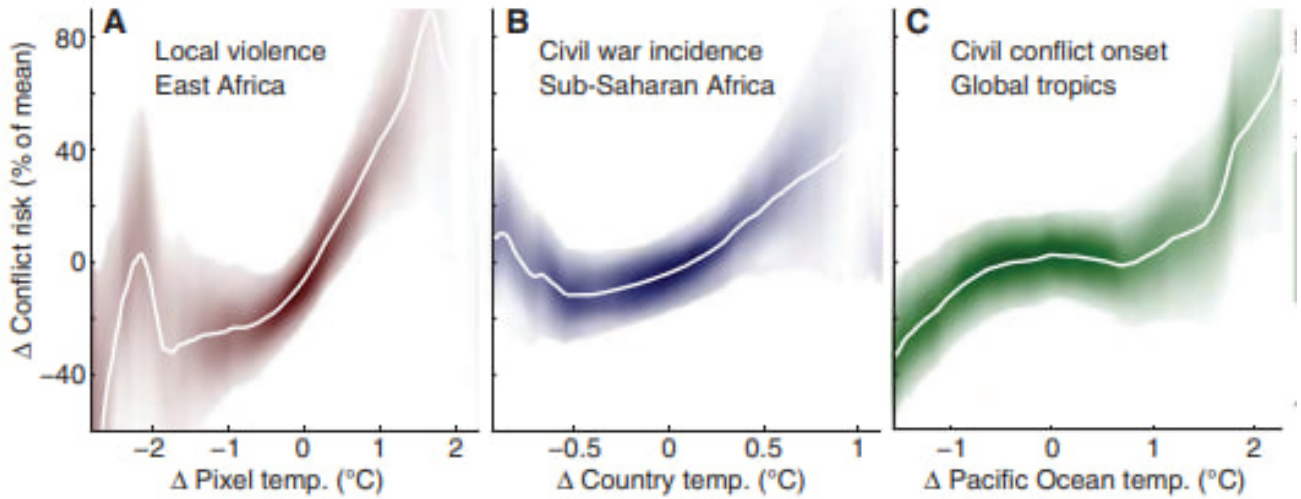


- Source: Authors' computation based on historical data

Motivation I

- Of the over 400 major revolutionary attempts in the 20th century, only 125 succeeded in achieving their primary objectives.
- Even more exceptional, only 34 of these revolutions led to the creation of a new nation-state (Grinin and Korotayev, 2020).
- One of them led to the birth of 8th most populous nation on Earth – People's Republic of Bangladesh.
- Can the success of this movement teach us about the conditions conducive to success?
- This paper:
  - A climate shock serves as a focal point to expose state failures.
  - Highlights government failures and amplifies existing grievances.
  - We assemble historical sources and conduct statistical analysis to quantify the role played by a natural disaster event.

Motivation II: Climate Shocks and Conflict



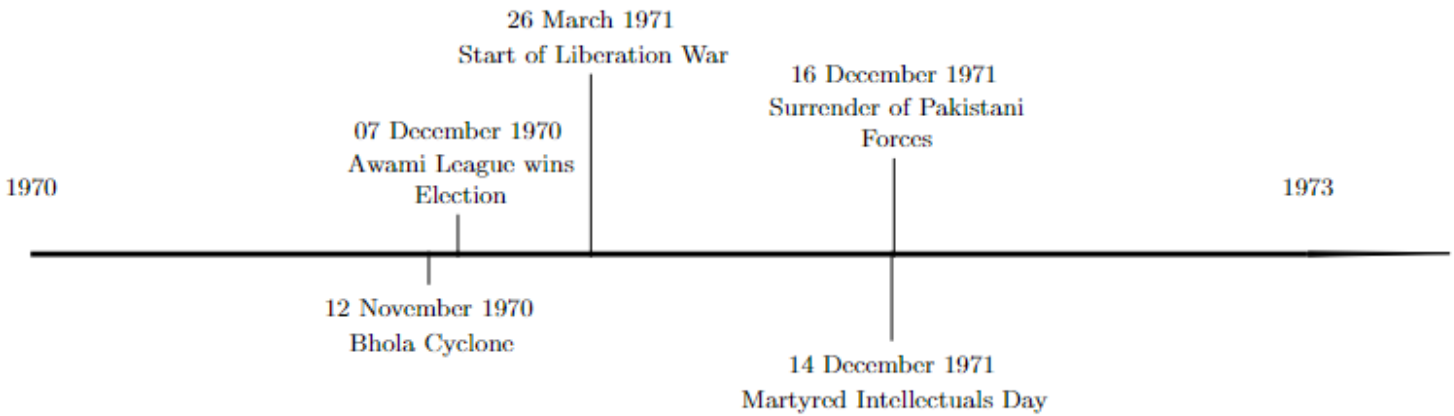
- Hsiang, Burke, Miguel (*Science* 2013):
  - Synthesis of 60 studies using 45 conflict datasets
  - Deviations from normal rainfall and temperature increase conflict risk
  - Mechanisms underlying this consistent empirical pattern?
- 1970-71 East Pakistan illuminates detailed mechanisms
  - Climate change projected to increase frequency & severity of disasters
  - The 1970 Bhola cyclone revealed the West Pakistan government's callous response towards Bengalis. Created a focal point for anger.

Context


0
1500
km
Islamabad
Afghanistan
China
Jammu and Kashmir
Lahore
Himachal Pradesh
Panjab
West Pakistan
Uttaranchal
Haryana
New Delhi
Nepal
Bhutan
Arunachal Pradesh
Uttar Pradesh
Assam
Rajasthan
Bihar
Nagaland
Meghalaya
Karachi
India
Manipur
Dhaka
Jharkhand
West Bengal
Mizoram
Gujarat
Madhya Pradesh
Calcutta
Chhattisgarh
Burma
Maharashtra
Orissa
Bombay/ Mumbai
East Pakistan/ Bangladesh
Andhra Pradesh
ARABIAN SEA
Goa
Karnataka
Bangalore
BAY OF BENGAL
Tamil Nadu
Lakshadweep
Andaman and Nicobar
Kerala
Sri Lanka
N

History of the Independence Movement

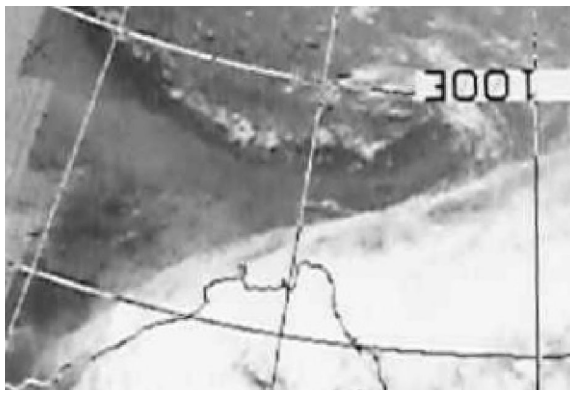
- 21 February, 1952: Bengali Language Movement
- 1950-1970: East Pakistan
  - Constituted 65% of the population
  - Earned foreign exchange from jute exports
  - Received only 29% of government budget[1]
- 1954 East Pakistan Legislative Assembly Elections: UF wins landslide
- 1966: Six-Point Movement: Administrative Decentralization, local tax collection, separate currencies, separate military

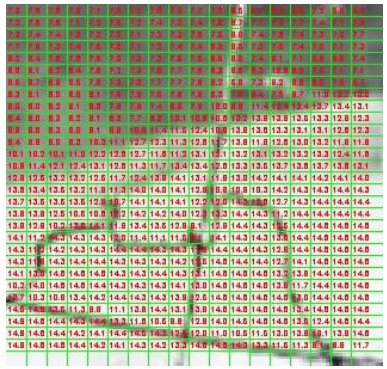


[1] Planning Commission of Pakistan 4th Five-Year Plan

Measuring Bhola Cyclone Intensity

- ITOS-1 satellite
  - Launched Jan 1970 into geosynchronous orbit: continuous monitoring
  - Sent infrared and visual observations of cloud cover to NHC
  - DoD priority during Cold War. Satellite to "predict brewing conflicts"
  - Nov 16, 1970: tape recorder malfunctioned. Sensory systems failed.



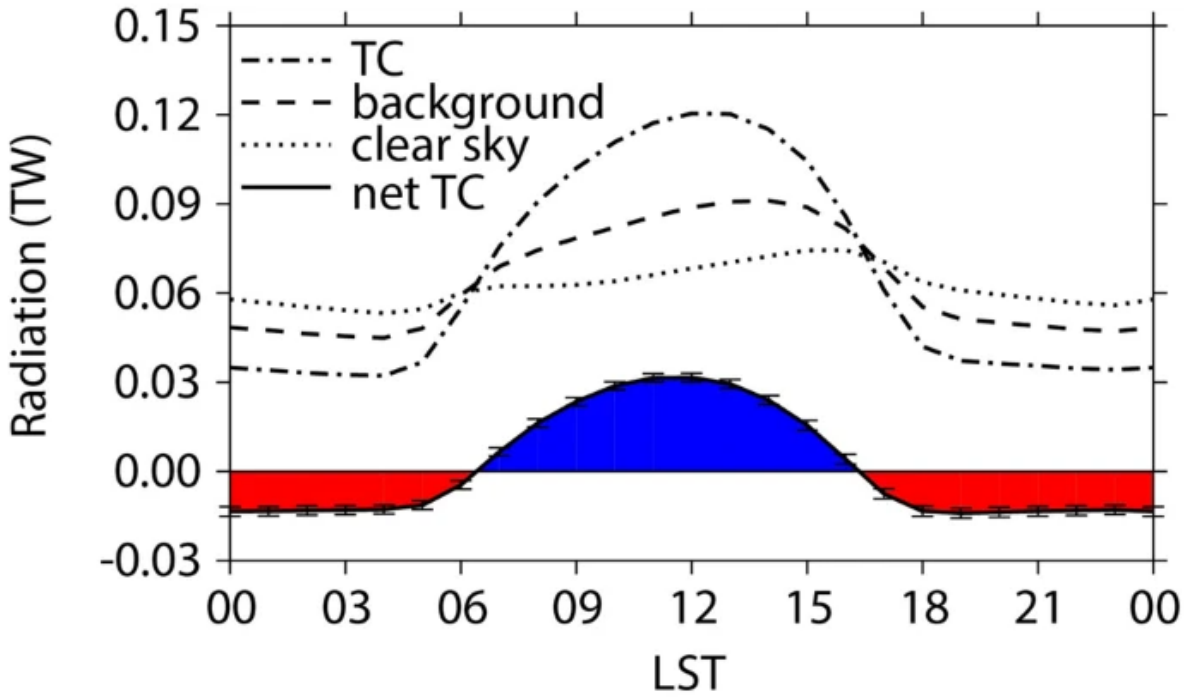


- We use special software to capture color intensity which corresponds to more severe radiation impact of the storm

