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Policies that strengthen the nexus between food, health, ecology, livelihoods and identities

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Food is at the core of the nexus between identities, health, ecology and livelihoods, an intrinsic space where different important dimensions of life converge. Yet, policy discussions and deliberations that impact on food and food systems are often fragmented and incoherent. This chapter explores the close connection between these different domains and offers feasible pathways on how to place the virtuous interplay between sustainable and diversified local food systems and healthy diets at the core of the public policy agenda. It argues that turning to what is defined as the Peasant Food Web is the most effective strategy to address multiple intertwined challenges and offers concrete policy proposals that can facilitate the transition to agroecology and support peasants in feeding the world through a reinforcing loop between biodiversity, nutrition, health and livelihoods. Such a strategy requires significant efforts to 'de-silo' the current policy approach to what are often mistakenly addressed as separate challenges and break down the artificial boundaries imposed by the institutional settings that support each of the interconnected Sustainable Development Goals (SDGs). This could lead to a new coherent and holistic narrative that can inspire and guide the profound transformations envisioned in the 2030 Agenda.

Many challenges, one common root

Food is at the core of the nexus between identities, health, ecology and livelihoods. It therefore intrinsically represents a space for convergence between different important dimensions of life - culturally, socially and economically. Yet, policy discussions and deliberations that impact on food and food systems are often fragmented and incoherent, despite the ambitious and interlinked objectives set forth by the 2030 Agenda for Sustainable Development.

The current outlook is deeply worrying. According to the State of Food Security and Nutrition in the World, in 2016, after a prolonged decline, the number of chronically undernourished people in the world was estimated to have increased to 815 million, rising

from 777 million in 2015.¹ The report sends a clear warning that the ambition of a world without hunger and malnutrition by 2030 remains an uphill challenge. Indeed, it shows unequivocally that the numbers of chronically undernourished people in the world have increased, signalling a reversal from the past slow but steady reduction. Even more worrying, the hunger increase is not only due to the worsening of conflicts and re-acutization of famines, but also to heightened levels of vulnerabilities of all those that continue to live in the margins of society. The human right to the adequate food and nutrition continues to remain grossly unfulfilled.

Many are using this dire state of affairs to promote the grand narrative of feeding the planet by

¹ FAO/IFAD/UNICEF/WFP/WHO (2017).

increasing agricultural productivity and scaling up production. Unfortunately, this is not at all the point. Not only does the world produce enough food for everybody, given that approximately one third of all food produced is currently wasted, but the hunger challenge cannot be addressed in isolation from other critical ones: persistent undernourishment and malnutrition while overweight and obesity advance at high rates; environmental degradation and pollution that threaten the ecological foundations of life and the resource base on which agriculture depends;² the loss of biodiversity critical to resilience;³ high greenhouse gas emissions that contribute to climate change;⁴ inequities in access to food; and policies that marginalize small-scale food producers, their practices and rights.⁵

These and other challenges are closely interconnected. A recent report by the International Panel of Experts on Sustainable Food Systems (IPES-Food) highlights that industrial food systems are increasingly making people sick and leading to massive public health costs (see Box 2.1). Indeed, childhood overweight and obesity are rising in most regions, and in all regions for adults.⁶ Industrial livestock production is considered one of the main contributors to the alarmingly increased levels of antimicrobial resistance. Many refer to diet-related non-communicable diseases as an emerging pandemic that is radically shifting the nature of health challenges in most countries and exposing the profound limitations of an insurance-driven approach to healthcare. Once again, financialization is widening the disconnect with real life and limiting the normative and fiscal space of the State; and the silo approach that separates food and health policies leaves the nexus between these two domains largely unaddressed.

Our planet is suffering too. While the dominant industrial agriculture system, perhaps embodied best by the input-intensiveness and monocultures of

the Green Revolution, has enabled increased yields, this has come at a great cost to the environment, as well as to human health and animal welfare. Industrial agriculture is in fact one of the major sources of greenhouse gas emissions, depletion of natural resources, environmental degradation and reduction of biodiversity. Tackling the existential climate challenge and realigning humanity's ecological footprint within planetary boundaries simply cannot happen without the sustainable redesign of food systems. Interestingly, concrete alternatives exist. Building on well-established FAO data, a recent report by the ETC Group stresses how peasants are the main food providers to more than 70 percent of the world's people while using no more than 25 percent of the resources – including land, water, fossil fuels – used to get the world's food to the table.⁷ Not only does the industrial food chain use at least 75 percent of the world's agricultural resources, but for every US\$ 1 consumers pay to chain retailers, society pays another US\$ 2 in health and environmental damages. Despite this reality, false solutions under captivating titles, such as 'sustainable intensification' and 'climate-smart agriculture', still get the lion's share of policy-makers' attention as well as public resources.

But the problem is not only a matter of health hazards and resource efficiency challenges; it is fundamentally an issue of identities and livelihoods. The skyrocketing expansion of the global food systems, with its astonishing levels of corporate concentration and global 'grabbing-value' chains, is increasingly squeezing small-scale, as well as medium-scale, food production, which not only feeds but also offers livelihoods, employment and incomes to both rural and urban communities. And the global food system is also promoting the homogenization of food habits across the globe, with profound challenges to identities, traditions and cultural heritage.

To complicate matters, food has become the domain of profound technological revolutions, all leading to the increasing homogenization, commodification, dematerialization, dehumanization and financialization of food. The mirage of technological solutions

2 IAASTD (2009).

3 FAO (2010).

4 Smith et al. (2014).

5 IFAD (2013).

6 IPES-Food (2017a).

7 ETC Group (2017).

often generates a false sense of comfort that downplays the transformational shifts that need to be confronted within both production and consumption. And technology is also the primary instrument for the concentration of economic power within global conglomerates and the dispossession of resources of local communities.

