Perspectives in Nutrition Science

Sustainable Food Systems for a Healthy World

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Key messages

- The physical and mental health of the human population is inextricably linked with the state of the environment.
- The environment is affected significantly by the food systems that play such an important part in human health and well-being.
- A "food system" approach helps relate all food system activities to the outcomes of these activities not only for food security, but also for the environment and enterprise.
- The food system approach thereby provides a framework for the systematic analysis of synergies and trade-offs among food security, environment and enterprise outcomes of possible policy, financial, social and/or technical interventions. It also helps identify the right people to engage in such analyses.

Definitions

What are "sustainable food systems for a healthy world"? This question of course involves three concepts, all warranting discussion: "sustainable," "food systems" and "healthy world." I feel it helps to address them in reverse order, dealing first with the concept "healthy world" – arguably the ultimate goal.

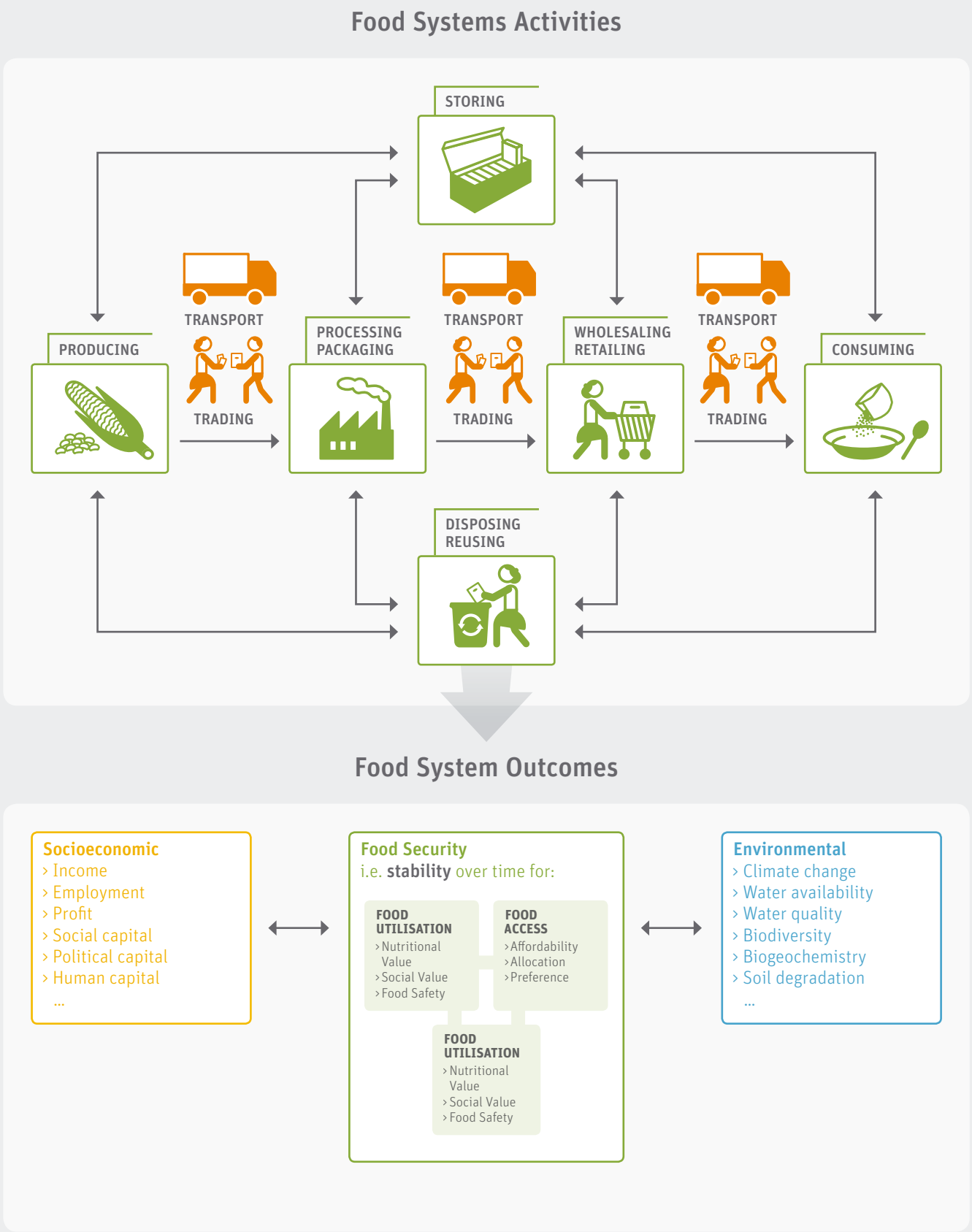
Many concerned with global environmental change, whether as academics or as the "interested public," may first think of biological, biogeochemical and/or biophysical parameters to define the concept "healthy world." Much has been published on the "state of the planet" in this vein, with recent major works by international bodies such as the IPCC on climate and UNEP's International Resource Panel on natural resources. These have been accompanied by numerous major papers in the academic literature which introduced, for instance, the concepts of "Planetary Boundaries" and a "Safe Operating Space for Humanity."[1,2]

