

GLOBAL LESSONS FOR INDIA'S ADAPTATION STRATEGY

Comparative Overview of National Adaptation Plans

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SUMMARY

This report, commissioned by GIZ, presents a comparative analysis of the National Adaptation Plan (NAP) processes implemented by Bangladesh, Brazil, Germany, South Africa, and Sri Lanka. The primary objective is to extract insights and provide recommendations for optimizing and enhancing India's NAP process. The study employs a generic set of questions tailored to each country's NAP context to extract detailed insights, collecting data through online interviews and questionnaires. The countries were selected based on their similarities to India in socio-economic markers and other aspects, with Germany included for its advanced practices.

The analysis reveals that all five countries have demonstrated significant coordination and stakeholder engagement in their NAPs, involving ministries, civil society, the private sector, and local communities. This participatory approach ensures that the needs and knowledge of diverse stakeholders are incorporated, enhancing the relevance and effectiveness of adaptation measures.

Scientific tools and data play a crucial role in shaping the NAPs, as seen in Bangladesh and South Africa, which use advanced tools like the Center for Environmental and Geographic Information Services (CEGIS) and the Council for Scientific and Industrial Research (CSIR) to tailor strategies to local contexts. Robust monitoring, evaluation, and learning frameworks are central to these plans, helping track progress and make necessary adjustments.

Gender integration varies across the NAPs, with some countries demonstrating comprehensive gender mainstreaming while others require improvement. Recognizing the differentiated impacts of climate change, these plans aim to ensure gender-responsive strategies.

Common challenges faced by these countries include inadequate funding, coordination issues across government levels, and the need for more private sector involvement. Countries like South Africa and Brazil have identified specific gaps in their initial plans and are working to address them.

Best practices in preparing NAPs include integrating scientific knowledge, stakeholder engagement, and robust policy frameworks. Examples include inclusive planning, mainstreaming adaptation into development planning, and establishing strong monitoring and evaluation frameworks.

GENDER INTEGRATION VARIES ACROSS THE NAPs, WITH SOME COUNTRIES DEMONSTRATING COMPREHENSIVE GENDER MAINSTREAMING WHILE OTHERS REQUIRE IMPROVEMENT.

Each country's unique national context requires tailored approaches to NAP development and implementation. Coordination across sectors and levels of government remains a significant challenge, necessitating strategies that engage community stakeholders directly and perform sector-specific vulnerability assessments.

The importance of timelines and funding is highlighted, with the NAP process typically taking at least three years. Clear timelines and funding sources are critical for effective planning and implementation.

Subnational processes and locally-led planning are emphasized, as seen in countries that have developed local adaptation plans at the subnational level. Encouraging smaller cities and municipalities to create their adaptation plans and conduct vulnerability assessments focused on their unique challenges is vital.

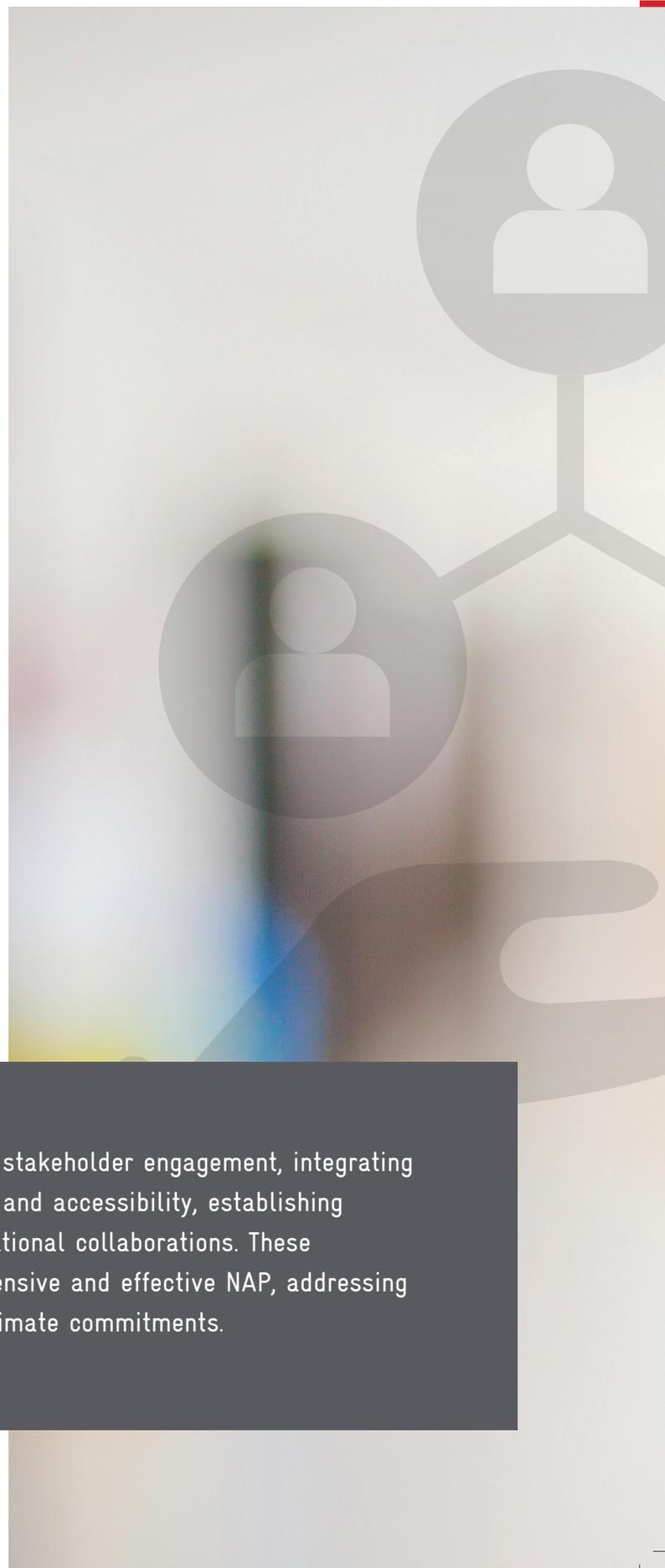
Private sector collaboration is often lacking in NAPs. Engaging the private sector from the outset to define specific areas for involvement and design strategies with tangible outcomes is essential for structured collaboration.