The 2030 Agenda may provide key opportunities to connect all these dots and place sustainable local food systems and healthy diets at the core of the public agenda. However, this requires significant efforts to ‘de-silo’ the current policy approach to what are mistakenly addressed as separate challenges and break down the artificial boundaries imposed by the institutional settings that support each of the related interconnected goals.

The food-health-environment nexus: addressing environmental and human health risks simultaneously

Box 2.1

BY THE INTERNATIONAL PANEL OF EXPERTS ON SUSTAINABLE FOOD SYSTEMS (IPES-FOOD)¹

Although they are described in different bodies of literature, discussed in different fora, and addressed (if at all) by different policies, a whole range of severe human health risks are closely connected to food system practices - and to each other. Most of these impacts fall under the following five categories:

1. Occupational hazards: Physical and mental health impacts suffered by farmers, agricultural labourers, and other food chain workers as a result of exposure to health risks in the field/factory/workplace (e.g., acute and chronic pesticide exposure risks, production line injuries, livelihood stresses). *People get sick because they work under unhealthy conditions.*

2. Environmental contamination: Health impacts arising via the exposure of whole populations to contaminated environments ‘downstream’ of food production, via pollution of soil, air, and water resources or exposure to livestock-based pathogens (e.g., contamination of drinking water with nitrates, agriculture-based air pollution, antimicrobial resistance). *People get sick because of contaminants in the water, soil or air.*

3. Contaminated, unsafe, and altered foods: Illnesses arising from the ingestion of foods containing various pathogens (i.e., foodborne disease) and risks arising from compositionally altered and novel foods (e.g., nano-particles). *People get sick because specific foods they eat are unsafe for consumption.*

4. Unhealthy dietary patterns: Impacts occurring through consumption of specific foods or groups of foods with problematic health profiles (e.g., resulting in obesity and non-communicable diseases including diabetes, heart disease, cancers). These impacts affect people directly through their dietary habits, which are shaped by the food environment. *People get sick because they have unhealthy diets.*

5. Food insecurity: Impacts occurring through insufficient or precarious access to food that is culturally acceptable and nutritious (e.g., hunger, micronutrient deficiency). *People get sick because they cannot access adequate, acceptable food at all times.*

¹ This contribution is based on IPES-Food (2017).

An urgent case for reforming food and farming systems can therefore be made on the grounds of protecting human health, and the five channels listed above represent focal points for the action that is required. However, discrete actions to address a given health impact may not suffice. The various health risks reinforce one another, and arise from the underlying imperatives of the *industrial* food and farming systems that are now prevalent in many parts of the world. For example:

- The stress generated by high-pressure work environments in industrialized food processing plants is itself a key factor in increasing the risks of frequent physical injury;²
- Undernutrition and pre-existing disease burdens make people more sensitive to the impacts of environmental change and contamination,³ and at further risk of food insecurity;
- Health risks are also mutually-reinforcing in livestock production; livestock disease risks in confined feedlots encourage the extensive use of antibiotics, which in turn allows antimicrobial resistance to spread;
- A pool of cheap and insecure labour, dangerous conditions and systematic stresses for farmers and foodworkers are

what sustains the low-cost commodity production at the base of global food systems, and underpins the mass production of unhealthy ultra-processed foods.

Health risks in food systems are not, therefore, limited to isolated pockets of unregulated production, or to those excluded from the benefits of modern agriculture and global commodity supply chains. Many of the severest impacts result from deliberate choices and trade-offs that have been made to promote low-cost commodity production in global food systems.

Furthermore, the impacts of food systems on health are exacerbated by factors like climate change, unsanitary conditions, and poverty – which are themselves driven by food and farming activities. In particular, a whole range of health risks in food systems are deeply intertwined with ecological change and degradation - the ‘food-health-environment nexus’.

First, food systems are a major driver of climate change. While estimates differ, food systems may account for as much as 30 percent of all human-caused greenhouse gas emissions.⁴ Climate change, in turn, stands to aggravate a series of health impacts. The changing climate may bring novel vectors into newly temperate climates, driving alterations in the incidence and distribution of pests,

parasites, and microbes, or create temperature-related changes in contamination levels.⁵ For example, people may be exposed to a greater accumulation of mercury in seafood as a result of elevated sea temperatures.⁶ New food safety risks could also emerge as a result of increasing floods and droughts.⁷

Meanwhile, climate change is likely to provoke crop losses due to changing frequency and severity of floods and droughts, and even to decrease the nutritional value of important food crops, such as wheat and rice, as atmospheric carbon dioxide reduces protein and essential mineral concentrations in plant species.⁸ According to the US Environmental Protection Agency, “overall, climate change could make it more difficult to grow crops, raise animals, and catch fish in the same ways and same places as we have done in the past”.⁹ Through changes in rainfall and temperature-driven shifts in plant biomass, climate change is also expected to affect the extent, frequency, and magnitude of soil erosion,¹⁰ with major knock-on effects for health (e.g., increased nitrogen leaching into water, threats to food production and

2 Lloyd/ James (2008).

3 Whitmee et al. (2015).

4 Niles et al. (2017).

5 Newell et al. (2010); Watts et al. (2015).

6 Ziska et al. (2016).

7 WFP (2015).

8 Niles et al. (2017); Watts et al. (2015); Ziska et al. (2016).

9 https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-agriculture-and-food-supply_.html

10 Whitmee et al. (2015).

food security). Climate change is also likely to increase the risks of natural disasters (e.g., landslides, tsunamis) with the potential to exacerbate food-related health impacts, particularly food insecurity.¹¹

Food systems also contribute to broader environmental and land use changes, further exacerbating a range of health risks. As many as half of zoonotic infection events from 1940–2005 have been attributed to changes in land use, agricultural practices and food production.¹² In other words, a vicious cycle has taken root: the expansion of industrial agriculture has driven zoonotic risks directly, while driving land use changes with further risks of zoonotic disease, and contributing significantly to climate change – itself a major driver of land use change (e.g., due to loss of fertility in existing production zones).

