









## SETTING THE STAGE TO PREPARE THE MP SAPCC

Guiding principles presented in the SAPCC include primary needs for preparing the SAPCC: aligning strategies with national priorities and developing an institutional structure conducive to this process. The MP SAPCC carried out these principles for Madhya Pradesh.

### Aligning with national priorities

**SAPCC GUIDING PRINCIPLE**  
*Address state-specific priority issues while creating an appropriate enabling environment for implementation of the NAPCC at state level.*

Vulnerability and adaptation are key concerns for the State of Madhya Pradesh. The MP SAPCC outlines a policy framework to address MP's state-specific needs while complying with India's national climate change priorities. The MP SAPCC proposes to ensure economic growth that is both inclusive and environmentally sustainable by (1) addressing the national agenda of climate change through appropriate adaptation measures; (2) developing a low-carbon development model in line with the Planning Commission of India without impeding the socio-economic development process of the state; and (3) proactively integrating climate change concerns into the development planning process. The policy framework delineates several general strategies and activities to achieve this mission (see section on Identifying Options for Addressing Climate Change).

### Institutional structure

**SAPCC GUIDING PRINCIPLE**  
*Consider governance and institutional contexts, and ensure appropriate institutional arrangements and building capacities, while prioritizing coordination, inter-departmental consultations, stakeholder involvement, and integration with regular planning and budgetary processes.*

As specified in the GOMP-UNDP Project on Strengthening MP Climate Change Cell, an institutional arrangement was established to carry out the SAPCC in Madhya Pradesh. This institutional structure consists of three distinct groups:

- **Project Steering Committee (PSC):** Functioning under the chairmanship of the GOMP Chief Secretary and consisting of stakeholder department heads, experts, as well as non-governmental organization, UNDP and EPCO representatives, the PSC meets twice a year to provide policy guidance and ensure ownership of relevant departments and stakeholders.
- **Project Implementation Committee (PIC):** Formed under the Principal Secretary of the GOMP Housing and Environment Department, the PIC makes administrative and financial decisions and undertakes periodic reviews. This committee has met at regular intervals to review progress on the MP SAPCC and guide the decision-making process.

- **Project Management Unit (PMU):** Set up to overlook the daily progress of the project, the PMU has functioned effectively. This unit has called experts to provide inputs on the SAPCC in workshops and has hosted meetings to coordinate SAPCC development.

The Executive Director (ED) of EPCO has been designated as the State Project Director (SPD), supported by the State Coordinator of GOMPCC Cell for technical assistance.

### ASSESSING VULNERABILITIES AND IMPACTS

**SAPCC GUIDING PRINCIPLE**  
*Assess the impacts of climate change on existing vulnerabilities, and identify and enhance risk management tools for addressing climate change.*

As specified in the SAPCC Common Framework, assessing the state's vulnerability to climate change is the first key step to devising a climate change action plan. Understanding the regional and local dimensions of vulnerability is necessary to develop appropriate and targeted adaptation efforts. Vulnerability and impact assessments must also take into consideration the combination of multiple stresses that contribute to climate change impacts. This assessment helps to enhance understanding of current vulnerability, to identify factors that increase vulnerability for certain districts, and to inform and facilitate the decision-making process.

**BOX 2: INITIATIVES SUPPORTING DEVELOPMENT OF THE MP SAPCC** ■ The MP SAPCC was drafted under the GOMP-UNDP Project on Strengthening MP Climate Change Cell. This project also aims to strengthen the MP CC Cell and develop it into a Knowledge Management Centre, and assist in mainstreaming climate change concerns into sectoral policies and programmes. This project set out the institutional structure for developing the MP SAPCC. ■ The MOEF-GIZ Project on Climate Change Adaptation in Rural Areas of India is contributing to several key steps of the MP SAPCC. Project objectives include carrying out a vulnerability and risk assessment of the State, developing technical adaptation options for implementation, establishing a programme on climate proofing rural development, developing adaptation-oriented financial instruments and providing climate change information and knowledge management. ■ The Indo-UK Project on Vulnerability & Adaptation Assessment for MP also plays an important role in assessing vulnerability and impacts and identifying adaptation strategies for the MP SAPCC. This project aims to build knowledge on climate change-induced vulnerability within the broader vulnerability context and relevant resilience building and adaptation measures that can be effectively incorporated into existing development processes. ■