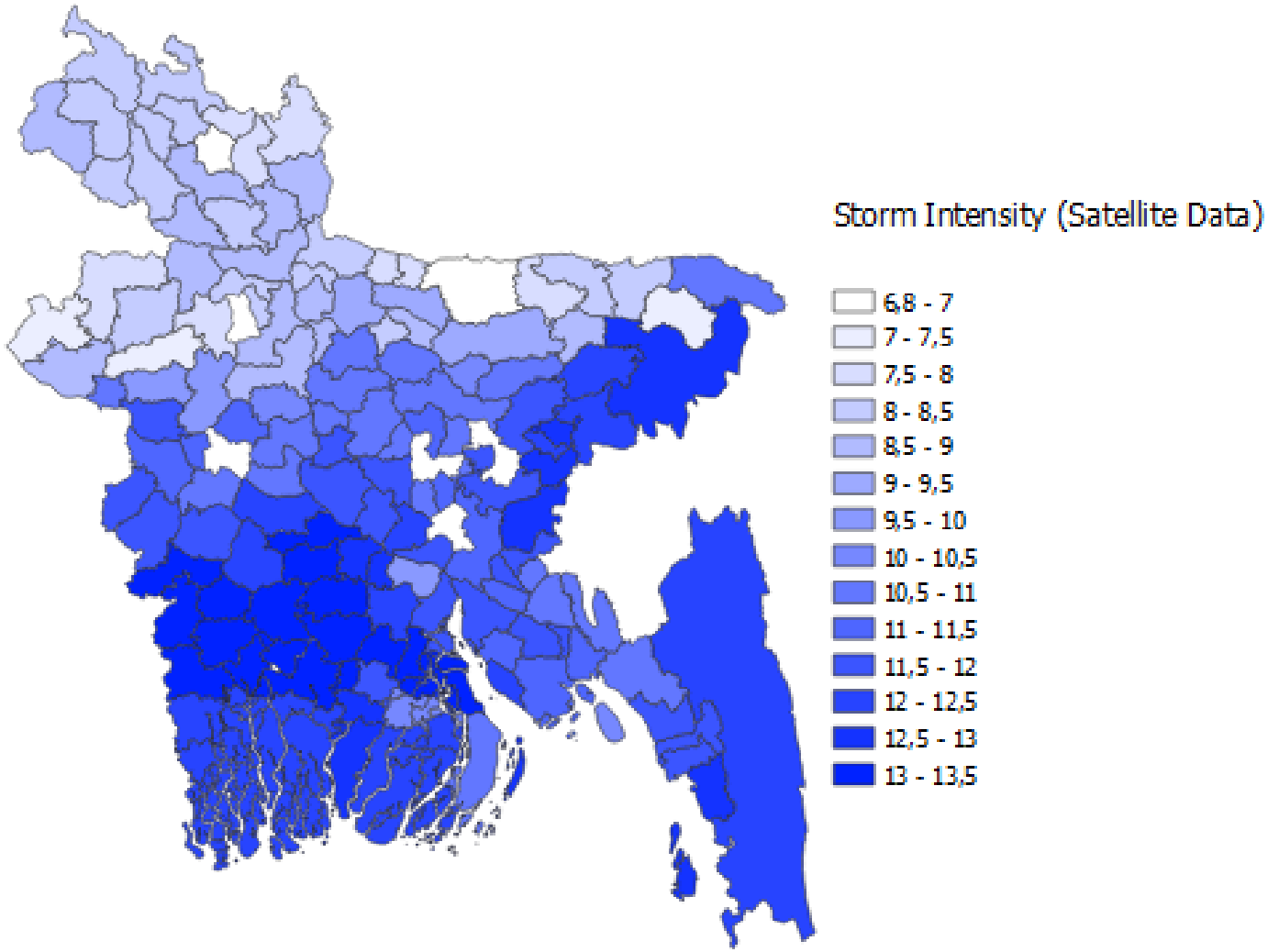
Measuring Cyclone Intensity from Outer Space

- The ITOS-1 Satellite captures the intensity of clouds.
- *Nature: Atmos. Sci* (2023) finds tropical cyclone intensity correlated with satellite-measured radiation levels linked to cloud cover.
- Idea: cyclone clouds prevent solar radiation from reaching the earth.
- Granular satellite data validated with ground weather stations measuring windspeed

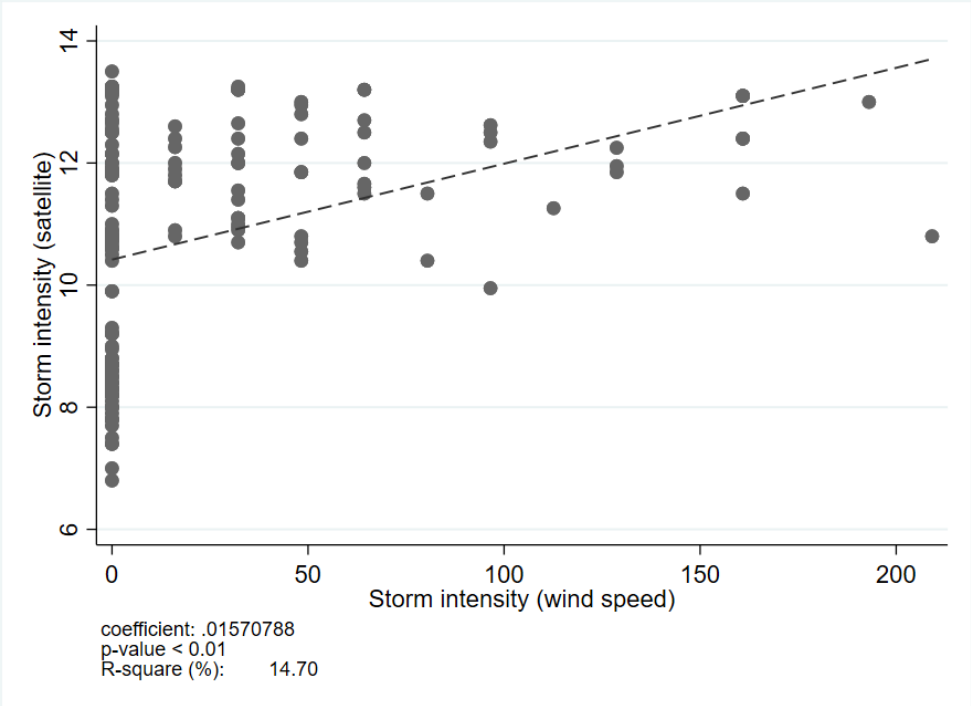
Fig. 3: Average diurnal cycle of radiation.



Storm Intensity Inferred from Satellite Data



Satellite and Wind Speed Data



- We use data from coastal weather stations to validate the inferences from satellite-based radiation measures

Cyclone Devastation

- Deadliest weather event in human history. 300,000 - 500,000 deaths.
- Many of the deaths occurred *after* the cyclone had already passed.
- Inadequate food and medicine distribution post-cyclone
- Only US$ 84.6 million in damages

Government Reactions

- Carney and Milkian, *The Vortex*, 2022

Government Reactions

- Carney and Milkian, *The Vortex*, 2022
- No cyclone warning sent despite ITOS-1 signals accessible by receiver

Government Reactions

- Carney and Milkian, *The Vortex*, 2022
- No cyclone warning sent despite ITOS-1 signals accessible by receiver
- World Bank, worried about instability, sent NHC meteorologist Neil Frank to Dacca to investigate causes of early warning system failure

Government Reactions

- Carney and Milkian, *The Vortex*, 2022
- No cyclone warning sent despite ITOS-1 signals accessible by receiver
- World Bank, worried about instability, sent NHC meteorologist Neil Frank to Dacca to investigate causes of early warning system failure
- *"Punjabi officials running East Pakistan feasted with Motor Rally drivers"* two days after cyclone instead of launching relief

Government Reactions

- Carney and Milkian, *The Vortex*, 2022
- No cyclone warning sent despite ITOS-1 signals accessible by receiver
- World Bank, worried about instability, sent NHC meteorologist Neil Frank to Dacca to investigate causes of early warning system failure
- *"Punjabi officials running East Pakistan feasted with Motor Rally drivers"* two days after cyclone instead of launching relief
- Sheikh Mujib suspended election campaign and visited delta with Awami League boat filled with rice sacks and fuel cans.

