

Radio As a Medium for Localized Climate Adaptation Narratives and Dialect-Based Communication in Nagaland

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Abstract—Climate change poses an existential threat to the fragile mountainous ecosystem of Nagaland, a northeastern state in India primarily dependent on climate-sensitive agrarian economies. While regional policy frameworks emphasize ecological resilience, top-down climate communication frequently stumbles over the region's immense ethno linguistic fragmentation. Nagaland is home to over 16 distinct tribes; each maintaining its own discrete language and localizes dialect. This research investigates the critical role of radio, specifically the vernacular programs of All India Radio (AIR) broadcast as an indispensable medium for translating complex, global climate science into culturally contextualized, dialect-based narratives. By analyzing local broadcasting strategies, this study explores how audio media bypasses literacy barriers and leverages oral traditions to foster climate adaptation. Traditional scientific communication often employs abstract terminology that alienates rural communities. In contrast, radio broadcast utilizing indigenous dialects can seamlessly integrate hyper-local weather forecasting with Traditional Ecological Knowledge (TEK), such as indigenous Jhum cultivation management and community-led forest conservation. Through a mixed-methods approach comprising qualitative content analysis of dialect programs and semi-structured interviews with rural listeners and radio producers, the study evaluates the efficacy of —dialect-matching in building community trust and disaster preparedness. Preliminary findings indicate that narratives broadcasted in a community's specific sub-dialect yield significantly higher comprehension and collective behavioral mobilization than those delivered in Nagamese (the market lingua franca) or English. Ultimately, this research argues that localizing climate communication using the sonic architecture of radio is not merely an operational choice, but a socio-ecological necessity. It positions indigenous language preservation as a cornerstone of environmental resilience, offering a scalable framework for climate communication.

Index Terms—All India Radio (AIR), Climate Change Adaptation, Dialectal Communication, Indigenous Knowledge, Localized Narratives

I. INTRODUCTION

Climate change is the long-term change in the Earth's weather patterns and temperatures, mainly caused by human activities such as burning fossil fuels, cutting down forests, and pollution. These changes are beyond the natural variations in climate that occur over time. The evidence for a changing climate from observations has increased considerably in recent years. The number of cold days and nights has likely decreased and the number of warm days has increased. However, in large parts of Europe, Asia and Australia it is likely that the frequency of heat waves has increased. The mean annual surface air temperature of India has risen by 0.4-0.6 °C over the last 100 years (Upakumar 2002). Annamalai et al. (2010) mentioned decreasing tendency of rainfall in both southwest and northeast monsoon season in most of the parts of India especially over the region from 9-16°N covering the rice growing areas exhibited an increasing tendency of rainfall. (Department of Science and Technology, 2016), North-East India is highly vulnerable to climate change, long plagued by conflicts, floods, erosion, landslides, displacement, livelihood loss, and biodiversity.

Climate change is actively disrupting the Hindu Kush-Himalaya region, including Nagaland a fragile mountain state in Northeast India's biodiversity hotspot whose terrain, watersheds, and agriculture where dependent population are on the frontline of the crisis. More than 70% of Nagaland's population is directly dependent on the climate sensitive subsistence

agriculture which is mainly based on two practices, Jhum and terrace wet-rice cultivation (Karthik Teegalapalli, 2017; Konyak, 2022). Shifting monsoons, unpredictable rainfall, and raising temperatures are having a disproportionate impact.

As these climate effects grow more severe, media is increasingly recognized as vital for educating communities on climate risks and adaptation. Radio is a platform for communicating information, having discussion, raising awareness about climate change issues in the face of more media options, with little or no access to the digital devices and having the broadest reach across media (Michael Rubinstien, n.d.) (Ahsan & Khatun, 2020). Among the communication channels, radio is proven to be the powerful tool for disseminating information about climate change as per the Intergovernmental Panel on Climate Change (IPCC, 2014).

