Proceedings of the TEEBAgriFood Second State-Level Stakeholder Workshop on TEEBAgriFood Initiative in Uttar Pradesh, India

Discussion on Draft Results

1st August 2023 (Tuesday), 10.00 to 17.00 hrs (IST), Auditorium, ICAR-Indian Institute of Sugarcane Research, Lucknow, Uttar Pradesh (Hybrid Mode)

Background

The Economics of Ecosystem and Biodiversity (TEEB), a global initiative, hosted by the United Nations Environment Programme (UNEP) was initiated to recognize, demonstrate, and capture the tangible and intangible values of ecosystems and biodiversity in monetary terms and help decision-makers acknowledge the diverse array of advantages offered by the ecosystem to further integrate them into decision-making and inform both public and private sectors engaged in the agri-food sector.

The UNEP global project titled "Economics of Ecosystems and Biodiversity: Promoting a Sustainable Agriculture and Food Sector", hereinafter referred to as TEEBAgriFood, evolved from the recognition of the fact that the global food system is the primary driver of biodiversity loss, with agriculture alone being the biggest identified threat. Therefore, TEEBAgriFood aims to explore the relationship between agriculture and the environment and society and promote sustainable agricultural policies to conserve biodiversity and restore degraded landscapes by capturing the positive and negative impacts and externalities across the entire agri-food systems and assess its impact on natural, produced, human, and social capitals. The TEEBAgriFood framework is an offshoot of the TEEB framework specifically applied to food systems, which is funded through the European Union Partnership Instrument (EUPI). The global project was launched in 2019 and is being implemented in 7 countries, namely, Brazil, China, India, Indonesia, Mexico, Thailand and Malaysia.

In India, it is being implemented in Uttar Pradesh, Uttarakhand, and Assam under the guidance of the Project Steering Committee co-chaired by the Ministry of Agriculture and Farmers Welfare and the Ministry of Environment, Forest and Climate Change for studying the impacts of organic farming and agroforestry on the four capitals namely Natural, Produced, Human and Social. UNEP in partnership with ICAR- Indian Institute of Farming Systems Research (ICAR-IIFSR) -Modipuram implemented the TEEBAgriFood initiative in Uttar Pradesh, where the project aims to inform planning processes by providing comprehensive scientific evidence to support food and agricultural policies with the help of modeling and valuation conducted for various scenarios developed in accordance with the policy interventions for upscaling organic farming and agroforestry for the year 2030 and 2050 against the base year 2020 under six scenarios- Business as Usual (BaU), Optimistic and Pessimistic in combination with two climatic considerations- RCP 4.5 and RCP 8.5. The determination of the study area and prioritized elements of natural, produced, social, and human capital being assessed under the project were finalized through state-level and national-level stakeholder consultations organized by research partners along with the UNEP-TEEB unit.

The first stakeholder consultation held in September 2022 was aimed at finalizing the scoping report. This involved pinpointing ecosystem-related variables and finalizing the elements of the four capitals: Natural, Produced, Human, and Social for evaluation. Concurrently, the consultation workshop helped envision potential scenarios for future practices in organic farming and agroforestry within the state's context, ultimately contributing toward making an economic case for the expansion of organic farming and agroforestry through flagship initiatives of the Government of India including Paramparagat Krishi Vikas Yojana (PKVY), Namami Gange Initiative (National Mission for Clean Ganga) , National Agroforestry Policy 2014, Trees on Every Bund (Har Med Par Ped), among others. The project findings serve as robust scientific evidence that advocates for alternative and resilient production strategies. Significantly, these findings hold applicability at both state and central governance levels, thereby contributing to informing the formulation of policies, both at national and sub national levels.

The second stakeholder workshop for the TEEBAgriFood application in Uttar Pradesh was held on 1st August 2023 at the Indian Institute of Sugarcane Research (IISR- ICAR), Lucknow, Uttar Pradesh. The workshop brought together varied stakeholders to deliberate on the preliminary findings of comprehensive scenario modeling and assessment of prioritized elements of four capitals. It aimed to –

- Discuss and receive inputs on the draft results of scenario modeling and valuation assessment in Uttar Pradesh.
- Engage in discussions with policymakers to explore the linkages of the TEEBAgriFood assessment with ongoing government flagship programs and related projects aimed at expanding organic farming and agroforestry.
- Discuss the national and local context of agriculture and environmental policy to ensure the policy relevance of TEEBAgriFood India and discuss the key policy entry points for the TEEBAgriFood Initiative at both national and state levels.
- Update stakeholders on progress of work in Uttar Pradesh.

The valuable contributions from varied stakeholders served to discuss the findings and their applicability to agri-food systems in Uttar Pradesh and it was useful in establishing synergies with national priorities and also encouraged collaboration amongst decision-makers through the discussion of results, methodologies, and approaches. These inputs will ultimately be incorporated into the finalization of the TEEBAgriFood assessments and synthesis report for Uttar Pradesh, India.

TEEBAgriFood Application in Uttar Pradesh- Proceedings of one-day State-level Stakeholder Consultation Workshop held on 1st August 2023.

Session 1: Opening and Special Remarks

Dr. Sunil Kumar, Director of IIFSR, welcomed all participants and in particular, thanked high-level speakers for attending the workshop. In his remarks, he thanked all the government officials attending the workshop virtually and physically, directors of ICAR institutions, representatives of KVKs, FPOs, and individual farmers, and provided an overview of the TEEBAgriFood project and its relevance within the context of Uttar Pradesh. Dr. Kumar acquainted the participants with the workshop's aim, which is to present the outcomes of the TEEB assessment in Uttar Pradesh; formulate a road map for expanding organic farming and agroforestry, and incentivize farmers to adopt sustainable practices.

Dr. Kumar provided a brief overview of institutional activities being carried out and the research strengths, further informing that the ICAR-IIFSR has been working tirelessly for the past 70 years to strengthen and evolve regenerative farming practices for ensuring food, nutrition, livelihood security, and sustainability and further elaborated on two national schemes being operated by ICAR-IIFSR, namely -All India Coordinated Research Project on Integrated Farming Systems (AICRP-IFS) and All India Network Programme on Organic Farming (AINP-OF) at 94 locations in 26 States/ UTs of India contributing to improving the farming systems research for making it more productive and sustainable.

He invited high-level speakers for their input and opinions on the project.

Dr. S.K Chaudhari, DDG NRM

Dr. S.K Chaudhari delivered the opening remarks, extending a warm welcome to the esteemed international and national dignitaries in attendance, and began by highlighting the global concerns summarised as follows-

- In the current context, where climate change and extreme events loom large, nature-positive agriculture emerges as a one-stop solution. This approach necessitates a harmonious integration of contemporary and traditional farming methods, underlining the urgency to explore nature-based solutions and shift towards traditional farming practices.
- The efforts should be directed to identify the hotspots where the promotion of sustainable agricultural practices can be maximized. Additionally, a significant focus was placed on integrated nutrient management to preserve soil fertility and ensure a consistent supply of essential plant nutrients.
- India is making significant progress in this regard and initiatives such as the Paramparagat Krishi Vikas Yojana (PKVY) and the Namami Gange mission are actively promoting organic farming practices in Uttar Pradesh and these efforts demonstrate India's confidence and commitment to addressing climate change through nature-based solutions. He pointed out that enhancing the resilience of agricultural methods is imperative for strengthening and advancing the certification process. The existing Participatory Guarantee Scheme (PGS) certification framework within the Paramparagat Krishi Vikas Yojana (PKVY) necessitates further strengthening to ascertain that farmers reap the full benefits of adopting organic practices.

In conclusion, Dr. Chaudhary emphasized the alignment with ongoing governmental initiatives which is extremely important and hence synergizing these efforts with existing government schemes stands as a crucial step toward realizing a more sustainable and resilient agricultural landscape.

Dr. R. Vishwanathan, Director, Indian Institute of Sugarcane Research – ICAR, Lucknow

Dr. Vishwanathan provided an overview of the ongoing work undertaken by ICAR-IIFSR regarding the critical analysis of biodiversity change and examining the impact of climate change on crop production.

He provided an overview of the State's status in terms of agriculture and highlighted some of the key points-

- The issue of climate change and how it impacts the production, productivity, and overall quality of agricultural yields. The contribution from Uttar Pradesh is significant, accounting for nearly 50% of the Nation's total agricultural output, which adds significantly to the national average. This agricultural output not only enhances economic prosperity but also ensures livelihood security for many.
- Beyond this, the agricultural byproducts serve as essential animal feed, further amplifying the benefits. An illustrative example is sugarcane, which stands out as an abundant biomass generator, yielding substantial biomass and actively sequestering carbon. The variations that exist among various sugar cane varieties were noted.
- The agricultural landscape faces challenges due to long-term weather fluctuations, such as significant decreases in rainfall and rising minimum temperatures, which have led to frequent instances of crop failure. Moreover, the increasing mechanization and pesticide usage have altered the innate disease resistance mechanisms in crops, posing additional challenges to sustainable agricultural practices.

