



Policy, Technology, and Equity: Reimagining India's Multilingual Development Agenda

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Abstract

Linguistic diversity is increasingly framed in global sustainability debates as more than a marker of cultural heritage; it functions as social and cognitive infrastructure for inclusive development. This paper examines multilingualism in India as a test case for what is termed here “linguistic sustainability” — a society’s capacity to keep many languages functionally alive across generations while simultaneously pursuing economic and technological modernization. India’s linguistic landscape, home to well over a thousand mother tongues and governed by a layered and often contested policy architecture, offers an unusually rich setting for this inquiry. The paper connects the mother-tongue provisions of India’s National Education Policy (NEP) 2020 to the United Nations Sustainable Development Goals (SDGs), with particular emphasis on SDG 4 (Quality Education) and SDG 10 (Reduced Inequalities), while also tracing linkages to SDGs 11, 13, and 16. Using a qualitative, document-based methodology, the study examines how indigenous languages preserve traditional ecological knowledge relevant to environmental sustainability, and how artificial-intelligence-enabled translation and localized digital content are reshaping access for rural and marginalized communities. The analysis concludes that nurturing linguistic diversity is not a matter of cultural conservation alone but an economic and developmental imperative for the Global South, and it proposes a set of policy interventions for embedding language more firmly within India’s development planning.

Keywords: multilingualism; Sustainable Development Goals; language policy in India; digital inclusion; traditional ecological knowledge; social equity

1. Introduction

Language is not a neutral vehicle for exchanging information. It carries a community’s history, its habits of categorization, and its claims to collective identity. As sustainable development and digital transformation increasingly intersect in the twenty-first century, linguistic diversity has moved from the periphery of development discourse toward its center. The 2030 Agenda speaks throughout of inclusion, yet language received comparatively little explicit attention when the Sustainable Development Goals were drafted (UNESCO, 2021). This paper positions India’s experience at the heart of that gap, arguing that the country’s extraordinary linguistic plurality should be understood not as an administrative burden but as a resource that, when properly stewarded, reinforces both social equity and ecological resilience.

Few countries illustrate the scale of the multilingual challenge, and the corresponding opportunity, as vividly as India. The 1961 census catalogued more than 1,600 distinct mother tongues; by the 2011 census these had been consolidated into 122 recognized languages, of which only 22 hold constitutional status under the Eighth Schedule (Mohanty, 2019). Despite this plurality, the practical machinery of governance in independent India has revolved chiefly around two languages — English and Hindi — leaving much of the remaining linguistic landscape to negotiate access to education, digital services, livelihoods, and environmental governance on largely unequal terms. This asymmetry is felt most acutely by tribal, rural, and minority-language populations.

A significant policy shift arrived with the National Education Policy (NEP) 2020, which requires that foundational schooling be delivered, wherever feasible, in a child’s home language. This commitment did not emerge in isolation. It coincides with the expansion of digital infrastructure through initiatives such as BharatNet and Digital India, and with rapid progress in artificial-intelligence-based language technology. Together, these developments represent a rare convergence of political will, technical capability, and social need. Yet converting policy commitments into practice remains difficult, particularly for the roughly 600 Scheduled Tribe communities whose languages lack a standardized script, a digital keyboard, or structured teaching material (Devy, 2022).

This paper proceeds in eight sections. Following this introduction, Section 2 reviews the relevant literature on linguistic ecology and sustainable development. Section 3 outlines the methodology. Section 4 traces India’s constitutional and policy treatment of language. Section 5 maps the connections between multilingualism and specific SDGs. Section 6 examines digital transformation and AI-driven language technology. Section 7 catalogues the structural obstacles to linguistic sustainability and translates the analysis into policy recommendations. Section 8 offers an expanded concluding synthesis.

2. Literature Review: Linguistic Ecology and Sustainability

Linguists have long relied on ecological metaphors to describe how languages coexist within a shared social space. Haugen's (1972) concept of linguistic ecology treats the coexistence of multiple languages within a community as analogous to species sharing a habitat, in which diversity itself becomes a source of systemic resilience. Maffi (2005) extended this analogy by demonstrating that linguistic, cultural, and biological diversity tend to cluster geographically, a correspondence she and her collaborators later labelled biocultural diversity (Maffi & Woodley, 2010).

