



MONTHLY RESEARCH SEMINAR REPORT

June 18, 2021

Thrust Area – Forests and Climate Change

Topic: Soil carbon sequestration to mitigate climate change

Speaker: Anshuman Das, Scientist 'B'

Forest Ecology and Climate Change Division, Institute of Forest Productivity,
Ranchi, Jharkhand

Topic: Soil as a carbon sink under coastal vegetation

Speaker: Dr. Shovik Deb, Assistant Professor

Uttar Banga Krishi Viswavidyalaya, Pundibari, West Bengal

The monthly research seminar/webinar was started with the welcome address by Mrs. Ruby Susana Kujur, Scientist 'C'. Thereafter, in the opening remarks, Dr. Nitin Kulkarni, Director, Institute of Forest Productivity (IFP), Ranchi informed the august body about the importance of soil carbon (C) under different ecosystems in mitigating climate change. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. The global average atmospheric carbon dioxide in 2019 was 409.8 parts per million. Despite a strong inter-dependence between climate and carbon sequestration, the role of soil organic carbon (SOC) dynamics on increase in atmospheric carbon dioxide (CO₂), and its strategic importance in decreasing the future rate of increase of atmospheric CO₂ are not widely recognized. One of the possible way is to increase SOC storage in the soil by protecting SOC encapsulated within stable micro-aggregates and macro-aggregates so that C is protected from microbial processes or to increase recalcitrant C in long turnover time. In this context, managing ecosystems is an important strategy for SOC/terrestrial sequestration.

Anshuman Das, Scientist 'B' discussed about importance of soil carbon sequestration in different forest ecosystems and land uses to mitigate climate change. Managing different types of ecosystems is an important strategy for SOC/terrestrial sequestration. Land use are very much sensitive to climate change and plays important role in SOC sequestration. Soil aggregates plays vital role in soil carbon sequestration through several mechanisms like

physical entrapment of carbon (within macro-aggregates and micro-aggregates), chemical protection (through organo-mineral complexes, adsorption etc.), biological stabilization. The carbon present within the aggregates are less vulnerable to loss as these carbon remain protected from physical access to microbes. Thus, soil aggregates influences the soil organic carbon dynamics under natural and managed ecosystems.

Dr. Shovik Deb, Assistant Professor discussed about importance of coastal vegetation in sequestering carbon in soil. Vast extent of coastlines and their rich floral diversity indicate that attention should be given to coastal natural ecologies. Coastal systems receive huge amount of terrigenous and marine sediment C load along with deposition of fine clay particle there. The clay-C complex in the soils and sediments of the estuaries and shorelines, gives C good stability. The coastal vegetation (like mangroves, marshes, seagrasses) also produces huge biomass. Accrual of this biomass helps to build enormous C stock in coastal soils (known as blue C). The coastal soil C also has high residence time due to occasional submergence and seepage of saline water, which restrict the microbial oxidation to great extent. Soil aggregation also causes high presence of physically recalcitrant C in coastal soils. However, global warming related events like sea-level rise, ocean acidification and ocean warming have severely started to affect the blue C ecology. The future of this ecology looks grim under the accelerated pace of these events. Special care from all the ends should be given to restore the blue C ecology. Later, after the presentation, discussion on the role of bamboo on soil organic carbon was also briefly discussed by Dr. Yogeshwar Mishra, GCR. The seminar was ended after the critical discussion on the presentations and formulation of future strategies and networking under the chairmanship of Dr. Nitin Kulkarni, Director, IFP, Ranchi. Finally, vote of thanks was proposed by Mrs. Ruby Susana Kujur, Scientist 'C'.

Expected outcome of the seminar:

1. Identification of research needs:

- Role of labile and recalcitrant pool of soil organic carbon in land uses for enhancing natural sinks for C sequestration to mitigate the climate change.
- Effect of temperature change on SOC decomposition in bulk soils and aggregates for predicting changes in the pattern and magnitude of SOC storage in different ecosystems.
- Preparation of C budget of Indian blue C ecologies (mainly mangroves) through:
 - a) Identification of prominent area under mangroves in India
 - b) Estimation of the temporal change of mangrove ecologies and prediction of future change dynamics
 - c)

Biomass C assessment d) Analysis of sediment load and soil C status (stock and pools) under mangroves

