



EXPLORING THE JOURNALISTIC EPISTEMOLOGIES IN ENVIRONMENTAL SUSTAINABILITY REPORTING: A QUALITATIVE STUDY FROM SINDH, PAKISTAN

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Abstract

Environmental journalism in the Global South plays a critical role in informing the public and politically responding to climate and sustainability issues. This research investigates how journalists in Sindh, Pakistan, one of the world's most climate-vulnerable areas, construct epistemic authority in their reporting on environmental sustainability. The qualitative design comprised semi-structured interviews with 15 journalists, and analysis was conducted thematically through textual/procedural, contextual/performative, and external epistemological modes. Results show that sustainability reporting is obstructed regarding regular newsroom practices and styles of reporting, negotiated legitimacy, and political or institutional pressures. These findings call for epistemically reflexive journalism that critically interrogates knowledge sources, authority, and framing practices associated with environmental narratives. Moreover, the study highlights challenges faced by journalists, including limited access to scientific expertise and the complexities of conveying urgent climate information within socio-political constraints. In this way, the study contributes to environmental communication scholarship by providing a situated, Global South perspective on journalistic knowledge production enduring a climate crisis. The research underscores the necessity for stronger newsroom support and training to empower journalists in navigating these challenges effectively.

Keywords: Environmental Journalism, Epistemology, Sustainability Reporting, Climate Communication, Media and Knowledge

Introduction

"A new kind of thinking is essential for mankind to survive and move to higher levels."

- Albert Einstein

With the increasing urgency and increasing crescendo of the multiracial global environmental crisis phenomena of climate change, loss of biodiversity, water scarcity, and pollution in its wake, journalism has assumed a crucial role in its public articulation and politics of eliciting responses to environmental sustainability challenges (Antilla et al., 2024; Boykoff & Yulsman, 2023). Journalists are not mere conduits of scientific information, public officials, and citizenry; they become active agents in making environmental knowledge through framing, sourcing, and narrative practices (Hansen, 2022; Tandoc & Maitra, 2025).

Network as well as infrastructural transformation of environmental journalism communalizes the broader epistemic crisis of diminishing trust in authority, rampantly growing misinformation, and an increased political discourse of post-truth (Steensen, 2019). Journalism scholars have consequently turned their attention more closely towards how journalists compose, authenticate and validate knowledge as claims-issues,



particularly in contested and complex cases such as environmental sustainability (Carlson & Lewis, 2022; Ekstrom & Westlund, 2019). Therefore, the inquiry involved within journalism studies in epistemology becomes central as far as constructing authority against three interrelated modes such as textual/procedural epistemology, which mainly features institutional routines, norming fact-gathering practice, narrative conventions; contextual/performative epistemology, negotiating credibility and legitimacy through journalistic identity, source engagement, frame choices; and external influences that capture structural and political constraints shaping journalistic autonomy and knowledge construction.

The Global South encapsulates the fullest extent of these tensions between epistemic reality and reality, including all development injustice and fragility of the state from which environmental journalism arises. Pakistan has made it into the top five on the Global Climate Risk Index (2020). The country has recorded extreme weather events since the year 1992 and has lost more than 12,000 lives and incurred an estimated loss of \$29.3 billion because of these incidents (World Bank, 2022). Approximately 12 million people were displaced, inundated one-third of Pakistan, and incurred losses greater than \$30 billion by the catastrophic floods of August 2022, further complicating the already distressing situation of having \$125 billion external debt and inflation exceeding 38%. Despite the acute climate risk, environmental journalism in Pakistan, especially in the province of Sindh, remains almost non-existent; it is mostly short-lived reporting, usually just episodic and with very little depth of science or structural framing.

The result is weakening of democratizing journalism by limiting civic engagement, public accountability, and sustainability transitions (Jamil, 2020; Godler & Reich, 2022), mirroring the wider patterns and deficiencies in epistemic infrastructures like those related to lack of scientific literacy, editorial independence, or institutional backing for sustainable reporting. This is a critical gap the present study addresses within its framework as emerging journalism scholarship on data and automated journalism (Carlson, 2024; Mahmood et al., 2025; Westlund & Lewis, 2017), investigative practice (Tong, 2024) and that engaging with narrative and interplay of expert and experiential knowledge (Jingrong, 2024).

Largely qualitative and with a multi-modal design, this study aims to investigate how journalists in Sindh construct and perform epistemic authority in environmental reporting. Its analysis is based on the six research questions (RQ1-RQ6) grounded in a three-part epistemological framework-textual/procedural, contextual/performative, and external constraints-adapted to explore knowledge practices in high-risk, low-capacity media environments.

Thus, these findings continue the discourse of environmental communication with an understanding of how the practices of journalistic epistemology are shaped by institutional routines, socio-political pressures, and developmental contexts. Besides contributing to global discussions involving media and sustainability, this study highlights actionable knowledge towards developing more reflexive, accountable, and transformative environmental journalism in climate-vulnerable regions.

