CENTRE FOR STUDIES ON ENVIRONMENT AND CLIMATE
ASIAN DEVELOPMENT RESEARCH INSTITUTE

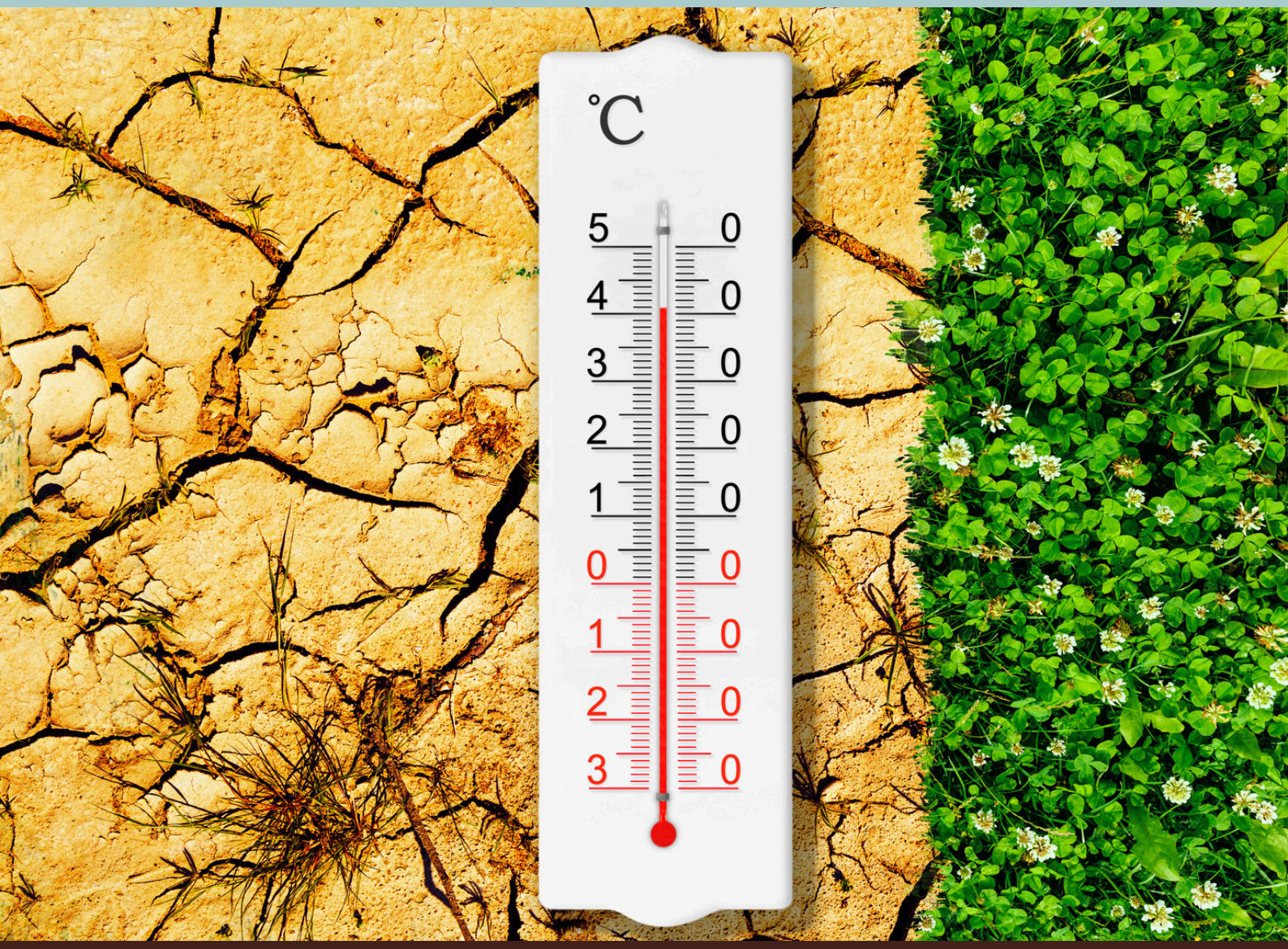
An ICSSR-recognised Institute

CSEC-ADRI'S

ANNUAL REPORT

2023-24

THE LATEST NEWS AND UPDATE ON ENVIRONMENT & CLIMATE CHANGE



Climate Chronicles: Navigating the Impacts and Solutions

CSEC-ADRI Team:
Dr. Sunil Kumar Gupta
Ms. Nisha Kataria
Ms. Pooja Kumari
Mr. Gulshan Patel
Mr. Sanjeev Kumar

Editor Team:
Dr. Ashmita Gupta – Member Secretory, ADRI
Dr. Sunil Kumar Gupta – Research Lead, CSEC-ADRI

Design & Compilation:
Ms. Nisha Kataria Mr. Sanjeev Kumar

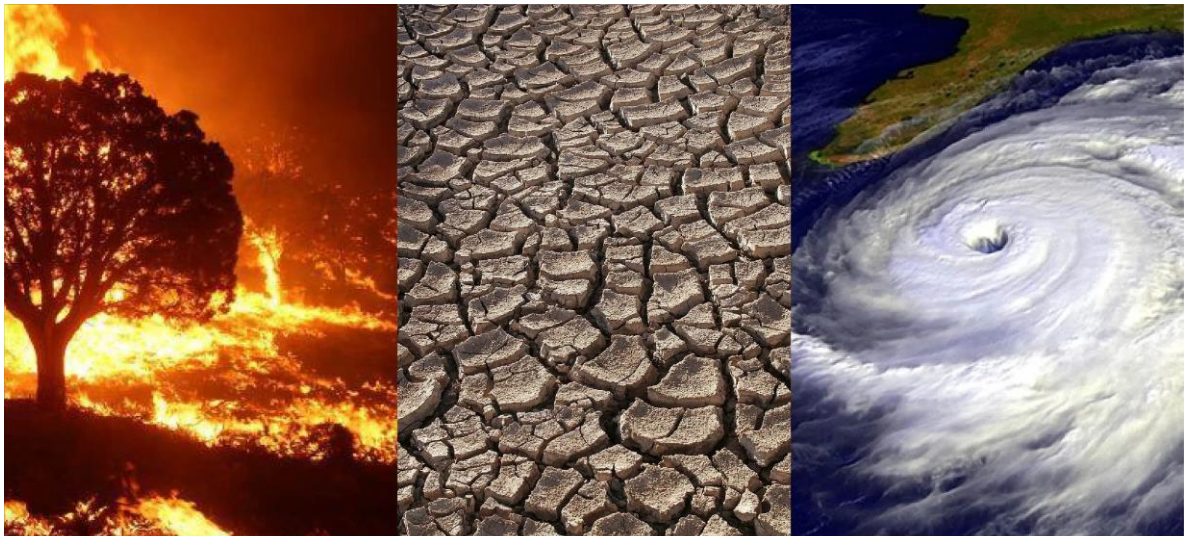
Copy Editor: Mr. Abhishek Prasad
Type Setting: Mr. Harendra Kumar

Annual Report: 2023-24

Published by:
Centre for Studies on Environment and Climate (CSEC), Asian Development Research Institute (ADRI),
BSIDC Colony, Off Boring Patliputra Road, Patna- 800 013 (Bihar), India

Climate Chronicle: Navigating Impact and Finding the Solutions

Climate Concerns: A Journey through Change



The potential future effects of global climate change include more frequent wildfires, longer periods of drought in some regions, and an increase in wind intensity and rainfall from tropical cyclones. Credit: left - Mike McMillan/USFS, center - Tomas Castelazo/ Wikimedia Commons / CC BY-SA 4.0, right - NASA.

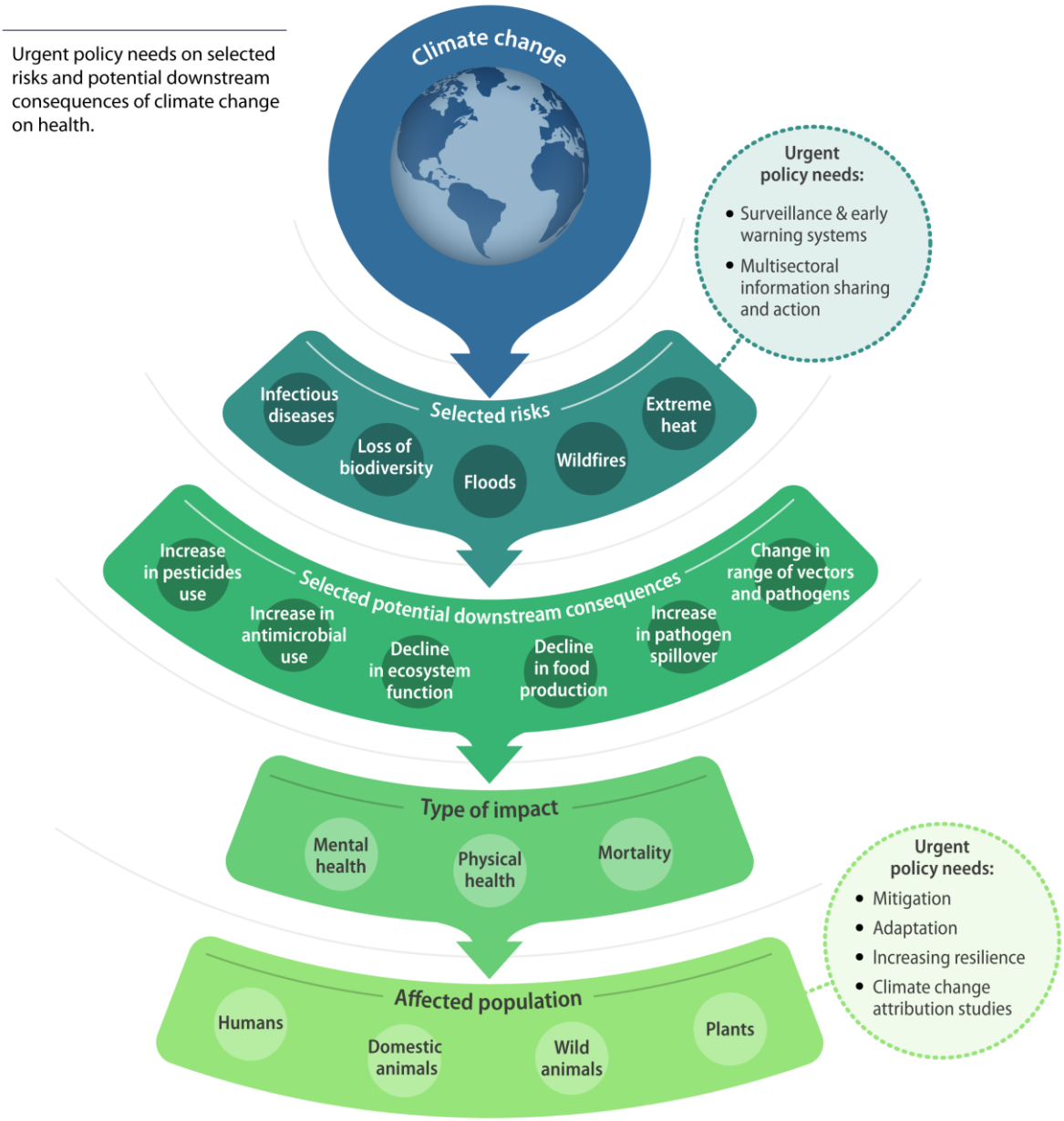
Climate Change Consequences

- Warmer temperatures increase the frequency, intensity, and duration of heat waves which can pose health risks, particularly for young children and the elderly.
- Climate change can devastate human health by worsening air and water quality, escalating the spread of certain diseases.
- Rising sea levels threaten coastal communities and ecosystems.
- Changes in the pattern and amount of rainfall as well as changes in the timing and quantity of stream flow, can affect water supplies water quality and the production of hydroelectricity.
- Changing ecosystems, influence the geographic ranges of many plant and animal species and the timing of the occurrence of their lifecycle events, such as migration and reproduction.

- Heightening the frequency and intensity of extreme weather events, such as heat waves, droughts, and floods, which can damage property and even make it disappear; causes costly disruptions to society, and reduces the capacity to afford insurance.

"The scientific evidence is unequivocal: climate change is a threat to human well-being and the health of the planet. Any further delay in concerted global action will miss the brief, rapidly closing window to secure a livable future"

- Intergovernmental Panel on Climate Change



What is Climate Change?

Climatic changes observed over the 20th and 21st centuries include increases in global air and ocean temperature, rising global sea-levels, and widespread reduction of snow and ice cover of the planet which will just not cease. Alterations in atmospheric and ocean circulation as well as regional weather patterns, which influence seasonal rainfall conditions, have also taken place. These changes have been caused by superfluous heat in the climate system due to the release of greenhouse gases (GHGs) into the atmosphere. Greenhouse gases are generated primarily by human activities such as the burning of fossil fuels (coal, oil, and natural gas) and crop residues, various agricultural practices, and land-use changes. Forest fires are also to be blamed. These incidents increase the amount of 'heat-trapping' greenhouse gases in the atmosphere. The aforesaid pattern of observed changes in the Earth's climate system is consistent with an accentuated greenhouse effect. Other climatic influences such as volcanic explosions, solar activity and natural variability cannot alone explain the timing and extent of these discovered changes.

Climate refers to the long-term regional or global average of temperature, humidity and rainfall patterns over many seasons, years, or even decades. While the weather can vary ephemerally over just a few hours, climate changes over a longer time-frame. Climatic change is the significant variation of average weather conditions becoming, for example, warmer, wetter, or drier over several decades or longer. It is the longer-term trend that differentiates climate change from natural weather variability.

-World Bank Organization

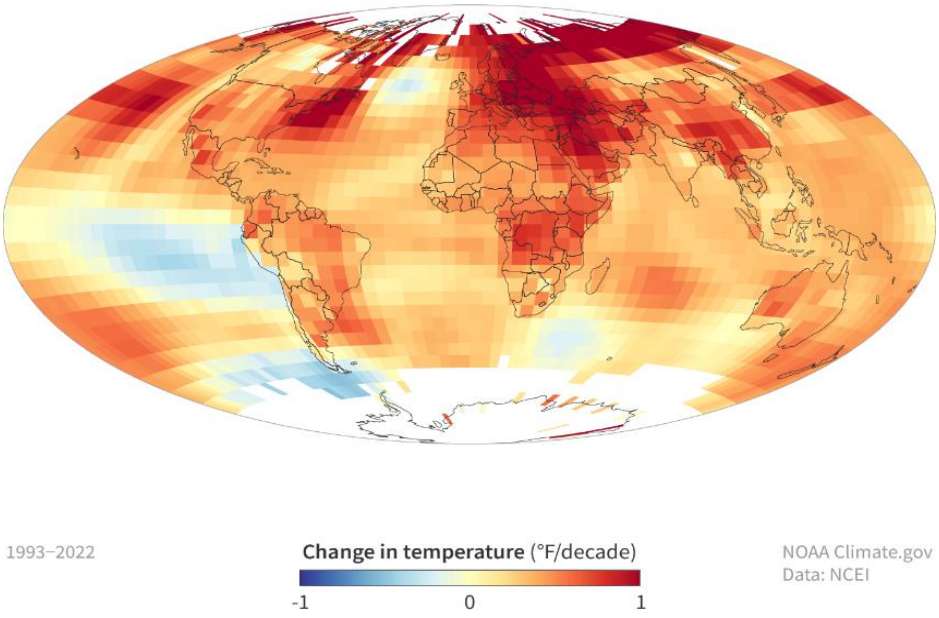
The IPCC's Sixth Assessment report, published in 2021, found that human emissions of heat-trapping gases have already warmed the climate by nearly 2 degrees Fahrenheit (1.1 degrees Celsius) since 1850-1900. The global average temperature is expected to reach or exceed 1.5 degrees C (about 3 degrees F) within the next few decades. These changes will affect all regions of Earth.

Climate change threatens the indispensable elements of good health – clean air, safe drinking water, nutritious food supply and safe shelter – and has the potential to undermine decades of progress in global health. Between the forthcoming years of 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year from malnutrition, malaria, diarrhoea, and heat stress alone.

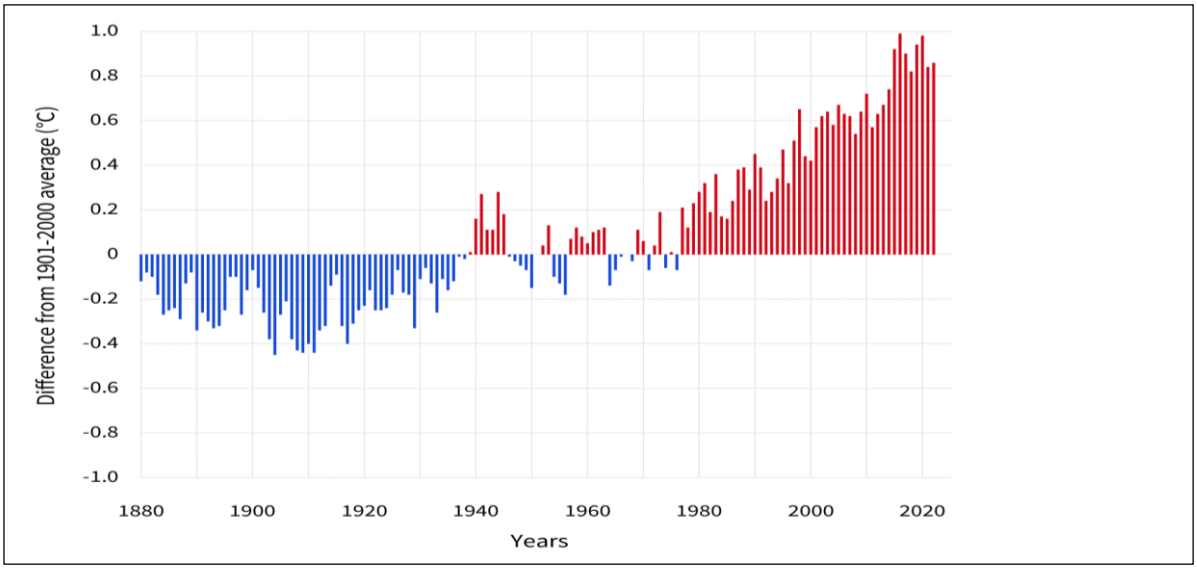
The direct damage costs to health are estimated to be between US$ 2-4 billion per year by 2030.
-IPCC

Impact of Climate Change

Mercury Rising: The Global Temperature Challenges

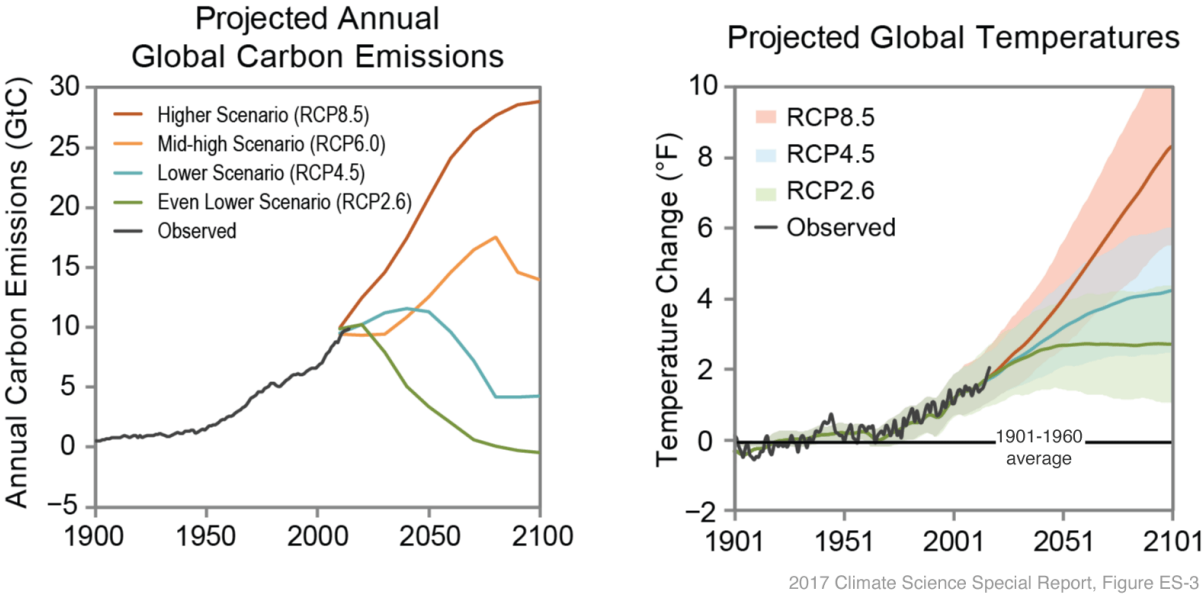


The relentless rise in global temperatures, as evidenced by the data, represents a stark reality of the profound impact of climate change. Over the past century, our planet has witnessed a steady increase in temperature, with an average increase of 0.08°Cper decade since 1880. This warming trend has accelerated since 1981, with a rate of 0.18°Cper decade. The year 2022 stands as a testament to this trend, with temperatures soaring to unprecedented levels of 0.86°C (warmer than the 20th-century average), making it one of the warmest years on record. Alarming patterns of change reveal that the 10 warmest years have all occurred in the past decade, underscoring the relentless pace of change.