Dr. Vishwanathan concluded by highlighting the global issues of poverty, hunger, climate change, and biodiversity loss, and noted that moving towards sustainable agriculture practices can be a solution. He added that the TEEBAgriFood project would be useful in strengthening the ongoing research projects in the institute.

B Prabhakar, Additional Principal Chief Conservator of Forests- UP Forest Department

B Prabhakar extended his congratulations to the IIFSR and TEEB team for their extensive study, which has shed light on the economic rationale for expanding organic farming and agroforestry. He drew attention to the current agricultural and forest landscape in Uttar Pradesh, highlighting the following key aspects:

- In Uttar Pradesh, approximately 6% of the total area is covered by forests, while 3% is designated as green cover. Remarkably, agricultural land occupies a substantial 70% of the state's territory.
- Following the guidelines of the National Forest Policy, it is recommended that at least 33% of a nation's total area should be under forest cover to maintain a balanced environment.

- Given the constraints posed by an increasing population and limited resources, especially land, the agricultural sector becomes a pivotal avenue for solutions. Agroforestry stands out as a promising approach to address these challenges.
- To ensure the effective adoption of such sustainable farming practices, it is crucial to create robust safety nets for farmers and provide them with appropriate incentives.
- The formulation of an agroforestry-centered industrial policy becomes imperative to encourage and incentivize farmers to embrace agroforestry on their lands.
- Equally essential is the establishment of a carbon-financing mechanism, accompanied by educating farmers about the concept of carbon credits.

In essence, B Prabhakar highlighted the significance of informed agricultural choices, solid support mechanisms, and forward-looking policies to drive the expansion of agroforestry and promote sustainable farming practices in Uttar Pradesh.

Dr. T. Damodaran, Director, Central Institute of Subtropical Horticulture

Dr. T. Damodaran, building upon insights shared by APCCF, highlighted potential areas of progress, mentioned below-

- Alongside the existing 6% forest cover and 3% green cover, an additional 14% could be included if mango cultivation is taken into account. Uttar Pradesh stands as the second-largest state in terms of mango cultivation area, encompassing a vast expanse of approximately 2.14 lakh hectares. Drawing from government records, Dr. Damodaran presented compelling statistics: In Lucknow alone, around 30,000 hectares of land are dedicated to mango orchards, sequestering 0.21 kg of carbon per pound of mangoes (based on 10-year-old orchards), and as per the data available, this region has orchards aged between 30 to 40 years.
- Considering that sugarcane and mango are the prominent crops in Uttar Pradesh's horticultural landscape, Dr. Damodaran underscored the significance of shaping policies that effectively address the underlying challenges faced by these practices. The rapid loss of orchards due to escalating urbanization and population growth demands for immediate attention. He also emphasized the untapped potential of carbon credits for these long-standing mango orchards, suggesting that farmers could potentially gain substantial financial benefits. Given the lack of adequate remuneration for farmers, orchard lands are progressively being diverted for alternative purposes. He noted a drawback associated with mango orchards—the persistent use of pesticides, which disrupts the delicate soil cycle and undermines the pollination process. An alarming consequence of these practices is the depletion of soil microbial carbon, with a decline of 101 tons per hectare.
- Building upon the financial benefits for farmers, Dr. Damodaran shared that for 15-year-old orchards, farmers could potentially earn up to INR 80,000 per hectare through carbon credit initiatives. Among various fruits, mango orchards exhibit a notably high Carbon Sequestration Potential (CSP), with an impressive 35.5 metric tons of carbon being sequestered per hectare in Uttar Pradesh's orchards.

Concluding his remarks, Dr. Vishwanathan emphasized that shifting towards organic and natural farming stands as a comprehensive solution, especially in light of the increasingly frequent extreme climatic events. It is crucial to prioritize the transition towards climate-resilient agriculture. In addition, the TEEBAgriFood project is in line with the efforts of the horticulture department. However, he also

pointed out that it is crucial to have strong support measures, such as implementing a carbon credit system, to ensure fallback options for the farmers. He extended his support and stressed the significance of engaging to collectively address these challenges and steer toward sustainable agricultural practices.

Dr. Alka Bhargava, Senior Policy Advisor, TEEB-UNEP

Dr. Bhargava expressed her gratitude to the director of CISH for the valuable insights and the potential for collaboration. She proceeded to provide a comprehensive overview of the TEEB framework and gave a brief background of the TEEB India initiative. It was launched in India in 2011 and an interim report was released in 2014 focusing on forests, inland wetlands, and marine and coastal ecosystems. Dr. Bhargava further explained that this project was perhaps the first of its kind to address food systems – organic farming and agroforestry being the mainstay in India project, and that the TEEB principles of UNEP were initiated with the sole purpose of 'making nature's invisible values visible' because this invisibility is a key driver of the ongoing depletion of ecosystems and biodiversity. The project covers the impacts on all four capitals – natural, produced, social, and human. She provided the following insights on the TEEBAgriFood India application and the need to mainstream the findings of the studies-

- Dr. Bhargava underlined the fact that it is well known that organic farming and agroforestry are beneficial but the emerging results from UP are hard-hitting in terms of the valuation and monetized terms, so there is the need to ponder on how to mainstream these results into programs and policy? She also picked up some of the facts given in a recent working paper of NITI Aayog "Green Revolution to Amrit Kaal" co-authored by Prof Ramesh Chand Member (Agri) NITI Aayog and Mr. Jaspal Singh, to substantiate one thematic area where the results can be applied – which is crop diversification. This positively correlates with improved soil health and groundwater levels and overall ensures high productivity. Dr. Bhargava summarized a few points from the paper-

    I. The States with the highest productivity of land are not the States with the highest productivity of rice and wheat. Rice and wheat productivity is highest in Punjab followed by Haryana, but the top three States in terms of aggregate land productivity are West Bengal, Himachal Pradesh, and Andhra Pradesh.
    II. The States that have shifted their area allocation and crop pattern in tune with changing demand patterns perform much better compared to those that have remained more or less rigid.
    III. Uttar Pradesh ranks third, behind Punjab and Haryana as having the highest Gross Irrigated Area as a % of Gross Cropped Area (80.46%) and hence has a great potential for crop diversification for increased land productivity and income to farmers.

- Dr. Bhargava discussed the potential of transitioning towards integrated organic farming systems with agroforestry in making agriculture more climate resilient. She emphasized that looking at food systems through the TEEB lens will enable greater appreciation of the impacts on the economy by way of valuation and monetization of the impacts on other capitals in addition to only yields.

In closing, Dr. Bhargava urged the diverse stakeholders attending the workshop to keep this mainstreaming objective in their minds as the discussion on the draft results proceeds so that there can be fruitful conclusions. She ended with the importance of incentivizing individuals to conserve natural

resources and advocated for the establishment of a safety net to provide ongoing support for farmers who adopt such sustainable practices.

Mr. S.K Shukla, Director, UP Council of Sugarcane Research

Mr. Shukla expressed concerns about the ecosystem's sustainability in the current scenario. During the discussion, Mr. S.K Shukla raised several noteworthy observations-

- The necessity for improvements within the carbon credit mechanism.
- Emphasis on introducing measures that contribute to waste utilisation, using the by-products and waste produced from sugarcane was given as an illustrative example.
- The significance of progressing in the field of carbon sequestration technology.

In conclusion, Mr. Shukla emphasized the critical role of strong policy interventions in ensuring that farmers who adopt sustainable practices and water-saving technologies receive appropriate incentives, and also discussed how the TEEBAgriFood project aligns with the government's goal of doubling farmers' income.

Dr. Sanjay Singh, Director General- UP Council of Agricultural Research

Dr. Singh provided a brief description of the UP Council of Agricultural Research which acts as a think tank for government involved in research, education, and extension domains. To ensure that the benefits are reaching farmers on the ground, he suggested-

- In terms of policy considerations and the adoption of sustainable agricultural practices, the establishment of additional testing laboratories for organic produce was noted. Dr. Singh informed that the National Centre for Organic and Natural Farming located in Ghaziabad is the sole institution for certifying organic produce, thus there's a need to have a broader network of certification laboratories for farmers' ease.
- For the implementation of a robust mechanism to determine pricing structures for organic produce a strong mechanism should be introduced to decide the rates for organic produce. Since the project primarily informs on the production process and not much on the post-production (market) process in Uttar Pradesh, it is important to create an efficient environment for adoption for farmers.
- Formation of clusters centered around a single village, as targeting individual farmers may yield suboptimal results. This approach could be enhanced through the formation of Farmer Producer Organizations (FPOs). Given UPCAR's close engagement with Krishi Vigyan Kendras (KVKs) and Farmer Producer Organisations (FPOs), there's a possibility for collaboration and collective action.