It is also important to think beyond health impacts *per se* and to consider the broader ecological basis for health. The practices associated with industrial agriculture (e.g., chemical-intensive monocropping) are disrupting ecosystems in fundamental ways, and undermining their capacity to provide essential environmental or ecosystem services such as controlling soil erosion, storing carbon, purifying and providing water, maintaining essential biodiversity and associated ser-

vices (e.g., regulating diseases), and improving air quality.¹³ All of these services, provided by nature, are under severe threat, with far-reaching implications for human health. For example, with some 35 percent of global food production dependent on pollination, the loss of pollinators – closely associated with pesticide use – could fundamentally undermine future food production.¹⁴ The general disruption of marine ecosystems is also occurring at a rapid rate, threatening fish populations and thus a key source of protein for many people.

In other words, the impacts of food systems on human health and on the environment cannot be seen in isolation. Steps to address the wide-ranging environmental impacts of industrial agriculture are also steps to address the human health impacts of agriculture – and are doubly urgent. And given the extent of the problems described above, a fundamental redesign of food and farming systems is necessary, to safeguard environmental and human health.

Five co-dependent leverage points can be identified to address the food-health-environment nexus, and to build healthier food systems:

I Leverage point 1: Promoting food systems thinking. The connections between different health impacts, between human health and ecosystem health, between food, health, poverty, and climate change, and between social and environmental sustainability, must systematically be brought to light. Only when health risks are viewed in their entirety, across the food system and on a global scale, can we adequately assess the priorities, risks, and trade-offs underpinning our food systems, that is, the systematic food insecurity, poverty conditions, and environmental degradation inherent in the industrial model versus the low-cost commodity production it is designed to deliver. All of this has profound implications for the way that knowledge is developed and deployed in our societies, requiring a shift toward interdisciplinarity and transdisciplinarity in a range of contexts (e.g., new ways of assessing risks; changes in the way that university and school curricula are structured). Concepts such as ‘sustainable diets’ and ‘planetary health’ help to promote holistic scientific discussions and to pave the way for integrated policy approaches.

I Leverage Point 2: Reasserting scientific integrity and research as a public good. Research priorities, structures, and capacities need to be fundamentally realigned with principles of public interest and public good, and

13 See, for example, Millennium Ecosystem Assessment (2005); IPES-Food (2016).

14 WHO/Secretariat of the Convention on Biological Diversity (2015); Whitmee et al. (2015).

11 Watts et al. (2015).

12 Whitmee et al. (2015).

the nature of the challenges we face (i.e., cross-cutting sustainability challenges and systemic risks). Specific measures are needed to counter the influence of vested interests in shaping scientific knowledge on the health impacts of food systems, and to reduce the reliance of researchers on private funding (e.g., new rules around conflicts of interest in scientific journals, initiatives to fund and mandate independent scientific research and independent journalism). Different forms of research involving a wider range of actors and sources of knowledge are also required to rebalance the playing field and challenge prevailing problem frames (e.g., a global North bias; approaches that exclude impacts on certain populations; siloed approaches that ignore nexus effects).

- I **Leverage Point 3: Bringing the alternatives to light.** The positive health impacts and positive externalities of alternative food and farming systems must be brought to light (e.g., agroecological crop and livestock management approaches that build soil nutrients, sequester carbon in the soil, or restore ecosystem functions such as pollination and water purification). It is crucial to document and communicate the potential of alternative systems to reconcile productivity gains, environmental resilience, social equity, and health benefits; to strengthen yields on the basis of rehabilitating ecosystems (not at their expense); to build

nutrition on the basis of access to diverse, healthy foods; and to redistribute power and reduce inequalities in the process. These outcomes must be seen as a package and as a new basis for delivering health – one in which healthy people and a healthy planet are co-dependent.

- I **Leverage Point 4: Adopting the precautionary principle.** The negative health impacts in food systems are interconnected, self-reinforcing, and systemic in nature (i.e., bound together in nexuses). However, this complexity cannot be an excuse for inaction. Disease prevention must increasingly be understood in terms of identifying specific risk factors (not the cause) by the accumulation of evidence from many different studies, from many different disciplines, as well as in terms of the collective strength, consistency, plausibility, and coherence of the evidence base. The precautionary principle was developed to manage these complexities, requiring policy-makers to weigh the collective evidence on risk factors and act accordingly. It must therefore be repositioned at the centre of policy-making for healthy food systems.
- I **Leverage Point 5: Building integrated food policies under participatory governance.** Policy processes must be up to the task of managing the complexity of food systems and the systemic health risks they generate.

Integrated food policies are required to overcome the traditional biases in sectoral policies (e.g., export orientation in agricultural policy) and to align various policies with the objective of delivering environmentally, socially, and economically sustainable food systems. Integrated food policies allow trade-offs to be weighed, while providing a forum for long-term systemic objectives to be set (e.g., reducing the chemical load in food and farming systems; devising strategies for tackling emerging risks such as antimicrobial resistance). These processes must be participatory. The general public must become a partner in public risk management and priority-setting, and buy into the rationale and priorities underpinning it.