This non-uniform warming has far-reaching consequences, disrupting eco-systems, and intensifying weather extremes, thereby threatening the stability of our planet. The urgency required to address this critical issue cannot be over-stated, as future projections indicate a potentially catastrophic scenario if greenhouse gas emissions continue to rise. Models project a potentially catastrophic scenario of global temperatures increasing by at least 2.4°C or even up to 5.9°C by the end of this century. Mitigating climate change and curbing further temperature rise requires immediate and concerted global efforts to make a transition toward a sustainable and low-carbon future.

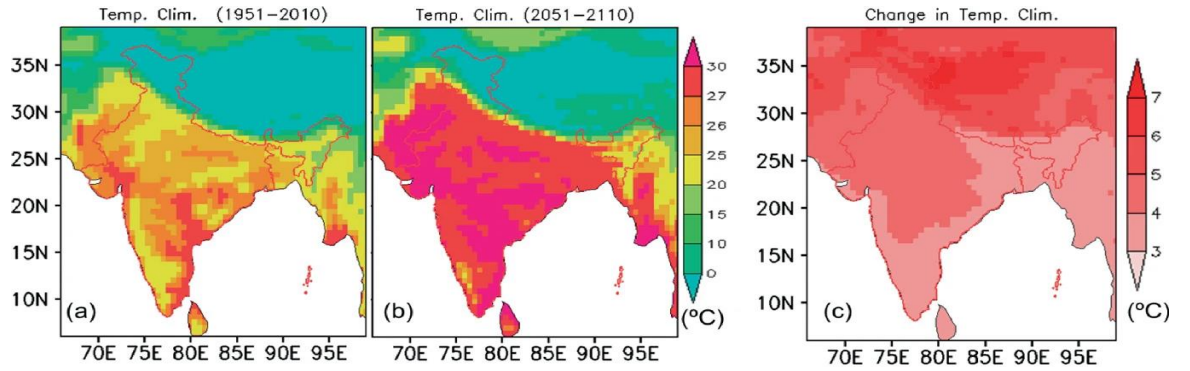
Rising Thermometer Readings: India's Climate Woes and its



2017 Climate Science Special Report, Figure ES-3

Future Battles

India is no stranger to the treacherous effects of a warming climate, as is evidenced by the progressively frequent and unprecedented bouts of scorching heat that are becoming the new normal. Disturbingly, these heat waves are projected to hold sway over even larger expanses of the country. A disconcerting forecast predicts potentially catastrophic consequences of a 4°C temperature increase: the western coast and southern regions of India could transit into new, high-temperature climatic regimes, creating substantial challenges for the agricultural, environmental, and economic sectors.



Temperature climatology from the AGCM ensemble mean for (a) present, (b) future climates and (c) the future temperature changes. **Source:** Mizuta et al. (2017)

On analyzing these temperature trends, a grim picture emerges. The annual mean surface temperature recorded between the years 1951 and 2010 covering a significantly expansive portion of India consistently hovered around 25°C or higher. However, looking into the period from 2051 to 2110, these same regions are expected to experience even more relentless high heat conditions, with temperatures consistently surpassing 27°C. Projections indicate impending warming of an additional 3-5°C across the whole of India during the 2051 to 2110 period when compared to the reference period of 1951-2010. In particular, central and north-western India are slated to face temperature augmentation of 4-5°C, while certain northern regions could witness an astonishingly high rise of 6°C or more. This temperature drift portends a challenging future, necessitating the execution of proactive measures to adapt to and mitigate the impact of this ever-mounting temperature escalation.

The Reign of Rain: Elucidating the Dual Nature of Precipitation

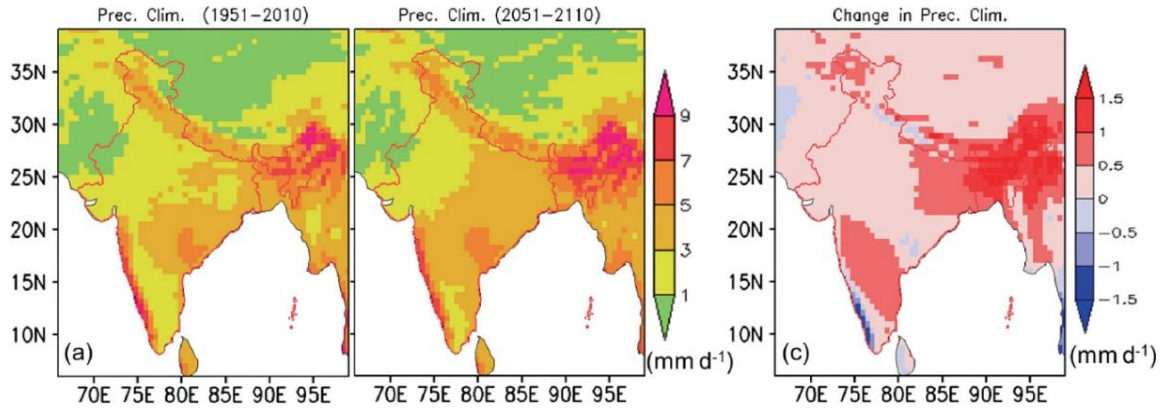
Precipitation serves as a fundamental climate parameter and is of utmost significance for meeting various needs of society: the provision of water for drinking, domestic use, agricultural practices, industrial processes, and the generation of hydropower. It's the

driving force behind significant climatic catastrophes, viz., droughts and floods that leave indelible scars on regions and their inhabitants.

In the context of South Asia, precipitation patterns are profoundly influenced by the El Nino-Southern Oscillation (ENSO) phenomenon. Traditionally, the emergence of La Nina, a counterpart to El Nino, has engendered noteworthy climatic consequences for this region. During the summer monsoon season, South Asia has started to experience a pronounced uptick in rainfall, which is a characteristic signature of La Nina's influence.

This intricate inter-play between ENSO and South Asia's precipitation fortunes deeply influences the complex web of climate dynamics, emphasizing the need for meticulous monitoring of rainfall and adaptation strategies in the face of a changing climate system.

Rising Flood Risks: Impact on India

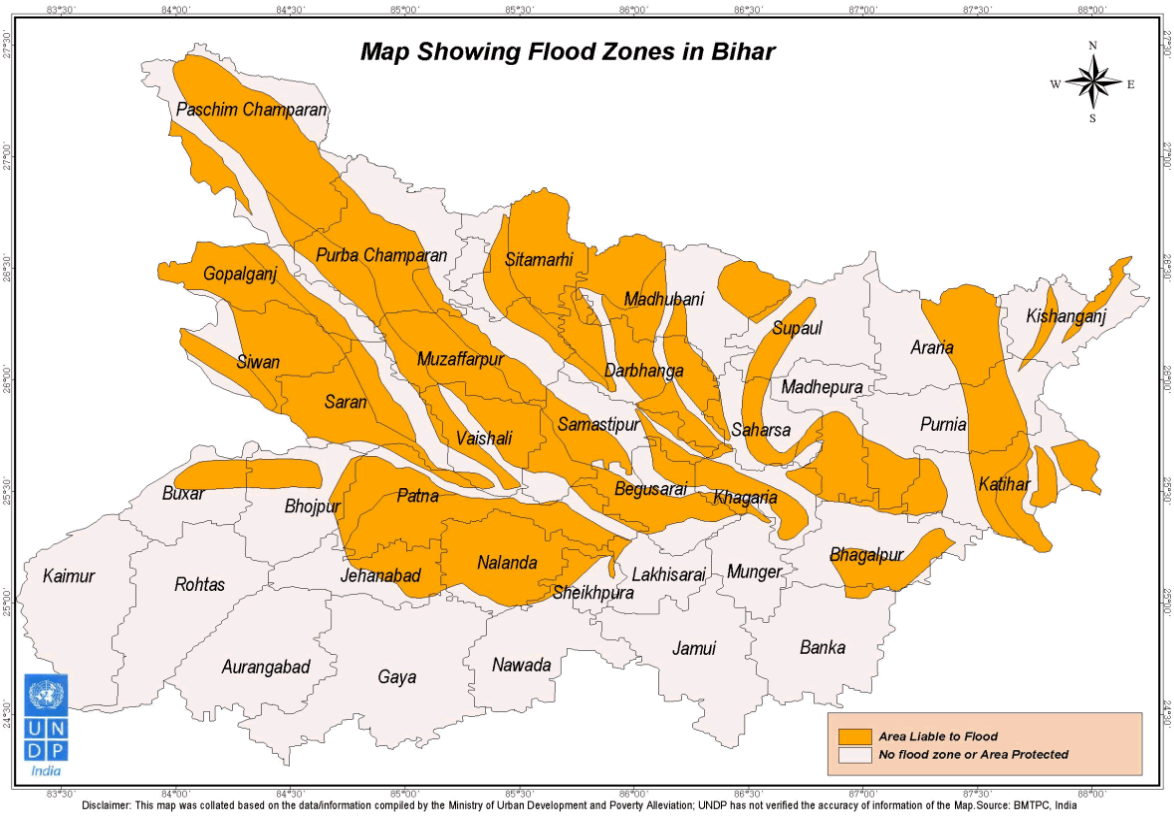


Source: Mizuta et al. (2017)

The exacerbation of adverse effects of floods due to climate change is posing a world-wide rapidly intensifying threat. The staggering toll of over 200,000 lives lost and nearly

one billion people getting affected by storms and floods between 2005 and 2014 highlights the magnitude of this calamitous issue in Asia particularly, which has earned the dubious distinction of being the most disaster-prone region of the globe. The nightmarish consequences of flooding are multi-faceted and heart-rending and are manifested in the form of erosion of riverbanks, destruction of villages and towns situated along river banks, loss of lives, damage to homes, decimation of crops and livestock, jeopardized livelihoods, and extensive harm to critical infrastructure.

Bihar, nestled in the northeastern part of India, stands as a prime example of a region acutely susceptible to the perils of flooding. This state, defined by a topography characterized by a network of perennial and non-perennial rivers, faces a distinct challenge, especially from rivers originating in Nepal that carry substantial sediment loads which get deposited eventually all over the plains of Bihar. Most of the rainfall in this area is concentrated within the three



months of the monsoon season. During the monsoon season, river flows increase up to 50 times of summer flows causing devastating floods (Matheswaran et al., 2019).

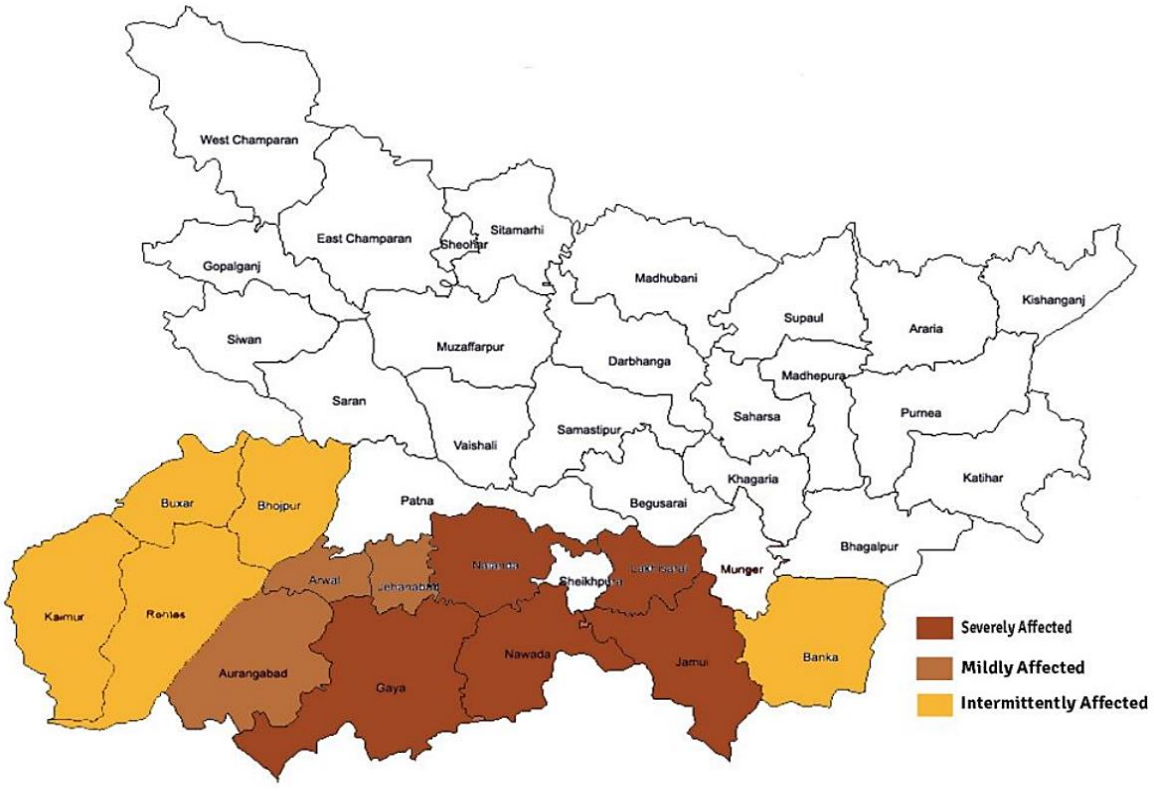
The Bihar government's Flood Management Information Systems Cell has classified floods in the region into four categories. Class I comprises flash floods that are triggered by intense rainfall in Nepal and is characterized by a short lead time of a mere 8 hours, with floodwaters receding relatively quickly. Class II consists of river floods, with a lead time of 24 hours and flood-waters persisting for a week or more. Class III is composed of drainage congestion in river confluences, featuring lead times that exceed 24 hours and floodwaters that persist for the entire Monsoon season, which can be as long as three months. Finally, Class IV refers to permanently waterlogged areas. Alarmingly, a staggering 73.63% of North Bihar's geographical area is classified as flood-prone. Out of the 38 districts in Bihar, 28 routinely face flooding, with 15 districts being the hardest hit. This tragic event resulted in colossal losses, affecting property, lives, farmlands, and critical infrastructure. The 2008 Kosi floods, for instance, ravaged over 350,000 acres of paddy fields, 18,000 acres of maize, and 240,000 acres of other crops, adversely impacting nearly half a million farmers in the region. Bhagalpur (35.8%), Patna (30.2%) followed by Khagaria (26.9%), Lakhisarai (26.4%) and Munger (21.7%) were the worst affected districts (Matheswaran et al., 2019). About 9.26 million populations were assessed to be affected, with Patna (1.45 million people) followed by Bhagalpur district (0.69 million people) contributing to the highest population affected by the late September flood wave. The 2019 late September flooding event also provided a conducive environment to the spread of waterborne diseases, especially in Patna which witnessed a high rise in dengue fever cases.

Drought: A Looming Threat to Agriculture

In recent decades, South Asia has witnessed a worrying trend of increasing aridity, particularly since the 1970s. This shift in the climate system has brought forth a growing number of droughts, foreboding significant consequences for the region. In both 1987 and 2002-2003, droughts wreaked havoc across more than half of India's cropped area, leading to substantial declines in the nation’s agricultural produce. Unfortunately, the outlook doesn't bode well, as certain areas, such as north-western India, Jharkhand, Orissa, and Chhattisgarh, are predicted to suffer even

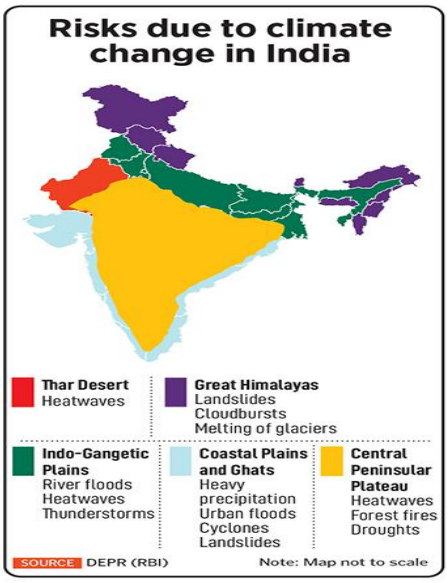
more persistent droughts in the future. The relentless march of extreme heat conditions, expected to intensify by the 2040s, is poised to further aggravate the effect of this challenge, causing significant drops in crop yields.

Droughts in South Asia, particularly in regions like Bihar, manifested in various forms with meteorological droughts being the first to strike due to direct environmental changes. Bihar, a state familiar with the dual onslaught of drought and flood, exemplifies the stark reality of the duo's co-existence. In 2013, when the Monsoon rains inundated 20 districts of Bihar, there was a rapid transformation of the scenario. By the end of that year's southwest monsoon, a staggering 33 districts were declared drought-stricken, bringing to the fore the volatile nature of the region's climate. This pattern repeated itself in 2015, 2009, and 2004 when 18, 26, and 19 districts respectively had to grapple with hardships imposed by the droughts. The formidable challenges posed by these increasingly frequent droughts call attention to the



urgent need for pro-active measures to safeguard agriculture and all types of livelihoods in the face of a deteriorating climatic landscape.

Health in Peril: India's Climate-Induced Health Crisis



Climate change has cast a dark shadow over the state of public health in India, exposing its vulnerable population to a range of illnesses and diseases. The World Health Organization (WHO) has sounded an alarm by declaring climate change as a global threat to the constant struggle to provide necessities like clean air, safe drinking water, nutritious food, and secure shelter to the people. The consequences for public health can be dire and are listed as follows:-

Rising Respiratory Woes: The surge in Ambient Particulate Matter Pollution has sparked a worrying uptick in respiratory diseases like Asthma, Chronic Obstructive Pulmonary Disease (COPD), and Lung Cancer.

Vector-Borne Epidemics: India is grappling with a rapid spread of vector-borne diseases such as Dengue, Malaria, and Chikungunya, which pose a grave health risk to its citizens.

Malnutrition and Food Insecurity: Disruptions in the food-producing eco-system due to climate change have led to a reduction in the availability of nutritious food, resulting in malnutrition and related health issues.

Mental Health Struggles: Climate-related natural disasters and events have taken a toll on mental health by triggering Anxiety, Depression, and Post-Traumatic Stress Disorder (PTSD) among afflicted individuals.

India's Economy in the Hot Seat: Climate Change Consequences

The impact of climate change is far-reaching, prompting economists and policy-makers to intensify their efforts to mitigate these risks. However, India's vulnerability is a notable challenge. India is ranked among the top 10 economies on the planet that are most at risk from climate-related events.

India's climate-related crises, such as extreme heat waves, erratic Monsoon rains, floods, and rising sea levels are set to have monumental reverberations for its economy and society. The Reserve Bank of India (RBI) warns that up to 4.5 per cent of India's GDP could be at risk by 2030 due to lost hours of labor because of extreme heat and humidity.

RBI's Department of Economic and Policy Research (DEPR) says in the latest report on Currency & Finance 2022-23 that 'Climate change due to rising temperature and changing patterns of monsoon rainfall in India could cost the Indian economy 2.8 per cent of its GDP and depress the living standards of nearly half of its population by 2050'.

The situation is dire, with labor-intensive sectors like agriculture and construction facing significant labor productivity losses due to heat stress. According to the World Bank, India may account for a substantial portion of the forecasted 80 million global job losses by 2030 due to declining labour productivity from heat stress. The economic toll of climate change is not going to be in the distant future; it is happening now, thereby calling urgently for comprehensive action to safeguard India's economy and the well-being of its people.

-Forbes India

A study by Duke University researchers underscores the grim reality of climate change's impact, revealing that India lost a staggering 259 billion hours of labour annually from 2001 to 2020 due to global warming. This loss of productivity amounted to a staggering cost of $624 billion.

SCARCITY OF WATER

According to a report by NITI Aayog, around 600 million people in India face extreme water stress, which is likely to worsen with climate change. Moreover, around 74% of the land used for growing wheat and 65% of the land used for cultivating rice in India will experience significant water scarcity levels by the year 2030.

AGRICULTURE

Agriculture is the backbone of India's economy and a crucial source of livelihood for a significant portion of its population. As this sector is heavily dependent on rainfall and temperature, unpredictable weather patterns affect crop yields and quality. As yields decrease and production costs increase, the price of food is likely to rise.

Climate Change Solutions

Buildings and Cities

In order to arrest the horrible effects of climate change generally and in the context of buildings and cities, a multi-faceted approach needs to be commissioned. Retro-fitting public buildings, promoting the use of sustainable technologies like heat pumps and solar cells, and incentivizing energy-efficient practices are of critical importance. Establishing carbon-neutral building standards for newer construction projects and assimilating ideas of sustainability into urban and rural planning can contribute to long-term resilience. Additionally, supporting mini-grid solutions, district heating, and waste-to-energy systems helps to create eco-friendly infrastructure. Individuals can also play their part by rationalizing their use of energy, making sustainable choices, and advocating for carbon-neutral building standards.

