

# Quarterly Review

**From the Desk of Rattan Lal**

## **Returning Land to Nature and Re-Carbonizing the Biosphere**

*There are 8.7 million species on the Earth and only a small fraction of these have been identified and studied. Human, the most dominant species, consume a large proportion of the net primary productivity. Human appropriation of net primary productivity (HANPP), which is an aggregate impact of land use on biomass available each year in ecosystems, is estimated at 15.6 Pg C /yr or about 23.8% of net primary productivity. Yet, human population is growing and estimated to increase from 7.9 B in 2022 to 9.8 B in 2050 and may be as much as 11.4 B by 2100. Human population, with growing economy, is also getting rich and affluent with tremendous demands on the finite natural resources. Land area under agriculture (growing crops and raising livestock) is already more than 5 B ha and there is a call for bringing more land under agriculture. Yet, 30 to 40% of all food produced is wasted. Of the 3 B tons of food grains produced, 1.2 B ton are wasted. In the meantime, inappropriate agricultural practices and indiscriminate use of inputs (e.g., fertilizers, pesticides, irrigation, plowing) along with deforestation and conversion of natural to managed ecosystems is changing climate, degrading soils, polluting water, contaminating air and dwindling biodiversity. World's food systems are responsible for about 30% of all anthropogenic emissions. Despite all this, 820 M people are food-insecure and prone to hunger or under-nutrition, 2 B are suffering from malnutrition or hidden hunger due to deficiency of micronutrients, protein or vitamins, 3 B cannot afford safe and healthy food. In developing countries (i.e., Sub Saharan Africa, South Asia, Central America, Caribbean, Andean regions), there is a large yield gap. Therefore, the world population should be fed from the food already produced by reducing waste, increasing access to food, encouraging plant-based diet, minimizing conflicts and civil strife, addressing poverty and inequality, and narrowing the yield gap by translating science into action. Humanity must plan to return some land to nature. Of the 5 B ha of land, cropland area can be decreased to 750 M ha and grazing land to 1.5 B ha. The remaining land (~ 2.5 B ha) must be returned back to nature. There should be a time table on a decadal scale to return land to nature between 2025 and 2100.*

*Rather than try to dominate, human must learn to live in harmony with nature. Returning some land back to nature will re-carbonize the biosphere, enhance biodiversity, create a safe zone for human and improve the environment.*

Sincerely,



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