



**Study Report on  
Rapid Assessment of Extreme Heat  
Impact on Agriculture, Fisheries,  
Livestock, Environment and Life and  
Livelihood at Chuadanga, Kushtia,  
Jhenaidah and Meherpur districts.**



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Together for Better Life



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## ACKNOWLEDGEMENTS

We would like to extend our sincere gratitude to the Executive Director of Wave Foundation for entrusting us with this assignment and for his steadfast support throughout its execution. We are particularly appreciative of the exceptional assistance provided by the District Coordination Team of WAVE Foundation, Chuadanga, in managing the seamless coordination of the assignment.

Our heartfelt acknowledgment also goes to all individuals and organizations who generously spared their valuable time to engage with us during the assessment process. We extend special thanks to the Chuadanga, Jhenaidah, Meherpur, and Kushtia district administrations, sectoral authorities, journalists, civil society personalities, and other stakeholders for their invaluable contributions, as well as to the field teams for their meticulous organization of field visits.

Furthermore, we wish to express our gratitude to the non-governmental organizations (NGOs), community-based organizations (CBOs), and community members who actively participated in the interviews, consultations, and focus group discussions. Most significantly, we extend our deepest appreciation to the colleagues who directly worked on the necessary data collection and drafting of this report. We are also thankful to the respondents who openly shared their experiences and provided invaluable recommendations, enabling us to continue our efforts towards improving climate resilience in the southwestern districts

# EXECUTIVE SUMMARY



This report provides a comprehensive analysis of the extreme heat impact on agriculture, fisheries, livestock, environment, and life and livelihood in the districts of Chuadanga, Kushtia, Jhainadah, and Meherpur. With a focus on the southwestern region of Bangladesh, the study identifies significant economic and social disruptions caused by record-high temperatures ranging from 40 to 43 degrees Celsius in 2024. The assessment includes a detailed analysis of the adverse effects on various sectors, highlighting the decline in agricultural productivity and monetary loss, the interruption of social customs, and the economic losses experienced by daily wage earners and small business owners.

The research findings underscore the severe reduction in daily incomes, with respondents reporting a decrease in average earnings by Tk 234 per person per day due to reduced working hours from 9 to 6 hours. The study reveals that extreme heat conditions have not only impeded economic activities but also negatively influenced environment, social and educational norms, with notable impacts on marriages, school attendance, and community ceremonies.

To mitigate these adverse effects due to extreme heat, the assessment report outlines several recommendations, including local resource mobilization, government and private relief assistance, and the promotion of climate-resilient agricultural practices, promoting social and homestead forestations, developing water reservoirs etc. It also suggests policy interventions such as declaring the southwestern region as a disaster-prone area, allocating local budget, establishing a national and international stakeholder alliance for advocacy, lobby and adequate funding opportunity for disaster preparedness, and promoting heat-resistant technologies.

The establishment of an effective alliance among national and international stakeholders, coupled with targeted local and national initiatives, will be vital in ensuring sustainable development and protecting the livelihoods of those most vulnerable to extreme heat conditions.

# INTRODUCTION



Climate change has led to about 1.8°F (1°C) of average global warming so far. We emphasize the word “average” because this slight rise in average temperatures can cause a much steeper rise in record highs and very hot days. In recent years, weather stations around the world are recording a growing number of extreme heat events and record-high temperatures.

Comparing Bangladesh to nations with advanced economies, its overall contribution to the global climate change issue is far less. Nevertheless, for the past few years, Bangladesh has seen an increase in heatwaves during the summer, especially from April to June. The greatest temperatures on record were reported in 2024. For almost every district in the nation, the Meteorological Department has reported average temperatures between 40 and 42 degrees Celsius.

According to the Meteorological Department, a mild heatwave is considered when temperatures range from 36 to 37.9 degrees Celsius, a moderate heatwave from 38 to 39.9 degrees Celsius, a severe heatwave from 40 to 41.9 degrees Celsius, and an extreme heatwave when temperatures exceed 42 degrees Celsius.

According to a World Bank assessment on climate challenges, Bangladesh's temperature would rise by 1.4 degrees Celsius by the year 2050. The report also notes that Bangladesh has experienced a 0.5 degree Celsius increase in temperature during the last 44 years. It also mentions how the changing climate is affecting the entire year, with summers becoming hotter and winters becoming colder. Due to climate change, the nation's distinctive seasonal fluctuations are becoming more noticeable, making these patterns more apparent.

Apparently to the Bangladesh Rice Research Institute (BRRI), immoral human activity against the environment is to blame for these extreme heat situation. Low-wage workers face extreme challenges as a result of the excessive heat spreading over the southwest region of Bangladesh. The extreme heat is making it difficult for personnel in the construction, agricultural, and battery-powered rickshaw industries, as well as van pullers. Many have been observed expressing their distress at being forced to leave their work in order to go outside. It greatly interferes with their day-to-day activities and impacting badly on life and livelihood.

Extreme heat conditions have a profound impact on the economic productivity of tropical low-income countries. They can lead to a nearly 1% reduction in per capita Gross Domestic Product (GDP) in these regions. Notably, such extreme weather events have already positioned Bangladesh among the top countries globally most vulnerable to climate change.

Experts in agriculture warn that the production of rice may be negatively impacted by these prolonged heat waves. In order to minimize production expenses and provide farmers more challenges, the Bangladesh Rice Research Institute (BRRI) has recommended farmers to make sure they have enough irrigation during hot weather. This circumstance emphasizes how urgently environmental variables that contribute to extreme weather conditions must be addressed in order to protect the nation's agriculture industry and general economic stability.

Chuadanga has been experiencing the most intense heatwave this year, dominating the news for recording the highest temperatures in the country for the majority of the past week.

Meteorological experts attribute this extreme heat to the district's geographical location. Hot air from India's Madhya Pradesh enters Bangladesh through this region, gradually cooling as it spreads eastward. Consequently, Chuadanga and its surrounding districts bears the initial brunt of the heatwave, they explained.

Temperatures in Chuadanga and its surroundings districts have consistently exceeded 40 degrees Celsius over the summer season, severely disrupting daily life. Movement and productivity in agriculture, livestock and fisheries and environment have significantly decreased as employable people's limits their outdoor activities due to the extreme heat condition.

Jashore is also experiencing extreme weather in recent days. This year's highest temperature in Jashore was recorded at 42.6 degrees Celsius on April 2024. The temperature in April has been the highest in the country for the past few years. And every year it is breaking the previous year's record. Global warming and climate change also contribute to this extreme heat condition.