In conclusion, he underscored the potential synergies that could be explored for direct on-ground benefits for farmers as UPCAR closely works with farmers on the ground.

Dr. Salman Hussain, Coordinator UNEP-TEEB and Head, The Economics of Nature Unit, Geneva

Dr. Hussain congratulated and extended his thanks for organizing the stakeholder consultation and providing a platform to discuss the opportunities that are available for mainstreaming the work done so far in Uttar Pradesh. He shared insights on various interventions at a global level-

- Provided insights on the recently concluded UN Food Systems Summit and the Stocktaking exercise in Rome, he informed that the main objective was to bring the global community together to understand the progress and extent to which food systems transformation is being undertaken and identify the obstacles globally. Furthermore, the summit discussed the linkages to livelihood improvement and farmers' welfare, while also achieving reductions in carbon emissions, biodiversity conservation, reduction in desertification, etc. Dr. Hussain emphasized that there was a continuing call for evidence-based assessment, and TEEBAgriFood aims to provide scientific evidence for the externalities and assigning monetary value to it.
- Dr, Hussain informed about the side event on True Cost Accounting (TCA) at the Summit, attended by more than 300 delegates from across the world. TEEB is an example of TCA.
- He took note of the work that has been done in Andhra Pradesh on Natural farming, and how India is taking an interest in accounting for the externalities and impacts on agri-food systems.
- Additionally provided insights into FAO's major annual flagship publication- The State of Food and Agriculture (SOFA) Report which brings to the audience the balanced and scientific-based assessments of agri-food systems. He informed that the publication is sent to every single agricultural ministry that is an FAO member globally. The upcoming edition for the 2023-24 period will focus on True Cost Accounting, encompassing the principles and framework discussed within the workshop.

Dr. Hussain concluded by highlighting the underlying objective of the TEEB AgriFood project which aims to make an economic case for upscaling organic farming and agroforestry by evaluating and monetizing positive and negative externalities and also briefly talked about the Namami Gange in India- which brings potential transformation in the food system.

Mr. Franklin Khobung, Joint Secretary, Ministry of Agriculture and Farmers Welfare

Mr. Khobung emphasized the evolving agricultural priorities throughout the country. Our priorities have shifted from the past, earlier achieving food security was the goal, now in addition to this, our aim is to also focus on the sustainable agriculture system, keeping global challenges into account. He further provided a background of several government initiatives in the realm of agriculture summarized below:

I. National Mission on Sustainable Agriculture (NMSA)

- NMSA is an umbrella scheme, starting from 2018 till 2030. Through this program, the government aims to identify all the important aspects of mitigation measures.
- Five important areas have been identified in the NMSA-
    1. Research
    2. Transforming the technologies to farmers
    3. Increasing infrastructure

4. Capacity building for farmers
5. Community-based adoption of sustainable agriculture practices.

II. Interventions on Agroforestry

Under National Agroforestry Policy 2014, Mr. Khobung apprised the participants of the following measures-

1. Quality planting material is supplied for agroforestry. 10% of seedlings qualify for quality testing and hence are provided for plantation.
2. Certification of seedlings is being done to ensure better pricing.
3. Central Agroforestry Research Institute (ICAR-CAFRI) has been hired to provide technical support- for certification of the planting material to farmers, for establishing tissue culture nurseries, and for research to be undertaken in the field of organic farming and agroforestry.
4. Local initiatives are supported by a 2% fund allocation, with subsidies available.
5. Under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), 60% of the funds have been allocated for agriculture and allied activities.

Mr. Khobung was of the opinion that implementation is required for carbon marketing in the agriculture sector for the amount of carbon sequestered and GHG emissions.

He also provided an overview of the Green Credits Programme (GCP), recently notified this year by the Ministry of Environment, Forest and Climate Change (MoEFCC). The program aims to incentivize voluntary environmental actions undertaken by diverse stakeholders including private sectors, small-scale industries, cooperatives, forestry enterprises, individuals, and farmer-produce organizations for their environmental actions. The green credits provided are based on certain activities listed in the implementation rule, which includes sustainable agriculture as one of the activities. Apart from this, tree plantation, water conservation, waste management, air pollution, mangrove conservation and restoration, ecomark, sustainable building, and infrastructure-based green credits are encouraged.

In conclusion, Mr. Khobung expressed that this project offers a great potential to align with ongoing government efforts and this alignment would be useful for promoting sustainability.

Dr. Michael Bucki, HOD-EEAS, EU Delegation to India

Dr. Michael Bucki extended his gratitude to IIFSR, the network of institutes within ICAR, and TEEB-UNEP for convening the stakeholder consultation workshop and conducting an expansive study to assess ecosystem services and inform on the existing agricultural policies. He provided his key insights and discussed the following-

- The G20 agricultural ministerial meeting outcome document of June 2023 held in Hyderabad, specifically articles 13 and 14, which underline the imperative to create an enabling environment to transition towards a climate-resilient food system. These articles emphasize innovation and responsible investments for nature-based solutions.
- The G20 Environment and Climate Sustainability Ministerial Meeting in Chennai in July 2023. He highlighted the significance of robust ecosystems in addressing overarching global challenges, such as climate change, biodiversity loss, land degradation, pollution, food security,

and water scarcity. He emphasized the need to create a transformative environment and provide innovative and accountable solutions through research where holistic accounting of elements is undertaken.

- Reaching global objectives in biodiversity and food security necessitates a return to the fundamental discourse of harmonious coexistence with nature, with more sustainable efforts at both local and global levels. In this connection, Dr. Bucki further highlighted through the application of the TEEBAgriFood framework, efforts are being made to scale up sustainable agricultural practices and fulfill commitments on nature restoration, carbon sequestration, soil fertility, air and water quality, and other vital aspects, concurrently addressing global commitments on food security and one health.
- The comprehensive evaluation of ecosystem services can inform decision-making, not only in Uttar Pradesh, Uttarakhand, or Assam. Its relevance extends across India and beyond, with the potential translation of these findings into actionable measures that can contribute to shaping domestic and global food systems.
- The European Union's extensive work towards global biodiversity, highlighting an escalated commitment from €250 million a decade ago to €1 billion annually, a fourfold increase in support for global biodiversity conservation.
- Importance of extending support to civil society and the private sector as they drive the transition to sustainable and resilient ecosystems.
- The forthcoming initiative aimed at safeguarding biodiversity and promoting resilient agriculture in Rajasthan, India.

Addressing feedback from diverse stakeholders, including farmers, he commented on some of the challenges, such as the mixing of organic and non-organic produce in markets, leading to the absence of premium market rates. This discourages the will to switch to sustainable agricultural practices. Dr. Bucki strongly advocated for the certification of organic produce, highlighting that labeling could potentially guide consumers towards more sustainable choices, and that even if organic produce doesn't fetch a significant premium price, it would definitely fetch a high market access.

He concluded by addressing certain outcomes related to social and human capital, particularly focusing on the empowerment of women. He stressed the significance of women's involvement, a subject extensively debated on a global scale, which contributes to and offers solutions for overarching global issues.

Dr. Madhu Verma, Senior Economic Advisor, IORA Ecological Solutions

Dr. Verma congratulated the team for taking up such extensive work and shared some of the works carried out in India using the TEEB framework and highlighted the importance of economic valuation techniques in transforming agriculture systems.

- She shed light on the report on Doubling Farmers' Income (DFI) and the WRI-India report on Transforming Agricultural Systems: Making the Hidden Visible which aims to provide functional solutions to the implementation of the DFI report.
- Dr. Verma also talked about green bonuses for the agricultural sector and highlighted that in the DFI report, emphasis was given to developing agriculture production systems in accordance

with the agroecological zones in the country which also took farmer empowerment, in particular women empowerment, R&D, risk management, etc into consideration.

- She noted that Doubling Farmers Income is particularly focused on increasing productivity, reducing production cost, optimal monetization of produce, introducing sustainable production technologies, and risk mitigation along the entire value chain.
- Offering her insights, she advocated for a broader perspective on forests beyond their role in timber and non-timber forest products (NTFPs) and highlighted how the study is effective in providing a micro-level perspective. Similarly, in the case of agroforestry, she suggested a comprehensive approach that extends to include horticulture, floriculture, and related domains.

In conclusion, Dr. Verma emphasized the need to scale up organic farming and agroforestry and replicate the same model in other states of the country depending upon the agro-climatic conditions; and also translate these results into policy-making and institutions.

Session 2: Presentation of draft results

Presentation 1: Overview of the TEEBAgriFood Application in Uttar Pradesh- Objectives, Scenario setting, Study area, and elements of the capital.

Dr. N. Ravishankar, Principal Scientist, ICAR-IIFSR

Dr. N. Ravishankar provided an overview of the project's scope. He provided a brief of the inception of the TEEBAgriFood Initiative in Uttar Pradesh, which was initiated in 2019, followed by the commencement of fieldwork assessments in February 2022.