Government Reactions

- Carney and Milkian, *The Vortex*, 2022
- No cyclone warning sent despite ITOS-1 signals accessible by receiver
- World Bank, worried about instability, sent NHC meteorologist Neil Frank to Dacca to investigate causes of early warning system failure
- *"Punjabi officials running East Pakistan feasted with Motor Rally drivers"* two days after cyclone instead of launching relief
- Sheikh Mujib suspended election campaign and visited delta with Awami League boat filled with rice sacks and fuel cans.
  - *"calculated the trip might be 10 times more effective for earning votes"*

Government Reactions

- Carney and Milkian, *The Vortex*, 2022
- No cyclone warning sent despite ITOS-1 signals accessible by receiver
- World Bank, worried about instability, sent NHC meteorologist Neil Frank to Dacca to investigate causes of early warning system failure
- *"Punjabi officials running East Pakistan feasted with Motor Rally drivers"* two days after cyclone instead of launching relief
- Sheikh Mujib suspended election campaign and visited delta with Awami League boat filled with rice sacks and fuel cans.
  - *"calculated the trip might be 10 times more effective for earning votes"*
- *"On Nov 21 Candy and Marty met with senior Pakistan army officials, gatekeepers to fleets of planes and helicopters who could save tens of thousands of lives with one phone call. the officials shut the door, put on music and started dancing."*
- Yahya Khan distracted with Nixon-Mao diplomacy
- Helicopter fly-by - *"doesn't look too bad"* - avoids press conference and meeting with relief officials, and proceeds to party in Dacca.

Yahya Khan partying during the War

The Friday Times

HOME LATEST ANALYSIS EDITORIALS FEATURES CITIZENS' VOICE CLIMATE CRISIS VIDEOS FACT-CHECK

Lest We Forget: Yahya Khan Was Busy Partying As Dhaka Fell

Ahmed Naveed Features December 14, 2021

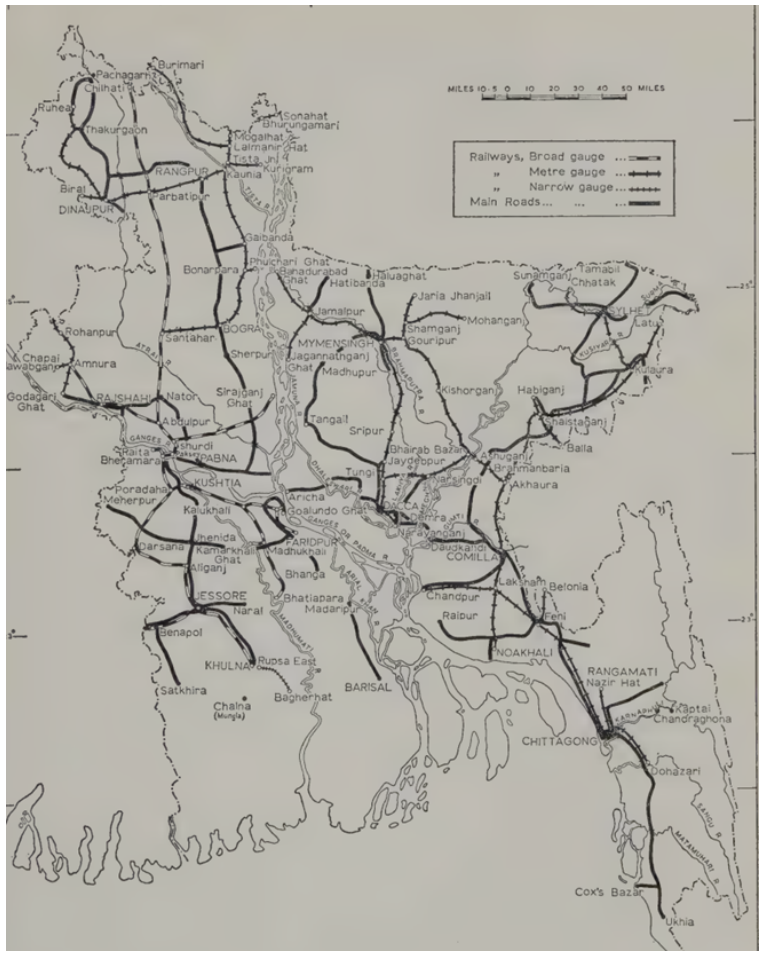
Aid Report

BANGLADESH

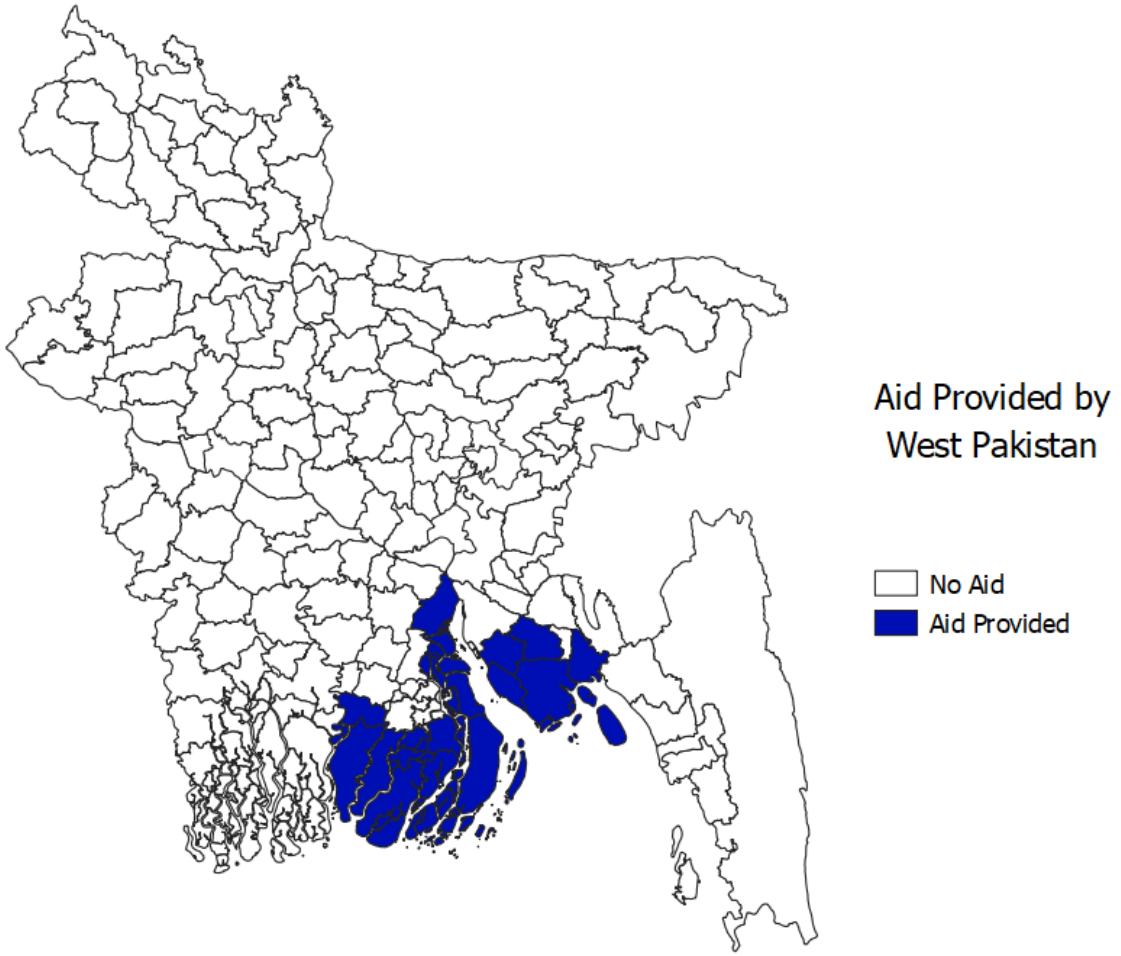
TECHNICAL NOTE ON
COASTAL AREA REHABILITATION AND CYCLONE PROTECTION PROJECT

Distribution of Tractors and Tillers in the Cyclone Affected Thanas under the Agricultural Rehabilitation Project

Districts / Thanas	Tractors Distributed	Tillers Distributed	Workshops[a/]
Barisal			
Bhola	15	65	1
Tajumuddin	15	37	1
Char Fasoon	25	20	
Lalmohan	20	20	
Daulatkhan	10	30	1
Patuakhali			
Amtali		41	1
Kalapara		84	
Patharghata		5	
Barguna		40	1
Bauphal		77	
Golachipa		35	1
Rangabali		36	
Bamna		30	
Noakhali			
Sonagazi	2		
Companiganj	3		
Shudharam	26		1
Ramgati	12		1
Total	156	544	8



Relief Work or Aid by West Pakistan



The Narrative we will Statistically Evaluate

- Pre-existing separatist sentiments in East Pakistan due to economic inequality
- The cyclone's devastation creates a focal point for political mobilization

- The Pakistani government's callous response ignited widespread outrage.
  - It revealed the *leader's type* to students (Besley and Burgess 2002)

- The Awami League's contrasting response shifted political views, expressed in elections 1 month later.

- West Pakistan government declines to relinquish political power to the Awami League, which secures a majority. Civil war commences in March 1971
  - Guerrilla warfare by "Freedom Fighters" to fight Pakistan army
  - Pakistan murders intellectuals on Dec 14, 1971 (2 days before surrender).

The Narrative we will Statistically Evaluate

- Pre-existing separatist sentiments in East Pakistan due to economic inequality
- The cyclone's devastation creates a focal point for political mobilization

- The Pakistani government's callous response ignited widespread outrage.
  - It revealed the *leader's type* to students (Besley and Burgess 2002)

- The Awami League's contrasting response shifted political views, expressed in elections 1 month later.

- West Pakistan government declines to relinquish political power to the Awami League, which secures a majority. Civil war commences in March 1971
  - Guerrilla warfare by "Freedom Fighters" to fight Pakistan army
  - Pakistan murders intellectuals on Dec 14, 1971 (2 days before surrender).

- Testable Implications of the cyclone's effects on politics and conflict:
  - Did cyclone affect voting patterns in Dec 1970 election?
  - Did relief provision mitigate the effects of the cyclone on voting?
  - Did the cyclone affect participation in warfare in 1971?
  - Were citizens of devastated areas especially politically active and become Pakistan army targets?