WAVE Foundation as a renowned organizations working for multi sectoral approach took the initiative in this instance to carry out rapid assessment on the extreme heat conditions at Chuadanga and its surrounding districts Meherpur, Kushtia and Jhinaidah in order to find out the impact on five development sector: agriculture, livestock, fisheries, life and livelihood, and environment. Bearing in mind to put forward some pragmatic recommendations to mitigate the challenges and through national and international actors' engagement in climate actions interventions and making the policy maker sensitive to the condition giving extra attentions to opportunities.

### Literature Review:

Bangladesh is grappling with a persistent heat wave induced by the 2023-2024 El Niño, with 51 out of 64 districts experiencing extreme temperatures ranging from 40 to over 43 degrees Celsius. The most severe heatwaves are concentrated in Rajshahi, Pabna, Khulna, Bagerhat, Jashore, Chuadanga, and Kushtia.

Nissan et al. (2017) highlight the necessity of an early warning system for heat-wave alerts based on predictive thresholds derived from current weather and climate data. This system is crucial for mitigating the adverse effects on human health.

Due to its unique geographic location, bordered by the Bay of Bengal to the south and the Himalayas to the north, Bangladesh is vulnerable to various meteorological events. The pre-monsoon season (March to May) frequently brings heat waves that have devastating impacts on ecosystems, economies, and the health of both people and animals (Karmakar & Das, 2020).

Understanding Bangladesh's maximum temperature climatology is essential for comprehending heat waves. Karmakar, Das, and Alam (2019) developed a climatology of the country's maximum temperatures, showing significant upward trends in both seasonal (pre-monsoon) and monthly mean maximum temperatures. This data underscores the growing intensity and frequency of heat waves.

Heat waves, characterized by extreme heat and high humidity, pose serious health risks, including heat stroke and death. This is especially prevalent in Bangladesh during the pre-monsoon season, necessitating thorough analyses, such as synoptic analysis, to assess their state and impacts (Mannan et al., 2021).



Rahman et al. (2023) explored the link between heat waves and livelihoods, revealing significant risks to human health, particularly in northwest Bangladesh. Their research underscores the need for a comprehensive understanding of the interaction between heat waves, food security, and health to enhance livelihood resilience.

Historically, heat waves have not been a prominent concern in Bangladesh and were not included as a key hazard in the national Standing Orders on Disaster (SoDs), last updated in 2019 (Daily Star, 2024). However, the increasing frequency and severity of heat waves have become a significant economic hazard, affecting multiple industries and exacerbating socio-economic vulnerabilities. The economic impacts are extensive, affecting infrastructure, health, agriculture, industry, and overall productivity (Financial Express, 2024).

Prolonged heat waves are now severely impacting life and the economy in Bangladesh (The Business Standard, 2024).

An extreme heat condition is a period of excessively hot weather, which may be accompanied by high humidity. A heat wave is usually measured relative to the usual weather in the area and relative to normal temperatures for the season. There is no universal definition of extreme heat or Heat Wave (HW). Most of the definitions are based on the persistence of maximum, minimum or mean surface air temperature above a threshold value that is based on the upper tail of the temperature distribution over a region [1]. Some of the definitions may even consider surface humidity levels as humidity can worsen a HW effect. Vaidyanathan et al. [2] provided a HW definition considering four core variables- the heat metric (viz., maximum/minimum/mean temperature, diurnal temperature difference etc.), duration, thresholds type and threshold intensity.

### **Objectives of the Study:**

The overarching objectives of the study are divided into two parts, aiming to enhance the assessment's evidence-based nature and authenticity for its users and target audiences.

#### **Overall Objective**

The overall objective of this rapid assessment is to conduct a comprehensive situation analysis through primary and secondary information on the perception of extreme heatwaves, with a focus on understanding the causes, identifying the multifaceted impacts, recognizing the associated challenges, and formulating pragmatic recommendations to mitigate those effects on agriculture, fisheries, livestock, the environment, and the livelihoods and economy of affected communities.

#### **Specific Objectives**

1. To analyse the context and understand the primary causes of extreme heatwaves.
2. To identify the impacts of extreme heatwaves on agriculture, fisheries, livestock, the environment, and the livelihoods and economy of people.
3. To recognize the challenges posed by extreme heatwaves to agriculture, fisheries, livestock, the environment, and the livelihoods of people.
4. To provide pragmatic recommendations for developing an action plan for mitigating the challenges of extreme heatwaves.

#### **Methodology of the Study**

To comprehensively address the research questions and objectives, this study employed a mixed-methods research strategy, integrating both quantitative and qualitative approaches. This methodological triangulation aimed to provide a more complete understanding of the research problem by leveraging the strengths of both data types.





## Quantitative Data Collection

### Survey Design and Administration:

- **Instrument Development:** A structured questionnaire was developed using closed-ended questionnaire only for collecting data on life and livelihood condition of the population living at the extreme heat region to quantify the response of the participants.
- **Sampling Strategy:** A stratified random sampling technique was utilized to ensure representation across different demographics and sectors relevant to the study. Interview using online questionnaires engaged various occupational categories respondents.
- **Data Collection Process:** Surveys were conducted using online platforms (Goggle Form) through in-person sessions to maximize reach and response rate.

### Data Analysis:

- Data collected using goggle platform through the online were analyzed and narrated in an automated manner.

## Qualitative Data Collection

1. Key Informant: A Guideline with series of semi-structured interviews questionnaire were used to conduct key informants interview. The Key informant interviewer includes, policymakers, practitioners, and community leaders. This approach allowed for in-depth exploration of participants' perspectives and experiences.
2. Nominal Group Technique: An interview guide with open-ended questions was developed to ensure consistency while allowing flexibility for participant's group discussions to elaborate their responses in a comfortable way. These groups were very informal and naturally organized.
3. Focus Groups: Multiple focus group sessions were organized to gather collective insights and facilitate interaction among participants. Participants for focus groups were selected based on their relevance to the topic, ensuring diverse viewpoints.
4. Community Consultations: Number of community level consultations were organized to get more insights on the issues relevant to the assessments. Participants of those consultations selected from civil society, GoB counterpart, local farmer, ordinary citizen, community clubs and NGO officials etc.
5. Document Analysis: Collecting and analyzing secondary document both published and non-published relevant documents, including policy papers, program reports, and academic literature, were reviewed to contextualize the findings from primary data sources.

