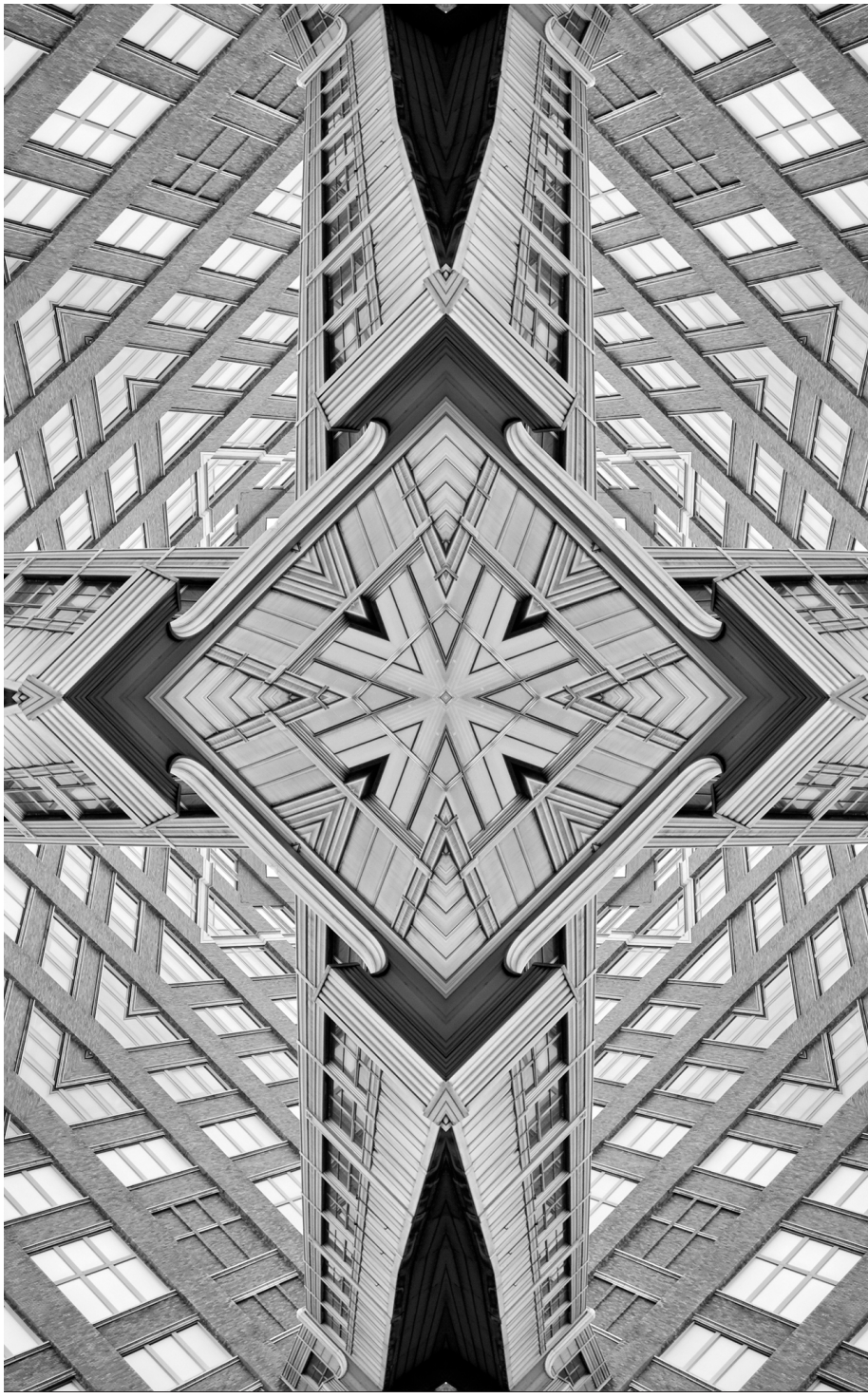
Issue Brief

ISSUE NO. 782
FEBRUARY 2025

ORF OBSERVER RESEARCH FOUNDATION



Mainstreaming Ecosystem-Based Adaptation in India

Diya Shah

Abstract

Ecosystem-based adaptation (EbA), recognised for its cost-effective and co-beneficial advantages, is seeing a global uptake. However, the number and scale of EbA projects remain limited compared to the opportunities offered by India's diverse ecosystems and indigenous practices. While lack of funding is a direct cause, the small scale of existing EbA projects also fails to attract funding. Breaking this cycle requires addressing other mechanisms that hinder EbA's growth. This brief explores India's potential and identifies key challenges to scaling up EbA.

