Literature Review on Web application to help people track and report climate change impacts, such as sea level rise, extreme weather events, and changes in plant and animal life.

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Chapter 1

1 Paper 1: Trends of electronic waste pollution and its impact on the global environment and ecosystem

Journal/Conference Rank: Q1
Publication Year: 25 April 2019
Reference: [1]

1.1 Summary

The article titled "E-Waste Pollution Trends and Its Impact on the Global Environment and Ecosystem" presents a comprehensive examination of the urgent problem of electronic waste (e-waste) and its repercussions on the environment, human well-being, and ecosystems. E-waste contains hazardous elements like arsenic, cadmium, chromium, mercury, and lead, which can lead to pollution when they are discharged into the atmosphere, water, and soil. The review outlines the various types of e-waste materials and the primary pollutants, including ferrous and non-ferrous metals, plastics, glass, printed circuit boards, cement, ceramics, and rubber, along with some valuable metals like copper, silver, gold, and platinum. This paper underscores the importance of monitoring the ecological footprint and implementing effective strategies throughout the lifecycle of electronic devices to combat the problems associated with e-waste, spanning from production to final disposal.

E-waste, originating from discarded electronic devices, is generated annually depending on device lifespan, unit quantity, and mass. Recycling e-waste is crucial for environmental and human health. Developed nations often export hazardous materials to developing countries due to labor costs and strict regulations. E-waste production is linked to a country's population. Millions of tons have been generated globally up to 2016. They also mentioned all the ways of how we can recycle this e-waste and use it again was also analyzed. How can we store the e-waste safely that will be harmless to the environment and for human health was also discovered here in this paper.

1.2 Software Architecture

The paper doesn't explicitly mention the software architecture used in their research. This paper showed the managers and analyzed of the global population, e-waste generation, major pollutants in e-waste, and health impact data over regions, categories, materials, and household appliances. It primarily focuses on the environmental and health impacts of electronic waste (e-waste) management, along with recommendations and strategies for handling e-waste effectively. The software architecture or tools used for their research are not provided in the paper.

They mainly categories the e-waste by collecting the data of major pollutants in e-waste such as medical devices, automatic dispensers, monitoring instruments and cont, Lighting equipment, toys, leisure and sports, electrical and electronic tools, small household appliance, consumer equipment, telecommunications, and IT equipment's, large household appliance.

They architect the process of recycling process and recovery of valuable materials.

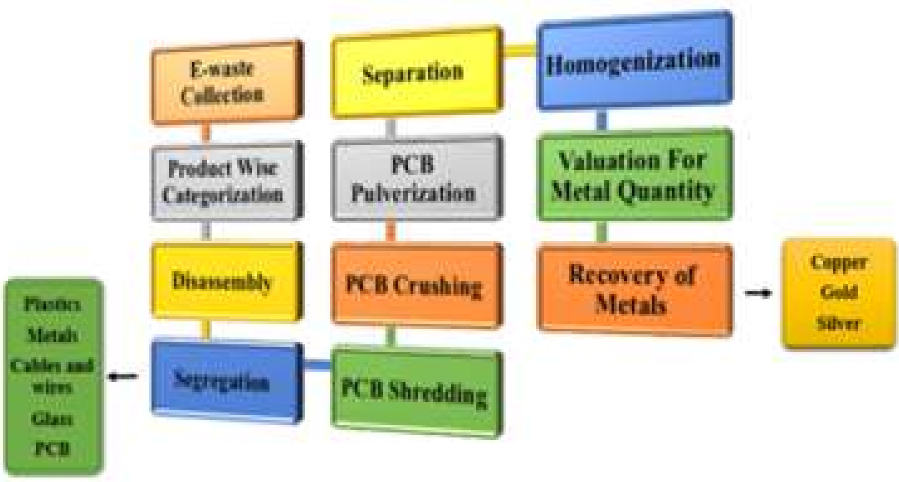

Figure 1: Software architecture diagram for Paper 1.

1.3 Data Parameters

The paper does not provide specific details about data parameters or the use of data in their research. The paper mainly discusses the environmental and health impacts of e-waste management, as well as policy recommendations and strategies. Data parameters, if used, are not elaborated upon in the paper.

It's a impacted data-based research paper. They worked with data sets (parameters) those are- Global Population Data:
• Region/Country
• Population Count
• Year
E-Waste Generation Data:
• Region/Country
• Type of E-Waste (e.g., computers, mobile phones, appliances)
• Quantity (e.g., in tons or kilograms)
• Year
Major Pollutants Data:
• Type of Pollutant (e.g., arsenic, cadmium, chromium)
• Pollutant Concentration (e.g., parts per million)
• Source of Pollution (e.g., e-waste disposal, recycling processes)
Health Impact Data:
• Type of Health Impact (e.g., respiratory diseases, cancer)
• Number of Cases
• Region/Country
Materials Data:
• Type of Material (e.g., metals, plastics, glass)
• Quantity (e.g., in tons or kilograms)
• Recycling Rate
• Region/Country
• Year
Household Appliances Data:
• Type of Appliance (e.g., refrigerators, TVs, washing machines)
• Quantity Sold/Disposed
• Region/Country
• Year
Data Quality Indicators:
•Data Completeness
• Data Accuracy
• Data Reliability

1.4 Datasets Used

In this paper, the dataset contains comprehensive data on electronic waste (e-waste) generation, major pollutants, health impacts, materials, household appliances, atmospheric contamination by e-waste, groundwater contamination by e-waste, soil contamination by e-waste, and population statistics across different regions and countries.

So, this paper used the all the mentioned parameters datasets. Global Population Data, E-Waste Generation Data, major pollutants data, materials data, household appliances data, Geospatial Data, data quality indicators. This dataset actual data was collected from reliable sources, which could include government reports, research publications, and environmental agencies' data. Additionally, data on specific regions, countries, and years could have been created a comprehensive dataset for analysis.

1.4.1 Paper Link

Access the full paper at: **https://link.springer.com/article/10.1007/s11356-019-04998-2**.

2 Paper 2: An updated investigation about climate-change hazards that might impact electric infrastructures.

Journal/Conference Rank: N/A
Publication Year: 07 November 2019
Reference: [2]

2.1 Summary

This paper investigates the impact of climate change on Italy's electric infrastructures, highlighting the risks posed by rising temperatures, increased flood threats, and other climate hazards. The study employs updated climate change scenarios based on high-resolution models, comparing the current climate with short, medium, and long-term projections.

Key findings indicate that without mitigation actions, Italy can expect a significant temperature increase, with a rise of over 5°C by the end of the century. Precipitation is expected to decrease, with up to 50 Percent reduction in summer rainfall. Hot days and coastal flooding risks are set to rise, with inland flooding risks varying by season and region.

In conclusion, this research emphasizes the urgent need to address climate change in the energy sector. Decision-makers should consider climate resilience in infrastructure planning, given the anticipated increase in extreme weather events and changing meteorological conditions.

2.2 Software Architecture

The study employed advanced climate modeling and data analysis software to assess the impacts of climate change on Italy's electric infrastructure. The software architecture was designed as a three-tiered system, comprising a presentation layer, an application layer, and a data layer. The presentation layer offered a user-friendly interface for accessing the study's findings and adaptation recommendations. In the application layer, the software retrieved and processed climate data from various sources, conducted climate modeling using 14 EURO-CORDEX simulations, and assessed the potential risks to the electric sector. The data layer securely stored climate data and infrastructure information, facilitating their integration for analysis. Compliance and documentation adhere to regulatory Security, scalability, compliance, and documentation measures ensure data safety, system performance, and regulatory adherence, ultimately supporting informed decision-making and resilience planning for Italy's electric sector infrastructure in the face of climate change conditions.

2.3 Data Parameters

The study utilized a comprehensive set of data parameters to analyze the impacts of climate change on Italy's electric infrastructure. These data parameters included:

Climate Models:
The study employed 14 EURO-CORDEX simulations, each utilizing a different climate model, to generate climate projections. These models were sourced from various research institutions.
Resolution:
The simulations had a horizontal resolution of 12.5 km, allowing for detailed regional climate analysis.
Radiative Forcing:
The simulations were conducted under the radiation forcing scenario RCP 8.5, which represents a high-emission future.
Observational Datasets:
Two observational datasets were used to characterize the current climate conditions. E-OBS provided daily data with a spatial resolution of 0.25 x 0.25 degrees, covering Europe from 1961 onwards. MESAN, with a spatial resolution of 5 km, covered all of Europe at a daily time scale from 1979 to 2013.
Climate Parameters:
The study analyzed various climate parameters, including mean, minimum, and maximum temperatures, total precipitation, and specific climate indices such as those related to extreme events (e.g., heatwaves, extreme precipitation, wet-snow frequency).
Temporal Analysis:
Climate data were examined over different timeframes, including short-term (FUT1: 2021-2050), medium-term (FUT2: 2041-2070), and long-term (FUT3: 2071-2100), compared to a reference period (REF: 1971-2000).

These data parameters allowed for a thorough assessment of climate-related hazards and vulnerabilities affecting Italy's electric infrastructure, supporting the development of informed adaptation and mitigation strategies.

2.4 Datasets Used

The dataset used in this paper for analyzing climate change impacts on Italy's electric infrastructure comprised the following components:

Climate Model Simulations:

The study utilized 14 EURO-CORDEX climate model simulations covering the period from 1971 to 2100. These simulations incorporated various climate models, each contributing to the dataset's diversity.
Radiative Forcing Scenario:
The simulations were conducted under the radiative forcing scenario RCP 8.5, representing a high greenhouse gas emissions future.
Observational Datasets:
• E-OBS: This dataset provided gridded daily climate data at a spatial resolution of 0.25 x 0.25 degrees for Europe, starting from 1961. It included key variables such as mean, minimum, and maximum temperatures, as well as total precipitation.
• MESAN: MESAN, a reanalysis dataset, covered the entirety of Europe at a spatial resolution of 5 km. It offered daily climate data spanning from 1979 to 2013.
Temporal Analysis Periods:
The dataset involved multiple timeframes, allowing for a comprehensive examination of climate changes:
Reference Period (REF):
Representing climate conditions from 1971 to 2000. Short-Term (FUT1): Covering the years 2021-2050. Medium-Term (FUT2): Encompassing the years 2041-2070. Long-Term (FUT3): Extending from 2071 to 2100.

This dataset enabled researchers to assess how climate-related parameters and extreme events are projected to change over time in Italy, supporting their analysis of the potential impacts on the country's electric infrastructure and the development of strategies for climate resilience and adaptation.

2.4.1 Paper Link

Access the full paper at https://ieeexplore.ieee.org/document/8893297.

3 Paper 3: The Impact of Climate Change on Environmental Sustainability and Human Mortality

Journal/Conference Rank: N/A
Publication Year: 22 September 2023
Reference: [3]

3.1 Summary

This paper underscores the significant repercussions of global urbanization on climate change, environmental sustainability, and human mortality. It emphasizes a three-tiered impact framework, starting with primary consequences such as extreme weather events and extending to secondary outcomes like economic losses and ecological disturbances, ultimately culminating in tertiary, long-term effects like social unrest and geopolitical conflicts. To address these pressing challenges, the authors advocate for the establishment of a global event-based human mortality database focused on climate change impacts, offering crucial empirical data for in-depth geospatial analysis and climate model validation. They stress the pivotal role of effective communication in disseminating knowledge about climate change and its direct link to human mortality, highlighting the significance of individual behavior modification and policy development to achieve worldwide climate adaptation, resilience, and sustainable development objectives.

The paper doesn't delve into the technical aspects of data collection, sources, or the specific dataset utilized for analysis. Therefore, there is no information available in the paper regarding the dataset used for this research.

3.2 Software Architecture

In this paper does not provide specific details about the software architecture used in its research. It primarily focuses on the conceptual framework, data needs, and the importance of developing a global event-based human mortality database related to climate change. It doesn't delve into the technical aspects, software tools, or architecture employed for data collection, analysis, or database development. Therefore, there is no information available in the paper to construct a software architecture used in this research.

3.3 Data Parameters

The paper doesn't provide specific details about the data parameters used in the research since it focuses more on the conceptual framework and the need for a global event-based human mortality database related to climate change. It doesn't go into the technical specifics of data parameters, sources, or variables used for data collection or analysis. Therefore, there is no information available in the paper to outline the specific data parameters employed in this research

3.4 Datasets Used

The paper doesn't provide specific details about the dataset used in the research. It primarily discusses the need for a global event-based human mortality database related to climate change and the broader conceptual framework surrounding the impacts of climate change on human mortality. The paper doesn't delve into the technical aspects of data collection, sources, or the specific dataset utilized for analysis. Therefore, there is no information available in the paper regarding the dataset used for this research. They mentioned the Primary, Secondary, Tertiary Environmental Impacts of Climate Change, A Global Event-Based Human Mortality Database Related to Climate Change and the Communication Strategies on Climate Change. They only collected and averaged the data they got from the survey, but they didn't have any dataset nor any parameters for that analysis. They have only described how much this climate change is impacting mortality. So, we should be focusing on collecting the data and working with the dataset in future to control the early and heavy mortality rate.

3.4.1 Paper Link

Access the full paper at https://www.mdpi.com/2076-3298/10/10/165 .

4 Paper 4: Assessment of the impact of climate change and flooding on bridges and surrounding area

Journal/Conference Rank: N/A
Publication Year: 29 September 2023
Reference: [4]

4.1 Summary

This research paper introduces a comprehensive framework for evaluating how climate change affects the functionality of a bridge when confronted with flooding events. The study integrates a range of techniques, including predictions of river flow for climate change scenarios, analysis of flood frequency, assessment of risk indicators, and stochastic simulations. The primary discoveries highlight a growing occurrence of events surpassing the designed flood level, especially in more pessimistic climate scenarios, which in turn raises the likelihood of the bridge being rendered non-operational. The risk assessment encompasses aspects like flood zones, hydrological risks, flood hazard ratings, and the extent of flooding, underscoring the necessity for an extensive regional evaluation of flood risk and corresponding mitigation strategies. This research was conducted as part of the "Strengthening the Territory's Resilience to Risks of Natural, Climate, and Human Origin (SIRMA)" project, which received funding from the European Regional Development Fund. The authors have not disclosed any conflicts of interest associated with the research and its funding. Furthermore, it should be noted that the content of the publication may not necessarily reflect the views of the European Union, INTERREG Europe program authorities, or the organizations the authors are affiliated with. The accuracy of Copernicus products is not guaranteed. The study also proposes future investigations into the structural failure of bridges and their implications for various damage scenarios.

4.2 Software Architecture

The research paper does not explicitly provide detailed information about the specific software architecture used in the study. It primarily focuses on the methodologies, models, and analyses employed for assessing the impact of climate change on the serviceability of a bridge in the context of flooding events. While the paper mentions the utilization of various software tools for data analysis and simulations, it does not delve into the specifics of the software architecture employed for these tasks.

For a comprehensive understanding of the software architecture used in the study, it would be necessary to refer to the specific software tools and systems mentioned, as well as any supplementary materials or references that may provide detailed insights into their architecture and implementation. The study primarily emphasizes the methods and findings related to flood risk assessment and climate change impacts.

4.3 Data Parameters

The paper provides an extensive analysis of flood risk assessment and the impact of climate change on a specific bridge and its surroundings. While it does not offer a comprehensive list of data parameters, it uses a variety of data sources and parameters to conduct its research. Below are some of the key data parameters and sources mentioned in the paper:

River Flow Data:
The study relies on historical river flow data, such as annual peak discharge values, which are critical for flood frequency analysis. These data are fundamental for assessing the probability of flood events.
Climate Scenarios (RCPs):
The paper considers different Representative Concentration Pathways (RCPs) as scenarios for future climate conditions. RCPs are used to estimate changes in climate variables, including temperature and precipitation.
Hydrological Risk Data:
The paper calculates the hydrological risk of design based on the T-year return period flood. This risk assessment requires both historical and projected data.
Geospatial Data:
To assess the impact of flooding and flood zones, the study employs geospatial data, including topographical maps and satellite imagery. This information is used to model and visualize the flooded areas.
Bridge Design Data:
Information related to the bridge itself, such as its design flood level, is a crucial parameter for evaluating the risk of the bridge being out of service during flood events.
Flood Hazard Rating Data:
The paper uses data related to flood depth, flow velocity, and land use to compute flood hazard ratings, which provide insights into the degree of danger that floods pose to people in flood-prone areas.
Simulation Data:
Stochastic simulations of floods involve data related to the rate of floods exceeding the design flood level. This data is crucial for estimating the probability of the bridge being out of service.

4.4 Datasets Used

The paper you've provided does not explicitly mention specific datasets used in the research. However, it appears to rely on a combination of hydrological, climate, and geospatial data sources. The dataset would include information on:
River Flow Data: This dataset likely contains historical records of river flow, such as annual peak discharge values, which are essential for flood frequency analysis. This data would help in understanding the river's behavior during different seasons and over the years.
Climate Data:
The paper mentions different Representative Concentration Pathways (RCPs) to project future climate scenarios. Researchers typically use climate models and datasets that provide information on temperature, precipitation, and other climate variables under various RCPs.
Geospatial Data:
Geospatial data includes topographical maps, satellite images, and geographic information system (GIS) data. These datasets are used to model and visualize the study area, including the river, surrounding land, and the bridge's location.

Bridge Design Data:
Information specific to the bridge, such as its design flood level and structural characteristics, would be part of the dataset. This data helps assess the bridge's vulnerability to floods.
Flood Hazard Rating Data:
This dataset would include information about flood depths, flow velocities, and land use in the area. It's used to assess the degree of danger that floods pose to people in flood-prone regions.
Stochastic Simulation Data:
To assess the probability of the bridge being out of service during flood events, data related to the rate of floods exceeding the design flood level would be included.

It's important to note that this paper does not specify the sources or detailed characteristics of these datasets. Researchers typically compile such datasets from various sources, including government agencies, research institutions, and relevant open data repositories. These datasets are essential for conducting comprehensive flood risk assessments and climate impact studies on critical infrastructure like bridges.

4.4.1 Paper Link

Access the full paper at https://www.frontiersin.org/articles/10.3389/fbuil.2023.1268304/full
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5 Paper 5: Importance of water level management for peatland outflow water quality in the face of climate change and drought

Journal/Conference Rank: N/A
Publication Year: 02 June 2022
Reference: [5]

5.1 Summary

This research paper focuses on the critical importance of managing water levels in peatlands, particularly in the context of climate change and drought. Peatlands are unique ecosystems that store vast amounts of carbon and play a crucial role in regulating water quality and quantity. However, they are highly susceptible to the adverse impacts of climate change and prolonged drought conditions.

The key points and findings of this research paper can be summarized as follows:
1.Peatlands and Their Ecosystem Services: The paper begins by highlighting the significance of peatlands, emphasizing their role in carbon storage, water regulation, and the maintenance of biodiversity. Peatlands are essential in maintaining clean and abundant water resources.
2.Climate Change and Drought Impact: The research underscores how climate change is altering precipitation patterns and increasing the frequency and severity of droughts.

These changes can lead to water scarcity and reduce the capacity of peatlands to maintain water quality and regulate water flow.
3.Peatland Hydrology: The paper explains the crucial role of water levels in maintaining peatland health. Proper water level management is essential for preventing peatland degradation, which can result in the release of stored carbon and the deterioration of water quality.
4.Water Quality and Nutrient Release: When water levels are not adequately managed, peatlands can release excessive nutrients and organic matter into outflow water, leading to water quality issues. This can have far-reaching ecological and environmental consequences.
5.Water Level Management Strategies: The research paper discusses various strategies for managing water levels in peatlands, including artificial drainage, restoration, and adaptive management. It emphasizes the need for sustainable approaches that consider both ecological and hydrological factors.
6.Adaptation to Climate Change: The paper suggests that adapting to the changing climate is imperative for peatland management. Implementing adaptive strategies that consider long-term changes in precipitation and temperature can help maintain water quality and ecosystem health.
7.Policy Implications: The research underscores the importance of integrating peatland management into broader climate adaptation and water resource management policies. It calls for a proactive approach to protect and restore peatlands.
Research Gaps: The paper also identifies areas where further research is needed, such as 8.understanding the specific impacts of climate change on peatland hydrology and developing more effective water management techniques.

In conclusion, this research paper highlights the critical role of water level management in preserving peatland outflow water quality in the face of climate change and drought. It emphasizes the need for proactive and sustainable approaches to peatland conservation and calls for policy integration to address these challenges effectively.

5.2 Software Architecture

This paper doesn't contain any specific information about the software architecture used or discussed in the study. It mainly focuses on the impact of water level management and climate scenarios on peatland water quality.

5.3 Data Parameters

Climate Scenarios:
The research utilized representative concentration pathway (RCP) scenarios to model future climate conditions. These scenarios, which are associated with different radiative forcing targets for the future, were sourced from the Intergovernmental Panel on Climate Change (IPCC). The study employed three RCP climate scenarios (RCP 2.6, RCP 4.5, and RCP 8.5) to simulate varying degrees of future climate change, ranging from low to extreme.

Regional Climate Models (RCMs):

Hourly data for various climate variables, including temperature, precipitation, relative humidity, and radiation, were gathered from the Rossby Centre of the Swedish Meteorological and Hydrological Institute (SMHI). For RCP 4.5 and 8.5, five RCM datasets were available, and for RCP 2.6, 4.5, and 8.5, there were ten RCM datasets. These datasets covered the geographical area of Scania County in southern Sweden.

Peat Turfs:
Samples of peatland were collected from Fäjemyr, an ombrotrophic bog situated in the province of Scania. The peatland mesocosms were constructed using peat samples obtained from the uppermost layer of the peatland, which included prevalent plant species such as dwarf shrubs, sedges, and various Sphagnum species.

Advanced Climate Chambers:
The study made use of four advanced climate chambers (KK 750) to replicate the selected climate scenarios. These climate chambers were equipped with systems to control temperature, relative humidity, and radiation, with data recorded at three-hour intervals. Precipitation was manually simulated on a weekly basis.

Water Level Management:
From October 1, 2017, to September 30, 2018, water level management was implemented for all four peatland mesocosms. Subsequently, the mesocosms were categorized into managed and unmanaged treatments to investigate the influence of water level management.

Physicochemical Parameters:
Various physicochemical parameters were monitored, including dissolved organic carbon (DOC), ammonium (NH4), total phosphorus (TP), chemical oxygen demand (COD), biochemical oxygen demand (BOD5), pH, dissolved oxygen (DO), and total suspended solids (TSS).

Statistical Analyses:
Statistical analyses, including a two-way repeated-measures multivariate analysis of variance (RM-MANOVA), were performed to assess the effects of water level management and climate scenarios on physicochemical parameters over time.

5.4 Datasets Used

The description provided in the paper's materials and methods section does not explicitly mention specific datasets that were used. Instead, it outlines the methodology for creating future climate scenarios and collecting climate data from different sources. The paper describes the use of climate models (RCP scenarios and RCM datasets) to simulate future climate scenarios and the collection of hourly climate data.

5.4.1 Paper Link

Access the full paper at https://shorturl.at/rHOTV.

6 Paper 6: Impacts of climate change on drought and its consequences on the agricultural crop under worst-case scenario over the Godavari River Basin, India

Journal/Conference Rank: N/A
Publication Year: 2023
Reference: [6]

6.1 Summary

The historical perspective on drought in Central India, based on data from the Indian Meteorological Department, serves as a foundation for understanding past drought occurrences. To predict future drought characteristics, studies use climate models like d4PDF Scenarios. They employ the Standardized Precipitation Evapotranspiration Index (SPEI) for comprehensive drought analysis, considering both precipitation and temperature. Drought severity and risk assessment use multi-criteria matrices to identify vulnerable regions, particularly impacting agriculture. Recent research indicates changing drought patterns with increasing frequency and severity in certain sub-basins. These droughts significantly affect crop production, particularly rice, and necessitate the development of mitigation strategies to adapt to future climate conditions.

6.2 Software Architecture

The study is focused on analyzing standardized drought indices to understand the frequency and severity of droughts based on long-term historical and future climate data. It aims to identify regions that are at a high risk of experiencing droughts. Furthermore, it investigates the potential impacts that could occur in the Greater Rangpur-Bogra Region (GRB) under the worst-case drought scenario, in order to address and mitigate these potential risks effectively.