Dynamic monitoring and evaluation systems are necessary to allow for regular policy updates based on ground-level feedback and scientific advancements.

Access to actionable data from global climate models has become more affordable over the last decade. Investing in foundational knowledge in earth systems science and understanding the full range of factors that increase vulnerability, including socio-economic factors, is crucial.

Cross-sectoral cooperation is vital, with the adoption of integrative concepts in policy discussions and strategic planning fostering collaboration. Concepts like climate resilience, ecosystem services, and urban sustainability help link sectors and promote interdisciplinary cooperation.

The recommendations for India include enhancing stakeholder engagement, integrating gender considerations, improving data integration and accessibility, establishing robust monitoring systems, and leveraging international collaborations. These strategies will aid India in developing a comprehensive and effective NAP, addressing climate change challenges, and meeting global climate commitments.



INTRODUCTION

Report Objectives

Commissioned by GIZ, this report analyzes National Adaptation Plan (NAP) processes from various countries to offer recommendations for optimizing India's NAP process. This is crucial in the context of international climate change commitments and sustainable development goals (SDGs).

In May 2022, the Indo-German Partnership for Green and Sustainable Development was established, highlighting international cooperation on SDGs and Paris Climate Agreement obligations. Germany's financial and technical support emphasizes the commitment to sustainable capacity-building projects addressing climate change.

The Sixth Assessment Report by the Intergovernmental Panel on Climate Change stresses the urgent need for strong climate adaptation strategies, particularly for countries like India, where many depend on climate-sensitive sectors. India must learn from international precedents, such as Brazil, South Africa, Bangladesh, and Sri Lanka, to improve its NAP process.¹

Overview of the UNFCCC's NAP Process

The UNFCCC initiated the National Adaptation Plan (NAP) process at COP 16 in 2010 to help countries, especially those highly vulnerable to climate change, build adaptive capacity and resilience. The NAP process focuses solely on adaptation measures and aims to integrate climate change adaptation into policies and programs across sectors like water, agriculture, and health.

The process has several phases: preparatory elements, implementation strategies, and reporting, monitoring, and review phases, ensuring adaptation plans are adaptable to future climate scenarios. Effective adaptation requires strong coordination between governmental and non-governmental sectors, understanding of climate risks, and sustained political commitment.

¹ IPCC, Working Group II: Impacts, Adaptation and Vulnerability, 2022

Overview of UNFCCC NAP Guidelines

The UNFCCC provides guidelines for NAP processes to integrate climate change adaptation into development planning, focusing on medium- and long-term needs.² The NAP process aims to reduce climate vulnerability through adaptive capacity and resilience, guided by principles such as:

- **Country-driven:** Tailored to specific national and regional contexts.
- **Participatory and transparent:** Involves stakeholders actively in planning and implementation.
- **Gender-sensitive:** Addresses vulnerabilities of men and women, promoting gender equity.
- **Based on best science and traditional knowledge:** Combines scientific knowledge with traditional practices.
- **Ecosystem-Based:** Utilizes biodiversity and ecosystem services to enhance resilience.
- **Continuous and flexible:** Adaptation strategies are regularly reviewed and adjusted.

The NAP process includes four elements:

1. **Laying the Groundwork and Addressing Gaps:** Initial assessments of climate impacts, vulnerability, and adaptation, identifying knowledge gaps.
2. **Preparatory Elements:** Compiling necessary information, assessing vulnerabilities, identifying adaptation options, and strengthening institutional frameworks.
3. **Implementation Strategies:** Developing strategies for NAP implementation, prioritizing adaptation options, integrating them into plans, and ensuring timelines and budgets.
4. **Reporting, Monitoring, and Review:** Evaluating the effectiveness of NAPs, monitoring progress, identifying gaps, and updating plans.

The UNFCCC supports countries, especially developing ones, with technical assistance, capacity-building programs, and financial resources through entities like the Global Environment Facility (GEF). The NAP Global Network, established in 2014, fosters collaboration among governments, practitioners, and donors to enhance resilience and adaptive capacity, providing technical assistance and promoting the integration of climate adaptation into national policies.³

² National Adaptation Plans Technical Guidelines for the National Adaptation Plan Process. UNFCCC LDC Expert Group, December 2012

³ NAP Global Network, Reporting on Progress in National Adaptation Plan Processes, 2023

METHODOLOGY

The methodology follows the 2012 guidelines from the Least Developed Countries Expert Group (LEG) for National Adaptation Plans (NAPs), focusing on initiation, stocktaking, planning, implementation, and monitoring. A question matrix was created to analyze each country's approach to stakeholder engagement, climate scenarios, national priorities, and evaluation systems. Five countries—South Africa, Bangladesh, Sri Lanka, Brazil, and Germany—were selected for comparison. Data was gathered via online interviews and questionnaires. Links were sent to stakeholders to facilitate participation, aiming to provide insights into each country's NAP context and adaptation strategies.

Interview participants

The table below lists contact details for the interview participants who contributed valuable insights and information to this report.



COUNTRY ASSESSMENTS

Bangladesh⁴

The National Adaptation Plan (NAP) of Bangladesh was developed under the leadership of the Ministry of Environment, utilizing the Bangladesh Climate Change Act of 2010, which led to the creation of the Climate Change Trust Fund and the Mujib Climate Prosperity Plan of 2030. The NAP aims to build a climate-resilient nation by developing strategies for sectors such as water resources, disaster management, fisheries, aquaculture, crops, and livestock. *“Overall, the multifaceted approach employed in developing the Bangladeshi NAP serves as a model for evidence-based and participatory climate adaptation planning, with potential applicability and relevance in other contexts facing similar climate-related risks and vulnerabilities”* - Interview participant.

Bangladesh’s NAP includes 11 climate stress areas with 113 interventions identified through data collection and assessment. It is aligned with the 2100 Delta Plan and Sustainable Development Goals (SDGs), highlighting its vertical and horizontal integration. The NAP uses CEGIS tools for analysis, focusing on specific ecological zones, identifying priorities, and implementing strategies. A gender analysis ensures that gender considerations are integrated, addressing differentiated impacts and needs.