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Setting the record straight: The Peasant Food Web feeds the world and protects the planet

The initial implementation phase of the 2030 Agenda has been dominated by a distressing narrative about the urgent need to leverage private sector engagement, investments and resources, as articulated in the SDG 2 analysis in the Spotlight Report 2017.⁸ In this context, we are often told that big agribusiness is the only solution for the widespread hunger, malnutrition and rapidly changing climate the world is facing today; that we need their technological innovations, financial clout, and global supply chains to feed the world. However, there is a different story playing out: in fact, it is a diverse network of small-scale producers that is the keystone of food security. The ETC Group report synthesises food systems research to tell this “tale of two food systems” comparing the Peasant Food Web and the Industrial Food Chain.⁹

The Peasant Food Web (the Web) is made up of small-scale producers that include farmers, live-stock-keepers, pastoralists, hunters, gatherers, fishers and urban or peri-urban producers. Often these producers are family or women-led, and often peasants are both farmers and fishers, or balancing growing food with urban work or farm labour for all or part of the year. No single term can describe the range of peoples and livelihoods in the Peasant Food Web. The Industrial Food Chain (the Chain) refers to the linear sequence of links running from production inputs (seeds, chemicals, fertilizers) to consumers (grocery retailers, food distributors, etc.). It can also be called the corporate food system, industrial agri-food, or commercial foods. The Chain – and its disproportionate power over food policies and regulations – is closely intertwined with today’s global capitalist trade system.

The Web is a key food source for 70 percent of the world’s people (4.5 – 5.5 billion), including almost all of the 3.5 billion rural people in the global South, and many in the North; 1 billion urban food producers; 800 million fishers or people who rely on small-scale

fisheries; and hundreds of millions who turn to the Web in times of scarcity. In terms of food production, the Web also produces as much as 70 percent of the world’s available food (in calories and weight).

Given these statistics, where does all the food from the Chain go? While the Chain produces a lot of agricultural commodities, most of these do not reach people: 44 percent of crop calories are used up in inefficiencies of industrial meat production, 9 percent go to biofuels or non-food products, 15 percent are wasted in transport, storage, and processing and 8 percent are wasted in households. In total, 76 percent is wasted or diverted. If you go further to look at how much of the Chain’s production is actually nourishing people, the wasted percentage grows: by some estimates, one quarter of the food people eat is overconsumed. The Chain is not only wasteful, but also expensive: ETC Group’s research shows that if we include the environmental, social and health damages it causes, the Chain costs US\$ 12.37 trillion per year, and that for every US\$ 1 spent on industrial food, US\$ 2 in damages are incurred. Diversity is important for social and environmental resilience, especially under the weather and climate volatility of the future. Across crops, livestock and fisheries, the Web nurtures diversity while the Chain’s production model favours uniformity. Peasants, mostly women who do much of seed selection and breeding, have bred 2.1 million varieties of 7,000 crop species while the Chain has only 0.1 million seed varieties under monopoly control (56% of these are ornamentals). Commercial plant breeders work with only 137 species and 16 of them account for 86 percent of the world’s food production, and 45 percent of all private research and development (R&D) resources are spent on a one single crop - maize. The story looks the same for livestock and fish. Peasants have domesticated at least 34 species of livestock and nurture more than 8,700 rare breeds of those species, while the Chain mainly breeds five livestock species (cattle, poultry, pigs, sheep and goats) and fewer than 100 commercial breeds. This extreme genetic uniformity has caused the rise of zoonotic diseases, with 60 percent of all human infectious diseases transmitted through domesticated animals, such as avian flu. Peasants harvest 15,000 freshwater and 20,000 marine species while the Chain catches 1,600 marine species and

⁸ Prato (2017).

⁹ See ETC Group (2017).

farms 500 others, but 40 percent of the industrial marine catch is composed only of 23 species. Despite the availability of thousands of marine species, the Chain focuses its R&D efforts on 25 aquatic species.

Not only does the Chain ignore the importance of diversity in its own crop and livestock development, but its environmental and social harm is also degrading diversity for the rest of us. The Chain uses more than 75 percent of agricultural land, destroys 75 billion tonnes of topsoil annually and its use of pesticides threatens vital pollinators, friendly insects and soil microbes. Its control over agricultural and food policies translates into restrictive seed sharing laws that deny peasants the right to share and use their own seed diversity. The Chain is also responsible for the fact that 91 percent of ocean fish stocks are overexploited or at maximum exploitation, and there has been a 39 percent decline in marine populations and a staggering 76 percent drop in the harvest of freshwater species since the 1970s. About 25 percent of the Chain's marine catch, worth US\$ 10-24 billion annually, is illegal and unreported, and at least US\$ 50 billion is lost annually through fisheries mismanagement.

As a consequence of the massive decline in crop species and genetic diversity, there is a 5-40 percent decline in nutritional qualities of commercially-bred varieties depending on the species. Depletion of the world's fish stocks and dependence on a handful of commercial aquaculture species have serious nutritional repercussions on more than 3 billion people who get 20 percent of their protein from fish and seafood. Because of subsidies, the Chain produces more than is needed for healthy nutrition along with a lot of unhealthy food, significantly contributing to making 30 percent of the world obese or overweight—more than the number of hungry people.

In terms of climate impacts, the Chain is responsible for at least 90 percent of agriculture's fossil fuel use and greenhouse gas (GHG) emissions and for 3-5 percent of the world's annual natural gas supply in manufacturing synthetic fertilizers. The Web uses one ninth of the energy of the Chain per kilogram of rice, and one third per kilogram of maize. Agriculture accounts for 70 percent of the world's freshwater

withdrawals, and one third of aquifers are distressed – the Chain uses most of this in irrigation, livestock and processing. For example, Coca-Cola's water footprint from direct and indirect uses could meet the personal needs of 2 billion people. The agroecological and organic practices of rainwater storage and crop rotation used in the Web reduces irrigation needs by 50 percent and 20 percent respectively.