Summary of Main Results

- The Dec 1970 election favored Awami League everywhere in East Pakistan, but storm-hit districts show more pronounced support.
  - A 10% increase in storm intensity is associated with a 2.5 percentage point increase in the Awami League vote share (74.5% $\Rightarrow$ 77%).
  - Storm intensity weakly *increases* turnout, despite infrastructure damage.
- Relief efforts mitigated the shift towards Awami League in storm-hit areas, but aid provision was too little to have any substantive impact in favor of "incumbents".
- Storm-hit districts disproportionately represented in the birthplaces of the list of freedom fighters.
  - 10% increase in storm intensity led to about 1 more insurgent identified in this archive (5 $\Rightarrow$ 6 per district)
- Storm-hit districts disproportionately represented in the birthplaces of intellectuals murdered by Pakistan army
  - 10% increase in storm intensity associated with 25% increase in the probability of getting targeted.

Related Literature

- **Climate shocks and Conflict**
  - Theory and cross-country analysis (Dell et al., 2012; Hsiang and Jina, 2014; Burke et al., 2015)
  - ➤ **Here:** How natural disasters may create focal points that catalyze political movements?
- **Emergence of Nationhood**
  - Historical evidence of nation states being born (Tilly, 1992; Banerjee and Iyer, 2013; Michalopoulos and Papaioannou, 2016)
  - ➤ **Here:** Identify one specific detailed mechanism by which climate causes conflict, by revealing the nature of political leaders.
- **Political and Economic Grievance and Collective Action**
  - Economic shocks provoke civil conflict (Miguel et al., 2004)
  - ➤ **Here:** The role of government failure and inadequate disaster response in fueling separatist sentiments and political activism.

Roadmap

1. Background
2. Data
3. Empirical Methodology
4. Results
5. Identification
6. Alternate Explanations
7. Mechanisms
8. Conclusions
9. Appendix: Robustness Checks

The Bhola Cyclone

TIME

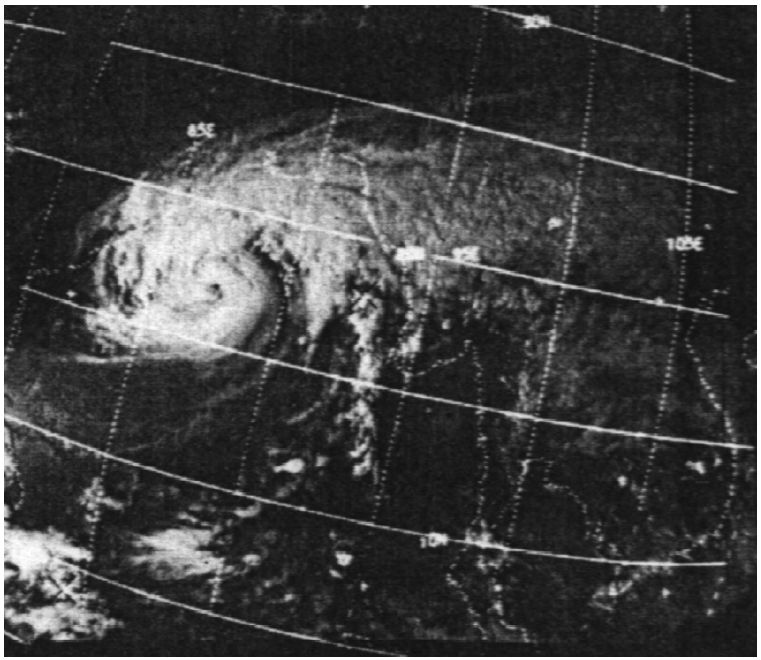
World: Pakistan: When The Demon Struck

Monday, Nov. 30, 1970

Above the howling wind and the driving rain, the villagers of Manpura Island could hear an unholy roar welling up from the Bay of Bengal. "It was pitch dark," said Abdul Jabbar last week, "but suddenly I saw a gigantic, luminous crest heading toward our village." Jabbar managed to survive the lethal 120-m.p.h. cyclone and the 20-ft. tidal wave that followed, but most of his neighbors were less fortunate. All but 5,000 of Manpura Island's 30,000 people died in the surging waters. Most of the island's cattle, sheep, goats and buffaloes were drowned, and its fishing boats were swept out to sea. Manpura is only one of scores of islands and coastal flats that found themselves in the path of the murderous storm that struck the teeming, impoverished Ganges Delta region of East Pakistan.

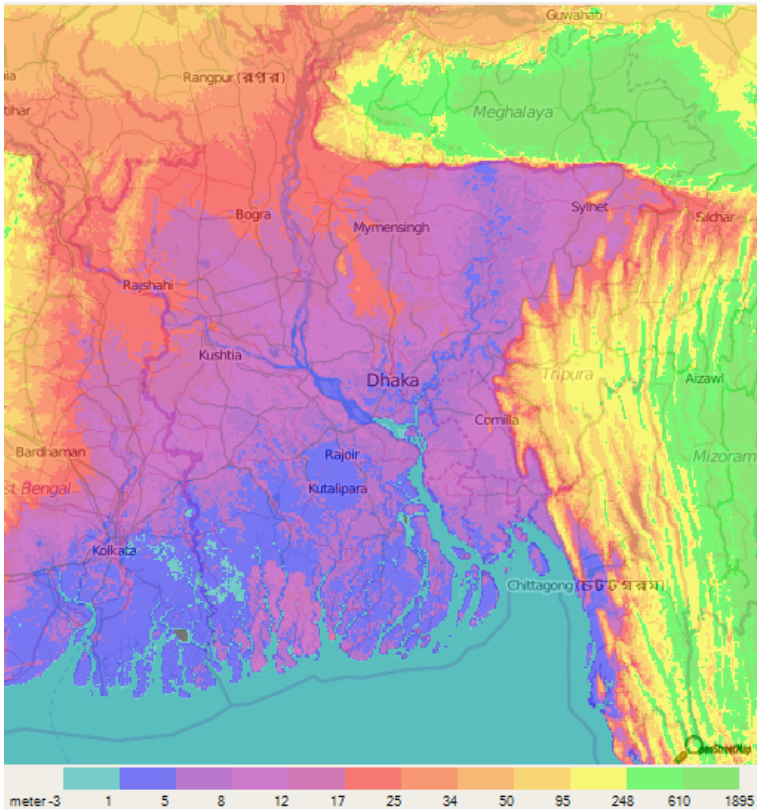
Staggering Sight. By the time the government finishes counting the casualties, the great Ganges cyclone may rank as the worst natural disaster of the 20th century—and one of the worst of all recorded history. The figures transcend normal comprehension and numb the mind. Officially, the toll at the end of last week stood at 150,000; the only natural catastrophe to claim more lives in this century was the 1920 earthquake that killed 180,000 in Kansu, China. Yet the government concedes that its count is far from complete and that newspaper estimates of 300,000 to 600,000 dead may well prove correct. The Pakistan Times predicted that the figure might rise to

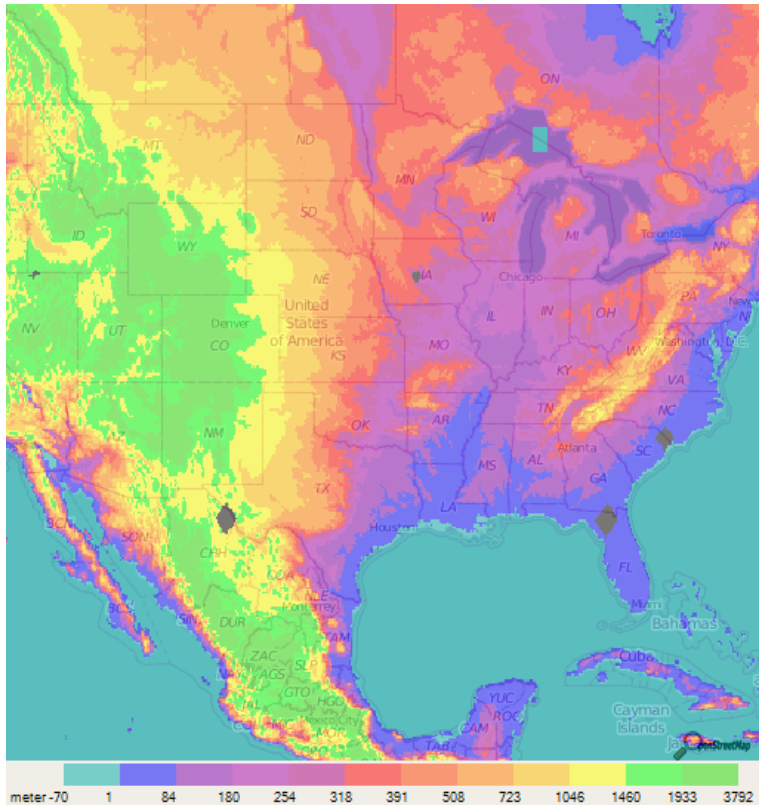
Comparing the Bhola Cyclone to Hurricane Katrina



- Wind speed: Bhola: 150 mph, Katrina: 175 mph
- Storm surge: Bhola: 18-25 feet; Katrina: 16-30 feet
- Casualties $300,000 - 500,000$ in Bhola, 1392 in Katrina

Difference in Vulnerability: Elevation





- Bangladesh is exceptionally low-lying, thus vulnerable to cyclones.