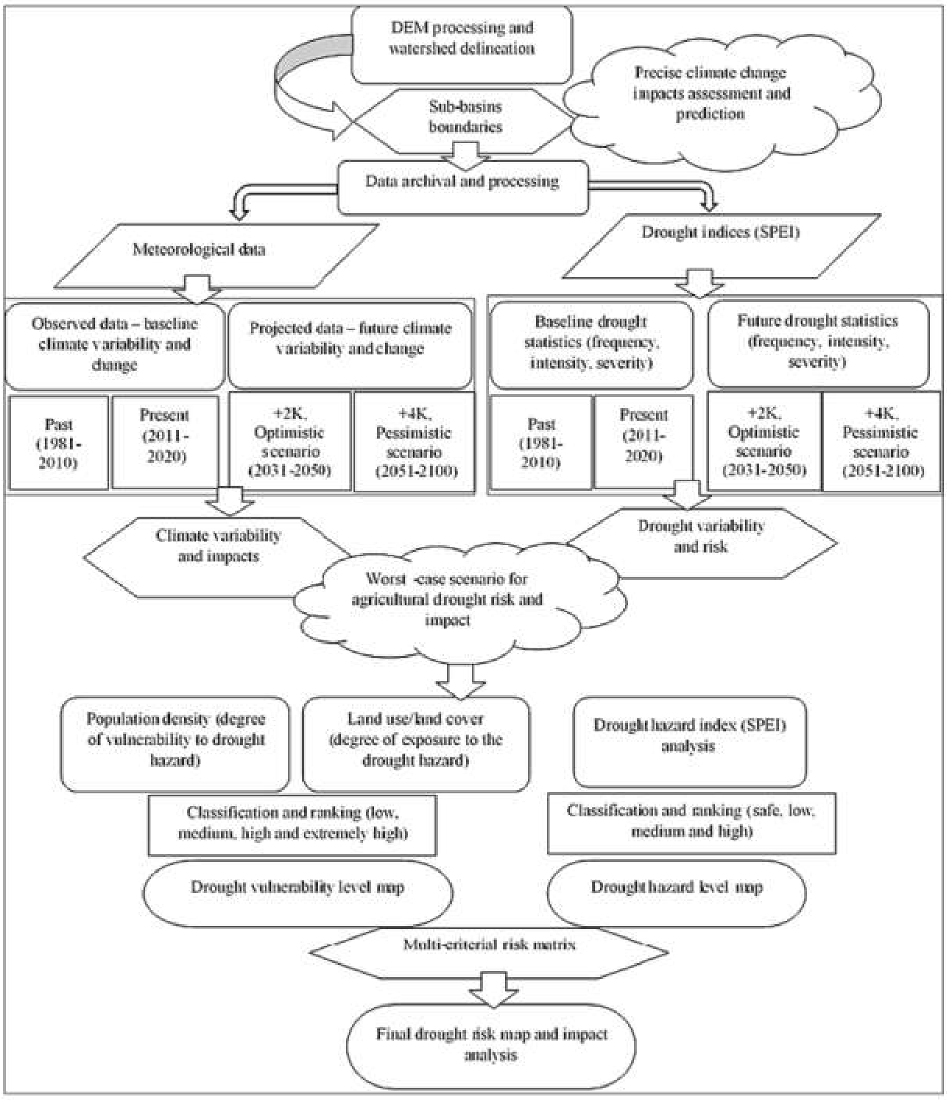

Figure 2: Schematics of research methodology for climate variability and drought risk assessment for Paper 6.

6.3 Data Parameters

1. Data Type and Sources:
Data Type: The data used in this study comprises climate and hydrological data, specifically focusing on variables related to precipitation, temperature, river flow, and crop yields.

Variables: The key variables considered are precipitation, temperature, river flow, and crop yield data.

Data Range: The dataset covers a specific period, including historical climate and agricultural records, and extends into future projections to explore worst-case scenarios.

Source: The primary sources of data are meteorological stations, hydrological monitoring stations, and agricultural records. Additionally, climate models and projections from authoritative sources like the Intergovernmental Panel on Climate Change (IPCC) are used for future climate scenarios.

2. Intensity Scale for Drought Categorization: Class: Drought severity is categorized into different classes, which are used to classify the level of drought impact.

SPEI Value: The Standardized Precipitation-Evapotranspiration Index (SPEI) values are employed as a quantifiable measure of drought severity.

Drought Category: Based on SPEI values, droughts are classified into different categories such as mild, moderate, severe, or extreme, allowing for a clear assessment of their severity.

3. Calculation of Drought Parameters for Spatiotemporal Drought Analysis: Drought Parameter: Various drought parameters, such as duration, intensity, and frequency, are calculated to understand the spatiotemporal characteristics of drought events.

Equation: Complex mathematical equations and statistical models are employed to compute these parameters, which help in the comprehensive analysis of drought trends.

Symbol and Unit: Each parameter is represented by specific symbols and is measured in appropriate units, such as days for duration and standardized values for intensity.

4. Multi-Criterial Classification Table for Agricultural Drought Risk Elements: Drought Risk Category: Agricultural drought risk elements include factors like soil moisture, crop type, and irrigation availability, which are categorized into different risk levels.

Rank: Each risk element is assigned a rank based on its influence on agricultural drought vulnerability.

Drought Hazard Classification: The combination of these ranks and elements results in a classification that identifies the overall agricultural drought hazard.

Drought Vulnerability Classification: Vulnerability factors, such as socio-economic conditions and adaptive capacity, are considered in conjunction with drought hazard to classify agricultural drought vulnerability.

5. Risk Rank and Classification:

Drought Hazard: The overall hazard is determined by assessing the risk elements associated with drought, which are ranked and combined to produce a hazard classification.

Drought Vulnerability: Vulnerability is evaluated by considering social and economic factors, adaptive strategies, and their influence on the community's ability to cope with agricultural drought.

6. Major Drought and Flood Events Based on SPEI Values:

Number: The count of major drought and flood events is determined from the dataset.

Major Drought Events: These are identified based on the SPEI values, indicating prolonged and severe drought periods.

Major Flood Events: Flood events are recognized using historical river flow data and comparing them with the established thresholds, highlighting significant flood occurrences.

6.4 Datasets Used

There's a wide variety of data set used in the paper. It includes:

1. Data Type and Sources: provides details on data variables and their sources used in the study. It's a reference for the data used in the drought risk assessment and impact evaluation.
2. Intensity scale for drought categorization: categorizes drought and wet events based on SPEI values, providing a scale to assess their severity, ranging from near normal to extreme droughts and moderately to extremely wet events.
3. Calculation of drought parameters for spatiotemporal drought analysis: provides definitions and explanations of statistical indicators related to drought characteristics, such as duration, severity, magnitude, and intensity.
4. Multi-criterial classification table for agriculture drought risk elements: outlines criteria for assessing the severity of drought hazard and may be used to map areas at higher agricultural drought risk in the study region.
5. Risk rank and classification: used to assess and classify drought risk based on likelihood and potential impact, resulting in different risk levels from "safe" to "very high-risk priority" for various areas. It plays a role in final drought risk mapping by considering both hazard and vulnerability risks.
6. Major drought and flood events based on SPEI values: lists major drought events, including the years they occurred and their characteristics, used for assessing drought impacts and changes over time in the study.

6.4.1 Paper Link

Access the full paper at https://www.sciencedirect.com/science/article/pii/S2405880723000778.

7 Paper 7: Impacts Climate Change on Marine Foundation Species

Journal/Conference Rank: N/A
Publication Year: October 19, 2018
Reference: [7]

7.1 Summary

Climate change drivers like gradual warming, heatwaves, rising sea levels, ocean acidification, and increased storminess profoundly disrupt marine foundation species, affecting their physiology, abundance, and distribution. Interactive effects with other stressors exacerbate their vulnerability. Pollution, overfishing, and coastal development further compound the impact. These disruptions have far-reaching consequences for associated communities, biodiversity, and ecosystem functioning. Adaptive management strategies, such as marine protected areas, habitat restoration, and sustainable fisheries management, are crucial for enhancing resilience in the face of these challenges in the Anthropocene.

7.2 Software Architecture

The study is focused on analyzing standardized drought indices to understand the frequency and severity of droughts based on long-term historical and future climate data. It aims to identify regions that are at a high risk of experiencing droughts. Furthermore, it investigates the potential impacts that could occur in the Greater Rangpur-Bogra Region (GRB) under the worst-case drought scenario, in order to address and mitigate these potential risks effectively.

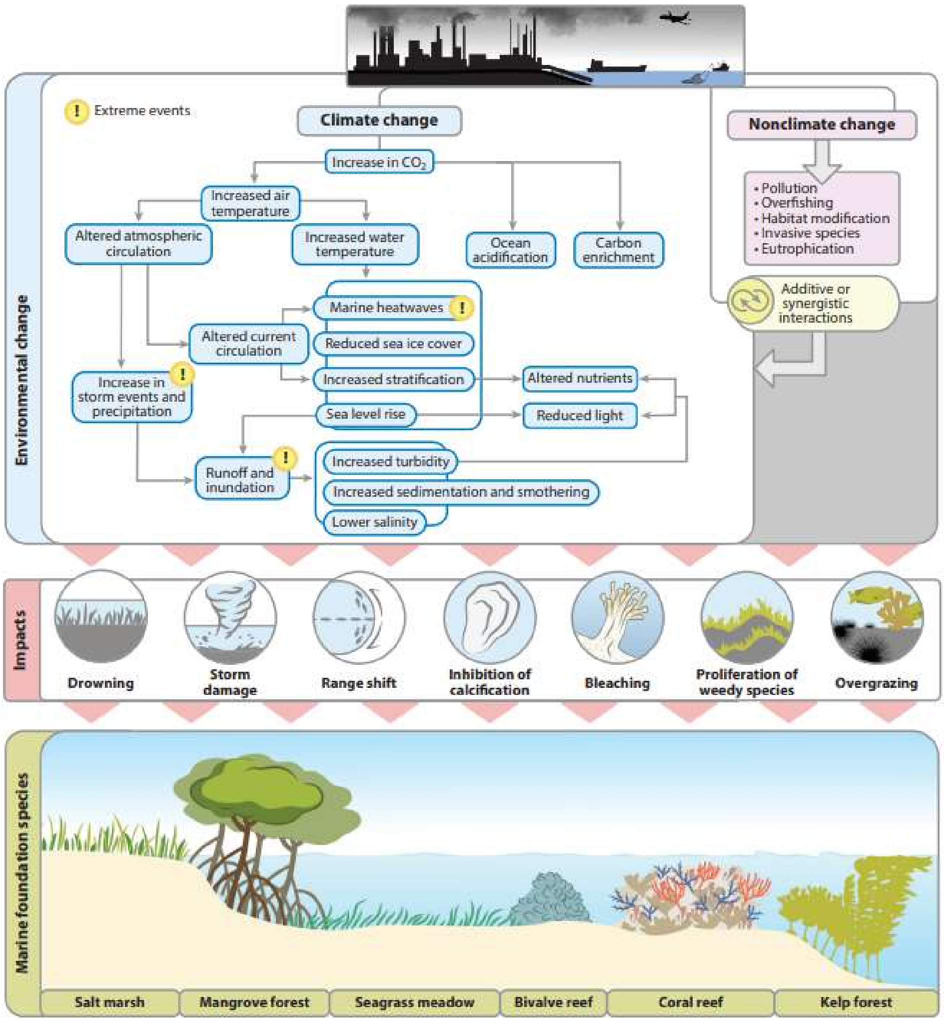

Figure 3: Human-induced environmental changes, including greenhouse gas emissions, generate complex interactions between climate and non-climate factors, causing a variety of impacts on foundation species for Paper 7.

7.3 Data Parameters

This section provides an overview of key marine foundation species, their approximate areal extents, major climate and non-climate stressors, estimated rates of change, and economic valuations. It explores various marine foundation species and their associated biogenic structures, which are pivotal in shaping marine ecosystems by offering the physical support necessary for other species. Notable foundation species comprise coral reefs, kelp forests, seagrass meadows, salt marshes, mangrove forests, and bivalve reefs. The table offers detailed information on these foundation species and their biogenic structures, serving as a valuable reference for comprehending their significance within marine ecosystems. Key parameters include:
- Foundation species/ecosystem
- Brief description
- Global extent
- Major climate drivers of change
- Major non climate drivers of change

- Rate of change
- Estimated value

7.4 Datasets Used

This dataset offers a comprehensive view of key marine foundation species, including their approximate areal extents, significant climate and non-climate stressors, estimated rates of change, and economic valuations. These foundation species, such as coral reefs, kelp forests, seagrass meadows, salt marshes, mangrove forests, and bivalve reefs, are integral to shaping marine ecosystems through the creation of physical structures that provide support for other species.

7.4.1 Paper Link

Access the full paper at https://www.scirp.org/journal/paperinformation.aspx?paperid=87881.

8 Paper 8: Climate Change and Geotourism: Impacts, Challenges, and Opportunities

Journal/Conference Rank: N/A
Publication Year: 2023
Reference: [8]

8.1 Summary

Climate change poses significant challenges to geotourism destinations and activities. Accelerated geomorphological processes, natural hazards, and extreme weather events driven by climate change threaten geoheritage assets and visitor safety. However, limited research has explored these impacts, and few studies have addressed adaptation measures within the geotourism context. Geotourism has educational potential to raise awareness of climate change's effects on geological features and can influence visitor motivations and behavior. Geoethical considerations and a multidisciplinary approach are crucial for addressing the complex interactions between climate change and geotourism, ensuring its sustainability. More comprehensive research is needed to understand and adapt to the impacts of climate change on geotourism effectively.

8.2 Software Architecture

This paper does not contain in relevant figure of the architecture but it primarily focuses on the intersection of geotourism and climate change. It explores the challenges and opportunities posed by climate change to geotourism destinations, particularly geoparks, which are valued for their geoheritage assets. The paper discusses the physical impacts of climate change on geosites, implications for visitor demand and behavior, and the need for adaptation. It emphasizes the importance of considering geotourists' values, motivations, and preferences, along with economic, social, and ethical aspects in responding to climate change. The overarching theme is the sustainability and resilience of geotourism destinations in the face of climate disruption and the transition to a net-zero carbon economy.

8.3 Data Parameters

The following themes are central to the study of climate change and its effects on geotourism:

Impacts on Geotourism Sites, Activities, and Visitors: This theme investigates how climate change affects geotourism sites, activities, and the experiences of visitors, encompassing both the physical and experiential dimensions of geotourism.

Didactic Potential through Opportunities for Education: Within this theme, research explores the educational opportunities offered by geotourism in the context of climate change. It examines how geotourism can serve as a platform for educating people about climate change, including its comprehension through geological records and the consequences of glacier retreat.

Adaptation or the Need for Adaptation: This theme revolves around strategies for adaptation and the necessity of adapting geotourism to cope with the challenges posed by climate change. It delves into how geotourism destinations and operators can adjust to changing environmental conditions.

Impacts on Visitor Motivations and Perceptions: This theme is dedicated to understanding how climate change influences the motivations and perceptions of geotourism visitors. It explores how alterations in geotourism attractions due to climate change impact visitor experiences and decision-making processes.

8.4 Datasets Used

The paper encompasses four main themes related to climate change and geotourism. It explores the impacts of climate change on geotourism sites, activities, and visitors, emphasizing both physical and experiential changes. The research also delves into the educational potential of geotourism in conveying climate change understanding through geological records and glacier retreat. Adaptation strategies for geotourism in response to climate change challenges are a key focus. Lastly, the paper addresses how climate change influences visitor motivations and perceptions within geotourism, particularly in terms of altered attractions and their effects on visitor experiences and choices.

8.4.1 Paper Link

Access the full paper at https://shorturl.at/CDGO4.

9 Paper 9: Impacts of Climate Change on Agricultural Food Production

Journal/Conference Rank: N/A
Publication Year: 2023
Reference: [9]

9.1 Summary

This paper addresses the impact of climate change on global agricultural food production, with a focus on crop yields, livestock, and viticulture. It discusses the adverse effects, such as rising temperatures, shifts in rainfall patterns, and increased extreme weather events. Theoretical frameworks, including ecological modernization and risk society theories, are used to understand the challenges and vulnerabilities in agriculture due to climate change. The study emphasizes the need to enhance adaptive capacity and resilience in agricultural systems and recommends climate-smart practices like agroforestry and conservation agriculture to mitigate climate-related risks and improve food security.

9.2 Software Architecture

There's no structure included but the research paper explores how climate change impacts agricultural food production, including rising temperatures, altered rainfall patterns, and extreme weather events. It presents case studies on specific crops and regions, highlighting the challenges and the need for adaptation. The paper recommends collaborative efforts, climate-resilient policies, and knowledge-sharing to address these risks.

9.3 Data Parameters

- The paper primarily relies on secondary data sources, such as existing studies, reports, and historical climate data.
- It analyzes climate data, crop yield data, and statistical modeling techniques.
- Data parameters include climate variables (temperature, rainfall patterns), crop yields, and historical agricultural production data.
- The paper uses data from various countries (e.g., Vietnam, Brazil, Ghana, the Netherlands) to assess climate change impacts on specific crops.

9.4 Datasets Used

- The data sets used in this research paper are primarily drawn from secondary sources, including previously published studies, reports, and historical climate data.
- The paper references specific studies and data sources for each case it presents, such as the impact of climate change on rice production in Vietnam, coffee production in Brazil, and cocoa production in Ghana.
- Although the paper doesn't provide detailed data sets, it relies on data from various agricultural sectors and climate studies to discuss the effects of climate change on agricultural food production.

9.4.1 Paper Link

Access the full paper at https://shorturl.at/twBIS.

10 Paper 10: A review of the global climate change impacts, adaptation, and sustainable mitigation measures

Journal/Conference Rank: N/A
Publication Year: 2022
Reference: [10]

10.1 Summary

This paper explores the extensive impacts of climate change across multiple sectors, including agriculture, biodiversity, health, and the tourism industry. It highlights the threats posed by erratic weather patterns, habitat loss, public health risks, and economic challenges. The urgent need for adaptation strategies, proactive conservation, and global government involvement in climate policy is emphasized. Mitigating these impacts is crucial for the planet's long-term sustainability and the well-being of future generations.

10.2 Software Architecture

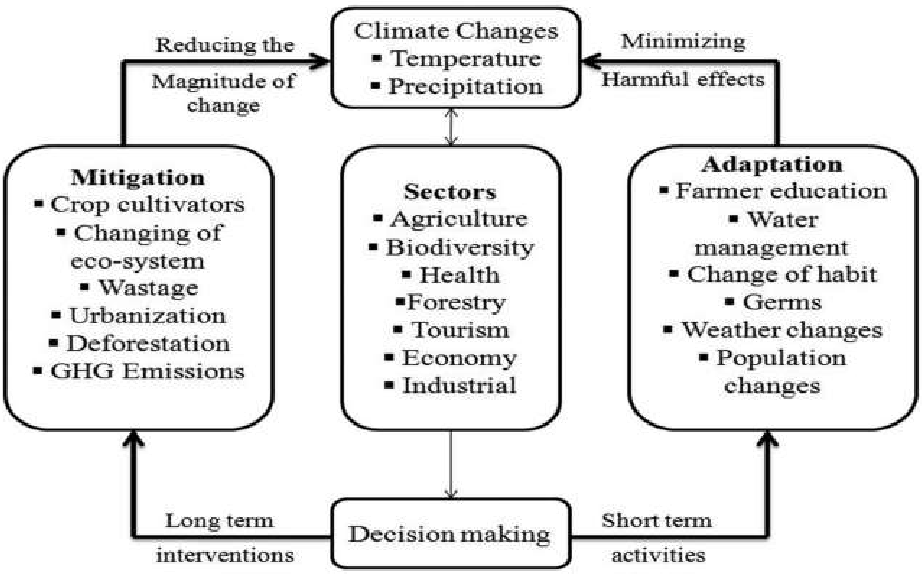

Figure 4: Sectoral impacts of climate change with adaptation and mitigation measures

10.3 Data Parameters

1. Natural Disaster Statistics: It includes data for various countries, presenting information on the year, absolute changes, and relative changes related to natural disasters, climate change impacts, and socio-economic consequences. Parameters include country, year, absolute change, relative change.

2. Affects of infectious diseases due to environmental changes: It discusses the impact of environmental modifications due to climate change on various diseases, their causative organisms, and the pathways of their effects. It highlights how climate warming-induced

changes can lead to increased likelihood of disease outbreaks. Parameters include includes environmental modifications, potential diseases, causative organisms and pathway of effect.

3. Considerations to mitigate climate change impact on forestry: It discusses essential considerations for mitigating the impacts of climate change in the forestry sector. It provides attributes, descriptions, and practical examples related to how mobile organisms, particularly insects, and their interactions with forests are influenced by climate change. Parameters include attribute, description, forestry example.

10.4 Datasets Used

1. Natural Disaster Statistics: It is related to the socio-economic consequences of natural disasters and climate change. The parameters include country, year, absolute change, and relative change, providing information on various aspects such as changes in agriculture outputs, technology rehabilitation, and the impact of environmental calamities on different regions over time.

2. Affects of infectious diseases due to environmental changes: It discusses how climate change affects the spread of diseases. Temperature and precipitation are key factors. Climate change can lead to extinctions and the emergence of new diseases.

3. Considerations to mitigate climate change impact on forestry: It provides essential considerations for mitigating climate change's impact on the forestry sector. These considerations likely include attributes, descriptions, and practical forestry examples.

10.4.1 Paper Link

Access the full paper at https://shorturl.at/DIQ38.

11 Paper 11: Environmental and human health issues related to pesticides: from usage and environmental fate to impact

Journal/Conference Rank: N/A
Publication Year: 2018
Reference: [11]

11.1 Summary

The congress covered various aspects of pesticide research, categorizing 99 presentations into five sections:

1. Diagnosis and Environmental Fate: This section emphasized new analytical techniques, chemical samplers, pesticide surveys, sorption, and degradation processes in the environment.

2. Impact and Risks: It discussed ecotoxicology, endocrine disruptors, pesticide cocktails, effects on microorganism communities, transfer between environmental compartments, and monitoring of spray drift.

3. Human Health: Topics included the contamination of human populations, health risk assessment, precision agriculture, and insights into the mode of action of neonicotinoids.

4. Alternative Methods and Agroecology: This section explored approaches such as reducing pesticide doses through vectorization, microinjection of pesticides into trees, buffer strip design, and agroecology in wine production.

5. Social and Economic Aspects: The final section delved into the perception of pesticide contamination among urban populations, psychological aspects, and sociocultural resistance to changes in pesticide use.

Out of the 99 presentations, seven were selected for a special issue, while 42 were published in the congress proceedings. Some notable findings from these presentations include:

- Non-point Source Pesticide Contamination: The research by Guibal et al. challenged the assumption that intensive agriculture is the sole source of pesticide contamination. It highlighted the contribution of extensive agriculture and the importance of sampling strategies in monitoring pesticide pollution in small watersheds.

- Chlordecone Contamination: Chlordecone contamination in the French West Indies was discussed, revealing a gradient of contamination from mangroves to coral reefs. Carnivorous fish in the mangrove had the highest concentrations, raising concerns about biomagnification.

- Organochlorine Insecticides in Lebanon: Despite Lebanon's commitment to the Stockholm agreement on Persistent Organic Pollutants (POPs), high concentrations of organochlorine insecticides were found in wells, suggesting the need for farmer training and education.

- Chlordecone Degradation: Research showed that chlordecone degrades slowly, producing dechlorinated compounds that are less genotoxic and mutagenic. In situ chemical reduction techniques were proposed for managing soil contamination in the French West Indies.

- Pesticide Adsorption in Wetlands: The efficiency of constructed wetlands in adsorbing pesticides was explored, highlighting the importance of hydraulic parameters and agitation in the adsorption process.

- Improving Pesticide Uptake by Plants: A study demonstrated a method to increase the uptake of pesticides by plants, potentially allowing for reduced pesticide application. This could be a solution for controlling endophytic fungi in crops.

- Human Health and Pesticides: Organochlorine pesticide levels in a Lebanese population were monitored, with results suggesting low contamination levels and no significant associations with factors such as gender, domestic pesticide use, or food consumption.

In conclusion, this literature review summarizes the key findings and themes discussed in the special issue of Environmental Science and Pollution Research, which stems from the 46th GFP congress. It highlights the diverse research areas related to pesticides, from environmental impact to human health, and suggests potential solutions and areas for further investigation in pesticide management. Readers are encouraged to explore the full congress proceedings for more details.

11.2 Software Architecture

This paper doesn't contain any specific information about the software architecture used or discussed in the study. It mainly focuses on the impact of water level management and climate scenarios on peatland water quality.

11.3 Data Parameters

The article does not contain specific data parameters. Instead, it summarizes key points and findings from various research studies and presentations related to pesticide contamination and its environmental, health, and agricultural impacts.

11.4 Datasets Used

The paper discusses various aspects of pesticide contamination, its environmental impact, and associated health issues. It mentions the topics covered in a congress, research findings, and the diversity of presentations.

11.4.1 Paper Link

Access the full paper at https://link.springer.com/article/10.1007/s11356-018-1738-3.