This framing carries direct implications for development theory. Mainstream development models, largely inherited from post-war Western economics, have tended to treat development as a uniform, exportable set of metrics and interventions assumed to travel well across dissimilar contexts. Indigenous and local communities, by contrast, have accumulated generations of practical knowledge about agriculture, water management, forestry, and medicine, much of it encoded directly in vocabulary, oral narrative, and ritual practice specific to a given language (Nakashima et al., 2012). UNESCO's (2021) estimate that roughly 40 percent of the world's approximately 6,700 living languages face some degree of endangerment is therefore not merely a linguistic statistic; it is a measure of how much accumulated ecological and cultural knowledge stands at risk of irreversible loss.

The Sustainable Development Goals, adopted in 2015, supply a usable normative scaffold for this discussion. Although the SDG framework does not name language explicitly, several goals connect to it in substantive ways: SDG 4 (Quality Education), SDG 10 (Reduced Inequalities), SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action), and SDG 16 (Peace, Justice and Strong Institutions) each carry documented linkages to language policy and practice (Skutnabb-Kangas & Phillipson, 2017). Following Oliveira (2016), this paper treats linguistic sustainability as a language ecosystem's capacity to keep multiple languages — especially minority and indigenous ones — functionally alive, socially respected, and transmitted across generations despite pressure from more dominant languages. Understood this way, language loss is not an inevitable or neutral process; it is an outcome of political and economic arrangements that advantage some languages over others, arrangements that deliberate policy and technology can, in principle, counteract. A parallel body of research on bilingual and mother-tongue education reinforces this ecological argument from a pedagogical angle. Cummins (2000) shows that children acquire literacy and academic concepts most readily in a language they already command, a finding with direct bearing on India's three-language formula and its NEP 2020 successor. Taken together, the linguistic-ecology and bilingual-education literatures converge on a single proposition: linguistic diversity is not incidental to development outcomes but constitutive of them.

3. Methodology

This paper adopts a qualitative, document-based research design appropriate to a policy-analytic inquiry of this kind. Primary materials include constitutional provisions (notably Articles 29, 30, and 343), the text of the National Education Policy 2020, and publicly available documentation of government digital-language initiatives such as BHASHINI and the Kisan Call Centre scheme. These are read alongside secondary scholarly literature on linguistic ecology, sociolinguistics, bilingual education, and natural language processing for low-resource languages. The analysis proceeds thematically: constitutional and policy architecture is examined first, followed by a structured mapping of multilingualism onto specific SDG targets, an assessment of digital and AI-driven language technology, and a synthesis of structural obstacles and policy responses. Because the inquiry is interpretive rather than statistical, its contribution lies in tracing conceptual and institutional linkages rather than in testing a hypothesis through primary data collection; this is a limitation the paper acknowledges and returns to in its concluding section.

4. Constitutional Foundations and the Architecture of Language Policy

India's management of its own linguistic diversity reflects decades of constitutional compromise, political bargaining, and administrative improvisation. The Constitution of 1950 captures the founding generation's mixed instincts on the language question. Article 29 protects the right of linguistic minorities to conserve their language, script, and culture, while Article 30 permits them to establish and administer their own educational institutions. At the same time, Article 343 designates Hindi as the official language of the Union, with English granted continued official status for what was intended as a transitional period — a transition that, in practice, has never concluded (Sridhar, 2013).

The Eighth Schedule originally listed 14 languages; successive rounds of political mobilization by different linguistic communities have since expanded that number to 22. Inclusion in the Schedule confers tangible benefits, including eligibility as a medium for Union Public Service Commission examinations, yet the hundreds of languages and dialects that remain outside it continue to lack standardized scripts, institutional backing, and structured teaching resources (Mohanty, 2019).

The three-language formula, first proposed by the Kothari Commission (1964–1966) and carried forward into NEP 2020, remains India's longest-standing, though frequently contested, mechanism for handling language in schools. It requires students to study their regional or mother tongue, Hindi (or another Indian language in Hindi-speaking states), and English. Implementation, however, varies considerably across states, and in practice the formula has often privileged a state's dominant regional language over genuinely minority tongues (Kumar, 2020).