Two approaches were carried out to obtain a broad understanding of the climate change-induced vulnerabilities of the state. First, insights on vulnerabilities were drawn from the perspectives and experiences of community members and stakeholders conveyed at regional workshops. An agro-climatic zone approach was followed by having focused discussions separately in each agro-climatic zone. These perspectives guided the strategy-building process of the SAPCC. Second, a preliminary assessment incorporating socio-economic and environmental indicators was carried out under the MOEF-GIZ Project on Climate Change Adaptation in Rural Areas of India (see Box 2).

### Stakeholder workshops and consultations

**SAPCC GUIDING PRINCIPLE**  
*Build broader stakeholder engagement to maximize perspectives and involvement in implementation.*

The SAPCC Common Framework identifies the importance of a participatory approach to enhance broad ownership of the process and “ensure its quality, consistency, relevance, pertinence and transparency.” This includes involvement of multiple stakeholders through workshops, public hearings, consultative meetings and inputs from expert and experienced individuals and organizations.

Accordingly, the GOMP CC Cell has adopted a bottom-up approach based on discussions with government and departmental officers, civil society individuals, farmers, media professionals, groups of experts and specialists and non-governmental organizations. Through 26 consultation workshops (e.g. a project launch workshop, a research institution networking workshop, and sectoral and agro-climatic zone stakeholder consultation workshops), participants shared concerns and helped the CC Cell identify sectoral and regional implications of climate change. These concerns — both business-as-usual and climate change-induced — are presented by sector in the draft MP SAPCC. For example, in the health sector, recorded baseline concerns in MP include low diseases surveillance and lack of robust early warning systems (EWS). Noted climate change-induced concerns include predicted increase in incidences of vector- and water-borne diseases and heat stress-induced morbidity.

### Vulnerability assessment

Methodology for formally assessing the vulnerability of the districts in MP is in its nascent stage, but has included use of a composite index based on a multivariate analysis of climate change-vulnerable indicators — social and economic indicators to determine socioeconomic vulnerability and agriculture, water resource, forest and climate indicators to identify environmental vulnerability.

Indicators were clustered into three classes — adaptive capacity, sensitivity and exposure — and weighted based on Principal Component Analysis (PCA). The resulting Composite Socio-economic Vulnerability Index (CSEVI) and Composite Environmental Vulnerability Index (CENVI) together make up the Composite Vulnerability Index (CVI) used to assign a vulnerability ranking from 1 (least vulnerable) to 50 (most vulnerable) for each of MP's 50 districts. Finally, Hierarchical Cluster Analysis was used to classify districts into four categories according to their degree of vulnerability: very high (4), high (3), moderate (2) and low (1).

Baseline results indicate that the 13 districts in Cluster 4 (very high vulnerability) are characterized by very low CVI. These districts lack adaptive capacity and show higher sensitivity and exposure to climate change. Comparatively, the 11 districts in Cluster 1 (low vulnerability) and 5 districts in Cluster 2 (moderate vulnerability) indicate high CVI values associated with high literacy rates, higher economic capacity, and greater access to infrastructure. These less vulnerable districts are also characterized by lower values of extreme climate events.

Despite a projected decrease in vulnerability (from high [3] to moderate [2]) in a few districts (Burhanpur, Bhind and Sagar), projections suggest an overall increase in vulnerability of districts: high vulnerability is projected for 40 percent of districts by mid-century and 42 percent of districts by end-century, compared to 26 percent at the baseline. This heightened vulnerability is especially due to increased sensitivity and exposure variables.