Transport

The transportation sector is a significant contributor to the grim effects of climate change. This demands immediate action. Assisting the transition of transportation fleets to electric vehicles, promoting zero-emission means of conveyance, investing in non-motorized mobility infrastructure, and encouraging public transportation are some of the key strategies. The different businesses in the nation can lead by example, switching to electric fleets and supporting e-mobility. Individuals can also contribute by adopting electric vehicles, choosing rail over air travel, reducing commuting distances, and supporting local government initiatives for better mass transit.

Nature-Based Solutions

Arresting deforestation and restoring eco-systems are pivotal steps for making the consequences of climate change less painful. Collaborative efforts aiming to attain global goals like the Bonn Challenge, monitoring and evaluating conservation efforts along with the restoration process, and investing in landscape conservation can play a significant role in this combat. Businesses should work with suppliers to rein in the bad impacts on eco-systems. They must align their supply chains to achieve the climate goals enshrined

in the UN charter. Individuals can support forest habitat conservation by adopting deforestation-free practices while leading their daily lives and by participating in local or national organizations which are focused on the restoration of Nature.

Agriculture, Food, and Waste

Sustainable practices in agriculture, food production, and waste reduction play a crucial role in climate change mitigation. Implementing schemes which have scientifically-based targets for the preparation of sustainable diets, minimizing food waste, and promoting climate-smart agriculture are key measures. Businesses must enumerate and report food loss and wastage while individuals can contribute by adopting mostly plant-based diets, reducing food wastage, and supporting local sustainable agriculture.

Industry

The industrial sector must give priority to promoting the energy efficiency of factories, reducing emissions, and the transition to low-carbon processes of manufacturing. Implementing and strengthening energy efficiency standards, pricing Carbon, and promoting renewable energy are necessary strategies. Companies should audit their operations, try to have knowledge or awareness of climate change risks and embrace renewable energy. It is imperative that individuals support companies practising sustainable and circular practices to encourage the shift towards a circular economy.

Energy

Transiting to renewable energy usage is fundamental to combating climate change horrors. Monitoring and reducing energy usage, divesting away from the habit of guzzling fossil fuels, setting de-carbonization targets, and advocating for ambitious policies for renewable energy consumption and energy efficiency are some critical suggestions. Both businesses and individuals can contribute to this passage by embracing renewable energy utilization, stopping or curbing the employment of fossil fuels, and supporting policies for a bright future for sustainable energy.

Government Initiatives

The government of India launched the National Action Plan on Climate Change (NAPCC) on 30th June 2008 by floating eight National Missions on climate change. These missions are listed below.

1. National Solar Mission
2. National Mission for Enhanced Energy Efficiency
3. National Mission on Sustainable Habitat
4. National Water Mission
5. National Mission for Sustaining the Himalayan Eco-system
6. National Mission for a Green India
7. National Mission for Sustainable Agriculture
8. National Mission on Strategic Knowledge for Climate Change

References

i. https://climateknowledgeportal.worldbank.org/overview#:~:text=Climate%20change%20is%20the%20significant,change%20from%20natural%20weather%20variability.
ii. https://www.epa.gov/climatechange-science/impacts-climate-change
iii. Climate Change: Global Temperature, NOAA
iv. https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature#:~:text=According%20to%20NOAA's%202021%20Annual,0.18%20%C2%B0C)%20per%20decade.
v. https://www.worldbank.org/en/news/feature/2013/06/19/india-climate-change-impacts
vi. Nayak, S., Takemi, T. (2022). Assessing the Impact of Climate Change on Temperature and Precipitation Over India. In: Sumi, T., Kantoush, S.A., Saber, M. (eds) Wadi Flash Floods. Natural Disaster Science and Mitigation Engineering: DPRI reports. Springer, Singapore. https://doi.org/10.1007/978-981-16-2904-4_4
vii. Senapati, S. (2022). Vulnerability and risk in the context of flood-related disasters: A district-level study of Bihar, India. International Journal of Disaster Risk Reduction, 82, 103368.
viii. http://bsdma.org/images/global/SDMP.pdf
ix. http://www.bsdma.org/Know-Your-Risk.aspx?id=3 Bihar State Disaster Management Authority.
x. Kumar, S., Roshni, T., Kumar, A. et al. GIS-Based Drought Assessment in Climate Change Context: A Case Study for Sone Command, Bihar. J. Inst. Eng. India Ser. A 102, 199–213 (2021). https://doi.org/10.1007/s40030-020-00505-w
xi. https://www.unep.org/interactive/six-sector-solution-climate-change/
xii. https://indiaclimatedialogue.net/2017/10/02/bihar-face-floods-droughts-rainfall-patterns-change/#:~:text=In%202013%2C%2020%20districts%20of,were%20hit%20by%20drought%2C%20respectively.
xiii. Fouque, F., Reeder, J.C. Impact of past and on-going changes on climate and weather on vector-borne diseases transmission: a look at the evidence. Infect Dis Poverty 8, 51 (2019). https://doi.org/10.1186/s40249-019-0565-1
xiv. Matheswaran, K., Alahacoon, N., Pandey, R., Amarnath, G., 2019. Flood risk assessment in South Asia to prioritize flood index insurance applications in Bihar, India. Geomat. Nat. Hazards Risk 10, 26–48. https://doi.org/10.1080/19475705.2018.1500495

NEWS FLASH

Global

Earth is hurtling towards a catastrophe due to climate change. The next decade is crucial: U.N. Panel

The New York Times, March 20, 2023: The latest report from the Inter-governmental Panel on Climate Change (IPCC) warns that Planet Earth is approaching a critical threshold stage of global warming within the next decade. To prevent catastrophic consequences, nations must urgently shift away from using fossil fuels. The report emphasizes the need for immediate global co-operation and substantial financial investment to limit the rise by another 1.5 degrees Celsius. This has been stipulated in the 2015 Paris Agreement. The world has a narrow window of opportunity to cut greenhouse gas emissions in half by 2030 and achieve net-zero emissions by the early 2050s. The report urges swift action and emphasizes that delays would make the goal unattainable.

Earth is hurtling towards a catastrophe due to climate change. The next decade is crucial: U.N. Panel

India Today; New Delhi; February 20, 2023: China, the United States, and India have been identified as the countries that are most vulnerable to climate change. Together, they happen to host 80% of the top 50 at-risk provinces by 2050, according to a report by the XDI Cross Dependency Initiative. The analysis focused on the

Built Environment, assessing over 2,600 regions globally using climate models and environmental data. China, with 16 of the 20 most vulnerable regions, faces risks to crucial manufacturing hubs from rising water levels and extreme weather. The USA follows with 18 high-risk states in the top 100, while China, India, and USA collectively account for over half of these unfortunate provinces. The report underscores the need for getting familiar with and determine the cost of the physical risks of climate change in economic planning.

Risks of Climate Change are Unavoidable and Going to be Deadlier: UN Climate Report

Global News; February 28, 2022: A United Nations Intergovernmental Panel on Climate Change (IPCC) report warns that the risks of climate change are "unavoidable" and multiplying, posing threats to human well-being, planetary health, and eco-systems. The report states that global warming beyond a few tenths of a degree could lead to as many as 127 degradations, some potentially irreversible and affecting daily lives, food security, and safety. It predicts a four-fold increase in climate extremes for children by 2100, rising sea-levels, and heightened risks of heat waves, diseases, and air pollution. The need for urgent action cannot be emphasized more to limit temperature increases and for adapting to climate change's warming impacts.

India

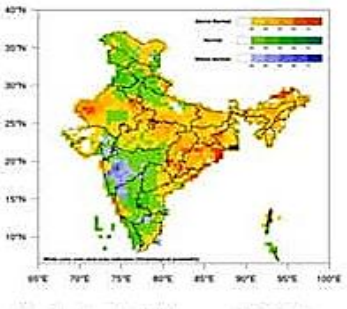
Climate Change has multiplied the chances of Heat Waves (such as the April, 2023 one across whole India) by more than 30 Times in Future

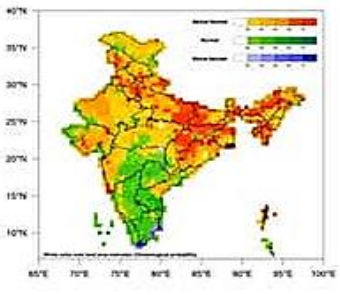
April 2023, Kochi: South Asia experienced an intense heat-wave, and an international team of climate scientists, part of the World Weather Attribution group, determined that human-induced climate change has made this catastrophic event to be 30 times more likely in the days ahead. The study, which also analyzed the heat-waves in Thailand and Laos, revealed that had there been no climate change, the occurrence of heat-waves in these regions would have been nearly impossible. The report indicates that as the world warms, the likelihood of similar events recurring increases manifold times. For India and Bangladesh, the chances of such episodes happening could triple if the 2°C warming threshold is breached and has the potential to recur every one or two years. This study emphasizes the importance of effective policies, vulnerability assessments, and social protection systems for putting a check on the impact of heat-waves.

IMD's Predictions for summer of 2023: Warmer Days and Nights; Frequent Heat-waves to Scorch North/Central/East India

The Weather Channel

Wednesday; March 1, 2023: The Indian Meteorological Department (IMD) has released its seasonal forecast for the period from March to May 2023, providing insights into the upcoming summer's weather patterns. The forecast predicts above-normal maximum temperatures in most parts of northeast, east, and central India, as well as some areas of northwest India. Heat-waves are expected to be more probable in northwest and central India, with a dip in their frequency in March. Warmer nights are anticipated across the entire country, except

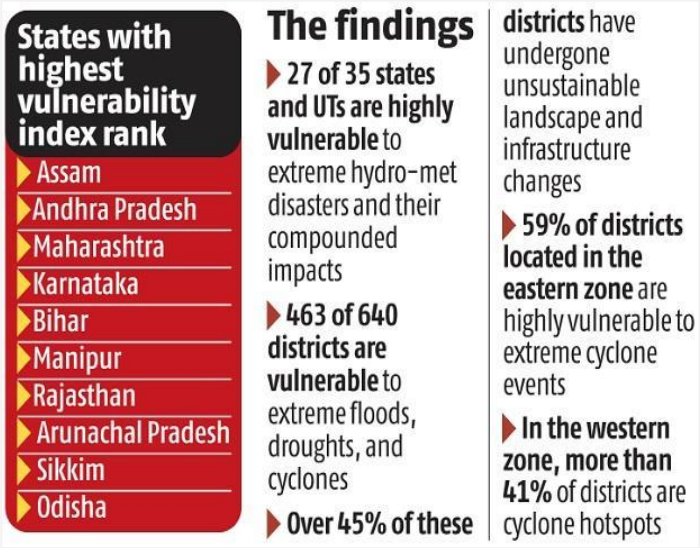




for South Peninsular India. March is expected to go through above-normal temperatures for both maximum and minimum values in most regions. Additionally, below-normal summer rainfall is forecast for Northwest and West-Central India, along with parts of East and Northeast India. Conversely, normal to above-normal precipitation is expected in East-Central and South Peninsular India. The overall countrywide rainfall is predicted to be normal. The IMD's seasonal forecasts utilize advanced methods, including the Multi-Model Ensemble (MME) approach, to provide accurate predictions based on global climate models.

More than 80% of Indians live in Districts Vulnerable to Climate Risks: Report dated September 29, 2023

Business Standard According to the Climate Vulnerability Index released by the Council on Energy, Environment, and Water, over 80% of Indians reside in districts which are vulnerable to climate risks. The report identifies Assam, Andhra Pradesh, Maharashtra, Karnataka, and Bihar as the states that happen to be most susceptible to extreme climatic events such as floods, droughts, and cyclones. Specific highly disaster-prone districts mentioned in the report include Dhemaji and Nagaon in Assam, Chennai in Tamil Nadu, Khammam in Telangana, and Gajapati in Odisha. This underscores the urgent need for climate resilience measures and adaptation strategies in these vulnerable regions.

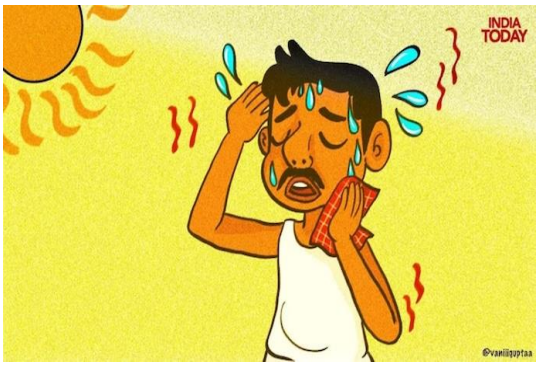


Bihar

The Numbers: Heat Strokes have killed more than 2,500 people in UP and Bihar in the past 10 years

18th June, 2023: The lowest numbers of heat-stroke mortalities were recorded in 2021 when only 374 people lost their lives. In that year, 57 and 36 people died in Bihar and UP respectively because of extreme heat. While May remained surprisingly cool and pleasant in many parts of north India, the scorching sun returned with a vengeance in June. According to reports, Deoria in UP reported 53 suspected heat-stroke deaths within 24 hours on June 21. Heat-strokes have also claimed the lives of at least 45 people in Bihar. Also, 68 people died in Uttar Pradesh's Ballia District between June 14 and 19.

Heat-wave grips parts of Bihar as Mercury soars above 44°C – the hottest in past 11 years.



June 2023: As many as 29 districts in Bihar are reeling under a severe heat-wave with the mercury level rising continuously, breaking the record of the past 11 years. The maximum temperature has even incredulously crossed the 44 degrees Celsius mark in at least ten districts of the state. Bihar recorded its highest maximum temperature in 11 years on June 7 with this heat-wave gripping parts of the unfortunate state. With the continual rise in temperatures, heat-wave conditions are prevailing in 29 districts of the state. The Indian Meteorological Department (IMD) has predicted that severe heat-wave conditions will persist in 11 districts, viz. Patna, Purnia, West Champaran, Supaul, Araria, Bhagalpur, East Champaran, Sheikhpura, Khagaria, and Katihar on Thursday. These districts are also experiencing strong hot winds with speeds ranging from 13 to 21 km/hr. Meanwhile, the maximum temperature has gone past 44 degrees Celsius in 10 districts of the state.

Centre for Studies on Environment and Climate (CSEC), ADRI

ONGOING PROJECTS

Climate Change Vulnerability Assessment and Health Impact of Heat Stress in Major Urban Centres in Bihar

The research project, titled "Assessment of Climate Change Vulnerability and Heat Stress in Patna Municipal Corporation," aims to comprehensively understand the impacts of climate change on urban centres, particularly focusing on heat stress in Patna, Bihar. The project adopts a multifaceted approach, integrating spatial analysis, vulnerability assessment, and climate variability evaluation to provide valuable insights into the vulnerabilities of Patna's urban population to heat stress. The rapid urbanization and population growth in Patna exacerbate the impacts of climate change, particularly the intensification of heat stress, which poses significant challenges to the city's residents. Moreover, Patna has witnessed a surge in heat-related issues in recent years, highlighting the urgency of understanding and addressing these challenges within the context of urban planning and resilience. The project employs a meticulously designed methodology comprising multiple stages to achieve its objectives. Initially, through spatial and data analysis, including GIS mapping and correlation analyses, the project scrutinizes land use changes, temperature variations, and air temperature patterns. Subsequently, vulnerability assessment profiles are developed, with a particular emphasis on identifying hotspots and areas of heightened vulnerability among different segments of the urban population. Anticipated outcomes of the project include a comprehensive mapping of heat stress patterns and vulnerabilities within Patna Municipal Corporation and the identification of hotspots and areas of heightened vulnerability. Additionally, the project aims to assess the trends and projections of heat stress exposure, providing valuable insights for urban planning and resilience strategies in Patna. Through these outcomes, the project seeks to contribute to the development of sustainable and resilient urban environments, fostering the well-being of communities facing similar challenges globally.

Clean Mobility Transition in Urban Freight Sector of Bihar and Jharkhand

CSEC-ADRI team is working on the project “Clean Mobility Transition in Urban Freight Sector of Bihar and Jharkhand”. With an increase in urban population and growing e-commerce, the demand for freight movement in cities has increased rapidly. India has more than 2.8 million

registered commercial vehicles that run over 100 billion km per year. It comprises only about 2% of on-road vehicle share which is responsible for about 40% of emissions and 33% of fuel consumption from road transport. Freight vehicles in urban environments produce more emissions than passenger and public vehicles. Bihar has witnessed an annual growth of 7% in passenger vehicles, 9% in private vehicles, and 4% in commercial vehicles under newly registered vehicles from 2017 to 2019. In Jharkhand, the registration of new commercial vehicles is growing at 6% annually. Many interventions including public policies are being designed to support the adoption of clean fuel vehicles in public and private vehicles, whereas commercial vehicles have remained unexplored and untouched due to a lack of data on the transportation of goods. Bihar and Jharkhand governments have taken the lead to improve the quality of the environment by reducing air pollution from the transport sector. The government has released their EV Policy which aims to achieve 15% of new vehicle purchases and registered to be electric in each vehicle category by 2028. To take this initial positive spillover forward, the CSEC-ADRI envisages a scoping study on a clean mobility transition roadmap for the urban freight sector in the eastern region.

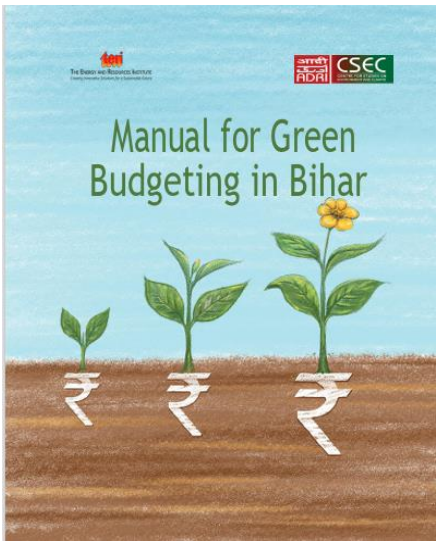
Bihar Clean Air Action Plan (BCAAP)

The Ministry of Environment, Forest, and Climate Change (MoEFCC) (based on directions from the South Bench of the Hon'ble National Green Tribunal) directed that all the State governments shall establish an action plan for Air Quality Management in coincidence with state departments". The Bihar Clean Air Action Plan (BCAAP) is the Air Quality Management Plan facilitated by the World Bank under a Technical Assistance Programme (TA) to the Bihar Government. Technical expertise was provided by national and international agencies, including the Indian Institute of Technology (IIT) Delhi, French National Institute for Industrial Environment and Risks (INERIS), International Institute for Applied Systems Analysis (IIASA), Norwegian Institute for Air Research (NILU), and the Centre for Studies on Environment and Climate at Asian Development Research Institute (CSEC-ADRI). CSEC-ADRI played a pivotal role in the BCAAP project. They contributed by developing short-, medium-, and long-term air pollution reduction strategies for Bihar's prioritized sectors through innovative cost-effective analyses and stakeholder consultations. Additionally, CSEC-ADRI mapped out key stakeholder departments and their responsibilities

while providing recommendations for enhancing air monitoring infrastructure and practices in Bihar. By spearheading these efforts, ADRI ensured that Bihar is well-positioned to implement the forthcoming National Mission for Clean Air effectively.

Manual for Green Budgeting in Bihar

Issues related to the environment need to receive more attention and need to be given more priority in the state budget. Along with the adequacy of budgetary resources for environment-related components in various schemes, the State Government can also innovate within the existing fiscal space and existing schemes. Over the past four years, CSEC-ADRI has collaborated closely with the Finance department of Bihar state to integrate environmental considerations into economic decision-making processes through Green Budgeting. This approach serves as a mechanism for issue-based budgetary mapping, similar to Climate Budgeting and Gender Budgeting, focusing on scrutinizing programmatic-level budget provisions aimed at achieving environmentally sustainable or green outcomes. In response to this initiative, CSEC-ADRI, in collaboration with The Energy and Resources Institute (TERI), has developed a green budget manual. This manual aims to define green budgeting and its significance, establish a methodology tailored to the state's context, serve as a resource for line departments, and raise awareness among governments and civil society regarding the importance and benefits of integrating green budgeting principles into fiscal policies and practices. By adhering to the principles outlined in this manual, stakeholders can effectively allocate resources to initiatives that enhance environmental sustainability, thereby fostering a greener and more resilient future for all.



Scoping opportunities of policy intervention for battery swapping framework for the clean mobility sector in Bihar

As the demand for Electric Vehicles (EVs) continues to rise in Bihar, the state government has unveiled its EV policy in 2023. CSEC-ADRI recognizes the importance of understanding current EV registration trends, the perceptions of EV owners, and the state of existing charging infrastructure. Through primary analysis, surveys, and interviews with EV owners and charging infrastructure operators, CSEC-ADRI is dedicated to generating policy recommendations. The focus lies on exploring the potential of Battery Swapping technology in Bihar. By examining the

feasibility and benefits of this innovative solution, CSEC-ADRI aims to provide insights that can guide policymakers in promoting the development of sustainable transportation and addressing the unique challenges facing the state's EV ecosystem. The comprehensive report of CSEC-ADRI will serve as a valuable resource for shaping future policies and initiatives in the electric mobility sector of Bihar.

