Food Mission: Eating adequate, healthy diets without consuming nature's bounty

Current food production methods are major contributors to human-caused climate change, unsustainable water use, ocean acidification and eutrophication, air and water pollution, deforestation and biodiversity loss. Current food consumption patterns are also driving inequalities in health outcomes through inadequate nutrition, leading to both food insecurity and hunger among some groups, and overweight and obesity in others. At the same time, food systems are vulnerable to the environmental changes now underway, e.g. through the increasing severity of droughts, floods, extreme heat events, diseases and land degradation caused, in part, by climate change, biodiversity loss and the way we manage food production itself. Earth's capacity to sustain current and growing needs for nutritious food will continue to weaken with ongoing environmental declines. For example, food security is threatened by the loss of pollinators and fertile soil. Loss of pollinators threatens annual global crop output worth between US$235 billion and US$577 billion (UNEP, 2021). Furthermore, access to sufficient and healthy food is very unequally distributed across the globe. Current food systems fail to deliver healthy diets to all, with some 800 million people undernourished and nearly two billion overweight (TWI2050, 2018). The COVID-19 pandemic has put the spotlight on food systems, which is thought to be one of the main drivers of the pandemic itself. The pandemic has also highlighted some of the main systemic risks of our hyperconnected global food system – trade disruptions, export bans and restrictions to migrant seasonal work – that have exacerbated food insecurity in already vulnerable areas. The transformation of the food system is thus imperative to limit the emergence of other similar threats in the future. This will require tackling human and environmental health as joint goals for the future development of food systems (Sperling et al., 2020). This implies that in transitioning towards sustainable food systems, the focus must be on enabling more equitable global access to nutritious foods and maximizing the nutritional value of produce while also minimizing the impacts on climate, land, water, biodiversity and oceans.

To support the transition to sustainable food systems that support healthy people and a resilient biosphere, science needs to:

- Provide better guidance on technological and social innovations, effective economic incentives and regulations, and forms of governance that will be required.
- Identify ways of overcoming existing impediments that slow down the transition towards more sustainable food systems, including regulatory barriers, market mechanisms, destructive subsidies and social and cultural factors.
- Improve understanding of interactions across food, water, energy and land use systems and their impacts on climate change, biodiversity loss, emergence of zoonotic diseases and impacts on public health (nutrition and through air and water quality) as well as how to build resilience to these impacts as they will inevitably increase in the future even with substantial mitigation efforts.

Critical areas for scientific inquiry:

- Identifying sustainable agricultural, aquacultural and fishing practices that minimize environmental damage and maximize resilience of food systems in the face of multiple shocks;
- Strengthening the biological diversity of crops, animal species and production systems, suited to diverse environmental conditions;
- Developing new and alternative food sources that improve food and nutritious health, while reducing environmental impacts;
- Enabling the shift towards affordable, healthy and environmentally sustainable diets;
- Identifying ways of reducing food waste and enabling the shift to circular food systems;
- Analysing current and future food crises (e.g. in the context of climate change, severe hunger or conflicts);
- Identifying mechanisms of governance, types of institutions and capacities required for transitioning towards more sustainable food systems;
- Understanding the distribution of power in food systems and identifying mechanisms for minimizing negative influence and control of large food corporations;
- Identifying the incentives for environmental stewardship in the food and land use system sectors;
- Identifying regulations, economic mechanisms and incentives that will advance the transition, but also identifying ways of removing regulatory barriers and inappropriate subsidies that undermine it;
- Identifying ways of protecting the food system workforce;
- Understanding interactions across and within systems (e.g. food–water–energy, land use–climate change–emergence of zoonotic diseases, food insecurity–climate change–conflicts and food systems–trade–risks), identifying synergies and trade-offs; and
- Assessing the roll-out of digital technology for the food systems, including through an equity lens.