While national and State climate adaptation policies are sophisticated, top-down implementation fails because communication is strictly in English or Hindi, creating a critical language disconnect at the local level. This instituted paradigm relies heavily on abstract, data-centric, and technocratic terminology—such as —greenhouse gas emission, —anthropogenic warming, —shifting precipitation baselines (Bisht, 2013), complex weather warnings broadcasted to Nagaland's rural, agrarian communities are often reduced to confusing jargon, failing to overcome local language barriers or provide actionable insights. With over 16 schedule tribes using mutually unintelligible languages and localized village dialects; Nagaland relies on Nagamese pidgin for basic communication. However, Nagamese lacks the emotional depth and specialized vocabulary needed to articulate complex ecological issues or drive community conservation.

Radio serves as an agent of Localization. The present study aims to fill this gap by exploring the sonic architecture of radio. Attempts to gauge the potential of audio media to overcome the challenges of textual literacy, utilize the rich indigenous oral traditions and use —dialect-matching to integrate global climate science into the fabric of local idioms and Traditional Ecological Knowledge (TEK) using vernacular All India Radio (AIR) Kohima broadcasts (Bisht, 2013; Verma, 2025).

II. LITERATURE REVIEW

Bisht, S.S. (2013). *Environment and Colonial regime*. The research investigates the British colonial regime Systematically transformed India's natural environment, shifting resource management from traditional community-based practices to state-controlled, commercial exploitation for imperial economic and strategic interests.

Zingkhai, H.G. (2015). *The Naga Traditional Practice of Prudent Use of Forest Resources for a Sustainable Livelihood*. It focuses on the socio-cultural, economic, and customary management of forest systems by Naga tribes, demonstrating how indigenous stewardship mitigates ecological degradation.

Borah, L., Kalita, B., Bora, P., Kulnu, A. S., & Hazarika, N. (2022). *Climate change impacts on socio-hydrological spaces of the Brahmaputra floodplain in Assam, Northeast India*. This paper examines the Assam floodplains, highlighting significant quantitative data on regional climate changes impacting Northeast India, including a rapid decrease in summer monsoon rainfall and a 0.7 C rise in mean temperature.

Pathak, H. (2022). *Impact, adaptation, and mitigation of climate change in Indian agriculture*. It examines the climate change significantly threatens Indian agriculture, impacting crop yields, soil health, and water resources, with half of the agriculture land being rainfed. Adaptation strategies include developing stress-tolerant crops, improving water efficiency, and enhancing pest management. The sector also needs to mitigate greenhouse gas emissions, contributing 14% to India's total emissions, through better land-use practices. Government initiatives aim to reduce emission intensity by 45% by 2030 and achieve net zero emission by 2070, focusing on making agriculture climate-smart.

Horam, C. (2023). *Tribal knowledge and climate change Adaptation: A case study of Tangkhul Nagas*. The study covers on the Tangkhul Nagas in neighboring Manipur. It addresses the lack of inclusion of tribal local institutions (like Village Authorities) in formal state climate frameworks and explores the necessity of "knowledge

coproduction"—bridging traditional knowledge with modern scientific systems.

Konyak, Z., & Ao, S. (2025). *Traditional rice farming and livelihood dynamics of Jhum cultivators in Mon district Nagaland, India*. Provides an inventory of tree stands found in the forest fallows of Nagaland, contributing to the understanding of farmer innovations and best practices among shifting cultivators in the Asia-Pacific region.

Lotha, T.N. (2024). *Climate change impact and Traditional Adaptation practices in northeast India: A Review*. It examines the extensive TEK of Northeast India's indigenous communities, focusing on their time-tested adaptation Strategies against escalating climate risks like flash floods, landslides, and changing weather patterns. By analyzing traditional farming, watershed governance, and biodiversity preservation, the text highlights the indispensable role of these practices in modern climate mitigation. Ultimately, it emphasizes the urgent need to document and preserve this vulnerable indigenous knowledge while integrating it with contemporary scientific frameworks to build more resilient adaptation models.