Attribution: Diya Shah, "Mainstreaming Ecosystem-Based Adaptation in India," *ORF Issue Brief No. 782*, February 2025, Observer Research Foundation.

Introduction

Ecosystem-based adaptation (EbA), which is part of the broader nature-based solutions (NbS) approach, was defined by the 15th Convention on Biological Diversity (CBD) Conference of the Parties (COP) in 2009 as "the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change."[1] The EbA approach aims to enhance resilience by acknowledging the interconnectedness of ecosystem health and human well-being while integrating traditional adaptation methods. It addresses sustainable development goals, climate adaptation and mitigation needs, human rights and well-being, nature conservation, and biodiversity preservation.[2] These co-benefits contribute to its cost-effectiveness compared to engineering-based solutions.

Evidence strongly supports this. An overall analysis of the literature[3] shows that NbS and EbA are more cost-effective than engineering-based solutions while still effectively mitigating hazards. Approximately 65 percent of the studies, most of them in developing countries, indicate that EbA interventions are more effective overall and in specific scenarios.[4] Multiple cost-benefit analysis methods, such as net present value, internal rate of return, and benefit-cost ratio,[5] have been used to assess EbA's socio-economic value. This scientific support, along with advocacy from international organisations like the Global Adaptation Commission[6] and IPCC AR6[7] report, has promoted the integration[8] of EbA into National Adaptation Plans. Despite this momentum, EbA's growth in India has been slow, even though India's diverse ecosystems, adaptation needs, and indigenous practices provide a basis for EbA projects. To advance EbA in India, its alignment with the nation's goals and challenges must be further explored.

Ecosystem-Based Adaptation: Fit for India

Understanding India's geographical and climate features is essential for exploring opportunities for adaptation. Spanning 3.28 million square kilometres and comprising 15 diverse agroclimatic zones,[9] India is highly vulnerable to cold and heat waves, erratic rainfall, droughts, excessive humidity, and aridity. The *Third National Communication*[10] report, published in 2023, showed the rising temperature trend in India and highlights the past decade as the warmest on record. Further, there is increasing rainfall variability, with some states experiencing more dry days and others facing heavier rainfall. While every area in India has been found to be vulnerable to some degree, the *Climate Vulnerability Assessment for Adaptation Planning in India*[11] report, published in 2020, identified western and southern India as extremely vulnerable to agricultural droughts, while the northern, central, and eastern regions are moderately vulnerable. Additionally, the eastern and southern zones are extremely prone to cyclones and floods.

This variability in the magnitude and type of climate impacts amplifies the range of events India must adapt to. Nonetheless, this variability only partly explains the country's vulnerability. India shelters 1.4 billion people, 80 percent of whom live in districts vulnerable to climate change, which enhances the severity of the country's climate woes.[12] The *Financing Adaptation in India*[13] report, published in 2024, highlighted a funding gap, noting that current resources are insufficient to support adaptation action and meet diverse state-level goals. Based on the updated State Action Plans on Climate Change, six Indian states collectively require INR 444.7 billion (US$5.5 billion) from 2021 to 2030 to address adaptation needs.[14] Given the scale and diversity of climate issues, cost-effective, multi-benefit strategies like EbA offer a practical solution to limited financing.

Further, India acknowledges adaptation as an "unwelcome additionality"[15] to development as it raises costs and its benefits must be assessed alongside the financial damage caused. This is reflected in many Indian projects, highlighting the country's commitment to cost-effective adaptation. The *Initial Adaptation Communication*[16] underscores the interconnectedness of economic, political, social and adaptive processes, implicitly supporting EbA methods with its holistic, human-centric approach. Nonetheless, while development interventions addressing adaptation issues are promoted,[17] adaptive action at national and local levels remains fragmented. In the absence of a standardised framework for India's varied adaptation needs, EbA offers a structured,

Ecosystem-Based Adaptation: Fit for India

impactful, and cost-effective solution. India's emphasis on multi-benefit projects aligns well with EbA's approach, strengthening the case for its mainstreaming. Further, India's diverse ecosystems and adaptation needs, combined with its rich indigenous knowledge and grassroots engagement, create a hospitable environment for establishing EbA as a best practice. With its heterogeneous geography and traditional cultural practices, India holds tremendous potential to scale up EbA initiatives and leverage the already constrained finances to adapt economically.