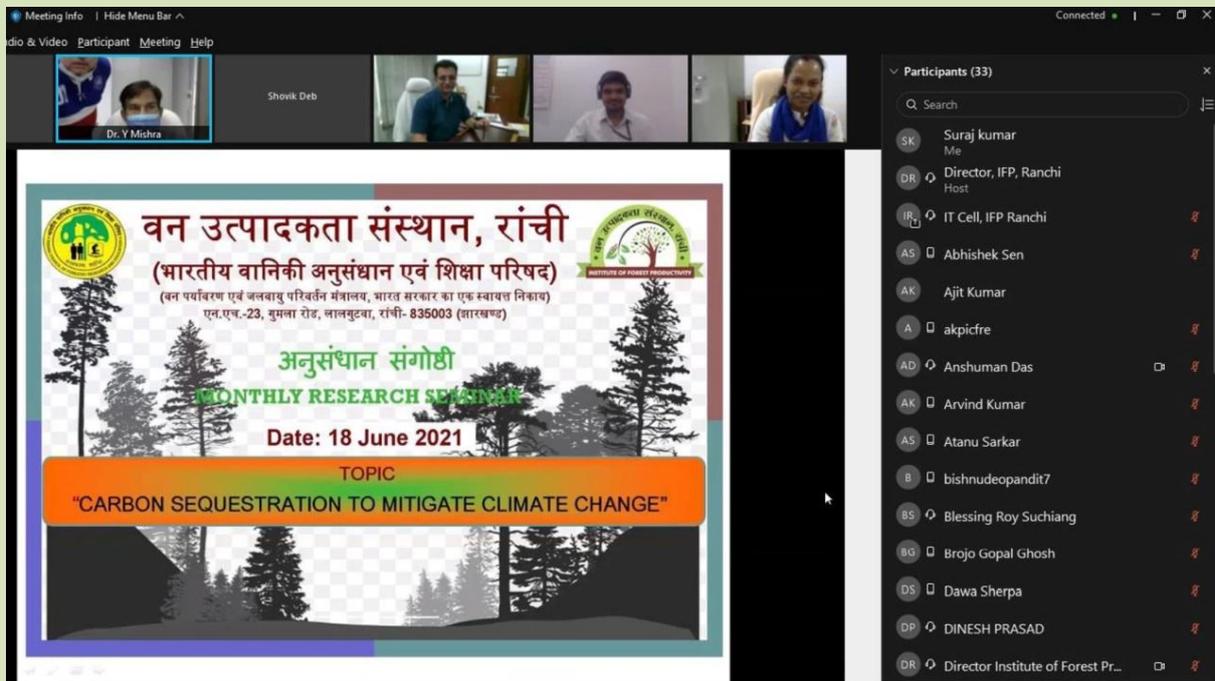
- Recommendation of protection strategies (especially for open mangroves outside national parks).

2. Formulation of future strategies/road map

- Research to be carried on role of soil aggregates in the different land uses for mitigating climate change.
- Initiative is to be taken how deep soil carbon sequestration in different ecosystems will influence the climate change.
- Detail on-ground study of the physical (soil-plant system) and socio-economic (human-forest association and conflicts) issues of each blue C ecology
- Recommendation of suitable future land management plans for each area so that any degradation (natural or man-made) of blue C can be replenished easily.