Comparing the Bhola Cyclone to Hurricane Helene 2024

- Wind speed: Bhola: 150 mph, Helene: 140 mph
- No immediate aid by central government after Bhola Storm, first reaction a week after, about 10 districts got some aid.
- 3500 personnel deployed, more than 1 million liters of water distributed for Helene Cyclone
  Source: Federal Emergency Management Agency (2024)

Vulnerability: Housing and Infrastructure

- *...and these are photos from Summer 2023, not 1970*

The Context

The New York Times

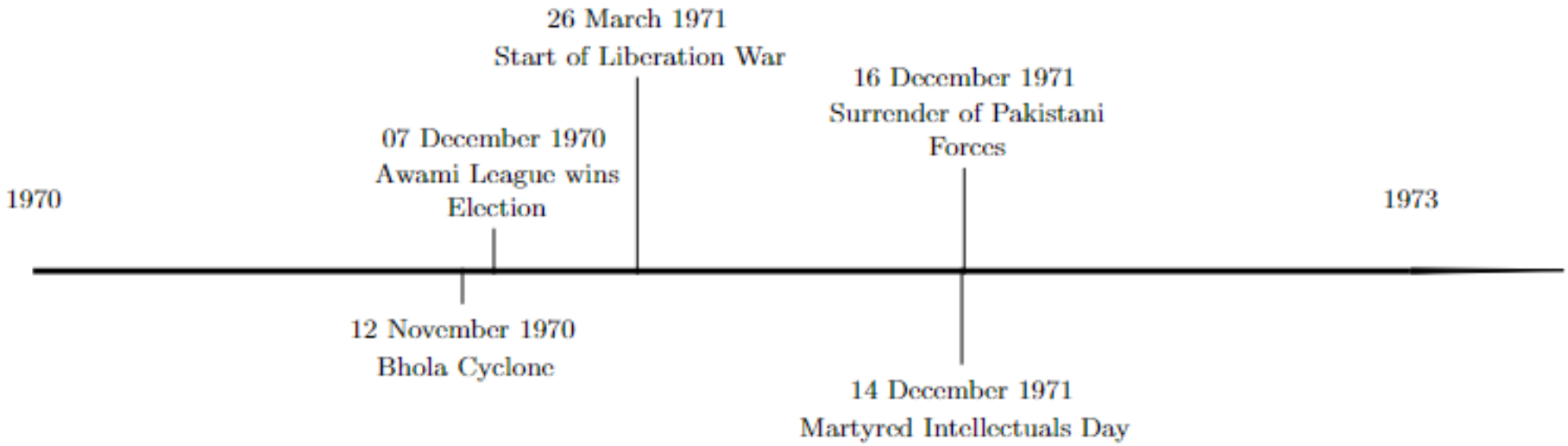
PAKISTAN RELIEF IS NEEDED BADLY

Share full article

By Sydney H. Schanberg Special to The New York Times

Nov. 22, 1970

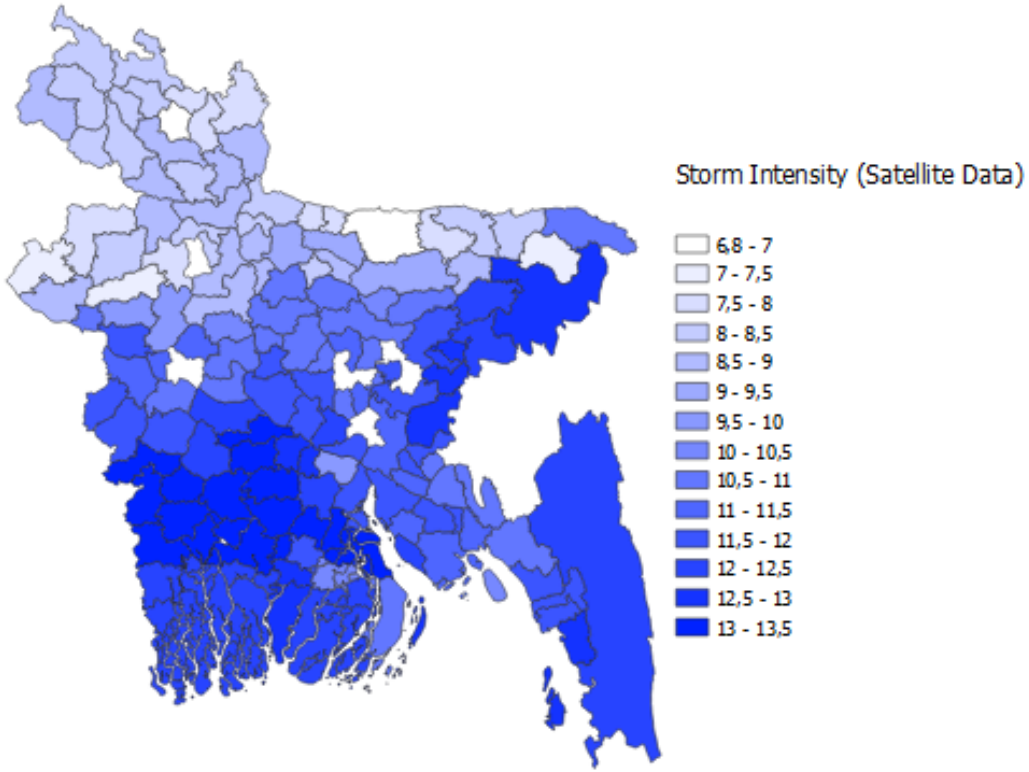
Timeline


26 March 1971
Start of Liberation War
16 December 1971
Surrender of Pakistani
Forces
07 December 1970
Awami League wins
Election
1970
1973
12 November 1970
Bhola Cyclone
14 December 1971
Martyred Intellectuals Day

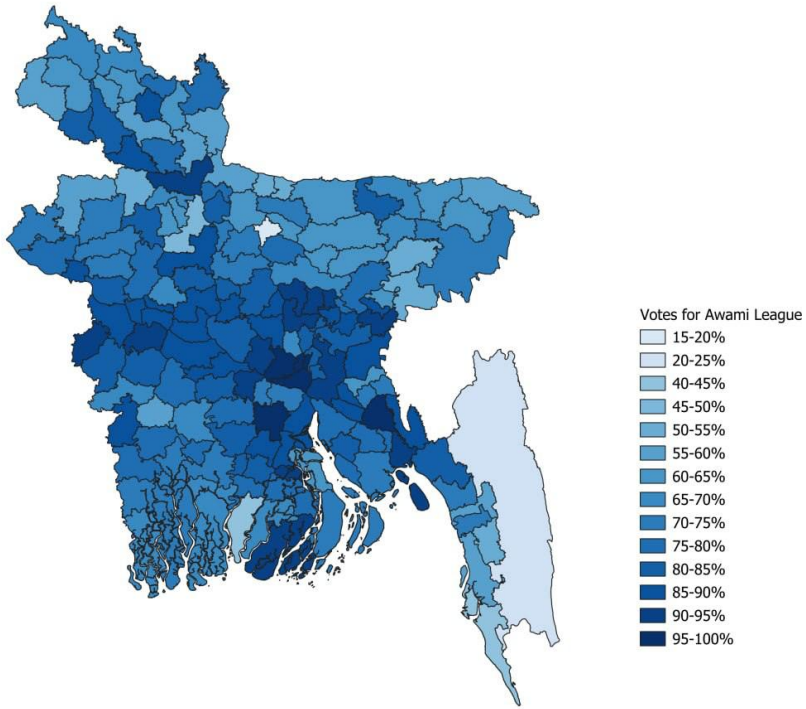
The Data

- Satellite image of ITOS-1 satellite commissioned by NASA NASA Space Science Data Coordinated Archive (2024)
- Weather stations data on wind speed National Centers for Environmental Information (2024)
- Report of East Pakistan Electoral commission Baxter (1971)
- Bangladesh Genocide Archive Bangladesh Genocide Archive (2024)
- Archive of Bangladesh Army Bangladesh Army (2024)
- Census of Pakistan Census of Pakistan (1951)
- World Bank reports on Aid provided after the Storm World Bank (1970)

The Spatial Variation of Satellite Data



Spatial Variation of Votes for Awami League



- Election Commission of Pakistan provides votes share obtained by Awami League in 1970 Elections.