## Sample and Sources of data:

The study employed a purposive stratified random sampling method to select participants. Approximately 960 respondents from different categories were selected. The category wise sample and participants selections were segregated as follows;

- Key Informants: 55 individuals (5 from each of 10 sub-districts, plus 5 government officials from relevant sectors at the district level)
- Discussions with Unorganized Groups: 20 sessions (approximately 10 participants per group, totaling around 200 participants)
- Group Discussions with Selected Stakeholders at the Grassroots Level: 10 groups (totaling 150 stakeholders)
- Interviews with Various Marginalized Professionals: 545 individuals (including day laborers, rickshaw pullers, transport workers, agricultural laborers, fishermen, small business owners, and lower-level employees)
- Open Discussions with Civil Society and NGO Officials: 10 individuals (including journalists and representatives of civil society)



## Study Areas:

The study area were selected considering recent severity and vulnerability due to extreme heat condition. It is evident that in current days Chuadanga and Jashore have been recording “very severe” levels of temperatures for a long time. The study was conducted in four district and 10 Upazila in southwest region;

Name of the district	Name of the Upazila
Chuadanga	Chuadanga Sadar, Damurhuda, Jibannagar, Alamdanga
Kushtia	Kushtia Sadar, Kumarkhali
Meherpur	Meherpur Sadar, Gangni
Jhenaidah	Jhenaidah Sadar, Maheshpur

## Ethical Considerations

- **Informed Consent:** Participants were fully informed about the purpose of the study, the nature of their participation, and their right to withdraw at any time without any consequences.
- **Confidentiality:** Measures were taken to ensure the confidentiality and anonymity of participants' responses, including secure data storage and anonymization of data during analysis.

By employing a mixed-methods approach, this assessment enriched the analysis with detailed, context-specific insights, providing a holistic understanding of the study problem.

## A. Findings: Causes

### a. Causes of Intense Heatwaves

- 1. Wide-ranging Plain land in the Region:** The area selected for the impact assessment are characterized by extensive plain lands. Adjacent to these districts are the Indian states of West Bengal and one of the hottest regions in the world, Murshidabad. Additionally, Bihar and Uttar Pradesh cover vast plains. When temperatures rise in these Indian regions, the heat is transported via convection over West Bengal and enters this region of Bangladesh without obstruction. As local temperatures are already high, the combination results in extreme heatwaves.
- 2. Loss of free flow of the Padma River:** The decrease in the navigation of the Padma River has led to its branches, Gorai, Mathabhangra, Kumar, Nabaganga, Chitra, Ichamati, Bhairab, Kapotaksha, Kajla, etc. besides numerous canals, wetlands, and Stillwater lakes in the area becoming almost dry. This reduces the heat absorption capacity of these water bodies, contributing significantly to rising temperatures.
- 3. High Humidity from the Bay of Bengal:** Moisture from the Bay of Bengal enters this region, resulting in higher humidity levels compared to other areas. This increases the feeling of extreme heat.
- 4. Climate Change and Low Rainfall in April:** Due to climate change, there has been no rainfall in April-May of the year, causing temperatures to rise. The unplanned filling and occupation of ponds, canals, and wetlands across the country as well as the study area are intensifying the heat, making it intolerable.
- 5. Closeness to the Tropic of Cancer:** Also known as the Northern Tropic, being near the Tropic of Cancer causes this region to experience intense sunlight. The reduction in wetlands and ecosystems has made this area more sensitive to extreme heat.



- 6. Deforestation and Wood Burning:** Excessive deforestation and wood burning for brick ovens degrade the heatwave situation. For example, in Chuadanga, there are 76 brick ovens, with only 17 having environmental approval. In Meherpur, only 1 out of 103 ovens is approved, and in Kushtia, only 22 out of 168 are approved. Annually, about 103,200 metric tons of wood are burned in Chuadanga alone. Additionally, the rate of deforestation for various development projects far exceeds the rate of tree planting.
- 7. Impact of Sandy Soil:** The region's sandy soil heats up and cools down quickly. Rapid urbanization has also reduced greenery, making the climate more extreme.
- 8. Recognition of Intense Heatwaves as a Disaster:** According to the Bangladesh Disaster Management Act 2012, intense heatwaves are classified as a natural disaster. But yet to date government has not taken necessary policy measures for this region to mitigate the impact of extreme heat and even not the condition is a disaster.

Considering the above causes of extreme heat situation, the mitigation strategies can be recommended as increasing green spaces, enhancing water bodies, regulating brick ovens, and promoting tree planting to counteract deforestation and urbanization effects.

## B. Findings (impacts)

Given their significant of the causes and consequences of extreme heat impact, the following sector-wise impact analysis and recommendations are proposed:

### B.1. Impacts on Agriculture Sector:

The region's economy greatly depends on the agriculture, thus agriculture sector are greatly impacted by the extreme heat condition.

- i. Crop Damage from Heatwaves:** Intense heatwaves are causing crops and plants to lose and die. Banana trees are dying, and banana bunches are falling off. Vegetables like betel leaf, pointed gourd, bottle gourd, eggplant, okra, ridge gourd, bitter melon, and snake gourd are turning yellow before maturing. Leafy greens are getting burnt by the heat of sun. Farmers are struggling to plant greens, vegetables, and jute seeds on time, leading to multiple sowings.
- ii. Insect Influx and Diseases:** There is an increase in pest attacks and diseases. The effectiveness of pesticides is reduced due to the heat, increasing the cost of crop care, which is becoming a burden to the farmers.
- iii. Damages of Fruit Tree:** Greenness of fruits trees like papaya, Malta, and guava have died, requiring replanting multiple times. Mangoes, oranges, and Malta are falling prematurely, and dragon fruit flowers are rotting.
- iv. Rice and Maize Production:** Due to extreme heat, unripe rice grains are turning into chaff, and maize produces are low. Betel plants are drying up, increasing maintenance costs and reducing production. Flowering trees in various orchards are losing flowers, and the fruits are smaller in size. Fruits like mangoes, jackfruit, and lychees are smaller, ripening prematurely. Saplings of vegetables like peanuts, taro, and pumpkins are dying.
- v. Increased Irrigation Costs for Boro Rice:** The lack of rain throughout the season has required additional irrigation for Boro rice, increasing production costs by an average of 2,500 taka per bigha. The grains are not maturing properly, resulting in a crop reduction of 80 KG per bigha. In Chuadanga, Meherpur, Jhenaidah, and Kushtia districts, a total of 180,811 hectares were cultivated with a target production of 1,084,866 metric tons. However, the actual production fell short by 108,052 metric tons. The additional cost for cultivating Boro rice on 180,811 hectares is approximately 337,664,545 taka. The decrease in yield by 80 Kg. per bigha results in a loss of 2,000 taka in income, totaling a net loss of 607,796,765 taka for the season.