Building a Framework for EbA: India's Approach

The Government of India's current adaptation measures have begun to lay a foundation for EbA. Initiatives such as the Jal Shakti Abhiyan[18] and Atal Bhujal Yojana[19] incorporate principles of ecosystem-based solutions, while the importance of NbS and indigenous knowledge has been validated, specifically in agriculture-related adaptation.[20] Coastal health and fisheries-sector programmes, including green fishing, halophyte cultivation, and seaweed farming, also align with EbA's nature-focused and human-centric approaches.

While these government-led adaptation projects do not explicitly advocate for EbA, they partially incorporate its principles to address climate stress. This changed in 2023, during the Himalayan Resilience Enabling Action Programme (HI-REAP) multi-stakeholder meeting, where the government officially acknowledged EbA's role in restoring the Indian Himalayan Region and enabling climate action.[21] This meeting further emphasised a return to indigenous water-conservation practices as traditional methods have proven to be inefficient for combating climate change.[22]

Further, the Ministry of Environment, Forest and Climate Change (MOEFCC), with UNDP's support, proposed scaling up EbA financing through the Enhancing Climate Resilience for India's Coastal Communities project, implemented in 2019.[23] Non-governmental organisations have also played a role in India's gradual adoption of EbA. The Watershed Organisation Trust's work in EbA establishment has been widespread, especially in Maharashtra. Under the Climate Change Adaptation[24] and the Water Stewardship Initiative,[25] Bhojdari has seen a 37-percent increase in incomes through climate-resilient agriculture and a 43-percent increase in forest cover and plantation via forest farming since 2016.[26] Similarly, projects for improving coastal health in Gujarat under the Biodiversity and Ecosystem-based Climate Change Adaptation programme based in Gandhinagar began in 2023.[27] These patterns present an argument for the definitive adoption of EbA practices.

Nonetheless, a major reason for the delayed uptake in India is financial limitations. Adaptation efforts already operate with limited funding, and the allocation for EbA is even more restricted. This lack of funding directly limits the number of EbA projects, while the small scale of existing projects further deters investment. Breaking this cycle requires addressing the challenges that EbA faces in securing direct financing and scaling up initiatives to attract larger funding opportunities.

Key Challenges in Upscaling EbA in India

Identifying challenges is crucial to unlocking the true potential of projects and exploring opportunities to establish EbA as a mainstream solution. Recognising challenges that directly or indirectly affect financial flows into EbA projects is an essential step in broadening EbA in India. While these challenges are broadly recognised as global problems in EbA implementation, they carry specific implications in India's context and must be examined accordingly.

Lack of Standardised Data and Monitoring Frameworks

Monitoring, evaluation, and learning (MEL) practices are increasingly recognised as critical in climate discourse. Extensive data collection and analysis are essential for all adaptation projects, including EbA projects. Nonetheless, a generic MEL framework is insufficient to evaluate impacts, considering EbA's multisectoral quality. Assessing EbA requires data collection, collation, processing, and analysis across various variables to examine interdependence and subsequent effects of EbA. Therefore, data regarding climate and geography needs to be augmented by socio-economic, bio-physical, developmental, and more such variables.

Long-term effectiveness is another crucial part of the assessment. Given EbA's dependence on ecosystem services that are vulnerable to long-term changes, it is essential to monitor impacts over time to avoid maladaptation.[28] The theory of change recognises this necessity within EbA practices and aims to provide a framework that allows long-term planning and monitoring for successful adaptation.[29]

Therefore, a complete evaluation of EbA requires a holistic analysis, making standardisation challenging across different EbA strategies. Nevertheless, it is possible to establish basic evaluation standards that mandate MEL protocols to ensure holistic analysis to some degree. Such intricate and specific MEL frameworks have been created through scientific research and systematised by various organisations such as NDC[30] and Friends of EbA (FEBA).[31]

Data and monitoring in India's EbA landscape are important for expanding the limited body of research on the impact and success of EbA projects. A major gap identified by the Initial Adaptation Communication[32] is that current assessments are primarily hazard-specific and fail to capture the socio-economic impacts of climate vulnerability. This is concerning for EbA, given

Key Challenges in Upscaling EbA in India

its interdependent nature. Without multifaceted analyses that examine impacts across sectors, potential trade-offs and adverse impacts may be overlooked.

