Indian Farming 76 (10): 03-06; October 2026

Mainstreaming ecosystem service valuation in India: Lessons from TEEBAgriFood projects around the globe

Alka Bhargava*

United Nations Environment Programme, TEEBAgriFood India, New Delhi 110 003

Agricultural performance needs to be assessed beyond yields per hectare and the tangible returns from markets. The United Nations Environment Programme (UNEP) led TEEBAgriFood initiative applies true cost accounting for valuation of ecosystem services and make nature's values visible. Study outcomes must be validated in the field and mainstreamed into policy, actualising the science–policy–implementation chain that fixes food metrics. Drawing on experience from India, Brazil, Thailand and Indonesia, this article shows how ecosystem service valuation can inform food system transformation and draws lessons for the Indian context.

Keywords: Ecosystem services, Policy mainstreaming, True cost accounting, Valuation

AGRICULTURE is the lifeline of every economy, yet food systems are proving unsustainable. Over-reliance on agrochemicals, land fragmentation, declining soil health, biodiversity loss and water scarcity are depressing yields, and climate change compounds all of them. Much of the problem lies in measuring the success of agriculture and food policy through the narrow lens of yield per hectare or per capita production, ignoring the links between food systems, environment and human well-being. Pro-nature options such as organic and natural farming and agroforestry consequently appear less competitive until their hidden costs and benefits are valued and mainstreamed in decision-making. The shift required is from using nature to working with nature.

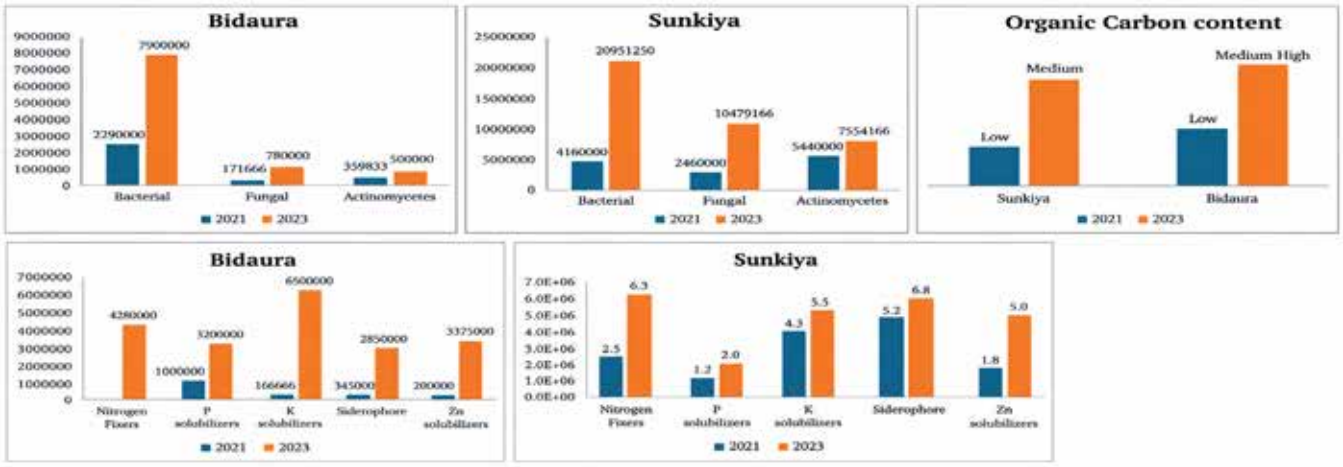
The Economics of Ecosystems and Biodiversity for Agriculture and Food (TEEBAgriFood), hosted by the United Nations Environment Programme, applies true cost accounting to make the hidden ecological and social costs and benefits of food systems visible in economic terms, valuing environmental, economic, social and human impacts so that nature's value is recognised, demonstrated and captured in public and private sector decision-making. The European Union funded TEEBAgriFood project was implemented in seven countries from 2019 to 2023. The India project analysed the impacts of scaling organic farming and agroforestry in Uttar Pradesh, Uttarakhand and Assam under different policy and climate scenarios for 2030 and 2050, against a 2020 base year. The IKEA Foundation supported successor project (2023-27) builds on that work and is being extended to Sikkim and to AICRP-Integrated Farming System (IFS) centres across India. The public sector component translates TEEBAgriFood findings into policy and programmatic interventions supporting food system transformation, livelihoods and community resilience, while private sector engagement promotes pro-nature choices among consumers, farmers, FPOs, communities and agri-businesses.