The NAP was developed with extensive stakeholder consultations, including national and sub-national levels, using workshops, interviews, and focus group discussions. *“A multifaceted communication strategy was employed to ensure stakeholders were well-informed about the intricate details of climate change risks, hazards, and impacts”* - Interview participant. A strategic communication approach and tools like the traffic light system for monitoring were employed to facilitate understanding and participation. The NAP emphasizes multi-stakeholder engagement, including ministries, civil society, and academia, supported by the Climate Change Trust Fund for both development and implementation.

“Central to the success of the NAP is the establishment of funding arrangements designed to mobilize resources for adaptation activities. This involves leveraging a combination of domestic resources, international climate finance, public-private partnerships, and other innovative financing mechanisms. Transparency and accountability are key principles guiding the allocation and management of these funds, ensuring that they are used efficiently and equitably” - Interview participant.



THE NAP USES CEGIS TOOLS FOR ANALYSIS, FOCUSING ON SPECIFIC ECOLOGICAL ZONES, IDENTIFYING PRIORITIES, AND IMPLEMENTING STRATEGIES.

⁴ Bangladesh Ministry of Environment, Forest and Climate Change, National Adaptation Plan 2023-2050, 2022

The NAP integrates health as a cross-cutting sector, addressing the impacts of climate change on public health challenges such as nutrition and diseases. Local and traditional knowledge are incorporated to enhance resilience, recognizing practices like indigenous seed keeping and farming techniques. Private sector engagement focuses on areas such as climate-smart agriculture and sustainable infrastructure.

Stocktaking involved government, civil society, and academia, using literature reviews, surveys, and consultations to assess adaptation efforts, challenges, and gaps. This informed the development of strategies tailored to ecological zones, prioritizing specific climate hazards. Alignment with national plans ensures the NAP supports broader development goals.

The NAP employs a Monitoring, Reporting, and Verification (MRV) system and a Development Results Framework (DRF) with SMART indicators to track progress and ensure accountability. The framework supports continuous learning, adapting strategies based on evidence and feedback.

Vertical integration is emphasized, with coordination between national and sub-national levels led by the Ministry of Environment. Local governments and community-based organizations play critical roles in tailoring strategies to regional needs. Horizontal integration involves sectors such as water resources, agriculture, disaster risk reduction, infrastructure, health, and biodiversity, highlighting interconnectivity and resilience-building.

The NAP addresses challenges such as data gaps, coordination, and resource allocation by proposing capacity-building initiatives and integrated data management systems to enhance monitoring and evaluation efforts. *“By following these processes and incorporating local adaptation plans of action, the NAP can deliver scenarios that enhance understanding of future climate risks and guide adaptive actions tailored to specific communities and contexts.”* - Interview participant.

Brazil⁵

Brazil's National Adaptation Plan to Climate Change outlines a comprehensive strategy across various sectors to prepare for climate impacts. The plan is coordinated by the Ministry of Environment and emphasizes a multi-stakeholder approach, involving governments, businesses, civil society, and international partners to ensure inclusive and region-specific adaptation measures. It includes developing sector-specific guidelines, enhancing climate research, promoting technology transfer, and increasing investments in adaptation initiatives.

“Effective engagement requires linking national and local levels.”

National adaptation plans must establish a connection between national strategies and local implementation to address unique community challenges effectively” - Interview participant.

In agriculture, the plan focuses on resilience through sustainable practices and climate-resilient crops, with partnerships like EMBRAPA to innovate farming techniques. For water resources, it modernizes irrigation, enhances storage capacities, and implements integrated watershed management. Biodiversity strategies prioritize conservation and sustainable use, while public health

⁵ Brazil Ministry of Environment, National Adaptation Plan to Climate Change, 2016

strategies address climate-induced health risks by strengthening infrastructure and surveillance. Urban development focuses on climate- resilient infrastructure, and coastal zones implement sea defenses and natural barrier restoration.

“The integration of young people into national adaptation planning represents more than just a procedural step; it’s about harnessing their creativity, energy, and passion to shape a resilient future for all.” - Interview participant.

The adaptation plan’s monitoring and evaluation system uses climate modeling and risk assessment tools to adapt strategies to emerging challenges. Initially launched by the Ministry of Environment and the Ministry of Science and Technology, the process engaged civil society and government entities to discuss adaptation strategies. GIZ provided support for meetings and stakeholder engagement. The plan includes cross-cutting issues like climate justice and sustainable development across sectoral plans.

A stocktaking by the Ministry of Science and Technology assessed climate data and adaptation barriers. The plan aligns with development policies, engaging stakeholders like finance ministries to integrate climate change into national budgets. Climate scenarios use IPCC and BESM models, while sectoral plans develop criteria and tools with a gender lens, coordinated by the Ministry of Women.

Stakeholder consultations included extensive engagement with local communities and municipalities to address local vulnerabilities. The municipal adaptation plan in Santos exemplifies local-level engagement despite federal resource limitations. The communication strategy aims to reach broader audiences, emphasizing the importance of adaptation for Brazil’s G20 presidency. Horizontal and vertical integration involve cross- sectoral collaboration and capacity building across municipalities, ensuring cohesive action across government levels.

“By aligning efforts with global adaptation goals, fostering youth inclusion in financing approaches, and setting specific targets for youth participation in monitoring and evaluation frameworks, we can empower young people to lead us towards a future characterized by resilience and sustainability” - Interview participant.

The monitoring and evaluation system, coordinated by the Ministry of Environment and the Ministry of Science and Technology, is crucial for presenting progress internationally. The NAP demonstrates strong national and sub-national coordination, involving state and municipal governments in implementing adaptation strategies tailored to local conditions. This decentralized approach integrates community knowledge into adaptation measures through public consultations and workshops.

Sectoral integration aligns agriculture with water management, urban planning with health objectives, and biodiversity with ecosystem services. Challenges include harmonizing policies and actions across sectors. Brazil addresses these by ensuring inter-ministerial coordination and stakeholder engagement. The M&E framework establishes baseline data, develops SMART indicators, and involves stakeholders to ensure transparency and iterative learning. Despite challenges like data gaps and capacity limitations, Brazil’s NAP emphasizes adaptive management and continuous improvement through stakeholder feedback and data-driven insights.

