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## An Ecosystem-based approach to Climate Resilient Agriculture

UPSCALING ECOSYSTEM-BASED ADAPTATION (EbA) TO CLIMATE CHANGE IN THE RAINFED REGIONS OF MAHARASHTRA, INDIA



Automated weather station by WOTR in Sangamner block, Ahmednagar District. Photo credit: WOTR

Agriculture is the main source of livelihood for more than half of Maharashtra's population, of which 80% are small and marginal farmers<sup>1</sup>. However, climate change, ecological degradation, and market pressures threaten sustainable agriculture production.

### Challenges to agricultural production in the rainfed regions of Maharashtra

- The majority of the state's cultivable area falls under rainfed agriculture (82%), of which 7.5 million ha (43% of the total cultivable area) is degraded<sup>2</sup>. Inappropriate management practices, overuse of chemical fertilisers and pesticides, and monocropping, among others, drive the degradation of agricultural land.
- In addition, extreme weather events and climate anomalies pose a severe threat to agricultural production, farmers' livelihoods and food security. Such anomalies include shifts in the monsoons, prolonged droughts, heavy and unseasonal rain and hail, as well as shorter winter days with higher minimum temperatures, longer summers and higher maximum temperatures<sup>3</sup>.
- In an era of market-driven agriculture, farmers rely on external inputs such as chemical fertilisers and pesticides for higher productivity. Maharashtra ranks third in the use of fertilisers in India, accounting for 11% of the countrywide consumption. In 2018–19, fertiliser usage in the state stood at 125 kg per hectare<sup>4</sup>. Chemical-intensive agriculture aggravates degradation of agricultural land, water sources and ecosystems<sup>5</sup>.
- Monocultures of cash crops, such as cotton and sugarcane, aggravate the risk of crop failure, bring new pests and diseases, alter food habits, and lead to a loss of biodiverse varieties which are resilient to climate risks.
- Better-off farmers exploit groundwater and other surface irrigation sources and thus deprive their poorer counterparts. Water intensive crops such as sugarcane are cultivated on 2% of the total geographical area of the state, while consuming a disproportionate 40% of the irrigation water<sup>6</sup>.

### Ecosystem-based Adaptation for productive and resilient agriculture

Ecosystem-based Adaptation (EbA)—a nature-based and human-centered approach to tackle the impacts of climate change—can help countries to effectively scale climate change adaptation measures while meeting goals of environmental conservation and socio-economic development<sup>7</sup>. Ecosystems provide communities with water, food, forage, fibre, bioenergy, and medicinal plants. By protecting and restoring these ecosystem services and biodiversity, EbA preserves the natural resource base for agricultural production,

#### What is Ecosystem based Adaptation (EbA)

The United Nations Convention on Biological Diversity (CBD) defines EbA 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” (CBD, 2009).

helps people adapt to climate change, and enhances food security<sup>8</sup>. An EbA approach to agriculture includes integrated soil and water management, use of eco-friendly pesticides and organic manure, promotion of agrobiodiversity, agroforestry and reforestation, as well as multi-layer farming with locally adapted crops to climatic variations. Agriculture is more resilient when aligned with the specific agro-ecological zone by choosing crops that suit the climate, soil type and rainfall conditions<sup>9</sup>.

## Opportunities for upscaling EbA in agricultural production systems

- Strengthening agriculture with EbA has become even more essential during the recent COVID-19 crisis. Environmentally resilient agricultural systems provide income not only to resident farming communities, but also to migrants who have returned home<sup>10</sup>.
- Agriculture is an important sector for both the central and the state government. NITI Aayog, the Committee for Doubling Farmers' Income and the National Rainfed Area Authority, are actively promoting the welfare of farmers through various projects. These stakeholders and their programmes provide opportunities for mainstreaming EbA into agricultural policies.
- The business model of Farmer Producer Organisations (FPOs) is gaining acceptance among farmers and can be effectively leveraged to implement EbA on a wide scale and develop ecosystem-based livelihoods.
- The various research institutes of the Indian Council of Agricultural Research (ICAR), the India Meteorological Department (IMD), as well as numerous NGOs and innovative farmers are demonstrating a range of tested methodologies for improving agricultural productivity while adopting more environment-friendly practices.