- vi. **Reduced Maize Production:** Due to poor grain development in maize grower, the production per bigha has decreased by an average of 240 Kg. In the four districts, a total of 99,044 hectares were cultivated with a target production of 1,331,745 metric tons, but only 1,154,179 metric tons were produced. This reduction of 177,566 metric tons results in an estimated loss of 443,915,000 taka in farmers' income.
- vii. **Dragon Fruit Damage:** According to farmers, the loss of dragon fruit flowers and fruits during the early season reduces the production by about 500 kg per bigha. In three districts, a total of 8,255 bighas were cultivated with a target production of 33,020 metric tons. However, the expected reduction of 4,127 metric tons will result in a financial loss of approximately 82,540,000 taka.
- viii. **Damages of Lychee Fruit:** This year, 1,720 hectares were cultivated with lychees in Chuadanga, Meherpur, Jhenaidah, and Kushtia districts, with a target production of 15,480 metric tons. Local farmers reported that about 30% of the lychees have been damaged, resulting in a production shortfall of approximately 4,644 metric tons.
- ix. **Losses in Mango Fruit productions:** In Chuadanga, Meherpur, and Jhenaidah districts, 7,015 hectares were cultivated for mango fruit productions. Local farmers reported that about 25% of the mangoes have fallen before maturity due to intense heat, resulting in a production loss of around 40%.
- x. **Destructions of Citrus Fruit:** About 60-65% of small fruits in Malta and orange orchards, lemon have been damaged or fallen off before maturity, leading to a 50% reduction in production. For Malta and oranges, the productions per bigha was expected to decrease by approximately 2,000 kg.
- xi. **Negative impact on Vegetable Crop:** Due to water scarcity, the leaves of spinach are turning yellow, reducing income by about 15,000-20,000 taka per bigha. The production of vegetables like okra, bitter gourd, and ridge gourd has decreased by 15-20%. Additionally, the cost of maintenance has increased by about 5,000-7,000 taka.
- xii. **Post-Harvest Vegetable Loss:** Vegetables are wilting and developing spots during transportation from the fields to the market due to the high temperatures. This reduces their freshness, resulting in lower market prices for farmers.
- xiii. **Losses in Betel Leaf:** Betel plants are drying up, potentially causing a loss of 25,000-30,000 taka per bigha. Income from pointed gourd fields is expected to decrease by 10,000-15,000 taka per bigha.
- xiv. **Labor Shortage Due to Heat:** Extreme heat is stopping farm workers and laborers from working in the fields throughout the day, leading to a shortage of agricultural labor. Previously, workers could work 6-8 hours a day, but now they can only work 4-5 hours due to the heat.

## B.2. Recommendations for agriculture sectors:

- **Review and Reform Agricultural Policies:** It is the time to review and reform countries agricultural policies giving attention to extreme heat condition at Chuadanga, Meherpur, Jhenaidah, and Kushtia, including provisions for separate incentives for farmers and climate-resilient crop management.
- **Design intervention to Increase Adaptation Capacity:** Design and Implement state of art and necessary initiatives, intervention and social awareness raising activities to enhance farmers' adaptation capacity to respond the adverse effects of climate change.
- **Promoting Drought-Resistant Crops:** Capacitizes local farmer on Preparing and practicing 'crop calendar' to produce and promote various drought-resistant crop varieties, in this case necessary technical support to farmers needed to be provided.
- **Promoting Environment Friendly Agriculture:** Ensure food safety by promoting environment friendly agricultural practices. Reduce the excessive use of pesticides and chemical fertilizers, and implement integrated pest management and organic fertilizer use for the betterment of environment and adaptation the crops to the climate change effect.



- **Soil Testing and Nutrient Management:** To be prepared to cope with extreme heat condition, concentration should give to increase crop production by addressing soil nutrient deficiencies identified through soil testing.
- **Ensuring Availability of Water:** Ensure availability of water for irrigation by re-excavating rivers, canals, wetlands, and ponds to increase water reservoirs through public and private partnership manner.
- **Promote efficient use of Water in Agriculture:** Implement AWD (Alternate Wetting and Drying) for paddy fields and drip irrigation systems in orchards for efficient water use.
- **Use renewable energy in Irrigation System:** Establish adequate solar irrigation projects through government, private, and individual initiatives. It needs necessary promotion to make popularize to the farmers.
- **Ensuring Cold Storage Facilities at local Level:** Set up cold storage facilities through public-private partnerships for the preservation of vegetables and fruits during huge production seasons.
- **Shelters Center at Farm Land for Farmers:** Construct shelters in the fields for farmers to protect them from extreme heat during their work at farming land and install adequate tube wells for safe drinking water.
- **Use of Technological advancement to Support Farmer:** Capacitizes local farmer to hunt technology based necessary technical support. In that case an Apps for farmer can be worthy for various agriculture information and support for addressing agricultural issues and opportunities.
- **Form Farmers' Forums:** For the purpose of collective bargaining form and activate 'Farmers' Forums' with genuine farmers to address agricultural development and farmer issues effectively.

### B.3. Impact of Intense Heat on the Fisheries Sector

Development of Fisheries and related product is another emerging sector for the countries development meeting the needs of the nutrition. Due to extreme heat condition in April 2024, the sector has been seriously impacted, which area as follows;

- **Reduced Water Levels:** Due to extreme heat, nearly 50% of water bodies such as canals, ponds, and lakes have dried up, leading to premature harvesting of fish, thus disrupting production target production of the districts.
- **Reproduction and Production Decline:** The extreme heat has significantly affected fish reproduction and production. Local hatchery owners reported that they couldn't incubate eggs on time this year, hindering the production of fish. Additionally, fish farmers are forced to sell their fish before maturity to prevent further losses from fish mortality may cause by the heat.
- **Degradation of Water Quality:** The rising temperature of pond water has destroyed natural fish food sources. The heat has altered the quantity and quality of water needed for fish and aquatic resources, leading to stunted fish growth and financial losses for farmers. This represents a 20% reduction in income due to the heatwave.

**Nandan Halder (a fish farmer) of Chuadanga Malopara states, "I have been farming fish for many years, but I have never had to put so much water in the ponds as this year. Last year, I made a profit of 500,000 taka from four ponds, but this year, due to the drought, my profit was only 400,000 taka."**

- **Declined Earnings of Fishermen:** Local fishermen and fishing laborers reported that their earnings have been declined due to the extreme heat. Normally, they would work 4-5 days a week, but during the heatwave, they could only work 1-2 days a week. Their weekly earnings dropped from 400-500 taka per day which approximately 800-1,000 taka per week.