Germany⁶

The German National Adaptation Strategy (DAS) is a comprehensive framework designed to enhance resilience to climate change impacts across various sectors. Developed by KomPass, the strategy emphasizes a multi-stakeholder approach involving federal and state governments, businesses, civil society, and international partners. It focuses on reducing vulnerability and improving adaptive capacity through detailed implementation plans known as Adaptation Action Plans (APA I, II, and III). *“The adaptation process in Germany began before 2008, with the first national adaptation strategy officially launched that year. This effort was spearheaded by the Ministry for the Environment, which coordinated the initiative through an inter-ministerial working group”* - Interview participant.

The DAS operates on both strategic and operational levels, integrating climate adaptation into federal policies and enhancing cooperation between federal and Länder (state) governments. KomPass provides policy advice, conducts environmental research, and disseminates information to support the strategy. Indicator-based monitoring is used to measure achievements and guide national implementation. The strategy’s key areas include water management,

6 Second Progress Report on the German Strategy for Adaptation to Climate Change (DAS). 2024

agriculture, disaster risk management, health, urban planning, biodiversity, and economic resilience.

“Horizontal coordination across various ministries and agencies was foundational to Germany’s adaptation approach from the beginning, recognizing the cross-sectoral nature of the issue” - Interview participant. The strategy highlights the need for stronger institutionalization of climate adaptation within federal ministries and improved horizontal and vertical cooperation. Financial support from the federal government is crucial for effective implementation, with an emphasis on mainstreaming adaptation within society, considering social and justice issues. The DAS also stresses the importance of broader participation and consultation.

Sectoral integration is central to the DAS, with efforts focused on water-efficient agriculture, enhancing public health systems to cope with climate-related emergencies, and ensuring infrastructure resilience. Biodiversity strategies prioritize conservation, while economic resilience plans integrate climate adaptation into economic planning, targeting sectors like tourism and industry.

“Currently, Germany’s strategy includes a national climate adaptation law passed last year. This law mandates the development of measurable adaptation targets, reflecting a significant shift towards concrete, actionable goals” - Interview participant. A robust Monitoring and Evaluation (M&E) framework is essential for assessing progress and effectiveness. This framework includes developing indicators, systematic data collection, regular reviews, and stakeholder engagement. Challenges such as data gaps and capacity building are addressed through targeted initiatives. The Climate Impact and Risk Assessment (KWRA) evaluates future climate impacts and informs adaptation action prioritization.⁷

“Germany’s climate risk assessments incorporate different scenarios, such as RCP 8.5 for pessimistic projections. The German Meteorological Service plays a crucial role in data collection and is currently developing a new platform to provide public access to processed climate data” - Interview participant. Germany contributes to European and international climate adaptation efforts, aligning with the European Climate Law and Paris Agreement. The vision for a climate-resilient Germany extends to 2100, focusing on sustainable development and reducing vulnerabilities. Vertical and horizontal integration ensure coordination across government levels and sectors, with a steering group managing the DAS and involving all relevant ministries.

The strategy began in 2008, led by the Ministry for the Environment. An inter-ministerial working group coordinates adaptation efforts across government departments, ensuring extensive collaboration. The cluster approach addresses resilience across human, economic, environmental, and infrastructure sectors, with sector-specific plans detailing adaptation measures.

Germany faces challenges such as inconsistent policy implementation, data gaps, and the need for improved impact assessments. The DAS addresses these through enhanced communication, stakeholder engagement, and the development of new adaptation instruments. The Sponge City concept exemplifies innovative solutions for urban water management.

Participatory processes involve federal, state, and municipal levels, ensuring diverse perspectives in planning. Communication strategies target broad audiences, emphasizing inclusivity and engagement, particularly among younger populations. The National Adaptation Award *“Blauer Kompass”* recognizes innovative projects, encouraging community involvement and sustainable solutions.

Germany plans to continue refining its adaptation strategy with a new Precautionary Adaptation Strategy and the fourth Adaptation Action Plan set for 2024. The National Climate Adaptation Law established in 2023 supports ongoing efforts to enhance resilience and sustainability across all sectors. By addressing key challenges and fostering collaboration, Germany aims to strengthen its climate adaptation strategies both domestically and internationally.

⁷ German Environment Agency, Climate Impact and Risk Assessment for Germany, 2021

South Africa⁸

South Africa's National Adaptation Plan (NAP) is overseen by inter-ministerial and intergovernmental committees and involves community members, civil society organizations, researchers, and the private sector. The NAP, which serves as the National Climate Change Adaptation Strategy (NCCAS), is embedded in national climate laws and policies and is reviewed every five years. Its vision is to guide South Africa towards climate resilience, outlining six goals, four strategic objectives, and nine strategic interventions.

“The national climate change adaptation strategy which eventually is our NAP was commissioned as part of the white paper policy on climate change that calls for the development of a national adaptation strategy. There has been a lot of research that went into the NAP to develop the scenarios and the possible adaptation interventions on those projected scenarios” - Interview participant. However, the cluster approach used may pose implementation challenges due to insufficiently detailed actions. The NAP identifies several gaps, including the absence of a vulnerability and resilience methodology and a unified climate platform. Provinces have conducted risk and vulnerability assessments, but implementation is hampered by inadequate climate finance. Some objectives lack SMART criteria. Gender is a guiding principle in the NAP, integrated into various sectors, though more mainstreaming is needed. The NAP acknowledges private sector funding opportunities but lacks clarity on their development and implementation roles. The NAP references a communication strategy and a monitoring and evaluation system, but specifics are missing.