Global lessons from the TEEBAgriFood project

The four capitals approach of TEEBAgriFood namely natural, produced, human and social capital has been applied across several food systems and national contexts to identify trade-offs, demonstrate co-benefits and support the scaling of sustainable agriculture.

***India: Evidence for scaling organic farming and agroforestry*:** The India applications demonstrate environmental gains from scaling organic farming and agroforestry under policy scenarios finalised in consultation with state governments and other stakeholders. In Uttarakhand, modelled soil erosion declined by 4.4–6.29% by 2030 and 2050, while in the Kosi watershed, nitrogen delivery fell by 7.7–10.03% by 2050 and phosphorus by 3–9%. Under the optimistic scenario, carbon sequestration rose by 58.1% to 517,888 Mg of carbon by 2050.

Farm-level co-benefits of organic farming were demonstrated on two plots set up in Uttarakhand to train farmers in producing their own inputs and using biofertilisers and biopesticides. Organic pea yields were 5–6% higher and organic onion yields 4–5% higher, raising the benefit-cost ratio by 9–25% despite identical market prices. Microbial activity, enzymatic



Changes in population of microbes (CFU/g) in the demonstration plots of Uttarakhand
Source: Assessment carried out by GBPUAT, Pantnagar (2019-23)

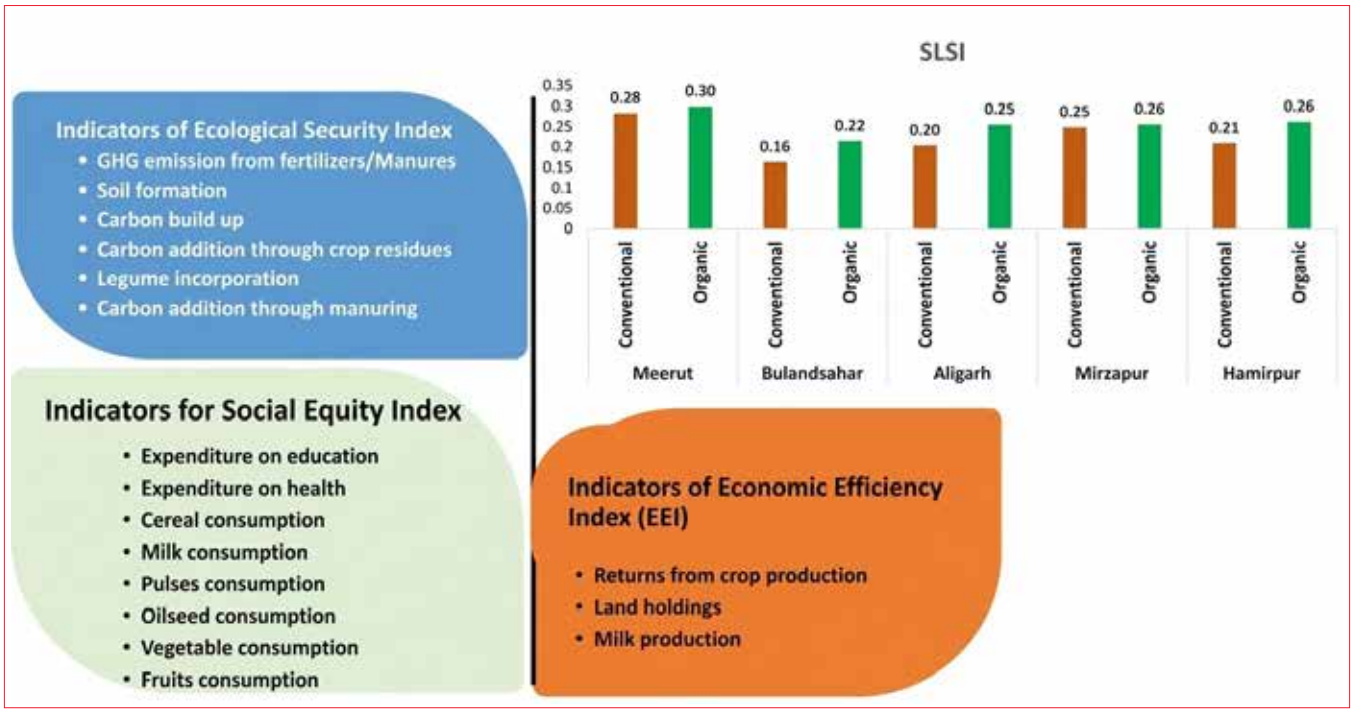
activity and soil organic carbon also improved. Scaling organic farming further raised the Agro-Diversity Index by 13.5%. These results challenge the assumption that improved environmental performance must come at the expense of productivity or farm-level returns.

