

M. S. Swaminathan Research Foundation – Annual International Conference*

The UN General Assembly declared 2022 the International Year of Sustainable Mountain Development and the International Year of Artisanal Fisheries and Aquaculture. This conference highlighting hill and coastal ecosystems reiterated the significance and vulnerability of ecosystems in the context of climate change, the importance of livelihoods dependent on ecosystems, and the tribal and rural communities that are traditional custodians of ecosystems.

The inaugural session set the tone for the three-day technical sessions. In his keynote address, Essam Yassin Mohammed (WorldFish and CGIAR, Malaysia) emphasized the importance of keeping aquatic life safe since it acts as a carbon sink, adding that adaptation and mitigation efforts in and through aquatic food systems must underpin all policies seeking to address climate change resilience. M. S. Swaminathan (M. S. Swaminathan Research Foundation (MSSRF), Chennai) recommended conserving genetic heritage and indigenous knowledge from tribal communities while iterating coastal and hilly restoration as essential for sustainable human health. The 32nd MSSRF Annual Report was released, and the 'Every Child a Scientist' Centre at Poompuhar was inaugurated by the Chief Guest, Siva V. Meyyanathan (Minister for Environment and Climate Change, and Youth Welfare and Sports Development, Government of Tamil Nadu, India).

Session 2 on 'Globally important agricultural heritage systems – status, trends and opportunities in empowering ethnic communities' was chaired by Shantanu Mathur (International Fund for Agriculture Development Global Engagement, Rome). The speakers included Endo Yoshihide (Globally Important Agricultural Heritage Systems (GIAHS), Food and Agriculture Organization, Rome), who talked on the global perspectives of GIAHS with cases from Asia and Africa; K. S. Varaprasad (Asia Pacific Association of Agriculture Research Institution, Bangkok), who presented an overview of the status of GIAHS in the Asia-Pacific; Ajay Kumar Singh

(Protection of Plant Varieties and Farmers' Rights Authority (PPVFRA), Government of India) who spoke on the role of PPVFRA in recognizing local farming communities and E. D. Israel Oliver King (MSSRF) who showcased the status of GIAHS India and the trends of Koraput (Odisha) and Kuttanad (Kerala). Apart from reiterating that GIAHS are rich in resources while communities from these regions remain poor, the session also focused on Kuttanad and Koraput, where biodiversity registers and database of local biodiversity and traditional knowledge are recorded. It was agreed that the GIAHS approach could be a good tool for rural vitalization and development based on ecological characteristics and sustainable agriculture; however, there is a need for action-oriented projects and regional networking to further improve GIAHS. Protecting the rights of the farming communities and offering them due credit as custodians were recognized, and the urgency to digitize traditional knowledge coupled with promoting agro-ecotourism to sustain rural development.

Invited speakers in session 3 on the 'Role of science and technologies in bridging knowledge gaps and sustaining ecosystems', shared outcomes of proven technologies and demonstrated methods that have aided in minimizing knowledge gaps among hill-dwellers and coastal communities. Chaired by Soumya Swaminathan (WHO, Geneva, Switzerland), the speakers included C. N. Ravishankar (ICAR-CIFE, Mumbai), who addressed the key challenges to sustainable fisheries and the way forward; K. Thangaraj (Centre for DNA Fingerprinting and Diagnostics, Hyderabad) who spoke on population genomics and public health in South Asia; Kadambot Siddique (The University of Western Australia, Perth, Australia) who discussed on the potential of future smart foods for mountain agriculture achieving Zero Hunger: nutrition, climate-resilient, economic and social benefits; B. Shadrach (CEMCA, Commonwealth of Learning, Canada) who presented knowledge systems for sustaining hill and coastal ecosystems and V. R. Prabavathy (MSSRF) who talked on beneficial microbes for managing soil health in smallholder agro-ecosystems of hilly regions. In conclusion,

the session emphasized that marine fisheries can become a powerful engine for rural economic growth and social development; however, a symbiotic relationship between science and public policy is essential. The other main takeaways were on sustainable value-chain development for future smart foods that have the potential to develop mountain/hill agriculture and bio inputs playing a key role in improving crop productivity.

Adaptation and resilience as critical areas of study in climate change are now moving from broad generalities or isolated case studies to an integrated, ecosystem-based perspective that considers socio-economic institutions in a fundamental way. Session 4 on day 2 focused on the specific challenge of salinization in coastal agriculture across different geographies – India, Bangladesh and Vietnam, which have important similarities as well as significant differences.

T. Jayaraman (MSSRF) chaired the session. The speakers included Dang Khieu Nhan (Mekong Delta Development Research Institute, Can Tho University, Vietnam), who spoke on adaptive agricultural land uses to salinization in the Mekong Delta sharing science-policy gaps; Shilpi Kundu (Sher-e-Bangla Agriculture University, Dhaka, Bangladesh) who spoke on gender dimension to climate challenges in coastal agricultural landscapes of Bangladesh; Mohammed Mizanul Haque Kazal (Sher-e-Bangla Agricultural University) who talked about climate change and agriculture management strategies in the coastal areas of Bangladesh; Deepak Mercy Johnson (Foundation for Agrarian Studies, Bengaluru) who discussed strengthening institutional mechanisms for responding to salinization with case studies from Kerala and R. Nagarajan (MSSRF) who spoke on assessing soil salinity and impact of sea-level rise using remote sensing tools.