Stakeholders were engaged through various committees. *“Funding was a key challenge as climate change is an unfunded mandate. Sectors said they had no additional resources*

for this and didn't have anything on climate change. They worked with donors and bilateral partners to mobilize resources for this” - Interview participant. The NAP integrates traditional knowledge and involves elders in the adaptation process. The cluster approach focuses on human, economic, environmental, and infrastructure resilience. While sectors like tourism and mining were not fully addressed initially, updates are planned. The NAP aligns with existing policies and uses the National Climate Risk and Vulnerability Assessment Framework for risk assessments. Low and high climate scenarios, based on IPCC reports, guide cost estimations for adaptation. The CSIR provides climate data, but a unified data platform is still under discussion. The NAP incorporates community-based adaptation approaches.

Stakeholder consultations took place at national and subnational levels, involving civil society and the private sector. While a service provider facilitated a bottom-up approach, concrete strategies for private sector involvement are still needed. The Environment department's communication unit conducted training and disseminated messages. Future updates will adopt an integrated

THE NAP IDENTIFIES SEVERAL GAPS, INCLUDING THE ABSENCE OF A VULNERABILITY AND RESILIENCE METHODOLOGY AND A UNIFIED CLIMATE PLATFORM. PROVINCES HAVE CONDUCTED RISK AND VULNERABILITY ASSESSMENTS, BUT IMPLEMENTATION IS HAMPERED BY INADEQUATE CLIMATE FINANCE. SOME OBJECTIVES LACK SMART CRITERIA.

⁸ Republic of South Africa Department of Forestry, Fisheries and the Environment, National Climate Change Adaptation Strategy, 2020

communication approach. Provincial strategies are included in the NAP, with risk and vulnerability assessments completed. Implementation is supported by government and partners, with provincial strategies and sector-specific priorities integrated into the NAP.

“Very strong civil society participation and house of chiefs/leaders. Undertook study on this to understand what information rests in traditional systems. SA has rural areas that have people who have seen the evolution of climate change. The study provided the basis for this” - Interview participant. The National Climate Change Information System (NCCIS) and National Climate Change Response Database (NCCRD) collect adaptation information at national and subnational levels. However, implementation is hindered by a lack of dedicated funding, leading to reconsideration of interventions. Partnerships with non-state actors can expedite adaptation implementation.

South Africa’s NCCAS enhances coordination between national and subnational levels, aligning with broader climate policies. Local governments develop tailored adaptation plans aligned with national objectives, ensuring comprehensive coverage of unique challenges. Coordination challenges include aligning policies across sectors and sustaining stakeholder engagement, which the NCCAS addresses through capacity building, improved communication, and stakeholder participation. Horizontal integration coordinates efforts across sectors such as water, agriculture, disaster management, and health, emphasizing water efficiency and agricultural sustainability, linking disaster preparedness with public health, and integrating climate risk assessments into urban planning. Conservation and ecosystem services contribute to climate adaptation, while economic resilience involves adjusting economic activities and industries to climate variability.

The NCCAS promotes a whole-of-society approach, engaging stakeholders in climate action planning. Data integration, monitoring, and evaluation are emphasized to refine strategies as conditions change. Capacity building and resource allocation equip sectors with necessary tools and knowledge for adaptation. The Monitoring and Evaluation (M&E) framework assesses adaptation measures’ effectiveness, tracking progress and informing policy adjustments. Objectives include measuring performance, supporting adaptive learning, and ensuring accountability and transparency. Key components involve developing indicators, systematic data collection, and stakeholder engagement. Challenges include data integration and stakeholder engagement across government and society. The M&E framework addresses these through capacity building and clear roles and responsibilities, enhancing climate adaptation efforts across governance levels.

Sri Lanka⁹

The development of Sri Lanka’s National Adaptation Plan (NAP) began in 2015, coordinated by the Climate Change Secretariat at the Ministry of Mahaweli Development and Environment. This was in collaboration with line ministries and agencies involved in adaptation, using UNFCCC NAP guidelines. The NAP aims to ensure sustainable development by minimizing climate change impacts on citizens, ecosystems, and the economy. The plan identifies nine vulnerable sectors: food security, water, coastal areas, health, human settlements, biodiversity, tourism, export development, and industry-energy- transportation. However, it lacks a legislative framework to anchor the process.

“All stakeholders invited together to see what to do next. Sectors more comprehensive and going down to provincial level. There are sectoral meetings and technical working groups to help and also do the validation for the new process” - Interview participant.

During its development, Sri Lanka’s NAP identified gaps in information, technology, governance, and resources. To address these issues, a stock-take was conducted and Sector Vulnerability Profiles (SVPs) and a Technology Needs Assessment (TNA) were developed. The updated NAP aims to address these gaps and include additional gender, resource mobilization, and waste management considerations. *“The first NAP was not gender sensitive but gender neutral. The revision is being made gender sensitive and a Gender and Social Inclusion Action plan is also being prepared”* - Interview participant. However, the plan remains largely gender-neutral.

The NAP’s integration with national policies and international commitments like the Sustainable Development Goals is clear, but it is unclear how subnational levels have integrated policies and strategies. The plan includes performance

⁹ Ministry of Mahaweli Development and Environment, National Adaptation Plan for Climate Change Impacts in Sri Lanka 2016-2025, 2016

indicators to track implementation, but a detailed framework for this is still in development. *“KPIs were developed based on the activities identified. It is expected to manage these for progress monitoring. The framework which has been designed to monitor the NDCs will be adopted here”* - Interview participant. Initial data was gathered using IPCC AR5 scenarios and a Vulnerability Data Book, with plans to use crop hazard maps and multi-hazard models.

Stakeholder consultations involved ministries, departments, civil society, and the private sector. Workshops and forums were conducted for awareness creation, though there was no formal communication strategy. The NAP emphasizes vertical integration, involving national and subnational entities in planning and implementation. Local government units play a crucial role in tailoring adaptation measures to specific conditions. The updated NAP will include Provincial Adaptation Plans (PAPs) to enhance local implementation.

“They are having a resource mobilization strategy for the resources to be used for this. Currently doing some costing to know how much it will cost so that those who invest know the cost” - Interview participant.

Horizontal integration connects sectors like agriculture, water, health, and infrastructure, addressing climate change impacts across domains. Coastal management strategies aim to protect marine biodiversity, while infrastructure planning considers rising sea levels. Health sector adaptation is linked to water management to control disease outbreaks. Cross-sectoral approaches involve resource management, emergency preparedness, and community engagement.