- **Impacted on Market system:** The heat has forced most farmers to quickly sell their fish, resulting in an excess in the market demand and lower prices. Consequently, farmers have faced financial losses.
- **Losses in Fish Production:** According to local fish farmers, fish production is expected to decrease by more than 30% this year. In the districts of Chuadanga, Meherpur, Jhenaidah, and Kushtia, 68,251 water bodies covering 42,396 hectares were expected to produce 107,160 metric tons of fish. Due to the heatwave, production is estimated to fall short by 32,148 metric tons, resulting in a financial loss of approximately 6,429,600,000 taka.

#### B.4. Recommendations for mitigating impacts on Fisheries:

- **Effective Planning and Training:** There is a need for developing and implementing effective and efficient plans to mitigate the challenges ahead of time by the relevant departments, and arrange training for fish farmers accordingly.
- **Introduce Water Retention Technology:** Innovate and introduce advance technology to retain water in ponds, canals, and lakes, and take administrative measures to free rivers from encroachment.
- **Ensure Government Incentives for Unemployed Fishermen:** Government should take necessary measure to provide incentives to the unemployed fishermen family and farmers during the extreme heat season. Both Government and Non-government organization can initiative soft loan assistance and free fry supply to genuine fish farmers.
- **Introduce Solar Pumps and Excavation:** Rigorous initiative has to be taken to install solar pumps to ensure water availability in wetlands, haors, and baors through government initiatives. Government also can engage NGOs and development partner for properly excavate government and private ponds to improve water retention and create adequate water reservoirs. .
- **Promote Reproduction and Climate-Resilient Fish Farming:** Arrange egg incubation before the heatwave to increase fish reproduction and expand the use of modern technology for climate-resilient fish farming.
- **Public –private initiative for River Dredging and Afforestation:** Undertake public-private partnership based river dredging interventions to increase river navigability and reduce temperatures by afforesting the banks of rivers, wetlands, canals, ponds, and all uncultivated areas.

#### B.5. Impacts on Livestock Sector:

The southwest region of Bangladesh, particularly the districts of Chuadanga, Kushtia, Meherpur, and Jhenaidah, is well-known for livestock production. This region meets a major portion of the country's total meat and livestock-related demands. The Black Bengal goat is a notable livestock animal in this region. However, extreme heat conditions are significantly impacting livestock production negatively in this area.

- **Shortage Food for the Animals:** Due to the extreme heat, there has been a significant losses of grass productions which is leading to shortage of green fodder. In some cases, farmers had to irrigate their fields more frequently to protect the grass from the heat, leading to increased production costs for fodder growers.
- **Increased Disease Incidence:** Most animal sheds are made of steel made tin sheets and are enclosed on all sides. This has been hampering adequate ventilation. Thus, heat inside the sheds feels too high during extreme heat condition at area. This has led to an increase in the heat related diseases.
- **Increased Feed Costs:** Small-scale farmers were unable to take their cattle and goats in the fields due to the extreme heat by sun, which is resulting in higher feed costs and reduced profits.



- **Hampering Reproduction:** Some goats, sheep, and cows did not become suitable for reproduction at the expected time due to uncomfortable weather. There were missed heat cycles and cases of miscarriages.
- **Impacting Milk Production:** Most dairy farmers live in rural areas and have lack of milk storing facilities. Besides, milk product are considered as hot food by the customer, thus, the demand for milk and dairy products in the market decreased due to the heatwave. Decreasing market demand causing farmers interest in dairy farming.
- **Supplies Labor Decreased:** Daily wage laborers were reluctant to work in extreme heat due to fear feeling of hot weather. Those who want to work demanded higher wages for less work. This has been impacted in increasing the production costs for farm owners and reduced net profits.
- **Delayed Weight Gain in Cattle:** Cattle fattening took longer than expected, particularly for those planning to sell cattle within a stipulated time to gain profits. Despite the increased cost of care, the cattle did not gain the expected weight, thus financial loss of farmers are lasting.
- **Milk Spoilage and Low Egg Prices:** Milk spoiled quickly in the heat, and egg prices were relatively low as it cannot be stored properly in extreme heat situations. This caused financial losses for farmers.
- **Reduced Milk Production:** According to local farmers, milk production decreased by about 20% in April-May due to the extreme heat. In Chuadanga, Meherpur, Jhenaidah, and Kushtia, approximately 13,634 metric tons less milk was produced than the target of 68,168 metric tons. This resulted in a financial loss of approximately 8,180,400,000 Taka for the farmers.
- **Reduced Meat Production:** Due to reduced feed intake during the heatwave, livestock gained less weight compared to previous periods. Meat production in the four districts decreased by about 17.5%, or approximately 10,850 metric tons less than the target of 62,000 metric tons for April-May. This led to a financial loss of around 65.1 crore Taka for the farmers.
- **Reduced Egg Production:** Similarly, egg production in April-May 2024 decreased by an average of 22.5% in the four districts, resulting in approximately 37,845,000 fewer eggs than the target of 168.2 million eggs. This caused a financial loss of around 3,784,500,000 Taka for the farmers.

Overall Financial Loss in Livestock sector can be calculated due to the extreme heat in Chuadanga, Meherpur, Jhenaidah, and Kushtia was approximately 7,706,490,000 Taka across the three areas mentioned

## B.6. Recommendations to mitigating impact on livestock:

1. **Construct Climate-Resilient Infrastructure and Improve Farm Management:** Implement effective plans and provide training to enhance the capacity of farmers to manage farms and build climate-resilient infrastructure to cope with extreme heat and other climate change impact like cold waves. Additionally, stakeholders should offer financial incentives to promising farmers.
2. **Ensure Adequate Food production and supplies to Address Animal Feed Shortages:** Initiative should be taken to provide training on fodder production, storage, and marketing, along with financial support, develop and facilitate entrepreneurs involved in animal feed production. This will help mitigate feed shortages during adverse conditions.



- 3. Ensure Fair Milk Prices:** Establish milk collection and storage hubs through government and non-government initiatives to ensure fair prices for dairy farmers. Promote private sector and individual entrepreneurs in dairy product production and marketing and enhance their capacity.
- 4. Protect Livestock General and Reproductive Health:** Take initiatives to safeguard livestock general and reproductive health wellness during adverse conditions. Implement multilateral agreements (among farmers, government, and private institutions) and take coordinated actions to address the situation.
- 5. Create a Livestock Database and Ensure Emergency Health Services:** Develop a database for livestock farms and farmers at both governmental and non-government levels. Establish a hotline in government animal hospitals to provide 24-hour health services and enhance monitoring of livestock health service quality.