The social and human rights track records of the Web and the Chain are equally illuminating. Farming, fishing and pastoralism provide more than 2.6 billion livelihoods worldwide. The Web nurtures and celebrates different ways of knowing and understands this diversity as critical to agriculture and sustainability. The Chain's human rights violations range from displacing small farmers to exposing farm workers to health risks from harsh work environments, agricultural chemicals and farm machineries to displacing agricultural labour with drones and automated processes. The Chain is guilty of modern slavery on its plantations, and exploits close to 100 million child labourers, including on palm oil and sugarcane plantations in India and the Philippines and cocoa farms in West Africa. Violence against peasants and workers is escalating as people are being driven off their land and criminalized or killed for saving their seeds and feeding their families.

Proponents of industrialized agricultural systems often point to innovation as the Chain's trump card – without their hefty research and development budgets, how are we to find technological fixes for climate change? However, when peasants can share and exchange seeds and knowledge freely, they can actually adapt very quickly to diverse growing environments. For example, peasants in Papua New Guinea adapted sweet potatoes across 600 cultures and landscapes from mangroves to mountaintops in a century (impressively fast given that it occurred before modern transport and communication).

Given the Chain's inefficiencies and social and environmental harm, it is evident that it cannot scale-up to successfully nourish humanity and the planet. Turning to the Peasant Food Web is the safest option to address the intertwined challenges of identity,

livelihoods, health and ecology that food systems are urgently pressed to confront.

Agroecology and food sovereignty point to the paradigm shift to transform food systems

However important, shifting the centre of gravity of public policies and investments in favour of peasants is not enough to reorient food systems towards sustainability. It is increasingly recognized that a paradigm shift towards diversified agroecological systems is needed.¹⁰

Agroecology is based on a holistic approach and system-thinking. It has technical, social, economic, cultural, spiritual and political dimensions. It combines scientific ecological principles with centuries of peasant knowledge and experience and applies them to the design and management of holistic agroecosystems.¹¹ Its practices are locally adapted, and diversify farms and farming landscapes, increase biodiversity, nurture soil health, and stimulate interactions between different species, such that the farm provides for its own soil organic matter, pest regulation and weed control, without resort to external chemical inputs. Agroecology has consistently proven capable of sustainably increasing productivity, ensuring adequate nutrition through diverse diets and has far greater potential for fighting hunger and poverty.¹² Evidence is particularly strong on its ability to deliver strong and stable yields by building environmental and climate resilience.¹³

Importantly, food sovereignty and agroecology promote more localized food systems centred on the agency of local food producers, therefore offering a concrete alternative to the industrial food and agriculture system that is largely dominated by corporations.¹⁴ While agroecology draws on social, biological and agricultural sciences, peasants' knowledge, expe-

riences and practices are the bedrock of agroecology as a science. Agroecology techniques are therefore not delivered top-down as has been the mainstay of past agricultural technologies but are instead developed on the basis of peasants' knowledge and experimentation, and through farmer-researcher participatory approaches.

Agroecology is therefore not simply about changing agricultural practices and making them more sustainable, although this is important, it is also about creating fundamentally different farming landscapes and livelihoods, and radically reimagining food systems that are diversified, resilient, healthy, equitable and socially just. In this respect, agroecology is a science, a practice and a foundational vision for an inclusive, just and sustainable society.¹⁵

The challenges facing agriculture and food systems are generally perpetuated in vicious cycles that act to lock in the dominant industrial model through a series of powerful feedback loops extending beyond the world of farming: current incentives keep producers (and consumers) locked into the structures and logics of the unsustainable industrial model, while simultaneously locking out the reforms that are needed.¹⁶

The concentration of power, held in a few multinational corporations, reinforces the lock-ins within unsustainable food systems. The disproportionate power these corporations wield determines what we grow, where and how we grow it, what we buy, what we eat and how much we pay for it. Unprecedented consolidation is underway in the seed, agri-chemical, fertilizer, animal genetics and farm machinery industries, while ever-bigger players dominate the processing and retail sectors; a result of significant horizontal and vertical restructuring across food systems.¹⁷ Such high levels of concentration reinforce the industrial food and farming model, exacerbating its social and environmental effects and deepening existing power imbalances.

10 Declaration of Nyeleni 2007 (<https://nyeleni.org/IMG/pdf/DeclNyeleni-en.pdf>); IAASTD (2009); De Schutter (2010); UNCTAD (2013).

11 Gliessman (2014).

12 Altieri et al. (2012); UNCTAD (2013); FAO (2015).

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16 IPES-Food (2016).

17 IPES-Food (2017b).

Therefore, a systemic transition is needed that would realign the incentives, empowering peasants to step off the treadmill of industrial agriculture while allowing new food systems with new infrastructures and new sets of power relations to emerge. The key is to establish political priorities, namely: to support the development of alternative systems that are based around fundamentally different logics centred on agroecology, and which, over time, generate more equitable power relations. Governments have a key role to play and must ultimately shift all public support away from industrial production systems, while rewarding diversified agroecological systems and the array of positive outcomes they bring about. At the same time, the root causes of consolidation in the food system need to be addressed, including through anti-trust regulation and competition laws or policies (see Chapter 1).