One such focus in EbA initiatives is the impact on biodiversity. Biodiversity preservation is a vital part of establishing a healthy EbA, and neglecting its role undermines its overall effectiveness. Given India's commitment to development through adaptation, extensive evaluation is critical.

Further, social inequalities, especially those related to gender and caste, are highly susceptible to climate impacts and consequent adaptation measures. Therefore, an increase in inequalities and the subsequent reduction in welfare for any section of society needs to be monitored as part of EbA initiatives and included in its impact assessment and social success.[33]

Finally, a critical drawback to India's EbA landscape is the lack of awareness regarding data requirements and limited accessibility to such data. While standardising methodologies may be difficult, establishing a systematic data dissemination and communication framework is necessary to bridge the financing gap. The absence of standardised data or unverified data deters investors as projects that lack accessible and accurate information on their outcomes are less appealing for funding. To attract more financing, data must be readily available and vetted against established standards to ensure its reliability. This would help reduce information asymmetry and increase confidence in the validity of various EbA practices. A public repository of such data would allow investors, policymakers, and beneficiaries to assess the improvements from EbA and identify areas that require further attention, thus directing funding where required. The development of a standard practice of monitoring within India is also necessary to avoid financing maladaptive projects and increasing financing towards EbA projects.

Therefore, extensive, long-term, and sector-specific data collection is essential to understand the interrelationships between various variables, which should be explored through a causal lens to avoid unnecessary trade-offs and adverse effects. Further, examining specific socio-economic dynamics, specifically in India, is critical to ensuring holistic development and avoiding the exacerbation of inequalities. These practices should be fundamental to the systematic implementation and expansion of EbA projects. However, data monitoring and evaluation alone are insufficient without a robust communication strategy to share results. A centralised platform acting as a data repository is vital for making EbA more accessible to financiers.

Knowledge Gaps

India faces three key knowledge gaps in the implementation and practice of EbA. First, the gaps in knowledge dissemination between policy frameworks and grassroots implementation. Second, the limited exploration of synergies between scientific evidence and traditional practices. Third, the ineptness of current communication strategies.

A prevalent challenge in adaptation processes is the policy-implementation gap, where strategies designed at the policy level lose coherence as they filter down to the grassroots, compromising the precision of planned action.[34] The acute lack of awareness regarding the extent, implications, impact, and need for EbA at the community level needs to be addressed to ensure effective implementation.[35]

Thus, EbA initiatives must integrate training and education programmes at the local level, targeting both beneficiaries and on-ground implementers. Such efforts would be instrumental in ensuring long-term success by introducing comprehensive reasoning for following EbA practices after their establishment. Organisations like the Indian Council of Agricultural Research are prime examples of introducing training to reduce knowledge gaps in the development sector; however, these steps are yet to become common practice in EbA initiatives.[36]

In the context of EbA, the policy-grassroots knowledge gap becomes a two-way challenge. EbA relies on indigenous knowledge and area-specific strategies that align with local cultures and climate-action goals. However, the upward transmission of such information faces unique challenges. While traditional practices, refined over generations, are invaluable for understanding human-ecosystem interactions and informing EbA, they are often intertwined with superstitions that may be ineffective or even counterproductive. Additionally, these practices typically lack the scientific, data-driven insights needed to inform policy, leading to their frequent dismissal. Their anecdotal nature also makes them inaccessible at the policy level since they cannot be accessed in written form and require in-depth involvement with communities to be gathered.

Key Challenges in Upscaling EbA in India

To ensure the seamless dissemination of information, the practical importance and value of indigenous knowledge must be emphasised by official sources and made essential to EbA application. This principle was underscored during the 16th session of the CBD COP,[37] where indigenous involvement in the design and implementation of adaptation strategies was deemed non-negotiable for biodiversity conservation. Similarly, the use of indigenous knowledge has been emphasised in India's National Biodiversity Mission[38] and further acknowledged in India's Initial Adaptation Communication to the UNFCCC in 2023.[39] It addresses the inherent inclusion of traditional practices and local knowledge as a way of life across communities in India, "the core of which is sustainability". However, such acknowledgement can be futile if the endorsement and propagation to decision-makers are omitted.