Sample of Data from Bangladeshi Military Heritage Archive

ক্রমিক	-সনা নম্বর	পদবী	নাম ও পিতার নাম	স্থায়ী ঠিকানা	চাকুরী-ত যোগদা-নর তারিখ	অবসর/মৃত্যুর তারিখ	অবস-ররপ্রকার	বীরগাথা কাহিনী	অবদান ও ত্যাগ	সেক্টর নম্বর	এসবিএও নম্বর	গে-জট নম্বর	মন্তব্য
ক	খ	গ	ঘ	ঙ	চ	ছ	জ	ঝ	ঞ	ট	ঠ	ড	ঢ
১।	বি-জও-১৮০১৫	মাঃওয়ারঃ অফিসার	আব্দুস সাত্তার (মৃত) পিতাঃ মফিজ উদ্দিন চৌধুরী	বাসা নং-৭৭/৭৮ টিন সেড ব্লক নং-৩, রোড নং-৯, মিরপুর-১২, ঢাকা-১২২১	২৪-১০-১৯৫৩	৩০-০৯-১৯৮৪ ১৪-০৩-২০০৯	সাধারণ অবসর	তিনি ২৪ অক্টোবর ১৯৫৩ তারিখে সেনা বাহিনীতে যোগদান ক-রন। ৭৩৪ ফিল্ড ইন-টেলি-জন্স কোম্পানী, ঢাকা সেনানিবা-স কর্মরত অবস্থায় ১৯ মে ১৯৭১ তারি-খ নি-জর জীবন বাঁচা-নার জন্য কর্মস্থল হ-ত পলায়ন ক-র কামথানা মুক্তিফৌজ ক্যাম্পে যান।	অতঃপর ক্যা-প্টন মোহাঃ সা-লক সাহেব এর সাথে মুক্তি বাহিনীতে যোগদান ক-রন। সেখান থে-ক তা-ক সেক্টর সদর দপ্তর মতিনগর, ভার-ত বদলী ক-র। কিন্তু দৈবাৎক্র-ম তা-ক বিশ্বাস কর-ত না পে-র ২২ জানুয়ারি ১৯৭২ পর্যন্ত তাদের তত্ত্বাবধানে রেখে দেন।	সেক্টর হেড কোঃ মতিনগর ইন্ডিয়া	০৩/১৫৩৪৪/২০০০	০৬/১৮৯৫৮/২০০৩	
২।	বি-জও-১৮০৩৬	অনারারী ক্যা-প্টন	এ বি এম আব্দুর রহমান (অবঃ) পিতাঃ আলহাজ আব্দুল হামিদ	গ্রামঃ পূর্ব আলাদাদপুর, পোঃ টেপক্তী থানাঃ লক্ষীপুর জেলাঃ লক্ষীপুর	১৯-০৯-১৯৫৫	১৮-০৯-১৯৮৭	সাধারণ অবসর	তিনি ১৯ সে-প্টম্বর ১৯৫৫ তারি-খ সেনাবাহিনী-ত -যাগদান ক-রন এবং ৩৪ এসএন্ডটি ব্যাটালিয়ন,এএসসি শিয়াল-কাট সেনানিবাস পাকিস্তা-ন ৬৪৩ এসটি কোম্পানী'-ত কর্মরত অবস্থায় ১২ এপ্রিল ১৯৭১ তারি-খ ২১৮ পে-ট্রাল ক-ম্পানী প্লাটুন, এএসসি-ত বদলী করা হ-ল বদলীকৃত ইউনি-ট যোগদান না ক-র বাড়ী-ত এ-স স্থানীয় মুক্তিবাহিনীতে যোগ দেন।	তিনি ১৯৭১ সা-ল জুন মা-স নোয়াখালী সদর মুন্সীরহাট এলাকায় ০২নং সেক্টরের অধীনে মেজর মোহাম্মদ আমিন এর নেতৃ-ত্ব ১২৭ জ-নর একটি দ-লর অস্ত্র এবং গোলাবারুদ ইনচার্জ হি-স-ব দায়িত্ব পালন ক-রন। এছাড়াও তিনি অফিসা-রর অবর্তমা-ন প্রশাসনিক দায়িত্ব পালন কর-তন। স্বাধীনতা সংগ্রা-ম বেলুনিয়া, পরশুরামপুর, ফেনী এবং চট্টগ্রাম এর বিভিন্ন এলাকায় মুক্তিযুদ্ধে ও অপা-রশ-ন অংশগ্রহণ ক-রন।	০২	০৩/১৫৩৪১/২০০০	০৫/১৪১৩৯/২০০৩	
৩।	বি-জও-১৮০৩৭	অনারারী ক্যা-প্টন	-নছার আহ-মদ চৌধুরী (মৃত) পিতাঃ আতাউর রহমান চৌধুরী	গ্রামঃ ৭০ উত্তরভাষানটেক -পাঃ ঢাকা ক্যান্ট থানাঃ কাফরুল জেলাঃ ঢাকা -১২০৬	২২-০৭-১৯৬১	২৬-১২-১৯৮৭ ২৫-০২-২০১২	সাধারণ অবসর	তিনি ২২ জুলাই ১৯৬১ তারি-খ সেনাবাহিনী-ত -যাগদান ক-রন এবং স্টেশন সাপ্লাই ডি-পা, চট্টগ্রাম সেনানিবা-স ৮২ সা-পার্ট প্লাটুন, এএসসি-ত কর্মরত অবস্থায় স্বাধীনতা সংগ্রা-ম ২৬ মার্চ ১৯৭১ তারি-খ স্বপরিবা-র পলায়ন ক-র সেনানিবা-সর বাহি-র চ-ল আ-সন।	তিনি ২৪ এপ্রিল ১৯৭১ তারি-খ ইপিআর সু-বাদার আব্দুল হামিদ এর সা-থ কাজ কর-ত থা-কন। ০৩ মে ১৯৭১ তারি-খ পরিবার রে-খ ভার-তর আগরতলায় চ-ল যান। সেখা-ন তাঁর মা-বাবা, ভাই--বান-দর খুঁ-জ না পে-য় দে-শ এ-স ৯ ই বেংগ-লর সা-থ যোগ দেন। তিনি ২নং সেক্টরের অধীনে বিভিন্ন এলাকায় মুক্তিযুদ্ধে ও অপারেশনে অংশ নেন।	০২	০৩/১৫৩৩০/২০০০	০৫/১৪১৩৫/২০০৩	

- To construct variables on Freedom Fighters in the Independence War we collect and geolocate data from the Bangladeshi Military Heritage Archive

Genocide Archive

Rajshahi University Teachers

* Prof. Qayyum
* Habubur Rahman
* Shree Sukha Ranjan Samadder

Names of M.C.A.s

* Mashiur Rahman
* Amjad Hossain
* Aminuddin
* Nazmul Haque Sarker
* Abdul Haque
* Syed Anwar Ali
* A.K. Sarder

- We geolocate places of birth of martyred intellectuals to construct dependant variable

Other Data

- Other data used in the analysis was obtained from various historical documents and books, e.g.
  - Autobiography of Sheikh Mujibur Rahman Rahman (1972)
  - Economic Geography of East Pakistan Ahmad (1968)
  - World Bank Report of 1972, World Bank (1972)
- Our analysis takes place at sub-district or 162 electoral district level (known as constituencies).

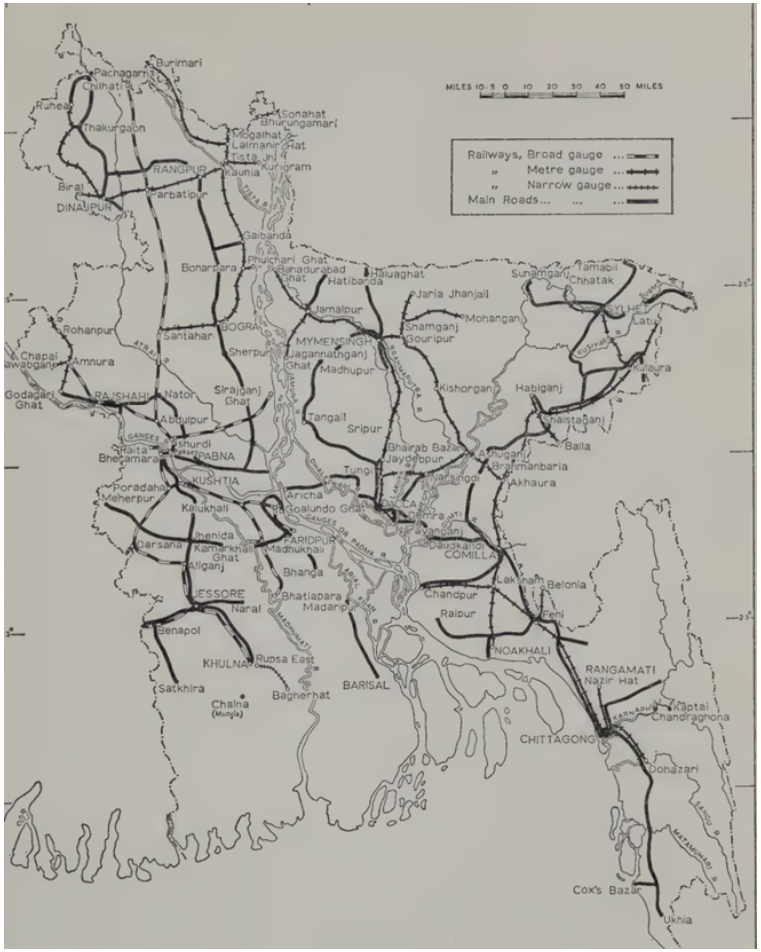
Other Data

BANGLADESH

TECHNICAL NOTE ON
COASTAL AREA REHABILITATION AND CYCLONE PROTECTION PROJECT

Distribution of Tractors and Tillers in the Cyclone Affected Thanas under the Agricultural Rehabilitation Project

Districts / Thanas	Tractors Distributed	Tillers Distributed	Workshops[a]
Barisal			
Bhola	15	65	1
Tajumuddin	15	37	1
Char Fasoon	25	20	
Lalmohan	20	20	
Daulatkhan	10	30	1
Patuakhali			
Amtali		41	1
Kalapara		84	
Patharghata		5	
Barguna		40	1
Bauphal		77	
Golachipa		35	1
Rangabali		36	
Bamna		30	
Noakhali			
Sonagazi	2		
Companiganj	3		
Shudharam	26		1
Ramgati	12		1
Total	156	544	8



Votes for Awami League

	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
Log (Storm Intensity 1970)	0.176***	0.250***	0.200**	0.213**
	(0.061)	(0.092)	(0.090)	(0.095)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Adj. R^2	.046	.086	.145	.095
Mean Dep. Var.	.745	.745	.745	.745
Observations	162	162	162	162

Insurgent Fighters

	(1)	(2)	(3)	(4)
	# of Insurgents			
Log (Storm Intensity 1970)	7.878***	11.618**	12.716**	12.787**
	(2.529)	(5.306)	(5.712)	(5.526)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Adj. R^2	.032	.031	.079	.08
Mean Dep. Var.	5.074	5.074	5.074	5.074
Observations	162	162	162	162

Intellectuals Murdered

	(1)	(2)	(3)	(4)
	Intellectuals Murdered 1971			
Log (Storm Intensity 1970)	0.495***	0.750***	0.580**	0.694***
	(0.172)	(0.266)	(0.268)	(0.260)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Adj. R^2	.033	.029	.109	.093
Mean Dep. Var.	.278	.278	.278	.278
Observations	162	162	162	162

Interpretation of the Results

- We show that Bhola cyclone has statistically significant impact on events leading to Bangladesh independence
- For example, 1% increase in storm intensity has an estimated effect of 0.26% increase in the share of votes for Awami League
- 1% increase in storm intensity has an estimated effect of 0.5 more insurgents emerging in the district.

Identification Checks

1. Balance Test - Balance over main district characteristics - 45
2. Placebo: One Day Before Storm - main results estimated with radiation, measured one day before storm, as independent variable - 48
3. Placebo: Mora Cyclone - main results estimated with 2017 Mora Cyclone intensity, measured by rainfall, as independent variable - 49

Is nature truly blind?