The variability assessment shows that socio-economic and environmental variables vary widely within the districts of MP. High ranges for social indicators (e.g. percentage of people below poverty line or with access to sanitation facilities) and environmental indicators (e.g. average crop yield or flood discharge) can be used to target different adaptation strategies as part of local sustainable development programmes.

### Impact assessment

**SAPCC GUIDING PRINCIPLE**  
*Build climate scenarios and invest in knowledge and research to reduce uncertainty and improve knowledge about appropriate responses.*

Regional climate models were not run specifically for MP; rather, mid-century and end-century data projections presented in the draft MP SAPCC were based on secondary data collected from various sources.

District population of MP was projected using the Ratio Method, while per capita income (net district domestic product) was projected using the polynomial trend from 2000-2010 data.<sup>1</sup> Climate projections for 2030s (2021-2050) and 2080s (2071-2098) were derived from PRECIS (Providing Regional Climate for Impact Studies),<sup>2</sup> driven by IPCC SRES A1B scenario (greenhouse gas emission scenarios).<sup>3</sup> These projections indicate, for example, that average surface daily minimum temperatures will rise in the 2030s throughout MP by 2.0°C – 2.4°C. PRECIS simulation modeling was also used to project regional changes in monsoon and winter precipitation.

- 1 Due to limitations of data availability, data for agriculture and some socioeconomic variables are assumed to be static since the base period.
- 2 PRECIS is a desktop version of the HadRM3 model with a grid resolution of 0.44° x 0.44°. The PRECIS simulation dataset was provided by the Indian Institute of Tropical Meteorology, Pune.
- 3 IPCC SRES A1B (GHG emission) scenario assumes a future world of very rapid economic growth, a global population that peaks in mid-century and declines thereafter, and rapid introduction of new and more efficient technologies.

Climate projections for changes in temperature and precipitation throughout MP indicate potential impacts on existing vulnerabilities in different sectors. For example, projected increasing temperatures and decreasing rainfall are expected to further hinder agricultural productivity with potentially challenging consequences for rural livelihoods, particularly in districts identified with high vulnerability.

In addition, impact assessments were conducted specifically for forest ecosystems and water resources in Madhya Pradesh based on the IPCC SRES A1B climate change scenario. The IBIS global dynamic vegetation model was used to assess the impact of projected climate change on forest ecosystems in MP.<sup>4</sup> Results show climate change impact on 23 percent of MP forest areas in the short term (2030s) and 48 percent in the long term (2080s). Increased rates of forest and soil degradation are likely throughout MP and would affect biodiversity and forest productivity. The climate change impact assessment on MP water resources was taken from the recent study (Gosain et al. 2011) conducted as part of the NATCOM Phase II study of MOEF. Current analysis using the SWAT hydrologic model shows, for example, that surface runoff is expected to increase in the Ganga basin.

4 The impacts of projected climate change were assessed at regional climate grid scales (about 50 X 50 km). The dynamic global vegetation model (IBIS) has been validated by Indian Institute of Science, Bangalore for its suitability to Indian conditions. The IBIS model was run at the national level and the outputs were extracted for Madhya Pradesh.

## IDENTIFYING OPTIONS FOR ADDRESSING CLIMATE CHANGE

The draft MP SAPCC outlines strategies to address specific concerns in each of the 10 key climate change-related sectors representing the NAPCC Missions: forestry, water, agriculture, animal husbandry, health, transport, energy, industry, rural development, and cross-cutting issues.

### Approach to identifying options for addressing climate change

Sectoral and regional stakeholder consultations helped to identify mitigation and adaptation options for MP. In the 26 consultative workshops in which stakeholders presented climate-related concerns (see section above on “Stakeholder Consultations and Workshops”), participants at all levels from farming communities to state government also discussed potential strategies to address impacts. Results of the Indo-UK Project on Vulnerability & Adaptation Assessment for MP also contributed to the adaptation approaches prioritized in its SAPCC. In the agricultural sector, for example, adaptation assessment indicates that changes in sowing dates and hybrid selection, along with other options such as widespread adoption of resource-efficient farming practices, may reduce negative impact of projected 2030s climate.