Policy changes to support peasants in feeding the world

With the right policies, land rights and peasant-led agroecological strategies could double or even triple rural employment,¹⁸ substantially reduce the pressure for urban migration,¹⁹ significantly improve food availability and nutritional quality, and eliminate hunger while slashing agriculture's greenhouse gas emissions by more than 90 percent.²⁰ For the billions of peasants to continue feeding themselves and most of the world, institutional and policy barriers must be removed, and the following simultaneous action pathways adopted:

1. Strengthen the role of producers' organizations in policy-making and build inclusive, interdisciplinary, rights-based policy spaces with robust safeguards against conflicts of interest

18 FAO (2013).

19 Assuming the projected migration increase does not happen because many peasants take advantage of new opportunities and return to farming.

20 ETC Group's projections are based on its understanding of the capacity of peasants to respond to positive incentives and the removal of barriers.

First, it is essential that public policies and programmes that have a bearing on the food, health and ecology nexus be defined with the structured and effective participation of smallholder producers' organizations, as the primary contributors to food security, and other rights-holder groups comprised of all those most affected by the related development challenges. This requires the full recognition of social movements and producers' organizations as the key governmental interlocutors in such policy processes as well as adequate public initiatives that facilitate their strengthening and capacity building. It is equally essential to re-articulate public spaces to ensure *ex-ante* interdisciplinary analysis and policy design, rather than *ex-post* coordination between food, health, environmental and other relevant policies. Finally, but most importantly, these institutions need to be firmly centred in the human rights framework, including the right to adequate food and nutrition, and protected by robust safeguards against conflicts of interest, in terms of integrity of the policy process, trustworthiness of the knowledge-base and adequate public financing.

2. Ensure agrarian reform, including the right to territories (land, water, forests, fishing, foraging, hunting)

Recognizing the rights of peasants, smallholders, fisherfolk, pastoralists and indigenous peoples to land and other productive resources is a fundamental pillar for ensuring that they will continue feeding themselves, their families and most of the world. Agrarian reform has reduced poverty and increased the per capita income of beneficiaries in many countries,²¹ and brought positive impacts on health status, educational attainment and overall economic development.²² The recognition of rights of indigenous peoples to their ancestral domain is a precondition for them to sustain agroecological practices. Aquatic reforms that benefit, give social protection and recognize the fishing rights of artisanal fishers and fisherfolk should be adopted. Recognition of rights to productive resources should be complemented by comprehensive support and social services to

21 Reyes (2002).

22 Balisacan (2007).

peasants with priorities determined by them. A UN declaration on the rights of peasants being discussed in a working group of the UN Human Rights Council,²³ may provide an excellent stepping stone in this direction, building on the normative rights-based framework offered by the *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the context of national food security* endorsed by the Committee on World Food Security (see Spotlight on SDG 2).²⁴

3. Restore the right to freely save, plant, exchange, sell and breed seeds and livestock and remove regulations blocking local markets and diversity

The exchange, sharing and saving of seeds and breeds among peasants and farming communities across generations is the foundation of the vast genetic diversity of crops and livestock that serve as basis for global agriculture, food and nutrition. Proprietary rights on seeds through patents and plant variety protection/plant breeders' rights impede peasants' free access to genetic materials that they need to produce food. The rights of peasants to freely save, plant, exchange, breed and sell seeds and livestock should be respected and all legal and institutional impediments to exercising such rights should be removed. The standardization of regional and global seed regulations marginalizes peasant seeds and breeds and adversely affects inter-community exchanges and sharing of genetic materials. Seed certification based on commercial standard of distinctiveness, uniformity and stability (or DUS) blocks peasants' seeds from local markets, eliminates opportunities for additional income and inhibits on-farm innovation on genetic resources. Seed regulations and standards should be reviewed and those that are inherently biased against peasants' seeds and breeds must be removed to encourage the growth of local markets, encourage on-farm innovation, support informal seed supply systems and promote diversity.

4. Focus public policies and investments on strengthening territorial markets²⁵

Territorial markets are the core of domestic food systems. These 'invisible' markets may be informal, formal, or somewhere in between, but are those through which most food transits; however, they have been largely ignored by public policies and investments. These markets are inclusive and diversified, and perform multiple economic, social, cultural and ecological functions within their territories, starting with but not limited to food provision. They contribute to structuring the territorial economy since they enable a greater share of the wealth created to be retained, redistributed, and returned to farm-level and local economies. They include embedded governance systems and offer the locus where political, social and cultural relations unfold, and where all people involved interact according to varying degrees of interdependence and solidarity.

It is urgent that governments employ public policy and investment to support these markets, both by strengthening them where they already exist and by establishing new spaces where they can take root and flourish. CFS's policy recommendations on 'Connecting Smallholders to Markets' provide an important stepping stone in this direction by addressing pricing policies, public procurements, dietary guidelines to promote fresh local products and maintain the connection between consumers and the source of food production, safety regulations adapted to be appropriate for different scales, contexts and modes of production and marketing, and appropriate credit and infrastructure, among others. The recommendations particularly highlighted the key role that governments can play by ensuring that public procurement of food and agricultural products is from agroecological and local sources. The purchase of agroecologically produced food for school canteens, hospitals and other public institutions would help to ensure ready sales outlets for peasants, while providing fresh, nutritious and diverse food.

23 See: www.ohchr.org/EN/HRBodies/HRC/RuralAreas/Pages/WGRuralAreasIndex.aspx

24 CFS (2012).

25 This paragraph builds on the report by the CFS Civil Society Mechanism (2016).

It is essential to build on these recommendations and develop coherent policy and investment frameworks at national and regional levels.

