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Moving Agri-Food Systems Beyond the Permeating Permanence of the Green Revolution

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Undoubtedly the Green Revolution (GR) was a godsend 'package' that saved many millions from hunger during the 1960s and 70s in South Asia and elsewhere. However, some of the negative externalities of the GR were very much apparent in its initial stages. [Limits to Growth](#)

<http://www.donellameadows.org/wp-content/userfiles/Limits-to-Growth->

[digital-scan-version.pdf](#)), the landmark report commissioned by Club of Rome in 1972, mentions some of the unintended consequences which ensued following the GR's farm mechanization:

- Agricultural unemployment
- Increased migration to cities
- Increased malnutrition among the poor and unemployed due to lack of purchasing power

Almost five decades down the line, the agricultural research community is facing and addressing new challenges in food systems. While some of them can be backtracked to the GR itself, they are becoming increasingly complex due to global environmental change. The plenary on 'Interactions between increasing staple crop productivity, resilience to climate change, improving nutrition and sustaining agrobiodiversity' at the Science Forum 2018 discussed some of these issues.

Food systems and agrobiodiversity in times of rising malnutrition and hunger

Last year, [Global hunger rates \(https://www.wfp.org/news/news-release/world-hunger-again-rise-driven-conflict-and-climate-change-new-un-report-says\)](https://www.wfp.org/news/news-release/world-hunger-again-rise-driven-conflict-and-climate-change-new-un-report-says), increased for the first time after many decades of decline. Partly attributable to the rising unrest across many parts of the world, [unhealthy diets \(http://globalnutritionreport.org/2018/02/01/diversifying-agriculture-for-healthy-diets/\)](http://globalnutritionreport.org/2018/02/01/diversifying-agriculture-for-healthy-diets/), are also a chief contributor to this coexistence of undernutrition and obesity. Prof. Ruth DeFries, in her [presentation \(https://www.scienceforum2018.org/sites/default/files/2018-10/SF18_ppt_defries.pdf\)](https://www.scienceforum2018.org/sites/default/files/2018-10/SF18_ppt_defries.pdf), said that, in the backdrop of burgeoning malnutrition, food systems need to rethink nutrient delivery. The case study from India reveals how the shift in dietary patterns has implications on the climate resilience of crops and malnutrition.

A shift from water efficient, but low yielding, minor cereals like millets and sorghum to relatively less climate resilient, high yielding and input intensive cereals like rice and wheat has resulted in a decline in the intake of

micronutrients like Iron. What makes the case interesting is that the country-level aggregate data masks the regional differences within the country, which makes it a point for data and analysis at sub-national levels for informed policy making. This is where the relevance of strengthening the science-policy interface, the crosscutting topic of SF 2018, becomes evident.

Truth vs Hype – Linkages between Productivity, Agrobiodiversity and Dietary Diversity

Notwithstanding the negative externalities of the GR that were mentioned above, Prof. Melinda Smale pointed out that (https://www.scienceforum2018.org/sites/default/files/2018-10/SF18_Smale_topic1_0.pdf), cropping intensification and productivity increase during the GR spared the conversion of more land into cropping, thereby pre-empting an increase in CO₂ emissions. The key observations from this presentation are listed below:

- The farm level diversity of crops has dwindled over the decades
- The genetic diversity of crops got expanded, some of it could be attributed to new breeding techniques
- There is no evidence for, or against, the premise that research on improving crop productivity decreased agrobiodiversity
- In a larger context, increase in agricultural productivity links with an associated increase in nutrition but the pathways are not always clear
- There is less evidence on the effectiveness of agriculture programs designed to enhance nutrition
- Linkages between crop diversity, dietary diversity, income and trade varies across countries according to its economic level

It is clear that generalizable evidence is not apparent in the interplay between productivity, agrobiodiversity and dietary diversity. This again suggests that interventions by regional level policymakers to act according to the prevailing state of (mal)nutrition is important to synergize Agri-Food systems with the SDGs.

To sum up, a rethink is needed in the cereal cropping pattern which is currently heavily biased towards the big three crops of rice, wheat and maize. Research and investment towards alternate options, mainly the minor cereals, comes with a host of co-benefits including lower water requirements, climate resilience and improved availability of micronutrients. But the way forward has to incorporate factors related to international trade and market linkages, income of farmers, along with the preservation of agrobiodiversity.



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