## Strategies and activities: following the MP SAPCC policy framework

Identified mitigation and adaptation options for MP fit into the five types of strategies presented in the MP SAPCC policy framework for developing a climate-resilient state and strengthening the development planning process:

- **Creating possibilities of synergies among sectors**, e.g. integrating climate change action plans of forest, water, agriculture, energy and health departments with rural development initiatives;
- **Climate resilience policy and climate proofing program**, e.g. assessing various developmental programmes, such as urban planning and sustainable agriculture, for their climate resilience quotient and suggesting climate proofing measures;
- **Improving governance and public service delivery system**, e.g. developing green governance favoring low-carbon societies, an efficient urban water supply and solid waste and waste water management systems, and weather-based early warning systems;
- **Knowledge management**, e.g. establishing State Climate Change Knowledge Management Centre (SCCKMC); developing comprehensive water databases and community disease profiles;

- **Effective monitoring and evaluation (M&E) of SAPCC**, e.g. commissioning baseline studies for each sector to evolve appropriate sectoral criteria; identifying M&E indicators; monitoring and evaluating the progress of the integration of climate concerns into developmental policies and planning, and the capacity of various line departments and their personnel to internalize climate change concerns.

Activities to support these strategies include **policy reform** (e.g. laws to implement biomedical waste management rules; review of existing policies to address climate change concerns); **resource mobilization** (e.g. exploring carbon market opportunities); **development of mainstreaming** (e.g. assisting departments in mainstreaming climate change concerns in planning process through district workshops or other interactive sessions); **research and education** (e.g. pooling resources for research and development of new, green technologies and practices; strengthening of health-related research; enhancing dissemination of new technologies); **capacity building** (e.g. creating awareness of climate change impacts on forests, health, etc.; training institutions, personnel and communities); and **pilot projects** (e.g. development of weather-based early warning systems; seed banks).

### Aligning options with national priorities

**SAPCC GUIDING PRINCIPLES**  
*Implement inclusive and sustainable development strategy that protects the poor and vulnerable sections of society from adverse effects of climate change.*  
*Identify and implement state-planned and community-based voluntary/autonomous adaptation.*

The strategies identified in the MP SAPCC align with national principles outlined in the NAPCC and presented in the SAPCC Common Framework.

Protecting the poor and vulnerable sections of society through an inclusive and sustainable development strategy that is sensitive to climate change is a core principle of India's climate change action plan. Consistent with this priority, the MP SAPCC supports rural livelihoods (e.g. providing opportunity for forest-based livelihoods like NTPF-based enterprises; allocating part of forest revenue for welfare of indigenous people; and creating cooperatives to enhance the livelihoods of marginal farmers) and promotes livelihood diversification for poor and vulnerable populations (e.g. creation of rural business hubs). The MP SAPCC also calls for vulnerability mapping that incorporates a poverty Index and inclusion of communities in development processes. MP also prioritizes community-based adaptation options, such as community-based forest management and agricultural practices.

**SAPCC GUIDING PRINCIPLE**  
*Undertake actions that deliver benefits for growth and development while mitigating climate change.*

Several proposed actions aim to move MP toward a low carbon pathway. These green growth strategies include regulating and planning urban expansion and sustainable urban transport, enhancing efficiency and low-carbon options in power generation, and exploring possibilities for carbon neutral villages. Imposing green tariffs for incentivizing clean energy production and availing carbon market opportunities also support the national principle of promoting new and innovative forms of market and regulatory and voluntary mechanisms for sustainable development.

**SAPCC GUIDING PRINCIPLE**  
*Ensure and improve ecological sustainability.*

Several adaptation and mitigation options outlined in the MP SAPCC support the national priority of enhancing ecological stability. For example, strategies call for conservation measures as part of sustainable forest management practices, enhancing green cover outside forests, and prioritizing soil and water conservation, particularly through new technologies.