5. Reorient public research and development to build on the agency of peasants and respond to their needs

As publicly funded institutions that are closest to the realities of peasants, national agricultural research centres need to be reoriented to support and respond to the requirements and priorities of peasants. However, it is essential that agroecological innovations have been developed *in situ* with the participation of farmers in a farmer-to-farmer or horizontal (rather than top-down) manner. Peasants are therefore not merely producers of food or recipients of technology, but rather innovators and co-creators of knowledge. It is such horizontal exchange of ideas and innovations among farmers and with social movements that has facilitated the spread of agroecology and should be supported by governments, civil society, donors and researchers. At the same time, the direct involvement of peasants in the formulation of the research agenda and their active participation in the process of technological innovation and dissemination is key. Farmers should be integrated into research and development systems, given tools to do their own on-farm research, and their capacity to share their knowledge with other farmers in farmer-to-farmer networks strengthened. Research priorities need to be identified in a participatory manner, enabling farmers to play a central role in defining strategic priorities for agricultural research.

6. Institute fair and just trade rules, determined by peasant-led policies

The current global trade rules, embodied in unilateral trade policies and more so in bilateral, plurilateral or in multilateral trade and investment agreements, generally favour the industrial food chain and the big corporations through subsidies, standards and regulations that are biased against peasant-led agroecology. In the name of providing access to cheap food to consumers, these regulations attempt to dismantle – both through the World Trade Organization (WTO) and more aggressively through Free-Trade Agreements (FTAs) – import duties that are critical to

protect domestic agricultural production and peasant livelihoods, especially in developing countries. At the same time, inequitable, unfair and irrational WTO rules on agricultural subsidies persist, allowing developed economies to subsidize agribusiness while preventing developing countries from supporting their peasant and agriculture sector. While the recent US threats to WTO as a multilateral platform are worrying, the current multilateral trading systems can only be supported if it reforms itself to bring in agricultural trade rules that ensure equity and benefits for developing countries and their peasants. Therefore, the WTO reform agenda needs to move towards the complete opposite of what the current US Administration wants, which ultimately is more unilateral benefits for itself and its big business. Moreover, trade can only be fair and just if the rules are determined by peasant-oriented paradigms and peasant-led policies. The active participation of peasants in developing trade policies should therefore become integral to the decision-making process.

7. Establish fair wages and working conditions for food and agricultural workers, also tackling gender discrimination

Agricultural workers represent the backbone of the global food production system and yet are the least unionized, have the least access to social security and protection, they are the most socially vulnerable, and employed under the poorest health, safety and environmental conditions.²⁶ Many receive wages that are below the national minimum rate and are often inadequate to ensure decent living conditions for them and their families. Some are even paid in kind or on piece-rate based on productivity. They constitute about 40 percent of the total agricultural workforce and yet are largely invisible in policies and programmes that are targeted at farmers whose conditions and circumstances are different. Their jobs are the most precarious with the introduction of automation, robotics and drones in industrial plantations and commercial farms. Food workers in downstream industries in the industrial food chain such as hotels and restaurants face a similar pre-

²⁶ Hurst (2007).

dicament. Among them, women tend to be further discriminated against and often engaged in work that is even more insecure, hazardous, poorly paid and vulnerable to sexual exploitation. The provision of fair wages, decent working conditions and social protection for food and agricultural workers is a key component of any strategy to support peasant-led agroecology.

8. Re-affirm and fulfill women's rights while pursuing gender equality²⁷

Despite their essential and central role, women are largely invisible in agriculture and often not recognized as 'farmers' – by their families, male farmers, local communities or the State. Women and girls face widespread gender discrimination, violence, sexual exploitation and social, cultural and legal constraints, and are routinely marginalized in terms of control over resources, access to social services and employment opportunities. Women are especially burdened by the amount of unpaid care work they complete: Women living in rural areas work up to 10 hours a day caring for family and community members. Although they make up on average 43 percent of the agricultural labour force in developing countries, they are also marginalized from decision-making spheres at all levels – including the household, local communities and national parliaments. It therefore essential for governments to prioritize the implementation of the UN Committee on the Elimination of Discrimination Against Women (CEDAW) General Recommendation 34 (2016) on the rights of women living in rural areas and further advance the fulfilment of women's rights and the pursuit of gender equality.

9. Reclaim healthy and sustainable diets as public goods²⁸

Consumers, regarded as citizens holding rights rather than market agents with purchasing power, have a right to healthy, affordable and accessible food

options, and to be protected (particularly children) from aggressive marketing of unhealthy food and beverages that promote diet-related non-communicable diseases (NCDs), as well as from equally aggressive marketing of breast milk substitutes. Ultra-processed food and beverage products which are affordably priced and ubiquitously promoted need to be regulated through economic and legislative measures (see Spotlight on SDG 12). Fiscal policies should include those that foster and facilitate access to healthy, fresh and locally produced foods, such as fruits, vegetables and legumes, reinforcing the nexus between the rights of consumers and those of small-scale local food producers. Furthermore, awareness of the critical importance of breastfeeding as one of the most cost-effective interventions to reduce child illness and death needs to be raised as does that of the role of healthy diets in the prevention of NCDs.

10. Recognizing the centrality of citizens' action and promote food democracy

Nonetheless, policy processes may remain constrained, in that the changes needed do not move far or fast enough. As such, there also needs to be a rethinking of how food policy is made, to be more inclusive and to encourage people to re-engage with the politics of food. In other words, there is a need for people to change their relationship to food systems more fundamentally; to shift from being consumers to being citizens.²⁹ Examples of bottom-up citizen-led initiatives are evident worldwide, and this includes community-supported agriculture, which allows people to support local farmers by entering into direct producer-to-consumer marketing schemes, cooperative marketing and purchasing structures and local exchange schemes (e.g., via community and school vegetable gardens) and fair trade schemes. As citizens start to actively shape what the future of their food and agriculture systems looks like, they reassert themselves as legitimate players in the policies that determine the food they eat; this is food democracy. Specific bodies, such as food policy councils, established at various levels from local or municipal to national level, can provide a platform at which var-

²⁷ This section is drawn from Wijeratna (2018).