Environmental concerns are clearly important, but only represent one view of a "healthy world." Another relates to the health of the human population, which has risen dramatically in recent decades. This is partially due to increased longevity – a development which few would argue is a bad thing. Further, the fact that now more than six billion people – or approximately 80% of the world's population – do not suffer from inadequate calorie intake is a remarkable human achievement; some 50 years ago, this proportion was approximately 65%.[3] But we should not be complacent: today some one billion people do not have access to sufficient calories[4] and at least two billion people lack sufficient micronutrients,[5] while – paradoxically – over two billion people consume too many calories.[6] This under- and over-consumption has led to a growing "triple burden" of malnutrition. Different, overlapping forms of malnutrition are the "new normal";[7] some people consume too little, while others – sometimes in the same community or even household – consume too much.

> "Different, overlapping forms of malnutrition are the 'new normal'"

Set against this backdrop is the fact that the global human population is expected to reach approximately nine billion people by 2050.[8] Furthermore, food consumption patterns are changing rapidly as average wealth increases (especially in the case of the emerging "middle class" in much of the world[9]), leading to many people consuming more food overall and more meat in particular.[10] This change in diet (coupled with an increase in

FIGURE 1: Food Systems *Activities and Outcomes* (adapted from Ericksen[19] and Ingram[20])



sedentary lifestyles) is leading to a pandemic of overweight and obesity,[11] which is bringing with it an increase in diet-related diseases such as type 2 diabetes.[12] At the other extreme is the major concern of insufficient nutrients for many, resulting in, for example, childhood stunting[13] and blindness.[14]

A "healthy world"

What, then, is a "healthy world"? From the viewpoint of the current human condition overall – and certainly looking forward – environmental and human health aspects are equally important. The environment underpins our food systems, clean air and fresh water, and a range of cultural and esthetic considerations;[15] a healthy environment is inextricably linked with physical and mental health of the human population. But it is also affected by the food systems that play such an important part in human health and well-being.

"Food systems"

The concept of "food systems" (as distinct from "food production systems") is not new: driven by social and political concerns, rural sociologists promoted this approach well over 20 years ago.[16,17] Several authors have since put forward frameworks for analyzing food systems, but Sobal et al[18] noted that few existing models broadly described the system, as most focused merely on one disciplinary perspective or one segment of the system.

Sobal et al identified four major types of model: food chains, food cycles, food webs and food contexts, and developed a more integrated approach including nutrition. One particular approach has emerged strongly over the last decade, substantially based on work in the global environmental change community.[19,20] In essence it relates all the food system activities (growing, harvesting, processing, packaging, transporting, marketing, consuming, and disposing of food and food-related items) to the outcomes of these activities not only for food security and other social issues, but also for the environment and enterprise. The food security outcomes are grouped into three components (Availability, Access and Utilization), each of which comprises three elements (**Figure 1**). All nine elements are either explicit or implicit in the widely cited FAO food security definition "when all people, at all times, have physical, economic and social access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life"; all nine have to be satisfied and stable over time (other than increasing, if too low) in order for food security to be met.