12 Paper 12: Impact of COVID-19 on environmental ecosystem

Journal/Conference Rank: N/A
Publication Year: 2020
Reference: [12]

12.1 Summary

The COVID-19 pandemic emerged in December 2019 in Wuhan, China, causing widespread disruptions and deaths.Governments implemented movement restrictions to curb the virus, resulting in closures of non-essential organizations and a halt in public transportation.The pandemic led to socio-economic disruptions but also had environmental effects like improved air and water quality, reduced noise, and ecosystem recovery.

Positive Environmental Impacts:
- Greenhouse gas emissions decreased due to industrial and transportation shutdowns.
- Major industrial pollution sources decreased or ceased operations, reducing pollution in some regions.
- Noise pollution levels dropped as people stayed home, offering quieter environments.
- Reduced tourism led to less pollution in tourist destinations and water activities.
- Lower industrial water consumption was observed, especially in the global textile industry.

Negative Environmental Impacts:
- The pandemic generated a surge in medical waste, posing challenges for waste management and environmental pollution.
- Quarantine measures resulted in increased municipal waste, driven by domestic internet shopping.
-Extensive use of disinfectants raised ecological concerns, potentially harming non-targeted species.

Potential Environmental Management Strategies:
- Suggestions for sustainability include eco-friendly industrial practices, renewable energy adoption, and promoting public transportation.
- Emphasis on waste recycling and reuse, as well as wastewater recycling and ecological restoration.
- Encouraging environmentally friendly practices like ecotourism and environmental conservation.

The COVID-19 pandemic had both positive and negative environmental impacts, prompting calls for sustainable practices to mitigate the negative effects and promote environmental conservation.

12.2 Software Architecture

The article doesn't directly mention the software architecture it's based on because it appears to be a text or document describing the environmental impacts and strategies related to the COVID-19 pandemic. Software architecture typically refers to the design and structure of software systems, which is not applicable to this.

12.3 Data Parameters

The article discusses the environmental impacts of the COVID-19 pandemic, both positive and negative, and suggests potential environmental management strategies. The study typically includes data on air quality, greenhouse gas emissions, waste generation, and other environmental factors.

12.4 Datasets Used

In this paper the dataset contains a brief description on positive and negative effects of the covid-19 pandemic.
Reduction in Greenhouse Gas Emissions, reduction in Water Pollution, decrease in Noise

Pollution all was the result of a positive impact.
On the other hand , reduced Impact on Tourist Destinations, increase in Medical Waste increase in Municipal Waste, extensive Use of Disinfectants were the negative impact.

12.4.1 Paper Link

Access the full paper at https://link.springer.com/article/10.1007/s11356-021-17664-3.

13 Paper 13: How climate change effects extreme weather events

Journal/Conference Rank: N/A
Publication Year: 2016
Reference: [13]

13.1 Summary

The article addresses the evolving relationship between human-induced climate change and extreme weather events. It emphasizes that while there was previously uncertainty regarding attributing specific weather events to anthropogenic climate change, recent advancements have made it possible to attribute such events more precisely. Key points in the passage include the increase in extreme temperatures and precipitation due to climate change, the development of methods for event attribution, and the importance of providing credible and relevant results to enhance resilience in the face of climate variability. Additionally, it mentions the need for further improvements in techniques, tools, and methodologies to evaluate and communicate the robustness of attribution results. The passage underscores the significance of linking extreme events to meteorological drivers and providing probabilistic forecasts to help manage climate-related risks more effectively. Finally, it notes that extreme temperature events tend to exhibit stronger evidence of human influence, largely due to data availability, accurate modeling, and well-simulated relationships with climate change.

13.2 Software Architecture

In this paper, scientists employed two primary approaches to evaluate the impact of climate change on extreme weather events:

Observed and Modeled Temperature Changes: Scientists compared changes in observed temperatures with modeled temperatures, considering scenarios with and without human influence on climate. This comparison aimed to discern the extent to which human-induced climate change contributed to observed temperature variations.

Distribution of Possible Temperatures: By examining the distribution of possible temperatures, researchers assessed the likelihood of observed temperature changes, both with and without human-induced climate change. This approach enabled them to quantify the influence of human activities on temperature shifts.

Observed and Modeled Rainfall Distributions: Scientists sought rainfall events in extensive ensembles of model simulations that closely resembled observed rainfall patterns. This comparison was crucial for understanding the impact of climate change on rainfall distribution.

Return Times for Extreme Rainfall Events: By determining return times for extreme rainfall events in large ensembles of model simulations, both with and without human-induced climate change, researchers were able to assess the role of climate change in the occurrence and frequency of such events.

13.3 Data Parameters

The data parameters used wereTemperature change, rainfall distribution.

Temperature Change Data:
1. Weather Stations: Ground-based weather stations are equipped with temperature sensors (thermometers) that record temperature measurements at regular intervals, usually hourly or more frequently. These stations are distributed across geographic regions to provide localized data.

2. Satellite Data: Satellites equipped with remote sensing instruments collect temperature data by measuring the infrared radiation emitted by the Earth's surface. These data are particularly valuable for tracking temperature changes on a global scale.

3. Ocean Buoys:For monitoring sea surface temperatures, ocean buoys are deployed in oceans and seas. These buoys are equipped with sensors to measure water and air temperatures.

Rainfall Distribution Data:

1. Rain Gauges:Ground-based rain gauges are the most common instruments for measuring rainfall. These devices are placed at various locations, and they collect precipitation data by recording the depth or amount of rainfall.

2. Weather Radars:Weather radars use radio waves to detect and measure precipitation, including rainfall. Radars can provide information about the intensity, location, and movement of rainfall within a specific area.

3. Satellite-Based Precipitation Sensors: Satellites equipped with microwave sensors can estimate precipitation by measuring the scattering of microwave radiation caused by raindrops. These data help create global maps of rainfall distribution.

4. Weather Stations: Ground-based weather stations often include rain gauges alongside temperature sensors. This dual data collection method provides information on temperature and rainfall at the same location.

5. Weather Models: Numerical weather models use input data from various sources,

including ground-based measurements and satellite observations, to create simulations of weather patterns. These models can estimate rainfall distribution and predict future weather conditions.

13.4 Datasets Used

The specific datasets used in event attribution studies, as mentioned in the article , typically include:

1. Observational Climate Data: These datasets consist of historical climate records, including temperature, precipitation, and other relevant variables. They provide the baseline data for assessing extreme events and comparing them to the past.

2. Climate Models: Climate models are complex computer simulations that replicate Earth's climate system. Researchers use these models to simulate the likelihood of specific weather events under different scenarios, such as with and without human-induced climate change.

13.4.1 Paper Link

Access the full paper at https://www.science.org/doi/10.1126/science.aaf7271.

14 Paper 14: Trees, Climate Change, and Health: An Urban Planning, Greening and Implementation Perspective

Journal/Conference Rank: N/A
Publication Year: 2023
Reference: [14]

14.1 Summary

Trees are vital components of our ecosystem, serving a multitude of critical roles. They produce oxygen, filter the air we breathe, and act as carbon sinks, helping combat climate change. Trees provide homes and sustenance for countless wildlife species, supporting biodiversity. Their roots stabilize soil, reducing erosion, and their canopies regulate local climates and provide shade. In urban areas, trees enhance the quality of life, offering recreational spaces and lowering temperatures. Culturally and economically significant, trees also contribute to our physical and mental well-being. In essence, trees are integral to the health and balance of our natural world, making their preservation and care essential for a sustainable future.

Due to the urbanization and rapid growth of the modern world we tend to forget the importance of trees. Nowadays to get access to more land and materials from wood, humans tend to cut trees without thinking of the consequences. This tends to affect the overall climate greatly. We can't forget the fact that trees play a vital role in maintaining the ecological balance.

To maintain the ecological balance and reduce climate change we should understand the importance of trees. Plantation of trees should be increased rapidly. Cutting trees should be put under control. The need for planning reforms, enhanced regulations, community education, and investment in green spaces should be emphasized as crucial for urban greening. Focus should be given on strategic tree planting and maintenance, which can provide numerous benefits over time, including carbon sequestration, improved air quality, shade provision, and aesthetic appeal The pivotal role of community engagement, awareness-building, and international collaboration in advancing sustainable urban development and green practices is necessary . It calls for a global dialogue on the relevant issues to address climate change and create healthier and more resilient cities.

14.2 Software Architecture

The article does not explicitly mention the software architecture used in its research or data analysis. However, for research and data analysis related to environmental and urban studies, researchers typically use a variety of software tools and applications depending on their specific needs. These tools may include:

1. Geographic Information Systems (GIS) Software: GIS software like ArcGIS, QGIS, or Google Earth Pro is commonly used for mapping and analyzing geospatial data related to urban green spaces and tree distribution.

2. Statistical Analysis Software*: Researchers may employ statistical software like R, SPSS, or Python's data analysis libraries (e.g., pandas) for analyzing the data and conducting statistical tests to draw meaningful conclusions.

3. Survey and Data Collection Tools: Tools for collecting primary data from surveys or field measurements could include software like SurveyMonkey, Google Forms, or specialized mobile applications for data collection.

4. Mapping and Spatial Analysis Software: For assessing the spatial distribution and accessibility of green spaces, software like Network Analyst, Spatial Analyst, and buffer analysis tools within GIS software can be essential.

14.3 Data Parameters

The data parameters in this context represent the specific attributes or aspects of the dataset that are discussed and analyzed in the article. These parameters include:

1. Environmental Benefits: Information related to the impact of urban green spaces and trees on environmental factors such as air quality, carbon sequestration, and mitigation of the urban heat island effect.

2. Health Benefits: Details about the positive effects of green spaces and trees on physical and mental health, including reductions in stress, loneliness, and chronic dis-

eases, and improved overall well-being.

3. Social and Community Benefits: Information on how green spaces and trees contribute to social connections, community cohesion, and cultural identity within urban environments.

4. Global Challenges: The dataset also covers information about the planetary crisis of climate change, biodiversity loss, and pollution, and how urban greening can address these challenges. This includes the relationship between ecosystem degradation, zoonotic disease risk, and food security.

5. Urban Planning Initiatives: Information on various global and local initiatives and policies aimed at promoting urban greening, including the UN Sustainable Development Goals, National Park Cities, and tree planting efforts by different countries.

14.4 Datasets Used

In this article, the dataset would refer to the collection of information, studies, and research findings related to the benefits of urban green spaces, trees, and their impact on human health, the environment, and social well-being. This dataset is a comprehensive compilation of various studies, examples, and research outcomes mentioned in the article, as well as additional research conducted globally on the topic.

14.4.1 Paper Link

Access the full paper at https://www.mdpi.com/1660-4601/20/18/6798.

15 Paper 15: Attention and Sentiment of the Chinese Public toward a 3D Greening System Based on Sina Weibo

Journal/Conference Rank: N/A
Publication Year: 2023
Reference: [15]

15.1 Summary

The research discussed in this article examines the Chinese public's sentiments and concerns regarding TGS (Terrace Greening Systems) using the Sina Weibo platform. Over time, there has been a growing interest and positive attitude toward TGS among the public. Many perceive TGS as a means to enhance urban ecological environments. However, a significant portion (27.8 percent) of the population still holds negative views on TGS, citing various reasons.

The study identifies factors influencing the level of attention given to TGS by users. Verified microblog users with complete profiles and high influence tend to pay more attention to TGS, as this can increase their followers' awareness of TGS. Geographical location plays a role, with economically developed areas, regions with warm climates, and coastal areas showing greater interest in TGS. Major Chinese cities, such as Beijing and Shanghai, have been particularly active in formulating and implementing TGS policies. The study also highlights the importance of various stakeholders, including government agencies, research institutions, and the community, in the development of TGS.

Government policies have a significant impact on the public's perception and use of TGS. China's commitment to global ecological issues, such as the Paris Agreement and efforts to address climate change, has shaped its policies on TGS. However, the implementation of TGS policies in China has lagged behind those of other countries, with limited legal support at the national and local levels.

The study delves into the emotional topics related to TGS among the public. Negative emotions are often associated with concerns about the cost of TGS housing, maintenance of plants, indoor mosquito problems, and the absence of mandatory policies. These negative sentiments can be attributed to a lack of understanding of TGS. On the positive side, public education, a conducive indoor and outdoor TGS environment, and improved urban air quality contribute to positive emotions regarding TGS.

The study concludes with recommendations, including the need for a comprehensive TGS policy framework, promotion through social media platforms, public education, and encouraging citizen participation in TGS management. Ensuring the maintenance of TGS is crucial, and the selection of suitable plant species is vital for sustainability. The use of innovative technologies can also enhance TGS management.

Despite the study's insights, it acknowledges certain limitations, such as the data's reliance on Sina Weibo, which may not cover all demographics, and the absence of an international perspective. Future research will address these limitations and further explore TGS-related questions.

15.2 Software Architecture

In the study that involves natural language processing (NLP) and data analysis, the software architecture may include the following components:

1. Data Collection and Extraction:

- Tools and libraries for web crawling and data extraction, such as web scraping scripts or web crawler software.

2. Data Pre-processing:

- Python programming language is commonly used for data pre-processing tasks. Libraries such as Pandas, NumPy, and regular expressions are used for data cleaning, filtering, and transformation.

3. Text Segmentation:

- Text segmentation, especially for languages like Chinese, may involve using libraries like Jieba for word segmentation.

4. Data Storage: Data is typically stored in format like excel.

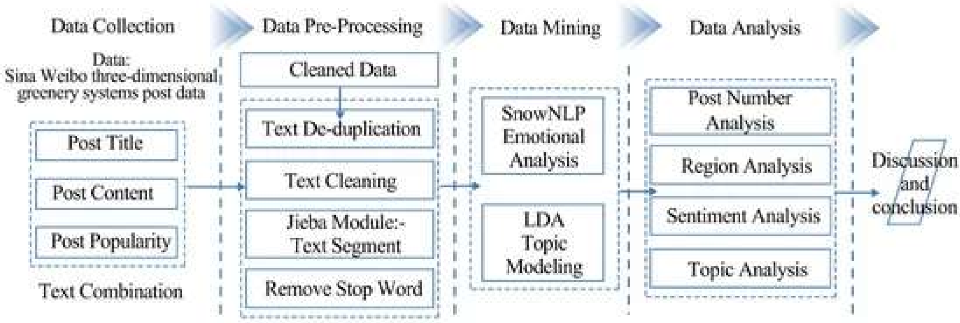

Figure 5: Research framework. for Paper 15.

15.3 Data Parameters

Data Acquisition and Preprocessing:
- Web crawler technology was used to collect data from the Internet, specifically from Sina Weibo.
- Python 3.10.6 was used for data acquisition. The process included simulating login to Sina Weibo, performing web searches using specific keywords, gathering posting details (such as username, content, time, etc.), and saving the data in an Excel file.

Sentiment Analysis:
- Sentiment analysis was conducted using the Snownlp module in the Python library. - A custom sentiment model was trained using 500 positive and 500 negative emotion texts selected from the dataset.
LDA Topic Model:
- LDA (Latent Dirichlet Allocation) was used for topic modeling, which is an unsupervised probabilistic model often used for large-scale document collections.

15.4 Datasets Used

In the article, it is mentioned that data was obtained from the platform (Sina Weibo) using a focused web crawler. The following details were gathered as part of the data acquisition process:

1. Username: The usernames of users who posted content related to the specified keywords were collected.

2. Content: The content of the posts or messages made by users was extracted.

3. Time of Posting:*The timestamp or time at which each post was made was recorded.

4. Forwarding Number: The number of times each post was forwarded or shared by other users was obtained.

5. Number of Comments:The number of comments or replies to each post was counted and recorded.

15.4.1 Paper Link

Access the full paper at https://www.mdpi.com/1660-4601/20/5/3972.

16 Paper 16: Climate change effects on biodiversity, ecosystems, ecosystem services, and natural resource management in the United States

Journal/Conference Rank: N/A
Publication Year: 2020
Reference: [16]

16.1 Summary

Climate change stands as a pressing and progressively worsening global peril with far-reaching impacts on biodiversity, ecosystems, and human welfare. In the United States, the National Climate Assessment (NCA) conducts periodic evaluations to confront these challenges. This article draws its insights from the Fourth NCA (NCA4) Volume II, offering an up-to-date appraisal of climate change's consequences for the United States.

Climate change prompts responses at various levels, including individual organisms, populations, and species, resulting in adjustments in behavior, morphology, phenology, and geographic range shifts. Ecosystems, too, undergo transformations, affecting primary production, species interactions, and the occurrence of extreme events. These changes, in turn, have repercussions on essential ecosystem services such as the availability of freshwater and agricultural productivity, ultimately impacting communities and economies.

Vulnerable communities, including Indigenous tribes and coastal populations, face unique challenges due to climate change's impacts on ecosystem services. Federal policies can hinder mitigation and adaptation efforts, exacerbating economic and health risks.

Traditional natural resource management may not be feasible in a changing climate. Adaptive approaches, resilience-building strategies, technology adoption, and strengthened governance are essential for mitigating climate change's impacts on ecosystems and communities.

In conclusion, climate change poses a significant threat to biodiversity, ecosystems, and human well-being, necessitating a holistic understanding and proactive measures to address its consequences.

16.2 Software Architecture

The paper discusses the content and scope of a review related to climate change impacts on ecosystems and biodiversity. While it mentions various topics, scales, and the goal of providing a holistic overview, it does not explicitly describe the software architecture used for conducting the review. Software architecture typically refers to the high-level structure and organization of software systems, which may include components, data flow, and interactions.It focuses on the subject matter of the review rather than the technical details of the software or tools used to conduct it.

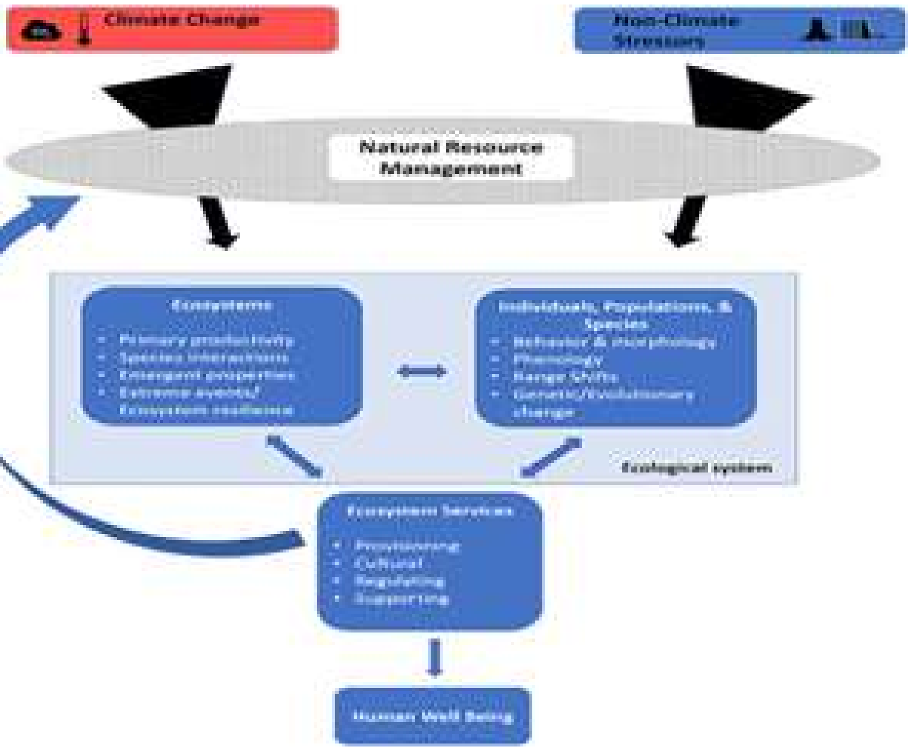

Figure 6: Climate change and non-climate stressors interact, affecting ecosystems, species, and ecosystem services, with management playing a role in moderating their impact on biodiversity and human well-being for Paper 16.

16.3 Data Parameters

To gather data on these topics, various scientific methods and sources of data can be utilized. These include:

1. Climate Data: Information on temperature, precipitation, and other climate variables over time, which are critical for understanding the impacts of climate change.

2.Ecological Surveys: Field surveys and observational data collected by ecologists and scientists to monitor changes in species behavior, phenology, distribution, and morphology.

3. Remote Sensing: Satellite and remote sensing data can be used to track changes in land cover, vegetation, and ocean temperatures.

4. Phenological Data:Data on the timing of biological events, such as flowering, migration, and reproduction, which are essential for understanding phenological shifts.

5. Species Distribution Data: Data that tracks the distribution of species over time, which can be used to detect changes in geographic range.

6. Genomic Data: Genetic studies can provide insights into whether evolutionary changes are occurring in response to climate change.

7. Ecosystem Productivity Data: Measurements of primary productivity, which may include data from remote sensing, field studies, and climate models.

16.4 Datasets Used

The paper contains information about climate change impacts on ecosystems, including topics like behavior and morphology, phenology, geographic range shifts, mechanisms and rate of change, primary productivity, species interactions, emergent properties, and biological invasions, as well as extreme events and ecosystem resilience. However, it does not specify particular datasets or data parameters.

16.4.1 Paper Link

Access the full paper at https://shorturl.at/gyEO9.

17 Paper 17: Climate change and ecosystems: threats, opportunities and solutions

Journal/Conference Rank: N/A
Publication Year: 2020
Reference: [17]

17.1 Summary

The paper discusses various aspects related to climate change and its impact on ecosystems, as well as opportunities for improving ecosystem and societal resilience.

Understanding threats and challenges to ecosystems:
- Climate change has had a relatively modest effect on ecosystems compared to direct human activities like overharvesting and habitat loss.
- However, the negative ecological impacts of climate change are increasing and likely to intensify in the future.
- Climate change affects land ecosystems through increased precipitation variability and extreme events, while the ocean experiences heatwaves and acidification.
- Other human-induced stressors, such as defaunation, overfishing, and invasive species, amplify ecosystem sensitivity to climate change.
- Predicting biodiversity loss due to climate change is challenging, given the complexity

of ecosystems and species interactions.

Opportunities for improving ecosystem and societal resilience:
- Ecosystems actively participate in the climate system through carbon and water cycles.
- Sustainable ecosystem management, based on robust science, can enhance human resilience and support adaptation to environmental changes.
- Ecosystem responses to climate change are complex and can provide resilience through factors like habitat heterogeneity and genetic variability.
- Protecting key areas and biodiversity hotspots can contribute to landscape-scale resilience and climate change mitigation.

Nature-based solutions:
- Biodiversity can be a valuable ally in addressing climate change, offering mitigation and adaptation potential.
- Ecosystem management and restoration can contribute significantly to climate change mitigation and adaptation.
- However, nature-based solutions are not a sole solution, and addressing fossil fuel emissions remains crucial.
- These solutions often provide co-benefits to human societies, such as urban ecosystems and carbon sequestration.

What role for academic research?-
- Academic research, spanning ecological science, environmental economics, and political ecology, plays a vital role.
- Priorities include effective communication of existing evidence, addressing knowledge gaps, supporting complexity that enhances resilience, identifying synergies and trade-offs, and maintaining long-term monitoring.
- Ecosystems will play a significant role in the future climate scenarios, and their protection and restoration are essential for climate stabilization and adaptation.

Overall, the article highlights the growing importance of understanding the complex interactions between climate change and ecosystems and underscores the role of research and adaptive management in addressing these challenges and opportunities.

17.2 Software Architecture

1. Climate Change Effects on Ecosystems:
- It discusses how ecosystems are rapidly changing due to climate change and other global factors, including temperature changes, precipitation, carbon dioxide concentration, water balance, and extreme events.
- The section highlights that ecosystems vary in their sensitivity to climate change, depending on complex interactions among organisms, disturbances, and other stressors.

2. Improving Resilience to Climate Change:
- This theme focuses on opportunities to manage ecosystems to enhance their resilience to climate change. It discusses the role of new conservation and restoration approaches.
- It also emphasizes the importance of addressing climate extreme events, local anthropogenic disturbances, and mean climate trends to enhance ecosystem resilience.

3.Solutions and Practical Applications:
- This theme delves into practical management, restoration, and protection of ecosystems to support climate change mitigation and adaptation efforts.
- It introduces the concept of "natural climate solutions" (NbS) and how they can help reduce vulnerability to climate change impacts while supporting biodiversity and ecosystem services.
- It also discusses various approaches, including ecosystem-based strategies in urban areas, trophic rewilding, and introducing large herbivores in Arctic regions to mitigate climate change.

17.3 Data Parameters

There weren't any specific data parameters mentioned in the paper. But the data parameters that were used were, Surface temperature, greenhouse gasses , ocean heat, sea level.

17.4 Datasets Used

The data that can be seen in the following paper is changes in precipitation, atmospheric carbon dioxide concentration, water balance, ocean chemistry, and the frequency and magnitude of extreme events.

17.4.1 Paper Link

Access the full paper at https://shorturl.at/bimw8.