The session concluded with an appreciation of the relevant issues and challenges as well as exploring the way forward, specifically on strengthening institutional mechanisms responding to salinization in coastal ecosystems. Fostering gender approaches to climate-resilient agriculture in the context of macro-economic changes, particularly

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when triggered by climate change, and the inclusion of farmers' knowledge, attitude, perception, adaptation and mitigation were captured as essential to resource management and policy formulation.

Session 5 on aquaculture and fisheries in hilly and coastal ecosystems recognized that the global food system faces many complex challenges, including hunger, malnutrition, diet-related diseases, and an ever-growing population that needs sufficient and healthy food. The need to reduce food loss and waste, the depletion of natural resources and the effects of climate change compound the problem. Fish, molluscs, crustaceans and aquatic plants are not just essential and indispensable foods for healthy diets but also have cultural heritage and culinary traditions. Keeping in mind that small-scale artisanal fishers and fish farmers produce a large portion of our seafood, speakers in this session talked about the emerging fishery and aquaculture techniques alongside technologies and challenges while presenting new opportunities to operationalize fishery programmes in hill and coastal ecosystems.

Chaired by Modadugu Vijay Gupta (World Food Prize Laureate), there were presentations by Kuldeep K. Lal (ICAR-NBFGR, Lucknow) on 'Fish genetic resources of upland regions, their management and utilisation'; E. Vivekanandan (Central Marine Fisheries Research Institute, Chennai) on 'Climate trends, impacts and adaptation strategies in the coastal ecosystem'; Arun Padiyar (WorldFish, Bhubaneswar) on 'Scaling locally relevant fisheries and aquaculture technologies through partnerships and convergence for wider impacts in Odisha'; Bikram Keshari Baliarsingh (Deutsche Gesellschaft für Internationale Zusammenarbeit, Bhubaneswar) on 'Integrated aquaculture initiative in Eastern Ghats of Odisha' and S. Velvizhi (MSSRF) on 'Value chain improvements in small scale fisheries sector: experiences of MSSRF'. In concluding points, it was established that there is an urgent need for science-based interventions and community involvement to mainstream fish genetic resources in order to achieve increased productivity through

diversification. Bridging science innovations in fisheries with Government development programmes is essential for the scalability and sustainability of marine ecosystems. Also evident was that focus on developing farmer collectives in hilly and coastal regions is a must to address structural and institutional challenges.

The last session of day 2 was on meeting the challenges in achieving Sustainable Development Goals (SDGs) 1 and 2 of the United Nations for hill and coastal ecosystems. It was chaired by Narayan G. Hegde (MSSRF). The speakers included Pius Rane (North East Slow Food and Agrobiodiversity Society, Shillong), who talked about the indigenous peoples' food systems as a hidden treasure; G. Sugumar (Tamil Nadu Dr J. Jayalalitha Fisheries University, Nagapattinam) who spoke on the role of fisheries in addressing SDGs 1 and 2; Sunil Nautiyal (G B Pant National Institute of Himalayan Environment, Almora) who highlighted perspectives from the Himalayan region; R. Gopinath (MSSRF) who spoke on the impact of MSSRF's R&D interventions in hilly and coastal terrains and Sara J. Scherr (Eco-agriculture Partners, USA). It was concluded that there are challenges to achieving SDG 1 (No Poverty) and SDG 2 (Zero Hunger) in the hilly and coastal regions since climate-change vulnerabilities are high with poor infrastructure and healthcare. Integrated landscape management was recognized as essential to address the SDG goals, and local landscape partnerships through collaborative community engagement and dialogue were inevitable for sustainability.

The third and final day of the conference opened with a session on gender equality seeking empowerment pathways for sustainable gender balance. Participants shared methods and experiences while addressing gender inequality prevailing in the hilly and coastal regions. Nitya Rao (University of East Anglia, UK) chaired the session. The speakers included Nikita Gopal (ICAR-Central Institute of Fisheries Technology, Cochin), who spoke on 'Developing responsive and inclusive models for addressing gender inequalities in fisheries'; V.

Sindhu (Kudumbashree State Mission, Thiruvananthapuram), who talked on 'Collective farming and women's empowerment: a case from Kudumbashree'; A. K. Panda (ICAR-Central Institute for Women in Agriculture, Bhubaneswar) who spoke on 'Mainstreaming gender and empowering women in agriculture' and R. Rengalakshmi (MSSRF) who discussed 'Gender, technology and innovations in enhancing climate resilience: potential pathways and challenges'. Conclusions drawn were that gender empowerment is a must to bring about gender equality, and it should be more than a crosscut in policies, especially for credit, extension services, inputs and advisories. It was observed that despite some visible structural changes, women (especially those from tribal communities) are yet to experience a wholesome enabling environment. It was agreed that gender equality can be achieved by developing an evidence base through systematic research and documentation, advocacy and convergence of policies and programmes.

In the plenary session, Madhura Swaminathan (MSSRF) chaired, and the speakers were Shantanu Mathur, V. B. Mathur (National Biodiversity Authority, Chennai) and G. N. Hariharan (MSSRF). Salient points that emerged over the three days were presented by Hariharan, and the lead speakers provided insights and views. Mathur iterated that implementing frameworks for biodiversity conservation in the hill and coastal ecosystems requires the globalization of resources. Mathur emphasized the need to re-establish the importance of meeting Agenda 2030 and highlighted aspects of conservation and protection of agricultural and fishery ecosystems as paramount to achieving the SDGs. In her final remarks, Madhura Swaminathan called for the younger generation of researchers to focus on bringing scientific evidence for all levels of policy uptake.

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