The concept also recognizes the motives of different food system "actors" and the range of policy, market, social, technological and biophysical environments that influence their actions. The food system approach thus allows the food chain activities to be linked to their social, economic and environmental context (**Figure 2**). Moreover, as actors in each section of the food chain affect each other's behavior, two-way linkages are taken into account. This food system concept has proved useful in a number of ways – for example, in helping define international, climate change / food security agendas;[21] in assessing sustainable nutrition security;[22] in futures thinking;[23] and in international and national assessments.[24]

> "The food system approach allows food chain activities to be linked to their social, economic and environmental context"

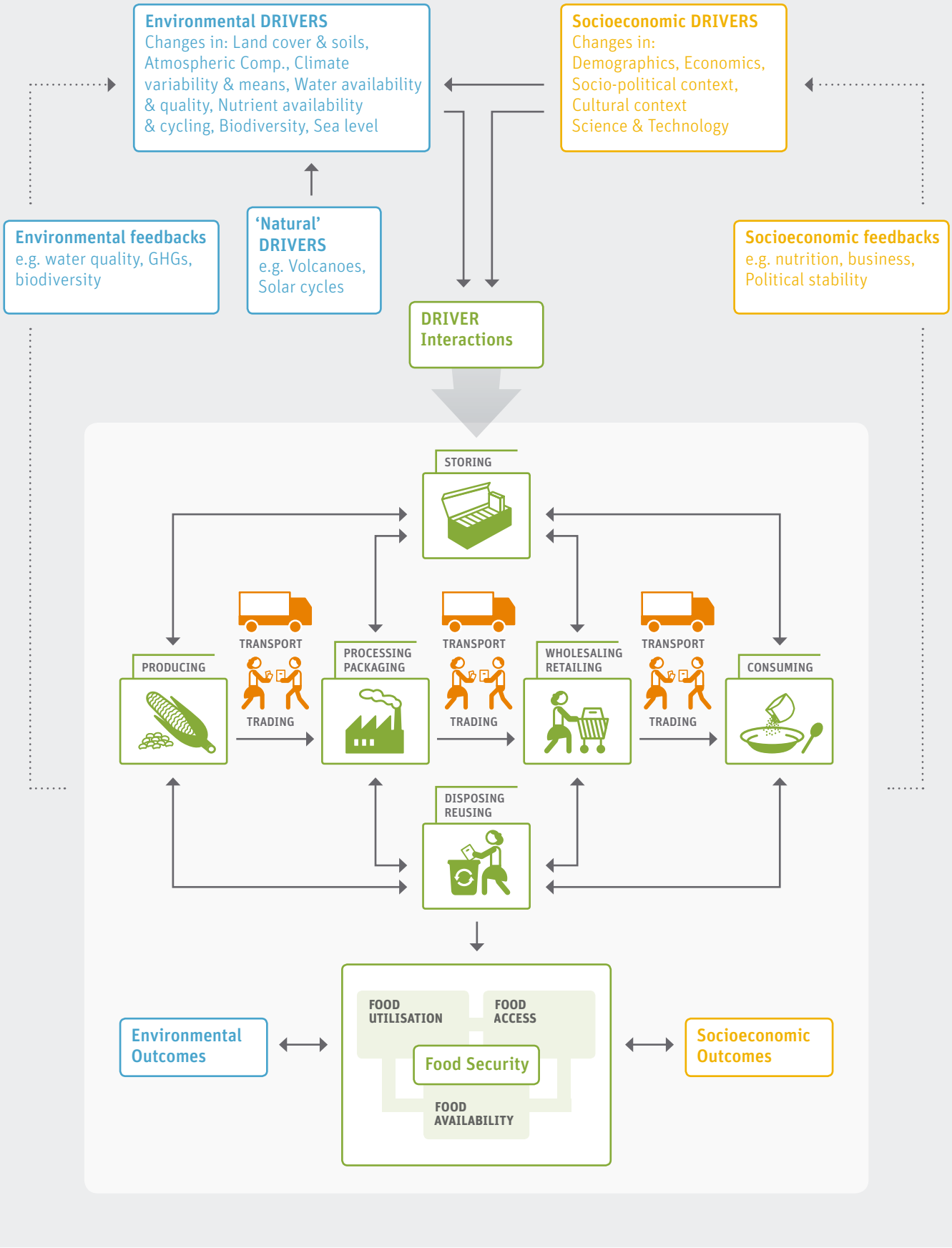
The food systems approach helps to engender discussion of adaptation options to improve outcomes across the full set of food system activities (i.e., along the length of the food chain) rather than just, say, in the agricultural domain. It also provides a framework for systematic analysis of synergies and trade-offs of possible interventions, balanced across a range of societal goals (**Figure 2**). Further, it serves as a "checklist" to ensure that the right people are engaged in discussion and that the right range of outcomes (some hitherto unforeseen) is being considered by those planning and/or implementing adaptation.[20] This is particularly valuable for considering how to improve health and well-being using an "Innovation System" perspective, as this recognizes that need for multiple dialogues among stakeholders.[25]

