

P-1: WATER EROSION APPRAISAL IN DIFFERENT AGRO-ECOLOGICAL REGIONS

1.1 Inventory and database of erosion status using modern tools and procedures

- Development of intensity-duration-frequency curves using rainfall data for different agro-ecological regions of India.
- Assessment of soil erosion fluxes of Uttarakhand.
- Impact of land use land cover changes on soil erosion susceptibility in Bundelkhand region using Remote Sensing and GIS technique.

1.2 Soil erosion process modeling and climate change studies

- National Mission on Sustaining Himalayan Eco-system (NMSHE) - Task force on Himalayan agriculture for lower and middle Himalayan region.
- Application of integrated spatial science tools for prediction of soil erosion map under changing climate scenario for the Uttarakhand state.
- Study of atmospheric and soil carbon dioxide fluxes in temperate mountainous ecosystem of Western Ghats with reference to climate change impact assessment.

1.3 Soil carbon dynamics and erosion productivity studies

- Erosion productivity relationships for evaluating vulnerability and resiliency of soils under different agro-climatic regions of India.
- Assessment of soil organic carbon in transit under erosion processes: A source or sink for atmospheric CO₂.
- Environmental tracer based study on erosion induced loss of soil organic carbon and its impact on agronomic productivity and environmental quality.
- Development and validation of a spatially explicit simulation framework to quantify runoff-erosion-carbon flux at watershed scale.
- Assessing the vegetation and SOC recovery potentials of abandoned / fallowed shifting cultivated sites in Central Eastern Ghats.
- Land use effect on soil carbon stock and soil quality in Mahi ravine ecosystem of semi-arid tropics.

P-2: CONSERVATION MEASURES FOR SUSTAINABLE PRODUCTION SYSTEM

2.1 Resource conservation measures for arable lands

- Development of conservation agriculture practices for rainfed production systems in North-western Himalayan region.
- Evaluation of conservation tillage based *Arundo donax* mats for resource conservation and enhancing cropping intensity on sloping crop lands.
- Determining resource conservation potential of bio-degradable waste and their on-farm utilization to increase crop productivity and profitability.
- Evaluating the effect of organic amendments on resource conservation and productivity of rainfed semi-arid vertisols.
- Effect of varying water regimes on Zn and N dynamics and rice productivity in saline vertisols.
- *In situ* moisture conservation practices under aonla based agro-forestry system for sustainable production in red soils of Bundelkhand.
- Restoration of shifting cultivated lands for resource conservation and sustainable production in Eastern Ghats.
- *Jhola kundi* based vegetable farming with soil moisture conservation practices for increasing profitability of tribal farmers of Eastern Ghats High Land region.
- Conservation tillage systems for enhancing productivity and resource use efficiency under rainfed area of South-eastern Rajasthan.
- Resource conservation and productivity enhancement through organic and inorganic amendments in soyabean-mustard cropping systems.

- Cover crops and reduced tillage for enhancing productivity and soil health in rainfed farming system in the hilly areas.

2.2 Resource conservation measures for non-arable lands

- Improvisation of soil working techniques for enhancing tree establishment under rainfed conditions of North-Western Himalayas.
- Soil fertility restoration and carbon sequestration potential of five agro-forestry trees in Himalayan foothills.
- Evaluation of traditional minor millet based agro-forestry systems under recommended agri-silvi-cultural practices of North-Western Himalayas.
- Efficacy of different soil and water conservation measures on bamboo productivity and resource conservation in Himalayan foothills.
- Development and characterisation of quality planting material of important MPT's for degraded lands of North-West Himalayas.
- Evaluation of *Bael* and Olive based agro-forestry system with soil amendments in Doon Valley.
- Evaluation of rooting media and rootstocks of major sub-tropical fruits spp. For raising quality planting materials on degraded lands.
- Promotion and expansion of Lemon grass (*Cymbopogon flexuosus*) cultivation as an alternative crop for livelihood security in SC and ST communities in Dehra Dun District.
- Up scaling research assessment of productivity, hydrological behaviour, resource conservation and intangible benefits of selected commercial bamboo species in Uttarakhand.
- Assessment and improvement of nutritional quality of horticultural crops on sloping lands in North-Western Himalayas.
- Phyto-rehabilitation of saline - sodic vertisols through *Prosopis juliflora* based silvipastoral system.
- Regulated deficit irrigation and canopy architecture management for fig (*Ficus carica L.*) in semi-arid vertisols.
- Peach based agri-horticulture land use system for degraded Shiwaliks.
- Evaluation of moisture conservation techniques for sustainable production of Tree Borne Oil Seeds (TBOS) in Bundelkhand.
- Evaluation of promising fruit species with different moisture conservation practices in red soils of Bundelkhand region.
- Evaluation of cover crops under cashew and mango plantation for improving soil health and productivity in Eastern Ghats High Land Region of Odisha.
- Evaluation, characterization and development of elite genotypes of *Cassia auriculata* for cultivation in arid and semi-regions.
- Effect of shade trees on productivity and soil health in rejuvenated tea plantations in Nilgiris.
- Resource utilization and productivity of Dragon fruit based horti-silviculture system under rainfed agro eco-systems of Central Gujarat.