## ABOUT THE PROJECT

As part of the [International Climate Initiative](#) by the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU), the [Watershed Organisation Trust](#) (WOTR), based in Pune, India, and Berlin-based [Think Tank TMG Research](#), aim to develop a roadmap for upscaling of EbA in Maharashtra. This project entails a series of participatory multi-stakeholder dialogues at both the local and state levels, with the intention of identifying promising [EbA initiatives](#). An important aspect of these processes is to identify the enabling environment for EbA to be implemented and sustained at a broader scale. These stakeholder dialogues are expected to contribute to building the required political and societal support for EbA at the country level.

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<sup>1</sup> NITI Ayog, (nd). Task force on Agriculture development, accessed on 12th November, 2020- [https://niti.gov.in/writereaddata/files/Maharashtra\\_Report\\_0.pdf](https://niti.gov.in/writereaddata/files/Maharashtra_Report_0.pdf). (Marginal farmers cultivate up to 1 hectare, while small farmers cultivate more than 1 hectare and up to 2 hectares).

<sup>2</sup> ISRO, (2015-16). Desertification and Land Degradation Atlas of India, (Based on IRS AWiFS data of 2011-13 and 2003-05), Space Applications Centre, ISRO, Ahmedabad, India, accessed on 12th November, 2020- [https://vedas.sac.gov.in/vedas/downloads/atlas/DSM/Desertification\\_Atlas\\_2016\\_SAC\\_ISRO.pdf](https://vedas.sac.gov.in/vedas/downloads/atlas/DSM/Desertification_Atlas_2016_SAC_ISRO.pdf).

<sup>3</sup> Maharashtra State Adaptation Action Plan on Climate Change (2014), accessed on 13th November, 2020- <http://mahervis.nic.in/Pdf/other/ToR%27s%20for%20Maharashtra%20SAPCC.pdf>.

<sup>4</sup> Mott MacDonald. (2019). Draft ESA and ESMF State of Maharashtra Agribusiness and Rural Transformation Project, accessed on 13th November, 2020- [https://www.smart-mh.org/cdn//2019/08/190818171526\\_405e4be8b9d3ce2374fe29ce1561a62b.pdf](https://www.smart-mh.org/cdn//2019/08/190818171526_405e4be8b9d3ce2374fe29ce1561a62b.pdf).

<sup>5</sup> Bhattacharyya, R. et al. (2015). Soil Degradation in India: Challenges and Potential Solutions. Sustainability, 7, 3528-3570, accessed on 13th November, 2020- <https://www.mdpi.com/2071-1050/7/4/3528>.

<sup>6</sup> NITI Ayog, (nd). Task force on Agriculture development, accessed on 12th November, 2020- [https://niti.gov.in/writereaddata/files/Maharashtra\\_Report\\_0.pdf](https://niti.gov.in/writereaddata/files/Maharashtra_Report_0.pdf).

<sup>7</sup> D'Souza, M. et al. (2020). Scaling Ecosystem-based Adaptation to Climate Change in Maharashtra, India, accessed on 13th November, 2020- [https://wotr-website-publications.s3.ap-south-1.amazonaws.com/Scaling\\_Ecosystem\\_based\\_Adaptation\\_in\\_Maharashtra\\_India\\_An\\_Analysis\\_of\\_Policies%20and\\_Programmes.pdf](https://wotr-website-publications.s3.ap-south-1.amazonaws.com/Scaling_Ecosystem_based_Adaptation_in_Maharashtra_India_An_Analysis_of_Policies%20and_Programmes.pdf).

<sup>8</sup> Stiem-Bhatia, L. (2020). Rebuilding our food systems — an ecosystem-based approach for resilience, Ideas on sustainability transformations and responses to climate change, Enabling Sustainability, Edited by TMG, accessed on 11th November, 2020- <https://medium.com/enabling-sustainability/rebuilding-our-food-systems-an-ecosystem-based-approach-for-resilience-a88ff5fe01b>.

<sup>9</sup> The concept of agro-ecological zones was developed by the Food and Agriculture Organization of the United Nations (FAO).

<sup>10</sup> Multi-Layer Farming Helps in Providing Food and Nutrition Security in the time Of Covid-19, accessed on 9th November, 2020- <https://thewotrblog.wordpress.com/2020/04/20/multi-layer-farming-helps-in-providing-food-and-nutrition-security-in-the-time-of-covid-19/>. (Blog).