This issue is compounded by the limited scientific understanding of EbA implementation in India. The ambiguous practicality of applying traditional knowledge necessitates scientific evidence to guide policy design. Together, both allow for forming a knowledge base that provides effective strategies that create significant measurable impact. While there is notable global evidence supporting the cost-effectiveness and impact[40] of EbA initiatives, there is an acute lack of research in the Indian context.

Given the specificity and customisation required for climate issues, regional contexts, and cultural practices in each EbA initiative, further research is necessary for effective implementation in India to avoid maladaptation.[41] While case studies from other countries can serve as baselines, their insights must be tailored to address Indian climate issues. For instance, in Odisha, mangrove plantations to save shorelines have led to increased community dependence on mangrove-related livelihoods. Cyclones have repeatedly damaged these plantations, leaving communities with diminished income and failing to address the core climate challenges.[42] While mangrove restoration can be helpful, regeneration efforts involving new plantations can disrupt local ecosystems. Here, research on the conduciveness of mangrove plantations would have been vastly helpful in implementing this EbA initiative.

Information circulation contributes to the knowledge problem, particularly regarding resource management—an area where India has abundant experience. While this knowledge has been systematically developed through extensive surveys across various government levels and refined over time, it lacks a framework for application in adaptation efforts, hindering EbA

implementation. Given that resource management varies significantly based on type, geography, and usage, district-level expertise could be pivotal role to tailoring EbA projects to specific needs. Yet, this information is not readily available and accessible to serve this purpose.

The need for an information archive is essential for effective vertical and horizontal dissemination. The complexity of stochastic ecosystems and each level of implementation underscores the importance of addressing knowledge gaps through intensive monitoring and research feedback networks to upscale and mainstream EbA.[43]

Ambiguity in Taxonomy and Unsystematic Financing

Monitoring drawbacks and knowledge gaps cannot be addressed without clarifying the taxonomy of EbA. This ambiguity leads to a lack of formal understanding of what qualifies as EbA at the national level.

Due to this vagueness, financing EbA remains unsystematic, making it difficult to accurately estimate the true funding allocated to these practices. In India, where EbA is often informally included within development projects, the actual funding for EbA is likely underestimated. Several EbA practices are undertaken under the guise of development, with their impacts not being separately assessed or recorded. Consequently, EbA benefits are unaccounted for, leading to insufficient awareness of its usefulness and financial shortcomings.

To address this, India must establish clear criteria to identify EbA initiatives, even within development projects. While India acknowledges EbA as a valuable adaptation strategy, the concept remains fairly abstract. A formal definition and clear specifications would help reduce information asymmetry regarding the profitability and success of EbA projects, which currently deters investment. FEBA has developed criteria that could serve as guidelines or be directly recognised by India.[44]

In the context of already restrained finances, the lack of awareness about EbA initiatives makes financing difficult. To increase funding, EbA projects must be made accessible for private investment. A centralised programme to identify and create a formal pipeline of EbA initiatives is required to ensure that there is a sufficient supply of projects to match available financing. Thus, mapping Indian climate issues and ecosystem services would be a good starting point

to draw attention to EbA. The Green Credit Programme (GCP) launched by the MOEFCC in 2023 offers a centralised platform that can identify areas of vulnerability and accrue funding for the same. EbA as a core component of the GCP would establish an official pipeline of EbA projects, increase direct funding for them, and raise their profile in adaptation discussions. This would also address one of the programme's major criticisms[45] by emphasising the evaluation of ecosystem needs, services, and socio-cultural interdependence. Thus, EbA would help ensure that initiatives under the GCP are not maladaptive, allowing credits to be earned without further compromising socio-economic or environmental factors.[46]

Institutional and Governance Issues

The smooth implementation of EbA as a common practice within India requires the involvement of multiple levels of government due to institutional rigidities and policy inconsistencies. Such issues are compounded by governance challenges such as land ownership and fragmentation.[47] Competing land rights act as barriers to EbA execution, while successful implementation depends on the degree of fragmentation and the participation by private landowners.[48] The Goulburn Broken Catchment[49] is often used as an example to illustrate the partial restoration of riverbanks as private owners on one bank refused to enact EbA initiatives. This poses a major problem in India, where landholdings are fragmented. According to the latest census, approximately 86 percent of operational land holdings are marginal and small.[50] Based on this, the challenges to mainstreaming EbA implementation in India are considerable.