Muse, M.E., Njumba, B.D., & Nkwenchu, N. V. (2024). *Assessing the role of Radio on climate change communication in the Bamenda Municipality, Cameroon*. It investigates on how climate change needs to be communicated effectively as it is a huge global issue. The objective of this study was to examine the use of radio for climate change awareness in Bamenda Municipality. It highlights the importance of radio as a medium for disseminating information.

Rawat, A., Kumar, D., & Khatri, B. S. (2024). *A review on climate change impacts, models, and its consequences on different sectors: a systematic approach*. It explores the causes and the impacts of climate change towards the change on air, water, flora, fauna and humans with the emphasis on economic.

Purohit, S., Hande, O.M., & Imran Khan, Y.D.I. (2025). *Role of Traditional Ecological Knowledge in the current climate crisis: Case study of Mahadev Koli in Maharashtra, India*. This paper explores the integration of Traditional Ecological Knowledge (TEK) with modern climate tracking, focusing on the

Mahadev Koli community inhabiting the Western Ghats region of Maharashtra, India.

Sah, S.K., & Prashar, A. (2025). *Media as a tool for Climate change Adaption: a study of Radio's role in Gaya District*. The research explores the role of radio in helping people cope with the impacts of climate change in Gaya District, Bihar, India. It focuses on the need for communication and education to build resilience among vulnerable population impacted by climate change. And how radio serves as a crucial channel for disseminating climate related information in areas with limited access to Digital platforms as it is more accessible compared to Digital media.

Wonglangka, W., Amloy, A., Ounchanum, P., Ruangwittayanusorn, S., Thooptimthean, T., & Siriphon, A. (2025). *Translating Traditional Ecological Knowledge into a Design Framework for Sustainable Resource Management: A Case Study of the Ruza System of Nagaland, India*. It covers an in-depth analysis of Nagaland's indigenous Ruza (Zabo) water-harvesting systems. It outlines how gravity-fed resource flows and closed-loop agro ecology function as highly resilient climate adaptation models.

III. METHODOLOGY

3.1. Participants and Sample

The study deployed a mixed-methods sampling strategy. The study deployed a mixed-methods sampling strategy. For the quantitative component, a controlled audio auditioning playback experiment (N=200) was executed to measure the communicative efficiency of dialect-matching.

A sample of 200 farmers (n=100 from Mon District and n=100 from Kohima District) was established via stratified sampling across the target territories. For the qualitative component, the study engaged key stakeholders through Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs), which included a focus group discussion with local farmers and 5 elite interviews with vernacular radio language translators working at All India Radio (AIR) Kohima.

3.2. Data collection and Analysis

The data were gathered by combining qualitative content analysis with experimental audio testing.

Qualitative Content Analysis:

A sample of 12 months of archived audio broadcasts related to weather, agriculture, and environmental changes from AIR Kohima stations was transcribed and analyzed using NVivo software.

The coding matrix tracked the ratio of loan verses indigenous metaphors, and the inclusion of traditional calendars.

Quantitative Audio Auditioning Experiment:

The 100 stratified participants were exposed to identical emergency weather bulletins concerning erratic high-velocity wind currents and changed Jhum burning windows across three linguistic mediums- Native Tribal Dialect, Nagamese, and English. Three parameters were mathematically evaluated.

Factual Comprehension Accuracy:

Measured via the recall of specific weather metrics.

Perceived Trust score:

Rated on a 1-5 Linkert scale.

Behavioral Mobilization Intent:

Measured by the participants' self-reported willingness to modify personal agriculture schedules based on the audio clip.

Field Interviews:

Semi-structured key informant interviews and focus groups were transcribed to isolate themes surroundings the emotional resonance of dialects versus market lingua franca.

IV. DATA ANALYSIS

The research demonstrates the communication shift from native tribal dialects to Nagamese and English and the comprehension, trust, and the behavioral mobilization intent.

