National Symposium on Tropical Meteorology
TROPMET 2023

Climate Communication Channels: An Innovative Approach Integrating *AI/ML* and *Indigenous Knowledge Systems* for Extreme Weather Events Prediction and Mitigation in Coastal Regions

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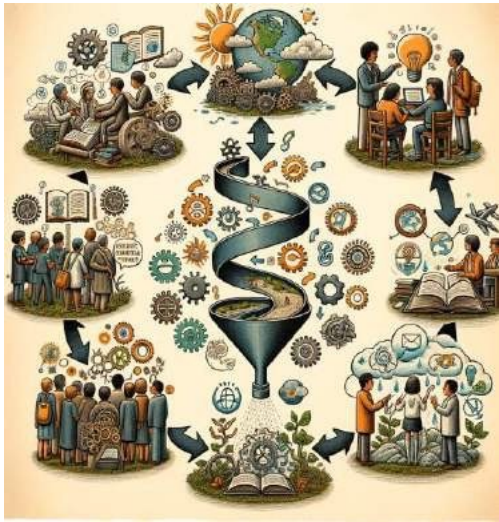


Era of “Global Boiling” and Extreme events

- Climate change is driving “Global Boiling” a term signifying the rapid rise in Earth's temperatures, leading to more frequent and severe extreme weather events.
- Coastal areas are particularly vulnerable, facing increased risks from rising sea levels, intensified storms, and disruptive flooding events.
- India with a coastline of 7500 Kms is vulnerable to these weather extremities.
- The escalating severity of extreme weather events can lead to devastating impacts on coastal infrastructure, economies, and habitats.
- Adaptation and mitigation strategies are essential for coastal regions to cope with the heightened challenges posed by climate-induced extreme weather phenomena.

AI in Extreme Events prediction and Mitigation

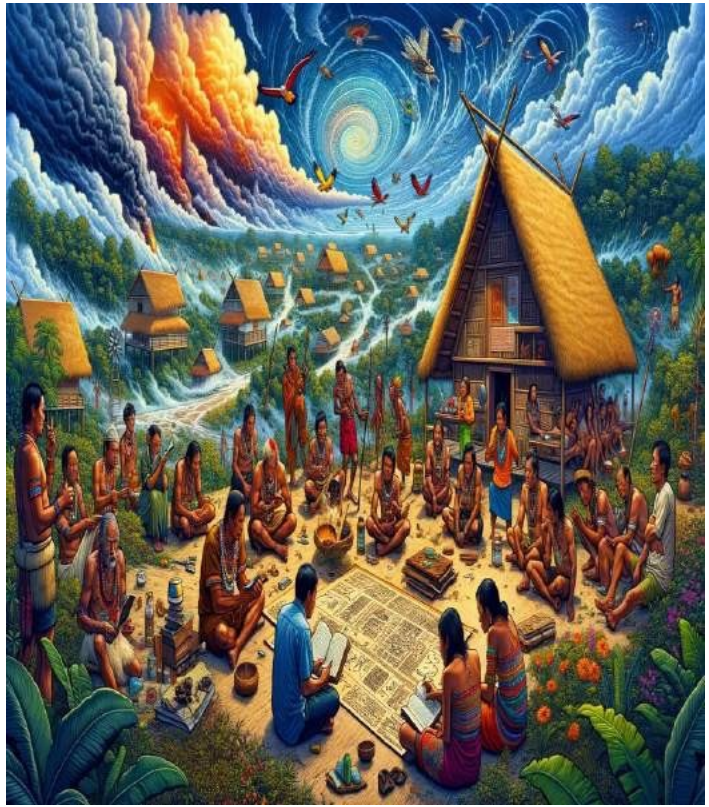
- **Improved accuracy of weather forecasting**: AI/ML algorithms can analyse vast amounts of data from various sources, including satellite imagery, ocean buoys, and weather stations, to provide more accurate weather forecasts. This information can help coastal communities prepare for extreme weather events such as hurricanes, typhoons, and tsunamis.
- **Early warning systems**: Using modern technology to analyse historical weather data, to identify patterns and predict when extreme weather events are likely to occur. This could be useful in developing intelligent early warning systems that alert coastal communities to potential threats, giving them time to prepare and evacuate if necessary.
- **Flood prediction and mitigation**: Deploying intelligent sensors and other sources to predict when and where flooding is likely to occur. This information can be used to develop flood mitigation strategies such as building sea walls, improving drainage systems, and relocating vulnerable communities.
- **Optimizing energy consumption**: AI/ML algorithms can analyse weather data to optimize energy consumption in coastal areas. For example, they can predict when demand for electricity will be highest and adjust the output of wind turbines and solar panels accordingly.
- **Improving disaster response**: AI information dissemination via social media, news reports, and other sources to provide real-time information about extreme weather events. This information can be used to coordinate disaster response efforts and ensure that resources are deployed effectively.