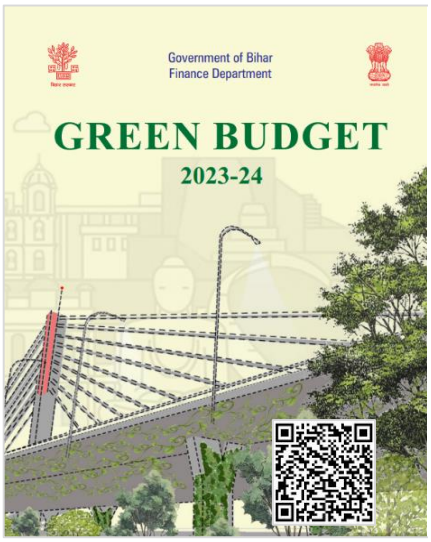
Exposure to Traffic-Related Fine Particulate Matter and Associated Health Risks

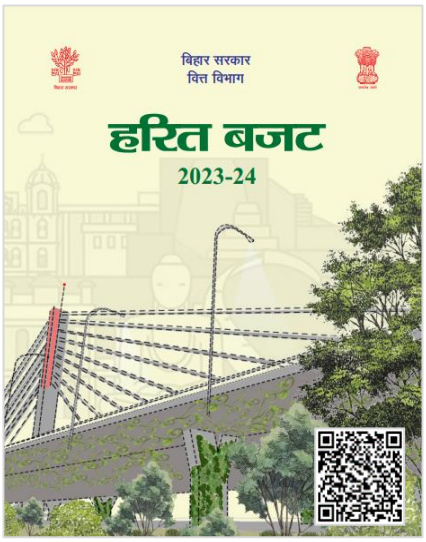
CSEC-ADRI team is working on "Exposure to traffic-related fine particulate matter and associated health risks, Patna". The ongoing research focuses on studying the health implications of exposure to fine particulate matter ($PM_{2.5}$) originating from traffic in Bihar. Through a multifaceted approach, it aims to understand how traffic-related $PM_{2.5}$ affects respiratory health among the population of Patna. This research involves a literature review, data collection on $PM_{2.5}$ levels and traffic patterns specific to Patna, health impact assessments tailored to the region, spatial analysis to identify hotspots of exposure, and collaboration with local stakeholders including policymakers, public health officials, and community members. By synthesizing findings and engaging with stakeholders, the study endeavours to inform evidence-based interventions and policies aimed at mitigating health risks associated with traffic-related $PM_{2.5}$ exposures and promoting public health in Patna, Bihar.

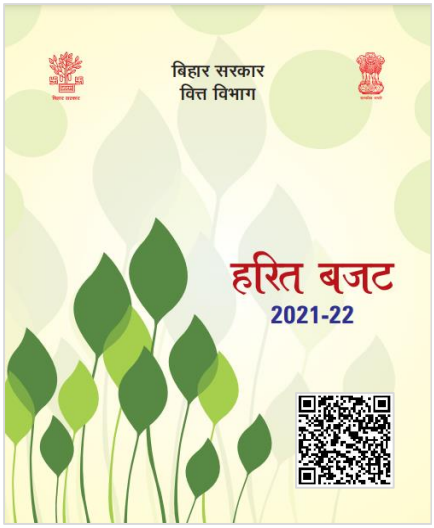
Dynamic Data Driven Dashboard

CSEC-ADRI is developing a special dashboard focusing on three important environmental areas i.e. Transportation, Green Budget, and Air Pollution. This dashboard looks at how Bihar and Jharkhand are moving towards using e-vehicles, Bihar's Green Budget, and Air Pollution data. The data collected is very carefully gathered from different surveys and aims to catch the attention of policymakers and researchers. A dashboard is like a big storage space for important environmental information. It gives policymakers and researchers a good understanding of the challenges and opportunities in these areas. For example, it shows how e-vehicles are moving in Bihar and Jharkhand, helping policymakers make better plans. It also shows how Bihar is spending money on environmental issues, so policymakers can see what's working and what needs more investment. Besides, the dashboard shows real-time data on air pollution. This helps policymakers keep an eye on pollution levels, find areas where pollution is really bad, and take action to fix the problem and keep people healthy. In short, this dashboard is a very important tool for research groups. It gives them the data and information they need to make real changes and help the environment in Bihar and Jharkhand.

PROJECT REPORTS

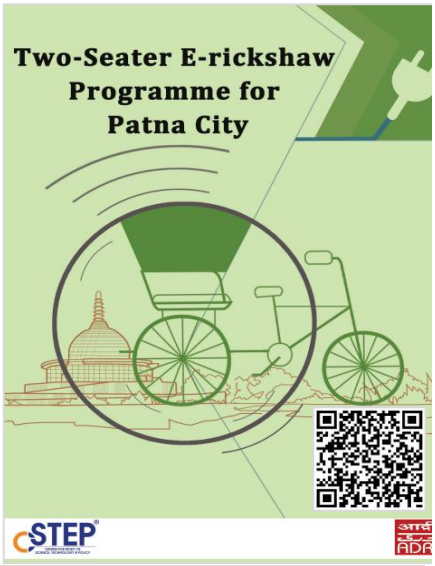




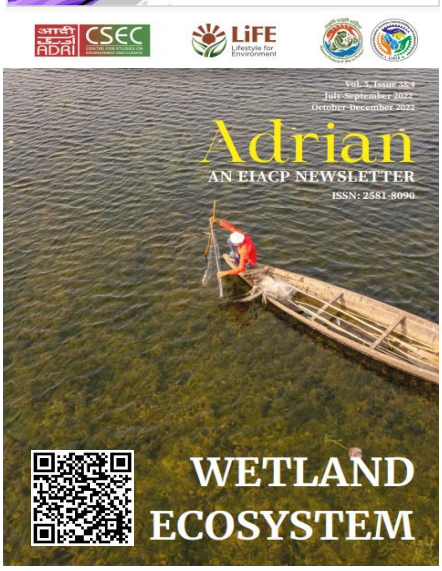


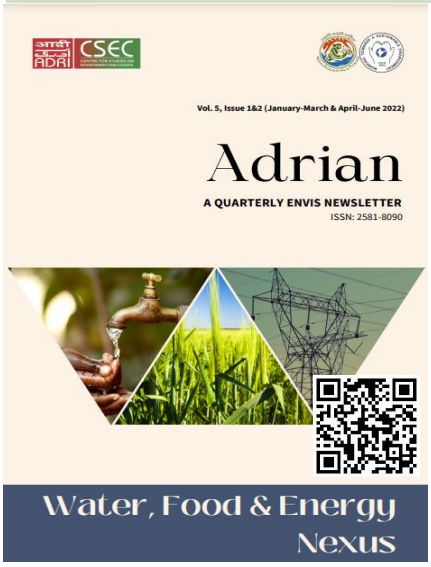

COMPREHENSIVE
CLEAN AIR ACTION PLAN
FOR THE CITY OF PATNA

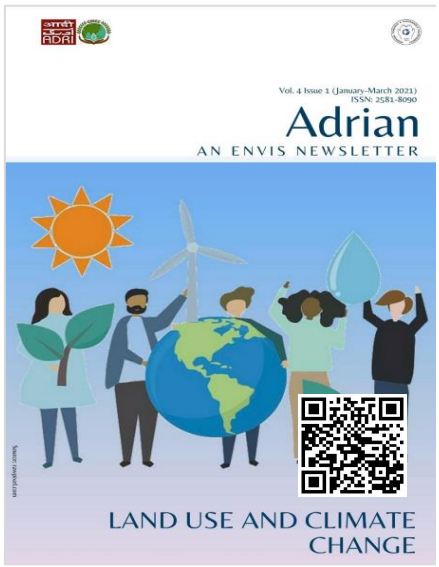

Health
Nutrition
Education
Protection
Participation
Standard Operating
Procedure for
Child Budgeting
in Bihar
unicef
for every child


Two-Seater E-rickshaw
Programme for
Patna City

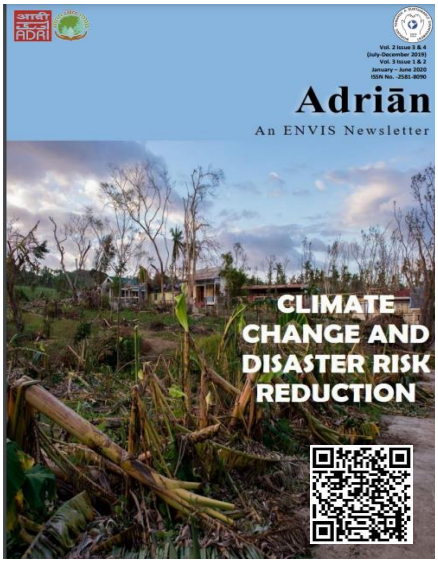

Adrian
AN EIACP NEWSLETTER
Vol. 6, Issue 1 & 2
(January-June 2023)
ISSN: 2581-8090
WETLAND MONITORING
AND MANAGEMENT


Adrian
AN EIACP NEWSLETTER
ISSN: 2581-8090
WETLAND
ECOSYSTEM


Vol. 5, Issue 1&2 (January-March & April-June 2022)
Adrian
A QUARTERLY ENVIS NEWSLETTER
ISSN: 2581-8090
Water, Food & Energy
Nexus


Vol. 4 Issue 1 (January-March 2021)
ISSN: 2581-8090
Adrian
AN ENVIS NEWSLETTER
LAND USE AND CLIMATE
CHANGE


Vol. 3 Issue 3-4 (July-December 2020)
ISSN: 2581-8090
Adrian
AN ENVIS NEWSLETTER
Vulnerability of Wetlands to
Climate Change


Adrian
An ENVIS Newsletter
CLIMATE
CHANGE AND
DISASTER RISK
REDUCTION

EVENTS/ACTIVITIES

Celebration of World Water Day

Patna, March 22, 2024: The Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP) Center of CSEC-ADRI, Patna organized a lecture on 'Environment and Climate Change' at ADRI campus on the occasion of World Water Day (22 March 2024). The lecture was delivered by Dr Abhijit Sarkar, a Senior Scientist, formerly with the Indian Space Research Organization (ISRO) and Faculty for the UN Course for Asia Pacific Countries. The lecture emphasized technical aspects of climate change, changing patterns of hydrology, meteorology, air pollution and other related conditions in Bihar.

Celebration of World Forest Day

Patna, March 21, 2024: World Forest Day (21 March) was celebrated by the Asian Development Research Institute (ADRI) today with its Director, Professor (Dr.) Ajit Sinha, planting a sapling on the institute's premises. Ms. Pooja Kumari of the Environmental Information, Awareness, Capacity Building and Livelihood Program (EIACP) Center of CSEC-ADRI talked about the indispensability of forests as they serve as a Carbon sink by absorbing harmful greenhouse gases, thereby putting a check on the adverse effects of climate change. Moreover, they generate the life-giving Oxygen gas and more than 30 per cent of newly-emerged diseases afflicting humans globally since the 1960s can be attributed to the calamitous deforestation taking place every day on our planet. She added that forests are home to eighty per cent of amphibian species. Shri Anjani Kumar Verma of ADRI elaborated on how forest coverage badly needs to be expanded in our state of Bihar as the current figures show a coverage much below

the ideal of one-third of the total land area of the state. He pointed out the need for humans to co-exist with Nature, including forests. He also mentioned that we in Bihar also have a tradition of planting a tree on the occasion of the birth of a girl child. This practice should be adopted widely. Member-Secretary of ADRI, Dr. Ashmita Gupta, stated that the creation of an awareness of the significance of forests is imperative. Shree Indrajit Goswami, also of ADRI recited a song composed by him and written by Sunil Kumar in the Khortha language. The song was in honour of Mother Nature.

Experts talked about indispensability of forests as they serve as Carbon sink by absorbing harmful greenhouse gases

OUR CORRESPONDENT

PATNA: World Forest Day was celebrated by Asian Development Research Institute (ADRI) on Thursday with its Director Professor Dr. Ajit Sinha planting a sapling on Institute's premises.

Pooja Kumari, Environmental Information, Awareness, Capacity Building and Livelihood Program (EIACP) at Centre for Studies on Environment and Climate (CSEC) at ADRI, talked about indispensability of forests as they serve as Carbon sink by absorbing harmful greenhouse gases, thereby putting a check on adverse effects of climate change. Moreover, they generate life-giving Oxygen gas and more than 30 percent of newly-emerged diseases afflicting humans globally since 1960s can be attributed to calamitous deforestation taking place every day on planet. She added that forests are home to eighty percent of amphibian species.

Anjani Kumar Verma, ADRI, elaborated on how forest coverage badly needs to be expanded in Bihar as current figures show coverage much below the ideal of one-third of total land area of state. He pointed out the need for humans to co-exist with Nature, including forests. "We in Bihar also have a tradition of planting a tree on occasion of the birth of a girl child. This practice should be adopted widely," he pointed out.

ADRI Member-Secretary Dr. Ashmita Gupta stated that creation of an awareness of significance of forests is imperative. Indrajit Goswami, also of ADRI recited a song composed by him and written by Sunil Kumar in Khortha language. The song was in honour of Mother Nature.

Climate Change Mitigation and Adaptation in the Forestry Sector

Patna, March 20, 2024: A workshop on Climate Change Mitigation and Adaptation in the Forestry Sector was organized by Climate Change and Wetland wing of Environment, Forest & Climate Change Department, Govt. of Bihar. The workshop was chaired by the Secretary of the department, Smt. Bandana Preyashi. The workshop was inaugurated by Shri N. Jawahar Babu, Principal Chief Conservator of Forest (Climate Change and Wetland). On this occasion, Dr. C.N. Prabhu, Director, BMSK, Patna made a presentation on Extreme Weather Events and Climate Change Vulnerability in Bihar. The role of Wetlands in Climate Change mitigation was explained by Dr Ritesh Kumar, Director-WISA, New Delhi. Dr. R.S. Rawat, Scientist, ICFRE, Dehradun explained the role of forests in climate change mitigation and adaptation in India. Shri S Chandrashekhar, Member Secretary, Bihar Pollution Control Board presented about the Low Carbon Development Pathway in Bihar. A detailed presentation on Climate Finance was delivered by Dr. Snehal M. Bansod, BIRD Lucknow. In the concluding session, Mr. Utkarsh Lal from GIZ-India shared lights on the Climate Smart Solution at the Gram Panchayat Level. Dr. Sunil Kumar Gupta, Ms. Ghazal Hashmi, Ms. Pooja Kumari and Ms. Nisha Kataria from CSEC-ADRI Patna participated in the workshop and shared their knowledge about mitigating the impact of climate change on the forest sector.

Workshop on Environmental Awareness at the Grassroots Level: Women as Agents of Change

Patna. March 13, 2024: Society is up against a formidable challenge of successfully addressing the deleterious effects of climate change on our planet. Since women happen to possess very deep knowledge of the valuable traditions and practices of local eco-systems along with that of sustainable resource management, they are ideally suited to halt this downslide in the state of our environment. So, they should be empowered in such a way that permanent solutions to this problem can be identified and awareness about our environment is created among all. This view was enunciated by Dr. Prem Kumar, Hon'ble Minister, Environment, Forest and Climate Change Department of the Government of Bihar during a workshop titled Environmental Awareness at the Grassroots Level: Women as Agents of Change today.

This program was jointly organized by the Center for Studies on Environment and Climate (CSEC) as well as Jan Shikshan Sansthan (JSS), which are both part of the Asian Development Research Institute (ADRI) to commemorate International Women's Day. While delivering the Special Address of the event, the Mayor of Patna, Ms. Sita Sahoo, praised the women of Bihar for contributing immensely to the sustenance of different livelihoods along with participating in all kinds of economic activities, be it in agriculture, handicrafts, and other services happening either in rural areas or in urban centres of the state. Moreover, she stated that women

can serve effectively as agents of change in the lifestyles of people because human activity must be modified to combat the grave crisis of environmental degradation. Eight women with remarkable achievements in various sectors of work shared their inspiring stories after being felicitated by the Mayor. Among these eight, Ms. Anjali of Radio Mirchi stated that both women and Nature have very similar qualities of giving life. So, it is a reality that women will be the best spokesperson for teaching society about Nature to stymie the catastrophe of climate change. Ms. Devopriya Dutta of Tarumitra urged people to be friends of Nature as this can result in fantastic consequences for our planet. Moreover, sixteen women achievers who have done commendable work at the grassroots level of endeavours like ANM, ASHA, Anganwadi, JSS and Jeevika were also appreciated and duly awarded. Ward Councilor Ms. Shweta Rai and Ms. Diksha Priyadarshini, the Mukhiya of Sadisopur Panchayat were also honoured for their efforts. Earlier, the Member-Secretary of ADRI, Dr. Ashmita Gupta suggested in her Opening Address that we should pay attention to the little things in the stories of women so that it can culminate in a big beneficial effect on the environment in future. Dr. Sunita Lall of ADRI presented a memento on behalf of ADRI to the Mayor. Dr. Sandeep Kumar, Director of JSS compered the event while Dr. Sunil Kumar Gupta of CSEC gave the Vote of Thanks.

14/03/24

हिन्दुस्तान

महिलाओं को परंपराओं का होता है गहरा ज्ञान : प्रेम कुमार

अंतरराष्ट्रीय महिला दिवस पर पर्यावरण जागरूकता पर हुई कार्यशाला

आधारभूत संरचना निर्माण का शिलान्यास

पटना, हिन्दुस्तान ब्यूरो। सहकारिता विभाग की ओर से संचालित नौ प्राथमिक सर्वी सहकारी उत्पादक समिति में आधारभूत संरचना निर्माण कार्य का सहकारिता मंत्री डॉ प्रेम कुमार ने शुभारंभ की शिलान्यास किया। यहां ग्रामीण मंडी, संग्रहण केंद्र, कार्यालय, गोदाम, कोल्ड स्टोरेज बनाए जाएंगे। वीडियो कांफ्रेंसिंग के माध्यम से मंत्री ने बेगूसराय के डंडारी, नवादा की खोदावंदपुर, दरभंगा के सिंघवाड़ा निर्माण कार्य का शिलान्यास किया।

पटना, हिन्दुस्तान ब्यूरो। हमारा समाज जलवायु परिवर्तन के हानिकारक प्रभावों से सफलतापूर्वक निपटने की एक कठिन चुनौती का सामना कर रहा है।

महिलाओं की स्थानीय संसाधन प्रबंधन के साथ-साथ स्थानीय पारिस्थितिक तंत्र की मूल्यवान परंपराओं और प्रथाओं का बहुत गहरा ज्ञान होता है। इसलिए वे हमारे पर्यावरण की स्थिति में इस संघर्ष को रोकने के लिए आदर्श रूप से उपयुक्त हैं। बुधवार को ये बातें पर्यावरण, वन और जलवायु परिवर्तन विभाग के मंत्री डा. प्रेम कुमार ने कहीं।

वे इनवायरनमेंटल अवेयरनेस एंड द ग्रासरूट्स लेवल- वीमेन एज एजेंट्स ऑफ चेंज विषयक कार्यशाला के दौरान ये बातें कहीं। यह कार्यक्रम सेंटर फॉर स्टडीज ऑन इनवायरनमेंट एंड क्लाइमेट (सीएसईसी) और आद्री का प्रमुख भाग जन शिक्षण संस्थान (जेएसएस) द्वारा संयुक्त रूप से आयोजित किया गया था। यह कार्यशाला अंतर्राष्ट्रीय महिला दिवस मनाने के लिए आयोजित किया गया था। इस मौके पर पटना की मेयर सीता साहू ने सभी प्रकार की आर्थिक गतिविधियों जैसे कृषि, हस्तशिल्प या अन्य सेवाओं में महत्वपूर्ण योगदान देने के लिए बिहार की महिलाओं की प्रशंसा की। इस अवसर पर विभिन्न क्षेत्रों में उल्लेखनीय उपलब्धियां हासिल करने वाली आठ महिलाओं को महापौर ने सम्मानित किया। कार्यक्रम में सुश्री अंजलि, सुश्री देवप्रिया, सुश्री श्वेता राय और सुश्री दीक्षा प्रियदर्शनी, डॉ. अश्मिता गुप्ता डा. सुनील कुमार गुप्ता आदि थे।

Regional Workshop on Climate-Health Risk Management in India

Patna, March 5, 2024: The Asian Development Research Institute (ADRI) in collaboration with the Centre for Environmental Health (CEH) at the Public Health Foundation of India (PHFI) organized a regional workshop titled Climate-Health Risk Management in India (CHARISMA): Dissemination and Impact today. This workshop was aimed at addressing the crucial intersection of climate change and public health.

Welcoming the guests, Dr. Poornima Prabhakaran, Director of the Centre for Health Analytics Research and Trends, at Ashoka University stressed the fact that climate change is a burning issue of the utmost concern. Its adverse effects are manifested not only in the form of deterioration in people's health but also in lost livelihoods. Shri Tripurari Sharan, State Chief Information Commissioner, portended that the calamitous consequences of climate change have now percolated right down to individual homes and society. He lamented the fact that rice and wheat consumption and cultivation have largely replaced millets (Ragi) in people's diets, thereby accentuating this crisis. Dr. Jente Broeckx of VITO, Belgium, provided insights into the CHARISMA dashboard, a powerful tool designed as part of a three-year project by PHFI-CEH to assess and manage climate-related health risks in urban environments. In a collaborative effort with local stakeholders and authorities, this project aims to support Indian cities in drawing up measures to adapt and cope with climate and health impacts caused by climate change. The project is targeted to work in 50 cities.