Dr. Ravishankar briefly discussed the first stakeholder consultation held in September 2020, which marked a key milestone in the project's trajectory. The consultation was useful in

- Formulating the study's framework- this entailed defining the study area and setting scenarios within three distinct perspectives – Business as Usual, Optimistic, and Pessimistic – considering two climatic scenarios, RCP 4.5 and RCP 8.5.
- Finalization of the parameters integral to the evaluation of the TEEBAgriFood Framework specifically within the context of Uttar Pradesh.

The scoping report was presented at the National Level stakeholder consultation held in November 2022.

Dr. Ravishankar provided an overview of missions and programs introduced by the Government of India to advance Sustainable Development Goals. He added that the government is placing significant emphasis on the promotion of organic and natural farming, backed by substantial budgetary allocations. Among the prominent missions are the National Mission on Sustainable Agriculture, National Rainfed Area Development, the Agroforestry Sub-Mission, and Soil Health Management. These schemes aim at prioritizing sustainability alongside considerations of productivity and profitability. He emphasized three primary objectives of the project:

- To evaluate the economic case for scaling up Organic Farming (OF) and Agroforestry (AgF) practices.
- To evaluate key government initiatives in Uttar Pradesh, with a specific focus on schemes such as Pradhan Mantri Krishi Vikas Yojana (PKVY), National Mission for Clean Ganga (Namami Gange), National Programme for Organic Production, and the National Agroforestry Policy.
- To assess sustainable livelihood security indicators and ecosystem services, encompassing both beneficiaries who have adopted these practices and those who have not.

Further elaborating on the trends of the organic farming expansion in India, as indicated by APEDA (2021)- over the past 8 years, organic farming has consistently seen growth at a rate of 22% at the national level annually. In Uttarakhand, as per IIFSR analysis, the growth rate of organic farming has been observed at 10% annually. Uttar Pradesh presents a fertile landscape for the advancement of both organic farming and agroforestry practices, each of which significantly contributes to the overarching goal of sustainability.

Uttar Pradesh accounts for approximately 20% of the overall food production, which is 315.7 million tonnes as of 2021. However, as reported by the Central Research Institute for Dryland Agriculture-National Innovations on Climate Resilient Agriculture (CRIDA-NICRA), the occurrence of severe

climatic events could potentially result in a 23% reduction in rice yield, along with yield losses ranging from 6 to 20% for wheat. Hence, it becomes important to rely on sustainable production strategies, and in this context, the TEEBAgriFood initiative in Uttar Pradesh examines the key initiatives at the state and national levels.

The selection of five districts for this study demonstrates their distinctiveness across various parameters, including net sown area, net irrigation, total forest area, cropping intensity, and geographical expanse. Among these, three districts, namely Aligarh, Bulandshahar, and Meerut, stand out with a total of 100% area under net irrigation, contributing to an 85% overall net irrigation area at the state level. Conversely, the remaining two districts, Hamirpur and Mirzapur, have a comparatively lower extent of net irrigated area, incorporating segments of dryland and rainfed regions.

The TEEBAgriFood study particularly focuses on the monocropping system prevalent in Aligarh, Bulandshahar, and Meerut districts, while addressing the diversified system evident in Hamirpur and Mirzapur districts. The LULC map of the state clearly demarcates a large amount of forested land within the Hamirpur and Mirzapur districts. This distinction is the underlying rationale behind the selection of these specific districts for the study.

Further, Dr. Ravishankar explained the three policy scenarios in combination with two climatic scenarios RCP 4.5 and RCP 8.5, projected for the study.

Business-as-usual	• Organic Farming – Expansion of organic farming @ 10%/year) (https://pgsindia-ncof.gov.in/) • Agroforestry – 10% of the cropped land (Chavan et al., 2015, Curr. Sci.; Rizvi et al., 2014; ICAR-CAFRI, 2018, ISO 9001:2015) in U.P. • Vision to increase by 15 % in near future
Optimistic	• Under these policies- NMCG, NMNF, PKVY, JKPY, LAC • Organic Farming – Expansion of organic farming @15% growth rate/year) which will cover 23.61% of the net cultivated area in 2050 • Agroforestry – 33% of the cropped land
Pessimistic	• Organic Farming- Negative growth rate of 5 % per annum due to yield loss in the initial years, discontinuation of policies which will reduce the net cultivated area under organic farming to 0.09% of the net sown area. • No change in the Agroforestry area due to a reduction in timber value and pest harboring.

Presentation 2: Draft Results on Natural and Produced Capital

Dr. Meraj Alam Ansari, Senior Scientist (Agronomy)

Dr. Meraj elaborated on crucial global concerns, such as the influence of climate change on overall biodiversity and the agri-food system and its linkages to Sustainable Development Goals. He emphasized how the adoption of regenerative farming practices which includes nature-positive approaches, such as agroforestry and organic farming can address broader challenges by enhancing the carbon sequestration potential and reducing the adverse impact of climate change. Furthermore, he detailed that the TEEBAgriFood initiative in Uttar Pradesh is one such initiative to assess the impact of regenerative farming practices across various policy considerations (Business-as-Usual, Optimistic, and Pessimistic), in combination with the examination of two climatic projections (RCP 4.5 and 8.5) and their effects on four capitals: natural, produced, human, and social.

The initiative began in Uttar Pradesh with the following objectives-

- Impact of organic farming on ecosystem services, produced capital as well as livelihoods, and health.
- Spatial planning of agricultural production to maximize ecosystem services.
- Economic valuation for scaling up organic farming and agroforestry.
- Policy, institutional, and governance solutions for sustainable food production.

Natural Capital elements assessed include - carbon sequestration, sediment yield, and water provisioning services (quantification). The tools used for assessment are the InVest Model (for carbon sequestration) and the SWAT model (for sediment and water yield); data sources used for assessing these elements include InVest data store, NASA Power, NBSSLUP, ICAR-CAFRI, FSI, MoAFW (PGS) and primary survey and secondary data from published records available in the public domain. The assessments of these elements were conducted across various climate change scenarios and policies pertinent to Organic Farming (OF), conventional methods, and Agroforestry.

The InVest model employed for assessing the carbon sequestration potential for different years required input files encompassing LULC maps for different climatic scenarios for the years 2030 and 2050, taken against the base year of 2020. Additionally, the assessment incorporated carbon pool data drawn from the InVest model, including parameters such as above-ground biomass, below-ground biomass, soil, and dead biomass. According to the Green India Platform, the social cost of carbon stands at 86 USD per metric ton of CO_2, and this value was incorporated into the valuation of elements considered for the TEEB study in Uttar Pradesh.

Crop provisioning services are studied in the produced capital using the Decision Support System for Agrotechnology Transfer (DSSAT) model. Data for these evaluations were sourced from secondary data from published records including ICAR-IIFSR data as well as the primary survey. Produced capital is assessed under different climatic considerations as well as varied policy scenarios including OF, AgF, and conventional practices.

Primary survey data was collected from a sample of 60 individuals who were beneficiaries (organic farmers), as well as 60 individuals who were not beneficiaries (conventional farmers). The beneficiary

group consists of households encompassed within the demarcated clusters under PKVY and Namami Gange initiatives in these five districts.

Discussion on Results:

Carbon Sequestration (Natural Capital)

The study encompassed an analysis of carbon sequestration potential for different land uses and for aggregate land cover across five districts of Uttar Pradesh. As part of the assessment- carbon stocks are calculated in million tons along with their economic valuation in million dollars, under different policy scenarios (Business as Usual, Optimistic, and Pessimistic) coupled with different climatic projections (RCP 4.5 and RCP 8.5) for each district.

The findings prominently highlight the significantly enhanced carbon sequestration potential observed within an **optimistic scenario**, notably across three distinct farming systems and various land uses, spanning all districts except Hamirpur and Mirzapur. This significant change in carbon sequestration is due to the shift from conventional farming practices to sustainable farming, driven by policy initiatives such as the National Mission on Clean Ganga, Paramparagat Krishi Vikas Yojana, and Rashtriya Krishi Vikas Yojana.

On the other hand, the exceptions - Hamirpur and Mirzapur account for a large amount of forested land, and indications from the InVest Model propose that increasing land pressures could trigger deforestation in the upcoming years. Consequently, this predicts a decline in carbon stock, even in the optimistic scenario. The dense patches of forests, which currently hold a lot of carbon, might be affected by the upcoming changes. Therefore, it is imperative that agricultural policies align effectively with forest conservation policies to maintain the necessary ecological balance.

Water and Sediment Quantification (Natural Capital)

The parameters used for assessing water and sediment quantification are topography, soil, LULC, and other meteorological data. The model used for assessing the water and sediment quantification is the Soil and Water Assessment Tool (SWAT). The SWAT model helps in the hydrological modeling of drainage areas comprising areas as minimum as a few square km to thousands of square km.