The Monitoring and Evaluation (M&E) framework tracks progress, assesses adaptation impacts, and supports continuous improvement. Objectives include tracking and reporting on adaptation activities, evaluating effectiveness, and using insights for adaptive learning. The framework emphasizes stakeholder engagement and alignment with national and global policies. Challenges include data gaps and technological limitations, addressed through international support and collaboration.

COMPARATIVE ANALYSIS

The comparison of climate change adaptation strategies reveals key similarities and differences across Bangladesh, Brazil, Germany, South Africa, and Sri Lanka. A notable similarity is that all countries emphasize vertical and horizontal integration, highlighting the importance of collaboration between national and local governments and across sectors like agriculture, water, and health.

However, each country approaches these challenges differently. Bangladesh and Sri Lanka integrate local knowledge into their plans, relying on community-based strategies for regional vulnerabilities. Brazil focuses on capacity-building across municipalities, involving community members to understand local vulnerabilities. Germany takes a federal approach, integrating adaptation into national policies with cross-sectoral collaboration, while South Africa uses a cluster approach, integrating human and economic resilience with ecological infrastructure. In monitoring and evaluation, Germany has a systematic framework, whereas Brazil is still developing its system. Regarding gender considerations, Brazil makes it central to its strategy, involving its Ministry for Women, while Germany addresses gender across other policy areas.

The following table provides a comparative analysis of the climate change adaptation strategies of Bangladesh, Brazil, Germany, South Africa, and Sri Lanka, focusing on their respective focus areas and approaches, vertical and horizontal integration, monitoring, evaluation, and learning systems, and the integration of gender considerations into National Adaptation Plans (NAPs).

BANGLADESH AND SRI LANKA INTEGRATE LOCAL KNOWLEDGE INTO THEIR PLANS, RELYING ON COMMUNITY-BASED STRATEGIES FOR REGIONAL VULNERABILITIES.

Countries	Launching the process	Strategies	Stocktaking knowledge, capacities, and gaps	Alignment with development priorities	Climate scenarios and gatherin initial data
Bangladesh	Challenges: Integrating local knowledge and practices; Solutions: Emphasis on water resources, agriculture, disaster risk reduction, and social safety.	Challenges: Coordination between national and sub-national levels; Solutions: Ministry of Environment leads efforts, with local governments and community-based Organizations Implementing tailored adaptation measures.	Challenges: Need for adaptation measures at specific regional levels; Solutions: Coordination between national and sub-national levels to ensure tailored Implementation.	Challenges: Aligning national policies with local needs; Solutions: Integration of local knowledge and practices with national adaptation goals.	Challenges: Gathering relevant data for decision-making; Solutions: Use of IPCC scenarios, crop hazard maps, and community-based knowledge to inform strategies.
Brazil	Challenges: Capacity-building across municipalities; Solutions: Involvement of civil defense professionals and community members in planning.	Challenges: Understanding local vulnerabilities and developing solutions; Solutions: Emphasis on capacity-building across municipalities and involving community members in planning.	Challenges: Coordination across multiple sectors; Solutions: Emphasis on municipal adaptation plans involving various sectors.	Challenges: Aligning federal and local efforts; Solutions: Municipal adaptation plans and workshops for local leaders.	Challenges: Federal resource constraints; Solutions: Municipal adaptation plans and local-level workshops to address vulnerabilities and gather data.
Germany	Challenges: Integration across federal policies; Solutions: Comprehensive approach integrating adaptation into federal policies.	Challenges: Promoting cross-sectoral collaboration; Solutions: Comprehensive approach integrating adaptation into federal policies across sectors like health, water, agriculture, and infrastructure.	Challenges: Customizing adaptation plans to local needs; Solutions: Development of local adaptation plans aligned with national objectives but customized to local needs and vulnerabilities.	Challenges: Ensuring coherence across policies; Solutions: Integration of adaptation into federal policies for comprehensive sectoral resilience.	Challenges: Effective data utilization; Solutions: Use of IPCC scenarios and comprehensive data collection for informed decision-making.
South Africa	Challenges: Lack of a unified climate platform; Solutions: Cluster approach integrating sectors like human resilience, economic resilience, and ecological infrastructure.	Challenges: Identifying gaps in existing strategies; Solutions: Cluster approach focusing on human resilience, economic resilience, and ecological infrastructure with gender considerations.	Challenges: Coordination between multiple government levels; Solutions: Integration across government levels to enhance adaptability, with national-level coordination and local government adaptation plans.	Challenges: Aligning national and sub-national priorities; Solutions: Cluster approach focusing on resilience and ecological infrastructure with integration across government levels.	Challenges: Gathering diverse data for comprehensive adaptation; Solutions: Use of cluster approach and coordination across government levels for effective data gathering.
Sri Lanka	Challenges: Coordination between national and sub-national levels; Solutions: climate Change Secretariat leads efforts with local governments for tailored adaptation measures.	Challenges: Addressing sectoral vulnerabilities; Solutions: Identification of vulnerable sectors like food security, water, coastal areas, health, biodiversity, and infrastructure for sustainable development.	Challenges: Ensuring effective localized implementation; Solutions: Coordination between national and sub-national levels, with local government units and community organizations playing a crucial role.	Challenges: Promoting interconnectivity between sectors; Solutions: Emphasis on interconnectivity between agriculture, water, health, and biodiversity through designated climate cells.	Challenges: Utilizing diverse data sources for adaptation; Solutions: Use of IPCC scenarios, vulnerability maps, and provincial multi-hazard maps for informed adaptation strategies.