3. Networking research options & opportunities

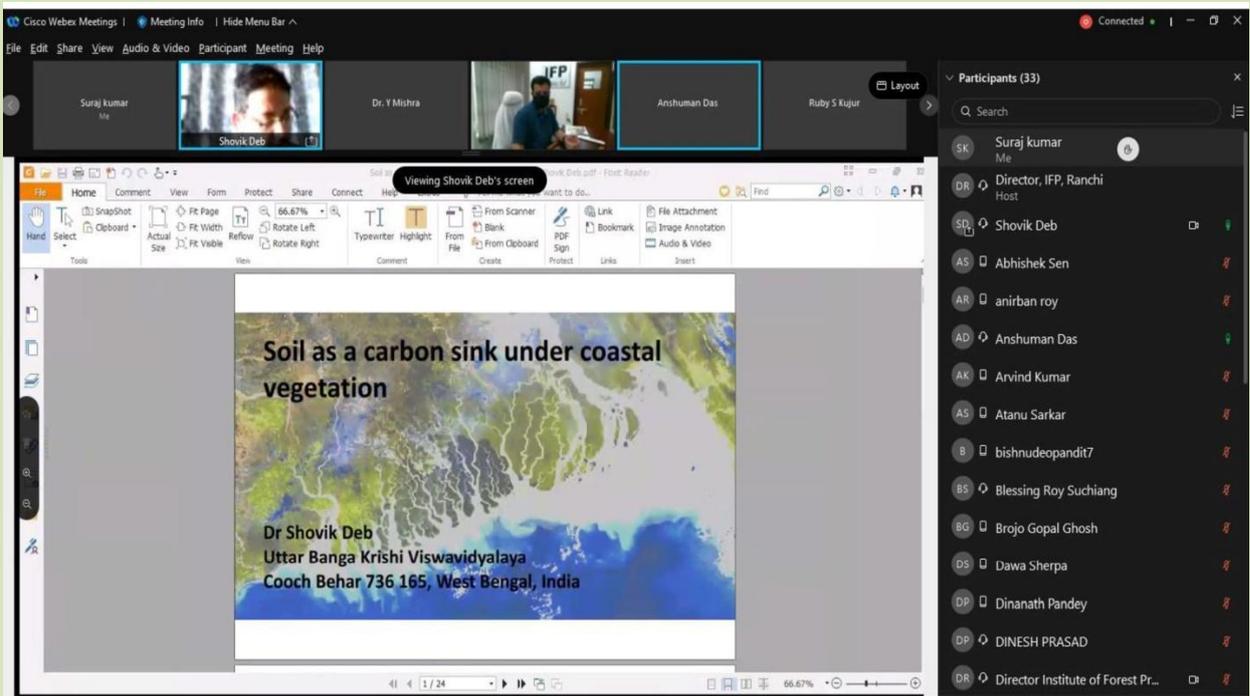
Research and developmental plans should be taken by governmental bodies in collaboration with regional institutes/ local universities. The state forest departments also should be taken into considerations. This will help to bring national experts, people with local knowledge and administrators together to formulate projects based upon real need and towards successful implementation.