AI in Extreme Events Prediction and Mitigation

- **Pangu-Weather:** An AI-based system capable of predicting global weather a week in advance.
- **NowcastNet**: An AI-based system that creates accurate predictions for rainfall up to six hours ahead
- **ClimateAi**: A machine-learning approach that uses generative adversarial networks (GANs) trained on global weather forecasts to predict extreme local weather events.
- **IBM Research**: Researchers at IBM have developed AI models that can predict extreme rainfall with a TFT and quantify carbon sequestration in urban forests.
- **Nvidia**: Nvidia has introduced machine-learning methods that are able to predict weather at least as accurately as conventional methods, and much more quickly.

Indigenous Knowledge for Climate Change Adaptation

- **Historical Wisdom:** Indigenous communities have harnessed centuries-old knowledge to predict weather and adapt to environmental changes.
- **Natural Indicators:** The Orang *Suku Laut* tribe in Indonesia interprets wind patterns, marine life behaviour, and ocean currents for weather forecasting.
- **Astrological Insights:** In East Africa, indigenous methods utilize star-moon alignments and stellar movements to predict rainy seasons.
- **Meteorological Observations:** Traditional weather forecasting in East Africa also includes assessing wind strength, cloud types, and sky colour.
- **Temperature and Phenomena:** Indigenous forecasting considers temperature fluctuations, lightning, thunder, and rainbows as indicators.



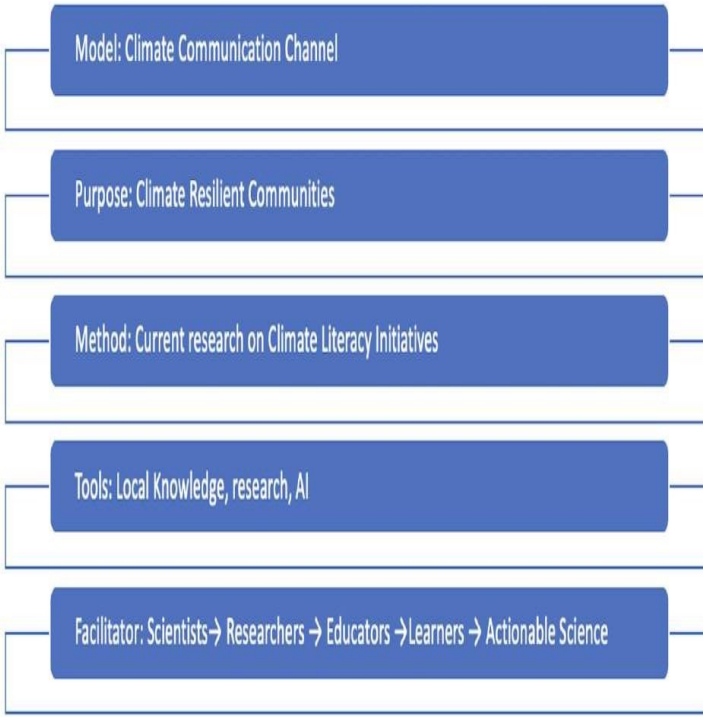
Indigenous Knowledge for Climate Change Adaptation

- **Agricultural Planning:** In sub-Saharan Africa, indigenous knowledge informs crucial decisions regarding crop and livestock management.
- **Environmental Protection:** Indigenous practices include strategies for preserving the environment as part of weather adaptation measures.
- **Disaster Preparedness:** Indigenous communities use local knowledge to prepare for and cope with natural disasters effectively.
- **Cultural Transmission:** This invaluable knowledge is passed down through generations, preserving the wisdom for future use.
- **Integration Potential:** Combining indigenous knowledge with modern science offers a holistic approach to weather prediction and disaster management in coastal regions.