11 sub-basins are taken into account in the Upper Ganga Basin.

- Compared to the existing figures, water yield, and sediment loss show an upward trend across all policy and climatic scenarios, highlighting the impact of climate change.
- The model predicts an increase in dry days in the future (2030 and 2050 in both RCP 4.5 and 8.5), resulting in an uneven distribution of rainfall. Additionally, the annual rainfall is projected to rise in 2050, as indicated by the model, consequently leading to an escalation in sediment loss.
- The monetary value put to water is Rs. 18.43 per cubic meter (Verma et al. 2017), whereas the economic valuation of soil (sediment yield) is done by using a cost estimate of Rs. 60 per cubic meter (CWC, 2012) along with an assumed weight of soil as 1.2 tonnes/cum (Reddy et al. 2012).

- The value of water provisioning services is estimated to be INR 9.51, 28.18, 26.61, and 57.15 million annually for Meerut, Bulandshahar, Aligarh, and Mirzapur respectively for the current year (2020).
- The estimated value of sediment yield (loss) is INR 43.18, 73.07, 86.03, and 380.85 million annually for Meerut, Bulandshahar, Aligarh, and Mirzapur respectively for the 2020 scenario.

Crop Provisioning Services (Produced Capital)

- DSSAT 4.8 was used to assess the crop provisioning services in produced capital.
- Input parameters used are-
  - Soil Profile wise (0-120 cm) physicochemical status (such as B.D., organic carbon, soil texture, pH, NO3 + and NH4 - Nitrogen, extractable P and K)
  - Weather: Historical daily weather data (Tmax, Tmin, Solar radiation, and Rainfall) of the respective districts for calibration of the model.
  - Crop: Observed field/secondary crop data were used for calibration of the model.
  - For prediction (for 2030 and 2050) of the produced capital under various scenarios, Tmax, Tmin
  - Rainfall data of SSP2 and SSP5 i.e., RCP4.5 and RCP8.5 of ACCESS-CM2 was used.
  - Crop area growth data under different policies. (BAU, Optimistic, Pessimistic)

- The main cropping system consists of sugarcane, ratoon, and wheat. The model forecasts a decline in yields (t/ha) for 2030 and 2050, except for Ratoon. By 2050, the model indicates that wheat may not be viable for harvest due to forced maturity, both in conventional and organic practices.
- Valuation of production of crops in million US $ per hectare- it tends to decrease in all the scenarios except for the 2050 optimistic scenario where it is 1.82 and 1.76 million dollars per hectare against the current scenario where it is 1.65 million dollars per hectare.

- The findings offer direct insights into certain ongoing programs at both the state and central levels of government. Additionally, policy considerations should also include the following-
  - Monetization of ecological benefits accrued from organic and agroforestry under changing climatic scenario
  - Compensation for Ecosystem Services for farmers engaged in organic and agroforestry
  - A systematic approach to scale up organic farming in the state, balancing production targets with environmental benefits.
  - Policy framework and realignment of ongoing schemes/new schemes to meet the SDGs
  - Promoting gender equality by empowering women in farming.

Presentation 3: Draft Results on Social and Human Capital

Dr. N. Ravishankar, Principal Scientist, ICAR-IIFSR

- In social and human capital, the TEEBAgriFood aims to assess a variety of elements including women empowerment, agrobiodiversity, and human health with a particular focus on Malaria, and sustainable livelihood security.
- The tool used for assessing sustainable livelihood security is the Sustainable Livelihood Security Index (SLSI), whose indicators are selected based on various research papers within the state context and primary survey data was used to formulate a comprehensive indicator to capture the interconnectedness between ecology-economic-equity in sustainable development. The parameters studied during fieldwork are computed using the SLSI and it is measured after combining the weighted index of an Ecological Security Index (ESI), the Economic Efficiency Index (EEI), and the Social Equity Index (SEI).
- The malaria aspect in human health is studied using weighted overlay analysis where LULC data is used, to determine the distance from the stream for establishing the correlation between the distance to the stream and the probability of getting the disease. The three steps followed are satellite data processing using NDVI, DEM, and LULC, then reclassification and assigning weightage codes, and lastly performing weightage analysis and risk mapping.
- Agrobiodiversity is assessed using the Agrobiodiversity Index and the parameters studied are- Cropping intensity, Livestock diversity, Mechanization extent, Crop diversity, Residual diversity, Production diversity, Perceived soil quality, Cultural ecosystem, and Crop-livestock integration.
- Women empowerment is assessed using a variety of parameters- Extent of involvement of farm women in different farm management operations including crop to be sown, land preparation, harvesting, threshing, packaging, decision making on and off-farm, etc. Other than this, education, the number of children, and crop-livestock integration were also taken into account.

Discussion on results

- Findings from the ecological security index revealed that organic farming performed better compared to conventional farming in various aspects. Notably, organic farming displayed advantages in terms of greenhouse gas (GHG) emissions, soil formation, carbon accumulation, addition of carbon via residues (quantified from sugarcane residues), inclusion of legumes, and carbon addition through manure application.
- The analysis of the social equity index indicated that in certain districts, there is a slightly higher consumption pattern in organic farming due to greater crop and food diversity, although the difference is not particularly pronounced. The factors considered within the social equity index involve expenditures on education and healthcare, as well as consumption of cereals, milk, pulses, oilseeds, fruits, and vegetables.
- The economic efficiency index does not yield substantial findings favoring organic farming when contrasted with conventional farming. This can be attributed to farmers being in a transitional phase.
- The role of women was significant in the beneficiaries' households in comparison to non-beneficiaries. Their engagement is more pronounced due to their active roles in tasks such as

composting, urine collection, and dung collection. These responsibilities highlight the essential contribution of women in various aspects of organic farming. Women farmers demonstrate a notably higher level of involvement in decision-making, both on and off the farms, compared to conventional farming practices. Furthermore, an interesting observation is that women with larger families tend to generate increased profits. It is also noted that women are positively engaged in both farming and dairy activities. Other than this, soil quality is also found to be positively correlated with women working in the field, this is attributed to women adeptly managing tasks such as manure handling. Consequently, the production of manure exhibits a positive correlation with the degree of women's involvement.

- A high Agrodiversity index was observed in organic farming compared to conventional agriculture across all five districts. Production diversity, soil quality, cultural services, and pollination are observed more in organic farming.
- While there may be initial yield reductions in the initial years, the data suggests that over the long term, the adoption of these practices proves advantageous not only for the environment but also for the economic gains of farmers. TEEBAgriFood assessments inform on the need to strengthen policy measures for providing financial incentives to farmers who adopt such practices.
- Malaria Study (Human Health)- No significant impact of land use change on malaria infestation under different policies with various climate change scenarios.
  In certain instances, when agroforestry zones are projected near settlement areas, there is a slight shift towards a higher risk category of malaria infestation. However, this shift is not substantial in terms of the overall area affected.
- Overall, organic farming demonstrates greater social, human, and health benefits as compared to conventional farming methods.

Session III: Inputs on the draft results:

Following the presentation of the draft results of the TEEBAgriFood application in Uttar Pradesh, an open discussion session was held to receive inputs for refinement of the draft results and further explore linkages for policy mainstreaming of results. The summary of observations and discussions are as under:

Dr. Mahi Lal- Head Crop Division, ICAR-IISR Lucknow

- Government of India has introduced an innovative "one-district one-product" (ODOP) initiative, being implemented by many Ministries as per their mandate, and designed to promote balanced regional development by identifying a singular product per district. Considering this, he inquired if the studies have integrated them while conducting comparisons of ecosystem services.
- Dr. Lal made reference to specific research papers concerning organic carbon sequestration, establishing the criticality of maintaining 1.5% organic carbon content for optimal soil health. Therefore, he suggested that this aspect be duly considered in the reporting of organic carbon findings.
- Regarding soil erosion, he recommended a comparative assessment of the study's sediment loss results against permissible soil erosion thresholds.

- Dr. Lal queried whether the study accounts for the diverse categorization of farmers, given that the farming community is not homogenous and includes small, marginal, and large-scale farmers.
- Dr. Lal suggested including the assumptions that were kept in mind while applying different models. He further queried about the data processing and modeling, to which the IIFSR team explained that the model was calibrated with observed and field data, and then the model was validated, further, the values were predicted for various future scenarios.
- Dr. Lal suggested incorporating the underlying assumptions considered during the application of various models. He also inquired about the data processing and modeling techniques, to which the IIFSR team clarified that they calibrated and validated the model using observed field data, and subsequently, predictions were made for various future scenarios.
- The query was raised regarding crop provisioning services, where the model indicates that by 2050 wheat may not be viable for harvest due to premature maturation, both in conventional and organic practices. The IIFSR team responded that, as per the sequential model, the initial crop's harvesting process takes more time than anticipated, consequently leading to an extension of the wheat sowing season into February.