Table 1: Communicative Vectors by linguistic Medium (N=200)

Linguistic Medium evaluated	Factual comprehension Accuracy (%)	Perceived Trust score (Mean 1-5)	Behavioral Mobilization Intent (%)
Native Tribal Dialect (Konyak and Tenyidie)	(91.0%)	4.85	86.0%
Nagamese (Lingua Franca)	(54.0%)	3.10	39.0%
English	(18.0%)	2.45	11.0%

Table 1 highlights that there is a massive, cascading drop in communication effectiveness as you move from a person's native indigenous language down to English. Local dialects are overwhelmingly superior across every single metric, while English incredibly poorly for this specific target group. Almost everyone accurately understands their Native Dialect (91%). Less than joint-majority understands Nagamese (54%), and a shocking 18% understand English. This implies that formal or official messaging done exclusively in English is missing over 80% of the audience.

Perceived Trust score (Mean 1-5):

Trust is deeply tied to native identity. The native Dialect scores a near-perfect 4.85 out of 5. Nagamese sits at a moderate 3.10, while English drops to a skeptical 2.45 people trust information much more when it is spoken in their mother tongue.

Behavioral Mobilization Intent (%):

This is the ultimate test of communication. 86% are willing to act on information given in their Native Dialect. The number drop to 39% for Nagamese and 11% for English.

Statistical variance trends

The deficits in comprehension Nagamese are fine for transactional, open-market trading but comprehension drop-off under technical risk conditions is severe, plunging to 54(%).

English-language broadcasts did not do well critically, with natural agrarian operates only getting 18 (%) comprehensions. This creates a jagging discussion between the drafts of urban policy from above and agriculture realities on the ground.

Frameworks for script Translation and TEK Synthesis
Qualitative text matrix coding of archived scripts

using NVivo identified the precise linguistic workarounds deployed by AIR Kohima translation desks to resolve systematic voids in indigenous vocabulary.

Linguistic workarounds for industrial concepts

Indigenous languages such as konyak, Ao and Angami evolved within local forests and widen ecosystems; they do not have phonetic roots for industrial and globalized climate concept. Scriptwriter was active in scriptural loan-word transliteration. Instead, they resort to ecological metaphorization.

Greenhouses gas Emission Carbon blanket is translated as an unnatural, heavy smoke- blanket, trapping the valley's breath. Translated by a Konyak vernacular script translator AIR Kohima (konyak: \text {yak-ai Aa khoih}). This connects the concepts directly to the stagnant, uncomfortably warm layer of inversion air observed by villages over valley floors during high-volume, unmanaged Jhum biomass clearing.

The shifting precipitation baselines are presented without statistical millimeter variances, in terms of the degradation of local phonological signs, the unpredictable monsoon rains that continue long after the wild orchid have dropped their blooms or the cicadas have ceased their evening calls – all of which the weather are no longer telling the same story.

The synthesis Model for Traditional Ecological Knowledge (TEK) and forecasting

The key informants' interviews (KIIS) and the Focus Group Discussion (FGDs) showed that local farmers usually ignore or reject modern scientific weather forecasts if they are just given as cold, disconnected numbers or data charts. To the farmers, that kind of data feels detached from reality. To fix this, AIR Kohima scripts do not just read out data from satellite tracking and scientific numbers but narrates to real things for those farmers to see with their own eyes by highlighting the traditional ecological phenomena.

V. FINDINGS/RESULTS

Airtime Allocation and Broadcaster Institutional Metrics

To assess the foundational reach and structural consistency of climate-related messaging, the All India Radio (AIR) Kohima collaborated alongside

institutional reporting from the Indian Council of Agricultural Research (ICAR), Medziphema. The Station broadcast simultaneously across three distinct state official language, English, Nagamese (market lingua franca) and 15 distinct sub dialects which includes (Konyak, Ao, Lotha, Angami, Phom, Sumi, Khamniungan, Chang, Sangtam, Chakhesang, Zeliang, Pochury, Rengma, Yimchunger and Kuki).