दैनिक भास्कर 06/MAR-2024 पटना

सेहत की चिंता • आद्री ने पीएचएफआई के सहयोग से कार्यशाला आयोजित की

जलवायु परिवर्तन का प्रतिकूल प्रभाव लोगों के स्वास्थ्य के साथ आजीविका पर भी पड़ रहा

Morning India

WEDNESDAY, PATNA, MARCH 6, 2024

Experts praise Bihar for being ahead in setting up air-quality monitoring stations in all districts

OUR CORRESPONDENT

PATNA: Secretary, Environment, Forest and Climate Change Bandana Preyashi announced that state government has recently uploaded a strategic document, which CM Nitish Kumar remarked will be in public domain for eliciting feedback from scientists and other stakeholders in order to combat climate change. Experience of working at ground level is of paramount importance while devising policy, she added.

Preyashi was addressing a workshop titled 'Climate-Health Risk Management in India: Dissemination and impact today', organized here on Tuesday. The workshop was aimed at addressing crucial intersection of climate change and public health and was organized under the aegis of Asian Development Research Institute (ADRI) in collaboration with centre for Environmental Health.

Earlier, welcoming the guests, Dr. Poornima Prabhakaran, Director of Centre for Health Analytics Research and Trends, Ashoka University, stressed on the fact that climate change is a burning issue of utmost concern. Its adverse effects get manifested not only in form of deterioration in people's health but also in lost livelihoods.

Tripurari Sharan, State Chief Information Commissioner, portended that calamitous consequences of climate change have now percolated right down to individual homes and society. He lamented the fact that rice and wheat consumption and cultivation has largely replaced millets (Ragi) in people's diets, thereby accentuating this crisis.

Dr. Jente Broeckx of VITO, Belgium, provided insights into CHARISMA dashboard, a powerful tool designed as part of a three-year project by PHFI-CEH to assess and manage climate-related health risks in urban environments. In a collaborative effort with local stakeholders and authorities, this project aims to support Indian cities in drawing up measures to adapt and cope with climate and health impacts caused by climate change. The project is set to run for 50 cities.

Speaking on the occasion, Dr. S. N. Sharma, VBD Consultant, AVIA-GIS, Belgium shared his experiences on how the mapping for rise in Dengue cases was done at Lucknow under the CHARISMA project.

Jostein Nygard, Senior Environment Scientist at World Bank remarked optimistically that there has been some progress in mitigating air pollution in Indo-Gangetic plains. Neha Sharma, Environment Consultant at the World Bank praised Bihar for being ahead of all other Indian states in the task of setting up air-quality monitoring stations in all the districts. She also suggested distribution of clean cook-stoves to homes so as to get the PM 2.5 levels to go down to a desirable 35 micrograms from current 70 micrograms.

Alankrita Pandey, CEO, Ayushman Bharat, Dr Ravishankar of Medanta Hospital, Dr. Indroneel Sen and Dr. Ashok Ghosh were among some of the many researchers and academicians who deliberated in this workshop. Dr. Poornima Prabhakaran, Director, CHART- Ashoka University welcomed the distinguished guests and Dr. Ashmita Gupta, Member-Secretary, ADRI sketched out an overview of initiatives that ADRI has been undertaking.

Speaking on the occasion, Dr. S. N. Sharma, VBD Consultant, AVIA-GIS, Belgium shared his experiences on how the mapping for rise in Dengue cases was done at Lucknow under the CHARISMA project. Smt. Bandana Preyashi, Secretary, Environment, Forest and Climate Change announced that the Bihar government has recently uploaded a strategic document, which the Hon'ble CM remarked will be in the public domain for eliciting feedback from the scientists and other stakeholders in order to combat climate change. She pointed out that the experience of working at the ground level is of paramount importance while devising policy. Mr. Jostein Nygard, Senior Environment Scientist at the World Bank remarked optimistically that there has been some progress in mitigating air pollution in the Indo-Gangetic plains. Ms. Neha Sharma, Environment Consultant at the World Bank praised Bihar for being ahead of all other Indian states in the task of setting up air-quality monitoring stations in all the districts. She also suggested the distribution of clean cook-stoves to homes so as to get the $PM_{2.5}$ levels to go down to a desirable 35 micrograms from the current 70 micrograms. Smt. Alankrita Pandey, CEO, of Ayushman Bharat; Dr Ravishankar of Medanta Hospital, Dr. Indroneel Sen and Dr. Ashok Ghosh were among some of the many researchers and academicians who deliberated in this workshop. Dr. Poornima Prabhakaran, Director, CHART- Ashoka University welcomed the distinguished guests and Dr. Ashmita Gupta, Member-Secretary, ADRI sketched out an overview of initiatives that ADRI has been undertaking.

Mega Event on Lifestyle for Environment

New Delhi, February 9-10, 2024: The Environmental Information Awareness Capacity Building and Livelihood Programme (EIACP) Center of CSEC-ADRI Patna participated in Mega Event on Lifestyle for Environment (LiFE) at India Gate, New Delhi from 9 – 10 February 2024. The main focus of the EIACP centre was to highlight the

importance and status of the wetlands of Bihar. The centre showcased wetland-based products/goods made by community members, EIACP Newsletters, Reports, Knowledge kits, Infographics, Interactive Games on Traditional Water Management of India, Documentaries etc. There were a large number of people who interacted at the stall with their queries and questions on the wetland. Ms. Leena Nandan, Secretary (Ministry of Environment, Forest and Climate Change, Government of India), Ms. Nameeta Prasad, Joint Secretary and other officials of MoEFCC visited the stall. Students from various schools and colleges were attracted by the knowledge kits of the centre. Other Officials from the different EIACP Centres also inquired about the status of wetlands in Bihar.

Celebration of World Wetlands Day

Lecture cum Drawing Competition and Wetland Walk

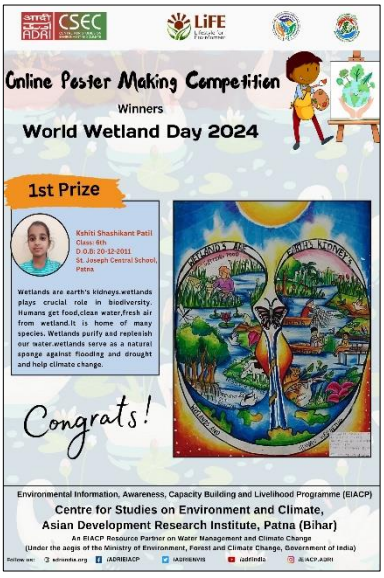
Patna, February 2, 2024: The Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP) Centre of CSEC-ADRI Patna organized a "Lecture cum Drawing Competition and Wetland Walk" on the occasion of World Wetlands Day on 2nd February 2024. The objective of the program was to sensitize the students about the importance of Wetlands for sustainable lifestyle choices in ensuring judicious use of our natural resources and healthy lifestyle decisions.

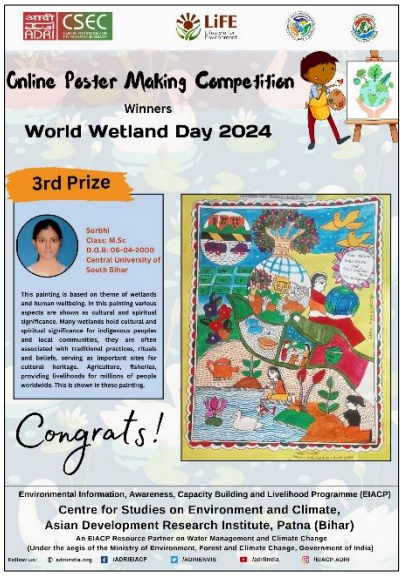
The first session of the event was organized at Rajkiya Kanya Madhya Vidyalaya, Adalatganj, Patna. Students from classes six to eight participated in the event. The session begins with a lecture cum video presentation followed by a drawing competition. A total of 76 students participated in this session and took the pledge on Mission Lifestyle for Environment.

The second session (Wetland Walk) was conducted at Rajdhani Jalashay, Patna in collaboration with the Patna Park Division, Govt. of Bihar. The top 30 students in the drawing competition were selected for the event. The student witnessed bird watching and different methods to conserve wetlands. Forest officials and the EIACP team addressed the meetings and stressed the need for wetlands for the environment. The event concluded with the distribution of prizes for the competition winners. Overall, 100-120 participants actively participated in the event.

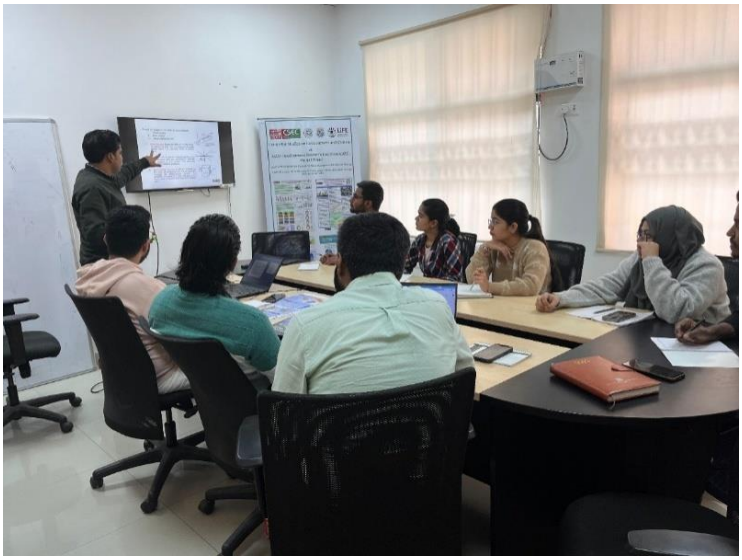
Online Poster Making Competition on World Wetland Day

Patna, January 25, 2024: EIACP Centre of CSEC-ADRI organized an online poster-making competition on the occasion of 'World Wetland Day' on 2 Feb. 2024. The theme of the competition was 'Wetland and Human Wellbeing', The competition was organized among the students on the national level from 25th January to 10th February. Students from Bihar, Delhi, Odisha, Tamil Nadu, Andhra Pradesh, West Bengal, Uttar Pradesh and Telangana state have participated in this competition. Top three students were awarded with cash prizes of Rs. 3000, Rs. 2000 and Rs. 1000.





Lecture on air pollution and associated health risks



Patna, December 27, 2023: Dr. Sunil Kumar Gupta is an expert on air pollution. While delivering his lecture, he highlighted the importance of air pollution research. He covered the following topics during his first lecture on air pollution: Definition of air pollution, air pollutants, sources of air pollutants (natural and anthropogenic sources), Point, Line and Area sources, Primary and Secondary Air pollutants, Major air pollutants i.e. CO, SO2, NOx, NH_3, PM, VOCs, O_3, Metals and its associated health risks.

Mega Exhibition on Lifestyle for Environment

Ayodhya, December 19, 2023: EIACP Centre of CSEC-ADRI participated in the Mega Exhibition on Lifestyle for Environment at Ayodhya, Uttar Pradesh organised by EIACP Sulabh-IIHH under the Ministry of Environment, Forest and Climate Change (MoEF&CC). The centre highlighted the importance of wetlands for LiFE. The centre showcased many items related to wetlands, such as wetland-based products made by community members (Sikki crafts and paintings), documentaries, infographics, maps, newsletters, etc. A large number of people interacted at the stall with their queries and questions about the wetland. An educational kit based on Traditional Water Management Practices of India attracted a large number of school kids. Senior Officials from the Ministry and various EIACP centres from Sulabh, WWF, SPA, NBRI, and UPCB were present in the program.

Integrated Management Planning Strategy for Wetlands in Bihar

Patna, December 12 - 13, 2023: A two-day workshop on 'Integrated Management Planning Strategy for Wetlands in Bihar' was organized by the German Corporation for International Cooperation (GIZ) from 12 to 13 December 2023 in Patna, Bihar. This event was a collaborative effort between the Climate Change and Wetland wing of the Department of Environment, Forest, and Climate Change, the Government of Bihar, and GIZ. Shri N. Jawahar Babu (IFS), Principal Chief Conservator of Forest Environment, Climate Change & Wetland, Govt. of Bihar, Shri Surendra Singh (IFS), CCF, Member Secretary, Bihar State Wetland Authority, Shri Ashutosh (IFS), Principal Chief Conservator of Forest (HOFF), Department of Environment, Forest and Climate Change and DFO, Samastipur were present on the occasion. Some other organizations like BSWA, SEEDS, and ADRI also participated in the workshop. All the team members also visited DEBKHAL CHAUR (a Wetland) in Samastipur. Dr. Sunil Kumar Gupta and Ms. Pooja Kumari from CSEC-ADRI Patna participated in the workshop and gave their expert views during the panel discussion on wetlands.

Documentary on Lake Baraila

Baraila Lake Salim Ali Jubba Sahni Bird Sanctuary is a natural inland wetland located in the Vaishali district of Bihar. This area is a seasonal floodplain under lower Gangetic plains. Its total area is 1204 hac. The geographical location of Lake Baraila is between 25°45'58" & 25°45'37" North latitude and between 85°31'48" & 85°34'50" East longitude. The villages that fall under this wetland are Amthanwa, Jhil Baraila, Mahthi Dharamchand, Dulwar, Loma etc. The area has immense ecological and environmental importance by way of performing hydrological and wetland and aquatic ecosystems. Keeping the conservation aspects in mind the Government of

Bihar declared the wetland as a sanctuary in in the year 1997. However, it was published in the Gazette of India as Baraila Lake Salim Ali Jubba Sahni Bird Sanctuary in 2016 (Gazette of India, 2016).

Water birds that migrate depend on the wetlands of the Gangetic plains to survive. The Baraila Lake serves as a habitat for various animals, including fish, amphibians, and reptiles in addition to migratory and resident water birds. The Indian Shag, Red collard dove, Asian Koel, Small Bee catcher, Brahmany starlet and tree pie are the main resident birds, Black Ibris, Brahmany Shell Duck, Bar-headed Goose, Oriental Magpie Robin and Lesser Whistling duck are migratory birds of this sanctuary.

Wetlands are often associated with long-standing cultural practices that enable human societies to thrive, adapt to environmental change, and use nature in a sustainable way. According to data from the Ramsar Sites Information Service (RSIS), nearly all Ramsar Sites provide cultural ecosystem services, and over half have spiritual and inspirational values. Integrating both nature and culture in the management of wetlands can therefore play a powerful role in their conservation and wise use. The CSEC-ADRI team prepared a documentary on the Baraila wetland. The wetland is situated in Vaishali district of Bihar. The documentary highlights the traditional and cultural beliefs of the local community toward wetlands. The video underlines the importance of wetland conservation through lifestyle for the environment.

Documentary on Wetlands of Bihar

Research Paper Presentation in International Conference

Bengaluru, December 6-8, 2023: Dr. Sunil Kumar Gupta from CSEC-ADRI presented his work on the topic of "Effect of Sulphur content on filterable and condensable particulate matter emissions from diesel generators" at the 8th Indian International Conference on Air Quality Management (IICAQM-2023) IIT Madras, 4th – 8th December 2023 that was organized by IISc., Bengaluru.

The study shows that filterable and condensable particulate matter emitted from diesel fuel with high sulphur content is liable to be a major contributor to air pollution. The unsatisfactory state of fuel sulphur levels in many developing countries can be attributed to vehicle fuel standards that are several years behind the vehicle emissions standards of developed countries. Many countries with far higher fuel sulphur content have neither defined the resources nor policies necessary to match this global trend. These nations include Indonesia, Thailand, Nigeria and South Africa, all of which face significant air-quality challenges. A coordinated system approach of enforcing emission standards along with setting appropriate fuel standards will reduce pollution and improve air quality worldwide.

Stakeholder Consultation Workshop

Patna, November 06, 2023: A crucial Stakeholder consultation workshop was convened today at the Bihar State Pollution Control Board, Patna, chaired by Smt. Bandana Priyashi, Secretary, DoEFCC, delved into the Bihar Clean Air Action Plan (BCAAP) prepared collaboratively by the World Bank Group and ADRI. Dr. D. K. Shukla, Chairman, and Shri S. Chandrasekar, Member-Secretary of BSPCB, joined the discussions. The meeting addressed the formidable challenges of air pollution in Bihar, particularly in the IGP area. Stakeholder departments, including Agriculture, Transport, Urban Development and Housing, Rural

Development, and Energy participated actively, providing valuable insights and suggestions to buttress the efficacy of the Bihar Clean Air Action Plan. Representatives from CSEC-ADRI - Dr. Sunil Kumar Gupta and Ms. Nisha Kataria - contributed to the collaborative efforts being made towards improving air quality in the state.

Green and Climate Sensitive Budgeting

Patna, 31 October 2023: Ms Hashmi provided her views on the green budget of Bihar. This green budget was initially based on one of the flagship schemes of the Bihar government -the Jal Jeevan Hariyali scheme. It is largely based on expenditure, focusing on the schemes and what the state plans through departments. Here, the major stakeholder is the Finance Department, which pushes all the departments to work towards the green budget while also enhancing the capabilities of the stakeholders. Ms Hashmi stressed that Bihar has increased its green budget from 7% to 12.55% of the total budget and has also increased the number of schemes from 103 to 237. This reflects the fact that more departments are joining in the green budget effort. She maintained that green budgeting can be an important tool to achieve the 2070 goal of a low-carbon development pathway. She further shared her insights from the Road Construction Department, which, after the launch of the green budget, has been using 20% plastic in road construction. She said that it showed that the departments are also enthusiastic about increasing their involvement in environmental sustainability activities.

She spoke about climate-resilient agriculture, a major policy of the state's agriculture department that covers SDG 13, green budgeting, and climate-sensitive agriculture. According to Ms Hashmi, one of the limitations is a lack of knowledge among the officials for whom green budgeting is only a budgeting or accounting process, and they do not consider it an SDG. She suggested increasing competitiveness among the states. She added that if the states enhance their capabilities in environmental sustainability activities, they are bound to receive more funding and resources, thereby strengthening the state's competitiveness and enhancing the budgeting experience. Since the green budget currently is more of an accounting process, encouraging competitiveness in this manner would provide more details regarding any kind of value addition by the schemes.

The Iconic Experiences Show on Sustainability

Hotel Hyatt Delhi, October 17, 2023: EIACP Centre of CSEC-ADRI participated in the TIES (The Iconic Experiences Show) Exhibition on Sustainability in Delhi. Smt. Nazda Khatoon and Shri Jasim (CSEC-ADRI community members) demonstrated the products (handicrafts and paintings) developed from Sikki grass commonly found around wetlands. Community members from EIACP G.B. Pant, Almora and HIMCOSTE also displayed their products.

Expert Consultation Event: SDG Blueprint for Sustainable Agriculture

New Delhi, October 10, 2023: Dr. Sunil Kumar Gupta, CSEC-ADRI, participated as an Expert in "SDG Blueprint for Sustainable Agriculture" organized by TERI, New Delhi. The discussion focused on SDG # 8 and SDG # 17.

Dr. Gupta provided his views on SDG 8 (Decent Work and Economic Growth). Comprehensive agricultural reform is imperative not only for transitioning to climate-resilient agriculture but also for addressing nutrition concerns. The Green Revolution, while contributing to development, has led to a monoculture of crops. Creating a dynamic dashboard that provides real-time updates on vulnerable areas is essential. This tool can track budget allocations and expenditures in these regions, engendering transparency and accountability. Integrated dashboards can offer valuable insights into the effectiveness of existing schemes and monitor the progress of new ones. This approach ensures that policies do not become overly focused on yield-

specific calculations but instead, they consider holistic and sustainable outcomes. Collaborations with institutions like IITs and ICMR can be instrumental in promoting sustainable agricultural development. Their expertise can help provide farmers with the necessary knowledge and resources to thrive in an ever-changing agricultural landscape. The resilience and inclusivity of the agricultural sector is vital. This requires expanding the definition of farmers to include landless labourers, tenants, and sharecroppers. These marginalized groups need support and recognition in agricultural policies. These considerations will provide a roadmap for India's agricultural policies, emphasizing transparency, inclusivity, sustainability, and a holistic approach to agricultural development.