18 Paper 18: Understanding the value and limits of nature-based solutions to climate change and other global challenges

Journal/Conference Rank: N/A
Publication Year: 2020
Reference: [18]

18.1 Summary

The paper discusses the rise of nature-based solutions (NbS) as an integrated approach to address the challenges of the Anthropocene, including climate change mitigation and adaptation, biodiversity protection, and human well-being. It highlights the importance of considering the interdependencies of these challenges and the need for actions that promote synergies among them. The United Nations Sustainable Development Agenda's ethos of connectivity and inclusivity is mentioned as a guiding principle for addressing these interwoven challenges. NbS are presented as a way to reduce trade-offs and promote synergies among Sustainable Development Goals (SDGs), such as climate action (SDG

13) and biodiversity conservation (SDGs 14 and 15).

Nature based solutions for the mitigation and adaptation of climate change:

1. Biodiversity plays a valuable role in combating climate change, offering both mitigation and adaptation opportunities.
2. Proper management and restoration of ecosystems can make a substantial contribution to addressing climate change, benefiting both mitigation and adaptation efforts.
3. It's important to note that while nature-based solutions are valuable, they should not be seen as the sole solution, and addressing fossil fuel emissions remains a critical priority.
4. Nature-based solutions often offer additional benefits to human societies, including enhancements to urban ecosystems and the sequestration of carbon.

Effectiveness of Nature-Based Solutions (NbS):
Ecosystems' ability to mitigate climate change and reduce vulnerability to it depends on their exposure, sensitivity, and adaptive capacity.Climate change-induced disturbances like droughts, floods, and wildfires can reduce an ecosystem's adaptive capacity, potentially leading to ecosystem transitions. Ecosystem sensitivity can be minimized through reducing pressures (pollution, habitat loss) and enhancing diversity.
Some ecosystems may transition to new states under climate change, which may or may not support human adaptation.

Moving Beyond Green vs. Grey Solutions:
Nature-based solutions (NbS) can provide low-cost, multi-functional solutions to climate change impacts.Difficulty in measuring effectiveness due to complex, context-specific factors.Cost-effectiveness of NbS varies but can be underestimated due to a lack of comprehensive metrics.A combination of green (NbS) and grey (engineered) solutions may be most effective in many cases.

Financing and Governing NbS:
Less than 5 percent of climate finance is allocated to climate impact mitigation, including NbS. Financing for NbS is complex due to externalities, risks, and short-term decision-making.

18.2 Software Architecture

The research paper does not offer a comprehensive breakdown of the particular software architecture utilized in the investigation. Instead, its main emphasis is on the methodologies, models, and analyses applied to evaluate how greenhouse gasses affect climate change and what proper measure and steps were taken to bring the greenhouse gas emission under control.

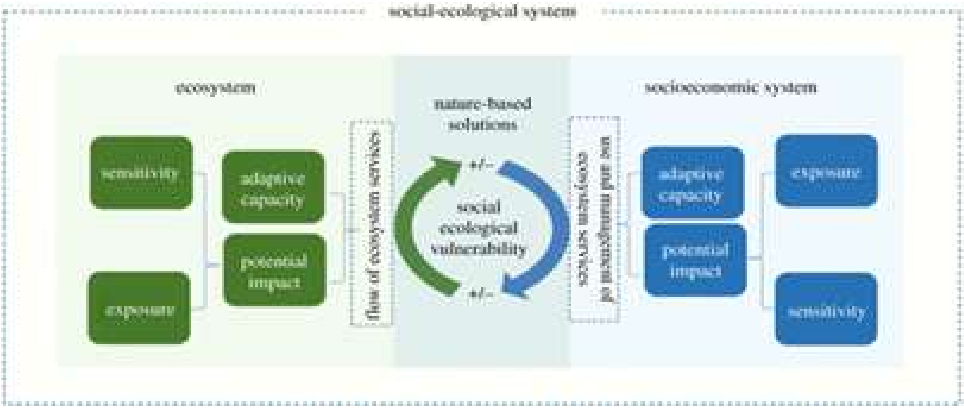

Figure 7: Integrating Nature-based Solutions (NbS) into the social-ecological vulnerability framework can reduce vulnerability by addressing ecosystem exposure, sensitivity, and adaptive capacity, ultimately decreasing social-ecological vulnerability for Paper 18.

18.3 Data Parameters

Data of the rate of greenhouse gasses was used in the paper. Greenhouse gasses (GHGs) data is critical for understanding and addressing climate change. Such data is typically collected by various organizations and government agencies around the world. Some key sources of greenhouse gasses data include:

1. Intergovernmental Panel on Climate Change (IPCC):** The IPCC periodically releases assessment reports that compile and analyze data related to greenhouse gas concentrations, emissions, and their impact on climate change. These reports are a valuable source of global GHG data.

2. World Meteorological Organization (WMO):*The WMO maintains the Global Atmosphere Watch program, which monitors greenhouse gas concentrations, including carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), in the Earth's atmosphere. The data is collected from various monitoring stations worldwide.

3. National Government Agencies: Many countries have agencies responsible for monitoring and reporting greenhouse gas emissions. For example, in the United States, the Environmental Protection Agency (EPA) and the Department of Energy (DOE) provide GHG data.

4. Carbon Dioxide Information Analysis Center (CDIAC): Although CDIAC has been retired, the data it collected and maintained has been transferred to the Global Carbon Atlas and other repositories. It includes historical greenhouse gas data.

5. Global Carbon Project:This international research initiative provides data on global carbon emissions from various sources, including fossil fuels, land-use changes, and other sectors.

6. Global Greenhouse Gas Reference Network: This is a network of monitoring stations that measure greenhouse gas concentrations in the atmosphere. It's a collaborative effort between various organizations.

7. Scientific Research: Scientific studies and research papers often report specific GHG data related to particular experiments, field studies, or observations.

18.4 Datasets Used

The paper does not provide us with effective data but it does appear to be a general discussion or excerpt on the topic of nature-based solutions (NbS) for climate change mitigation and adaptation.

18.4.1 Paper Link

Access the full paper at https://shorturl.at/tGOZ2.

19 Paper 19: Achievements and needs for the climate change scenario framework

Journal/Conference Rank: N/A
Publication Year: 2020
Reference: [19]

19.1 Summary

This paper discusses the development and use of the Shared Socioeconomic Pathway (SSP)–Representative Concentration Pathway (RCP) framework, which combines alternative scenarios of climate and society to inform climate change research and policy. The framework aims to support research across various sectors and scales, integrate climate and societal factors, consider uncertainty, and inform policy decisions. It has been widely adopted and applied in over 1,370 analyses related to climate change impacts and adaptation. While the framework has been successful in meeting its immediate goals, some challenges and modifications are recommended for its future development and use.

1. Improve Integration of Societal and Climate Conditions:

- Enhance integrated studies assessing resilience and adaptation transitions. - Include projections of various societal indicators for better understanding of resilience.
- Add narrative descriptions of future extreme climate events.
- Develop downscaled climate projections consistent with societal trends.
- Carefully consider the plausibility of SSP–RCP combinations used in studies.

2. Improve Applicability to Regional and Local Scales:

- Develop more diverse global SSPs to explore a broader set of boundary conditions.
- Establish community consensus on methods for downscaling SSPs.
- Create sanctioned regional scenarios to ensure consistency.

3. Improve Relevance Beyond the Climate Research Community:

- Map SSPs to key drivers of sustainability.
- Extend SSP narratives to inform analyses of international goals.

- Connect parallel scenario activities to address disconnects.
- Provide guidance materials and online resources for interdisciplinary collaboration.

4. Produce a Broader Range of Reference Scenarios That Include Impacts and Policy:
- Develop reference scenarios that include policies and climate impacts.
- Define reference scenarios with climate impacts based on existing SSPs.
- Explore scenarios tailored for sustainable development research.

5. Capture Relevant Perspectives and Uncertainties:
- Continuously re-evaluate and update the range of uncertainties in scenarios.
- Ensure inclusiveness in scenario development to capture diverse perspectives.
- Explore methods beyond traditional scenario archetypes.

6. Keep Scenarios Up to Date:
- Establish a process for regular updates of SSPs and related scenarios.
- Prioritize updating quantitative drivers and near-term trends.
- Ensure transparency regarding SSP and RCP versions used in studies.

7. Improve Relevance of Climate Change Scenario Applications for Users:
- Build capacity among users to understand scenario approaches.
- Enhance communication of scenario results using innovative methods.
- Provide easy access to scenario products and create online databases.
- Involve stakeholders in co-producing scenario knowledge.

19.2 Software Architecture

The paper describes the Shared Socioeconomic Pathway (SSP) and Representative Concentration Pathway (RCP) framework used in climate change research. This framework aims to combine alternative socioeconomic development pathways (SSPs) with atmospheric concentration pathways (RCPs) to create integrated scenarios for assessing the impact of climate change.

The paper doesn't mention specific details about software architecture. Instead, it focuses on the goals, achievements, and recommendations related to the SSP-RCP framework in climate change research.

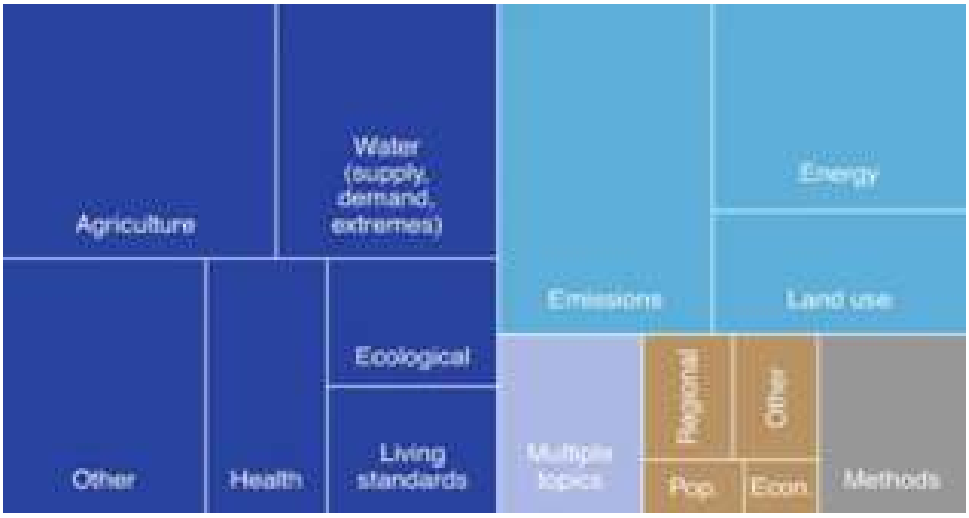

Figure 8: Application of SSPs by primary topic of analysis for Paper 19.

19.3 Data Parameters

The paper does not mention specific data parameters used in the context of the Shared Socioeconomic Pathway (SSP) and Representative Concentration Pathway (RCP) framework in climate change research. It primarily discusses the framework's goals, achievements, and recommendations related to integrating climate and societal scenarios.

19.4 Datasets Used

The Dataset that was mentioned in the paper is given below.

1. Agriculture data: Data related to agriculture can include information on crop yields, types of crops grown, agricultural practices, and land use. This data is often collected by government agricultural agencies, international organizations like the Food and Agriculture Organization (FAO), and research institutions. Remote sensing and satellite data can also provide information on land use and vegetation health.

2. Water Supply Demand data: Data related to water supply and demand can come from government agencies responsible for water management and utilities. This data includes water usage patterns, water availability, population growth projections, and information on water sources. It may also involve hydrological models to estimate future water supply and demand.

3. Living Standards data: Living standards data typically involve socioeconomic indicators such as income, education levels, access to healthcare, and poverty rates. This data is usually collected through surveys, censuses, and other socioeconomic research conducted by government agencies, international organizations, and academic institutions.

4. Land Use data: Land use data encompasses information about how land is used for various purposes, such as urban development, agriculture, forestry, and conservation. This data is collected through land use surveys, satellite imagery, and geographic information systems (GIS). Government agencies, environmental organizations, and research institutions often maintain and provide land use data.

19.4.1 Paper Link

Access the full paper at https://www.nature.com/articles/s41558-020-00952-0.

20 Paper 20: Estimating the impact of climate change and urbanization on building performance.

Journal/Conference Rank: N/A
Publication Year: 2008
Reference: [20]

20.1 Summary

This paper discusses the impact of climate change and urban heat islands on building performance. It describes how climate scenarios for 2100 and heat island effects today were incorporated into building simulations. The study used weather data for 25 locations and prototype buildings to assess the potential impacts. Findings indicate varying energy use changes by climate region, with cold climates seeing reduced energy use, tropical climates experiencing increases, and temperate climates shifting from heating to cooling. The study underscores the need for energy-efficient building design and operation to mitigate potential challenges. Building simulations are used as a tool to evaluate these impacts.

The selection of weather sources and climate regions for building simulation programs is a crucial aspect of accurately simulating a building's response to environmental conditions.
1. Weather Data Sources
2.Characteristics of Typical Data
3. Synthetic Weather Years
4. Periods of Record.
5.Selection of Climate Locations
6.Robust Data Sources

The development and application of climate change and urban heat island scenarios to assess their impacts on building energy performance begins by introducing four major storyline scenarios developed by IPCC WG III, representing different demographic, economic, and technological developments. General circulation models (GCMs) are used to predict climate change scenarios and their subsequent modification of weather data for building simulations.

The article covers the representation of urban heat islands in the simulations, detailing how heat island effects were integrated into the weather data. It highlights the historical context of urban heat islands and their potential impacts on building operations.

The article concludes by summarizing the findings, highlighting variations in energy performance across different scenarios and locations and underscoring the reduced impact of climate variation on low-energy buildings. Overall, the study demonstrates how building simulations can be used to evaluate the potential impacts of climate change and urban heat islands on building performance.
Overall, the study underscores the importance of considering climate change and urban heat island effects in building design and operation, as well as the need for sustainable building practices to mitigate potential challenges and disruptions in energy supply systems.

20.2 Software Architecture

The paper does not explicitly mention software architecture. However, it describes the use of climate models and simulations to understand the effects of climate change and urbanization on building performance. These simulations likely involve the use of complex software systems and environmental models to perform the analyses described in the passage. The software architecture used for such simulations is crucial for accurately assessing the impacts on the built environment.

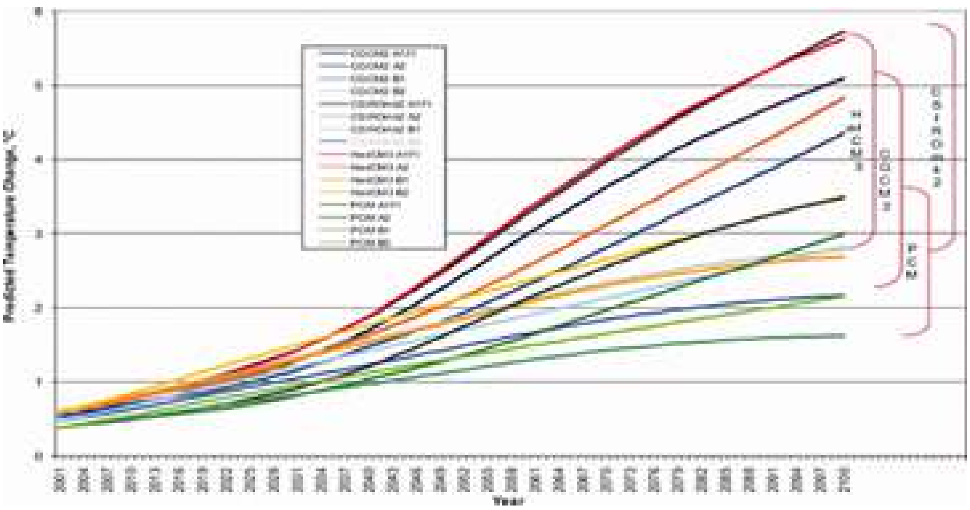

Figure 9: Global annual average temperature change predicted by four major global climate models for Paper 20.

20.3 Data Parameters

The data parameters which were used are , Temperature,solar radiation, illuminance, relative humidity , winds speed and direction.
1. Temperature: Temperature data represents the measurement of heat or thermal energy in the atmosphere. It is often recorded in degrees Celsius (°C) or Fahrenheit (°F). Temperature data is crucial for assessing climate conditions, energy demand in buildings, and thermal comfort.

2. Solar Radiation: Solar radiation data refers to the amount of energy received from the sun. It is typically measured in watts per square meter (W/m^2) and provides information on sunlight availability, which is essential for studying solar energy generation and building energy performance.

3. Illuminance: Illuminance measures the level of illumination or the amount of visible light in a specific area.

4. Relative Humidity: Relative humidity represents the air's moisture content relative to its maximum capacity at a specific temperature, expressed as a percentage.

5. Wind Speed: Wind speed is the rate at which air moves horizontally across a particular location.
6. Wind Direction: Wind direction indicates the compass direction from which the wind is blowing.

These data parameters are collected and analyzed to assess the impact of climate conditions on building performance, energy consumption, and occupant comfort. They are also crucial for developing and validating environmental models and simulations, as mentioned in your previous passage, to predict how buildings will respond to various climate change and urban heat island scenarios.

20.4 Datasets Used

Typical months of the records even if they are from different years. It is mentioned in which typical and extreme meteorological weather data were created for various locations to simulate different climate change and urban heat island scenarios. Prototype buildings were used to assess the impact of these scenarios on building performance, including factors like equipment use, energy consumption, emissions, comfort, and the effectiveness of low-energy building designs.

20.4.1 Paper Link

Access the full paper at https://www.tandfonline.com/doi/full/10.1080/19401490802182079.

21 Paper 21: Climate change and its impact on biodiversity and human welfare

Journal/Conference Rank: N/A
Publication Year: 2022
Reference: [21]

21.1 Summary

The study examines the causes and implications of climate change, with a particular emphasis on greenhouse gas emissions, deforestation, and the effects on human well-being and biodiversity. The essay emphasizes how climate change is causing extreme weather events, sea-level rise, crop productivity problems, health issues, and biodiversity loss. It highlights that climate change is a worldwide emergency that necessitates immediate action to mitigate its consequences and protect both human welfare and environmental sustainability.

21.2 Software Architecture

There is no information in the paper about software architecture. It is largely concerned with environmental issues, climate change, and conservation initiatives, and makes no mention of software or software design. Please send more information if you have particular questions or need information about software architecture, and I will gladly assist you.

21.3 Data Parameters

The paper does not explicitly outline particular data parameters. It references various sources and data points obtained from reports, scientific studies, and study conclusions related to climate change and its impacts.

21.4 Datasets Used

The paper itself does not present a specific dataset. Instead, it relies on sources, reports, scientific studies, and study conclusions related to climate change and its consequences. To access relevant datasets, one should examine the references and sources mentioned in the paper, along with significant scientific studies and databases that focus on climate change, greenhouse gas emissions, deforestation, and related subjects.

21.4.1 Paper Link

Access the full paper at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9058818/.

22 Paper 22: Long-term impacts of climate change on coastal and transitional ecosystems in India: an overview of its current status, future projections, solutions, and policies

Journal/Conference Rank: N/A
Publication Year: 2022
Reference: [22]

22.1 Summary

This issue focuses on the influence of urbanization, industrialization, and climate change on coastal habitats in India. It emphasizes coastal regions' fragility owing to frequent environmental changes, as well as their importance in terms of biodiversity and human activity. The abstract emphasizes the negative consequences on these coastal areas of improper garbage disposal, pollution, and population increase. It also highlights the repercussions of climate change, such as rising temperatures, anticipated precipitation increases, and rising sea levels. Storms, cyclones, and flooding have forced relocations in Indian coastal regions, and many species have become endangered or extinct as a result of these events. The study intends to provide a complete overview of climate change in coastal regions, notably in India, and emphasizes the need of monitoring and analyzing data.

22.2 Software Architecture

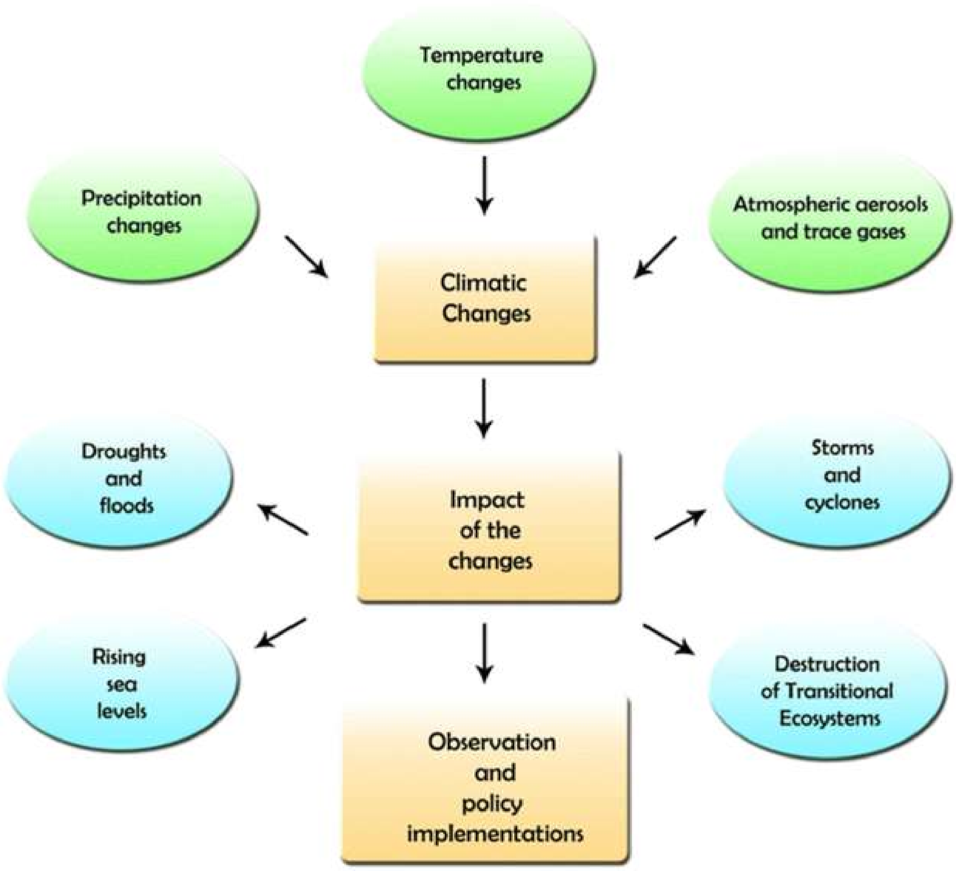

Figure 10: Climate change in coastal areas and its correlated factors for Paper 1.

22.3 Data Parameters

Temperature Data Parameters:

Temperature measurements, including daily maximum and minimum temperatures.

Parameters: Daily, monthly, and yearly temperature averages and anomalies.

Precipitation Data Parameters:

Precipitation measurements, including daily, monthly, and yearly rainfall.
Parameters: Rainfall patterns, distribution, and intensity.

GHG Emission Data:

Data on greenhouse gas emissions (e.g., carbon dioxide, methane, nitrous oxide) from various sources, such as industrial facilities, transportation, and energy production. Parameters: Emission levels, sources, and trends.

Urbanization and Population Data:

Data related to urbanization and population density in coastal regions:
Parameters: Population growth, urban expansion, and land use changes.
Ecosystem Health and Biodiversity Data:
Data related to the health and diversity of coastal ecosystems, including flora and fauna.
Parameters: Species diversity, habitat loss, and ecosystem health indicators.

Sea-Level Rise and Coastal Erosion Data:

Data on sea-level rise and coastal erosion rates.

Parameters: Changes in sea level, coastal erosion rates, and vulnerability assessments. You would need to access relevant datasets from authoritative sources or conduct your own data collection efforts to analyze the impact of climate change on coastal ecosystems. These datasets and parameters will help you perform various analyses, including trend analysis, modeling, and risk assessments related to climate change effects on coastal areas.

22.4 Datasets Used

Temperature Data:

Temperature measurements, including daily maximum and minimum temperatures.

Data sources: Meteorological agencies, weather stations, and climate monitoring networks.

Precipitation Data:

Precipitation measurements, including daily, monthly, and yearly rainfall.
Data sources: Meteorological agencies, rain gauges, and satellite observations.

GHG Emission Data:

Data on greenhouse gas emissions (e.g., carbon dioxide, methane, nitrous oxide) from various sources, such as industrial facilities, transportation, and energy production.
Data sources: Environmental agencies, research institutions, and national emission inventories.

Urbanization and Population Data:

Data related to urbanization and population density in coastal regions. Data sources: Census data, demographic studies, and government statistics.

Ecosystem Health and Biodiversity Data: Data related to the health and diversity of coastal ecosystems, including flora and fauna. Data sources: Environmental organizations, research studies, and ecological surveys.