Research Questions

1. How are the selection of sources and framing of narratives from the various journalistic routines affecting the construction of environmental knowledge in the Sindh-based media?
2. In what ways do journalists in Sindh assert their credibility and negotiate epistemic authority in reporting environmental problems?
3. How does the institutional and political context challenge journalists in making knowledge claims regarding environmental sustainability?
4. What roles do technological factors, such as algorithmic curation and digital disinformation, play in shaping environmental reporting practices?
5. How are environmental events in Sindh represented in text, performative and institutional dimensions of journalistic epistemology?
6. To what extent do journalists acknowledge and navigate external influences while reporting on rather complex environmental crises in their region?

Integrated Epistemological Framework

The study uses a three-dimensional epistemological framework based on Carlson and Lewis (2021), *News Epistemologies: How Journalists Know What They Know* (Columbia University Press), to analyse how



environmental knowledge is produced in journalism in an all-encompassing manner.

Figure1

Integrated Epistemological Framework

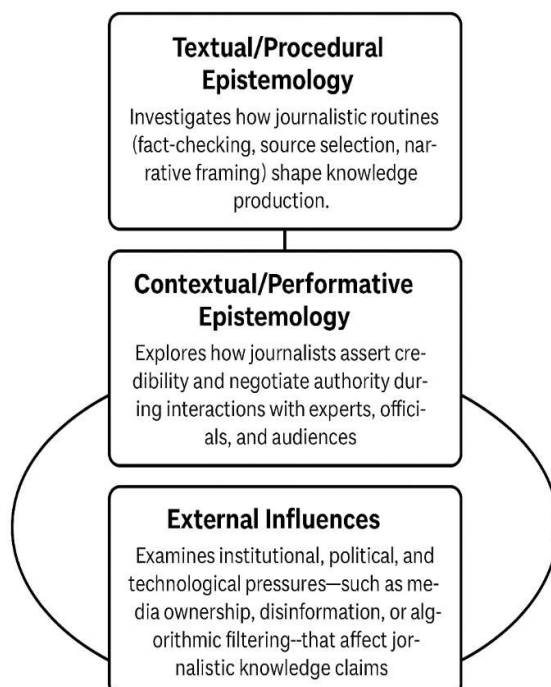


Figure1 shows the integrated epistemological framework. The figure shows the three interlinked modes through which journalistic knowledge is constructed: Textual/Procedural Epistemology concerned with routines in the newsroom like fact-checking or framing; Contextual/Performative Epistemology, which talks about how journalists deploy authority through interaction; and External Influences, which are institutional, political, and technological expectations that shape epistemic practices.

Figure 2

Theoretical framework

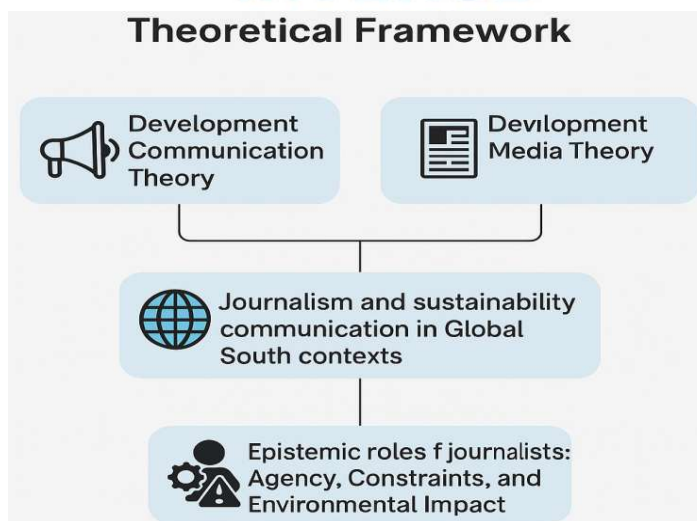


Figure2 is the theoretical framework that integrates Development Communication Theory and Development Media Theory to provide a context to journalism and sustainability communication in Global South settings, which leads to an analysis of how journalists conceptualize their cognitive roles in influencing environmental discourse.



Contributions and Significance

This study contributes to and contextualizes epistemological inquiry within the growing field of environmental communication in a higher climate-risk zone of the Global South. It extends the theoretical frameworks that have been previously built, especially the three-mode epistemological framework proposed by Carlson and Lewis (2022), which are now used and revised in the context of Sindh's institutional and environmental journalism landscape in Pakistan. In this way, the research begins to enhance our knowledge and understanding of how journalistic knowledge practices operate under conditions of political volatility, developmental precarity, and structural constraints on press autonomy.

On the methodological side, the study uses a multi-modal qualitative approach, incorporating semi-structured interviews, shadowing, text analysis, document review, and reflective journaling. This rich method facilitates an epistemically sensitive audit of journalistic routines, interactions, and institutional environments and provides an account firmly based on how environmental knowledge is constructed, disputed, and legitimized in the daily practices of the newsroom.