The Sustainable Livelihood Security Index, applied in five project districts of Uttar Pradesh, underlined the value of assessing socio-economic alongside ecological aspects of smallholder systems; the composite index was higher for organic than for conventional systems.

Policy support options summarising the recommendations of the EU phase were suggested in the publication 'Promoting a Sustainable Agriculture and Food Sector in India', including support for farmers during transition to organic farming and agroforestry, restoration of land resources, enhanced carbon sequestration, stronger water conservation, improved agrobiodiversity and better livelihood security (https://www.unep.org/resources/report/promoting-sustainable-agriculture-and-food-sector-india).

From evidence to policy

- During India's G20 Presidency in 2023, TEEB supported the land restoration theme of the Environment Working Group, and the TEEB framework was included in the G20 compendium of best practices on land restoration.
- TEEB principles have been included in the syllabus of the new B.Sc. (Natural Farming) course of ICAR, offered in four Central Agricultural Universities and 51 State Agricultural Universities.
- TEEBAgriFood principles are included in the Framework for Ecosystem Services Assessment in Organic and Natural Farming, released at the 19th



Application of Sustainable Livelihood Security Index (SLSI) in Uttar Pradesh
Source: Assessment in UP carried out by ICAR-IIFSR (2019-23)

Annual Meeting of AINP-OF in November 2024.

- During revision of the Rainfed Area Development scheme, which assists States in adopting ICAR-Indian Institute of Farming Systems Research (IIFSR) Integrated Farming System models, suggestions were made to strengthen its monitoring and evaluation by valuing hidden costs through the TEEBAgriFood capitals approach.
- Phase 2 applies a landscape approach, with greater engagement of farmers and FPOs and more primary data to strengthen policy relevance.

***Brazil: Valuing urban and peri-urban agriculture*:** Rapid urbanisation across the Sao Paulo metropolis has increased sealed soils, vegetation removal, reduced groundwater recharge and deepened dependence on distant food systems, intensifying flooding, drought, heat stress and food insecurity in urban peripheries and favelas. Urban and peri-urban agriculture (UPA), backed by indigenous and local knowledge systems such as urban farms, community and residential gardens, agroforestry, edible gardens, cultivation beneath transmission lines and green-belt farming, was initiated as a nature-based solution in 2019. TEEBAgriFood assessments quantified benefits far beyond fresh produce, showing that agroecological transition of unproductive areas could deliver by 2030:

- **Food security:** Approximately 700 ha of organic farms could ensure access to healthy and fresh food to vulnerable populations in food deserts.
- **Green jobs:** Potential to generate 1,80,000 jobs.
- **Cooling capacity:** Agroforestry systems could decrease temperatures by 0.20°C in some cities.
- **Flood mitigation:** Water infiltration potential represents three flood control pools, each one costing USD 29 million.
- **Erosion regulation:** Mulching and cultivation could significantly avoid sedimentation and increase water quality.