Climate Communication Channel: Conceptual Framework

Climate Communication Channel

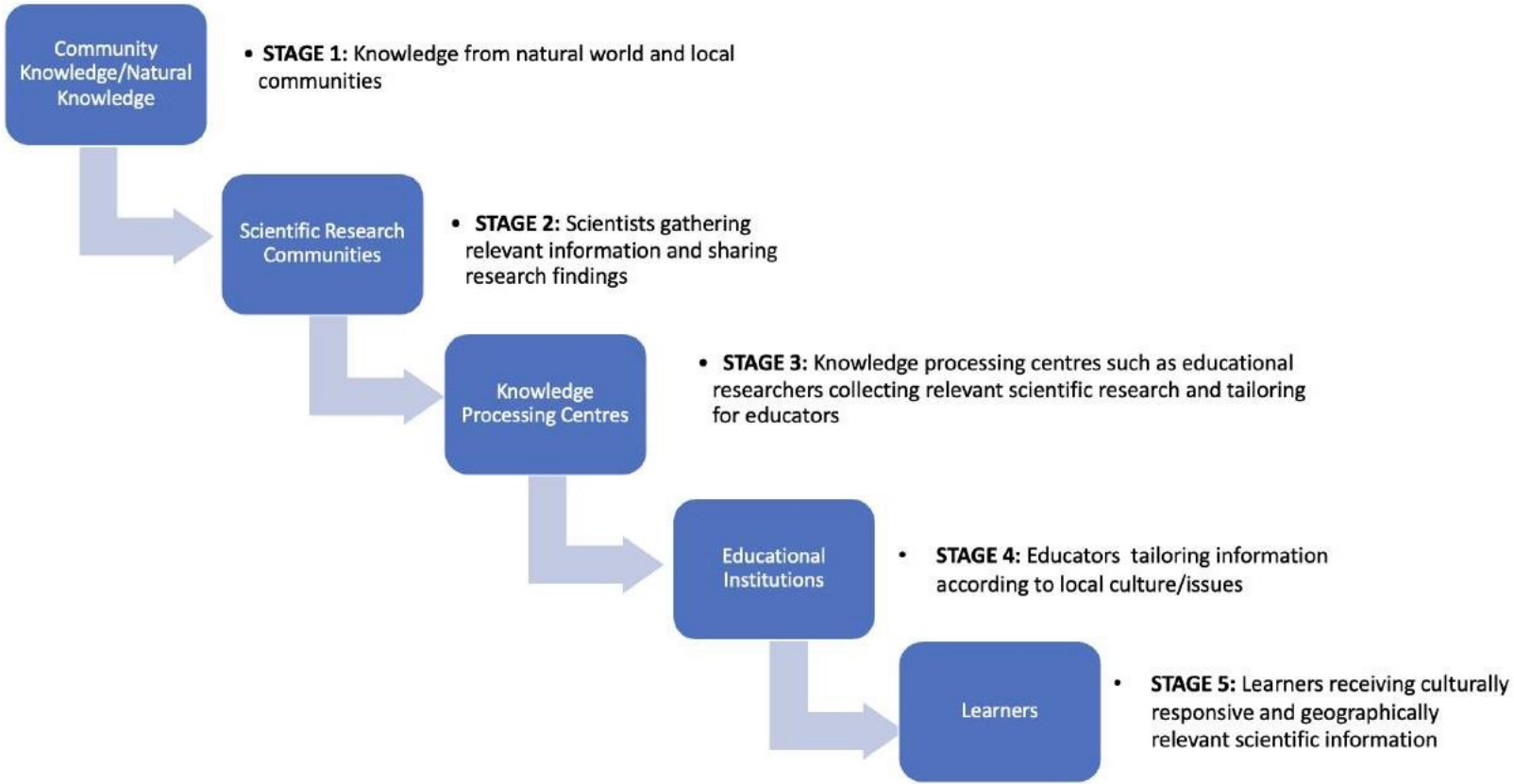
- **Critical Context:** 6th IPCC Assessment Report identifies a 1.1°C rise in global temperatures, emphasizing the urgency for immediate climate action.
- **The 3C Model:** A strategic framework aimed at disseminating crucial adaptation and mitigation strategies across diverse communities.
- **Inclusivity in Crisis:** Recognizing that no community is immune to climate change, the 3C Model aims to equalize access to climate knowledge and action.
- **Closing the Literacy Gap:** The model is designed to bridge the divide in climate literacy through targeted education and outreach.
- **Educational Imperative:** Accurate scientific knowledge as a catalyst for engagement and a counter to misinformation.
- **Community Knowledge Integration:** The 3C Model prioritizes the conservation of local and indigenous knowledge as a vital component of climate education.