Theoretically, the study inserts epistemological interrogation into debates concerning journalists' authority, credibility, and knowledge production across the interstices of environmental risk, media policy, and digital infrastructure. By that, it serves to enrich environmental communication scholarship by providing situated insight into a region that is still not represented in a global discussion.

From a practical perspective, the research outlines concrete implications for media development in Pakistan. It identifies journalist-centred and institutional enablers and barriers to epistemic rigor, thus informing the design of professional training, reform of editorial policy, and strategic interventions by media support organizations. The findings are of particular interest to journalism schools, press councils, and NGOs that wish to enhance the capacity of environmental reporters in contexts of ecological vulnerability and systemic constraint.

Literature Review

Journalistic Epistemology: Theoretical Foundations

Journalistic epistemology is how journalists create, validate, and disseminate knowledge while doing their reports (Carlson & Lewis, 2022). It goes beyond the idea of journalism as a neutral transmitter of facts. It thinks of journalism or journalism as a knowledge-producing institution moulded by professionalism, organizational routines, and socio-political constraints (Hanitzsch, 2007; Godler & Reich, 2022). The increasingly complicated picture of the moving world-with its pervasive realities of misinformation, algorithmic filtering, and disinformation-challenges the fundamental and simple definition of objectivity and verification; therefore, epistemological reflexivity would be even more important in environments characterized by systemic risk and uncertainty (Tandoc & Maitra, 2025; Steensen, 2019).

Carlson's typology of journalistic epistemologies includes procedural practices (e.g., source selection and newsroom routines), performative acts (such as building legitimacy through framing), and institutional constraints (including organizational and normative pressures). Building on this, the present study adopts a modified tripartite framework-textual/procedural, contextual/performative, and external influences-with which to explore how journalists in Sindh navigate environmental knowledge production under conditions of climate urgency and institutional fragility.

Environmental Communication and Sustainability Reporting

Environmental communication now appears very much critical across all the boundaries among media & communication studies, science communication, and environmental justice (Hansen, 2022; Schafer & Painter, 2021). The scholars have already started to learn that media do not only inform the public understanding but also mediate the legitimacy of policy agenda and scientific knowledge claims (Boykoff & Yulsman, 2023). Despite its increasing importance, sustainability journalism continues to episodic tendencies, framing environmental issues as discrete events rather than systemic processes (Olausson, 2018).

This research into the journalistic epistemologies of environmental sustainability reporting in Sindh, Pakistan, is contextualized by a growing academic focus on localized environmental challenges and educational interventions in the region. Recent scholarship has provided critical analyses of historical environmental degradation and policy challenges, particularly concerning smog and climate resilience (Rafiq-



uz-Zaman et al., 2024a; 2024b). Concurrently, studies in urban centres like Bahawalpur have empirically documented the nexus between public awareness, education, and specific issues such as solid waste management and plastic pollution (Khalid et al., 2024; Bano et al., 2024), while also exploring innovative pedagogical approaches to foster environmental consciousness (Rafiq-uz-Zaman et al., 2024c; Khalid et al., 2024b). This existing body of work establishes a foundational understanding of the socio-educational dimensions against which journalistic reporting practices must be examined.

This framing challenge is compounded by journalists' limited access to credible data, difficulties in synthesizing sometimes very complex scientific findings, and tensions between advocacy and professional norms of neutrality (UNESCO, 2024; Westlund & Lewis, 2017). Such challenges are intensified within under-resourced newsrooms in developing countries like Pakistan, which suffers from low levels of science literacy and a host of political and commercial interventions (Jingrong, 2024). Under such circumstances, it becomes increasingly compelling to examine how journalistic practice interacts with environmental risk in contexts of strained media resources.

The Epistemic Crisis in Journalism

The term "epistemic crisis" has now been at the heart of current critiques of journalism (Steensen, 2019). One essential manifestation of this kind is weak verification practices, over-reliance on press releases, and shallow engagement with scientific evidence (Antilla et al., 2024). Within these contexts, it is political elites or institutional gatekeepers who hold epistemic authority-the right to define truth-which further ingeniously marginalizes scientific voices and community knowledge (Schmidt, 2017).

While there is much scholarly inquiry to be explored regarding journalistic resistance to such conditions, recent studies have started hinting in that direction. For instance, upon mentioning how fact-checking practices are deployed as a mechanism of epistemic defence, Tandoc et al. (2024). Meanwhile, Tong (2024) focuses on how these journalists navigate constraints placed on them by using expert sources and civil society partnerships. Taken together, these studies make a case for the need to investigate epistemic practices in under-researched regions, especially those with high environmental vulnerability and low institutional support.