Exogeneity of the Storm

- The main assumption that allows us to state that relationship between independent and dependent variables are likely causal is the assumption that storm is exogenous and its' impact was random over the sample especially when accounting for the distance to the coast
- We support this thesis by conducting a balance test over the broad set of district characteristics and pre-treatment outcomes.
- But much more...

Balance Test

	(1) Area	(2) Population 1964	(3) Indicator of City 1961	(4) Rail Road 1964
Log (Storm Intensity 1970)	115.509	189004.944	0.094	0.495
	(157.248)	(138676.585)	(0.262)	(0.340)
Distance to Coast	Yes	Yes	Yes	Yes
Mean Dep. Var.	231.384	221699.883	.191	.42
Observations	162	162	162	162
	Road 1964	# of Factories 1964	Jute, % of territory 1964	Electricity, Coverage 1964
Log (Storm Intensity 1970)	0.549	0.594	18.158	23.435
	(0.332)	(0.641)	(18.656)	(16.201)
Distance to Coast	Yes	Yes	Yes	Yes
Mean Dep. Var.	.512	.525	44.267	11.532
Observations	162	162	162	162
	English Speakers 1951	Persian Speakers 1951	Bengali Speakers 1951	Arab Speakers 1951
Log (Storm Intensity 1970)	2.416	-0.013	-3.224	0.202
	(1.541)	(0.144)	(2.496)	(0.579)
Distance to Coast	Yes	Yes	Yes	Yes
Mean Dep. Var.	16.901	.523	76.481	1.62
Observations	162	162	162	162
	Mujib Visit 1969	Student Protests 1969	Famine Casualties 1943	# of Politicians Born in the District Before 1970
Log (Storm Intensity 1970)	0.077	0.030	1.932	1.544
	(0.176)	(0.108)	(1.434)	(2.375)
Distance to Coast	Yes	Yes	Yes	Yes
Mean Dep. Var.	.056	.043	4.025	1.821
Observations	162	162	162	162

Estimated Equation

$$Y_i = \beta_1 \text{Bhola Cyclone Intensity}_i + \mathbf{X}_i\gamma + \epsilon_i \quad (1)$$

Where

- Y_i represents the political outcome of interest, such as the vote share for the Awami League, in electoral district i
- The variable Bhola Cyclone Intensity$_i$ captures the intensity of the cyclone in district i
- The vector $\mathbf{X}_i$ includes control variables which comes in 3 variants: Baseline Controls, All Controls, PDS Controls (Belloni et al. (2014))
- The error term ϵ_i captures unexplained variation in the considered outcome of interest
- Newey-West standard errors are used as the baseline

Controls

- Baseline Controls
  - Votes for Awami League 1954
  - Distance to Coast
- All Controls
  - Baseline Controls + pretreatment political and economic outcomes
- PDS controls
  - Controls selected using post-double selection, following Belloni et al. (2014), to avoid overfitting and have a principled covariate selection algorithm.

Placebo: Satellite measures One Day before Storm

	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
Log (One Day before Bhola Storm Radiation)	-0.146	-0.213	-0.114	-0.195
	(0.135)	(0.141)	(0.129)	(0.134)
Mean Dep. Var.	.745	.745	.745	.745
	# of Insurgents			
Log (One Day before Bhola Storm Radiation)	-3.317	-7.620**	-6.565	-6.411*
	(3.293)	(3.838)	(4.524)	(3.553)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Mean Dep. Var.	5.074	5.074	5.074	5.074
Observations	162	162	162	162

Placebo: 2017 Mora Cyclone

	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
Log (Mora Storm Intensity 2017)	-0.012	-0.013	-0.027**	-0.021*
	(0.012)	(0.013)	(0.013)	(0.013)
Mean Dep. Var.	.745	.745	.745	.745
	# of Insurgents			
Log (Mora Storm Intensity 2017)	0.142	-0.389	-0.507	-0.397
	(0.339)	(0.375)	(0.458)	(0.384)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Mean Dep. Var.	5.074	5.074	5.074	5.074
Observations	162	162	162	162

Mechanisms

- What political and economic factors are driving the result?
- Could Pakistani Government's response neutralize the effect of Storm?
- Are the results driven by preexisting grievance which were sharpened by the storm?

Causal Mediation Analysis: Heckman and Pinto, 2024

	Aid from W. Pakistan	Votes for UF 1954	Roads 1964	Mujib Visits 1970
	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
NIE				
Log (Storm Intensity)	-0.460**	-0.213	-0.050	0.006
	(0.226)	(0.132)	(0.080)	(0.020)
NDE				
Log (Storm Intensity)	1.564***	0.856***	0.672**	0.477**
	(0.537)	(0.293)	(0.332)	(0.187)
TE				
Log (Storm Intensity)	1.104***	0.642***	0.621**	0.483***
	(0.341)	(0.207)	(0.268)	(0.184)
Baseline Controls	Yes	Yes	Yes	Yes
% of Effect Mediated	41.7% ***	33.2% *	8.1%	1.3%
% of Effect Mediated P-val.	.002	.067	.436	.757
Observations	162	162	162	162

Take away

- Lack of aid from the West Pakistani government explains 41.7% of the variation in support for Awami League.
- How much did the aid from West Pakistan dampen the effect of the storm?

Lack of Aid from Central Government

	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
Log (Storm Intensity 1970) X Aid by West Pakistan	-1.080***	-1.263***	-1.441***	-1.441***
	(0.399)	(0.468)	(0.347)	(0.332)
Log (Storm Intensity 1970)	0.191***	0.279***	0.236**	0.236***
	(0.063)	(0.097)	(0.092)	(0.088)
Aid By West Pakistan	2.676***	3.157***	3.612***	3.612***
	(0.982)	(1.158)	(0.846)	(0.809)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Storm + StormXAid = 0 (P-val.)	.026	.038	.001	.001
Mean Dep. Var.	.745	.745	.745	.745
Observations	162	162	162	162

Lack of Aid from Central Government

	(1)	(2)	(3)	(4)
	# of Insurgents			
Log (Storm Intensity 1970) X Aid by West Pakistan	-30.728	-29.485	-43.922**	-43.922**
	(19.861)	(19.624)	(22.172)	(21.193)
Log (Storm Intensity 1970)	8.143***	12.626**	13.474**	13.474**
	(2.818)	(5.350)	(5.684)	(5.433)
Aid By West Pakistan	76.620	74.486	108.610*	108.610**
	(49.813)	(49.328)	(55.501)	(53.048)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Storm + StormXAid = 0 (P-val.)	.252	.399	.174	.174
Mean Dep. Var.	5.074	5.074	5.074	5.074
Observations	162	162	162	162

Preexisting Political Sentiment

	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
Log (Storm Intensity 1970) X Votes for UF 1954	0.012**	0.012**	0.011**	0.011**
	(0.005)	(0.005)	(0.005)	(0.005)
Log (Storm Intensity 1970)	-0.567*	-0.524	-0.496	-0.515
	(0.325)	(0.335)	(0.324)	(0.321)
Votes for UF 1954	-0.025**	-0.026**	-0.024**	-0.025**
	(0.011)	(0.011)	(0.011)	(0.011)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Mean Dep. Var.	.745	.745	.745	.745
Observations	162	162	162	162

Major Agricultural Zones

Jute Producing Regions are most Impacted

Panel A. Jute				
	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
Storm Intensity 1970 X Jute 1964	0.009***	0.009***	0.009***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)
Log (Storm Intensity 1970)	-0.224*	-0.259**	-0.276**	-0.287**
	(0.124)	(0.126)	(0.132)	(0.134)
Jute, 1964	-0.020***	-0.021***	-0.020***	-0.021***
	(0.006)	(0.005)	(0.006)	(0.006)
Mean Ind. Var.	44.267	44.267	44.267	44.267
Observations	162	162	162	162
Panel B. Rice				
	Votes for Awami League (December 1970)			
Storm Intensity 1970 X Rice 1964	-0.008	-0.010	-0.011	-0.010
	(0.007)	(0.007)	(0.007)	(0.007)
Log (Storm Intensity 1970)	0.484	0.588**	0.601**	0.611**
	(0.310)	(0.296)	(0.286)	(0.285)
Rice, 1964	0.017	0.021	0.025	0.024
	(0.017)	(0.016)	(0.015)	(0.015)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Mean Ind. Var.	36.333	36.333	36.333	36.333
Mean Dep. Var.	.745	.745	.745	.745
Observations	162	162	162	162

Preexisting Economic Grievance

	(1)	(2)	(3)	(4)
Panel A. Roads				
	Votes for Awami League (December 1970)			
Log (Storm Intensity 1970) X Paved Roads 1964	0.037	0.044	0.080	0.080
	(0.121)	(0.121)	(0.122)	(0.117)
Log (Storm Intensity 1970)	0.157**	0.222**	0.142	0.142
	(0.072)	(0.108)	(0.103)	(0.098)
Paved Roads Coverage 1964	-0.089	-0.100	-0.181	-0.181
	(0.286)	(0.288)	(0.292)	(0.280)
Observations	162	162	162	162
Panel B. Railroads				
	Votes for Awami League (December 1970)			
Log (Storm Intensity 1970) X Railroad 1964	-0.126	-0.055	-0.115	-0.115
	(0.119)	(0.127)	(0.134)	(0.129)
Log (Storm Intensity 1970)	0.252***	0.267**	0.247*	0.247**
	(0.094)	(0.124)	(0.130)	(0.124)
Railroad Coverage 1964	0.330	0.162	0.302	0.302
	(0.282)	(0.301)	(0.318)	(0.305)
Observations	162	162	162	162
Panel C. Factories				
	Votes for Awami League (December 1970)			
Log (Storm Intensity 1970) X Major Factories 1964	-0.039	-0.018	-0.045	-0.059
	(0.072)	(0.074)	(0.075)	(0.070)
Log (Storm Intensity 1970)	0.189***	0.253**	0.214**	0.236**
	(0.071)	(0.104)	(0.099)	(0.105)
# of Major Factories 1964	0.104	0.051	0.106	0.145
	(0.174)	(0.180)	(0.182)	(0.169)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Mean Dep. Var.	.745	.745	.745	.745
Observations	162	162	162	162

Interpretation of Mechanisms

- We consider the lack of response of central Pakistani government a mechanism to interpret our results. We find results consistent with the theory in which citizens learn about the characteristics of their leadership by observing their response to a natural disaster.
- The storm also had more effect in areas where Awami League had support previously. We show that storm interacted with votes for United Front, the electoral alliance in which AL participated, has positive effect on votes for the Awami League

Economic Mechanisms

- Awami League were more successful in jute (but not rice) producing areas.
- We suppose that is because jute was largely exported and its' destruction by the storm intensified poverty and political grievance
- We do not see effect of interaction with infrastructure which is showing that the storm created short-term economic problems rather then intensified long-term ones

Conclusion

- The Bhola Cyclone played a pivotal role in Bangladesh's nation-building process and significantly influenced. subsequent events
- Natural disasters can catalyze social processes, profoundly affecting both economic and political landscapes, especially as climate change intensifies
- We need to think more carefully how natural disasters will impact politics and revolutionary movements.