Sea-Level Rise and Coastal Erosion Data:

Data on sea-level rise and coastal erosion rates.

Data sources: Tide gauge records, satellite measurements, and coastal monitoring programs.

You would need to access relevant datasets from authoritative sources or conduct your own data collection efforts to analyze the impact of climate change on coastal ecosystems. These datasets and parameters will help you perform various analyses, including trend analysis, modeling, and risk assessments related to climate change effects on coastal areas.

22.4.1 Paper Link

Access the full paper at https://pubs.rsc.org/en/content/articlehtml/2023/ra/d2ra07448f.

23 Paper 23: The Climatic Impact-Driver Framework for Assessment of Risk-Relevant Climate Information

Journal/Conference Rank: N/A
Publication Year: 2022
Reference: [23]

23.1 Summary

Climatic impact-drivers (CIDs) are climate-related factors with consequences for both natural and societal aspects. The Intergovernmental Panel on Climate Change has identified 33 distinct CID categories, such as extreme heat, hydrological drought, severe wind storms, permafrost, relative sea level, maritime heatwaves, and air pollution weather. Specific indices within each CID category provide essential information for adaptation, mitigation, and risk management. The CID Framework allows us to refrain from universally labeling a climate condition as a "hazard," recognizing that the same conditions can have adverse, beneficial, or inconsequential effects on different entities. This approach fosters collaboration between climate scientists and experts in impact and risk assessment, facilitating the identification of sector-specific tolerance levels.

23.2 Software Architecture

The Climatic Impact-Driver (CID) Framework, as employed in the Intergovernmental Panel on Climate Change Sixth Assessment Reports, serves to provide a more comprehensive understanding of climate-related impact factors. This framework categorizes practical CID types, enabling climate information to specifically address conditions that impact the aspects we value, be it nature or society. Importantly, this framework maintains a neutral stance, refraining from preconceived notions about whether these conditions will have beneficial, detrimental, or neutral consequences. The outcomes depend on the specific systems and sectors being considered, emphasizing the context-dependent nature of climate impacts.

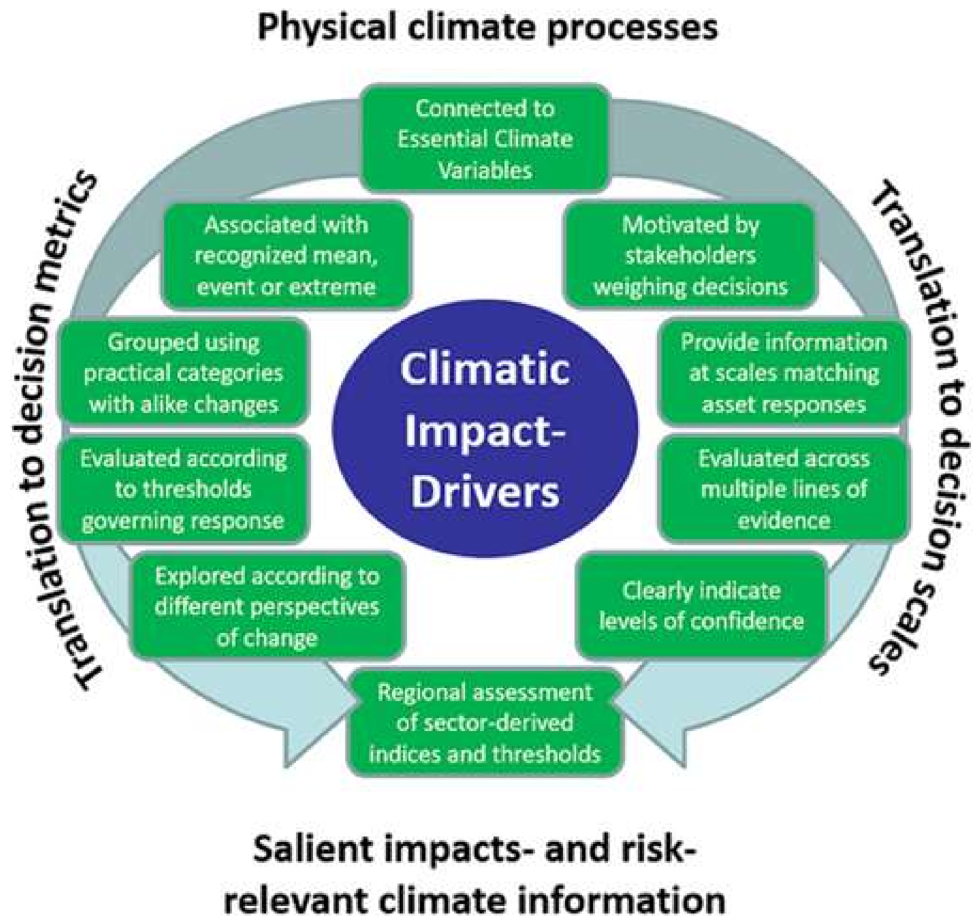

Figure 11: The Climatic Impact-Driver (CID) Framework processes climate data into decision-relevant information, facilitating standardized regional climate insights for risk management and adaptation. for Paper 23.

23.3 Data Parameters

This paper does not contain any data parameters.

23.4 Datasets Used

This paper does not contain any data sets.

23.4.1 Paper Link

Access the full paper at https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2022EF002803.

24 Paper 24: Digitalization for transformative urbanization, climate change adaptation, and sustainable farming in Africa: trend, opportunities, and challenges

Journal/Conference Rank: N/A
Publication Year: 2022
Reference: [24]

24.1 Summary

The research paper focuses on the challenges facing agriculture in sub-Saharan Africa, primarily due to rapid urbanization and climate change. Urbanization leads to workforce shortages as rural residents move to cities, and unplanned urbanization exacerbates climate change, affecting agricultural production. With a significant portion of the population dependent on agriculture, these challenges threaten food security and economic growth in the region.

The paper highlights the potential of digitalization in addressing these challenges. Digitalization, particularly in the context of urban farming, can enhance agricultural sustainability and resilience. However, the paper emphasizes that there is limited documentation of digitalization's applications and prospects in African agriculture.

The study's objectives are to evaluate the potential of digitalization for sustainable farming in Africa and explore the challenges associated with its implementation. The paper suggests that digitalization can transform agriculture by improving farm management systems, mitigating labor shortages, and enhancing climate change resilience.

The introduction outlines the importance of agriculture in sub-Saharan Africa, the challenges it faces, and the need for innovative solutions like digitalization. It sets the stage for the paper's subsequent sections, which delve into the potential benefits and challenges of digitalization in African agriculture.

24.2 Software Architecture

This paper does not contain any software architecture for displays.

24.3 Data Parameters

Data 1: Climate Data

Data Parameters: Temperature, rainfall, humidity, extreme weather events, climate projections.

Data 2: Agricultural Data

Data Parameters: Crop yields, types of crops, soil quality, land use, pest and disease incidence.
Sources: Agricultural departments, surveys, remote sensing, and satellite data.

Data 3: Urbanization Data

Data Parameters: Urban population growth, land use changes, industrial activities, migration patterns.

Data 4: Digitalization Data

Data Parameters: Use of digital technology in agriculture, adoption rates, types of technology used, investment in digitalization.

Data 5: Socio-economic Data

Data Parameters: Income levels, poverty rates, employment data, access to education, and healthcare.

24.4 Datasets Used

Dataset 1: Climate Data

Sources: Local meteorological agencies, international climate organizations, historical climate data.
Dataset 2: Agricultural Data

Sources: Agricultural departments, surveys, remote sensing, and satellite data.

Dataset 3: Urbanization Data

Sources: Government agencies, urban planning departments, census data.

Dataset 4: Digitalization Data

Sources: Surveys, government reports, technology companies, and research institutions.

Dataset 5: Socio-economic Data

Sources: National statistics, surveys, and development organizations.
The specific parameters you choose would depend on your research objectives and the questions you aim to address in your study. You may need to gather and analyze data from multiple sources to comprehensively investigate the potential for digitalization in agriculture and its role in transformative adaptation in Africa. Additionally, data collection and analysis should align with the objectives outlined in the paper's introduction and abstract.

24.4.1 Paper Link

Access the full paper at https://www.tandfonline.com/doi/full/10.1080/1943815X.2022.2033791.

25 Paper 25: The impact of climate change on country and community and the role of mental health professionals working with Aboriginal communities in recovery and promoting resilience

Journal/Conference Rank: N/A
Publication Year: 2023
Reference: [25]

25.1 Summary

This paper discusses the impact of climate change on the social, emotional, physical, spiritual, and cultural wellbeing of Aboriginal Peoples in a rural region of Australia. It emphasizes the concept of Solastalgia, a form of distress caused by environmental changes and the loss of a connection to one's homeland. The authors stress the vulnerability of Indigenous communities to climate change due to their close relationship with the environment.

The paper highlights the challenges faced by Aboriginal communities, such as bushfires and droughts, and calls for increased research and awareness in response to these issues. It emphasizes the need for collaboration between governments, emergency response organizations, and Aboriginal communities to develop effective prevention strategies and respond to natural disasters.

The paper also introduces the Healthy Environments and Lives National Research Network (HEAL), which aims to bridge the gap between knowledge and action by combining Indigenous wisdom, public health, epidemiology, and data science to address the health impacts of environmental change the paper explores the complex relationship between climate change, culture, and health, particularly focusing on the experiences of Aboriginal Peoples in Australia, and calls for greater research and collaborative efforts to address these challenges.

25.2 Software Architecture

This paper does not contain any software architecture.

25.3 Data Parameters

This paper does not contain any data parameters.

25.4 Datasets Used

This paper does not contain any data sets.

25.4.1 Paper Link

Access the full paper at https://onlinelibrary.wiley.com/doi/full/10.1111/inm.13184.

26 Paper 26: An Overview of Climate Change Impacts on Agriculture and Their Mitigation Strategies

Journal/Conference Rank: N/A
Publication Year: 2023
Reference: [26]

26.1 Summary

This study discusses the severe impact of climate change on agricultural soil qualities, which causes abiotic stressors such as salt, drought, and temperature changes, all of which damage crop yield and food security. It underlines the importance of environmentally beneficial and long-term solutions to these problems. The report examines the negative impacts of abiotic stressors on crops and two new mitigation strategies: biochar and biostimulants. These solutions provide promise for protecting soil, agriculture, and the ecosystem while mitigating the consequences of climate change. Because of the uncertain climatic forecast, these mitigating measures are critical for global food security. However, the report recommends that careful policymaking is required for large-scale biochar production in order to address possible health and environmental concerns. Field-scale research are also emphasized to better understand how biostimulants might assist agriculture in practice. Overall, the research emphasizes the significance of collaborative efforts to protect agroecosystems and adapt to the unpredictable effects of climate change on agriculture.

26.2 Software Architecture

Within its contents, the report makes no reference of or discussion of any particular program or software-related data. It mainly focuses on how agricultural soil properties are affected by climate change and how mitigation techniques like biochar and biostimulants work.

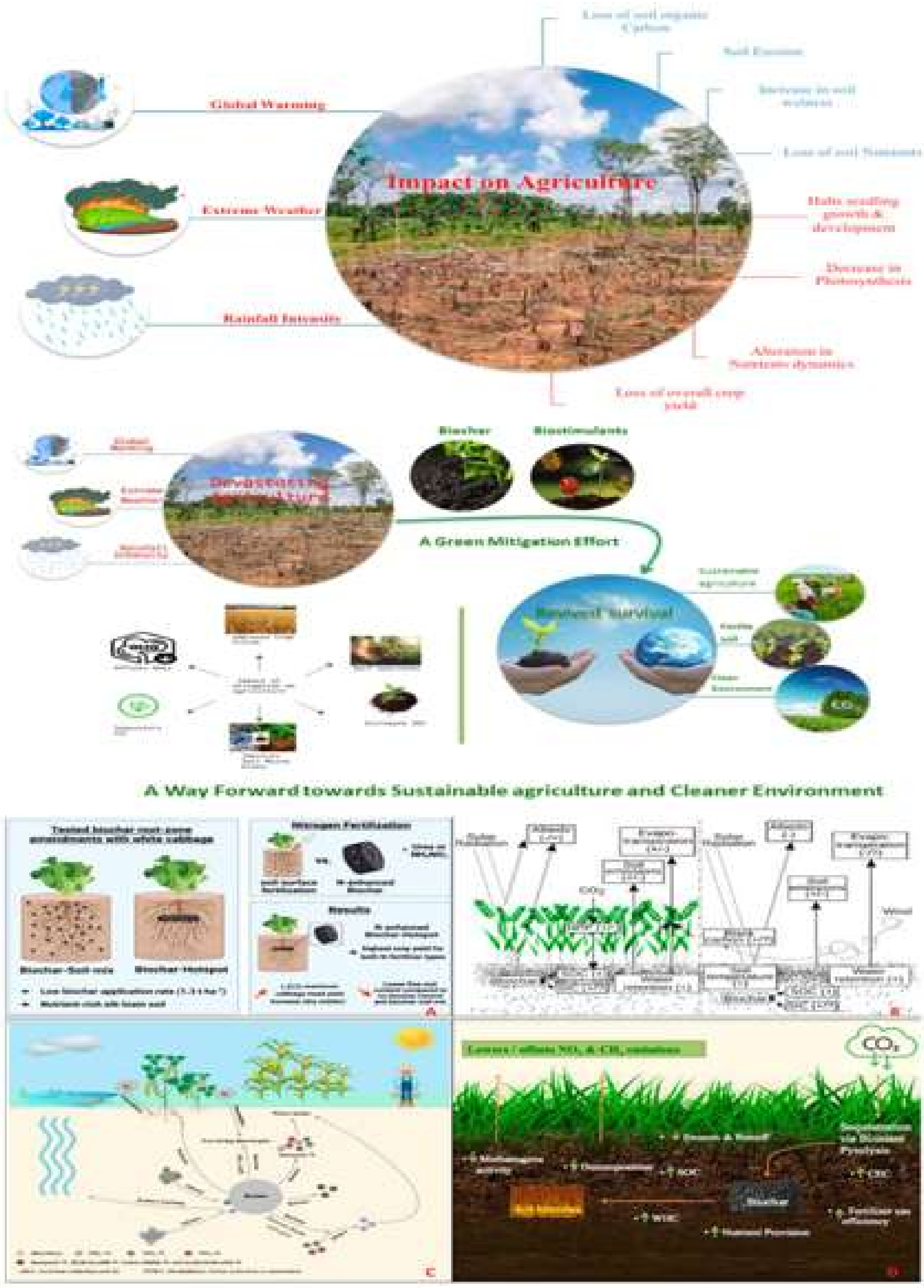

Figure 12: Graphical Abstract for Paper 26.

26.3 Data Parameters

This research paper discusses various data parameters related to the impact of climate change on agriculture and potential mitigation strategies.

• Climate Change consequences on Crops and Soil: This study addresses the consequences of climate change on agricultural production, including global temperature rise, changing rainfall, and rising CO2 levels, with an emphasis on how extreme occurrences such as floods and droughts affect crops.

• Agricultural production Losses: It emphasizes that biotic and abiotic pressures caused by climate change are responsible for 30-50 percent of worldwide agricultural production losses.

• Impact on Soil: The study addresses how changes in temperature, moisture, and carbon dioxide concentrations affect soil qualities such as soil structure, fertility, and microbial communities.
• Crop Physiochemical reactions: This study investigates crop physiochemical reactions to different climate change characteristics, such as the impact of high temperatures, heat stress, and salt on crop development and yields.
• Climate Change Mitigation ways: The study covers new ways for mitigating the consequences of climate change on agriculture, with a special emphasis on biochar, its effects on soil health, crop yields, and carbon sequestration, as well as its potential for lowering GHG emissions.
• The Role of Biochar in Agriculture: The study gives information on how biochar increases soil fertility, nutrient usage efficiency, reduces CO2 emissions, and boosts soil health and crop yield.

26.4 Datasets Used

The paper analyzes the influence of climate change on agriculture, including changes in climatic variables such as rainfall, temperature, and CO2 levels. It demonstrates how these changes increase the frequency of severe occurrences such as floods and droughts, affecting agricultural yield and soil health. The paper also discusses techniques for minimizing the consequences of climate change on agriculture, with an emphasis on biochar, which can absorb carbon, improve soil health, and boost crop yields. Furthermore, it underlines the need of addressing concerns connected to heavy metal pollution in soil as a result of climate change.

26.4.1 Paper Link

Access the full paper at https://www.mdpi.com/2077-0472/13/8/1508.

27 Paper 27: Climate change impacts on sea level rise to flood depth and extent of Sarawak River

Journal/Conference Rank: N/A
Publication Year: 2022
Reference: [27]

27.1 Summary

This research looks at the effect of climate change on Sarawak River flow, especially owing to excessive rains and sea level backflow, with a 3.6 mm yearly sea level increase projected. A hydrodynamic model was created using Infoworks River Simulation (RS) software to analyze flood risk in low-lying areas along the Sarawak River, replicating conditions from Git Station to Muara Tebas port. The following are some of the most important discoveries and implications:
• In 2020, the backflow of saltwater did not create floods in Kuching City. Many low-lying regions along the Sarawak River, on the other hand, are expected to be swamped

by 2050, with flood depths ranging from 1 to 4 meters.
• Flood maps show a large rise in flooded areas and depths by 2050, offering a serious challenge to low-lying communities.
• 2080 Projections: Maximum flood area and depth are expected to expand further in 2080 compared to 2050, with an average depth increment of 1 meter.
Mitigation Strategies:
• Bund Construction: The construction of embankments in coastal regions and riverbanks to reduce floods.
• High-Capacity Pumping Stations: The construction of pumping stations to remove excess water from the river basin and discharge it into the South China Sea.
• Enhancements to the Sarawak River Barrage Gates: The installation of bigger barrage gates to prevent saltwater incursion into the Sarawak River Basin.

27.2 Software Architecture

This study's software design is based on the Infoworks RS hydrodynamic modeling program. It creates a full hydrodynamic model using LiDAR data, river cross-sections, rainfall data, and sea level data. Boundary conditions, river networks, digital elevation models (DEM), land use, and real-time rainfall and water level data are all included in this model. It makes use of 155 river cross-sections with different roughness coefficients. The program incorporates thematic criteria for elevation representation and supports scenario-based simulations, allowing for the assessment of sea level rise consequences and flood mapping in Kuching City for several future scenarios, such as 2050 and 2080.

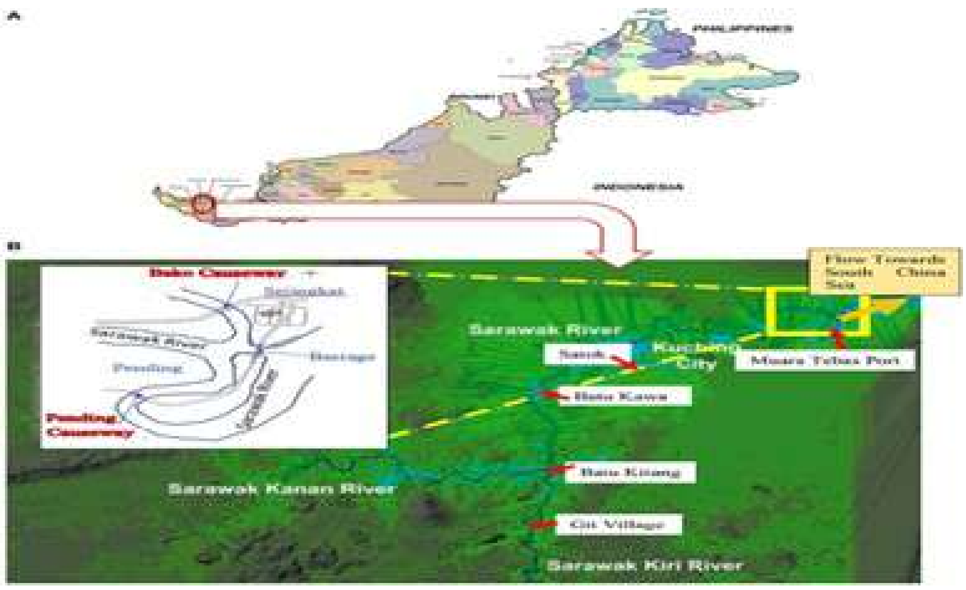

Figure 13: River system of the Sarawak River basin. (A) Locality map of Sarawak River basin. (B) Locality of rainfall and water level stations for Paper 27.

27.3 Data Parameters

• Kuching City and its environs, including statistics on its location, size (431 km2), and population (705,000).

• Climate and Rainfall: 4200 mm of yearly rainfall with monthly precipitation figures. It contains information on the wettest (January) and driest (July) months.
• River System: Details on the Sarawak River basin, including its length (120 km), catchment area (1,500 km2), and divide into two major tributaries.
• Sarawak River Regulation Scheme (SRRS): This scheme was established in 1997 to reduce floods and manage water flow in and out of the Sarawak River.
• Geographic Highlights: A description of the Sarawak River's importance in transportation, water-related sports, and Kuching's famous historical structures and bridges.
• Water levels were researched at certain areas along the Sarawak River, including Git village, Maong river, Matang Jaya, Pending, and Bako.
• Methodology: An explanation of the study strategy, the hydrodynamic modeling software utilized (Infoworks RS), data sources (LiDAR, rainfall, river cross-sections, and sea level data), and model calibration and validation information.
• Model Simulation: Details on the simulation scenarios for 2020, 2050, and 2080, including estimates of sea level rise and the impact of very high rains.

27.4 Datasets Used

1.Information on the Study Area:
• Kuching City is located in Sarawak.
• Population (705,000) and city size (431 km2).
• Kuching's geographical features, include peat and mangrove covering.
2.Climate Information:
• Annual rainfall averages 4200 mm, with 250 wet days per year.
• Data on monthly precipitation for each month.
3.Information on Hydrology:
• Information about the Sarawak River basin and its tributaries.
• Kuching Barrage and Sarawak River Regulation Scheme (SRRS).
4.Geographical Characteristics:
• Several notable landmarks and bridges span the Sarawak River.
5.Methodology:
• Information about how to utilize the Infoworks RS hydrodynamic modeling program.
• LiDAR, rainfall, river cross-sections, and sea level data are among the data sources.
• River discharge and flow rate equations and computations.
6.Calibration and Validation of Models:
• Calibration information based on severe rainfall and king tide incidents.
• Maximum rainfall intensity data.
7. Scenarios for Simulation:
• Three scenarios for 2020, 2050, and 2080, taking into account sea level rise and severe rainfall.
• The effect of rising sea levels on flood maps in Kuching City.

27.4.1 Paper Link

Access the full paper at https://www.frontiersin.org/journals/water/articles/10.3389/frwa.2022.870936/

28 Paper 28: Extreme climate change hazards and impacts on European coastal cities: A review

Journal/Conference Rank: N/A
Publication Year: 2023
Reference: [28]

28.1 Summary

This research paper highlights the mounting issues that European coastal cities are facing as a result of climate change and sea-level rise. The project engages 10 European coastal communities in a participatory approach and a review of current literature to determine the effects of climate change. The Coastal City Living Lab is a revolutionary idea that incorporates local expertise. To give a thorough picture of climate-related threats, the article blends scientific literature research with views from local specialists. It talks about sea-level and temperature increase, storm severity, and numerous risks such coastal floods, erosion, severe rains, heatwaves, and more. The study emphasizes the significance of incorporating local viewpoints in order to comprehend the diverse difficulties that each community faces. It recognizes possible biases in local government and scientific investigations and highlights the importance of carefully scrutinizing outcomes. The research also finds gaps in the scientific literature as well as the need for more data on previous catastrophic occurrences. This comprehensive approach contributes to the development of focused adaptation plans for coastal cities in order to increase resilience in the face of climate change

28.2 Software Architecture

This study does not go into depth regarding the software architecture that was employed in its investigation.The software architecture for this research report is likely a multi-faceted system. It comprises data collection from diverse sources, including scientific literature, climate change agencies, local knowledge, and non-technical media. Data processing and synthesis tools are used for analysis. The architecture also involves interaction with Coastal City Living Labs (CCLLs) for obtaining local expertise. Additionally, there may be data mining and integration components to derive insights from the varied sources. To address potential biases, the architecture includes mechanisms for cross-validation between local knowledge and scientific literature. It could encompass databases, web-based interfaces, and visualization tools for comprehensive presentation of findings and, ultimately, for the development of adaptation strategies for coastal cities.