Pakistan's Environmental Vulnerabilities and Media Landscape

Pakistan ranks among the world's top five countries that are most vulnerable to climate change, according to the Global Climate Risk Index (Germanwatch, 2020). From soaring heatwaves and water outages to disastrous floods, the country faces a series of cascading environmental crises whose serious implications for human security and development have been observed (Dow & Downing, 2016). In Pakistan's media landscape, however, environmental journalism remains a peripheral issue. Journalists who happen to report on the environment are mostly not trained, face indifference from the editorial board of their newspapers, and operate under political or commercial constraints that deprioritize ecological matters (Jamil, 2020).

In Sindh province, these systemic weaknesses worsen. Limited access to environmental data, failed institutional support, and the scourge of political and crime-oriented news agendas largely characterize the life of a journalist (Rod et al., 2006; Sundblad et al., 2008). Few empirical studies have investigated how journalists in Sindh undertake the epistemic processes of environmental reporting. It is from this lacuna at the intersection of media practice, environmental communication, and epistemology that the present study draws its foundation.

Methodology

This research employs a qualitative design to explore how journalists in Sindh Pakistan create and authenticate environmental knowledge from within the institutional and political structural constraints. Using an adapted three-mode epistemological framework (Carlson & Lewis, 2021)-textual/procedural, contextual/performative, and external influences-the study analyses the layered processes through which journalistic authority is negotiated, produced and challenged in the environmental context of sustainability reporting.

Data Collection

The data were collected through semi-structured interviews, document reviews, shadowing limited newsroom work, and researcher journaling for triangulation and contextual depth. A total of 15 journalists



working across print, television and digital platforms were selected through purposive and snowball sampling. Participation was based on their active involvement in environmental, climate, or science reporting in Sindh either through reporting or in an editorial capacity.

Interviews were conducted between March and April 2025, lasting 45-60 minutes in Urdu or English per participant preference. With the informed consent of the participants, interviews were recorded for audio. The interview guide was organized around the three epistemological modes, eliciting responses on issues pertaining to sourcing practices, fact verification, narrative construction, institutional dynamics, and external pressures such as editorial influence and media ownership. Ethical approval for the study was granted by the author's institution, with protocols ensuring voluntary participation, the confidentiality of information, the use of pseudonyms (J1–J15), and post-interview member checking for correctness in interpretation.

Participant Demographics and Professional Roles

The sample consisted of 15 journalists from various media organizations, including Dawn, Geo News, BBC Urdu, Express Tribune, Samaa TV, and Independent Urdu. The roles included environment correspondents, climate desk editors, investigative reporters, sub-editors, and anchors, providing a multidimensional view of journalistic knowledge practices. The participants collectively had 5 to 15 years of professional experience—apart from the average of 10.2 years, thereby ensuring epistemic maturity and field familiarity.

The group also reflects gender diversity and role variation, spread across national and digital newsrooms and including professionals with dedicated climate or science beats. This level of diversity allowed capturing broader views on how environmental journalism is shaped across editorial hierarchy and institutional types of Sindh's fast-changing media landscape.

Data Analysis

The data analysis was organized through a multi-phase thematic strategy in NVivo 14. Following grounded theory methods (Corbin & Strauss, 2015), the analysis proceeded through iterations between empirical insight and the conceptual frame along abductive lines. The first open coding phase saw the identification of common themes such as "limited source verification," "editorial gatekeeping," and "journalistic science illiteracy." In axial coding, these recurrent ideas were grouped into thematic categories, which were later refined through selective coding, organized under the three epistemological domains.

For analytical trustworthiness, two researchers coded a subset of transcripts independently, achieving 85% intercoder agreement. Discussions resolved outstanding issues. Triangulation among interviews, observations, documents, and reflexive journals strengthened findings. Memo writing documented researcher positionality, whereas member-checking with participants ensured resonance and accurate interpretation of preliminary findings.

Interview Protocol: Mapping Journalistic Epistemology

The semi-structured interview guide was structured around thematic areas that embody the epistemological framework guiding the study. The first area included questions on textual/procedural epistemology concerning how journalists gather information, verify sources, and construct environmental narratives within institutional routines. Second, this dimension of contextual/performative epistemology deals with how credibility, professional identity, and legitimacy are brokered in interactions with sources, audience, and editors. Thirdly, the structural impediments such as political interference, media ownership, and algorithmic pressures shaping journalistic autonomy come into play in this module dealing with external influences. Lastly, integrated practices look at how journalists perceive systemic environmental causes, editorial decisions, and tensions between normative ideals and institutional realities. These thematic sections together presented narratives that were rich and reflective of how knowledge-making unfolds in the intersecting pressures of journalism and environmental governance in Sindh.

Limitations

Given the thorough nature of this study focusing on one provincial context, the sample size and regional focus are impediments to generalizability at the macro-level. Nevertheless, in tune with qualitative traditions and the aims of situated epistemology, this study offers valuable contributions to environmental communication scholarship by providing informed and context-specific explorations of journalistic



knowledge construction in a high-risk Global South setting.