Criteria, method, and tools	Stakeholder consultations	Communications strategy	Planning for horizontal, vertical, & cross-sectoral Integration	Monitoring, evaluation, and learning
Challenges: Ensuring efficient Integration across sectors; Solutions: Use of MRV systems and a Development Results Framework (DRF) for monitoring.	Challenges: Coordination among diverse stakeholders; Solutions: Local governments and community-based organizations play a crucial role in tailored adaptation measures.	Challenges: Creating effective communication strategies; Solutions: Emphasizes the integration of local knowledge and practices, along with workshops for awareness.	Challenges: Ensuring coordinated Implementation across sectors; Solutions: Integration of water resources with agricultural resilience, disaster risk reduction, and community-based programs.	Challenges: Monitoring progress and ensuring transparency; Solutions: Monitoring, Reporting, and Verification (MRV) system, Development Results Framework (DRF), and a traffic light system for progress tracking.
Challenges: Establishing effective adaptation plans; Solutions: Municipal adaptation plans for cities and Involvement of diverse stakeholders.	Challenges: Federal resource constraints; Solutions: Municipal adaptation plans, cross-sectoral coordination, and capacity-building activities for local leaders.	Challenges: Engaging a wide range of stakeholders; Solutions: Emphasis on community engagement and capacity-building activities for local leaders.	Challenges: Cross-sectoral coordination; Solutions: Emphasis on municipal adaptation plans and cross-sectoral integration involving various ministries and stakeholders.	Challenges: Developing a monitoring and evaluation system; Solutions: sectoral plans establish targets and indicators, development of a comprehensive M&E framework.
Challenges: Cross-sectoral collaboration; Solutions: Encouraging collaboration across water management, agriculture, health, and Infrastructure.	Challenges: Developing effective adaptation plans; Solutions: NCCAS as a unifying framework aligning national policies with local actions and promoting local adaptation plans.	Challenges: Ensuring effective communication strategies; Solutions: Comprehensive adaptation strategies with systematic data collection and stakeholder engagement.	Challenges: Ensuring comprehensive climate adaptation; Solutions: Sectoral integration across water management, agriculture, health, and Infrastructure for resilient measures.	Challenges: Evaluating adaptation measures; Solutions: M&E framework with specific indicators, systematic data collection, and regular stakeholder engagement.
Challenges: Promoting sectoral collaboration; Solutions: Encouraging collaboration between sectors like agriculture, health, water, and biodiversity.	Challenges: Enhancing collaboration among diverse stakeholders; Solutions: National-level coordination with federal and state governments, encouraging local governments to develop adaptation plans.	Challenges: Engaging diverse stakeholders; Solutions: National-level coordination and regular reporting mechanisms involving a broad range of stakeholders.	Challenges: Coordination across sectors; Solutions: Cluster approach Integrating agriculture, health, water, and biodiversity for comprehensive climate impact solutions.	Challenges: Ensuring effective adaptation measures; Solutions: M&E framework assessing effectiveness with regular reporting, feedback mechanisms, and stakeholder engagement.
Challenges: Promoting cross-sectoral collaboration; Solutions: Emphasis on sectoral coordination through designated climate cells within each sector.	Challenges: Coordinating diverse stakeholder efforts; Solutions: Local government units and community organizations crucial for implementing adaptation measures tailored to regional needs.	Challenges: Ensuring comprehensive communication; Solutions: Emphasis on workshops and forums for awareness creation with collaboration between ministries and experts.	Challenges: Enhancing inter-sectoral collaboration; Solutions: Emphasis on sectoral coordination with Inter-visibility between agriculture, water, health, and biodiversity.	Challenges: Tracking implementation and progress; Solutions: Key performance indicators for tracking implementation, with regular reviews and stakeholder engagement.

CONCLUSIONS AND RECOMMENDATIONS

IT UNDERSCORES THE CRUCIAL ROLE OF SCIENTIFIC TOOLS AND DATA INTEGRATION IN TAILORING ADAPTATION MEASURES AND THE SIGNIFICANCE OF DYNAMIC MONITORING AND EVALUATION FRAMEWORKS IN TRACKING PROGRESS.

The following table summarizes the conclusions and recommendations drawn from the analysis of the National Adaptation Plans (NAPs) across five countries. Each section provides an overview of key insights and tailored recommendations to enhance the effectiveness of climate adaptation strategies.

Notably, the table highlights the importance of comprehensive coordination and stakeholder engagement, emphasizing the need for participatory approaches involving local communities, civil society, and the private sector. It underscores the crucial role of scientific tools and data integration in tailoring adaptation measures and the significance of dynamic monitoring and evaluation frameworks in tracking progress.

The table also addresses gender integration, challenges in implementation, and best practices for preparing NAPs, advocating for enhanced funding mechanisms and private sector collaboration. Moreover, it stresses the importance of strategic investment in data, locally-led planning, and cross-sectoral cooperation to foster sustainable and inclusive adaptation efforts.