## PRIORITIZING OPTIONS FOR ADDRESSING CLIMATE CHANGE

**SAPCC GUIDING PRINCIPLE**  
*Set out options and evaluate and rank them according to criteria (cost-effectiveness, cost-benefit, feasibility, ease of implementation, 'no-regrets', robust to different scenarios, incremental versus transformative change, etc.).*

Proposed strategies and activities to address climate change have been classified in the "Strategies and Budget" section of the MP SAPCC as high, medium or low priority. Per the Common Framework, the PMU of the MP Climate Change Cell has prioritized these mitigation and adaptation options based on needs expressed in stakeholder consultations. Timeframe, available resources and cost-benefit analysis can also play a role in prioritizing these activities. More detailed prioritization will be conducted in the next stage of the project. The MP SAPCC calls for the development of evaluation tools, such as generation of Marginal Abatement Cost Curves (MACC), to help further prioritize implementation of emission reduction options.

## FINANCING OPTIONS FOR ADDRESSING CLIMATE CHANGE

**SAPCC GUIDING PRINCIPLE**  
*Link with national policies and programmes to identify financial or policy support that may be available.*

Estimated costs and possible financial and technical sources for each proposed mitigation and adaptation strategy are also indicated in the MP SAPCC. These financing options include bilateral institutions (e.g. GIZ); national investment schemes, such as the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Green India Mission (GIM), and the National Rural Employment Guarantee Act (NREGA); and carbon market instruments, such as the Carbon Development Mechanism (CDM) (e.g. the CDM afforestation/ reforestation project in the Harda District of MP). In addition, there is potential for SAPCC strategies to be integrated into existing projects (e.g. Water Sector Restructuring project, funded by the World Bank), to take advantage of established funding sources. Increasingly countries in the Asia region are looking at national budgetary resources as a source of climate finance. National and State governments allocate large sums of money annually to address climate change related objectives (in the energy sector, transportation, agriculture, water supply, disaster management and so on), even though those funds may not necessarily be labelled as climate finance. SAPCC objectives can be achieved by better aligning these resources with climate policies.

**SAPCC GUIDING PRINCIPLE**  
*Estimate additional resource requirements, and explore existing, additional and new carbon finance potential.*

In addition to the financing options included in the draft SAPCC, several strategies also call for enhancing carbon finance potential through the CDM and exploring other market-based opportunities for forest conservation, such as Reduced Emissions for Deforestation and Degradation (REDD+). MP prioritizes exploring CDM potential in energy efficiency, waste management, forestry, and industry initiatives.

## Looking to the future: replicability and next steps

The strategies proposed in the MP SAPCC guide state departments in integrating and mainstreaming climate change concerns into state and district-level schemes, projects, programmes, missions and policies in order to build resilience to climate change in Madhya Pradesh. As conditions and climate concerns change, the GOMP CC Cell can integrate new strategies into the action plan, pursue criteria to further prioritize strategies, and explore additional financing options. In particular, seeking opportunities to engage with the private sector at both state and district levels could enhance financial support for MP. SAPCC monitoring, reporting and evaluation in coordination with GOMP CC Cell will also be necessary.

The Madhya Pradesh SAPCC project provides a model for SAPCC development in other states. The processes and strategies presented, and their outcomes, provide an empirical basis for discussion on critical success factors. These include coordination and institutional issues, how to conduct meaningful vulnerability assessments, and measures to promote full engagement in identifying and prioritizing options.

In addition, this case study has identified gaps that may contribute to strengthening the Common Framework for future application. For example, the inclusion of private sector engagement would strengthen the Framework's guidance on financing options.

Furthermore, future support from the national level could include strengthening of institutional capacity at the national and state levels to address climate change issues, strengthening a climate change information pool or knowledge base in India, and developing partnerships to help leverage new and additional climate financing.

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