Findings and Interpretation

Table 1

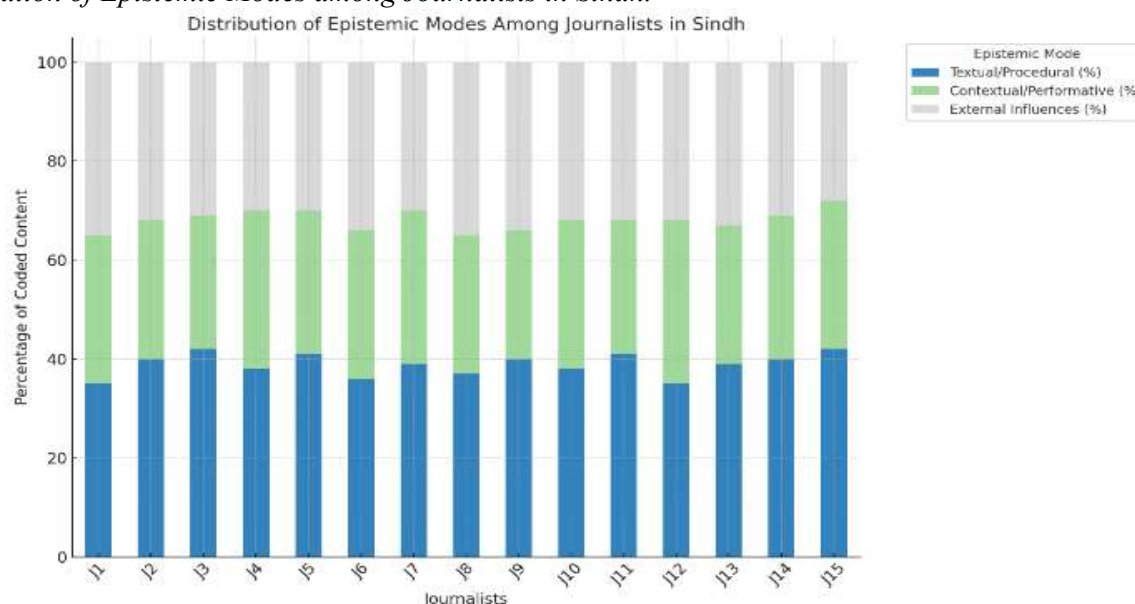
Thematic Summary Table

Epistemic Mode	Key Features	Representative Codes	Average Percentage (%)
Textual/ Procedural	Fact verification, sourcing routines, structure of news texts	fact-checking, institutional pressure, editorial review	38.87%
Contextual/ Performative	Legitimacy negotiation, journalist-source dynamics, identity performance	credibility struggle, advocacy avoidance, source reputation	29.20%
External Influences	Political pressure, editorial constraints, access to expert knowledge	censorship, lack of data, political framing	31.93%

The coding analysis indicates that incursions/procedural epistemology accounted for the highest percentage (38.87%) of in-journalist' practice, the areas in which one regularized fact verification, followed institutional sourcing, and, lastly, construction of narrative through standardized means. This suggests that the environmental news content is heavily dependent on mainstream newsroom conventions and editorial supervision. Contextual/performative epistemology represented 29.20 percent, emphasizing the performative aspects of credibility-building, including the management of journalist-source dynamics, pressures to maintain neutrality, and avoidance of advocacy. Externals accounted for 31.93 percent of the responses, signifying structural constraints to act, for example, political interference, limited access to scientific expertise, and editorial censorship. It is this convergence of contexts that characterizes a hybrid epistemic setting, where the knowledge production of journalism is simultaneously constituted through procedural norms, identity negotiations, and systemic pressures.

Figure 3

Distribution of Epistemic Modes among Journalists in Sindh.



The three epistemic modes-Textual/Procedural, Contextual/Performative, and External Influences-were distributed among 15 environmental journalists working in Sindh, as illustrated in this stacked bar chart. The Textual/Procedural mode is the most favoured mode (with an average of 38-43%) indicating a large reliance on means of professional reporting, such as the use of press releases and institutional sourcing.



Contextual/Performative mode (25 to 35%) is suggestive of many efforts to gain credibility and assert professional legitimacy, while External Influences (around 25 to 30%) seem to indicate prevailing structural constraints, notably political and editorial pressures. In essence, the chart shows a hybrid epistemic configuration informed by overlapping journalistic routines, contextual negotiations, and systemic constraints.

Epistemic Modes in Environmental Journalism: Thematic writing analysis

This presents thematic writing analysis of qualitative data collected from fifteen environmental journalists whose focus is on major news media organizations in Sindh, Pakistan. Using NVivo 14, the study made a tripartite coding process-the open, axial, and selective to undertake analysis of qualitative data by "abductive reasoning," which is aligned with three main epistemological modes: textual/procedural, contextual/performative, and external influences. Rough proportions of the coded content are distributed approximately as follows: textual/procedural epistemology (39%), contextual/performative epistemology (30%), and external influences (31%).