Thank You for Your Attention

- Twitter: **@mrsultan713**
- Email for more detailed questions/feedback: smehmood@nes.ru
- More information on my work:
  https://sites.google.com/view/sultan-mehmood/home

Wind Speed Data

	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
Log (Storm Intensity (Wind) 1970)	0.016***	0.019**	0.021**	0.024***
	(0.006)	(0.008)	(0.009)	(0.008)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Mean Dep. Var.	.745	.745	.745	.745
Observations	162	162	162	162

Estimation with Coastal Regions Excluded

	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
Log (Storm Intensity 1970)	0.273***	0.289***	0.257***	0.225***
	(0.061)	(0.059)	(0.067)	(0.069)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Mean Dep. Var.	.759	.759	.759	.759
Observations	140	140	140	140

Accounting for Conley Spatial Correlation

Panel A. Radius 10km			
	(1)	(2)	(3)
	Votes for Awami League (December 1970)		
Log (Storm Intensity 1970)	0.176***	0.250***	0.200**
	(0.061)	(0.092)	(0.086)
Mean Dep. Var.	.745	.745	.745
Observations	162	162	162
Panel B. Radius 100km			
	Votes for Awami League (December 1970)		
Log (Storm Intensity 1970)	0.176*	0.250**	0.200*
	(0.092)	(0.127)	(0.119)
Mean Dep. Var.	.745	.745	.745
Observations	162	162	162
Panel C. Radius 150km			
	Votes for Awami League (December 1970)		
Log (Storm Intensity 1970)	0.176***	0.250***	0.200***
	(0.061)	(0.044)	(0.046)
Mean Dep. Var.	.745	.745	.745
Observations	162	162	162
Panel D. Radius 200km			
	Votes for Awami League (December 1970)		
Log (Storm Intensity 1970)	0.176*	0.250***	0.200**
	(0.091)	(0.081)	(0.078)
Baseline Controls	No	Yes	Yes
All Controls	No	No	Yes
Mean Dep. Var.	.745	.745	.745
Observations	162	162	162

Alternative Definitions of Dependant Variable

	(1)	(2)	(3)	(4)
	Votes for Awami League	Log(Votes)	Ihs(Votes)	Poisson
Log (Storm Intensity 1970)	0.176***	0.248**	0.141***	0.239***
	(0.061)	(0.104)	(0.051)	(0.083)
Baseline Controls	Yes	Yes	Yes	Yes
Mean Dep. Var.	.75	-.32	.69	.75
Observations	162	162	162	162

Robustness to Various Fixed Effects

Panel A. District Fixed Effects			
	(1)	(2)	(3)
	Votes for Awami League (December 1970)		
Log (Storm Intensity 1970)	0.176***	0.245***	0.254**
	(0.061)	(0.086)	(0.097)
District Fixed Effects	No	Yes	Yes
Baseline Controls	No	No	Yes
Mean Dep. Var.	.745	.745	.745
Observations	162	162	162
Panel B. East - West Fixed Effects			
	Votes for Awami League (December 1970)		
Log (Storm Intensity 1970)	0.176***	0.191***	0.250***
	(0.061)	(0.060)	(0.093)
East - West Fixed Effects	No	Yes	Yes
Baseline Controls	No	No	Yes
Mean Dep. Var.	.745	.745	.745
Observations	162	162	162
Panel C. North - South Fixed Effects			
	Votes for Awami League (December 1970)		
Log (Storm Intensity 1970)	0.176***	0.253***	0.194**
	(0.061)	(0.067)	(0.091)
North - South Fixed Effects	No	Yes	Yes
Baseline Controls	No	No	Yes
Mean Dep. Var.	.745	.745	.745
Observations	162	162	162

Permutation Inference Test

	(1)	(2)	(3)	(4)
	Votes for Awami League (December 1970)			
Log (Storm Intensity 1970)	0.176***	0.250***	0.200**	0.213**
	(0.061)	(0.092)	(0.090)	(0.095)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Mean Dep. Var.	.745	.745	.745	.745
Observations	162	162	162	162
Perm. Inf. Test P-val.	.01	< 0.001	< 0.001	< 0.001

Turnout

	(1)	(2)	(3)	(4)
	Turnout on December 1970 Election			
Log (Storm Intensity 1970)	0.032	0.105*	0.037	0.020
	(0.036)	(0.056)	(0.057)	(0.054)
Baseline Controls	No	Yes	Yes	No
All Controls	No	No	Yes	No
PDS Controls	No	No	No	Yes
Adj. R^2	-.002	.018	.235	.22
Mean Dep. Var.	.567	.567	.567	.567
Observations	162	162	162	162

Robustness

- Some Robustness Checks Roadmap:
  1. Wind Speed Result - 65
  2. With Coastal Regions Excluded - 66
  3. Conley Spatial Correlation - 67
  4. Alternative Definitions of Dependant Variable - 68
  5. Various Fixed Effects - 69
  6. Permutation Inference Test - 70

Ahmad, Nafis, *An Economic Geography of East Pakistan*, London: Oxford University Press, 1968.

Banerjee, Abhijit and Lakshmi Iyer, "Response to 'A re-examination of Banerjee and Iyer'by Iversen, Palmer-Jones and Sen," *Journal of Development Studies*, 2013, *49* (12), 1647–1650.

Bangladesh Army, "List of Freedom Fighters," 2024. Accessed: 2024-08-21, available at `https://www.army.mil.bd/List-of-Freedom-Fighters`.

Bangladesh Genocide Archive, "Martyred Intellectuals," 2024. Accessed: 2024-08-21, available at: `https://www.genocidebangladesh.org/martyred-intellectuals/`.

Baxter, Craig, "Pakistan votes–1970," *Asian Survey*, 1971, *11* (3), 197–218.

Belloni, Alexandre, Victor Chernozhukov, and Christian Hansen, "High-Dimensional Methods and Inference on Structural and Treatment Effects," *Journal of Economic Perspectives*, May 2014, *28* (2), 29–50.

Burke, Marshall, Solomon M Hsiang, and Edward Miguel, "Climate and conflict," *Annu. Rev. Econ.*, 2015, *7* (1), 577–617.

Census of Pakistan, "Census of Pakistan," 1951. Accessed: 2024-08-21, available at: https://repository.lahoreschool.edu.pk/xmlui/handle/123456789/14510.

Dell, Melissa, Benjamin F Jones, and Benjamin A Olken, "Temperature shocks and economic growth: Evidence from the last half century," *American Economic Journal: Macroeconomics*, 2012, *4* (3), 66–95.

Federal Emergency Management Agency , 2024. FEMA.

Grinin, Grinin and Andrey Korotayev, "20th Century revolutions: characteristics, types, and waves," *Nature*, 2020, (124).

Hsiang, Solomon M and Amir S Jina, "The causal effect of environmental catastrophe on long-run economic growth: Evidence from 6,700 cyclones," Technical Report, National Bureau of Economic Research 2014.

Michalopoulos, Stelios and Elias Papaioannou, "The long-run effects of the scramble for Africa," *American Economic Review*, 2016, *106* (7), 1802–1848.

Miguel, Edward, Shanker Satyanath, and Ernest Sergenti, "Economic shocks and civil conflict: An instrumental variables approach," *Journal of political Economy*, 2004, *112* (4), 725–753.

NASA Space Science Data Coordinated Archive, "ITOS 1," 2024. Accessed: 2024-08-21, available at `https://nssdc.gsfc.nasa.gov/nmc/spacecraft/display.action?id=1970-008A`.

National Centers for Environmental Information, 2024. Accessed: 2024-08-21, available at `https://www.ncei.noaa.gov/data/poes-essa-noaa-image-files/access/1970/11/`.

Rahman, S. M, *Bangladesh, My Bangladesh*, New Dehli: Orient Longman Limited, 1972.

Tilly, Charles, "Coercion, capital, and European states, AD 990–1990," in "Collective violence, contentious politics, and social change," Routledge, 1992, pp. 140–154.

World Bank, "A reconstruction program for the cyclone damaged coastal ares of East Pakistan," 1970. Accessed: 2024-08-21, available at: `https://documents1.worldbank.org/curated/en/`

35533149297239378/pdf/East-Pakistan-Reconstruction-program-for-the-cyclone-damage.pdf.

_ , "Report and recomendation of the president to executive directors on a proposed credit to People's Republic of Bangladesh for a coastal area rehabilitation and cyclone protection program," 1972. Accessed: 2024-08-21, available at: https://documents1.worldbank.org/curated/en/324111468007479422/pdf/Bangladesh-Reconstruction-Project.pdf.