### B.7. Impacts on Environmental Sector:

Extreme heat can coincidentally overlap with other hazards like droughts, dust storms, pollution events, or wildfires. However, their simultaneous occurrence is usually due to common atmospheric drivers or land conditions. Extreme heat can lead to soil desiccation, worsening drought severity; this combination is a typical example of a compound event with disproportionate impacts on societies and ecosystems.

Climate Characteristics of Chuadanga and its surrounding: The climate of Chuadanga is extreme. It situated at an elevation of 16.68 meters (54.72 feet) above sea level, the district experiences a tropical humid and dry climate. The annual average temperature here is 28.46°C, which is 0.72% higher than the national average. The district records a minimum temperature of 6.0°C and a maximum of 43.7°C. While the national average annual rainfall is 2200 millimeters, Chuadanga averages only 60.59 millimeters. Over the past five years, average rainfall during the monsoon months of June and July has been steadily decreasing. Below are the recorded average rainfall data by the district weather office: The environmental impact can be described as;

- **Drought Conditions:** If there is no rainfall for more than 20 consecutive days on an average in a dry season, which is considered as drought. In Chuadanga, Meherpur, Jhenaidah, and Kushtia districts, the region has experienced no rainfall throughout March and April, resulting in extreme heat. Consequently, ponds, canals, and other water bodies have dried up, leading to a shortage of irrigation and safe drinking water. River flows have nearly ceased, groundwater levels have dropped by 6-8 feet, causing soil moisture deficits, crop failures, and fodder shortages for livestock.
- **Crop Failure:** The severe heat combined with the lack of rainfall has led to drought conditions, adversely affecting farmers' crops. The agriculture department and farmers fear a crop failure. Irrigation costs have increased, and expenses for labor and pesticides have risen. While rice has not been affected, the extreme heat has prevented farmers from sowing jute. Fruits like mangoes, lychees, and guavas have dropped prematurely. The stems and tops of various vegetables, including bitter gourd, cucumber, and taro, are drying out, and flowers and fruits are dropping.
- **Creating Water Crisis:** The extreme heat has led to a severe water crisis. As groundwater levels continue to drop, more than half of the tube wells in most villages of the region are no longer functioning, causing a significant shortage of water.
- **Deforestation by Brick Ovens:** Extensive deforestation and wood burning have intensified the region's heat. One major cause of deforestation is the use of wood in brick ovens. Besides, the forest grabber cutting the tree without any reason which is tremendously leading to deforestation.





**Forest Loss:** According to Global Forest Watch, Bangladesh lost 8.39 thousand hectares of forest between 2002 and 2023. During this period, the total forest area decreased by 8.7%. In 2010, there were 2.22 million hectares of natural forest, which accounted for 16% of the total land area. By 2023, 17.8 thousand hectares of natural forest had been lost, equivalent to 10.9 megatons of carbon dioxide emissions. Between April 28 and May 5, 2023, Global Forest Watch reported 76 deforestation alerts in Chuadanga, but no action was taken by the relevant authorities.

**Chuadanga:** In 2010, Chuadanga had 125 hectares of tree cover, which accounted for 0.11% of the district's land. By 2020, Chuadanga had 60.3 thousand hectares of trees, covering more than 51.9% of the district's land. As of 2023, the loss of more than one hectare of trees in Chuadanga is equivalent to 1.42 lakh tons of carbon dioxide emissions.

**Meherpur and Kushtia:** Similarly, in 2010, Meherpur had 74 hectares of tree cover, and Kushtia had 54 hectares. By 2023, the loss of more than one hectare of trees in these districts is equivalent to 481 and 924 tons of carbon dioxide emissions, respectively.

Extreme heat levels range from 40°C to 41.9°C, while very extreme heat levels are above 42°C. From April 16 to May 5, 2023, the average temperature in Chuadanga, Meherpur, Jhenaidah, Kushtia, and Jashore districts was above 40°C (with a maximum temperature of 43.8°C), the highest in the country.

## B.8. Recommendations to mitigating impact on Environment:

- **Conserve Water Bodies:** Ensure conservation and restoration of water bodies such as rivers, canals, ponds, lakes, and wetlands to maintain water reservoirs on the earth's surface. Reduce dependency on groundwater and plant various indigenous tree species around water bodies.
- **Impose Necessary Laws:** Strictly enforce environmental laws to stop deforestation, encroachment, pollution, and ensure penalties for offenders. No development projects should be undertaken without environmental assessment.
- **Promote Environment Friendly Constructions:** Urban planning should prioritize eco-friendly building construction by preserving forests or plantations, preventing encroachment on canals, rivers, and wetlands. Building designs for homes, businesses, and offices should include provisions for planting trees.
- **Promote Green Farming:** Continuous farming and intense heat are depleting soil fertility, beneficial bacteria, and minerals, impacting the environment due to chemical fertilizer and pesticide use. Therefore, promote environmentally sustainable farming practices.
- **Promote homestead Plantation:** Plan to densely cover rural homes with trees to provide shelter. This requires increasing awareness and initiatives at individual, family, societal, and national levels for effective, medium, and long-term shelter management.
- **Strengthen Local Network among the Environmental Actors:** Government and non-governmental organizations should collaborate at the district level to address environmental issues and climate change challenges. Establish networks among all governmental and non-governmental development agencies and civic-social organizations to implement joint initiatives.



- **Taking evidence based National and Local Advocacy Initiative:** Form an advocacy forum for local and national-level environmental policy advocacy and law reformation, integration, and implementation.

These recommendations will highlight the strategies for addressing environmental degradation and climate change challenges through collaborative efforts at various levels of government and society.

## B.9. Impacts on Livelihood Sector:

*The total population for Four Selected Districts are 6,096,112  
Female - 3,096,137, male - 2,999,975  
Total workforce from both gender 2,620,380  
Due to the extreme heat condition in these districts,  
daily economic losses amount to Tk 61,31,68,775.  
In 20 days, the total income loss estimated Tk 12,26,33,75,484.*

The extreme heat has reduced the number of people traveling on roads and other means in this area, with most shops seen closed. People's normal movements have been disrupted, and there has been a significant downturn in business, commerce, and productivity.

Due to intense heatwaves, road surfaces have melted, affecting pedestrian movement and causing roads to deteriorate under the weight of heavy vehicles, leading to hazardous travel conditions.

Workers, agricultural laborers, daily wage earners, rickshaw-van pullers cannot work, and they have to spend money saved. Due to the severe heatwave, income and employment have been significantly affected. For example, daily laborers used to earn 400 Taka earlier, now they earn between 200 to 300 Taka. Passengers cannot be found in the road side due to excessive heat. As a result, income has also decreased by 30%-40%. Due to the decrease in income of ordinary people, the demand for daily necessities has also decreased. Being outside during the day was very difficult, and the sources of low-income people have been reduced. Small businesses have also decreased by more than 30%. As a result, people's income has decreased by 30% compared to other times.