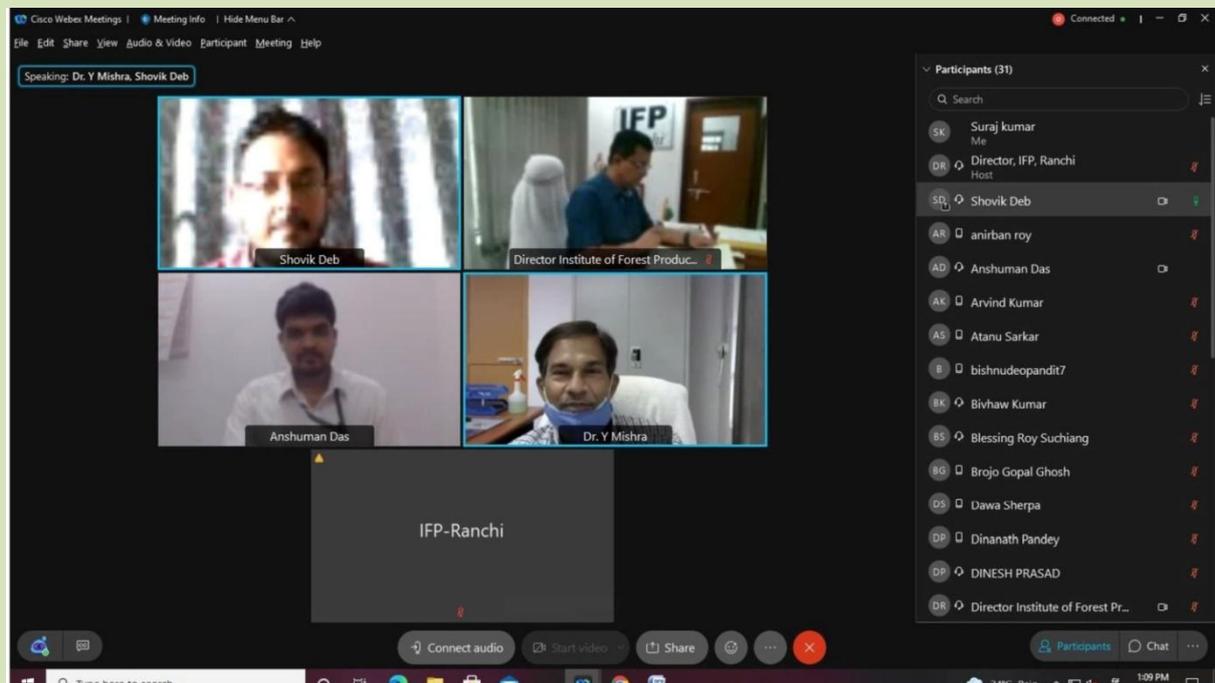
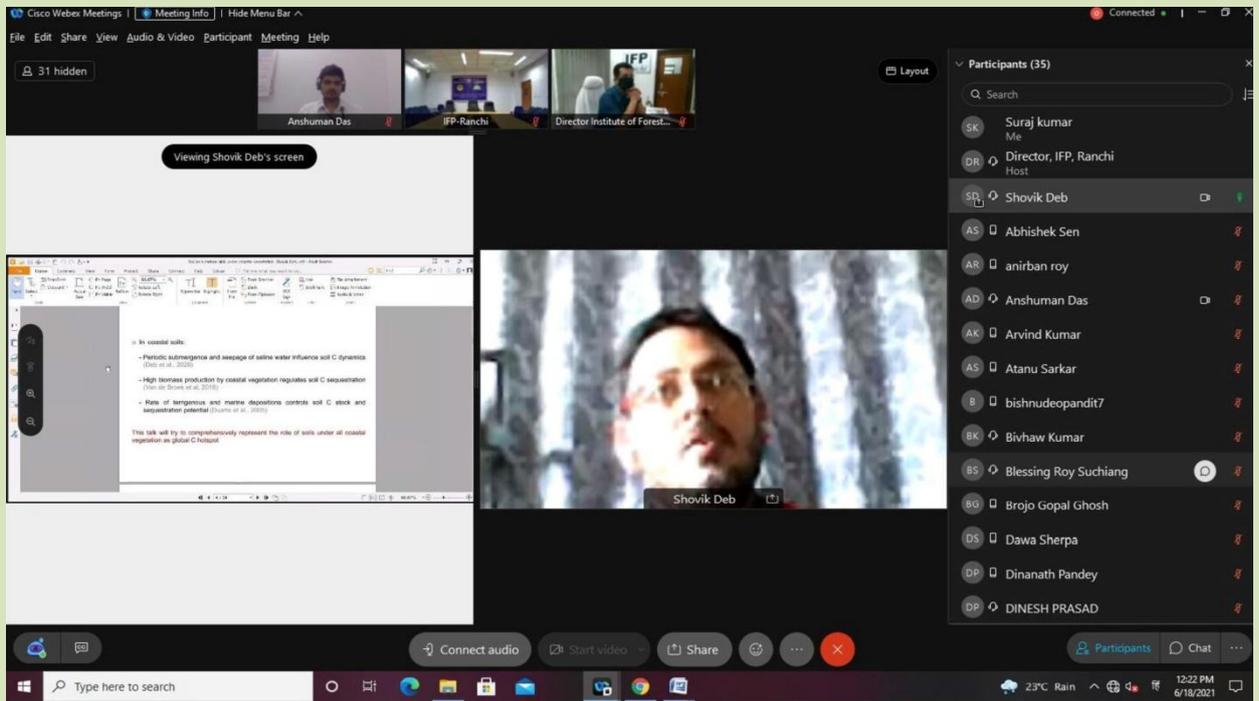
Glimpses of the Seminar