These findings led to two Presidential Decrees: A National UPA Programme, which adopts TEEB's UPA Guide as the basis for joint planning by states, districts and municipalities; and the National Food Security and Nutritional Strategy for Cities. Government replicated TEEB's capacity building in 12 metropolitan regions covering over 96 cities, with USD 3.2 million committed, showing how quantified evidence on urban agriculture justifies policy support and investment (https://wedocs.unep.org/rest/api/core/bitstreams/08bdf8e9-6b2c-4ba7-9d7b-a4ddab586b71/content).



Brazil's national policy on urban and peri-urban agriculture, unveiled by President Luiz Inacio Lula da Silva

***Thailand: Assessing the true value of rice systems for people and planet*:** TEEBAgriFood analysis in north-eastern Thailand examined organic rice expansion under four scenarios and the economic impacts of adopting the sustainable rice platform, raising a key policy question on recognition of public support towards environmental and health benefits that market prices do not reward. The policy recommendations from the study are:

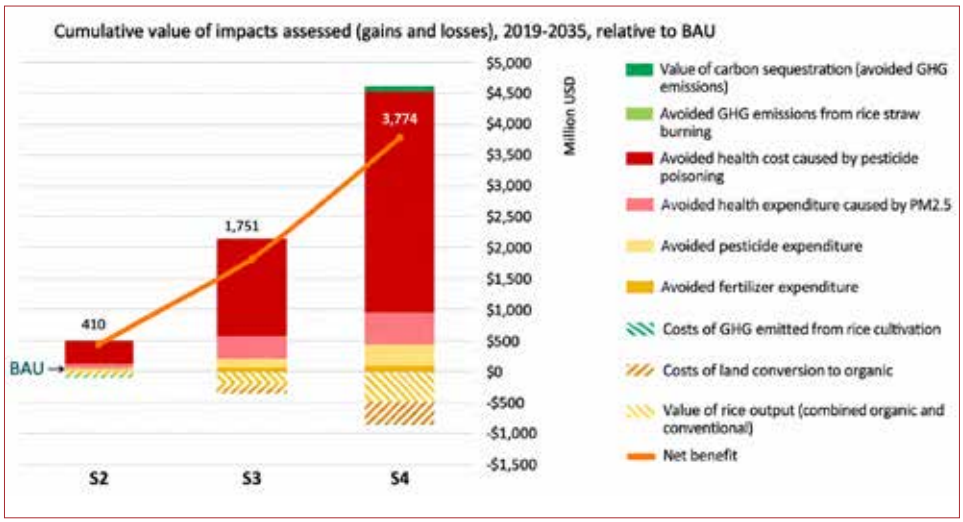
- Reorienting agricultural subsidies, which largely ease farmers' financial hardship rather than encourage sustainable practice, so that support is conditional on sustainable practices.
- Recognising that organic rice yields projected to be marginally lower than conventional yields, by about 1% over 2019-2035, can be offset by an organic price premium of about 3.5%.
- Government intervention to minimise market distortion where the health and environmental externalities of organic rice cannot be captured by markets, so that society continues to benefit from these positives; while at the same time organic farmers also receive enhanced returns from cultivation cost reduction and health improvement.
- Reducing certification costs by supporting groups of farmers in defined areas rather than relying on individual certification so as to fulfil requirements of international organic markets.

***Indonesia: Integration of agroforestry in the national development plan*:** The Ministry of National Development Planning sought science-based advice for food system policies that reward stewardship of natural, produced, human and social capitals. With 1.7 million households dependent on cocoa and 90% of production from smallholders, the project asked how cocoa agroforestry could be expanded and intensified to raise yields while maximising outcomes across the four capitals, and how cocoa could serve national ecosystem restoration objectives. Focus was on strengthening cross sectoral and land use planning policies to internalise natural capital costs and benefits in its design.