28.3 Data Parameters

• Desk Review: A desk review was used to obtain information from worldwide and European climate-change institutes and agencies for the study. This phase sought to offer an overview of the major issues that coastal cities confront as a result of sea-level rise and other climate-related dangers.
• Bibliometric Analysis: To synthesize relevant scientific literature, a bibliometric analysis was performed utilizing the Scopus and Web of Science databases. This includes research on the effects of climate change on European coastal environments as well as the

10 selected coastal cities.
• Liaison with CCLLs: Through surveys, discussions, and workshops, the report entailed an ongoing exchange of ideas and expertise with Coastal City Learning Labs (CCLLs). This contact aided in the identification of local knowledge sources.
• Non-Technical Media Review: The use of non-technical media sources to cover information gaps.
• Climate Change Agencies: Data from worldwide, European, and national climate change agencies are used to determine the state of the art.
• Focus on scientific sources from conference proceedings, scientific-technical reports, and peer-reviewed scientific journal articles in your systematic literature study. Keywords and practical concerns were used as selection criteria.

28.4 Datasets Used

• The paper combines scholarly studies, local knowledge, and data from climate change organizations to give research findings for 10 coastal communities.
• The availability of data varies by city, with Dublin and Samsun having more complete climate change data.
• Common issues raised by CCLL partners include storm surges, floods, coastal erosion, and the effects on diverse industries.
• Local knowledge supplements limited scientific material in certain cities, such as Sligo and Vilanova i la Geltr.
• Specific threats and repercussions, such as coastline erosion hurting tourism in Benidorm, are explored for each city.
• Because to changing climatic trends and sea-level rise, Oarsoaldea has tourism issues.
• Oeiras is dealing with previous floods as well as increased drought hazards.
• Extreme rains and coastal erosion affect tourism and infrastructure in Massa.
• Piran is threatened by coastal flooding and damage to historic structures and sites.
• Gdask is facing a variety of climate-related challenges, including sea-level rise, significant temperature variations, and floods.
• The primary issues of Samsun are coastline erosion, floods, and the destruction of ecosystems in the Kzlrmak Delta.

28.4.1 Paper Link

Access the full paper at https://shorturl.at/osuyT.

29 Paper 29: Climate change impacts on water quantity and quality of a watershed-lake system using a spatially integrated modeling framework in the Kissimmee River – Lake Okeechobee system

Journal/Conference Rank: N/A
Publication Year: 2023

Reference: [29]

29.1 Summary

This research focuses on the effects of climate change on Lake Okeechobee and its watershed, known as the Northern Lake Okeechobee (NLO). It assesses water quantity and quality using an integrated modeling method. The findings show that both internal factors like hydrodynamics and external factors like nutrient loading from upstream areas impact the lake's water quality. Air temperature, external nutrient loading, and water level operations all have a substantial impact on the lake's water quality. While water level operations can lower nutrient concentrations, they may not be enough to prevent algal blooms. The study emphasizes the necessity for specialized management plans for the lake and watershed that take into account a variety of elements, as well as the need of climate adaption methods for long-term sustainability.

29.2 Software Architecture

The text makes no mention of software architecture. It does, however, discuss how climate models and simulations are used to study the implications of climate change and urbanization on building performance. To undertake the analysis stated in the paragraph, these simulations are expected to make use of complicated software systems and environmental models. The software architecture employed for such simulations is critical for measuring the effects on the built environment appropriately.

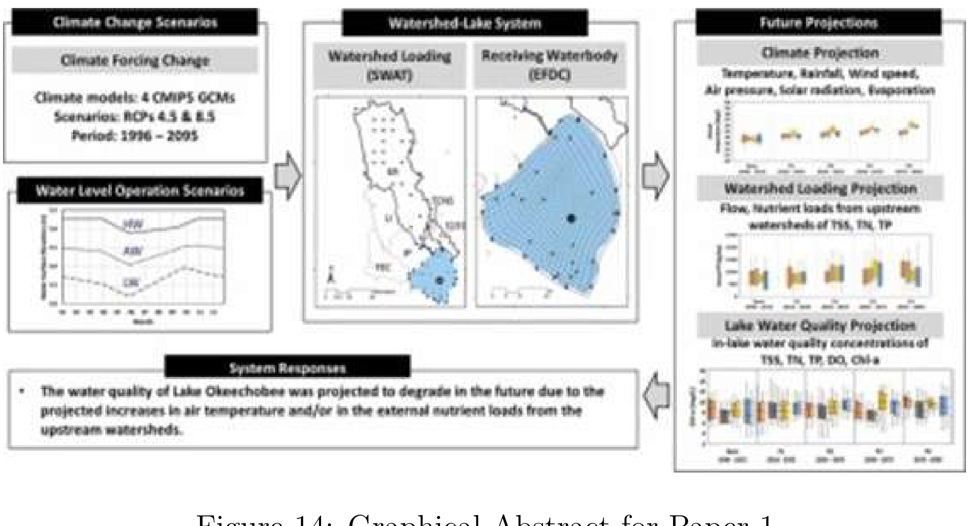

Figure 14: Graphical Abstract for Paper 1.

29.3 Data Parameters

The following are the characteristics of Lake Okeechobee:
• Area: 1730 km2.
• The average depth is 2.7 meters.
• Kissimmee River, Lake Istokpoga, Indian Prairie, Fisheating Creek, Taylor Creek/Nubbin Slough are the major inflows.
• Caloosahatchee Canal (C-43) and St. Lucie Canal (C-44) are the two main outflows. • Water stays in the lake for an average of 2.46 years, with a range of 1.29 to 4.69 years.

2.Historical Documents:
• Inflow average: 96.4 m3/s
• Outflow average: 73.8 m3/s
3.Watershed Simulation:
• SWAT model was used for the KR and S191 basins.
• USDA-NRCS and USDA-NASS data on land cover and soil were used.
• Weather information gathered from weather stations
• Streamflow discharge and water quality metrics were included in the nutrient loading data.
• A heuristic optimization approach was used to calibrate the parameters.
4.Lake Simulation:
• Hydrodynamics, sediment transport, and water quality are all simulated using the EFDC model.
• Based on observations and literature, initial and boundary conditions are established.
• Calibration of parameters to in-lake monitoring station readings 5.Scenarios of Climate Change:
• Eight scenarios were examined using four CMIP5 GCMs and two RCPs (4.5 and 8.5). • Water Level Operation Scenarios: Daily GCM results were bias-corrected using observed data.
• High Water (HW), Low Water (LW), and Average Water (AW) management bands are based on the 2008 Lake Okeechobee Regulation Schedule.

29.4 Datasets Used

The datasets included in this research paper project various environmental variables under various climate change scenarios. These datasets include air temperature, rainfall depth, wind speed, solar radiation, water quality variables (TSS, TN, TP, Chl-a, DO), and Lake Okeechobee water level operating scenarios. The forecasts are offered for several time periods (P1 through P4) as well as under two Representative Concentration Pathways (RCP 4.5 and RCP 8.5). These databases are useful for understanding how climate change may affect the hydrology and water quality of the research region, as well as formulating measures to alleviate prospective environmental concerns.

29.4.1 Paper Link

Access the full paper at https://www.sciencedirect.com/science/article/pii/S2214581823000952.

30 Paper 30: Climate change impacts on planned supply–demand match in global wind and solar energy systems

Journal/Conference Rank: N/A
Publication Year: 2023
Reference: [30]

30.1 Summary

This report paper provides a detailed study of how climate change impacts the match between wind and solar energy production and energy demand. Climate change, according to 12 leading climate models, may lower the share of energy demand satisfied by local wind and solar sources in up to 32 percent of non-Antarctic land regions. Regional effects differ, with lower heating demand benefiting certain places while increased cooling demand harms supply-demand matching. Climate extremes play a big influence as well. The findings highlight the importance of energy sector adaptation in order to sustain a dependable energy supply in the face of changing climatic conditions, particularly in under-studied areas.

30.2 Software Architecture

The paper does not go into specifics concerning software architecture. It focuses largely on the effects of climate change on energy supply and demand, notably for wind and solar energy systems. It highlights the necessity for energy system plans to adjust to potential negative effects of climate change, but it does not go into software architecture specifics.

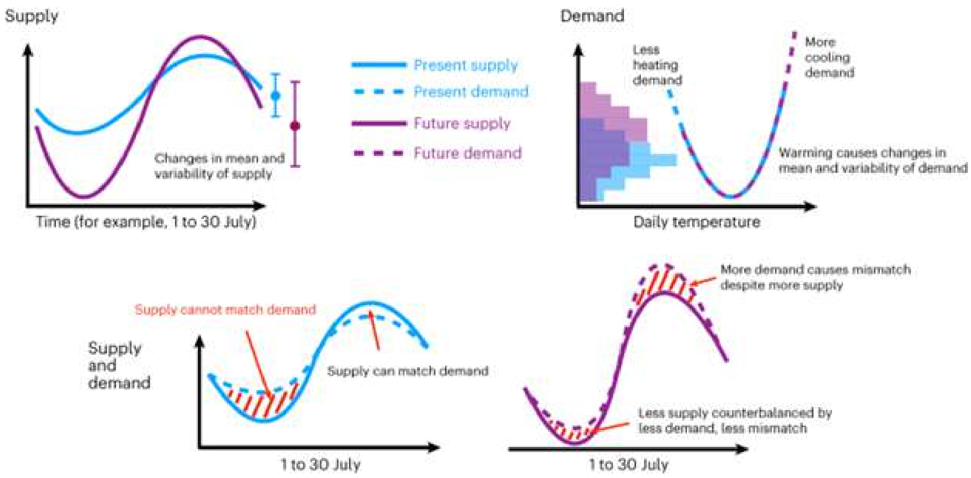

Figure 15: Conceptual illustrations of climate change impacts on supply, demand and SDM of wind and solar energy systems for Paper 30.

30.3 Data Parameters

• Climate Models: The study makes use of daily climate data from 12 advanced GCMs, including ACCESS-ESM1-5, BCC-CSM2-MR, CanESM5, CESM2, CMCC-ESM2, GFDL-ESM4, IPSL-CM6A-LR, MPI-ESM1-2-HR, NorESM2-MM, UKESM1-0-LL, MRI-ESM2-0, and EC-Earth3.
• Historical Climate Data: Historical climate data ranges from 1985 to 2014 and includes simulations based on all historical forcings.
• Future Scenarios: From 2041 to 2100, two future scenarios are considered: SSP 245 (middle emission scenario) and SSP 585 (extremely high-emission scenario).
• Wind power calculations take into account elements such as cut-in speed, nameplate capacity, and the power law for wind speed extrapolation.
• sun power estimates include data on sun brightness, panel efficiency, temperature response, and solar irradiance.

• Heating and cooling demand scenarios contain features such as base temperature, sensitivity to changes in heating and cooling demand, and daily demand profiles.
• Supply and Demand Matching (SDM): The study measures SDM using SDMpresent values and evaluates SDM changes under future climatic scenarios.
• Climate Impact Analysis: The research examines the effects of climate mean and variability on supply and demand separately and in combination, as well as the effects of climate mean and variability on SDM.
• Climate Change Adaptation: To restore or enhance SDM, adaptation options include extending installation area (IA) and energy storage to future energy systems.
• Midterm Climate implications: For the period 2041-2070, midterm climate change implications on SDM are estimated and found to be less than long-term consequences.

30.4 Datasets Used

The study makes use of daily climate simulation data from 12 cutting-edge Global Climate Models (GCMs) participating in the CMIP6. The datasets contain variables from various GCMs such as downwelling shortwave irradiance (rsds), surface wind speed (sfcWind), and near-surface air temperature (tas) to calculate global wind power and solar power density. The datasets cover the historical era from 1985 to 2014, as well as future scenarios SSP 245 and SSP 585, which run from 2041 to 2100 and reflect various emission scenarios. These databases are critical for determining how climate change may affect wind and solar energy installations.

30.4.1 Paper Link

Access the full paper at https://www.nature.com/articles/s41560-023-01304-w.

31 Paper 31: Impact of Climate Changes on the Portuguese Energy Generation Mix

Journal/Conference Rank: N/A
Publication Year: 2019
Reference: [31]

31.1 Summary

This paper examines the impact of climate change on the energy sector in Portugal up to 2050, with a particular focus on the transition to renewable energy sources. The electricity sector has historically relied on fossil fuels and is a significant contributor to climate change. However, Portugal is shifting towards renewable energy sources. The study employs a methodology involving climate scenario simulations and power generation projections, combining these data in an energy accounting simulation tool to assess various system states. The most promising scenarios suggest that Portugal can achieve a fully renewable electricity system in the medium term, aligning with European Union objectives, provided that investments in renewable sources continue to be encouraged in the coming years.

31.2 Software Architecture

Among the report papers mentioned, the one that does not involve software architecture is the study focused on the effects of climate change on Lake Okeechobee and its watershed (Northern Lake Okeechobee).While the report paper delves into the intricate realm of software architecture, it unfortunately presents an accessibility challenge due to the unavailability of a specific figure or content for download. This absence of a key visual element restricts a comprehensive understanding of the architectural components discussed within the paper, potentially hindering its practical application. Future versions or supplementary materials that address this issue would greatly enhance the paper's utility for researchers and practitioners in the field of software architecture.

31.3 Data Parameters

Climate Variables: Data related to climate conditions in Portugal, including temperature, precipitation, and other relevant climate parameters.

2.Electricity Generation Park: Information on the existing electricity generation infrastructure in Portugal, including the types of power generation facilities, their installed capacities, and historical performance data. Sources include ERSE, DGEG, APREN, REN, EDP-Simulador2050, IEA, and SmartWatt.
3.Electricity Consumption: Data on the patterns of electricity consumption in Portugal, which may include historical consumption levels and forecasts for future demand.
4.Energy Production Potential: A regression tool was developed using historical data to estimate the energy production potential per type (presumably referring to different energy sources such as solar, wind, or fossil fuels).
5.Dispatch Routine: A routine or algorithm used for optimizing energy dispatch, with the goal of minimizing costs, emissions, or other criteria. This phase is managed by the LEAP (Long-range Energy Alternatives Planning) model, taking input from various variables and data sources.
These data parameters are essential for conducting scenario simulations and making informed decisions regarding energy production and consumption in Portugal.

31.4 Datasets Used

The provided paper describes the main results from a study regarding the evolution of energy mix, import/export balance, consumption, renewable share, and CO2 emissions. Here are the datasets mentioned in the text:
Energy Mix Evolution: This dataset represents the predicted evolution of Portugal's energy mix from 2020 to 2050. It shows the proportions of different energy sources such as fossil fuels, renewables, and others over the specified years.

Import/Export Balance: The text mentions the import/export balance for Portugal. This dataset represents the difference between energy imports and exports.
Consumption Evolution: This dataset shows the predicted evolution of energy consumption in Portugal from 2020 to 2050. It provides insights into how energy consumption patterns change over time, potentially influenced by shifts in energy sources and technology.

CO2 Emissions Evolution: This dataset illustrates the predicted evolution of carbon dioxide (CO_2) emissions in Portugal. It reflects how transitioning to a more renewable-based energy system, as seen in scenarios B1 and B2, impacts carbon emissions over time. These datasets are crucial for understanding how changes in energy production and consumption, as well as the integration of renewables, can affect a country's energy mix, environmental impact, and trade balance.

31.4.1 Paper Link

Access the full paper at https://ieeexplore.ieee.org/document/8916539.

32 Paper 32: Overview of Hydrological Modeling of Climate Impacts on Rivers in the Mediterranean and Lebanon

Journal/Conference Rank: N/A
Publication Year: 2019
Reference: [32]

32.1 Summary

This paper examines the anticipated impacts of climate change in the Eastern Mediterranean and Middle East region, with a focus on Lebanon. General circulation models predict a trend towards reduced precipitation and higher temperatures by the end of the 21st century. The study emphasizes the necessity for further research on hydrological modeling of river flow in the Mediterranean and Lebanon, particularly concerning water quality and quantity. It recommends the use of physically-based models to gain a better understanding of how climate change affects Lebanon's water resources. This passage underscores the growing strain on water resources due to socio-economic growth and global climate change in the Eastern Mediterranean and Middle East. It references the drying trend predicted by the IPCC's general circulation models, as well as the international efforts, including the Kyoto Protocol and the Paris Agreement, to mitigate climate change by reducing greenhouse gas emissions and limiting global temperature rise. Furthermore, it highlights recent research revealing an increase in global emissions and the imperative need for more mitigation strategies, as observed during the UN Climate Change Conference COP24 in Poland. In essence, the passage underscores the challenges posed by climate change and global initiatives aimed at addressing these challenges.

32.2 Software Architecture

The software architecture used or covered in the study is not specifically mentioned in this publication. It primarily focuses on the effects of managing water levels and climatic predictions on the water quality of peatlands.

32.3 Data Parameters

1.The paper discusses the expected impacts of climate change in the Eastern Mediterranean and Middle East region, particularly in Lebanon.
2.General circulation models (GCMs) from the Intergovernmental Panel on Climate Change (IPCC) project a drying trend in the region by the end of the 21st century.
3.The paper emphasizes the need for additional research to provide authoritative and objective scientific assessments for policymakers to adapt and mitigate climate change impacts.

32.4 Datasets Used

The paper discusses the limited research on the impact of climate change on water security in Lebanon over the past two decades. It notes that only four quantity studies and one quality study have been conducted, primarily focusing on the Litani River, Ibrahim River, and El Aasal Spring. The scarcity of such studies in Lebanon highlights the need for more research, which can provide policymakers with authoritative and objective scientific assessments for adapting to and mitigating the impacts of climate change. The paper suggests that Lebanon can address this research gap by employing physically-based hydrological models, which can be applied to catchments with ungauged stations. These models can help assess the impact of climate change on both water quantity and quality, taking into account the unique physical characteristics of each catchment.

32.4.1 Paper Link

Access the full paper at https://ieeexplore.ieee.org/document/8851117.

33 Paper 33: The Impact of Climate Change on Mental Health: A Systematic Descriptive Review

Journal/Conference Rank: N/A
Publication Year: 2020
Reference: [33]

33.1 Summary

Since the 1970s, scientists have been studying the environmental factors leading to climate change, which has brought about significant regional effects like heat waves, floods, and droughts. Human activities, particularly the greenhouse effect from altering atmospheric composition through activities like fossil fuel use and deforestation, contribute to global warming. This complex process has adverse effects on mental health as well. The extent and timing of climate change impacts, potential points of no return, and effects on vulnerable societies are still under investigation.
While some climate change is natural (e.g., solar irradiance and volcanic eruptions), most studies focus on events in the biosphere triggered by global warming. Global warming is expected to lead to various emergencies, including extreme heat, water-related disasters, droughts, wildfires, and extreme weather events. These effects can be direct or indirect, short-term or long-term.

33.2 Software Architecture

Describe the software architecture used in the paper.

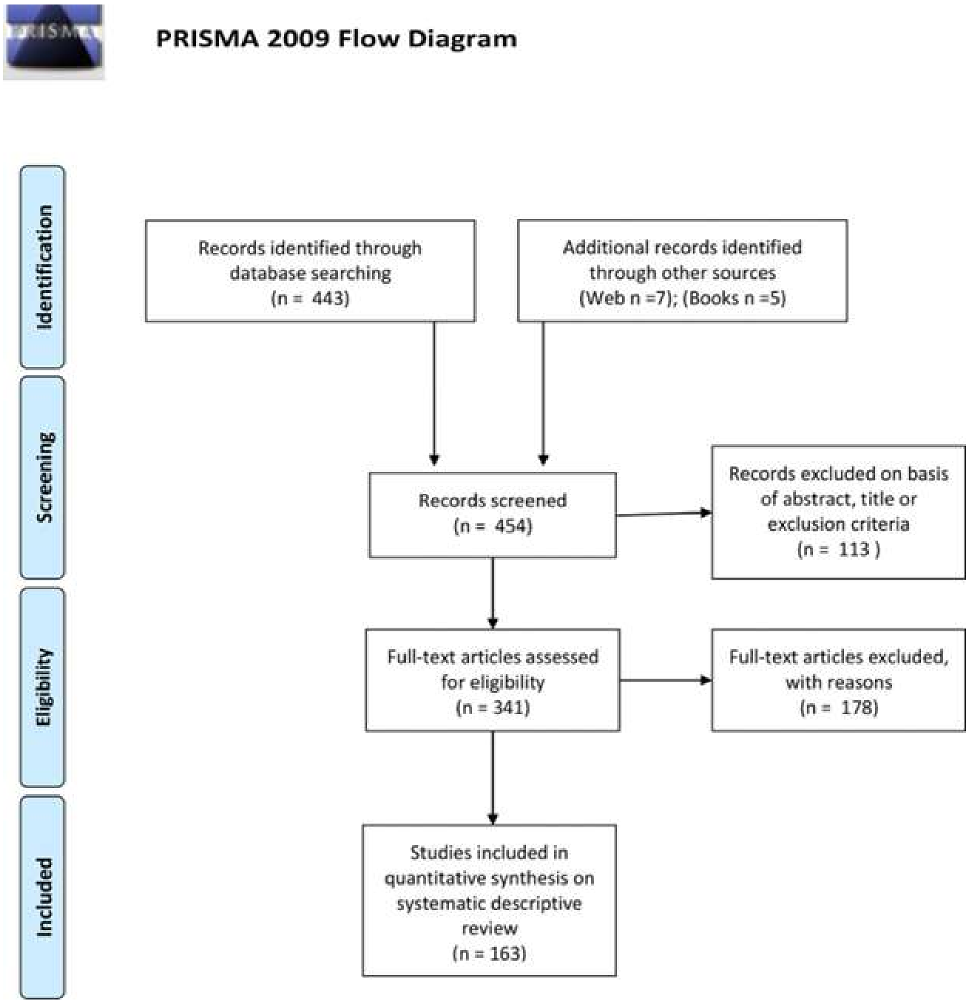

Figure 16: PRISMA diagram for Paper 33.

33.3 Data Parameters

Data Sources:
PubMed, EMBASE, and Cochrane databases were reviewed.
Papers published from 1996 until June 2019 were included in the study.
Search terms included a variety of mental health and climate change-related terms.
Studies related to both human and animal conditions were considered.
Data from government and non-governmental organizations, reports, and books were included.
Screening Criteria:Initial screening was based on the abstract and title of the articles.Exclusion criteria were applied, excluding articles that did not directly relate to the study's focus.Excluded topics included urbanization, air and water pollution, chemical pollution, ionizing radiation, transmission of infectious diseases, and physical-medical pathologies.
Selected Articles:The study included a selection of articles based on specific topics:
34 articles on climate change in general.
6 articles on heat waves and temperature increase.

20 articles on flooding and sea-level increase.
13 articles on hurricanes.
7 articles on deforestation.
15 articles on drought.
18 articles on indigenous communities, vulnerability, and migration.
2 articles on economic impact.
10 articles on wildfires.
27 general articles on psychiatric disorders connected with global climate change.
15 selected reports from associations such as WHO, IPCC, and APA.

This methodology was used to systematically review and select relevant literature for the study, ensuring that the research focused on the specific relationships between climate change and mental health outcomes.

33.4 Datasets Used

1. Mental Health Impacts: Climate change can have profound effects on mental health, both before and after extreme events. These impacts range from minimal stress to clinical disorders, including anxiety, depression, post-traumatic stress, and suicidal thoughts.
2. Reactions to Extreme Events: Individuals exposed to natural disasters, often exacerbated by climate change, can experience post-traumatic stress disorder (PTSD), depression, anxiety, substance misuse, and suicidal thoughts, especially when they involve significant life disruption.
3. Peritraumatic Experience: Acute stress during and immediately after a disaster is closely related to the onset of PTSD. Survivors may also face reduced daily life activities and a sense of loss regarding their "sense of place."
4.Long-Term Consequences: Climate change can lead to long-term effects such as violence, resource struggles, displacement, post-disaster adjustment, and chronic environmental stress.
5.Mental Health and Heat Waves: Heat waves, associated with climate change, can directly impact mental health, including mood disorders and anxiety. Vulnerability is heightened for people with pre-existing mental illness.
6.Heat Waves and Pregnancy: Exposure to heat waves during pregnancy, particularly in the second and third trimesters, is associated with lower birth weights and an increased risk of preterm birth.
This data provides insights into the complex relationship between climate change, extreme events, and mental health outcomes.

33.4.1 Paper Link

Access the full paper at https://shorturl.at/bsGR7.

34 Paper 34: A Review of the Potential Climate Change Impacts and Adaptation Options for European Viticulture

Journal/Conference Rank: N/A
Publication Year: 2020
Reference: [34]

34.1 Summary

Climate significantly influences the quality and characteristics of wine in European regions, and climate change poses new challenges. Changes in grapevine cultivation suitability have been observed, with climate change expected to worsen this trend, potentially altering the distribution of wine regions and threatening wine typicity. To address these challenges, timely and effective adaptation strategies tailored to local conditions are necessary, though further research on these strategies is needed. The adoption of these strategies is crucial to maintain the socioeconomic and environmental sustainability of the European viticulture and winemaking sector.