NEP 2020 nonetheless marks a substantive departure from earlier policy. Its requirement of mother-tongue instruction for at least the first five years of schooling draws on a considerable body of cognitive and pedagogical evidence showing that children learn most effectively in a language they already know (Cummins, 2000). The policy also frames multilingualism as valuable in its own right, rather than as scaffolding toward eventual fluency in other languages, positioning it as a means of sustaining cultural heritage and building cognitive flexibility. Classical, tribal, and endangered languages receive explicit mention, although critics rightly caution that recognition unaccompanied by resources tends to remain largely symbolic (Kumar, 2020).

Obtaining Eighth Schedule status has often been as much a political achievement as a linguistic one. Mobilization by Bhojpuri speakers, who number over 50 million, and by Rajasthani speakers illustrates how closely language recognition is bound up with identity politics in India; Schedule status functions simultaneously as a marker of cultural legitimacy and as a route to administrative and economic resources (Sridhar, 2013). This dynamic compounds the sustainability problem under discussion here: where recognition depends on a community's capacity for political mobilization rather than on linguistic vitality or demonstrated need, smaller and less organized groups — tribal communities in particular — are left at a structural disadvantage.

5. Mapping Multilingualism onto the Sustainable Development Goals

India's multilingual framework connects to the SDGs in ways that are both concrete and structural. Table 1 sets out these linkages across five goals, identifying the general mechanism connecting multilingual policy to each goal alongside its specific Indian institutional expression.

Table 1 Multilingualism and the SDGs: An India-Specific Mapping

SDG	Relevance to Multilingualism	India-Specific Application
SDG 4: Quality Education	Mother-tongue instruction improves learning outcomes and lowers dropout rates among linguistic minorities.	NEP 2020 mandates home-language instruction through Grade 5, benefiting tribal and regional communities.
SDG 10: Reduced Inequalities	Multilingual service delivery narrows socio-economic gaps by giving people access to information in their own language.	Regional-language digital platforms help close the urban–rural gap in delivering government schemes.
SDG 11: Sustainable Communities	Indigenous languages encode local ecological and community knowledge essential to sustainable habitation.	Traditional ecological knowledge held in Adivasi languages guides forest conservation and water-harvesting practices.
SDG 13: Climate Action	Communication in local languages strengthens community participation in climate adaptation and disaster preparedness.	State disaster-management bodies increasingly use regional languages for rural early-warning systems.
SDG 16: Peace and Institutions	Recognizing linguistic rights supports inclusive governance and eases ethno-linguistic tension.	Official language policy and Eighth Schedule recognition of 22 languages promote cultural equity.

Note. SDG = Sustainable Development Goal; NEP = National Education Policy. Compiled by the authors based on UNESCO (2021) and Government of India (2020).

The link between mother-tongue instruction and learning outcomes under SDG 4 is especially well documented in the Indian context. Studies from Odisha, Andhra Pradesh, and Chhattisgarh consistently find that children taught literacy first in their home language outperform peers taught exclusively in a state's dominant language (Jhingran, 2009). Multilingual programming under the Sarva Shiksha Abhiyan and its successor scheme, Samagra Shiksha, has been associated with measurable declines in early-grade dropout among Scheduled Tribe students in states where implementation has been comparatively robust (Government of India, 2020).

SDG 10 connects to multilingualism principally through the channel of access. Where government services such as health care, agricultural extension, and legal aid are delivered only in dominant languages, speakers of other languages face a structural informational disadvantage that compounds existing socio-economic marginalization. Devy (2022) demonstrates how monolingual norms in post offices, banks, and courts effectively exclude citizens who are fully literate only in their mother tongue; conversely, multilingual service delivery has improved uptake of welfare schemes and public health programs in tribal districts.

Indigenous languages also carry forward traditional ecological knowledge with direct relevance to SDGs 11, 13, and 15. Among the Kondh communities of Odisha, the Kui language preserves an elaborate vocabulary for forest species, soil categories, and rainfall patterns with no real equivalent in Odia or Hindi (Mishra, 2023). Built up over generations of close contact with particular ecosystems, this vocabulary underwrites sustainable farming, forest stewardship, and disaster preparedness. Because that knowledge is bound to the language that encodes it, a shift among younger Kui speakers toward Odia threatens to erode the ecological lexicon, and the practices that depend on it, in tandem.