Weekly Baseline Airtime structural tracking indicates no dedicated standalone climate programming. Climate programming is embedded in agricultural programming. The main vehicle is the Agro-met Advisory Bulletin produced using the telemetry of ICAR Medziphema. This Bulletin is broadcasted for a precise duration of 15 minutes daily, totaling 105 minutes (1.75 hours) weekly. On world milestone dates such as World Environment Day, the station replaces its regular programming content.

Communicative Efficiency of Dialect Matching

Data from the controlled audio auditioning playback experiment (N=100, stratified as n=50 Mon District and n=50 Kohima District) was isolated to mathematically outline the performance of different language system used during agriculture risk events. Participants were exposed to similar emergency weather bulletins for enatic high-velocity wind currents and changed Jhum burning windows. Tracking was tested with 3 parameters factual comprehension Accuracy (recall of specific weather metrics) perceived trust score (rated on 1-5 Linkert scale) behavioral mobilization intent (willingness to modify personal agriculture schedules based on the audio clip)

VI. DISCUSSION

This research demonstrates that while Nagamese functions effectively as a transactional lingua franca in urban commercial hubs, it lacks the socio-cultural authority and emotional resonance required to motivate collective community action during climate emergencies. When environmental warnings are broadcast in Nagamese, rural populations often perceive them as distant administrative matters - mirroring Bisht's (2013) critique of top-down institutional communication that alienates indigenous custodians.

Whereas dialect-matching via All India Radio (AIR)

Kohima establishes the cultural proximity needed to transform abstract risks into immediate local imperatives, validating the media frameworks of Muse et al., (2024). To overcome the limitations of isolated statistical forecasts and macro-level satellite blind spots in the fractured terrain of the Hindu Kush-Himalayan region, AIR Kohima employs a TEK-Meteorological synthesis. This Model co-presents satellite telemetry alongside regional phonological markers, aligning with Horom's (2023) concept of knowledge co-production Purohit et al., (2025) observations on indigenous climate tracking.

This hybrid approach proves vital for mitigating Jhum (slash-and-burn) micro-crisis, as shifting monsoon baselines and rising temperatures disrupt ancestral timelines, real-time, dialect-matched agro-met advisories provide critical guidance on altered burning windows to prevent ecological degradation, supporting climate-smart agriculture and resilient resource frameworks noted by Pathak (2022), and Wonglangka et al., (2025). Ultimately, as underscored by Sah and Prashar (2025), in an ethno linguistically fragmented region with limited digital penetration, dialect-based radio broadcasting transcends mere policy, serving as an irreplaceable, democratizing mechanism for indigenous survival and climate adaptation.

VII. CONCLUSION

This research paper looks at the important role of All India Radio (AIR) Kohima in translating global climate science into local, dialect-based stories to build environmental resilience in Nagaland. In a highly fragmented ethno linguistic landscape and an agrarian economy that is deeply vulnerable to climate change, top-down communication frameworks in English or Nagamese fall flat due to technocratic jargon and lack of emotional resonance.

Mixed methods analysis (qualitative script analysis and quantitative experiment with N=100 auditioning) reveals a significant drop-off in communication effectiveness outside native languages. Native tribal language broadcast achieved 91% factual comprehension and 86% behavioral mobilization, far exceeding the comprehension and mobilization achieved through Nagamese and English. Due to the lack of phonetic roots for industrial concepts in the indigenous languages, AIR Kohima uses —

ecological metaphorization to explain complex phenomena like greenhouse gases through familiar traditional experiences. Ultimately, this research shows that the sonic architecture of radio is a socio-ecological imperative for the incorporation of contemporary meteorological data into traditional Ecological Knowledge (TEK). It is an effective approach to reduce agricultural risks, maintain indigenous languages and provide a scalable model for community-based climate adaptation.

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