Textual/Procedural Epistemology (39%). Much of the data suggest strong adherence to procedural norms and institutional routines in environmental reporting. Journalists described workflows that primarily focused on repackaging of government statements, often with maximal detachment from any verification protocols or scientific cross-checking.

"We mostly end up reshaping the same government press release-it's routine---only sometimes I confirm the figures with the climate ministry." (J4, The News)

This epistemological mode illustrates how institutional authority is often used as a proxy for something that is fact without deeper fact-checking or critical consideration. Many of the respondents admitted to rarely consulting independent or academic environmental sources, and their reporting has been episodic-that is, it has typically had a very event-oriented structure, highlighting, for instance, floods or tree-planting days, rather than engaging with deeper, structural, or systemic issues surrounding the environment.

The establishment of an epistemic mode suggests a kind of "precarious objectivity" whereby journalistic neutrality is artificially constructed with bureaucratic narratives instead of verified facts. Here, the environmental reality becomes institutionalized and ritualized, entrenching it in habit rather than investigation.

Contextual/Performative Epistemology (30%). The second major thread highlights the ways in which journalists perform and negotiate their epistemic authority in real time, often changing their tone or referring to the support of their media organization to ensure that they can get legitimacy from a source or editor.

"When I speak with local activists or scientists, I mostly open by saying, 'My editor is behind me-so they take me seriously.'" (J7, Samaa TV).

This finding reflects an epistemology of performance-sustaining credibility during field interactions, not on the persona of a journalist. Several journalists have indicated the duality in appearing neutral and asserting professional expertise when confronting or heavily-laden data environmental issues.

This type of epistemic modality gives insight into how fragile and relational epistemic legitimacy is. In general, journalists become prisoners of their imagined position in hierarchies of institutions and of power within the political sphere. "To look professional" or to avoid a backlash was limiting their capability to challenge the prevailing narrative even though they were well informed.

External Influences (31%). It revealed a great part of the interviews as to how external constraints such as political interference, ownership pressure of the media, inadequate learning, and scientific illiteracy affected the horizon of environmental reporting.

"Sometimes the owner steps in-make calls to focus less on Pakistan polluting and more on bigger pictures we must cover." That definitely affects my recommendations." (J2, Express Tribune).

Journalists acknowledged personal and institutional limitations concerning complex environmental science. Such epistemic vulnerability avoided in-depth considerations of climate change, biodiversity loss, and easement of ecological degradation. Several fledgling editorial teams were deficient in offering support, training resources, and credible science sources for climes issues or topics, which forced many reporters either to oversimplify or ignore central elements in sustainability reporting.



This domain chronicles the mechanization of epistemic autonomy by external ruptured systemic pressures. In Sindh, development-centered political narratives dominate the media's agenda; therefore, environmental journalism is marginalized. Under-resourced, politically vulnerable, and largely reactive, the beat remains investigative or preventive.

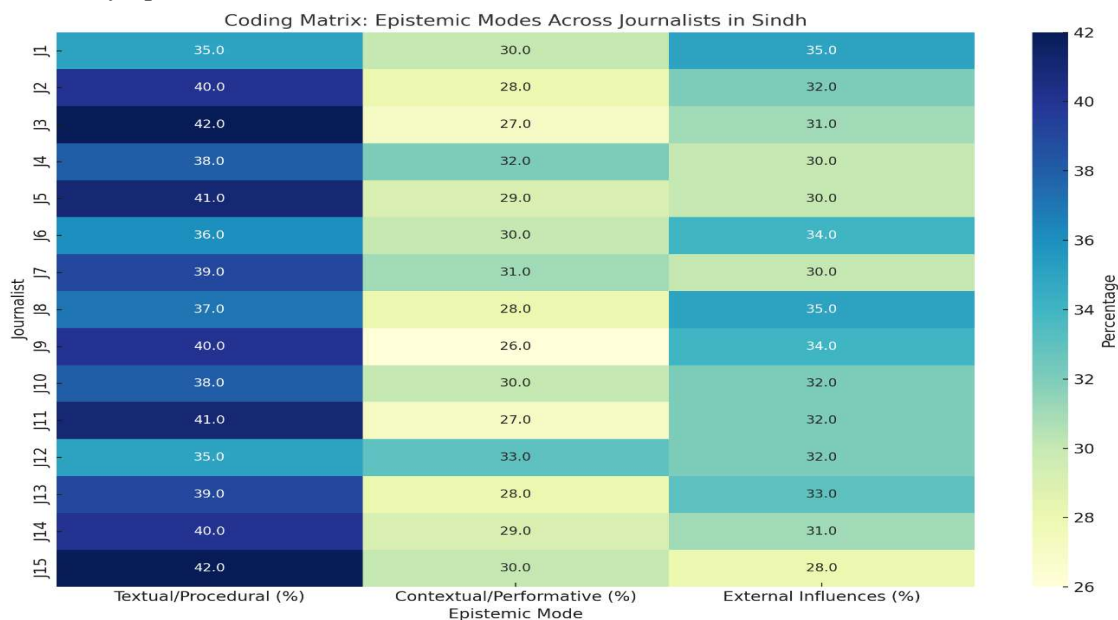
Cross-Domain Patterns and Thematic Convergence