National Seminar- Moving Towards Green Economy: Strategies, Innovation & Frameworks at St Xavier's College of Management and Technology, Patna

1. Environmental Information, Awareness Capacity Building and Livelihood Programme (EIACP): An Overview

Ms. Pooja Kumari and Dr. Dipesh Kumar

Patna. October 12, 2023: Awareness is a key factor in our fight against environmental challenges of the present times including climate change, bio-diversity loss, resource depletion, etc. It is unequivocal that both policy-led initiatives and actions at individual and community levels are needed for the betterment of our environment. The recently launched Mission LiFE (Lifestyle for Environment) is an India-led global mass movement aimed at sensitizing individuals towards pro-planet activities and healthy lifestyle practices. The government has been promoting awareness and capacity-building programs in the field of

Environmental Management/Sustainability since 1983 through the Environmental Information System (ENVIS) scheme. The ENVIS scheme has been recently revamped and it currently operates under the umbrella of the Environmental Information, Awareness Capacity Building and Livelihood Programme (EIACP) with the support of various thematic centres (*n*=60) spread across the country. This existing network of EIACP centres engages in a wide range of activities, which among others include the generation of awareness, sensitization, green skill development, and capacity-building programs existing under different domains of the environment. This program also serves as a one-stop platform for the dissemination of environmental information, informed policy formulation on various facets of the environment and facilitation of alternate livelihoods through green skilling. The objective of this study is to analyze the effectiveness of the scheme and to highlight its major achievements and limitations. Keywords: ENVIS, EIACP, Environmental Awareness, Green Skill Development, Lifestyle for Environment.

2. Regulatory Landscape for Clean Mobility Adoption in Bihar

Mr. Anshuman Kumar, Mr. Ravitej Prasad, Dr. Sunil Kumar Gupta

Patna, October 12, 2023: The transition to cleaner fuel mobility has been a major challenge in the automotive industry in the past decade. The shift towards cleaner fuels can help improve public health, optimise mobility, create new job opportunities, and promote the growth of the sector. In this context, it is necessary to examine the transition to clean fuel mobility at the national and sub-national levels. The National Electric Mobility Mission Plan (NEMMP) provides the necessary incentives to facilitate the shift to EVs from conventional Internal Combustion Engine (ICE) vehicles. The government's flagship Faster Adoption and Manufacturing of E-vehicles (FAME) scheme has also provided the impetus needed for the transition across the entire country. Moreover, in Bihar, the Bihar State Road Transport Corporation (BSRTC) and the Department of Transport are the nodal institutions or primary stakeholders that are in charge of putting the EV strategy into action. The Bihar EV policy

and FAME scheme have been crucial for the rapid growth of EV registrations in the state. Bihar has seen a rise in e3W registrations for para-transit (last mile-connectivity of passengers in urban areas), urban freight, and an increase in the number of EV fleets with the assistance of FAME subsidies, as well as attempts to incentivise this segment in the BIIPP. However, the share of EV registration in Bihar was only 4% in 2022 as compared to its neighbouring state- Uttar Pradesh - with an EV registration share of 16%. The mobility sector in Bihar needs a vision supported by a technology-investment-regulatory roadmap. This is an opportunity to leapfrog to a cleaner, healthier, and more sustainable future for Bihar.

Keywords: Transition, clean fuel, mobility, incentives, para-transit, regulatory roadmap.

3. Green Budget: Growth and the way forward

Ms. Ghazal Hashmi, Dr. Ashmita Gupta

Patna, October 12, 2023: This paper explores the concept of "green budgeting," which involves increasing public funds that are allocated to environmental programs and mobilizing fiscal policy for environmental sustainability. With global temperatures already rising due to climate change, countries worldwide are committed to combating its adverse effects. Green budgeting aims to integrate climate and environmental considerations into decision-making processes, fostering budget transparency and supporting the achievement of international and national commitments and goals.

It examines green budgeting methodologies used worldwide, such as the Climate Assessment of Local Budgets, Climate Public Expenditures and Institutional Review, and Climate Budget Tagging. It also analyses the experience of the government of Bihar in implementing a green budget to promote environmental sustainability and climate action.

The findings reveal that the Green Budget of Bihar has been steadily getting more funds over the years, with a significant focus on climate action, life on land, clean water and sanitation, and zero

hunger. Various departments contribute to different activities under green budgeting, with a focus on program implementation, technology, and infrastructure. Additionally, research highlights the potential of green budgeting for promoting green bonds, carbon pricing policies, environmental impact assessments, and sustainable investment strategies. The study concludes that green budgeting can serve as a catalyst for adopting financial tools that support sustainable development and reduce environmental impacts. The implementation of green budgeting requires a well-functioning budgeting system, strong leadership, political ownership, and effective communication with stakeholders. Going forward, green budgeting has the potential to drive low-carbon development and promote climate action through inclusive and coordinated efforts across sectors and governments.

Keywords: Green budgeting, fiscal governance, green policies, environmental sustainability, financial tools.

EIACP Regional Workshop

Raipur, September 21, 2023: Dr. Sunil Gupta and Dr. Dipesh Kumar from CSEC-ADRI participated in the EIACP regional evaluation workshop for the East-zone centres at Raipur, Chhattisgarh. The Chhattisgarh Environment Conservation Board (CECB) hosted the workshop under the aegis of the Ministry of Environment, Forest, and Climate Change, Govt. of India. Shri Unmana Sarangi (Dy Director, EIACP Division, MoEF&CC) released two documentaries on Wetlands and Mission LiFE developed by the EIACP Centre of CSEC-ADRI. EIACP personnel from the Centre for Mining Environment at Indian Institute of Technology (IIT-ISM), Botanical Survey of India, Zoological Survey of India, Forests and Environment Department under Government of Jharkhand, Centre for Environmental Studies-Forests and Environment Department Govt. of Odisha, and Department of Environmental Science-Kalyani University attended the event.

World Ozone Day 2023

Patna, September 16, 2023: The Environment, Information, Awareness, Capacity Building and Livelihood Program (EIACP) Centre of CSEC-ADRI Patna organized an Inter-College Quiz Competition on the occasion of "World Ozone Day 2023". This event's objectives were to remind the youth about the detrimental effects of Ozone layer depletion and how an environmentally-conscious lifestyle can solve many of the most pressing challenges of the 21st century, including climate change. The event also sensitized the audience about the India-led global movement of Mission Lifestyle for Environment (Mission LiFE). A total of 25 students from A.N College, College of Commerce, Arts and Science, and Patna University participated in the event.

Talk on Advantages of Data-Dashboard in Policy Making

Patna. September 04, 2023: Dr. Mayank Agarwal, an expert in Computer Science and Engineering from IIT Patna, highlighted the significance of data dashboards in policymaking during a talk organized by the Asian Development Research Institute (ADRI). He emphasized that dashboards provide a centralized, easily-understandable format for monitoring and analysing information in real-time. Dr. Agarwal underscored the importance of visual representations, such as charts and graphs, in quickly comprehending complex data, facilitating trend analysis and deep insights crucial for policy-making. Dr. Ashmita Gupta, Member-Secretary at ADRI, chaired the session, which was attended by in-person as well as virtual participants.

Presentation on Municipal Solid Waste Management and Associated Risks to Environment and Health in Patna

Presenter: Ms. Aditi Raj

Supervisors: Dr. Sunil Kumar Gupta and Dr. Dipesh Kumar

Patna, 04 September 2023: Ms. Aditi Raj has completed her internship under the supervision of Dr. Sunil Kumar Gupta and Dr. Dipesh Kumar CSEC-ADRI. She presented her work on the topic of "Municipal Solid Waste Management and Associated Risks to Environment and Health in Patna".

Summary of work: This study investigates the multi-faceted challenges posed by municipal solid waste management in Patna, focusing on its impact on both the environment and the health of waste workers. Patna, the capital city of Bihar, faces escalating issues associated with the generation and disposal of solid waste, driven by rapid urbanization and population growth. Against this backdrop, this study aims to provide a comprehensive assessment of the environmental consequences and health risks borne by waste workers in the city. The study methodology encompasses a blend of quantitative and qualitative approaches, including waste composition analysis, environmental impact studies, and health surveys of waste workers. Findings reveal a substantial proportion of non-segregated waste, leading to inadequate recycling and waste-to-energy practices. This improper waste management practice has resulted in environmental degradation, soil and water contamination, and air pollution, contributing to long-term ecological concerns. Moreover, the study finds significant health hazards faced by waste workers, who often labour under hazardous conditions with limited protective measures. Occupational health risks include exposure to toxic substances, physical injuries, and heightened vulnerability to infectious diseases. These occupational risks have profound implications not only for the health and well-being of waste workers but also the broader public health in Patna. The study underscores the urgent need for systemic improvements in waste management practices, including enhanced waste segregation and recycling initiatives, innovative waste-to-energy technologies, and comprehensive health and safety measures for waste workers. Addressing

these challenges can mitigate the adverse environmental impacts of municipal solid waste and safeguard the health of those at the forefront of waste management in Patna.

Keywords: Municipal solid waste, solid waste management, environment, health impacts.

Mission Lifestyle for Wetlands

Gokul Jalashay, Buxar, 08 June 2023: Mission Lifestyle for Environment (Mission LiFE) is an India-led global mass movement to nudge individual and community action to protect and preserve the environment. The Mission recognizes that Indian culture and living traditions are inherently sustainable. CSEC-ADRI, as an Environment, Information, Awareness, Capacity

Building and Livelihood Programme (EIACP) resource partner, under the aegis of the Ministry of Environment, Forest, and Climate Change (MoEF&CC), Govt. of India envisaged awareness cum sensitization on Save Wetlands Campaign in Bihar. The aim was to encourage a mission for youth volunteering for wetlands conservation in Bihar. Among the ecologically significant wetlands of Bihar, Gokul Jalashay was considered the focus of the campaign. Gokul Jalashay is a hotbed of biodiversity, especially that of migratory birds and is under pressure from unregulated and unscientific management practices.

प्रभात खबर बक्सर

केंद्रीय राज्यमंत्री अश्विनी चौबे ने बच्चों को कराया गोकुल जलाशय का भ्रमण

जलाशय अमृत धरोहर, इसे संरक्षित करना जीवन का संरक्षण है : मंत्री

बच्चों से बात करते केंद्रीय राज्यमंत्री.

आपके द्वार जन चौपाल में कंचनपुर गांव पहुंचे अश्विनी चौबे

As a Chief Guest, Shri Ashwini Kumar Choubey, Hon'ble Union Minister of State, Environment, Forests and Climate Change, Govt. of India, graced all the programs. Several other dignitaries, including the Joint Secretary EIACP-Division, MoEFCC Shri. (Dr.) Sujit Kumar Bajpayee, Dr. Rajasekhar Ratti, Scientist-D, Wetland Division, MoEFCC, Shri. Surendra Singh, Chief Conservator of Forest (CC/Wl) and Member Secretary, Bihar State Wetlands Authority, Shri. S. Chandrasekar, Member Secretary, Bihar State Pollution Control Board, Shri. Rajkumar M.,

Divisional Forest Officer, Bhojpur, Dr. Gopal Sharma, Scientist-F, Zoological Survey of India, and Shri. Arvind Mishra (Mandar Nature Club) was also present in all the programs.

Mission Lifestyle for Marathon

Kila Maidan, Buxar, 17 June 2023: To strengthen the ongoing Mission Life awareness campaigns in the state of Bihar, the EIACP Centre of CSEC-ADRI, Patna organized a marathon under the Save Wetlands Campaign in Buxar. The theme of the marathon was "Run for Lifestyle for Environment". Around 550 individuals (12-50 years) from different parts of Bihar registered for the marathon run to promote environmental awareness and conservation efforts with a special focus on Mission Life and Wetlands.

Minister of State (MoEFCC), Shri Ashwini Kumar Choubey was present as the chief guest in the program. Shri Choubey Choubey flagged off 5, 7 and 12 km marathons. Shri Sujit Kumar Bajpayee, Joint Secretary, MoEF&CC, and Sh. Rajkumar M. (IFS). DFO Bhojpur was also present on the occasion.

Shri. Choubey emphasized the need to adopt sustainable lifestyle choices which would ensure environmental sustainability. He also highlighted the fact that the current era of mindless consumption is detrimental in the long run, and we should aim for long-term goals and not run after short-term benefits and comforts. Shri Choubey also stressed that Prakriti and Pragati should go hand in hand, and the effort of every individual is important in saving the earth from such calamities.

बक्सर भास्कर

पटना, रविवार, 18 जून, 2023 · राजपुर · चौसा · इटाढ़ी · दुमरांव · चौसाई · dainikbhaskar.com

मौसम

लोकल सोना चांदी भाव

	सोना	चांदी
24 कैरेट	60110	
22 कैरेट	55100	
प्रति किलो		73500

शहर में आज

धार्मिक/सामाजिक

पर्यावरण अनुकूल जीवनशैली के लिए मैराथन दौड़

किला मैदान में प्रधानमंत्री के लाइफ मंत्र के प्रति जागरुकता के लिए जीवनशैली मैराथन का हुआ आयोजन, सांसद ने मैराथन दौड़ को हरी झंडी दिखाकर किया रवाना

देश के विभिन्न राज्यों से प्रतिनिधि हुए शामिल :

नगर भवन में जीवनशैली प्रदर्शनी का अवलोकन

Mission LiFE Exhibition

Town Hall, Buxar, 17 June 2023: The mission life exhibition was also inaugurated by Shri Ashwini Choubey (Minister of State, MoEF&CC). Six EICAP centres (namely G.B. Pant National Institute of Himalayan Environment (GBPNIHE) Almora, Assam Science Technology and Environment Council (ASTEC), Forest and Environment Department Sikkim, Forest and Environment Department Jharkhand, International Institute of Health and Hygiene (IIHH-Sulabh) Delhi, and CSEC-ADRI Patna had set up their stalls for the exhibition. These stalls showcase the objective of Mission LiFE under the seven themes save water, save energy, healthy lifestyle, reduce waste, no use of single-use plastics, adopt a sustainable food system and reduce e-waste. Apart from the EIACP centres, the Zoological Survey of India (ZSI), Forest Divisions of Bhojpur, and Begusaria (Bihar), JEEVIKA-BRLPS, Bihar State Pollution Control Board (BSPCB), and Bureau of Indian Standards (BIS) also showcased their products and innovations in sustainability. The stall of CSEC-ADRI exhibited innovative handicrafts derived from wetlands as alternative livelihood opportunities for the community living around significant wetlands of Bihar.

Youth Parliament on Lifestyle for Environment

Patna, May 20, 2023: A 'Youth Parliament on Lifestyle for Environment' was organised by the Centre for Studies on Environment and Climate at Asian Development Research Institute in Patna on May 20, 2023. The event was organised to encourage youth participation in the climate change dialogue and for grassroots action. Undergraduate and postgraduate level nominated students from different colleges from

Bihar were invited for the debated cum discussion competition on various aspects of LiFE. It is part of a collective effort by more than 60 Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP) hubs and resource partners across India, under the aegis of the Ministry of Environment, Forests and Climate Change, Government of India. Jury Members, consisting of Prof. Atul Aditya Pandey from Patna University, Prof. Shahla Yasmin from Patna University, Dr. Gopal Sharma, from Zoological Survey of India and Mr Vivek Tejaswi from CSEC-ADRI have shortlisted 10 candidates out of 35 nominated candidates from Bihar who will be competing at all India level debate competition and participate in a mock parliament in New Delhi. Based on the outcomes of the second stage, five candidates will be conferred the Youth Icon Award on World Environment Day, to be held in Delhi on June 5 2023. The nominated participants were from institutions like Bihar Engineering University, Bihar Agriculture University, Nalanda University, Patna University, National Institute of Technology, Patliputra University, and others.

Presentation on decarbonising the Transport Sector in Bihar

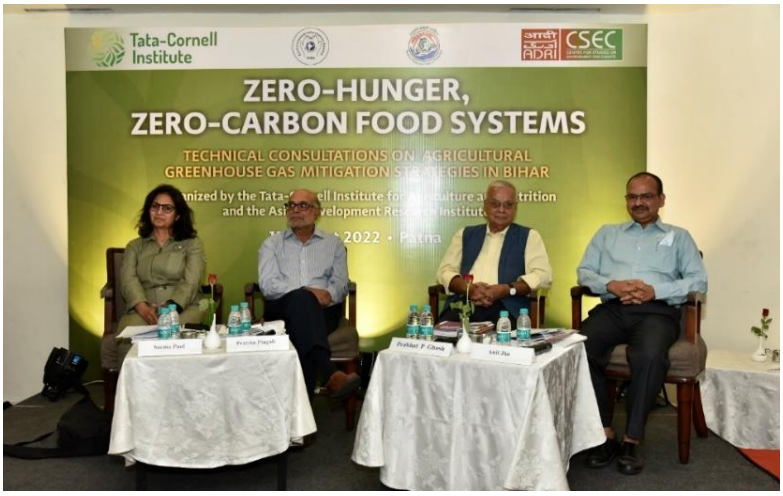
Patna, April 13, 2023: Mr. Anshuman Kumar presented the progress report on de-carbonising the Transport Sector in Bihar as a part of the ongoing study on Climate Resilient and Low Carbon Development Pathways for Bihar on the 13th of April, 2023 at Parivesh Bhavan, Bihar State Pollution Control Board, Patna. The discussion was on the methodology and findings from the deep-dive assessment of emissions from the transport sector of Bihar state, which was completed by WRI for passenger vehicles and by ADRI for freight vehicles. The objective of this meeting was primarily to get feedback on the methodology being followed for the analysis of both passenger and freight transport emission estimation and projection and the trends that are being observed

in the passenger and freight transport segment. This discussion was also joined in by authorities from Bihar Transport Department, Indian Oil Corporation Limited, Inland Waterways Authorities of India and others. The feedbacks given by these authorities were incorporated in the final report on road freight transport optimization and de-carbonization in Bihar.

Roundtable Discussion on State Initiatives for the Transformation towards a Green Economic Growth

Patna. November 22, 2022: The Centre for Studies on Environment and Climate at ADRI, Patna, in collaboration with the Centre for Budget and Governance Accountability (CBGA), Delhi, organized a roundtable discussion on "Bihar's Policy and Budgetary Priorities for Transitioning towards Green Economic Recovery." This event focused on aligning economic recovery with sustainable development goals, ensuring resilience to shocks, and promoting social benefits. Dr. Prabhat P Ghosh underscored the importance of collective actions for green growth, and Dr. Sudhanshu Kumar talked about effective public finance mechanisms. Recommendations included leveraging green budgets, creating livelihoods from decentralized renewable energy, and implementing a comprehensive climate financing strategy. Representatives from various sectors participated in the discussion, contributing to the dialogue on greening Bihar's public finance system.

Technical Consultation on 'Zero-Hunger, Zero-Carbon Food Systems (ZHZC) in Bihar



Patna. August 11, 2022: The Centre for Studies on Environment and Climate (CSEC-ADRI) in collaboration with Tata-Cornell Institute for Agriculture and Nutrition (TCI) organized a technical consultation on 'Zero-Hunger, Zero-Carbon Food Systems' (ZHZC) in Bihar. The workshop aimed to address GHG emissions in agriculture, focusing on potential mitigation solutions. Held on August 11, 2022, in Patna, the consultation involved discussions on developing a GHG emissions-reduction strategy for attaining SDG Goal # 2 (Zero Hunger and Food Security). Dr. Prabhu Pingali from Cornell University emphasized the need for state-specific analyses, addressing challenges in technology adoption and consumer behaviour. Dr. Prabhat P Ghosh highlighted economic indicators impacting hunger levels and proposed agricultural growth for a Net Zero target by 2040. Speakers covered topics such as soil health, and crop diversity, and key stakeholders included representatives from various organizations and government departments.

Green Audit Report Release

Patna. July 29, 2022: The Centre for Studies on Environment and Climate (CSEC) conducted a Green Audit of Patna Women's College (PWC) for the NAAC accreditation 2022-23. The Green Audit report, released on July 29, 2022, revealed notable findings in areas such as Biodiversity, Water, Energy, and Waste. The campus boasts a 22% green cover with diverse

floral and faunal species. A water audit found a daily pumping of 245,000 litres, with 20 taps requiring repair. The college practices water recycling and displays precautionary messages for minimal water loss. An energy audit reported varying consumption levels chiefly due to old wiring and use of high-energy appliances, but new buildings use energy-efficient appliances, and solar-powered streetlights promote environmental sustainability. The waste audit highlighted the absence of segregation technology and sewage treatment, but bio-degradable waste is being composted for organic manure. The college's student-led green initiatives contribute to environmental awareness and sustainability.

Green Dialogue: Greening Priority Sectors for Sustainable Economic Recovery in Bihar

Patna. July 27, 2022: The Centre for Studies on Environment and Climate at the Asian Development Research Institute (CSEC-ADRI), Patna, in collaboration with Development Alternative (DA), New Delhi, organized a 'Green Dialogue' in Bihar focused on 'Greening the Priority Sectors for Sustainable Economic Recovery.' The dialogue, attended by Shree S. Siddharth, Additional Chief Secretary (Finance), aimed to explore green growth prospects in priority sectors like industries and agriculture using technological and financial innovations within Bihar's policy landscape. Shree Siddharth highlighted the state's commitment towards developing a robust green budget by emphasizing the need for training and policy design to address both positive and negative aspects. The event included talks on technological innovation and innovative financial practices, followed by a roundtable discussing strategies, priorities, and gaps in Bihar's policy landscape for sustainable recovery and climate resilience. Agriculture Secretary N Saravanan Kumar praised the state's measures for promoting organic farming and climate-resilient agricultural practices.