In addition to land fragmentation, institutional fragmentation is a hindrance to mainstreaming and broad scaling.[51] Differences in government structures, policy choices, and legislation lead to varying success rates in implementations.[52] Additionally, legislative processes often favour certain adaptation practices over others, making EbA implementation more inconsistent.[53] Given India's extensive government network and stratification, scaling EbA across agroclimatic zones requires the involvement of multiple agents. As cultural diversification often occurs alongside changes in governmental jurisdiction, communication and coordination become key challenges to overcome.

Standardisation of legislative preferences and EbA mandating procedures should be established at the national level, while the application and type of EbA must remain highly customisable to application zones.

Key Challenges in Upscaling EbA in India

These issues have also been observed in other South Asian and developing nations,[54] where key governmental and institutional issues often stem from capacity and transparency concerns. India's population adds to these issues, specifically as vulnerable populations contribute significantly to population growth. While there are substantial EbA-specific hurdles to overcome, India's governance-related difficulties must be addressed concurrently.

Conclusion

Operationalising EbA as a best practice will need considerable effort and time. Therefore, a concerted push towards integrating EbA into development policy must be prioritised. The language used in government adaptation and development initiatives reflects the slow progress towards NbS for resilience. However, this pace is insufficient given escalating climate-change problems and shrinking finances. The global case for EbA is established; it is now time to tailor it to India's needs and strengthen the country's adaptive capacity to protect its populations and enhance its welfare.

Diya Shah *is Research Assistant with the Centre for Economy and Growth at the Observer Research Foundation.*

Endnotes

1 Neville Ash, Ninni Ikkala, Claire Parker, *Ecosystem-based Adaptation (EbA) Fifteenth Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP15)*, International Union for Conservation of Nature, 2009, https://www.iucn.org/sites/default/files/import/downloads/iucn_position_paper_eba_unfccc_cop_15_2.pdf.

2 IUCN, "Story: Ecosystem-Based Adaptation and the Successful Implementation and Achievement of the Sustainable Development Goals," IUCN, https://iucn.org/story/202207/story-ecosystem-based-adaptation-and-successful-implementation-and-achievement.

3 Marta Vicarelli et al., "On the Cost-effectiveness of Nature-Based Solutions for Reducing Disaster Risk," *The Science of the Total Environment* 947 (2024), https://doi.org/10.1016/j.scitotenv.2024.174524.

4 Vicarelli et al., "On the Cost-Effectiveness of Nature-Based Solutions for Reducing Disaster Risk"

5 Ninni Ikkala Nyman et al., *Making the Case for Ecosystem-Based Adaptation: The Global Mountain EbA Programme in Nepal, Peru and Uganda* (United Nations Development Programme, 2016), Chap. 3, https://www.undp.org/publications/making-case-ecosystem-based-adaptation

6 Global Adaptation Commission, *Adapt Now: A Global Call for Leadership on Climate Resilience*, World Bank Group, 2019, https://doi.org/10.1596/32362

7 Katherine Calvin et al., *Climate Change 2023: Synthesis Report, Summary for Policymakers*, The Intergovernmental Panel on Climate Change, 2023, https://doi.org/10.59327/ipcc/ar6-9789291691647.001

8 United Nations Environment Programme, *Guidelines for Integrating Ecosystem-Based Adaptation into National Adaptation Plans: Supplement to the UNFCCC NAP Technical Guidelines*, UNEP, 2021, https://wedocs.unep.org/handle/20.500.11822/36703

9 Indian Council of Agricultural Research, "Agricultural Research Data Book 2024," 2024, https://iasri.icar.gov.in/agridata/23data/chapter1/db2020tb1_2.pdf

10 Ministry of Environment, Forest and Climate Change, *Third National Communication and Initial Adaptation Communication to the United Nations Framework Convention on Climate Change* (New Delhi: Ministry of Environment, Forest and Climate Change, 2023), https://unfccc.int/sites/default/files/resource/India-TNC-IAC.pdf

11 Indian Institute of Technology Mandi, Indian Institute of Technology Guwahati and Indian Institute of Science Bengaluru, *Climate Vulnerability Assessment for Adaptation Planning in India*, Department of Science and Technology, Swiss Agency for Development and Cooperation, 2020, https://dst.gov.in/sites/default/files/Full%20Report%20%281%29.pdf

12 World Bank, "Helping India Build Resilience to Climate Change," https://www.worldbank.org/en/country/india/brief/advancing-climate-adaptation-building-resilience-to-climate-change-in-india.