Climate Communication Channel

- **Sequential Framework:** The model's five-stage approach begins with collecting local ecosystem knowledge and ends with practical classroom applications.
- **Knowledge Processing Centres (KPCs):** Institutions translate scientific information into educational curricula, tailored to cultural and geographic contexts.
- **Transformative Education:** Local educational bodies adapt KPC material, creating relevant and culturally-responsive teaching content.
- **Holistic Educational Ecosystem:** End-users, including teachers and students, contribute to and benefit from a dynamic cycle of climate knowledge exchange, supported by tools like WhatsApp for effective communication.

Climate Communication Channel (3C Model)



Climate Communication Channel (3C Model) Description

- **Concept Map Overview:** The 3C Model's concept map in lays the groundwork for transforming climate knowledge into actionable education and community engagement.
- **Diverse Voices Integration:** Central to the model is the integration of diverse perspectives, ensuring solutions are culturally sensitive and locally relevant.
- **Preserving Community Knowledge:** The model stems from a need to conserve local and indigenous knowledge, often transmitted orally and not widely documented.
- **Stage 1 - Knowledge Collection:** Gathering community-based insights on natural ecosystems and local climate adaptation strategies, including experiential and nature-derived wisdom.
- **Stage 2 - Scientific Collaboration:** Engaging scientific communities to validate and enhance the knowledge collected in Stage 1, turning it into scientifically sound data.
- **Stage 3 - Curriculum Development:** Knowledge Processing Centres (KPCs) like CIRES Colorado University and CLEAN process the validated data to create climate education curricula.
- **Stage 4 - Tailored Education:** National and local educational institutions act as transformative
- **Stage 5 - End-User Learning:** The ultimate stage where teachers and students engage with the curriculum, enriching the community knowledge base through interactive learning.
- **Implementation Case Study:** The 3C Model's successful application in Indian contexts, with CIRES and other organizations creating region-specific educational resources.
- **Communication and Expansion:** Utilizing platforms like WhatsApp for effective information dissemination in India, showcasing the potential of the 3C Model for global application in climate education.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3C Model Framework for Extreme Weather Event Prediction and Mitigation in Coastal Areas

- **Localized Data Gathering:** In Stage 1, collecting specific ecological and climatic information from coastal communities, focusing on historical patterns and local indicators of extreme weather.
- **Scientific Validation:** In Stage 2, researchers collaborate with local communities to scientifically analyze and validate indigenous knowledge, enhancing the accuracy of extreme weather predictions.
- **Curriculum Development for Preparedness:** Stage 3 involves developing educational curricula that focus on preparedness and response strategies for extreme weather events, using scientifically validated community knowledge.
- **Customized Educational Tools:** In Stage 4, adapting educational materials to suit the unique needs of coastal areas, focusing on region-specific weather patterns and mitigation strategies.
- **Empowering Local Stakeholders:** Stage 5 ensures that teachers and learners in coastal communities are equipped with the knowledge and tools to effectively predict and respond to extreme weather events.
- **Community-Driven Warning Systems:** Leveraging local knowledge within the 3C Model to develop community-driven early warning systems for coastal regions.
- **Mitigation Strategy Development:** Using the validated data to devise practical mitigation strategies that are rooted in both scientific understanding and local cultural practices.
- **Enhancing Resilience through Education:** Focusing the educational content on building resilience and adaptive capacities among coastal inhabitants to withstand extreme weather impacts.

Global Applications of the 3C Model

- **Versatile and Global Framework:** The 3C Model offers a flexible and globally applicable approach to climate change, integrating AI/ML tools with indigenous knowledge for tailored strategies in various regions, including but not limited to coastal areas.
- **Enhanced Prediction with AI/ML:** Incorporation of AI and Machine Learning enhances the accuracy and efficiency of predicting and responding to extreme weather events worldwide.
- **Empowerment through Indigenous and Local Knowledge:** The model leverages the rich, contextual insights of indigenous wisdom, crucial for effective climate adaptation and mitigation strategies in diverse ecological settings.
- **Education as a Key Component:** Tailored educational initiatives derived from the model equip global communities with the necessary knowledge and skills for proactive climate resilience and sustainable actions.
- **Collaborative and Inclusive Approach:** The 3C Model fosters a collaborative environment that encourages input and active participation from international research bodies, local communities, and educational institutions, driving comprehensive and sustainable climate solutions.

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With Gratitude

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