Signing of Memorandum of Understanding with IIT Delhi

Patna, 16 May 2022: Institutional-level collaboration has been established between the Asian Development Research Institute (ADRI) and Indian Institute of Technology (IIT)-Delhi today. This has been made possible by the Centre for Studies on Environment and Climate (CSEC) at ADRI, Patna signing a Memorandum of Understanding (MoU) with Shree Arun Duggal of the Centre of Excellence for Research in Climate Change and Air Pollution (CERCA) at IIT-D to strengthen policy-based research pertaining to environment and climate change at the regional level

CSEC-ADRI works closely with the state government to support evidence-based policy research in the field of air pollution, water resources management, climate change mitigation, etc., whereas CERCA, IIT-D has been working towards devising solutions to fight air pollution and promoting scientific research in the field of environment in India. The collaboration envisages strong handholding support ranging from the regional level to the national and international stage environmental agendas by identifying collaborative action for evidence-based policy research. This will be broadly in thematic areas like Air Quality Management, Climate Change Adaptation, Environmental Resources, and Data Governance. Moreover, scholarly events will be organized for the demonstration or dissemination of research outcomes of interest to the states. Also, the collaboration calls for identifying opportunities for further extensions of collaborations with agencies/ institutions pursuing similar interests.

Surveys/Data Collection

Bihar and Jharkhand, May-September 2023: An ADRI survey team comprising Mr. Gulshan Patel and Mr. Anshuman Kumar collected data from logistics owners and industries on travel characteristics of freight vehicles. The data has been collected under the project "Developing Clean Mobility Transition Pathway for Freight Vehicles in Bihar". The data helped to create baseline data for freight transport in Bihar and Jharkhand and also to devise models for policy recommendations to transit to clean mobility in Bihar.

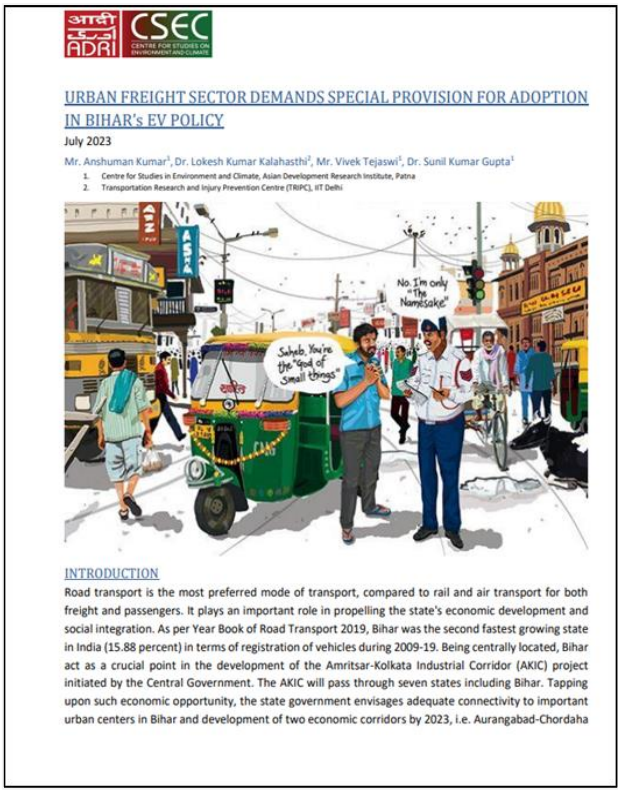
Patna, April – May 2023: ADRI undertook a comprehensive survey focusing on owners of 3-wheeler Electric Vehicles (EVs) to gather insights into their current charging preferences and perceptions, as well as the challenges hindering the widespread adoption of battery swapping in EVs. Spearheaded by Mr. Kanhaiya Kumar, Dr. Sunil Kumar Gupta, and Ms. Nisha Kataria, this survey constitutes a crucial part of the ongoing project aimed at exploring the potential of Battery Swapping in the realm of Electric Vehicles. The collected data promises to shed light on valuable perspectives, paving the way for making informed decisions and advancements in the field of sustainable transportation.



Patna, January 2024: The ADRI survey team, led by Mr. Gulshan Patel, Mr. Madan Murari, and Mr. Sanjeev Kumar recently conducted a very incisive data collection endeavour. Focusing on the current charging and swapping infrastructures for electric vehicles in Patna, this initiative aims to establish a comprehensive baseline of the operational practices and existing network of infrastructure for charging EVs in the city. The gathered data promises to be a valuable resource for understanding the current situation and shaping the future landscape of electric vehicle infrastructure in Patna.

Patna, October-Present 2023: The ADRI monitoring team, led by Mr. Gulshan Patel, Mr. Sanjeev, and Ms. Anshika Kumari has been diligently conducting Air Quality Monitoring since October 2023. This crucial data collection makes up an integral part of the pilot project addressing "Exposure to Traffic-related Fine Particulate Matter and Associated Health Risk in Patna." By monitoring air quality, the team aims to provide valuable insights about the impact of fine particulate matter on public health.

Infographics



URBAN FREIGHT SECTOR DEMANDS SPECIAL PROVISION FOR ADOPTION IN BIHAR'S EV POLICY

July 2023

Mr. Anshuman Kumar[1], Dr. Lokesh Kumar Kalahasthi[2], Mr. Vivek Tejaswi[1], Dr. Sunil Kumar Gupta[1]

1. Centre for Studies in Environment and Climate, Asian Development Research Institute, Patna
2. Transportation Research and Injury Prevention Centre (TRIPC), IIT Delhi

INTRODUCTION

Road transport is the most preferred mode of transport, compared to rail and air transport for both freight and passengers. It plays an important role in propelling the state's economic development and social integration. As per Year Book of Road Transport 2019, Bihar was the second fastest growing state in India (15.88 percent) in terms of registration of vehicles during 2009-19. Being centrally located, Bihar act as a crucial point in the development of the Amritsar-Kolkata Industrial Corridor (AKIC) project initiated by the Central Government. The AKIC will pass through seven states including Bihar. Tapping upon such economic opportunity, the state government envisages adequate connectivity to important urban centers in Bihar and development of two economic corridors by 2023, i.e. Aurangabad-Chordaha

CSEC-ADRI Patna and IIT(ISM) Dhanbad

07-07-2023

Scoping Clean Mobility Transition in Urban Freight Sector, Jharkhand

Opinion Brief

Mr. Anshuman Kumar[1], Dr. Leeza Malik[2], Dr. Sunil Kumar Gupta[1], Mr. Vivek Tejaswi[1]

1. Centre for Studies in Environment and Climate, Asian Development Research Institute, Patna
2. Department of Civil Engineering, IIT (ISM) Dhanbad

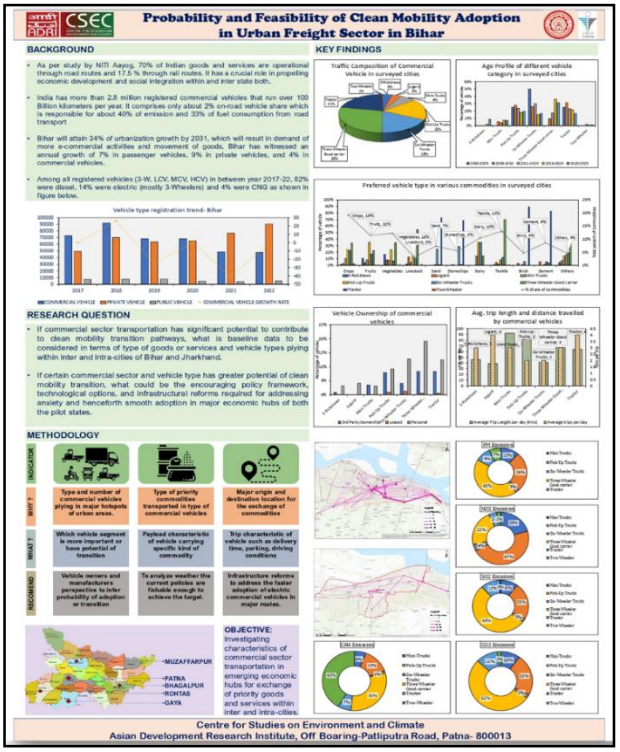
ABSTRACT

In India, freight vehicles constitute 2% of all road vehicles but account for over 45% of all road emissions, makes them an ideal segment for the transition. With India aiming for net zero by 2070, transport decarbonization is a vital pathway to that goal.

In October 2022, the Department of Industries Jharkhand issued its gazette notification implementing Jharkhand's Electric Vehicle Policy 2022. The vision of the Jharkhand EV Policy has two major objectives. The first objective is to make the state preferred destination for EV manufacturing and auto-component, while the second is to increase EV adoption within the state.

Jharkhand EV Policy aims to achieve 10% E.V registration in all vehicle segment, while India aims to achieve 30% electric vehicle penetration in private cars, 70% in commercial vehicles and 80% in two and three-wheeler vehicles by 2030.

The Jharkhand EV Policy incentives and measures are divided into three categories i.e., consumer demand incentive, charging infrastructure incentive and industry manufacturing incentives. Manufacturing industries incentives is very much opulent through different subsidies for Micro, Small, Medium and Non-MSME, while consumer demand incentives and charging infrastructure incentives only focuses on providing similar subsidies for multiple vehicles. Therefore, a comprehensive understanding of data is required to design policies for different vehicle segments and owners.



Probability and Feasibility of Clean Mobility Adoption in Urban Freight Sector in Bihar

BACKGROUND

- As per study by NITI Aayog, 70% of Indian goods and services are operational through road routes and 17.5 % through rail routes, it has a crucial role in propelling economic development and social integration within and inter state both.
- India has more than 2.8 million registered commercial vehicles that run over 100 Billion kilometers per year. It comprises only about 2% on-road vehicle share which is responsible for about 40% of emission and 33% of fuel consumption from road transport
- Bihar will attain 34% of urbanization growth by 2031, which will result in demand of more e-commercial activities and movement of goods. Bihar has witnessed an annual growth of 7% in passenger vehicles, 9% in private vehicles, and 4% in commercial vehicles.
- Among all registered vehicles (3-W, LCV, MCV, HCV) in between year 2017-22, 82% were diesel, 14% were electric (mostly 3-Wheelers) and 4% were CNG as shown in figure below.

Vehicle type registration trend- Bihar

RESEARCH QUESTION

- If commercial sector transportation has significant potential to contribute to clean mobility transition pathways, what is baseline data to be considered in terms of type of goods or services and vehicle types plying within inter and intra-cities of Bihar and Jharkhand.
- If certain commercial sector and vehicle type has greater potential of clean mobility transition, what could be the encouraging policy framework, technological options, and infrastructural reforms required for addressing anxiety and henceforth smooth adoption in major economic hubs of both the pilot states.

METHODOLOGY

INDICATOR	Type and number of commercial vehicles plying in major hotspots of urban areas.	Type of priority commodities transported in type of commercial vehicles	Major origin and destination location for the exchange of commodities
WHY ?	Which vehicle segment is more important or have potential of transition	Payload characteristic of vehicle carrying specific kind of commodity	Trip characteristic of vehicle such as delivery time, parking, driving conditions
WHAT ?	Vehicle owners and manufacturers perspective to infer probability of adoption or transition	To analyze weather the current policies are fishable enough to achieve the target.	Infrastructure reforms to address the faster adoption of electric commercial vehicles in major routes.
RECOMEND			

-MUZAFFARPUR
-PATNA
-BHAGALPUR
-ROHTAS
-GAYA

OBJECTIVE: Investigating characteristics of commercial sector transportation in emerging economic hubs for exchange of priority goods and services within inter and intra-cities.

KEY FINDINGS

Traffic Composition of Commercial Vehicle in surveyed cities

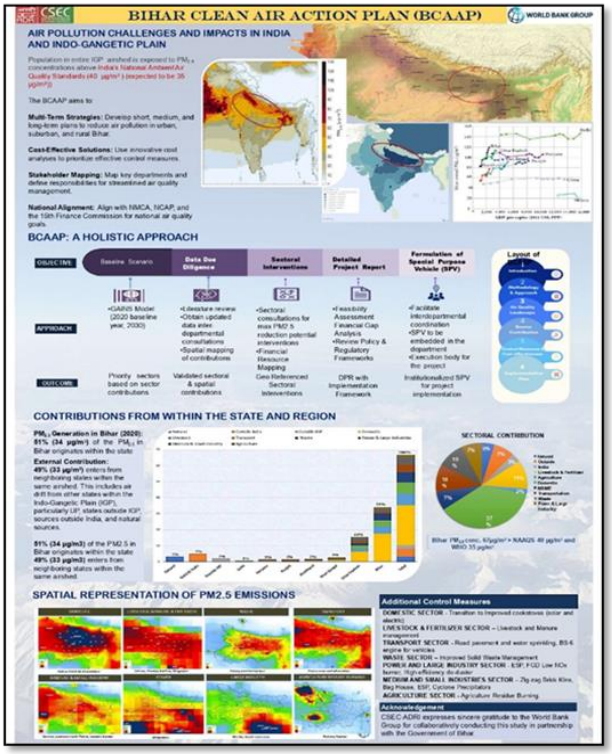
Age Profile of different vehicle category in surveyed cities

Preferred vehicle type in various commodities in surveyed cities

Vehicle Ownership of commercial vehicles

Avg. trip length and distance travelled by commercial vehicles

Centre for Studies on Environment and Climate
Asian Development Research Institute, Off Boaring-Patliputra Road, Patna- 800013



BIHAR CLEAN AIR ACTION PLAN (BCAAP)

AIR POLLUTION CHALLENGES AND IMPACTS IN INDIA AND INDO-GANGETIC PLAIN

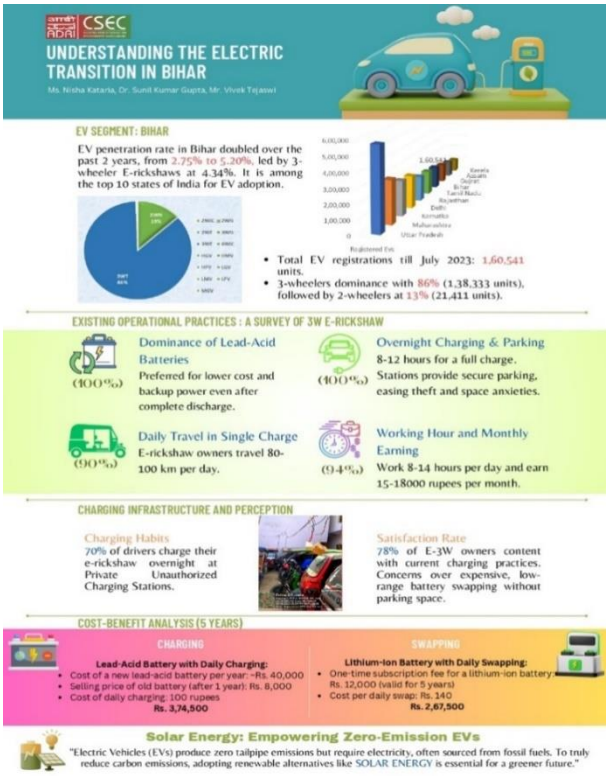
BCAAP: A HOLISTIC APPROACH

CONTRIBUTIONS FROM WITHIN THE STATE AND REGION

SECTORAL CONTRIBUTION

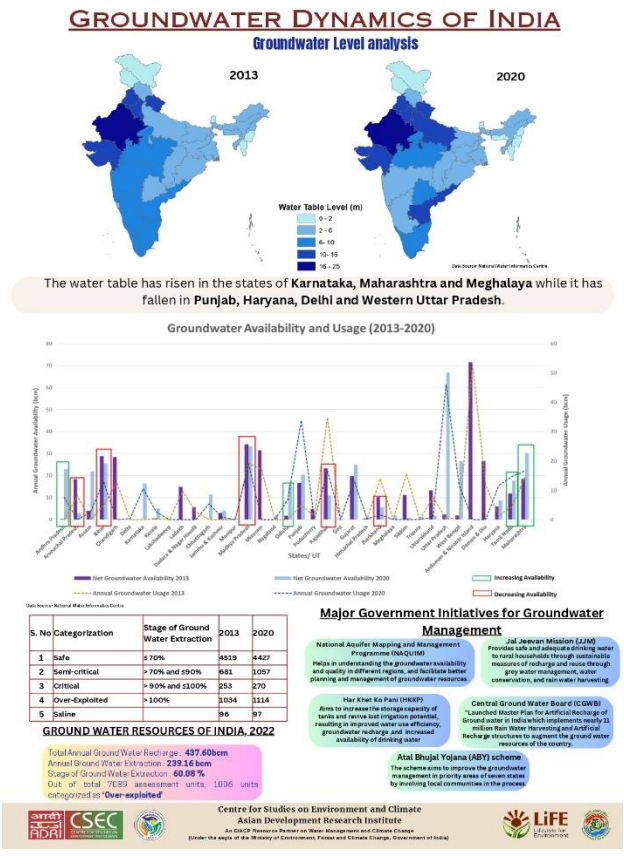
SPATIAL REPRESENTATION OF PM2.5 EMISSIONS

Additional Control Measures


UNDERSTANDING THE ELECTRIC TRANSITION IN BIHAR
Ms. Nisha Kataria, Dr. Sunil Kumar Gupta, Mr. Vivek Tejaswi
EV SEGMENT: BIHAR
EV penetration rate in Bihar doubled over the past 2 years, from 2.75% to 5.20%, led by 3-wheeler E-rickshaws at 4.34%. It is among the top 10 states of India for EV adoption.
Total EV registrations till July 2023: 1,60,541 units.
3-wheelers dominance with 86% (1,38,333 units), followed by 2-wheelers at 13% (21,411 units).
EXISTING OPERATIONAL PRACTICES : A SURVEY OF 3W E-RICKSHAW
Dominance of Lead-Acid Batteries
Preferred for lower cost and backup power even after complete discharge.
(100%)
Overnight Charging & Parking
8-12 hours for a full charge. Stations provide secure parking, easing theft and space anxieties.
(100%)
Daily Travel in Single Charge
E-rickshaw owners travel 80-100 km per day.
(90%)
Working Hour and Monthly Earning
Work 8-14 hours per day and earn 15-18000 rupees per month.
(94%)
CHARGING INFRASTRUCTURE AND PERCEPTION
Charging Habits
70% of drivers charge their e-rickshaw overnight at Private Unauthorized Charging Stations.
Satisfaction Rate
78% of E-3W owners content with current charging practices. Concerns over expensive, low-range battery swapping without parking space.
COST-BENEFIT ANALYSIS (5 YEARS)
CHARGING
Lead-Acid Battery with Daily Charging:
Cost of a new lead-acid battery per year: -Rs. 40,000
Selling price of old battery (after 1 year): Rs. 8,000
Cost of daily charging: 100 rupees
Rs. 3,74,500
SWAPPING
Lithium-ion Battery with Daily Swapping:
One-time subscription fee for a lithium-ion battery Rs. 12,000 (valid for 5 years)
Cost per daily swap: Rs. 140
Rs. 2,67,500
Solar Energy: Empowering Zero-Emission EVs
"Electric Vehicles (EVs) produce zero tailpipe emissions but require electricity, often sourced from fossil fuels. To truly reduce carbon emissions, adopting renewable alternatives like SOLAR ENERGY is essential for a greener future."