Endnotes

13 Aanandita Sikka et al., *Financing Adaptation in India*, Climate Policy Initiative, 2024, https://www.climatepolicyinitiative.org/publication/financing-adaptation-in-india/

14 Sikka et al., *Financing Adaptation in India*

15 Ministry of Environment, Forest and Climate Change, *Third National Communication and Initial Adaptation Communication*.

16 Ministry of Environment, Forest and Climate Change, *Third National Communication and Initial Adaptation Communication*.

17 Sikka et al., *Financing Adaptation in India*

18 Ministry of Jal Shakti, "Jal Shakti Abhiyan," Ministry of Jal Shakti Department of Water Resources, RD and GR, https://jsactr.mowr.gov.in/.

19 Ministry of Jal Shakti, "Atal Bhujal Yojana (Atal Jal)," Ministry of Jal Shakti Department of Water Resources, RD and GR, https://ataljal.mowr.gov.in/.

20 Ministry of Environment, Forest and Climate Change, *Third National Communication and Initial Adaptation Communication*.

21 International Centre for Integrated Mountain Development, "Ecosystem Based Adaptation Strategies in the Indian Himalayan," https://blog.icimod.org/ecosystems-landscapes/ecosystem-based-adaptation-strategies-in-the-indian-himalayan-region/

22 International Centre for Integrated Mountain Development, "Ecosystem Based Adaptation Strategies in the Indian Himalayan Region"

23 UNDP Climate Change Adaptation, "Enhancing Climate Resilience of India's Coastal Communities," United Nations Development Programme, https://www.adaptation-undp.org/projects/enhancing-climate-resilience-indias-coastal-communities

24 Watershed Organisation Trust, *Climate Change Adaptation Project*, National Bank for Agriculture and Rural Development, Swiss Agency for Development and Cooperation, https://www.nabard.org/auth/writereaddata/File/24%20CCA%20Brochure-final.pdf

25 Watershed Organisation Trust, *Water Stewardship and Water Budgeting: A Pathway to Manage the Water Available in a Time of Growing Water Scarcity in Rainfed Maharashtra*, WOTR, 2020, https://wotr-website-publications.s3.ap-south-1.amazonaws.com/Policy_Brief_WSI_2_Mar_2020.pdf.

26 Watershed Organisation Trust, "An EbA Case Study – Nurturing Nature and People Amid Climate Change in Bhojdari," WOTR, https://wotr.org/2021/04/22/eba-case-study-bhojdari-maharashtra/.

27 AKDN, "Enhancing the Resilience of Coastal Communities in Gujarat," https://the.akdn/en/resources-media/whats-new/news-release/enhancing-the-resilience-of-coastal-communities-in-gujarat.

Endnotes

28 Eulalia Gómez Martín et al., "Assessing the Long-term Effectiveness of Nature-Based Solutions Under Different Climate Change Scenarios," *Science of the Total Environment* 794 (2019), https://www.sciencedirect.com/science/article/pii/S0048969721035877#s0065.

29 GIZ, UNEP-WCMC, and FEBA, eds., *Guidebook for Monitoring and Evaluating Ecosystem-Based Adaptation Interventions*, GIZ, 2020, https://www.adaptationcommunity.net/download/ME-Guidebook_EbA.pdf.

30 Nationally Determined Contributions Partnership, "ALivE - Adaptation, Livelihoods and Ecosystems Planning Tool," NDC Partnership, https://ndcpartnership.org/knowledge-portal/climate-toolbox/alive-adaptation-livelihoods-and-ecosystems-planning-tool.

31 Friends of EbA, "EbA Tools Navigator," https://toolsnavigator.friendsofeba.com/.

32 Ministry of Environment, Forest and Climate Change, *Third National Communication and Initial Adaptation Communication*.

33 Ministry of Environment, Forest and Climate Change, *Third National Communication and Initial Adaptation Communication*.

34 Shafaq Masud and Ahmad Khan, "Policy Implementation Barriers in Climate Change Adaptation: The Case of Pakistan," *Environmental Policy and Governance* 34, no. 1 (2023), https://doi.org/10.1002/eet.2054

35 UNEP and Global Adaptation Network, "Challenges of Scaling up and Financing Ecosystem-Based Adaptation in Africa: The Role of Innovation," United Nations Environment Program, https://www.unep.org/gan/news/blogpost/challenges-scaling-and-financing-ecosystem-based-adaptation-africa-role-innovation.