6. Digital India and the Linguistic Frontier

India's expanding digital infrastructure, from the BharatNet broadband rollout to the Jan Dhan–Aadhaar–Mobile trinity, cuts both ways for linguistic sustainability. On one hand, digital platforms can deliver content in many languages simultaneously, support new learning materials for minority languages, and enable voice interfaces that bypass the requirement of script literacy altogether. On the other hand, digital ecosystems gravitate naturally toward dominant languages, chiefly English and, secondarily, Hindi, which risks deepening the marginal status of smaller languages still further (Choudhury, 2021).

The government's response has been institutionally ambitious even where execution lags behind intent. The Ministry of Electronics and Information Technology's BHASHINI mission aims to build AI-driven translation, speech-recognition, and text-to-speech tools across all 22 scheduled languages and, eventually, a broader set of Indian languages, an acknowledgment at the highest policy level that digital inclusion cannot be separated from linguistic inclusion

(Choudhury, 2021). Resource allocation across languages nevertheless remains starkly uneven: Hindi, Bengali, and Tamil enjoy far more sophisticated tooling than tribal languages such as Santali, Bodo, or Gondi.

Neural machine translation has matured sufficiently to produce workable translations across a growing number of Indian language pairs. Homegrown efforts such as the Anuvaad platform from the National Informatics Centre, and open-source toolkits such as iNLTK (Arora, 2020), have built genuine natural-language-processing infrastructure for Indian languages, with direct applications in translating government orders, court judgments, health advisories, and agricultural bulletins — work that could substantially widen the accessibility of the state for citizens whose first language is neither English nor Hindi.

Voice interfaces may matter even more, given how many Indians speak their mother tongue fluently without being literate in any script. Voice-based agricultural advisory under the Kisan Call Centre scheme has already improved farmers' access to real-time crop information, insurance details, and market prices (Government of India, 2020); extending comparable voice services to maternal health, MGNREGS entitlements, and legal aid could meaningfully widen inclusion for linguistic minorities.

6.1 Why Low-Resource Language Technology Lags

Building strong language technology for India's more than 1,600 languages runs into several hard constraints: insufficient digitized text for training data, the absence of standardized Unicode encodings for several tribal scripts, and a shortage of computational linguists working in these languages at all. Commercial AI development compounds the problem by allocating resources roughly in proportion to market size, producing a self-reinforcing pattern of under-investment in low-resource languages (Choudhury, 2021). Addressing this gap calls for more than engineering effort alone; public funding for corpus-building, incentives for academic research on minority-language natural language processing, and open, appropriately licensed language-data repositories all have a role to play.

7. Structural Obstacles to Linguistic Sustainability

Constitutional guarantees, policy commitments, and technological initiatives notwithstanding, India's linguistic ecosystem confronts several persistent structural pressures, summarized in Table 2.

Table 2 Challenges to Linguistic Sustainability and Potential Interventions in India

Challenge	Primary Cause	Policy / Technological Intervention
English Hegemony	Colonial legacy and global market pressures	Bilingual education models; promotion of regional-language job markets through MSME and skill-development schemes.
Resource Disparity	Lack of NLP tools for low-resource languages	BhashaNet initiative; MeitY's BHASHINI project to build AI tools for 22 scheduled languages.
Linguistic Erosion	Urbanization and socio-economic migration	Community documentation projects; UNESCO Endangered Languages Programme; Bhasha Sangam initiative in schools.
Digital Divide	Low internet penetration in tribal regions	BharatNet broadband expansion; Digital India in local languages; vernacular-interface Common Service Centres.

Note. NLP = Natural Language Processing; MeitY = Ministry of Electronics and Information Technology; UNESCO = United Nations Educational, Scientific and Cultural Organization. Compiled by the authors.