Category	Conclusion	Recommendation
Comprehensive Coordination and Stakeholder Engagement	All five countries have demonstrated significant coordination and stakeholder engagement in their NAPs. Ministries, civil society, the private sector, and local communities were involved, ensuring a participatory approach.	Maintain ongoing dialogues with stakeholders, including local communities, to ensure their needs and knowledge are incorporated into the adaptation strategies. This will enhance local buy-in and the relevance of the measures. Support states in developing their adaptation plans and organizing resources for implementation. Encourage smaller cities and municipalities to develop local adaptation plans, recognizing their unique challenges.
Use of Scientific Tools and Data	The NAPs rely heavily on scientific tools, data, and climate scenarios. Countries like Bangladesh and South Africa use tools from, for examples, the center for Environmental and Geographic information Services (CEGIS) and the Council for Scientific and Industrial Research (CSIR) to tailor their adaptation strategies to local context.	Improve data integration and accessibility by developing unified climate data platforms to harmonize data collection and usage across different sectors and agencies. Enhance investment in climate research and data collection to provide accurate and timely data for vulnerability assessments and adaptation planning.
Monitoring and Evaluation	Robust monitoring, evaluation, and learning framework are central to the NAPs. These frameworks help track progress, assess the effectiveness of adaptation measures, and make necessary adjustments.	Establish a dynamic monitoring and evaluation system that allows for regular policy updates based on ground-level feedback and scientific advancements. Develop a comprehensive monitoring and evaluation framework to help track the progress of adaptation initiatives.
Gender Integration	Gender considerations are included in the NAPs, recognizing the differentiated impacts of climate change. However, the extent of integration varies, with some plans needing more comprehensive gender mainstreaming.	Strengthen gender mainstreaming by ensuring that gender considerations are comprehensively integrated across all sectors and strategies within the NAPs. Develop specific gender-responsive indicators and budget allocations to support this integration.
Challenges in Implementations	Common challenges include inadequate funding, coordination issues across different government levels, and the need for more private sector involvement. South Africa and Brazil highlighted specific gaps in their initial plans and are working on addressing them.	Enhance funding mechanisms by leveraging international climate finance, public-private partnerships, and innovative financing. This includes setting up transparent fund management structures and providing incentives for private sector participation. Engage the private sector from the outset to define specific areas for involvement and design specific strategies with tangible outcomes.
Best Practices in Preparing National Adaptation Plans	Effective preparation and implementation of NAPs require integrating scientific knowledge, stakeholder engagement, and robust policy frameworks. Examples include stakeholder engagement and inclusive planning, integrating climate science and vulnerability assessments, mainstreaming adaptation into development planning, implementing no-regrets strategies, and establishing robust monitoring and evaluation frameworks.	Adopt best practices by fostering continuous stakeholder engagement, integrating climate science into planning, mainstreaming adaptation into broader development plans, implementing no-regrets strategies, and developing clear implementation plans with detailed action steps, timelines, responsibilities, and resource allocations.
Unique National Contexts	Each country has unique policies and histories in dealing with climate change, requiring tailored approaches to developing and implementing NAPs. Coordination across sectors and levels of government remains a significant challenge.	Tailor strategies to India's specific context by developing localized adaptation plans that engage community stakeholders directly in the planning process to enhance effectiveness and relevance. Perform sector-specific vulnerability assessments to tailor adaptation strategies effectively across critical sectors like agriculture, water, and health.
Role of Stakeholder Participation	Stakeholder participation is crucial for developing comprehensive and inclusive adaptation strategies. It enhances the quality of participation and alignment between different government agencies.	See stakeholder participation as central to developing and constantly monitoring, evaluating, and reformulating the strategy as needed over time. Ensure diverse perspectives and local knowledge are incorporated into the planning process.
Importance of Timelines and Funding	The NAP process typically takes at least three years, with some countries taking longer. Clear timelines and funding sources are critical for effective planning and implementation.	Develop clear timelines and funding sources for the NAP, including funding for implementation. Explore diverse funding sources, including international finance mechanisms and public-private partnerships, to ensure robust financing for adaptation strategies.

Category	Conclusion	Recommendation
Subnational Processes and Locally-Led Planning	Subnational processes and locally-led planning are critical for effective adaptation. Countries analyzed had some form of focal adaptation plans at the subnational level.	Support subnational processes by assisting states in developing their adaptation plans and organizing resources for implementation. Encourage smaller cities and municipalities to develop local adaptation plans and conduct vulnerability assessments focused on their unique challenges.
Private Sector Collaboration	Collaboration with the private sector is often lacking in NAPs	Engage the private sector from the outset to define specific areas for involvement and design strategies with tangible outcomes, ensuring better involvement and structured collaboration.
Dynamic Monitoring and Evaluation	Monitoring and evaluation systems need to be dynamic to allow for regular policy updates.	Establish a dynamic monitoring and evaluation system that allows for regular policy updates based on ground-level feedback and scientific advancements.
Strategic Investment in Data and Knowledge	Access to actionable data from global climate models has become more affordable over the last decade. Therefore, investing in supercomputers at the national level to run regional or local climate models can be replaced by the detailed analysis that can now be done by the global models. This means it is more cost-effective to invest in building foundational knowledge in earth systems science and understanding the full range of factors that increase vulnerability within the country, including socio-economic factors.	The priority should be to ensure there is a critical mass of professionals able to understand and apply scientific knowledge related to climate impacts and vulnerability, both vertically at every level of governance, and horizontally across sectors and geographic regions.
Cross-Sectoral Cooperation	Framing is important. It is helpful to take ways to frame issues in ways that encourage cooperation across sectors. For example, using the concept of 'water security' instead of the 'water sector.' This approach can help to break through factors that can prevent necessary cooperation and information sharing between key sectors. Using 'water security,' for example, naturally points to linkages with other sectors such as agriculture or health, through the connections between water availability and food security.	Encourage the adoption of integrative concepts in policy discussions and strategic planning to foster cross-sectoral collaboration. Additional examples of relevant integrative concepts include climate resilience, linking sectors such as infrastructure, health, agriculture, and urban planning; ecosystem services, which connects biodiversity conservation with agriculture, forestry, and water management; the food-energy-water nexus, which links food production, energy generation, and water use; and urban sustainability, which integrates housing, transportation, green spaces, and public health. Invest in interdisciplinary training programs and develop shared data platforms for sectoral integration.

ANNEX 1:

ABBREVIATIONS

BESM	Brazilian Earth System Model CBA - Cost-Benefit Analysis
CEGIS	Center for Environmental and Geographic Information Services CRVAF - Climate Risk and Vulnerability Assessment Framework
CSIR	Council for Scientific and Industrial Research DAS - German National Adaptation Strategy
DRF	Development Results Framework EbA - Ecosystem-based Adaptation
EMBRAPA	Brazilian Agricultural Research Corporation GEF - Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)
INDCs	Intended Nationally Determined Contributions IPCC - Intergovernmental Panel on Climate Change KWRA - German Climate Impact and Risk Assessment KPI - Key Performance Indicator
LEG	Least Developed Countries Expert Group M&E - Monitoring and Evaluation
MRV	Monitoring, Reporting, and Verification NAF - National Adaptation Fund
NAP	National Adaptation Plan
NAPRS	National Adaptation Plan Readiness Support Project
NCCIS	National Climate Change Information System
NCCRD	National Climate Change Response Database
NDC	Nationally Determined Contributions PAP - Provincial Adaptation Plan
RCP	Representative Concentration Pathways SDGs - Sustainable Development Goals
SMART	Specific, Measurable, Attainable, Realistic, Timebound SRHR - Sexual and Reproductive Health and Rights
SSP	Shared Socioeconomic Pathways SVP - Sector Vulnerability Profiles
TNA	Technology Needs Assessment
UNFCCC	United Nations Framework Convention on Climate Change

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