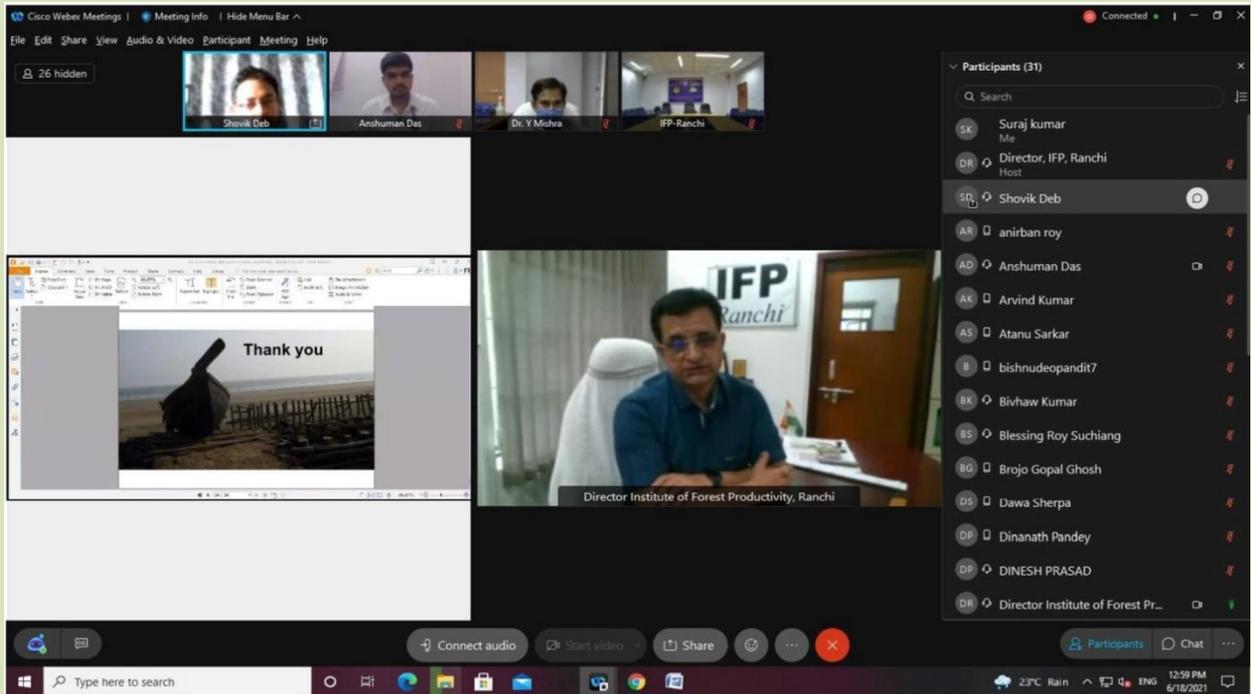
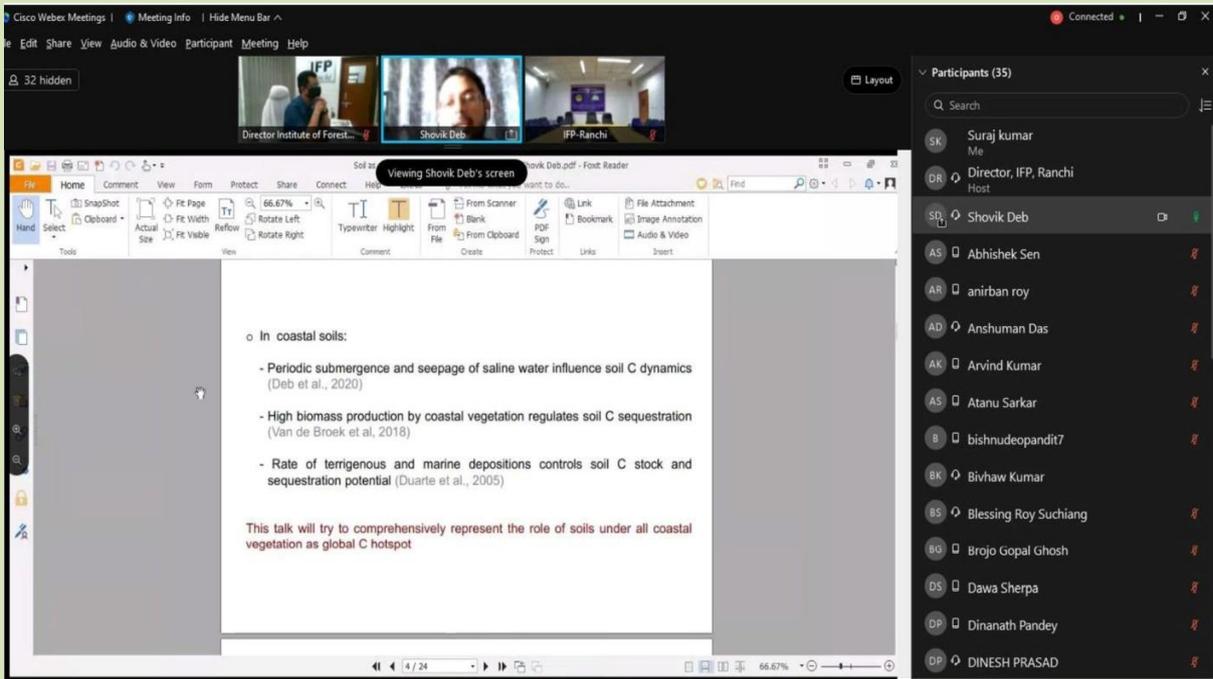
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