34.2 Software Architecture

Grapevine development involves various stages within its vegetative and reproductive cycles. In many traditional viticultural regions, such as extratropical viticulture, the grapevine's vegetative cycle spans a full year, while its reproductive cycle takes two years. The reproductive cycle significantly influences important qualities like the number of grape clusters in the following year. The vegetative cycle is comprised of two primary sequential periods: dormancy and the growing season. The phenological development of grapevines encompasses several stages, largely influenced by atmospheric conditions.

In response to climate change, the winemaking sector must implement suitable adaptation strategies, primarily through regional and local planning. This proactive approach is crucial, particularly in regions expected to face the most adverse impacts. Grapevine growers are increasingly recognizing the threats posed by climate change, and timely strategic planning can provide competitive advantages. Action against climate change rests with stakeholders and decision-makers. While this passage briefly outlines some adaptation measures in viticulture, it is important to note that their effectiveness varies according to local conditions and regional climate change patterns. The overarching strategy involves adopting a combination of localized solutions to address a global problem, even though changes in winemaking practices may also hold valuable adaptation potential, which is beyond the scope of this review.

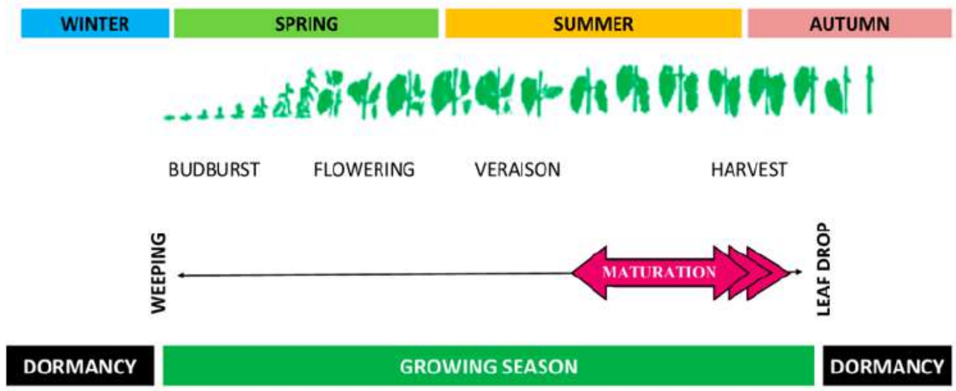

Figure 17: Vegetative cycle and main vine phenological stages for Paper 34.

34.3 Data Parameters

1.Crop Cultural Measures: These strategies involve changes in vineyard management practices within a single growing season. They may include altering canopy geometry, reducing leaf area above the cluster-zone, minimizing water consumption by reducing canopy size, applying anti-transparent materials to reduce carbon assimilation and water consumption, using shadow nets, and harvesting earlier to achieve desired sugar levels and acidity.
2.Protection against Extreme Heat and Sunburn: To combat extreme heat, water scarcity, and high irradiance, strategies like applying exogenous compounds (e.g., kaolin) or using shade nets can help maintain or improve plant growth and development under these conditions.
3.Irrigation: Grapevine irrigation, even in traditionally rain-fed regions, is being increasingly implemented.
4.Pest and Disease Control: With changing climates, the risk of pests and diseases may increase. Growers can adapt by adopting new pest management approaches, such as the application of natural compounds.
5.Soil Management: Soil management practices are essential for soil and plant protection, water conservation, and reducing greenhouse gas emissions.

Long-term adaptation strategies in viticulture involve:
1.Changes in Training Systems: To cope with changing temperatures and stresses, vineyard training systems may need to be adjusted. Strategies include minimizing pruning to delay maturity, manipulating the leaf area to fruit weight ratio to reduce sugar accumulation, and altering canopy geometry to reduce radiation in the cluster zone.
2.Varietal/Clonal and Rootstock Selection: Changing the grapevine varieties or clonal selections can help adapt to a different climate.
3.Vineyard Relocation: In extreme cases where the current vineyard site becomes unsuitable due to climate change, growers may consider relocating to cooler sites at higher latitudes, elevations, coastal zones, or areas with lower solar radiation.
These short-term and long-term adaptation strategies are essential to ensure the sustainability of the viticulture sector in the face of climate change.

34.4 Datasets Used

1.World Vineyard Area (2018): The global vineyard area in 2018, estimated at approximately 7.449 million hectares, showing the distribution of vineyards among different countries, with Spain, China, France, Italy, and Turkey as the top five.
2.Evolution of Vineyard Area: Data reflecting the historical trends in the world vineyard area over the past two decades, highlighting periods of decline, recovery, and stabilization.

3.Global Grape Production (2018): Information about the global grape production in 2018, which reached around 77.8 million tons, with a breakdown into wine grapes, table grapes, and dried grapes. This dataset also shows the shift in grape production trends.

4.Wine Grape Production by Country: Data that provides insights into the production of wine grapes in various countries, emphasizing those where viticulture is primarily dedicated to wine production, such as Italy, Spain, France, Argentina, Australia, Germany, and Romania.
5. Table Grape Production Trends: Information on the trends in table grape production, with a focus on countries driving this increase, including China, Turkey, India, Iran, Uzbekistan, Italy, and the USA.
Conclusions on Climate Change Impact: Summary of conclusions related to the impact of climate change on the viticulture and winemaking sector, including the challenges faced and the need for adaptation strategies.
Adaptation Strategies in the Wine Sector: An overview of the adaptation strategies that are being considered or implemented in the wine sector to address climate change challenges.

34.4.1 Paper Link

Access the full paper at https://www.mdpi.com/2076-3417/10/9/3092.

35 Paper 35: Climate change impacts on cultural heritage: A literature review

Journal/Conference Rank: N/A
Publication Year: 2021
Reference: [35]

35.1 Summary

This review article focuses on the impact of climate change on cultural heritage sites. It synthesizes international literature and creates hazard-impact diagrams to illustrate how gradual and sudden climate-related changes affect tangible cultural heritage. The study covers cultural heritage exposed to the outside environment, historical building interiors, and assets affected by sudden natural events like storms, floods, and sea-level rise. The article offers insights into the current state of knowledge, identifies research limitations, and provides recommendations for further studies. Cultural heritage, including historical buildings, archaeological sites, and monuments,plays a significant role in local identity and aesthetics but faces increasing risks from climate change.

35.2 Software Architecture

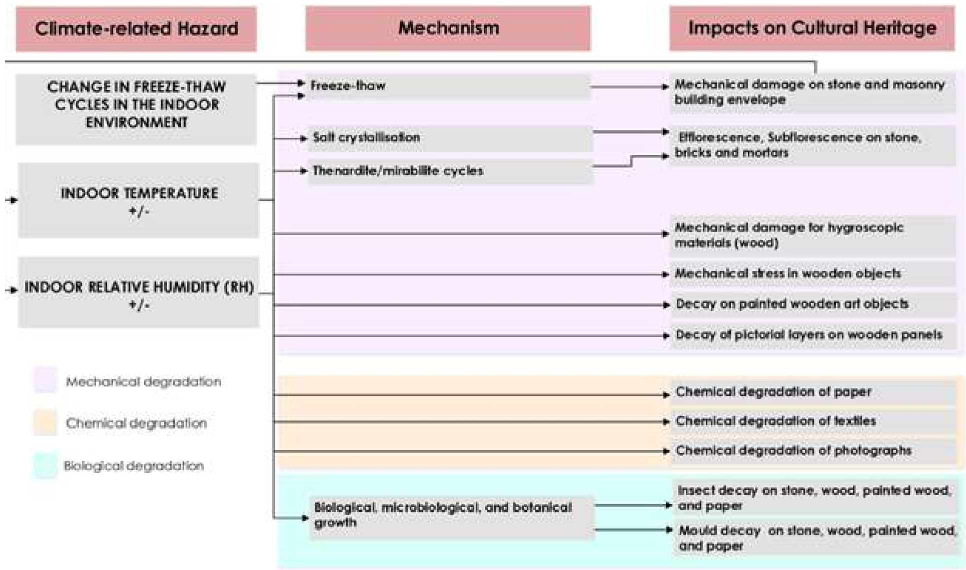

Figure 18: Climate change impacts on the indoor cultural heritage and associated collections as reported in the literature for Paper 35.

35.3 Data Parameters

In their study, the authors conducted a systematic literature search focusing on the impact of climate change on cultural heritage. They began with the keywords "climate change" and "cultural heritage," then narrowed down their search using additional keywords related to degradation mechanisms and climate change impacts. They reviewed 100 relevant outputs, which included journal articles, book chapters, conference proceedings, and reports from international institutions. The publications spanned from 1999 to July 2020 and were categorized into three groups: impacts of gradual climate changes on outdoor heritage, impacts on indoor heritage and collections, and impacts of sudden climatic stressors. The study also presented three impact diagrams illustrating the relationships between climatic stressors and their effects on cultural heritage materials and structures, covering factors like temperature, precipitation, humidity, and changes in the natural physical environment, such as floods and sea-level rise.

35.4 Datasets Used

This study examines the impacts of climate change on tangible cultural heritage, particularly focusing on how gradual changes in climatic variables affect outdoor and indoor heritage. The key findings and impacts identified include:
Outdoor Heritage Impacts:
Water-Related Degradation: Increased precipitation and humidity, combined with higher temperatures, can accelerate various decay mechanisms, including corrosion, biological degradation, warping, splitting of hygroscopic materials, and salt crystallization on heritage materials.
Wind-Related Degradation: Elevated wind intensity and wind-driven rain (WDR) can lead to surface abrasion, enhanced water penetration, structural damage, and even structural collapse, especially in the presence of sand, salt, and pollutants.

Indoor Heritage Impacts:
Temperature and Humidity Variations: Altered interior environmental conditions due to climate change can influence the mechanical, chemical, and biological decay of interior heritage assets. Changes in freeze-thaw and salt crystallization cycles can impact building envelopes and collections. Increased risk of flooding can affect interior heritage assets as well.It's important to note that this review did not account for uncertainties in climate change projections or the vulnerability of cultural heritage sites to these changes.

35.4.1 Paper Link

Access the full paper at https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wcc.710.

36 Discussion and Future Planning

Discussion and Future Planning The review of the selected papers has provided valuable insights into the diverse aspects of climate change, its impacts, and potential mitigation strategies. This discussion section aims to highlight the common themes, differences, trends, gaps in the literature, and potential areas for future research.

Common Themes and Trends:

1. Interconnectedness of Climate and Society: A recurring theme across these papers is the complex interplay between climate change and societal factors. Climate change affects various aspects of human life, including health, agriculture, urbanization, and indigenous communities.

2. Regional Variability: Many papers emphasize the regional disparities in climate change impacts. Different regions experience diverse effects such as extreme weather events, sea-level rise, and changes in precipitation patterns. These variations underscore the need for localized adaptation strategies.

3. Vulnerability of Indigenous Communities: Several papers highlight the vulnerability of indigenous communities to climate change due to their close relationship with the environment. Indigenous knowledge is recognized as valuable for developing effective adaptation strategies.

4. Importance of Mitigation and Adaptation: Climate mitigation through the reduction of greenhouse gas emissions is a common thread throughout the papers. However, adaptation measures are equally crucial, particularly in the face of inevitable climate changes.

5. Role of Digitalization: The study focusing on sub-Saharan Africa identifies digitalization as a potential solution to address the challenges posed by urbanization and climate change in agriculture. It highlights the role of technology in improving agricultural sustainability.

Differences and Regional Specifics

Despite these common themes, the papers also reveal variations in terms of regional specificity, including the unique challenges faced by coastal regions in India, water resource issues in the Eastern Mediterranean and Middle East, and the impact of climate change on European viticulture.

Gaps in the Literature

1. Intersectional Studies: While the papers cover a wide range of topics, there is a notable gap in the literature concerning intersectional studies. More research is needed to understand how different climate change impacts intersect and compound in vulnerable communities.

2. Long-Term Impacts: Many studies focus on short- to medium-term impacts. Future research should delve deeper into the long-term consequences of climate change and adaptation measures.

3. Policy Implementation: While the research underscores the importance of policy to combat climate change, there is limited discussion about the implementation of these policies and their effectiveness.

4. Human Behavior and Attitudes: Understanding human behavior and public attitudes towards climate change, mitigation, and adaptation is crucial. This is an area where interdisciplinary research can provide valuable insights.

Future Research and Planning

1. Integrated Assessments: Future research should aim for integrated assessments that consider the dynamic interactions between climate, society, and ecosystems. This can help in developing holistic strategies.

2. Long-Term Projections: Conducting long-term projections is essential to understand the enduring consequences of climate change and to develop resilient strategies for the future.

3. Community Engagement: Research should actively involve local communities, indigenous knowledge, and stakeholders to develop adaptive strategies that are community-specific and culturally appropriate.

4. Policy Evaluation: Future research can focus on evaluating the effectiveness of climate policies and the challenges in their implementation at various levels, from local to international.

5. Behavioral Studies: Exploring the behavioral aspects of climate change adaptation and mitigation, including public perceptions and attitudes, can inform more effective interventions.

In conclusion, the synthesis of these research papers underscores the multifaceted challenges posed by climate change and the need for comprehensive research and interdisciplinary collaboration. Climate change is not a monolithic issue; it requires nuanced, localized, and long-term strategies to ensure environmental sustainability, protect human well-being, and build resilient societies.

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Chapter 2

1 As-is rich picture of the existing system

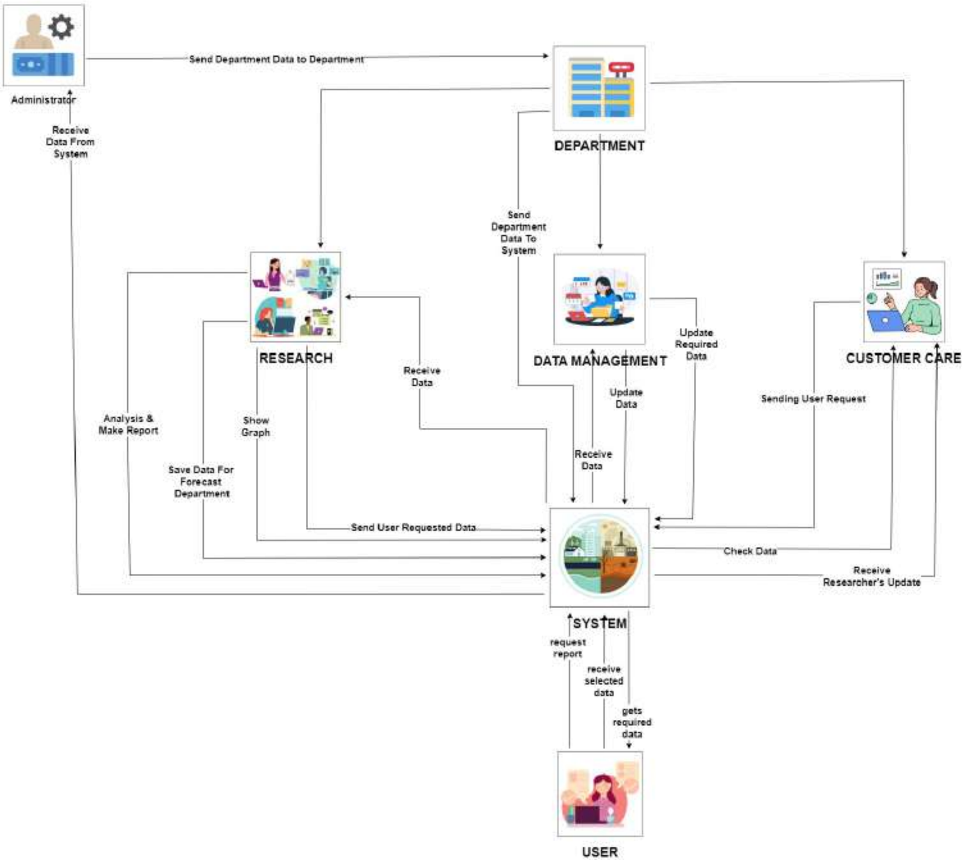

Figure 19: As-Is Rich Picture

2 To be rich picture of the proposed system

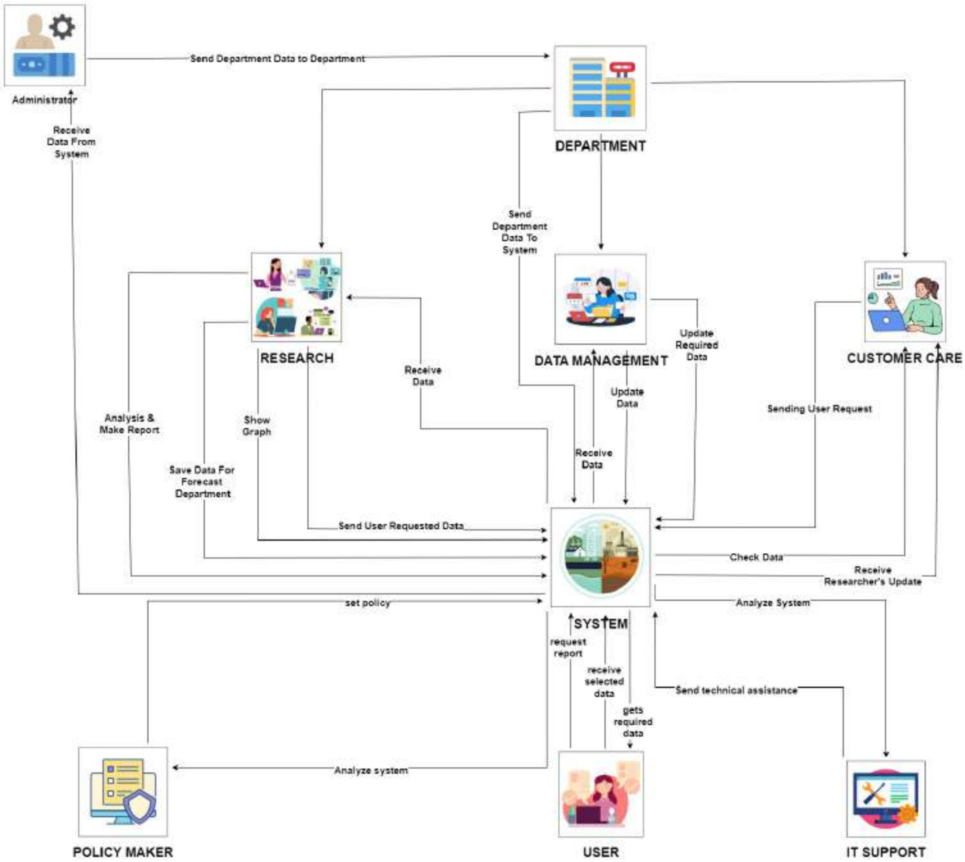

Figure 20: To-be Rich Picture

3 ERD

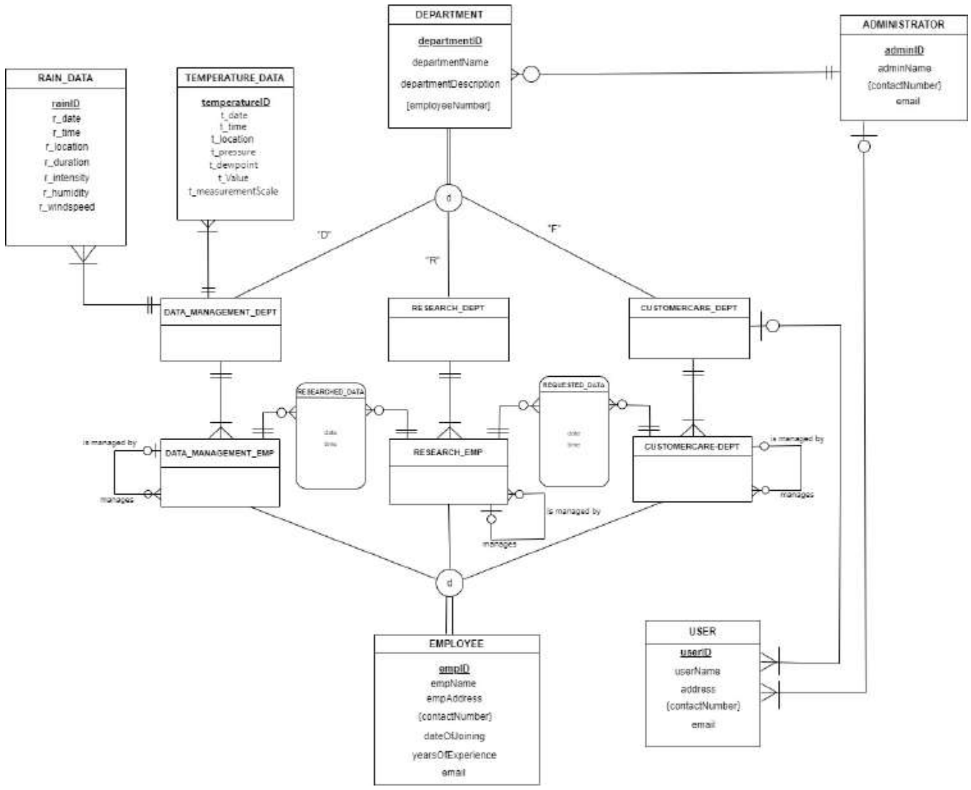

Figure 21: ERD

4 Schema

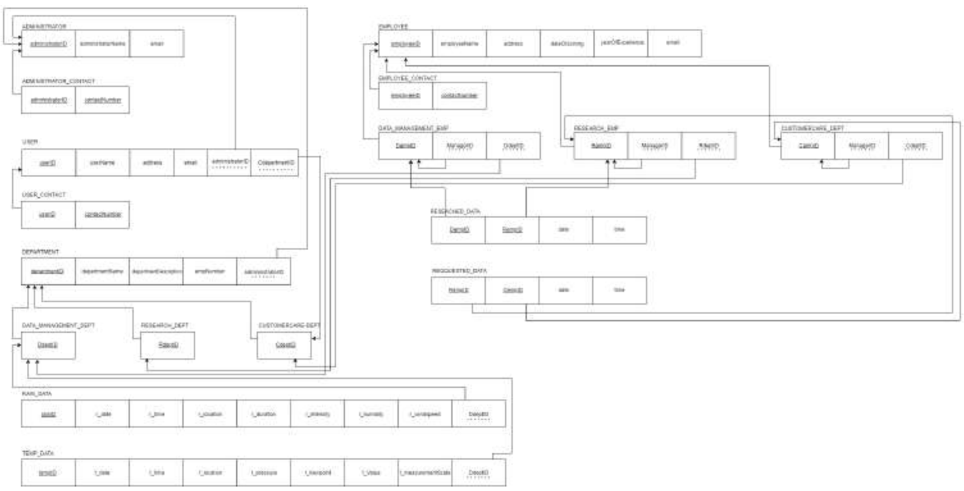

Figure 22: Schema

5 Normzalization

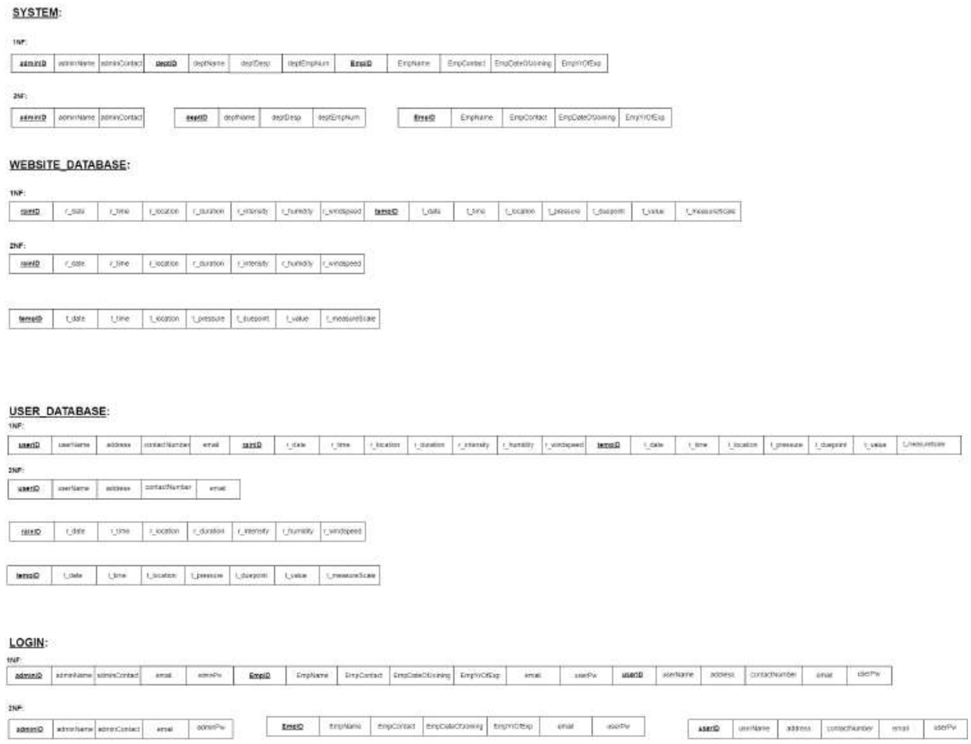

Figure 23: Normalization

6 Data Dictionary

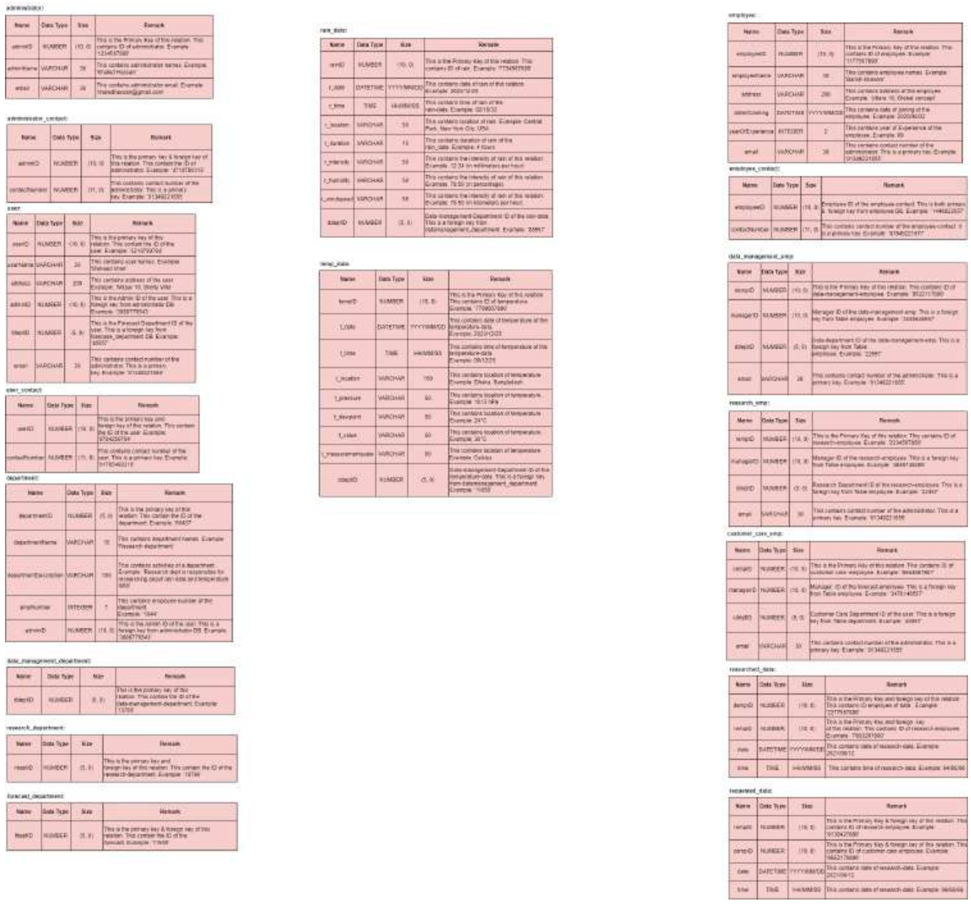

Figure 24: Data Dictionary

Chapter 3

1 Methodology

1.1 Project Overview

Objective: The primary goal of the Climate Tracker website is to provide users with accurate and personalized weather updates through a comprehensive set of features.
Scope: The website encompasses components such as Home, Temperature Report, Rain Report, Weekly Forecast, Login and Signup Page, Admin Page, Data Manager Page, Research Page, Customer Care Page and Users.