36 Indian Council of Agricultural Research, "Training Programme and Distribution of Fingerlings to Empower Local Farmers Organised," https://icar.org.in/training-programme-and-distribution-fingerlings-empower-local-farmers-organised

37 Convention on Biological Diversity, "Biodiversity COP 16: Important Agreements Reached Towards Making Peace with Nature," https://www.cbd.int/article/agreement-reached-cop-16

38 India Science, Technology and Innovation Portal, "National Biodiversity Mission," https://www.indiascienceandtechnology.gov.in/st-visions/national-mission/national-biodiversity-mission

39 India, Ministry of Environment, Forest and Climate Change, *Third National Communication and Initial Adaptation Communication*.

40 Vicarelli et al., "On the Cost-Effectiveness of Nature-Based Solutions for Reducing Disaster Risk."

41 Shweta Bhardwaj and Anil Kumar Gupta, "Ecosystem-Based Approaches and Policy Perspective from India," In *Disaster and Risk Research: GADRI Book Series* (Springer Nature Link, 2021), 101–25, https://doi.org/10.1007/978-981-16-4815-1_5

Endnotes

42 Akshit Sangomla, "Climate Crisis: Increased Evidence of Maladaptation, Says IPCC Synthesis Report," Down to Earth, March 20, 2023, https://www.downtoearth.org.in/climate-change/climate-crisis-increased-evidence-of-maladaptation-says-ipcc-synthesis-report-88345

43 Ministry of Environment, Forest and Climate Change, *Third National Communication and Initial Adaptation Communication*.

44 Friends of EbA, "EbA Criteria," https://friendsofeba.com/eba-criteria/

45 Simrin Sirur, "Green Credit Scheme's 'Methodology' Doesn't Inspire Confidence Among Experts," Mongabay-India, March 19, 2024, https://india.mongabay.com/2024/03/green-credit-schemes-methodology-doesnt-inspire-confidence-among-experts/

46 Anuja Malhotra and Abi Tamim Vanak, "How Green is the Green Credit Programme?," *Frontline*, February 24, 2024, https://frontline.thehindu.com/environment/green-credits-where-they-are-due/article67870309.ece.

47 Anna Lukasiewicz, Jamie Pittock, and Max Finlayson, "Institutional Challenges of Adopting Ecosystem-based Adaptation to Climate Change," *Regional Environmental Change* 16, no. 2 (2015), https://doi.org/10.1007/s10113-015-0765-6.

48 Lukasiewicz, Pittock, and Finlayson, "Institutional Challenges of Adopting Ecosystem-Based Adaptation to Climate Change"

49 Lukasiewicz, Pittock, and Finlayson, "Institutional Challenges of Adopting Ecosystem-Based Adaptation to Climate Change"

50 Shunya Fodder & Animal Nutrition, "India's Fragmented Land Holdings & Fodder Production," https://www.shunya.live/indias-fragmented-land-holdings-fodder-production/

51 Christine Wamsler and Stephan Pauleit, "Making Headway in Climate Policy Mainstreaming and Ecosystem-based Adaptation: Two Pioneering Countries, Different Pathways, One Goal," *Climatic Change* 137, no. 1–2 (2016), https://doi.org/10.1007/s10584-016-1660-y

52 Lukasiewicz, Pittock, and Finlayson, "Institutional Challenges of Adopting Ecosystem-Based Adaptation to Climate Change"

53 Nathalie Doswald and Matea Osti, *Ecosystem-Based Approaches to Adaptation and Mitigation – Good Practice Examples and Lessons Learned in Europe*, BFN Federal Agency for Nature Conservation, 2011, https://www.researchgate.net/publication/275583878

54 GIZ, *Financing Ecosystem-based Adaptation Learning Brief,* 2017, https://www.adaptationcommunity.net/wp-content/uploads/2018/01/giz2017-en-learning-brief-financing-eba-low-res.pdf

Images used in this paper are from Getty Images/Busà Photography.

ORF OBSERVER RESEARCH FOUNDATION

Ideas . Forums . Leadership . Impact

20, Rouse Avenue Institutional Area,
New Delhi - 110 002, INDIA
Ph. : +91-11-35332000. **Fax :** +91-11-35332005
E-mail: contactus@orfonline.org
Website: www.orfonline.org