Due to severe heatwaves, changes have occurred in all professions. Agricultural workers could not work for more than 5 hours. Previously they used to work for 8-9 hours. Business establishments have to be closed from 12 pm to 5 pm. Here too, 6 hours less time has been wasted.

There have been far-reaching impacts on social customs, ceremonies, religious activities, or movements due to extreme heat conditions. For instances, many events such as marriages, circumcisions, and other events have had to be changed. Many wedding dates have changed, resulting in incidents like broken marriages. Boys and girls are not attending school, college, punctuality, and classes. As a result, the importance of education is declining. The total 545 ordinary citizens participated in the survey. 99% of the respondents reported that their daily income severely decreased which is calculated an average of Tk 234 per day/ per person.



The study team further wanted to know about the participants average working hour in normal time. The respondents reported that before the extreme heat situation one person used to work for an average of 9 hours a day, now they can work for 6 hours, and as a result, their average daily work hour loss is three hours which is impactful negative on income for 234 Tk/ day. Besides, they believed that their social customs had been affected by the severe heat conditions.

#### **B.10. Recommendations to mitigating impact on Livelihood:**

- As an initial step to mitigate economic and social losses, arrangements for local resource mobilization can be effective. This can be facilitated by local individuals, organizations, or the government by collecting necessary assets, such as financial aid, to quickly assist those affected.
- Ensure prompt government/private relief assistance during heatwaves. Additionally, as an emergency response, ensure the distribution of umbrellas, saline, water, dry food, baby food, and animal feed to people affected.
- Implement pre-preparedness activities within the community. Promote a saving mindset so that individuals can protect themselves during disasters.
- Form a local level government disaster relief fund and create a list of local affected individuals to implement rehabilitation activities for immediate response.
- Develop entrepreneurship programs through environmentally friendly trade training and create employment opportunities through soft loans. Alternative employment arrangements should be made as well.

#### **C. Policy Recommendations for the National and International Actors:**

Based on the results mentioned in the abovementioned sectoral recommendations, it may not be feasible to implement all if there is a lack of necessary policy framework, resources, or guidance from the policy level. Considering the importance of the sectoral findings and recommendations, the following key policy recommendations are proposed:

1. Declare the southwestern region of the country as a disaster-prone area due to extreme heat under the full implementation of the National Disaster Management Act. Separate disaster management skills and provisions should be included in the Disaster act to adopt and implement for this region.
2. Establish an effective alliance involving national, international and local stakeholders for disaster preparedness and mitigation activities. This alliance should play a proactive role in addressing local issues through national and international advocacy and lobbying efforts.
3. Allocate separate provisions in the national budget for the southwestern region as prone to severe heat as disaster, ensuring effective monitoring and distribution of disaster relief during disaster periods and ensuring rapid resettlement assistance for affected individuals or families.
4. Provide necessary directions and arrangements to the local administration and relevant departments for the construction, renovation, and maintenance of water reservoirs, rivers, canals, afforestation, and greening projects to maintain tolerable temperature levels locally.
5. Establish a Ministry of Environment-led committee responsible for determining actions, project adoption, and necessary provisions for the southwestern region during all disaster periods and monitoring the implementation of government directives at the local level.
6. Promote the development of heat-resistant technologies, climate-resilient agriculture, fisheries, and animal breeding, promote the use of innovative fishing nets, and encourage youth engagement in enhancing environmentally friendly development initiatives locally. Government and non-governmental projects should be adopted and implemented at various levels.





## CONCLUSION

The study concludes that extreme heat conditions in the southwestern region of Bangladesh have profoundly impacted agriculture, fisheries, livestock, the environment, and the socio-economic fabric of affected communities. The significant decline in productivity, income, and social well-being underscores the urgent need for immediate and coordinated efforts to address the rising temperatures and their consequences.

Extreme heat has caused substantial crop failures, reduced yields, and increased farming costs due to additional irrigation and pest control needs. The heat has also negatively affected fisheries and livestock, leading to higher mortality rates and decreased productivity. These economic losses threaten food security and the livelihoods of those reliant on agriculture and related activities, while environmental degradation, such as diminished water bodies and loss of biodiversity, poses long-term risks to natural resource sustainability and ecosystem health.

The socio-economic structure of communities has been severely disrupted, with daily wage earners facing dramatic income reductions due to shortened working hours. Social activities and norms, including marriages, school attendance, and community events, have been adversely affected, undermining social cohesion. Immediate action is needed to implement the study's recommendations, which include promoting climate-resilient agricultural practices, improving water management, and developing heat-resistant infrastructure. Policy interventions should focus on declaring the region disaster-prone and establishing alliances among stakeholders to mobilize resources for disaster preparedness and climate adaptation. These initiatives are crucial for protecting livelihoods, enhancing resilience, and ensuring sustainable development in the face of climate change.

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জেলা কৃষি সম্প্রসারণ অধিদপ্তর, যায়যায় দিন- ২৯ এপ্রিল ২০২৪, শেয়ার বিজ- ২৬ এপ্রিল ২০২৪, বাসস- ৩০ এপ্রিল ২০২৪।

জেলা কৃষি সম্প্রসারণ অধিদপ্তর, চুয়াডাঙ্গা, কুষ্টিয়া, ঝিনাইহদহ ও মেহেরপুর।

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# সংযুক্তি: পত্রিকায় প্রকাশিত উল্লেখযোগ্য কভারেজ/নিউজ



## ১.সারাদেশ

### তাপদাহে চুয়াডাঙ্গাসহ চার জেলায় কৃষিখাতে ক্ষতি ৩৬৩ কোটি টাকা

১৫ মে, ২০২৪ ১৮:০২



তাপদাহের প্রভাবে চলতি বছর চুয়াডাঙ্গা জেলাসহ পাশের তিন জেলাতে কৃষিখাতে অন্তত ৩৬২ কোটি ৬২ লাখ টাকা ক্ষতি হতে পারে। এছাড়া চুয়াডাঙ্গা জেলাতে মৎস্য খাতে ৯৭ কোটি ৮৮ লাখ ও প্রাণিসম্পদ খাতে ৯৬ কোটি ৩৩ লাখ টাকা ক্ষতির আশংকা রয়েছে। বেসরকারি উন্নয়ন সংস্থা ওয়েভ ফাউন্ডেশনের এক সমীক্ষায় এসব তথ্য উঠে এসেছে। এছাড়া চুয়াডাঙ্গা, মেহেরপুর, ঝিনাইদহ ও কুষ্টিয়া জেলার জীবন-জীবিকায় অন্তত এক হাজার ২০০ কোটি টাকার ক্ষতি হয়েছে।