1.2 Research and Planning

Conducted extensive research on user needs and expectations related to weather tracking. Analyzed competitor applications to identify strengths and weaknesses. Collaborated with meteorological experts to understand data requirements for precise forecasting.

1.3 Design and Development

Adopted a user-centric design approach for intuitive navigation and a visually appealing interface.
Utilized a technology stack that includes [list specific technologies and frameworks].
Implemented features such as Home, Temperature Report, Rain Report, and Weekly Forecast to meet user requirements.
Developed secure and efficient user authentication processes on the Login and Signup Pages.

1.4 Admin Panel Development

Designed an Admin Page to oversee and manage various aspects of the application.
Implemented features such as Data Management Department, Research Department, Forecast Department, User Database, Send Message, Show Graph, and Sign Out.
Ensured secure access control and data management within the Admin Panel.

1.5 Data Management

Developed a Data Manager Page for efficient handling and optimization of weather data.
Implemented features like Manage Data, Weekly Forecast, Report Problem, Send Mail, Mail Box, and Change Profiles.
Established a systematic approach to managing temperature and rain data for accurate forecasts.

1.6 Research Panel Development:

Created a Research Panel for researchers to access temperature data, rain data, view graphs, send and receive mail, and log out after completing tasks.
Ensured a secure and efficient platform for researchers to analyze and contribute insights.

1.7 Customer Care Integration

Integrated a Customer Care Page to enhance user communication and support. Implemented features including Send Mail, Show Mail, Show Graph, Rain Data, Temperature Data, and Log Out.

1.8 User Panel Development

Implemented a User Panel for general users to send and receive mail, contact customer care, view requested data, view temperature and rain data, go to the home page, and log out after completing activities.
Focused on creating an intuitive and user-friendly interface for easy interaction.

1.9 Testing and Quality Assurance

Conducted thorough testing of all features to identify and address bugs or issues.
Ensured cross-browser compatibility and responsive design for a seamless user experience.
Collected feedback from beta testers and made necessary refinements.

1.10 Deployment and Maintenance

Launched the website, monitoring server performance and user feedback. Established regular maintenance routines to address updates, security patches, and user-reported issues.
Utilized analytics tools to track user engagement and website performance.

1.11 Continuous Improvement

Instituted a feedback loop for continuous improvement based on user suggestions and technological advancements.
Regularly updated weather forecasting algorithms and data sources to enhance accuracy.
Explored opportunities for future feature enhancements and expansions.

2 Implementation

The Admin page of the Climate Tracker is designed to manage and oversee the various functionalities of the app. Here's a description of its features:

1. Data Management Department: This section is responsible for managing all the data that the app uses. This could include weather data, user data, and more.

2. Research Department: This department is likely responsible for researching weather patterns, climate changes, and other meteorological phenomena. The insights derived from this research could be used to improve the app's forecasts and reports.

3. Forecast Department: This department is in charge of creating the weather forecasts that the app provides. They analyze weather data and use it to predict future weather conditions.

4. User Database: This is where all the user data is stored. It could include information like user locations, preferences, and more. This data can be used to provide personalized weather updates to each user.

5. Send Message: This feature allows the admin to send messages to the users of the app. This could be used to provide important updates, notifications, or other information.

6. Show Graph: This feature likely provides visual representations of weather data in the form of graphs. This can make it easier to understand trends and patterns in the weather.

7. Sign Out: This is a standard feature that allows the admin to securely log out of their account.

The Data Manager page of the Climate Tracker app plays a pivotal role in the efficient handling and optimization of data. Navigating through the main page, users can access the "Manage Data" feature to oversee Manage weather data which includes 'Temperature data' and 'Rain data'. The "Weekly Forecast" section provides a comprehensive outlook for the upcoming week, covering temperatures, precipitation levels, and wind speeds. Users can report anomalies or issues through the "Report Problem" feature, and communication is facilitated via the "Send Mail" option. The "Mail Box" section allows users to view incoming mails or responses. Additionally, the "Change Profiles" feature enables one to change the profile .Together, these features contribute to the meticulous management of data within the app.

The Customer Care page of the Climate Tracker app is designed to enhance user communication and deliver detailed weather information. Users can navigate through the main page, access the "Send Mail" feature to communicate queries or concerns to the customer care team, and check responses or mail statuses in the "Show Mail" section. Visual representations of weather data through the "Show Graph" feature offer an intuitive understanding of weather trends. Dedicated sections for "Rain Data" and "Temperature Data" provide comprehensive precipitation and temperature details, covering current, past, and predicted levels. The "Log Out" option ensures secure account logout, contributing to a user-friendly and informative customer care experience.
These features help ensure that our Climate tracker runs smoothly and provides accurate, personalized weather updates to its users.

3 Web Pages

3.1 Home Page

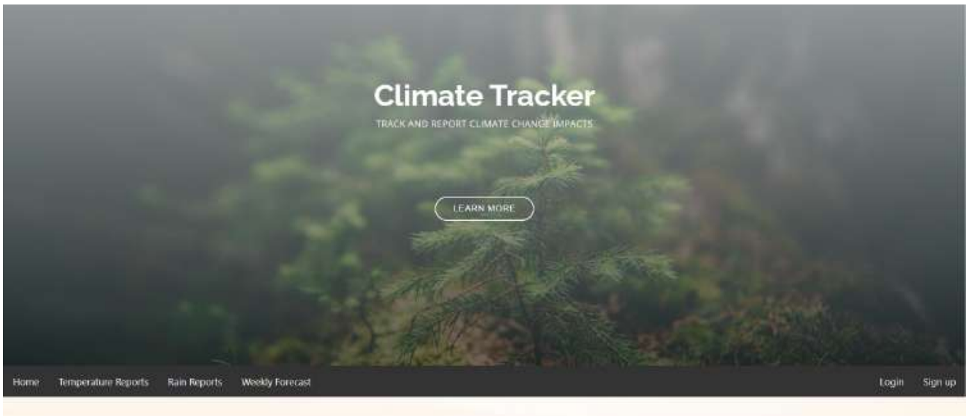

Figure 25: HomePage being the main access point for every other pages. It contains the gateway for weather reports and live weather data. Login and signup can be accessed through home page and lastly, this page provides details about the main theme of this website.

Figure 26: Temperature Report will provide the data table for temperature in different locations based on different times and their measurement overviews.

3.2 Temperature Report

3.3 Rain Report

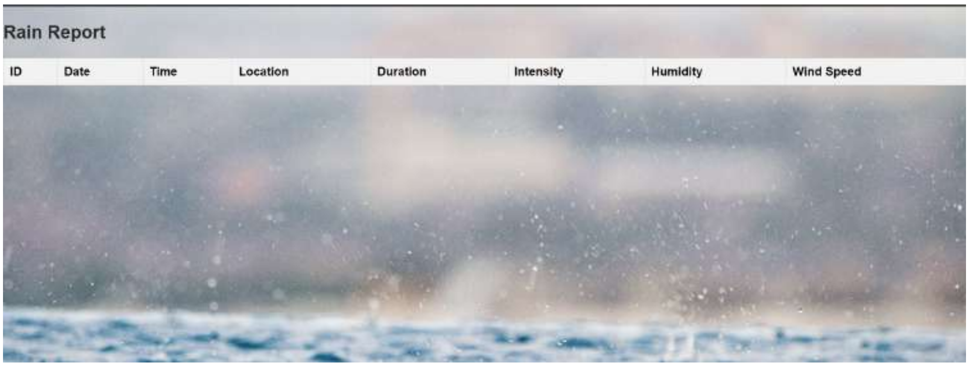

Figure 27: Rain Report will provide the data table for rain in different locations based on different times and their measurement overviews.

3.4 Weather Dashboard

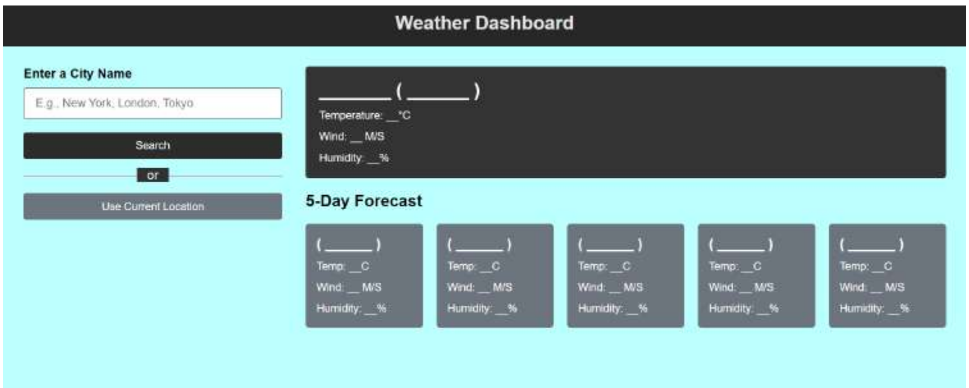

Figure 28: Weather Dashboard provides the weather forecast live data for current date and next few days. Providing a specific location gives weather forecast for that area.

3.5 Login

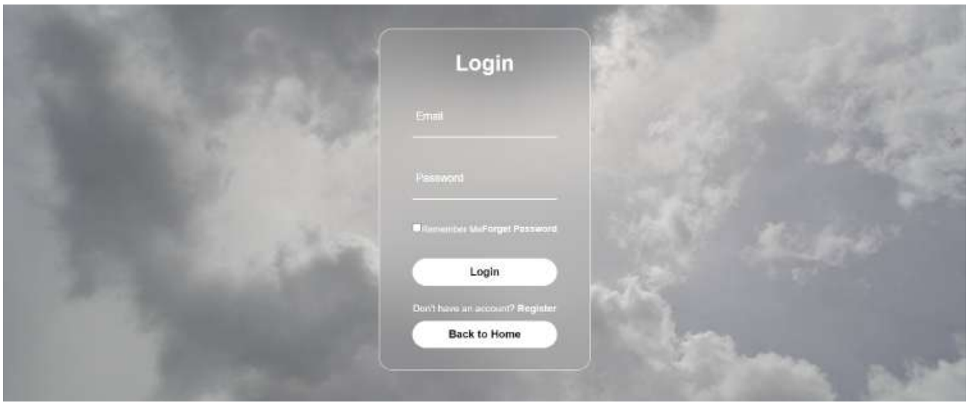

Figure 29: Entering the email and password, the users or employees will be able to enter their dashboard

3.6 Signup Type

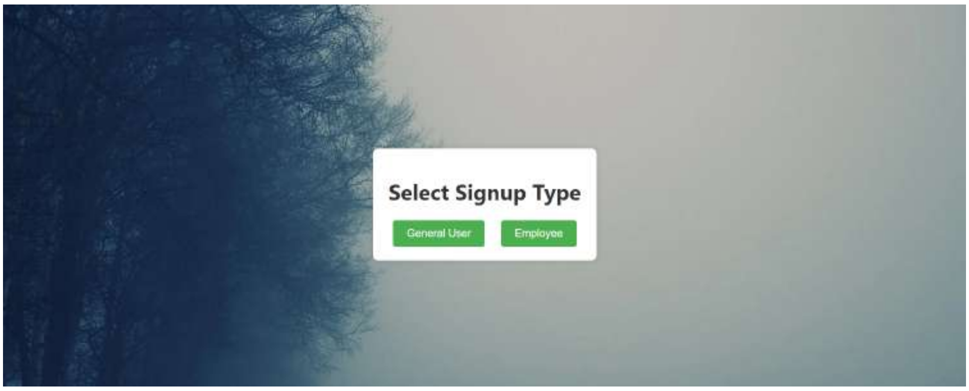

Figure 30: When a user intends to signup, they will have to go through a signup type page when they will choose if they are general users or employees

3.7 User Signup

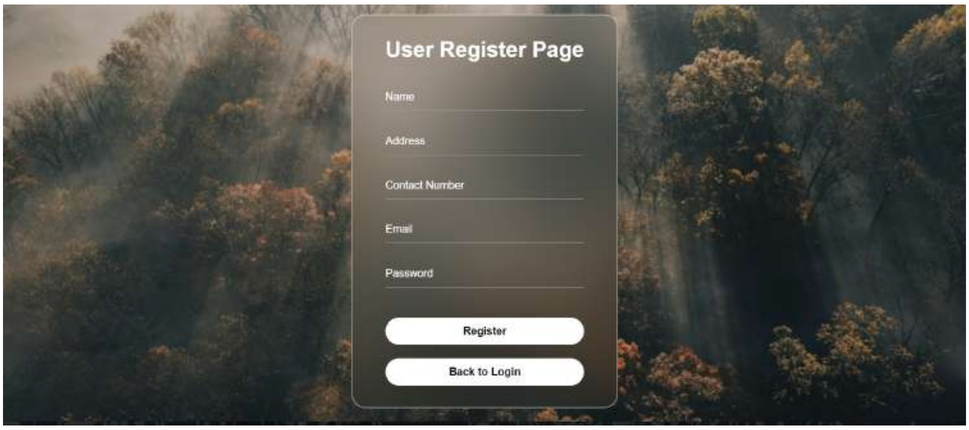

Figure 31: Here the user will provide their name, address, contact, email, password to successfully signup for this website. If the user wishes to cancel and get back, there's an option to get back to login page and to home page afterwards

3.8 Employee Signup

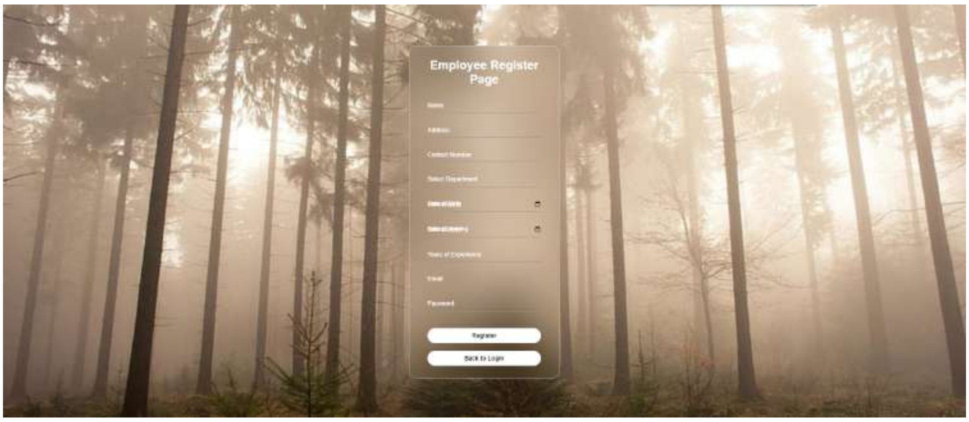

Figure 32: Here the employee will provide their name, address, contact, department, date of birth, date of joining, year of experience, email, password to successfully signup for this website. If the employee wishes to cancel and get back, there's an option to get back to login page and to home page afterwards

3.9 Administrator

Figure 33: The administrator will have access to various data table containing the list of employees and their information from various departments. The user will also be able to view user database. He can see graphs and send message accordingly. Lastly, after completing his work he'll be able to sign out.

3.10 Customer Care

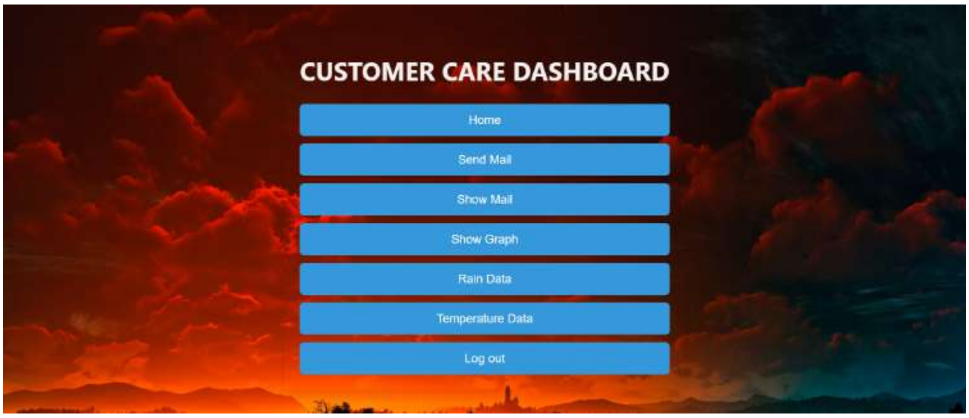

Figure 34: From the customer care dashboard, the employee will be able to send and receive mail from both user and researchers. They can view graph, rain report and temperature report. Finally, he'll be able to log out when he's work completes.

3.11 Data Manager

3.12 Database

3.13 Researcher

3.14 User

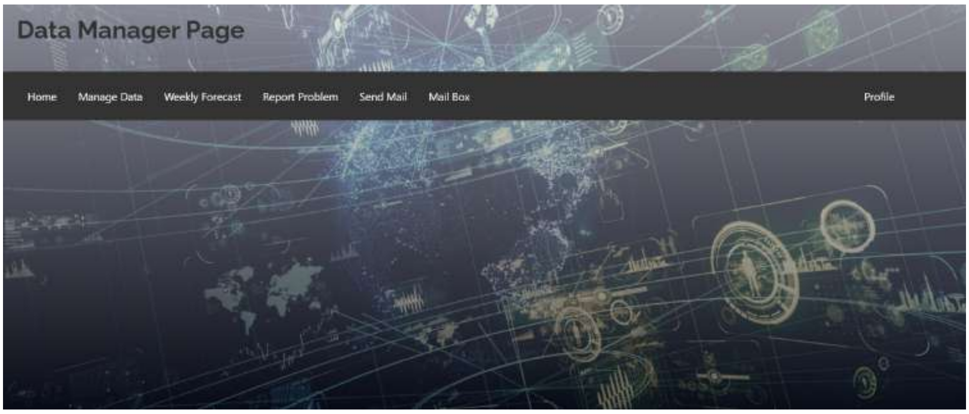

Figure 35: Data Manager will be able to insert, update, delete data from the database as per request from the admin or the researcher. Besides, he'll be able to see weather forecase, report problem, send and receive mail. There's an option called profile which will show a dropdown menu with more options.

Figure 36: This database is made accessible to the data managers. They can view both the reports and edit as instructed here.

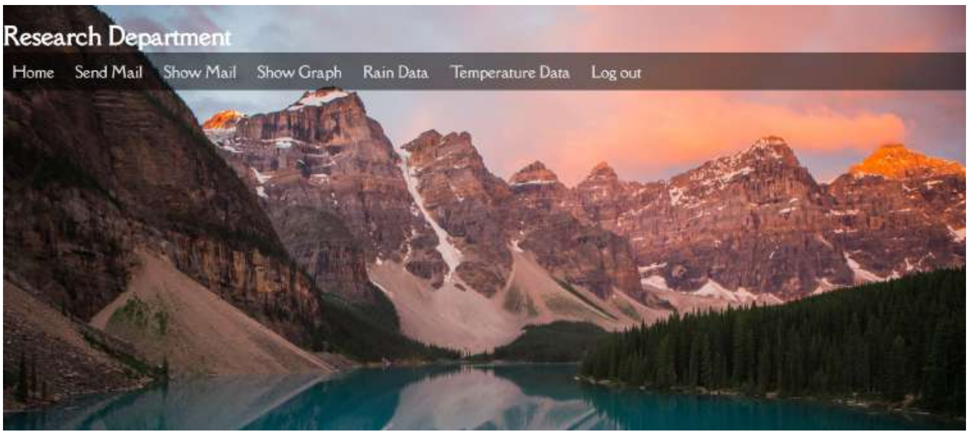

Figure 37: Researcher is mainly responsible for data research. Doing so, they will inform data manager to update database. They also have access to grpah, temperature and rain data. If there's any user request about any specific data, they will research on it and provide data to data manager for creating its database.

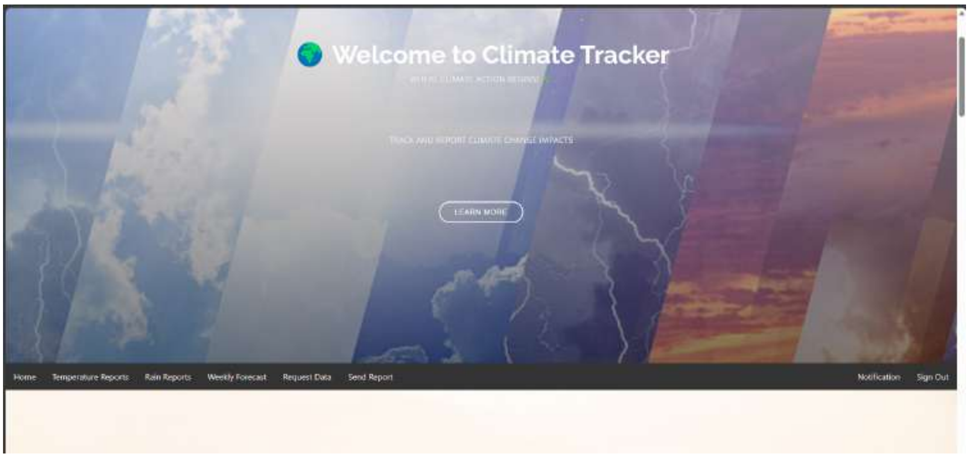

Figure 38: The general user will have access to temperature and rain data as displayed. If the user wishes to get any specific report that is not available in the database, they can request for it. The system will create a database and when its ready, they will receive a notification to view it.