"Sustainability"

Finally, then, how should the notion of "sustainable" be considered? There is increasing societal, political and business pressure to develop more "sustainable" food systems. This is driven by the need to satisfy the growing demand for food anticipated over the coming decades, coupled with the already well recognized deleterious environmental impacts of the ways in which we produce and consume food. Sustainability is traditionally conceived of in terms of three "pillars": **1)** environmental, **2)** economic, and **3)** social.

With the increasing concerns about climate change, biodiversity loss and other aspects of environmental degradation, environmental issues often dominate debates around "sustainable" food production, and the term is often used synonymously with overall sustainability. However, in the context of a sustainable food system, the "social" and "economic" pillars are of equal importance – even more so if they are conceived in broad terms: "social" should include, at least, nutrition and health outcomes,

FIGURE 2: Food systems *Drivers and Feedbacks* (adapted from Ericksen[19] and Ingram[20])



Food security is underpinned by physical, social and economic access to food.

cultural diversity, and social capital. The traditional "economic" pillar should include business sustainability, i.e., the sustainability of the enterprise, be it that of an individual farmer/fisherman, an SME or a multinational corporation. These are all businesses and, as they are also actors in the food system, they have to be sustainable from a business viewpoint if they are to fulfill their role.

All three sustainability pillars apply across all food system activities. The relative importance placed on each pillar's contribution to overall food system sustainability, however, varies depending on the sub-region, as well as on the spatial and temporal level in question. It also varies according to the viewpoint from which it is being considered; and this, in turn, may vary when contemplated from the perspective of an individual actor in the system. For instance, while fish farming in general needs to ensure high environmental sustainability when conducted over large areas, an individual fish farmer may view business sustainability as the most important factor. In contrast, for the "nutrition/health" component of social sustainability, both individual consumers and the public health community at large will most probably always consider the health pillar first.

Juggling these varied "sustainability" dimensions in food systems is not simple: the wide range of actors involved, their range of activities, incentives and barriers, and their spectrum of world views delivers a highly complex picture. But, as Ben Ramalingam notes: "…The whole system disguises rather than navigates complexity, and it does so at various levels … This maintains a series of collective illusions and overly simplistic assumptions about the nature of systems, about the nature of change, and about the nature of human actors."[26]

Achieving "sustainable food systems for a healthy world" requires navigating this complexity. I am sure that having clearer understandings of what is 'healthy', how to take a 'food systems' approach, and what does 'sustainable' mean and to whom and why, will certainly help.

"Having clearer understandings of the concepts 'healthy,' 'food systems' and 'sustainable' will help in the pursuit of sustainable food systems for a healthy world"

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