



Technical Note 4

Towards Sustainable, Healthy and Profitable Food Systems: Nutrition and the Sustainable Management of Natural Resources

Authored by the United Nations System Standing Committee for Nutrition*

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The way humans acquire food, through agriculture and food systems, is one of the largest contributors to greenhouse gas emissions, biodiversity loss, and agrochemical pollution of ecosystems (MA 2005; IPCC 2007, 2013; IAASTD 2009). Human nutrition, in turn, is highly dependent on multiple services provided by these ecosystems—for example, nutrient diversity, water quality, and climate regulation—and ensuring that these ecosystems are sustained for future generations (Deckelbaum et al. 2006; Herforth 2010; DeClerck et al. 2011; Remans and Smukler 2013). In the midst of climate change, the benefits of these ecosystems, with nutrition being an essential outcome of healthy ecosystems, are even more at risk. As we move forward into the Post-2015 Development Agenda and the Sustainable Development Goals (SDGs), nutrition and environmental sustainability should be considered intrinsically linked. This panel describes emerging thinking and practice at the nexus of nutrition, food systems, and natural resource management.

Metrics and Monitoring

In an analysis of the state of the planet and its people, the Millennium Ecosystem Assessment (MA) concluded that to address many of the threats to human well-being, natural resources should be managed to achieve multiple objectives simultaneously—for example, to produce nutritious food in a profitable manner while safeguarding biodiversity and minimizing greenhouse gas emissions (MA 2005). In 2009, a group of environmental scientists described nine planetary boundaries: climate change, biodiversity loss, chemical pollution, ocean acidification, nitrogen cycle, phosphorus cycle, change in land use, atmospheric aerosol loading, and stratospheric ozone depletion (Rockström et al. 2009). They estimated that for biodiversity loss, climate change, and nitrogen flows, boundaries of a safe-operating space have been crossed.

To capture the multifunctionality called for in the MA and assess dynamics toward the planet's limits, new metrics are being developed at the intersection of nutrition, food systems, and environment, as summarized in Table 1. In general, these measure aspects of nutritional benefit per unit of natural resource use. Simultaneously, monitoring systems are innovated to span the different spatial and temporal scales at which social, economic, and environmental variables are traditionally being measured and to enhance co-located monitoring and analysis (Sachs et al. 2010; Scholes, Palm, and Andelman 2013).

Table 1 Metrics that link nutrition and environment

Planetary boundary	Nutrition*environment metric	References
Climate change	Greenhouse gas emissions per unit of food item, nutrient, or dietary pattern	McDiarmid et al. 2012; Peters et al. 2008
Land use	Proportion of total cropland calories that end up delivered to people as food	Cassidy et al. 2013
Biodiversity	Nutritional functional diversity provided by the biological diversity in a unit of land or marketplace	DeClerck et al. 2011; Remans et al. 2011, 2014
Biodiversity	Amount of fish consumption from sustainable fish source as a percent of total fish consumption	Adapted from Institute of Medicine 2014 and Belton and Thilsted 2014
Nitrogen and phosphorus cycles	Nitrogen- and phosphorus-use efficiency in production and postharvest using nutritional output per unit of nitrogen or phosphorus input	Cassman, Dobermann, and Walters 2002; Shenoy and Kalagudi 2005; Rengel 2013; Kahiluoto et al. 2014
Freshwater depletion	Water-use efficiency and effective use of water in production, postharvest, and consumption processes	Blum 2009; Rengel 2013; Kahiluoto et al. 2014; Capone et al. 2014
Multiple	Percentage of food waste from producer to consumer	Authority of the House of Lords 2014

Multi-Objective Decision-Support Tools

Profitability is a fundamental driver of food systems. It is therefore critically important to consider profitability, environmental concerns, and nutrition objectives together. New decision-support tools are increasingly being used by researchers and policymakers to explore these trade-offs, synergies, and feedback loops (Daily 1997; Daily et al. 2009; Foley et al. 2005; Raudsepp-Hearne et al. 2010a, 2010b; Groot, Jellema, and Rossing 2010; Groot et al. 2013). These tools help to understand and identify potential win-win options between economic, environmental, and social variables but as yet do not include explicit human health or nutrition dimensions beyond caloric needs (Remans and Smukler 2013; Herforth et al. 2014). This needs to change.

Policies and Programs: Potential Mechanisms for Generating Health and Sustainability within a Market System

A number of initiatives, noted in the following paragraphs, are being pursued to reconcile nutrition, profit, and environmental sustainability.

Making the best choice the easy choice: A very real challenge is how to make healthy and sustainable choices the easy default choice, accessible to all including vulnerable population groups. This is a systems question and calls for changes at the production, institutional, market,

and consumer levels. Practical examples that increase access to diverse, sustainable diets can be found in improved school meal programs, diversification of agricultural subsidies, or incentives to reduce food waste. Brazil, for example, promotes local, often underutilized, food biodiversity in its national social safety and school meal program (Schmitt and Grisa 2014; Campos et al. 2014). Malawi increased support for legume production to its agricultural subsidy program (Chirwa and Dorward 2013). The European Union is exploring incentives for supermarkets to minimize food waste at the farm, store, and consumer levels (Authority of the House of Lords 2014). Such incentives might be particularly important for highly perishable food items such as fresh vegetables, fruits, and fish, which are often also nutrient dense.

Informing choices and empowering consumers: While consumers have increasingly access to information on healthy choices, they are less well informed on the environmental consequences of those choices. Several countries are developing new national dietary guidelines that take environmental and health concerns jointly into account (for example, Sweden, Norway, the United Kingdom, Spain, France, Italy, the United States, Malawi). Although some contradictions are apparent—such as seafood often being a healthy diet choice but not always an environmentally sustainable choice—mostly the intersection of healthy and environmentally sustainable options align (Burlingame and Dernini 2012; McDiarmid 2013; Garnett 2014). Standards and labeling to reflect production and processing practices are tools to inform consumer choices. Additional consumer empowerment, for example, through increased income generation by women or engagement of men in nutrition education programs, could enable a larger diversity of consumers to access a more healthy and sustainable option (Negin et al. 2009; Dewey and Kuyper 2012).

Payments for ecosystem services (PES): Incentives are offered to farmers or landowners in exchange for managing their land to provide certain ecological services, such as clean water or carbon mitigation (Tacconi 2012). Adding nutrition needs to PES programs could promote the sustainable management and conservation of nutritionally important natural resources, for example, diversity of genetic resources, in the marketplace. Farmer fields, community, and global seed banks serve an important function of safeguarding the genetic material and evolutionary processes of crop varieties adapted to diverse environments and offering different nutritional profiles.

Nutrition-Sensitive Landscapes (NSL): The overall idea of NSL (NSL 2014) is to set nutrition, social, and environmental targets together and to identify options that benefit these multiple objectives simultaneously in a given dynamic socioecological system. NSL does not imply that the environment can produce all nutrients required for adequate human nutrition; it does, however, mean a focus on building biological diversity into the landscape, diet, market, and food system to provide multiple sources of nutrients, and contribute to environmental and population resilience.

Conclusion

The challenges of the 21st century are increasingly interconnected. The challenge of achieving good nutrition status in a way that is environmentally sustainable is only now beginning to receive serious attention. A change at scale in how people interact with their environment to fulfill the goals of food and nutrition security is required. Measurement is key here—the environmental consequences of choices are not easily assessed through casual observation until it is too late. Innovative scientific methods, pilot studies, metrics, and good practices are emerging to help us

rise to the challenge. The opportunity is now to ensure that nutrition security and environment are closely linked in the Post-2015 Agenda.

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