Dr. H. Rajamohan, Chief Conservator of Forest- Environment, Forest and Climate Change Department, Lucknow

- On Hamirpur and Mirzapur's decreasing trends in the forest cover, Dr. Rajamohan advised examining the long-term deforestation trends in the area to explain the results on decreasing carbon stocks in the given two districts in an optimistic scenario. IIFSR team informed that the decadal data was obtained from the Forest Survey of India for the study.
- Dr. Rajamohan commented on carbon pricing and suggested the values fall in the range of 6 to 15 USD per tonne since 86 USD per tonne is on the higher side leading to overestimation. IIFSR informed about the social cost of carbon taken from GHG platform India for economic valuation and this concept is different from carbon markets.
- He also commented on the Terai region where large amounts of forest land are being lost at a rapid rate- to be taken into study.
- Queries regarding the selection of the study districts being mostly from the western part of Uttar Pradesh were raised, and the rationale behind the district-level study was explained based on demographics and agroecological zones.

Mr. Amrish Pal Singh, Superintending Engineer, Upper Ganga Basin Organisation (UGBO), Lucknow

- Mr. Singh commented on the water and sediment yield of produced capital. Surface water is not being used properly, and one of the common views over this is to extract water from the ground. He raised the issue of salinity in groundwater due to overexploitation, especially in southern states of India, where ocean water gets mixed with fresh water.

- Suggestion about accounting of indirect benefits to present an economic case for sustainable agriculture practices was made.

Inputs from Farmers, KVK representatives

In the course of discussing the initial outcomes, farmers, NGOs, and KVKs involved in the consultation contributed their perspectives on the TEEBAgriFood project. They highlighted the challenges they face in practicing organic farming and put forward their suggestions summarised as follows-

Mr. Daya Kumar Srivastava- Krishi Vigyan Kendra, Sitapur, Lucknow

Mr. Srivastava, a KVK representative from Sitapur made several observations and demanded certain provisions in providing facilities to farmers practicing organic or natural farming. His suggestions are as follows-

- To mandate the inclusion of eco-engineering models in schemes.
- Policy measures should focus on providing a standard package of practice for guiding the farmers involved in organic farming.
- Similar to the conventional guidelines that typically provide recommendations for N, P, and K requirements in production, a biofertilizer module should be available to assist farmers in determining the necessary inputs for their crop production.
- The costs involved in organic farming should be made clear, this would provide farmers with a comprehensive understanding of the total costs involved, thus encouraging the adoption of such practices.
- Mr. Srivastava enquired about the pesticide (chemical) detection device for determining the level of pesticides and quality of crops, which has been launched in certain districts of Uttar Pradesh. IIFSR team responded that the institution has come up with a kit, and working on resolving the technical- errors with the device, while ongoing research continues. Dr. Ravishankar further informed that ecological engineering is a well-established practice and many farmers are practicing such techniques in Uttar Pradesh to reduce pest infestation.
- Technological understanding of practices is less; hence capacity building is important.
- Mr. Srivastava suggested that the study should address the intrusion of wildlife into agricultural lands. In UP, 90% of the pulse crops have declined due to wildlife presence. He urged that for wildlife intrusion in the field, some scientific solution be provided to farmers, and a group or cluster of farmers be created for better implementation of such practices on the ground.

In response to Mr. Srivastava's comments and recommendations, Dr. Kumar informed that ICAR has developed practices and procedures for 72 different crops, which are being put into practice in 100 KVKs where integrated and organic farming is being carried out. Additionally, various agroforestry models have been introduced in KVKs. However, there has been limited progress due to farmer uncertainty regarding the types of trees to be planted.

Mr. Swetamber Tripathi, Farmer

Mr. Tripathi discussed the challenges faced by farmers that hinder the adoption of sustainable agricultural practices summarised below-

- Due to a lack of market provisions, farmers are not able to get the true value for their organic produce, making it difficult to adopt.
- Since farmers are not made into clusters, and such practices are only adopted by a few, it becomes difficult for others to continue practicing organic farming when lands are closely located.
- However, he noted that organic farming supports the diversification of crops, and happily informed that a board has been formed in Sitapur covering 50 km of area and is being supervised by experts to make implementation and guidance more accessible.

Mr. Vinod Saini, Farmer, Meerut

Mr. Saini discussed issues faced by farmers practicing organic farming:

- Organic farming is a time-consuming process and requires lots of patience.
- Preparing inputs for the crops is quite a heavy task- physically intensive and hence farmers with low family labor and less capacity to pay for hired laborers face considerable challenges. Hence, the replacement and availability of such input in the market is important. He suggested biofertilizers should be made available to farmers practicing organic farming.

Mr. Saini suggested Pulses (Dalhan fasal) should be made part of the crop basket that farmers choose to grow as they are nitrogen fixers that help maintain the soil nutrient balance, which reduces the dependency of farmers on inputs.

Concluding Remarks

Dr. Sunil Kumar, the Director of IIFSR, expressed his gratitude to all participants for their valuable contribution and active engagement in discussions. He acknowledged the significant amount of information gathered over the duration of the workshop and emphasized that the insights gained will be useful for improving assessments.

In his closing statement, he particularly emphasized the role of TEEB in valuing nature’s hidden services. He described how initiatives such as the National Bamboo Mission directly benefit farmers through incentives, but also account for the hidden value that lies in activities like pollination, offering indirect environmental advantages that TEEB aims to analyze. The dual significance of these measures, addressing not only the farmers' prosperity but also broader concerns such as biodiversity loss, climate change, and food security was very well noted.

Dr. Kumar also acknowledged the practical implementation of policy measures to enhance farmers' well-being and livelihoods and stressed the integration of TEEB assessment outcomes into policies and initiatives. He underscored the necessity for a clear methodology, from individual farmers to

management to policymaking, underscoring the significance of capacity building. More clarity on certification, premium prices, and geo-tagging of organic clusters were specifically highlighted.

Lastly, Dr. Sunil invited participants to continue their engagement with TEEBAgriFood India.

The stakeholder workshop ended with a vote of thanks presented by Dr Shamim, Senior Scientist, ICAR-IIFSR, and workshop moderator Dr Raghvendra KJ, Scientist, ICAR-IIFSR.

Annex I: List of participants

A. Participants who attended the workshop through physical mode:

Sl. No.	Name and designation of participants	Organization
1.	Mr. B. Prabhakar, IFS, APCCF (Projects)	PCCF & HoFF, UP
2.	Mr. Sanjay Singh, DG	UPCAR
3.	Dr. Sunil Kumar, Director, ICAR-IIFSR, Modipuram, Director	ICAR-IIFSR, Modipuram
4.	Dr. T. Damodaran, Director	CISH, Lucknow
5.	Dr. R. Viswanathan, Director, ICAR-IISR, Lucknow	ICAR-IISR, Lucknow
6.	Dr. A.K. Shukla, Director	UPCSR
7.	Dr. D.K. Sharma, Ex. Director	ICAR-CSSRI, Karnal
8.	Dr. Alka Bhargava, Senior Policy Adviser	TEEBAgriFood-India, UNEP
9.	Mr. Reuben Gergan, Project Officer	TEEBAgriFood-India, UNEP
10.	Ms. Rhea Malhotra, Consultant	TEEBAgriFood-India, UNEP
11.	Ms. Shivani, Consultant	TEEBAgriFood-India, UNEP
12.	Mr. Sanjaya Singh, IFS (retd), former PCCF	Govt. of UP
13.	Dr. N. Ravisankar, Principal Scientist & PC, CU	ICAR-IIFSR, Modipuram
14.	Dr. Madhu Verma, Senior Economic Advisor	IORA Solutions
15.	Dr. Raghavendra Singh, Principal Scientist & Head, CSRM	ICAR-IIFSR, Modipuram
16.	Dr. P.C. Jat, Principal Scientist & Incharge, TTA	ICAR-IIFSR, Modipuram
17.	Dr. P.P. Singh, Principal Scientist	ICAR-IIFSR, Modipuram
18.	Dr. M. Shamim, Senior Scientist	ICAR-IIFSR, Modipuram
19.	Dr. Meraj Alam Ansari, Senior Scientist	ICAR-IIFSR, Modipuram
20.	Dr Raghuveer Singh, Scientist	ICAR-IIFSR, Modipuram
21.	Dr Raghavendra, KJ, Scientist	ICAR-IIFSR, Modipuram
22.	Sh. A. K. Sharma, Senior Administrative Officer	ICAR-IIFSR, Modipuram
23.	Dr. Meenu Rani, Research Associate	ICAR-IIFSR, Modipuram
24.	Ms. Mahima Dixit, SRF	ICAR-IIFSR, Modipuram
25.	Mr. Mahesh Kumar, Young Professional-1,	ICAR-IIFSR, Modipuram
26.	Mr. Harjinder Dhaka, DST Project	ICAR-IIFSR, Modipuram
27.	Dr. Arun Baithe, Principal Scientist	ICAR-IISR, Lucknow
28.	Dr. Radha Jain, Principal Scientist	ICAR-IISR, Lucknow
29.	Dr. Shweta Singh, Scientist	ICAR-IISR, Lucknow
30.	Ratna Sahay, S.M. S	KVK, Unnao