বেসরকারি উন্নয়ন সংস্থা ওয়েভ ফাউন্ডেশনের এক সমীক্ষায় এসব তথ্য উঠে এসেছে। এছাড়া চুয়াডাঙ্গা, মেহেরপুর, ঝিনাইদহ ও কুষ্টিয়া জেলার জীবন-জীবিকায় অন্তত এক হাজার ২০০ কোটি টাকার ক্ষতি হয়েছে।

বুধবার (১৫ মে) বেলা ১১টায় ওয়েভ ট্রেনিং সেন্টারের সভাকক্ষে আয়োজিত সংবাদ সম্মেলনে এসব তথ্য উপস্থাপন করা হয়। সমীক্ষার মুখ্য গবেষক মোহা. হাসান আলী জানান, সম্প্রতি চুয়াডাঙ্গা, মেহেরপুর, ঝিনাইদহ ও কুষ্টিয়া জেলায় কৃষি-মৎস্য-প্রাণিসম্পদ, পরিবেশ ও জীবন-জীবিকার উপর তীব্র তাপদাহের প্রভাব মূল্যায়ন বিষয়ক একটি সমীক্ষা পরিচালনা করা হয়। এতে উল্লেখিত তথ্য গুঠে এসেছে। যা আগামীতে এ অঞ্চলের মানুষের জীবনে ভয়াবহ পরিণতি ডেকে আনতে পারে। সংবাদ সম্মেলনে সমীক্ষা পরিচালনাকারী দলের পক্ষে উপস্থিত ছিলেন ওয়েভ ফাউন্ডেশন মুখ্য গবেষক ড. মোহা. হাসান আলী, সংগঠনে উপদেষ্টা আব্দুস শুকুর, উপ-পরিচালক জহির রায়হান, সহকারী পরিচালক কিতাব আলী, জ্যেষ্ঠ সমন্বয়কারী আব্দুস সালাম ও কামরুজ্জামান যুদ্ধ।

## 2. DBC News

May 16, 2024



# সংযুক্তি: পত্রিকায় প্রকাশিত উল্লেখযোগ্য কভারেজ/নিউজ



৩. প্রথম আলো (চুয়াডাঙ্গা প্রতিনিধি);  
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## Why is Bangladesh in the grip of a sizzling heatwave?

5. Daily Star :

April 26, 2024



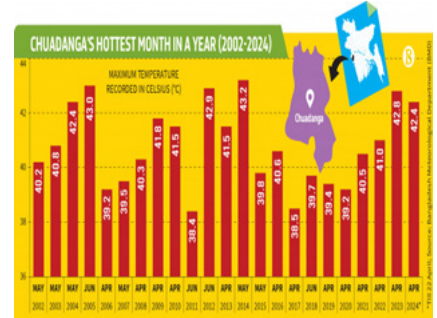
This April, Bangladesh has seen a record-breaking number of heatwave days—the highest in nearly eight decades. PHOTO: PRABIR DAS

6. Business Standard

April 23, 2024

## Closest to the sun': Why Chuadanga so hot in April?

The Met Office yesterday issued a heat alert for another 72 hours



7. বাসস

April 19, 2024

🏠 জাতীয়

👤 বাসস

🕒 ১৯ এপ্রিল ২০২৪, ১৭:৩৭

📅 আপডেট : ২০ এপ্রিল ২০২৪, ১৪:০৮

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চুয়াডাঙ্গায় তীব্র তাপ প্রবাহ, সর্বোচ্চ তাপমাত্রা ৪১.৩ ডিগ্রি সেলসিয়াস







## 8. Daily Ittefaq

18 April, 2024

### চুয়াডাঙ্গায় তীব্র তাপদাহ: হিট এলার্ট জারি করে মাইকিং

চুয়াডাঙ্গা প্রতিনিধি

প্রকাশ: ১৮ এপ্রিল ২০২৪, ১৯:১৩



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29 April 2024

### মৌসুমের সর্বোচ্চ তাপমাত্রা চুয়াডাঙ্গায়

চুয়াডাঙ্গা প্রতিনিধি

২৯ এপ্রিল ২০২৪, ০৩:৪৮ পিএম | অনলাইন সংস্করণ

8 Shares



## 10. Shomoy News

30 April 2024



### চুয়াডাঙ্গার সর্বোচ্চ তাপমাত্রা ৪২.৩ ডিগ্রি

চুয়াডাঙ্গায় চলতি মৌসুমের সর্বোচ্চ তাপমাত্রা রেকর্ড করা হয়েছে।

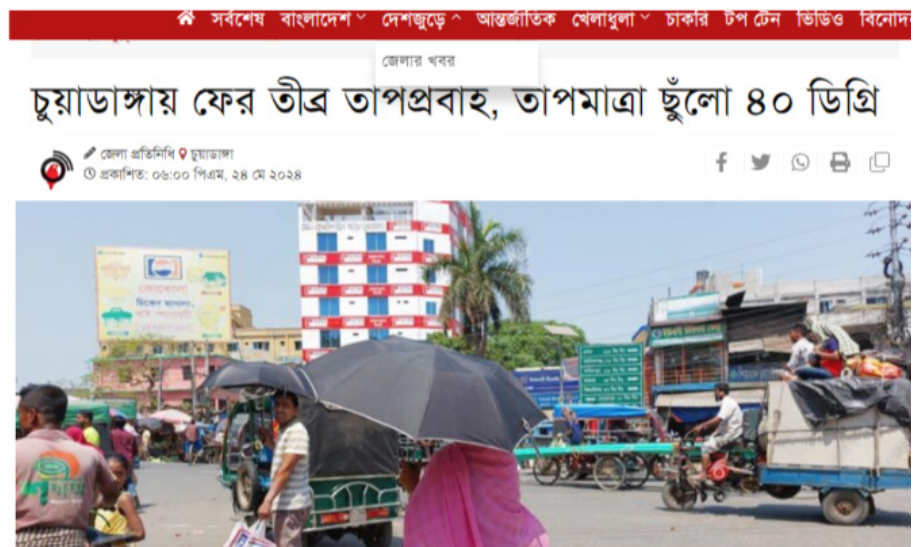


# সংযুক্তি: পত্রিকায় প্রকাশিত উল্লেখযোগ্য কভারেজ/নিউজ



## 11. Jago News

24 May, 2024



## 12. Akash Khobar

16 May, 2024





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