SAVE WETLANDS CAMPAIGN
LiFE
आर्द्रभूमि : सतत आजीविका का एक आधार
पर्यावरण सूचना, जागरूकता, क्षमता निर्माण और आजीविका कार्यक्रम केंद्र (EIACP)
सेंटर फॉर स्टडीज ऑन एनवायरनमेंट एंड क्लाइमेट
एशियन डेवलपमेंट रिसर्च इंस्टिट्यूट, पटना
(पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, भारत सरकार के तत्वावधान में)


LiFE
SAVE WETLANDS CAMPAIGN
पर्यावरण के लिए जीवन शैली
(Lifestyle for Environment)
परिचय
पर्यावरण सूचना, जागरूकता, क्षमता निर्माण और आजीविका कार्यक्रम केंद्र (EIACP)
सेंटर फॉर स्टडीज ऑन एनवायरनमेंट एंड क्लाइमेट
एशियन डेवलपमेंट रिसर्च इंस्टिट्यूट (आद्री), पटना
(पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, भारत सरकार के तत्वावधान में)
आद्री, बीएसआईडीसी कॉलोनी, ऑफ बोरिंग पाटलिपुत्र रोड, पटना-800013, बिहार (भारत)


GROUNDWATER DYNAMICS OF INDIA
Groundwater Level analysis
2013
2020
Water Table Level (m)
0 - 2
2 - 6
6 - 10
10 - 15
15 - 25
The water table has risen in the states of Karnataka, Maharashtra and Meghalaya while it has fallen in Punjab, Haryana, Delhi and Western Uttar Pradesh.
Groundwater Availability and Usage (2013-2020)
States/ UT
Net Groundwater Availability 2013
Net Groundwater Availability 2020
Annual Groundwater Usage 2013
Annual Groundwater Usage 2020
Increasing Availability
Decreasing Availability
S. No
Categorization
Stage of Ground Water Extraction
2013
2020
1 Safe ≤ 70% 4519 4427
2 Semi-critical > 70% and ≤90% 681 1057
3 Critical > 90% and ≤100% 253 270
4 Over-Exploited >100% 1034 1114
5 Saline 96 97
GROUND WATER RESOURCES OF INDIA, 2022
Total Annual Ground Water Recharge : 437.60bcm
Annual Ground Water Extraction : 239.16 bcm
Stage of Ground Water Extraction : 60.08 %
Out of total 7089 assessment units, 1006 units categorized as 'Over-exploited'
Major Government Initiatives for Groundwater Management
National Aquifer Mapping and Management Programme (NAQUIM)
Helps in understanding the groundwater availability and quality in different regions, and facilitate better planning and management of groundwater resources
Jal Jeevan Mission (JJM)
Provides safe and adequate drinking water to rural households through sustainable measures of recharge and reuse through grey water management, water conservation, and rain water harvesting
Har Khet Ko Pani (HKKP)
Aims to increase the storage capacity of tanks and revive lost irrigation potential, resulting in improved water use efficiency, groundwater recharge ,and increased availability of drinking water
Central Ground Water Board (CGWB)
"Launched Master Plan for Artificial Recharge of Ground water in India which implements nearly 11 million Rain Water Harvesting and Artificial Recharge structures to augment the ground water resources of the country.
Atal Bhujal Yojana (ABY) scheme
The scheme aims to improve the groundwater management in priority areas of seven states by involving local communities in the process
Centre for Studies on Environment and Climate
Asian Development Research Institute
LiFE

Green Budget of Bihar

A roadmap for green growth in Bihar

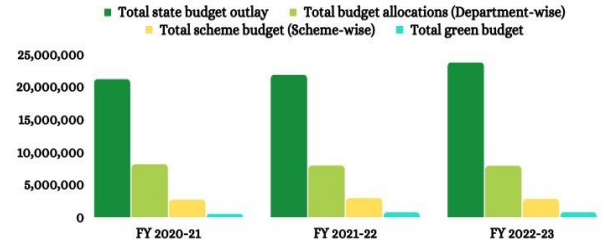
Ms. Ghazal Hashmi, Mr. Vivek Tejaswi

The concept of 'Green Budget' can be observed as a mechanism of budgetary analysis that can help in systematic mapping and tracking the sources of budget outlays, expenditures, and policies which, in turn, can support coordinated policy design and identification of periodic and continuous finance needs to achieve green objectives. This approach has reference to an international forum– 'One Planet Summit' in 2017, Organisation for Economic Co-operation and Development (OECD), appealing incorporation of Green Budgeting within national and regional financing and budgeting framework.

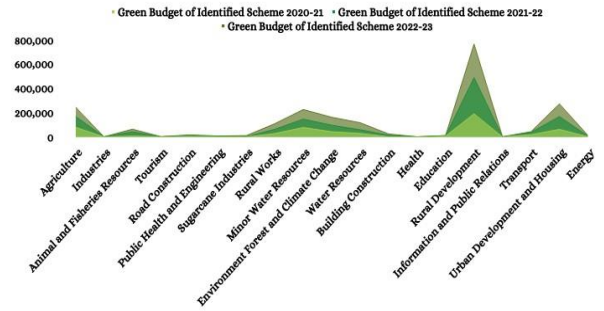
2020-21 **2021-22** **2022-23**

Percentage of Green in comparison to total budget allocation by state

Percentage of Green in comparison to budget estimated on identified schemes

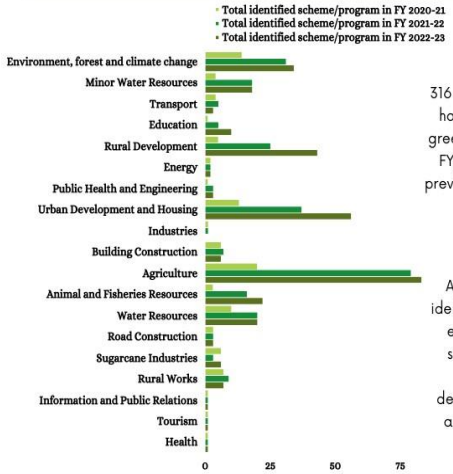


Department-wise contribution in Green Budget



The Green Budget contribution since 2020-21 to 2022-23 has increased by 92% for Sugarcane department, followed by 78% for Building Construction department and by 63% for Animal and Fisheries Resources department

Department-wise number of schemes/ programmes identified for green budget



316 schemes/ programmes have been identified for green budget in the current FY, which was 267 in the previous FY 2021-22 and 103 in FY 2020-21

Agriculture department identified largest number of environmental relevant schemes/programmes, followed by Urban development and Housing and Rural development

Centre for Studies on Environment and Climate
Asian Development Research Institute
An ENVIS Resource Partner on Water Management and Climate Change
Under the aegis of the Ministry of Environment, Forest & Climate Change, Govt. of India

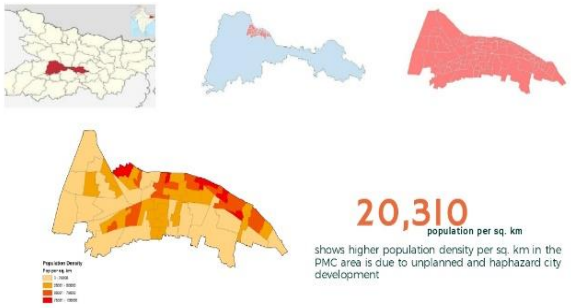
HEAT STRESS OF PATNA MUNICIPAL CORPORATION

A GEOSPATIAL ANALYSIS

Ms. Ghazal Hashmi

Heat waves induced by climate change and the artificial Urban Heat Island effect together pose another major challenge to cities across Bihar. Urban areas experience spells of unusual heatwave conditions which occur every year from March to July. The extreme temperatures combined with high humidity and resultant atmospheric conditions adversely affect people living in these regions leading to physiological stress, and sometimes even death. The state witnessed death of more than 100 people in 2019 due to heat wave in the worst affected districts of Gaya, Patna, and Aurangabad.

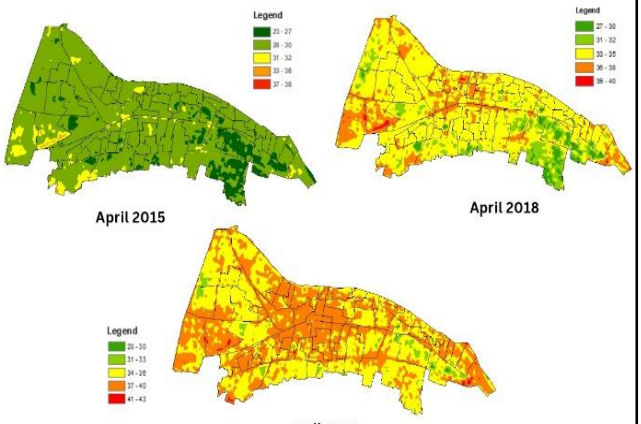
STUDY AREA



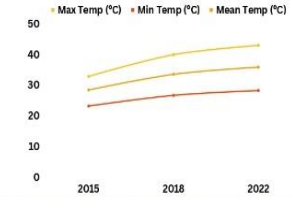
20,310 population per sq. km

shows higher population density per sq. km in the PMC area is due to unplanned and haphazard city development

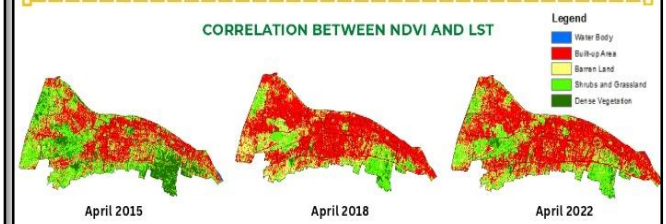
TREND OF LAND SURFACE TEMPERATURE

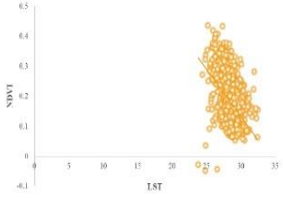


Year	Min (°C)	Max (°C)	Mean (°C)
2015	23.19	32.84	28.43
2018	26.67	39.92	33.52
2022	28.25	42.96	35.87



CORRELATION BETWEEN NDVI AND LST





Graph show the link with NDVI and LST. The regression line provided significant clarification, demonstrating a strong inverse link between LST and NDVI. These findings suggest that vegetation-covered areas have decreased as a result of urbanization, which has contributed in the effect of LST. The inverse relation between LST and NDVI demonstrates that the higher the amount of vegetation cover, the lower the LST.

Centre for Studies on Environment and Climate
Asian Development Research Institute
An ENVIS Resource Partner on Water Management and Climate Change
Under the aegis of the Ministry of Environment, Forest & Climate Change, Govt. of India.

WORKING GROUP

Research Team

Dr. Ashmita Gupta

Member-Secretary, ADRI

Dr. Ashmita Gupta is an economist. Her primary areas of interest are empirical micro-economics, labour, development, gender, public finance and international trade. She has been associated with and has taught in several research institutes in India and abroad. Her expertise includes the use of statistical tools to study social problems. Her papers have been published in reputed journals and have been cited by eminent scholars all over the world. She has been a post-doctoral researcher in Wageningen University, Netherlands and Indian Statistical Institute, Chennai. Before that, she completed her PhD from the University of Houston. She has a Master's from Jawaharlal Nehru University and a Bachelor's from Delhi University.

Dr. Sunil Kumar Gupta

Lead Researcher

Dr. Sunil Kumar Gupta is working as Research Lead (Air Pollution and Climate Change) at the Centre for Studies on Environment and Climate (CSEC), ADRI, Patna since March 2023. He obtained his Ph.D. in Environmental Sciences from IIT (ISM) Dhanbad, and his Post-Doctoral from IIT Madras and Chaoyang University of Technology, Taiwan. His research expertise is in air pollution exposure modelling, emission inventories, source apportionment, receptors, dispersion modelling and climate change.

Ms. Nisha Kataria

Research Associate

Ms. Nisha Kataria is currently working as a Research Associate at the Centre for Studies on Environment and Climate (CSEC), ADRI, Patna since May 2022. She holds a post-graduate degree in Environmental Sciences with a Gold Medal. Her current professional focus encompasses dynamic projects on Air Pollution and Climate Change Solutions. She has made significant contributions to the Bihar Clean Air Action Plan, collaborating with the World Bank and the government of Bihar. In this capacity, she has undertaken evidence-based policy research in the Electric Vehicle sector. Her endeavours can be seen in the form of hard work done by utilizing various mediums such as reports, research articles, newsletters, and info-graphics in order to successfully communicate valuable insights.

Mr. Anshuman Kumar

Project Coordinator

Mr. Anshuman Kumar is currently working as a Project Coordinator (Clean Mobility) at CSEC-ADRI. He has done his Master's in Urban Planning from Sushant University, Gurgaon. He has worked previously at the Centre for Science and Environment (CSE), New Delhi under the Sustainable Habitat and Building Programme for research in policies related to energy efficiency and thermal comfort in countries of Africa.

Research Interests: Transport planning, renewable energy policies, environmental planning and policies.

Ms. Ghazal Hashmi

Research Associate

Ms. Ghazal Hashmi is currently working as a Research Associate at the Centre for Studies on Environment and Climate (CSEC), ADRI, Patna. She holds a Master's degree in Environmental Engineering from the National Institute of Technology, Patna. She has worked earlier at CSIR-NEIST, Jorhat on sustainable inter-disciplinary use of resources.

Research Interests: Climate change adaptation, Environmental economics, Public finance, and GIS.

Ms. Pooja Kumari

Information Officer

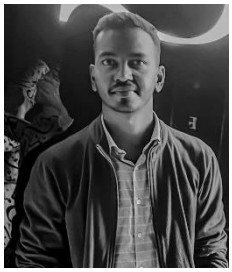
Ms. Pooja Kumari is currently working as an Information Officer under the Environment Information Awareness and Capacity Building Programme (EIACP) at the Centre for Studies on Environment and Climate (CSEC), ADRI, Patna. She holds a Master's degree in Environment, Climate Change & Sustainability Studies from Tata Institute of Social Sciences, Mumbai.

Research Interests: Climate Change, Clean Energy, Water Resource Management, Plastic Waste Management.

Mr. Vaibhav

Data Interface Developer

Mr. Vaibhav is currently working as Data Interface Developer at CSEC-ADRI. With a Bachelor's degree in Computer Science and extensive mastery of Java and its frameworks, including Spring, Hibernate, and Spring Boot, he brings valuable expertise to the IT industry. His proficiency also extends to the MYSQL database query language. Presently, Mr. Vaibhav is actively engaged in a very fascinating project, focusing on the End-to-End Development of Mobile Applications for Route Tracking. Additionally, he is passionately involved in creating the CSEC Dashboard, a comprehensive platform catering to various sectors of the environment.



Mr. Gulshan Patel

Project Assistant

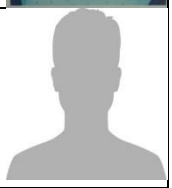
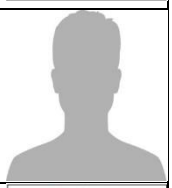
Gulshan is working as a Project Assistant for the ongoing project titled 'Climate resilient and Low Carbon Development Pathway' underway at CSEC. His major involvement is in inter-disciplinary research project coordination, assisting in field-based investigations and also participating in data analysis and literature reviews for the same. He is also associated with project monitoring and evaluation in the field for effective implementation. He holds a Master's Degree in Environmental science from the Central University of South Bihar, Gaya.

Mr. Sanjeev Kumar

Data Entry Operator

Mr. Sanjeev has joined as a Data Entry Operator under the Environment Information Awareness and Capacity Building Programme (EIACP) at the Centre for Studies on Environment and Climate (CSEC) at ADRI. He holds an MBA degree in HR and Marketing from Subharti University and a Bachelor's degree in English from Magadh University.

Research Intern

SN	Name	Topic	University/ Institute	Duration	Intern
1	Ms. Anshika Kumari	Particulate air pollution in transport microenvironment, Patna city	A N College, Patliputra University, Patna	December 19, 2023, to February 18, 2024	
2	Mr. Madan Murari	Current charging and battery swapping infrastructure trends for electric vehicles in Bihar	A N College, Patliputra University, Patna	December 19, 2023, to January 18, 2024	
3	Mr. Sanjeev Kumar	Data collection on urban freight transport (Jharkhand)	Central University of Jharkhand Cheri-Manatu, Kamre Ranchi - 835 222	September 2023 to October 2023	
4	Mr. Abhay Kumar	Data collection on urban freight transport (Jharkhand)	Central University of Jharkhand Cheri-Manatu, Kamra Ranchi- 835 222	September 2023 to October 2023	
5	Mr. Raushan Kumar	Data collection on urban freight transport (Jharkhand)	Central University of Jharkhand Cheri-Manatu, Kamre Ranchi - 835 222	August 2023 to December 2023	
6	Mr. Shahrukh Nawaj Alam	Data collection on urban freight transport (Jharkhand)	Central University of Jharkhand Cheri-Manatu, Kamre Ranchi - 835 222	August 2023 to December 2023	
7	Ms. Aditi Raj	Municipal Solid Waste Management and Associated Risks to Environment and Health in Patna	Indraprastha College for Women, 31, Shamnath Marg, Delhi- 110054, (Delhi University)	August 03, 2023, to September 4, 2023	
8	Ms. Swastika Chaudhary	Demystifying the Climate Change Reporting in print media, Bihar	Kristu Jayanti College, K. Narayanapura, Kothanur, Bangalore- 560077 (Bengaluru North University)	June 19, 2023, to July 19, 2023	
9	Mr. Kanhiya Kumar	Scoping Battery Swapping Potential in Bihar	Central University of South Bihar Fatehpur, Bihar 824236	April 04, 2023, to May 02, 2023	

9	Mr. Jitendra Kumar	Data collection on urban freight transport (Bihar)	Government polytechnic Gopalganj Vishambherpur, Gopalganj- 841501	March 01, 2023, to July 31, 2023	
10	Mr. Rajat Kumar	Data collection on urban freight transport (Bihar)	Central University of South Bihar Karhara, Fatehpur, Gaya- 824236	March 01, 2023, to July 31, 2023	
11	Mr. Rajasekhar Reddy Muttana	GIS-based spatial maps and statistical modelling interpretation for urban freight characteristics and trip distribution	Jindal School of Government and Public Policy, Narela Road Sonipat-131001, (O.P. Jindal Global University)	February 06, 2023, to May 30, 2023	
12	Mr. Ravitej Musunuri Prasad	Qualitative Analysis of Policy and Legal Nuances in the Clean Mobility Transition in Bihar	Jindal School of Government and Public Policy, Narela Road Sonipat-131001, (O.P. Jindal Global University)	February 06, 2023, to May 30, 2023	
13	Ms. Ridisha Kamal	Policy recommendation framework for clean mobility transition in Bihar	University School of Environmental Management, Guru Gobind Singh Indraprastha University, New Delhi	August 29, 2022, to September 24, 2022	

About the Centre

Centre for Studies on Environment and Climate (CSEC), hosted by the Asian Development Research Institute (ADRI). *(An EIACP Resource Partner on Water Management & Climate Change under the aegis of the Ministry of Environment, Forest & Climate Change* or MoEF&CC*, Government of India*).

CSEC happens to be a mandated centre which basically works in the research domain of environmental resource management by way of an inter-disciplinary mode. Though CSEC is the least experienced of all the centres functioning in ADRI, it brings to the fore - as part of ADRI - a transitional and transformational experience of dispensing research for more than twenty years. The centre is accredited and recognised by the Ministry of Environment, Forest and Climate Change. Comprehending inter-disciplinarily subjects by taking a holistic approach regarding the purview of climate change is the core agenda of this centre. The centre has already completed a number of projects sponsored by international organizations like the World Bank Group, New Venture Fund, DFID, UNICEF, and other organizations. The core competency of the centre draws its strength from a galaxy of research scientists who work on such varied subjects as Climate Change Anthropology, Environmental Resource Management, as well as Water and its diversified effects. With the assistance of its on-board capacity, CSEC is able to work, make identifications, and cater to an assorted clientele in keeping with its research agenda on multiple fronts. Its research agenda ranges from policy level 5 support to implementation, thereby leading to capacity building frameworks. The research activities of this centre entail multi-faceted dimensions, which are in accordance with the thematic areas of the centre.

Core Thematic Research Areas: Environmental Resource Management (Linked to SDGs), Climate Change and its Implications in Different Sectors, Water and Sustainable Management, Clean Air Action Plan, Clean and Renewable Energy Framework, Climate Change Anthropology, Disaster Management and Technological Interventions for Mitigation of Climate Change.

EIACP (Environmental Information Awareness Capacity Building and Livelihood Programme) has been conceptualized and is functioning now. Awareness, skilling, research and development in the green sector are some of the major prerequisites for a rational management of the environment. The programme draws its mandate from a Government of India (Allocation of Business Rules, 1961) law, wherein the objective of "Environmental Research and Development, Education, Training, Information and Awareness" has been tasked to the Ministry of Environment, Forest and Climate Change (MoEF&CC). EIACP (formerly known as ENVIS) uses a network of decentralized frameworks entrusted with the agenda of channelizing country-wide efforts towards environmental conservation and management. It encompasses the best functional aspects of the erstwhile ENVIS scheme. It will serve as a one-stop platform for the dissemination of environmental information, informed policy formulation on various facets that are related to environmental health, and facilitation of alternate livelihoods by means of green skilling. It involves a recalibrated approach towards charting out a pathway for the MoEF&CC so as to establish a strong social connect, thereby enhancing impact at the ground level.

The aims and objectives of the EIACP are as following:

- to nurture a green, sustainable and inclusive workforce in order to strengthen both living and environmental standards while fostering gainful self-employment of youth

- to conduct skilling courses not only in traditional areas but also in new emerging areas like those of electric vehicles, hazardous waste/ Bio-medical waste, etc. while considering their future scope, requirements and prospects
- to zealously participate in Mission LiFE (Lifestyle for Environment), which has been conceptualized by the Ministry
- to facilitate technical and environmentally-conscious participation by various industries with a focus on sustainable development
- to develop national and international collaborations for the exchange of knowledge and development of skills so as to achieve the SDGs
- to aid sustainable livelihoods of tribal populations, especially in the NER based on traditional knowledge and different crafts
- to facilitate the making of informed decisions and policy by catering to demand for research, innovation and data on nascent issues related to the environment
- to support the evolution of environmentally-conscious futuristic citizens, who will go on to constitute communities/populace with very high awareness about issues concerned with the environment

Address:

Centre for Studies on Environment and Climate (CSEC),
Asian Development Research Institute (ADRI),
BSIDC Colony, Off Boring-Patliputra Road, Patna-800 013 (Bihar)
Tel.: +91-612-2575649 (O)
Email ID: csec@adriindia.org Website: www.adriindia.org

Centre for Studies on Environment and Climate (CSEC),
Asian Development Research Institute, Patna



Our mailing address is: csec@adriindia.org