7.1 The Pull of English

The economic premium attached to English proficiency is probably the single strongest driver of language shift in India. Across socio-economic strata, including among poorer households, English-medium schooling is widely regarded as the surest route to social mobility and professional standing (Phillipson, 2009), a perception the labor market reinforces by rewarding English skills with higher wages and easier access to the formal economy. The resulting demand for English-medium education undercuts mother-tongue instruction even where the pedagogical case for it is strong (Cummins, 2000). This effect is sharpest in cities, where English's prestige is most visible and where migration and intermarriage already loosen the social networks that sustain minority languages; research in Mumbai, Chennai, and Hyderabad documents rapid intergenerational language shift, with many second-generation migrants losing active fluency in their parents' mother tongue (Sridhar, 2013).

7.2 Lopsided Resources Across Languages

Educational, technological, and administrative resources are distributed very unevenly across India's languages. Larger scheduled languages with established literary traditions, such as Tamil, Bengali, and Telugu, have reasonably good access to textbooks, dictionaries, digital keyboards, and online content. The roughly 100 languages UNESCO classifies as endangered, many of them tribal languages from Northeast India, central India, and the Andaman and Nicobar Islands, have little or no standard teaching material, no Unicode-compliant keyboards, and minimal digital footprint (Devy, 2022). This gap is worsened by a chronic shortage of teachers trained to instruct in tribal languages: even where mother-tongue medium schools exist as NEP 2020 requires, finding teachers both fluent in the relevant language and trained in multilingual pedagogy remains a serious bottleneck, one that calls for sustained investment in teacher training and incentives to attract qualified staff to remote tribal regions.

7.3 Migration, Urbanization, and Quiet Language Loss

Urbanization, internal migration, and a media landscape dominated by Hindi and English together accelerate language shift among younger speakers across many Indian communities. The process is usually gradual, passing through stages of bilingualism and mixed-language use before culminating in outright language abandonment. Documented cases span Arunachal Pradesh, home to more than 90 languages, as well as Himachal Pradesh, Rajasthan, and tribal belts of central India (Mohanty, 2019). Losing a language is never simply a communication loss; it erases a distinct way of categorizing and relating to the world. For sustainable development specifically, the most immediate cost is the disappearance of traditional ecological knowledge: crop names that encode agricultural wisdom, seasonal vocabulary that functions as an ecological calendar, and taxonomies that store medicinal knowledge (Nakashima et al., 2012). Documenting and revitalizing endangered languages is therefore better understood as a practical sustainability strategy than as a sentimental cultural project.

8. Toward a Multilingual Development Agenda

8.1 Mainstreaming Language Beyond Cultural Policy

The clearest implication of this analysis is that linguistic diversity needs to move out of its traditional silo within the Ministry of Education and cultural-preservation policy and into the mainstream of developmental planning. This means coordinating language considerations across environmental, health, agricultural, digital-infrastructure, and economic policy (Skutnabb-Kangas & Phillipson, 2017). Concretely, this could involve requiring new government digital platforms to offer interfaces in relevant regional languages as a condition of public funding, ensuring environmental-impact consultations with tribal communities take place in their own languages, and building linguistic indicators into India's Voluntary National Review reporting on SDG progress.

8.2 Rebuilding Language Technology Around Rights, Not Markets

AI-driven language technology development needs to shift from a market logic to a rights-based one. Today's concentration of language-technology investment in high-resource languages simply mirrors the commercial incentives of private firms, which have little reason to serve linguistic minorities. A rights-based alternative would treat access to digital information in one's own language as a constitutional extension of Articles 29 and 30, with public investment in language infrastructure scaled to the needs of the most marginalized language communities rather than to market size (Choudhury, 2021). BHASHINI offers a workable institutional starting point, but its scope needs to widen toward tribal and endangered languages through dedicated corpus-building, academic partnerships, and community-based data collection.

8.3 Making Multilingual Education Real, Not Symbolic

Turning NEP 2020's multilingual provisions into practice requires a sustained commitment to teacher training, curriculum design, and institutional support. Evidence consistently links well-implemented multilingual education to better learning outcomes, lower dropout rates, stronger cognitive flexibility, and a firmer sense of cultural identity among minority-language students (Jhingran, 2009). State governments need to move beyond nominal adoption of mother-tongue instruction toward producing tribal-language textbooks, training teachers in multilingual methods, and building assessment systems capable of measuring learning across several languages at once, work in which the Central Institute of Indian Languages and the NCERT have central roles to play.