Assessments found that nature-positive food systems can deliver positive environmental outcomes and rural livelihoods together, indicating a 27% increase in agri-food output with agroforestry, and that cacao agroforestry could be sustainably intensified and yields increased without expanding cultivated area. Recommended incentives included seedling supply, training and extension, certification and eco-labelling, and deforestation-free exports. Agroforestry was subsequently included in Indonesia's Five-Year Mid-Term Development Plan for the first time, moving from a primarily environmental intervention into mainstream development planning.

Implications for India's growth

Agricultural policy performs better when it



Total values for the three scenarios of organic rice expansion in Thailand
Source: https://drive.google.com/file/d/15j_AeKlGYBYze9frwOWzu1oHDMHqFsxh/view

accounts for the environmental, social and human impacts of production rather than relying on market and yield indicators alone. True cost accounting under TEEBAgriFood supplies the empirical economic evidence for scaling sustainable agriculture on the basis of these otherwise hidden costs. For India, the evidence suggests several practical areas for policy mainstreaming:

***Support for making sustainable production economically viable*:** Several government schemes already assist conversion to organic and natural farming and the formation of FPOs. Dedicated market channels for organic produce, including through e-NAM, could help farmers secure price premiums and make adoption self-sustaining, consistent with the lessons from Thailand.

***Strengthen market access and value addition*:** Wider access to NPOP certification would open global markets. Private sector work under the project emphasises local commodities, value addition, traditional knowledge and collaboration with bodies such as the Uttarakhand Organic Commodities Board to educate about the importance of sustainable value chains.

***Use valuation of ecosystem services to support land restoration*:** Evidence on the benefits of agroforestry and organic farming can inform restoration of degraded lands and contribute to India's commitments under the UN Convention to Combat Desertification (UNCCD).

***Recognise urban and peri-urban agriculture for urban resilience*:** The Brazil experience shows that UPA addresses urban heating, flooding and unemployment as well as demand for fresh organic produce. Similar approaches merit piloting on fallow and under-used land in and around major Indian cities.

***Integrate agroforestry into disaster risk reduction*:** Agroforestry on culturable wastelands and other fallow land, particularly on higher-gradient areas, can be considered within strategies for reducing erosion and other climate-related risks.

***Connect valuation with environmental-economic accounting*:** India has a long engagement with the System of Environmental-Economic Accounting (SEEA), led by the National Statistics Office of MoSPI with MoEFCC and other line ministries. As SEEA provides the internationally recognised accounting methodology and TEEB focuses on valuation and policy application, they complement each other. TEEBAgriFood studies can supply data for thematic environmental accounts, while SEEA ecosystem accounting can anchor biodiversity monitoring and state-level uptake under the Kunming-Montreal Global Biodiversity Framework. Uttarakhand's interest in developing a gross environmental product offers one avenue for integration.

All reports can be accessed at https://www.unep.org/topics/teeb

SUMMARY

Agricultural performance cannot be judged by yield and market returns alone. The TEEBAgriFood framework, through its four capitals approach and true cost accounting, makes the natural, produced, human and social values of agri-food systems visible so that ecosystem services from organic farming, agroforestry and urban agriculture enter economic and policy decisions. Studies in India shows reduced erosion and nutrient loss, higher carbon sequestration, greater agro-biodiversity and stronger livelihood security under organic and agroforestry scenarios, without loss of yield or farm income. Brazil, Thailand and Indonesia show the same valuation evidence converted into national programmes, subsidy reform and development planning. For India, the priorities are making sustainable production viable, strengthening market access and certification, using valuation for land restoration and disaster risk reduction, recognising urban and peri-urban agriculture, and linking TEEB valuation with environmental-economic accounting.

*Corresponding author email: alka.bhargava@un.org

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

Emphasises skill development and capacity building as critical enablers for modernising the fisheries value chain, enhancing productivity, reducing post-harvest losses and establishment of marketing linkages by developing human resource and institutional capacity.