The analysis here finds considerable overlap among the three epistemic domains, showing how they operate as mutually supportive constraints within environmental journalism in Sindh. Such procedural constraints-such as rigid newsroom routines-frequently intensified performative challenges-journalists also referred to those with limited authority or confidence when addressing complicated environmental subjects. External issues of editorial censorship or political sensitivities further compounded these internal barriers.

Investigative or data-driven approaches to environmental reporting most often met with blocks or indifference from the editorial top as systemic undervaluation of sustainability journalism becomes apparent. In addition, the general and large absence of scientific literacy coupled with a general lack of epistemic training results in routine practice overreliance which limits the capacity to critically interrogate environmental narratives and policy claims.

Figure 4.

Coding Matrix of Epistemic Modes across Journalists in Sindh



The Coding Matrix: Epistemic Modes across Journalists in Sindh heat-map extensively compares how different journalists engage in the three epistemological domains: Textual/Procedural, Contextual/Performative, and External Influences. Every cell represents per mode coded content percentage, the intensity of colouring from pale yellow to deep blue, as it explains visually an emphasis by epistemic mode.

High percentages of textual/procedural epistemologies above 41% show that journalists J3, J5, and J15 largely rely on routine newsroom practices, institutional sources, and format-driven reporting. It mirrors the more general argument that procedural knowledge practices dominate environmental journalism in Sindh.

In contrast, this engagement; contextual/performative, which indicates the journalists' efforts to gain credibility, legitimacy, and professional identity varies with values ranging from 26% (J10) to 33% (J12). Higher values here (e.g., J4, J12) may be indicative of greater field engagement or source negotiation tactics in contested environmental issues.

External influences include forms of political pressure, media ownership, and constraints in epistemic access. In most cases the participant values fall within the range of 28% to 35%. The fact that J1, J9, and J10 have high values in this domain corresponds to the qualitative descriptions of editorial censorship and infrastructural constraints imposed on environmental reporting.



However, the heat map indeed consolidates a central finding that journalists operate within a hybrid epistemic field whose procedural patterns are being dynamically conditioned by performative roles and structural limitations. This is how a multidimensional epistemic positioning denotes a nuanced landscape of environmental journalism particularly with respect to climate-vulnerable, media-constrained regions like Sindh.

The Conclusion of the Findings

These findings demonstrate that environmental journalism in Sindh is marked by procedural conformity, performative negotiation, and external constraint. Together, these factors compromise the epistemic depth of Environmental Sustainability coverage. These training implications become very important for media training, editorial reform, and policy support.

Discussion, Conclusion and Policy Implications

This study aimed to assess how journalists in Sindh construct and convey environmental knowledge epistemically, given the intensifying ecological crises. The findings reveal a deeply entrenched epistemic structure mediated by newsroom routines, identity negotiation, and systemic constraints, thus aligning with the global concern of epistemic crisis in journalism (Steensen, 2019; Carlson & Lewis, 2022).

The Epistemological Deficit in Textual Practice

What Ekstrom & Westlund (2019) refer to as a "*standardized epistemology*", where truth claims are shaped less by empirical rigor and more by institutional shortcuts expressed by the dominance of the textual/procedural mode (39%). Environmental reporters operating in Sindh constantly settle on government narratives and treat official press releases as self-evidently true, thereby indicating procedural faith that subverts the complexities of environmental sustainability. Carlson has raised ongoing concerns over how procedural inertia subsumes journalistic authority in specialized domains such as climate science.

Theoretical Reflection

Through the lenses of "*Development Communication Theory*", the study strengthens the view that communication systems in the developing world such as Sindh, Pakistan, are deeply institutionalized and directive in nature. Instead of being independent agents of change, journalists have tended to reproduce the agendas of political and bureaucratic elites, curtailing their potential for meaningful engagement with environmental challenges. This pattern follows McQuail's "*Development Media Theory*", positing that media in the postcolonial Global South operate within developmental lenses, in which critique and investigatory freedom are subjugated to the perceived national interest. There are often disincentives preventing Pakistani journalists from taking on structural contributors to environmental degradation in an environment where climate discourse is politicized, thus largely limiting the emancipatory potential of environmental journalism.