8.4 Letting Communities Lead Documentation

Documentation and revitalization of endangered languages must be led by the communities who speak them, with universities, research bodies, and the state playing supporting rather than directive roles. Community-based documentation programs, including those backed by international endangered-language archiving initiatives, have shown that training community members as documentarians, oral historians, and material developers is workable (Devy, 2022). India needs a stable national framework for funding such efforts, building institutional partnerships, and archiving and disseminating what they produce. Devy's People's Linguistic Survey of India remains the most instructive model of large-scale, community-driven language documentation available in the country.

9. Conclusion

This paper has argued that India's linguistic plurality functions as a socio-ecological asset rather than a developmental burden, one capable, with appropriate support, of advancing progress on several Sustainable Development Goals simultaneously. The case was built across four analytical moves: situating linguistic diversity within a linguistic-ecology and sustainability framework; tracing India's constitutional and policy treatment of language; mapping the connections between multilingualism and specific SDGs; and assessing both the promise and the present limits of digital language technology.

The central finding is that the fate of multilingualism within India's sustainable development trajectory runs through three institutional channels — education, digital infrastructure, and environmental governance — and that in each of these, the potential contribution of linguistic diversity remains substantially unrealized. This shortfall is held back by the continuing dominance of English, uneven resourcing across languages, and a persistent tendency to treat language policy as a cultural matter rather than a developmental one. NEP 2020 and BHASHINI represent genuine institutional progress, but both remain unevenly and thinly resourced in practice, and neither has yet been matched by the scale of investment their ambitions imply.

Several implications follow from this analysis, and they extend beyond the specific recommendations offered in Section 8. First, India cannot reach its sustainable development goals through a linguistically homogenizing strategy; a model of

development that treats language as an afterthought will systematically under-serve exactly the tribal, rural, and minority-language populations that the SDGs are meant to protect. The 2030 Agenda's pledge to leave no one behind must, in the Indian context, be read as including a pledge to leave no language behind, since for hundreds of millions of Indians, language is not an ornament of culture but the everyday medium through which they reach education, health care, livelihood, justice, and ecological knowledge.

Second, the analysis suggests that linguistic sustainability and digital sustainability are now inseparable policy problems. As government services, financial systems, and information ecosystems continue to migrate online, a language that lacks a functioning digital presence risks a second, faster wave of marginalization layered on top of older patterns of educational and administrative neglect. This makes the rights-based reorientation of language technology proposed in Section 8.2 not a peripheral technical fix but a condition for linguistic survival in the coming decades. Conversely, it also means that India's investment in AI-driven translation and voice technology carries stakes well beyond convenience: done well, it could become one of the most consequential interventions in the history of Indian language policy; done poorly, or left concentrated in already dominant languages, it could accelerate exactly the erosion it is nominally designed to prevent.

Third, this paper's findings carry relevance for the Global South more broadly, and not only for India. Many multilingual postcolonial states face a structurally similar tension between administrative efficiency, which favors consolidation around one or two dominant languages, and social equity, which requires sustained investment across many. India's scale and institutional complexity make it a demanding test case, but for that same reason its partial successes and continuing gaps offer transferable lessons for other linguistically diverse nations designing their own development and digital-inclusion strategies.

Finally, because this paper relies on a qualitative, document-based methodology rather than primary fieldwork or quantitative outcome data, its conclusions should be read as a conceptual and policy mapping rather than a definitive empirical verdict on the impact of any single program. Future research would benefit from longitudinal, community-level studies that track learning outcomes under NEP 2020's mother-tongue provisions, systematic audits of language coverage and quality within BHASHINI and related AI tools, and closer ethnographic attention to how specific tribal communities themselves define and prioritize linguistic sustainability. What this paper offers is the conceptual scaffolding, and the institutional map, on which such future work can build. A development model that is genuinely sustainable and inclusive in India will, almost by necessity, be a multilingual one; the task now is to make that model real in classrooms, in code, and in the everyday administration of the state.

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