31.	Dr. Ranjeet Singh, Scientist	ICAR-IISR, Lucknow
32.	Dr. A.K. Dubey, Head KVK	ICAR-IISR, Lucknow
33.	Dr. Rajesh Kumar, IC, AKMU	ICAR-IISR, Lucknow
34.	Dr. L.S. Gangwar, Principal Scientist	ICAR-IISR, Lucknow
35.	Dr. L.K Tyagi, Principal Scientist	ICAR-NBFGR, Lucknow
36.	Dr. Lalan Sharma, Senior Scientist	ICAR-IISR, Lucknow
37.	Dr. Ajay Pathak, Principal Scientist	ICAR-IISR, Lucknow
38.	Dr. Aalok Shiv, Scientist	ICAR-IISR, Lucknow
39.	Dr. D.S. Shrivastava, Sr. Scientist & Head	KVK, Sitapur
40.	Dr. R.R. Singh, S.M. S	KVK, ICAR-IISR, Lucknow
41.	Dr. V.P Jayant	ICAR-IISR, Lucknow
42.	Dr. A.K. Singh, Head	KVK, Unnao
43.	Dr. R.B.N Singh, Head	KVK, Rai Bareilly
44.	Dr. T.P. Chaudhary, Additional Director	Agri. Depot
45.	Dr. Chandra Gupta, Principal Scientist	ICAR-IISR, Lucknow
46.	Dr. V.P Singh, Principal Scientist & Head	ICAR-IISR, Lucknow
47.	Dr. Manoj Shrivastava, Principal Scientist & Head	ICAR-IISR, Lucknow
48.	Dr Sangeeta Srivastava, Principal Scientist	ICAR-IISR, Lucknow
49.	Mr. Abhishek Singh, STO	ICAR-IISR, Lucknow
50.	Mrs. Pallavi Rai, TO	ICAR-IISR, Lucknow
51.	Priya Tripathi, Employee	ICAR-IISR, Lucknow
52.	Dr. Deepak Rai, SMS	KVK, ICAR-IISR, Lucknow
53.	Mr. Alok Kumar Pandey, SMS	KVK, ICAR-IISR, Lucknow
54.	Mr. A.K Tomar	KVK, ICAR-IISR, Lucknow
55.	Mr. Ravi, Employee	ICAR-IISR, Lucknow
56.	Mr. Rakesh Kumar, Employee	ICAR-IISR, Lucknow
57.	Dr. V.K. Singh, Principal Scientist	ICAR-IISR, Lucknow
58.	Mr. Mukesh Kumar, PCCF (Ret.) U.P.	Forest Dept.
59.	Dr. H. Rajamohan, CCF(Planning)	Forest Dept.
60.	Dr. Mehi Lal, Ex. HOD	ICAR-IISR, Lucknow
61.	Dr. C.R. Rawat, Retd. Principal Scientist	ICAR- IGFRI
62.	Dr. Kamta Prasad, Principal Scientist	ICAR-IISR, Lucknow
63.	Dr. Barsati Lal, Principal Scientist	ICAR-IISR, Lucknow
64.	Dr. Manoj K Srivastava, Principal Scientist & Head	ICAR-IISR, Lucknow
65.	Dr. Sharmila Roy, Principal Scientist	ICAR-IISR, Lucknow

66.	Dr. H.B. Singh, Ex. Prof	BHU
67.	Dr. Dinesh Singh, Principal Scientist & Head	ICAR-IISR, Lucknow
68.	Dr. Mrityunjai Kumar Singh, Principal Scientist	ICAR-IISR, Lucknow
69.	Dr. K.K. Singh, Principal Scientist	ICAR-IISR, Lucknow
70.	Dr. Aditya Prakash Dwivedi, Senior Scientist	ICAR-IISR, Lucknow
71.	Dr. S.K. Yadav, Senior Scientist	ICAR-IISR, Lucknow
72.	Dr. S. R. Singh, Principal Scientist	ICAR-IISR, Lucknow
73.	Dr. T. K. Srivastava, Principal Scientist	ICAR-IISR, Lucknow
74.	Dr. G.K Singh,	ICAR-IISR, Lucknow
75.	Dr. S.K Singh, Head	KVK, Barabanki
76.	Dr. Sanjeev Kumar, Principal Scientist	ICAR-IISR, Lucknow
77.	Dr. J. Singh, Principal Scientist	ICAR-IISR, Lucknow
78.	Dr. Rajeev Kumar, Scientist	ICAR-IISR, Lucknow
79.	Saroj Kumar Singh, Chief Administrative Officer	ICAR-IISR
80.	Dr. Dilip Kumar, Principal Scientist	ICAR-IISR, Lucknow
81.	Dr. A. K. Mall, Principal Scientist & Incharge	ICAR-IISR, Lucknow
82.	Dr. A.K. Singh, Senior Scientist	ICAR-IGFRI
83.	Dr. Sanjay Kumar Goswami, Scientist	ICAR-IISR, Lucknow
84.	Mr. Sanjeev Shukla	FPO, PRATAPGARH
85.	Dr. R.P. Sahu, SMS	KVK, ICAR-IISR
86.	Dr. Niranjan Lal, Senior Scientist & Inchange	KVK, ICAR-IISR
87.	Mr. Amrish Pal Singh, Superintending Engineer	CWC
88.	Dr. Ram Ratan Verma, Principal Scientist	ICAR-IISR, Lucknow
89.	Dr. S.P. Singh, Principal Scientist	ICAR-IISR, Lucknow
90.	Deepenlik Chauhan, Director	KVK, ICAR-IISR, Lucknow
91.	Mr. A.K. Maurya, T.O.	ICAR-IISR, Lucknow
92.	Mr. Avadhesh Yadav, ACTO	ICAR-IISR, Lucknow
93.	Mr. Y.M. Sharma, CTO	ICAR-IISR, Lucknow
94.	Dr. Anita Swanani	ICAR-IISR, Lucknow
95.	Mr. Yogesh Mohan Singh, CTO	ICAR-IISR, Lucknow
96.	Mr. Ram Lakhan, Incharge	KVK, ICAR-IISR, Lucknow
97.	Dr. G.K Singh, CTO	ICAR-IISR, Lucknow
98.	Mr. Arun Shukla, YP-II	ICAR-IISR, Lucknow
99.	Mr. Himanshu, YP-II	ICAR-IISR, Lucknow
100.	Mr. Ramnagina, Farmer	Lucknow

101.	Mr. Sachin, Farmer	Lucknow
102.	Mr. Himanshu, Farmer	Lucknow
103.	Mr. Neeraja Pandey, Farmer	Lucknow
104.	Ms. Vartika, Farmer	Lucknow
105.	Mr. Ram, Farmer	Lucknow
106.	Mr. Abhishek, Farmer	Lucknow
107.	Mr. Ramesh, Farmer	Lucknow
108.	Mr. Y.M. Singh, CTO	ICAR-IISR, Lucknow
109.	Mr. Raghav, Farmer	Lucknow
110.	Mr. Upendra Kumar, Farmer	Lucknow
111.	Mr. Uttam, Farmer	Lucknow
112.	Ms. Ruby Shukla, Farmer	Lucknow
113.	Ms. Nitya Shukla, Farmer	Lucknow
114.	Mr. Umesh Chandra Pandey, Farmer	Lucknow
115.	Vinod Saini, Framer	Meerut
116.	Brijesh Tripathi, Farmer	Lucknow
117.	Mr. Ram Sumer, Farmer	Lucknow
118.	Mr. Girijashanker, Farmer	Lucknow
119.	Mr. Shekahr Tripathi, Farmer	Lucknow
120.	Swekanth Tripathi, Farmer	Lucknow
121.	Mr. Ashok Kumar, Farmer	Lucknow
122.	Mr. Sumit	Meerut
123.	Mr. Adil	Meerut
124.	Mr. Ved Prakash	Meerut
125.	Mr. Vikram	Meerut
126.	Mr. Sesh Pal Singh, Farmer	Lucknow
127.	Mr. Akhilesh Rajpoot, Farmer	Lucknow
128.	Mr. Rajesh, Farmer	Lucknow
129.	Mr. Satish Chandra, Farmer	Lucknow