P-3: WATERSHED HYDROLOGY FOR CONSERVATION PLANNING

3.1 Hydrological behaviour of land uses and management practices

- Hydrological evaluation of recommended forest grasses in Himalayan foothills.
- Evaluation of hydrological behaviour and production potential of recommended land use system / practices under different agro-ecological regions of India.
- Hydrologic systems analysis across multiple spatial scales and its implications on hydro-logic processes in sub-humid catchment of Eastern Ghat High Land Region of Odisha.
- Modelling the nutrient movement in agricultural watersheds and their impact on surface water resources of Nilgiris.

3.2 Water harvesting, groundwater recharge and management

- Development and rejuvenation of natural springs through soil and water conservation measures
- Consortia Research Platform-Water Theme 1 Water Resources Augmentation/ Conservation.
- Efficient groundwater management for enhancing adaptive capacity to climate change in sugarcane based farming systems in Muzaffarnagar district, U.P.
- Quantitative and qualitative assessment and management strategy for sustainable development of the ground water resources in Haridwar District.

- Employing system approach on zero energy drip irrigation system in bench terrace farming for hill region.
- Water quality assessment and its impact on adjacent soil and vegetation in riparian areas of Hindon and Kali rivers.
- Study on pollution status of Yamuna river and its impact on soil and crop health in Western U.P.
- Evaluation of direct recharge filter for revival of defunct and low yielding bore well vis-à-vis augmentation of ground water table in semi-arid region of Karnataka.
- Estimation of water budget components for predominant land uses of south-eastern Rajasthan for conservation planning.
- Strategies for rainwater harvesting and its multiple uses in rainfed agriculture in Central Gujarat.
- Field evaluation of ground water recharge filters developed by ICAR-IISWC, Vasad.

P-4: REHABILITATION OF AREAS AFFECTED BY MASS EROSION

4.1 Development and refinement of technologies for rehabilitation of ravines, landslides, mine spoils, riverbed mining, stream banks, torrents etc.

- Assessment of impact of extraction of RBM (River bed material) on physiography of stream flow courses of Himalayan foot hill streams.
- Ecological restoration of stone mine spoil area in south-eastern Rajasthan.
- Field evaluation of refinement of ravine reclamation technology in a model ravine area development project at Lohli-Bagli village in district Bundi (Rajasthan).
- Field evaluation of design of trenches under different agro-climatic regions.
- Enhancing productivity of ravine lands by plantation of *A. sapota* with intercropping systems.

P-5: INTEGRATED WATERSHED MANAGEMENT FOR SOCIO-ECONOMIC GROWTH AND POLICY ADVOCACY

5.1 Participatory watershed management and integrated farming system (IFS)

- Evaluation of criteria and techniques for classification of fisheries - sensitive watersheds for conservation and production management
- Socio-economic analysis of farming/livelihood systems of farmers across different land categories in Yamuna ravine area.
- Refining methodologies for data validation, planning, monitoring and evaluation of watersheds.
- Socio-economic analysis of tribal farming system in different topo-sequence in Koraput District, Odisha.

P-6: HUMAN RESOURCE DEVELOPMENT AND TECHNOLOGY TRANSFER

6.1 Capacity development approaches and information and communication technology (ICT)

- Developing ICT based e-learning tools for conservation measures and watershed management.
- Role of soil and water conservation technologies for climate resilient agriculture in Himalayan ecosystem - An action research.

6.2: Participatory technology dissemination and adoption

- Ensuing sustainable agricultural development and livelihood security in lower Shiwalik range of Uttarakhand.
- Assessing farmer's knowledge, vulnerability and adapting capacity of soil and water conservation technologies under changing climatic scenario.
- Determination of heterogeneity in agro-forestry practices and acceptability alongwith altitude gradient in Western Himalayas.
- Assessment of sustainability factors for soil and water conservation projects.
- Farmer participatory technology application for sustainable resource management and livelihood security in North-West Himalayas.
- Role of women in conservation and management of natural water resources for domestic and irrigation uses.
- Documentation and validation of ITKs in soil and water conservation practiced by tribal farmers of Tamil Nadu.