Fragile Epistemic Authority and Journalistic Identity

The findings show that journalists negotiate their epistemic legitimacy based on editorial support, perceived scientific literacy, and relationship with sources. This aligns with what Hanitzsch (2007) calls the "*Performative Dimension*" of epistemology, where journalists must constantly validate their credibility, often in hostile or unsupportive environments. In Sindh, performative epistemology is further challenged by self-doubting journalists, coupled with limited institutional support.

Systemic Constraints and External Barriers

With the near equal prevalence of external epistemic influences (31%) political pressure, economic prosperity, and censorship borne out does, therefore, analytically establishing, that journalism in Sindh operates within what Tandoc & Maitra would describe as an "*Epistemic Squeeze*." This therefore compromises journalistic independence and shifts sustainability reporting toward safer, less critical, or event-based narratives.

Inter-actions across Modes: A Vicious Cycle

With respect to the interdependencies, all three modes of epistemic behaviour create a vicious cycle. Journalists come under external constraints; hence censorship, lack of means, and on-and-on, which reinforce procedural habits of quoting officials that weaken performative authority of, say, failing to challenge claims. This self-reinforcing cycle taints knowledge legitimacy and democratic accountability, thereby compromising environmental justice.



Conclusion

The study aimed to investigate how journalists in Sindh in Pakistan construct and justify knowledge about environmental sustainability through the three-dimensional epistemological lenses of textual/procedural, contextual/performative, and external influences. Qualitative methods and thematic coding confirm the complexity and constraint of the epistemic landscape in interviews with 15 prominent environmental journalists.

The findings corroborate the idea that environmental journalism is shaped in Sindh by an institutionalized matrix of routine-working conditions, weak integration of science, interference by politics, and insecurity of editors. Textual/procedural practices are characterized by deadline pressure and reliance on official narratives, while performative credibility is often negotiated under hostile or resource-scarce conditions. To these very dynamics, external influences such as censorship, limited access to data, and chronic under-financing of the sector add another layer for environmental journalism in Sindh, which leads to an all-too-often superficial or fragmentary treatment of sustainability-related topics.

This fragile epistemic status undermines the democratic role of journalism in rendering environmental violators accountable, building public consciousness, and framing climate change as a systemic issue. If this ever-fragile valence is not remedied, it provides grounds for popular fatigue, policy inertia, and a belief in environmental degradation as inevitable or unchangeable.

Policy and Practical Implications: Towards an Epistemically Reflexive Journalism

The study characterizes an immediate urgency requiring the repositioning of environmental journalism in Sindh as an epistemic institution central to sustainability governance. Achieving high-quality environmental communication requires far more than information-access; it demands the very opposite methodologically ontological challenge to preconceptions of environmental knowledge construction, validation, and communication across quite politically and developmental contexts.

Media institutions ought to form dedicated environmental desks with editorial independence and invest in epistemological training for journalists through specialized workshops addressing scientific literacy, source verification, and critical interrogation of greenwashing. Long-form and investigative reporting should be encouraged to allow deeper exploration into environmental injustice, climate resilience, and policy failure, rather than simply covering episodic narratives.

Lawmakers and regulatory agencies should implement transparency laws ensuring real-time and verifiable access to environmental data from both public and private sectors, along with legal protection for journalists investigating ecological issues which are sensitive or politically contentious, thus strengthening both press freedom and public accountability.

Academic and training institutions should reorganize journalism curricula to integrate environmental literacy and the epistemology of science and sustainability. By promoting collaboration among students, researchers, and working journalists, universities can help produce sound, context-driven, and community-based sustainability media located in local realities.

International agencies and NGOs such as UNEP, UNDP, and the Earth Journalism Network should direct funds and fellowships, as well as provide mentorship for journalists from neglected regions like Sindh. These efforts should be complimented by public epistemic literacy campaigns meant to inform the public on how environmental knowledge is produced and why credible and accountable journalism is imperative for ecological governance.

Ultimately, the advancement of sustainability in Pakistan's media requires an epistemically reflexive journalism detecting not only environmental facts but also socio-political frameworks, sources of authority, and the truth-making processes that formulate public understanding. With this transformation, environmental journalism may henceforth move along a spectrum from reactive reporting to a much more proactive position in justice, resilience, and sustainable development."

Final Note

This research presents a case for the urgent reconfiguration of environmental journalism in Sindh as an epistemic institution central to environmental governance. Advancing sustainability will require the empowerment of journalists through better training, institutional support, and epistemological adjustment.



Using a developmental communication theory framework, such media reforms will facilitate Pakistan's movement towards a more equitable and ecologically resilient future, where journalists become internal agents of environmental change rather than passive observers.

Contributions of the Authors

Each author made a substantial contribution to the work reported and took part in the ideation, development, and final approval of the manuscript.

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Informed Consent Statement

Every participant in the study gave their informed consent.

Statement of Data Availability

The corresponding author can provide the data used in this study upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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