Sub-theme 1: Bioscience Research

Eastern part of Ethiopia is rich in plant, microbe and animal diversity. Biodiversity provides ecosystem services, and forms an integral part of the rural economy, providing subsistence, goods and medicines. However, research on biodiversity, particularly from the point of view of their ecology and conservation status; use to the local people and potentials for pharmaceuticals and industrial purposes; responses to abiotic and biotic stresses are lacking. As a result, biodiversity is being lost together with indigenous knowledge of people around them. The biosciences research sub-theme, therefore, set out a research priority to study 'Plant, Microbial and Animal Biodiversity' from the following specific project components stand point.

- ✓ Wildlife and plant ecology, species diversity, microbial diversity, genetic characterization and screening cell/tissue culture and gene pool enhancement in Eastern Ethiopia;
- ✓ Eco-epidemiology and transmission of parasites among human, domestic and wild animals in Eastern Ethiopia;
- ✓ Phytochemical and bioactivity studies of ethno-medicinal plants, antioxidant properties;
- ✓ Impact of climate change on plant performance;
- ✓ Biofuel fuel production (production enhancement using fast growing grass codigestion with animal manure, and algae, lignocellulosic substrate, biogas upgrading, small scale biogas establishment for community
- ✓ Biological method of domestic, agricultural and industrial waste management using plant, algae and fungus
- ✓ Innovation technologies on the biopesticides and biofertilizers, immunology, climate change adaptive genetic resources, biotechnological entrepreneurs, etc
- ✓ Range management theories and model

Sub-theme 2: Chemical Science Research

Synthetic materials have many applications in medicine, pharmaceuticals, food, construction, manufacturing industries, etc. Ethiopia is rich in resources (biological and non-biological) that can be used as input in material science and synthesis. The rich biological resources we have are opportunities to use natural products in an array of applications provided that efficient scientific

methods of extraction, screening and isolation are put in place. With this great potential, a great deal of researches are required to advance knowledge in areas of material science using local resources that would inevitably be used to generate technologies for various applications.

The Chemical research sub-theme, therefore, set out a research priority to study 'Material Synthesis and Method Optimization for Natural Product Extraction and Trace Chemical Analysis' from the following specific project components stand point.

- ✓ Material synthesis (transition metal-chalcogens, conducting polymers, metal oxides/conducting polymers and metal-organic frameworks);
- ✓ Method development for the extraction, synthesis, and isolation of trace chemical compounds.
- ✓ Utilization of locally available low cost materials for environmental remediation.
- ✓ Chemical education;
- ✓ Extraction and isolation of new compounds from natural products;
- ✓ Developments of nanomaterial for different applications
- ✓ Environmental process and analysis of microplastics, and impact of nano material on the environment.

Sub-theme 3: Mathematical Research

Mathematics provides the framework for understanding almost any complicated phenomenon. Advanced mathematical techniques are used to model and test products on computers, optimize production techniques and have interplay with various systems. Advancing mathematical research helps to build strong scientific community capable of technology generations and new innovations. Despite its immense role, research in mathematics is not being conducted to its best level.

Thus, recognizing the importance of mathematical researches to the building of strong scientific bases for technology generations and innovations, the Mathematical Research Sub-theme set out a research priority to study 'Modern Techniques in Optimization, Mathematical Models in Stochastic Differential Equations and Queuing Theory' from the following specific project components' stand point.

- ✓ Modern Optimization Techniques;
- ✓ Stochastic Differential Equation and Queuing Models;
- ✓ Algorithms in Fixed Point Theory;

- ✓ Climate and Plant disease modelling
- ✓ Computational Methods for Agricultural Data Mining and Analysis
- ✓ Numerical Algorithms for Analyzing High-Dimensional Disease Data

Sub-theme 4: Biophysics and Computational Physics

Computational physics develops algorithms that are of immense use in industries and medical issues. Research output on material computation can serve as an input to any nanoscale related research to improve the efficiency of the material for energy generation, waste treatment, sensors and so on. Biophysics looks for mathematical laws of nature and makes detailed predictions about the forces that drive idealized systems in living things. In spite of immense industrial and environmental applications research works are scanty so far in Ethiopia. Cognizant of enormous use of Biophysics and Computational physics research in industries, environment and medicine, the Biophysics and Computational Physics Sub-theme prioritized research areas from the following specific project components' stand point.