B. List of online participants:

Sl. No.	Name and designation of participants	Organization
1.	Mr. Franklin Khobung, Joint Secretary	Ministry of Agriculture and Farmers Welfare
2.	Dr. Salman Hussain, Coordinator UNEP-TEEB and Head,	The Economics of Nature Unit, Geneva
3.	Mr. Michael Bucki, HOD-EEAS,	EU Delegation to India
4.	Dr. S. K. Chaudhari, DDG	ICAR
5.	Mr. Jacob D, OFR Kayamkulam, OFR Agronomist	AICRP-IFS Thiruvananthapuram (Kerala)
6.	Dr. A. Arunachalam, Director	CAFRI, Jhansi
7.	Dr. J.P. Tetarwal, Jr. Agronomist	AICRP-IFS, Kota Rajasthan
8.	Mr. L.K. Arvadiya, Agronomist	AICRP-IFS, Navsari Gujarat
9.	Dr. P.M. Shanumugan, Chief Agronomist	AICRP, IFS
10.	Dr. Shrinivas Rao	AICRP-Integrated Farming Systems, Agricultural Research Station, Vizianagaram, Andhra Pradesh India
11.	Dr. R.S. Dadarwal, I/C Agronomist	AICRP-IFS, Hisar Haryana
12.	Ashok Kumar Gupta, Chief Scientist	FSR Jammu
13.	Dr. C.P. Chandrashekar, OFR Agronomist	UAS, Dharwad, Karnataka
14.	Deputy Director Agriculture, Mirzapur	DDA, Mirzapur
15.	Dr. A.S. Karle, Chief Agronomist	AICRP-IFS Parbhani, Maharashtra
16.	Dr. B.M. Mourya, Agronomist, College of Agriculture	AICRP-IFS, Rewa (M.P)
17.	Dr. Bindu JS, Soil Scientist	KAU, Kerala
18.	Dr. Gautam Veer, RA	ICAR IIFSR
19.	Dr. Namrata Jain, Agronomist (OFR)	Department of Agronomy, JNKVV, Jabalpur
20.	Dr. Shiv Lal, Senior Scientist, PI, NPOF	NRCSS, Ajmer
21.	Dr. Sohan Singh Walia, Professor and Head and PI	AICRP-IFS, PAU, Ludhiana
22.	Dr. S.B. Bhagat**,** Chief Agronomist	AICRP-IFS, Karjat, Maharashtra
23.	Dr. Masood Ali, Ex Director	ICAR-IIPR, Kanpur
24.	Dr. NP Thakur, Soil Science	ANDUAT, Faizabad (U.P)
25.	Dr. R.M. Solanki, Agronomist	(AICRP-IFS) Junagadh, Gujarat
26.	Dr. Rajendra prasad Sahu, Agronomist	Department of Agronomy, JNKVV, Jabalpur
27.	Dr. Ravi Kant NPOF	MPUAT, Udaipur
28.	Dr. Sneha Kumari, OFR Agronomist	(AICRP-IFS), Sahara, Bihar

29.	Dr. C.M. Kalibavi, Chief Agronomist	(AICRP-IFS), Bellary, Karnataka
30.	Dr. Hari Singh Agronomist (OFR)	(AICRP-IFS), Udaipur, Rajasthan
31.	Dr. Kodam Chiranjeevi Senior scientist (Agro) & Officer I/c, OFR	Rajendranagar, Hyderabad
32.	Dr. N. Sathish Kumar, Agronomist (OFR)	(AICRP-IFS), Erode, Tamil Nadu
33.	Mr. Manthati Goverdhan, Chief Agronomist	Rajendranagar, Hyderabad
34.	Mr. Raj Bahadur, Agronomist (OFR)	MOU, (U.P)
35.	Dr. S. Karmakar, Chief Agronomist	(AICRP-IFS), Ranchi, Jharkhand
36.	Dr. Sanjay Kumar, Sabour Chief Agronomist	(AICRP-IFS), Sabour, Bihar
37.	Ms. Sanjukta Mohapatra, Agronomist	AICRP-IFS, Orissa
38.	Mr. Shaon Kumar Das, Senior Scientist	Sikkim, Meghalaya
39.	Ms. Suvigya Sharma	GB Pant University, Pantnagar, Uttarakhand
40.	Dr. Veena, Principal Scientist	CTCRI, Trivandrum, Kerala
41.	Ms. S. Sunitha	ICAR-CTCRI
42.	Deputy Director Agriculture	Mirzapur
43.	District Forest Officer	Bulandshahr, Uttar Pradesh
44.	Dr. B. Gangwar, Ex Director	ICAR-IIFSR, Modipuram
45.	Dr. Sohan Singh Walia, Associate Professor	PAU, Ludhiana
46.	Dr. Sushant Singh Walia, Assistant Professor	PAU, Ludhiana
47.	Dr. S.S. Pinjari	
48.	CFO Meerut	
49.	Dr. Shiv Lal NRCSS	
50.	Dr. Sudhir Kumar Singh	
51.	Dr. Chandrakant	
52.	Mr. R.K. Pathak	
53.	Mr. Rupla Prasad	
54.	Mr. Gautam Chatterjee	
55.	NIC Mirzapur	
56.	Dr. Sushant Saxena	
57.	Dr. Y.B. Chauhan	
58.	Dr. Neeraj Kumar	

Annex II- Photographs of the 2nd UP Stakeholder Consultation Workshop

Annex III- Agenda

Stakeholder Workshop
Discussion on draft results of TEEB AgriFood Initiative in Uttar Pradesh, India

1st August 2023, Tuesday (10.00 to 16.00 hrs (IST), Hybrid mode (Physical and Virtual) Auditorium, ICAR-IISR, Lucknow

Organized by

ICAR-Indian Institute of Farming Systems Research (IIFSR), Modipuram in collaboration with TEEB-UNEP, NAAS-Lucknow chapter, FSRDA and ICAR-IISR, Lucknow

Agenda

09:45 hrs	ICAR song	
09:50 hrs	Felicitation, welcome, brief about stakeholder workshop and remarks	**Dr R. Viswanathan,** Director, ICAR-IISS **Dr Sunil Kumar**, Director, ICAR-IIFSR **Dr T. Damodaran,** Director, ICAR-CISH
10.00 hrs	Opening remarks and Address *(10 minutes)* by Chairman (Virtual)	**Dr. S.K. Chaudhari**, DDG (NRM), Indian Council of Agricultural Research
10.10 hrs	Opening remarks *(5 minutes)*	**Dr. Alka Bhargava,** Senior Policy Advisor, TEEBAgriFood-India, UNEP

10:15 hrs	Remarks by Special Invitees *(5 minutes each)*	**Mr. Devesh Chaturvedi**, Additional Chief Secretary (Agriculture), Government of Uttar Pradesh (TBC) **Mr. Franklin Khobung**, Joint Secretary, Ministry of Agriculture and Farmer's Welfare, Government of India (TBC) **Mr. B. Prabhakar**, Additional Principal Chief Conservator of Forests (PCCF), Government of Uttar Pradesh (TBC)
10:30 hrs	Remarks by Guest of Honour (5 minutes)	**Dr. Michael Bucki**, (TBC) Counsellor, Head of Section Delegation of the European Union to India
10:35 hrs	TEEB Initiative in India: objectives, milestones and scalable potential outcomes *(5 minutes presentation)*	**Mr. Reuben Gergan**, Project Officer, TEEBAgriFood India, UNEP
10:40 hrs	TEEB Initiative in Uttar Pradesh: Scope of the study *(10 minutes)*	**Dr N. Ravisankar**, Principal Scientist & PC, ICAR-IIFSR
10:50 hrs	Keynote address (*15 minutes*) by Chief Guest (Virtual)	**Dr. Salman Hussain**, Head, Economics of Nature Unit and Coordinator TEEB, UNEP
11:00 hrs	Tea Break	
11:15 hrs	TEEB Initiative in Uttar Pradesh: Presentation of draft outcomes of the study	**Dr. Meraj Alam Ansari** Senior Scientist & PI, TEEB-UNEP Project
11:30 hrs	Discussion on results pertaining to natural and produced capital elements estimated and valued under TEEBAgriFood Uttar Pradesh *(Moderated by Dr Mohd. Shamim, Senior Scientist & Mr Reuben Gergan, TEEB)*	**Open discussion** All participants/stakeholders
12:30 hrs	**Lunch**	
13:45 hrs	Recap of results on social and human capital elements under the study	**Dr. N. Ravisankar,** Principal Scientist & PC, ICAR-IIFSR
13:55 hrs	Discussion on results pertaining to social and human capital elements estimated and valued under TEEBAgriFood Uttar Pradesh *(Moderated by Dr Raghavendra, KJ, IIFSR & Mr Reuben Gergan, TEEB, UNEP)*	**Open discussion** All participants/stakeholders
14:55 hrs	Discussion on entry points and challenges of upscaling organic farming and agroforestry in Uttar Pradesh *(Moderated by Dr Alka Bhargava, TEEB, UNEP)*	**Open discussion**

15:15 hrs	Concluding remarks	Chair and Co-Chair
15:25 hrs	Vote of thanks	**Dr A.K. Prusty,** Senior Scientist & Co PI, TEEB-UNEP
15:30 hrs	Tea	