²⁸ Inspired by the Civil Society Nutrition Group's Vision Statement on Nutrition, delivered at the Second International Conference on Nutrition, Rome, Italy, November 2014.

²⁹ De Schutter (2017).

ious stakeholders come together to analyse the food systems on which they depend and develop proposals for reform. There are examples of such food policy councils prevalent in the USA and Canada since the 1980s, and more recently in the UK and other parts of Europe. They have also been institutionalized in a number of Latin American countries, particularly in Brazil.

Emerging obstacles to system change: the dematerialization, digitalization and financialization of food systems

Unfortunately, technology is making matters worse as the required paradigm shift points at the opposite direction than the powerful technological drivers of change currently at play. Three intertwined dynamics – dematerialization, digitalization and financialization - are profoundly changing the nature of both tradable goods and the markets where these are exchanged.³⁰

The **dematerialization** of food refers to a process that promotes a decrease in the physical substance of food and an increase in the market value of its immaterial dimensions. This happens at two levels. The first one relates to the value share of physical substance within the composition of food price. Traditionally, this was influenced by the significant farm-to-retail price spreads, meaning the difference between the retail price and farm value of a given food product, generated by the material and immaterial costs that contribute to defining the price of food, including transport, logistics and distribution costs. Increasingly the share of immaterial dimensions is becoming larger than the actual value of food, from the cost of advertising, financial remunerations to investors, skyrocketing profits of large distribution channels and sophisticated attempts to use food purchases to gather information on consumers. The second dimension of dematerialization is related to fashion and taste, where aggressive marketing and new food fashions are generating an immaterial notion of food that is often unrelated to its physical qualities. This

means that we can buy egg-like-products that do not actually contain eggs. Some of these trends are sometimes promoted by ill-framed health concerns, whereby the focus, even assuming the health concern is legitimate, is placed on retaining the consumption of an artificially reproduced taste rather promoting healthy and sustainable diets. Some might argue that food always included immaterial dimensions, such as identities, cultures and traditions as well as, more broadly the joy of consuming a delicious meal. The difference here is the emerging shift from these socio-cultural, and inherently public, immaterial dimensions of food to market-valued, and therefore inherently private and tradeable, components (information on consumer choice, advertising, financial remuneration to brokers and retailers). The paradox is the market ‘choice’ of foods whose acceptability and price are fundamentally de-linked from physical production and whose taste mimics something that in fact might not even be there.

The **digitalization** of food refers to an increasingly automated, delocalized and informatized process of food production and commercialization. This starts at the level of agricultural inputs, with ongoing efforts to advance bioinformatic infrastructures that are transforming seeds and other plant genetic material into digitalized objects. Paradoxically, while this process might have been initiated by scientists genuinely concerned with safeguarding biodiversity by creating virtual genetic material which might be transplanted to future territories, it has now been captured by global corporations aiming to patent nature and acquire control of the production process by controlling the market in agricultural inputs. This means that plant and breed varieties are now circulating around the globe in the form of (patented) genetic data while the physical exchange of real seeds is even made illegal in some countries.

At the level of production, advancements in automation and robotics, drone technologies and remote-control devices have all rendered possible the extreme de-localization of unmanned agricultural activities, for example though remote-controlled robotic solutions to greenhouse automations. e-commerce and service related apps for mobile devices are reshaping the retail and food service industry by allowing cus-

³⁰ This section draws on the opening chapter of the Right to Food and Nutrition Watch 2018 (forthcoming).

tomers to place online orders with physical groceries, online retailers and restaurants for home delivery. New applications are beginning to flourish that enable customers to scan the barcode of the product they want to reorder, place orders through microphones embedded in their mobile phones, or simply click the button of small devices associated with specific food products, maybe even embedded by manufacturers in the hardware of kitchen appliances, and have products seamlessly delivered to their doors. The concept of the marketplace as a physical location where people gather for the sale and purchase of goods, with all its colours, traditions, knowledge, negotiations and transactions, is increasing regarded by today's homogenizing version of modernity as a reminiscence of an archaic past.

The **financialization** of food refers to the increasing role played by financial markets within food systems. This plays out at two main levels. The first is the significant growth in the sale and purchase of financial products linked to food commodities, with the consequence of agricultural commodity futures markets replacing real economy determinants as the main drivers of food prices and their volatility. The second is related to the transformation of agricultural resources, mostly land but increasingly patents on genetic resources and infrastructures, into financial assets that can be subjects of acquisitions and resales in financial centres that are often completely delocalized from their physical locations and completely independent of their actual use. Indeed, the financialization of land facilitated land-grabbing by (foreign) investors in manners that are often completely independent from agricultural production.

These intertwined dynamics have shifted decision-making power away from physical production systems in favour of often-unknown financial actors that are primarily interested in upstream operations rather than actual agricultural activities. They therefore promoted grabbing of resources, upscaling of production, increasing delocalization of production from distribution and marketing, and the growth of intermediaries as the key point of aggregation in the food chain. Not only has this increased the distance between producers and consumers and facilitated the dispossession of communities of their land and

other resources, it also undermines the effective decision-making power of local and national public spaces. These vicious processes have been largely facilitated by market liberalization measures promoted by global financial institutions. A perfect example is the numerous Investor-state dispute settlement (ISDS) mechanisms embodied in bilateral and plurilateral trade agreements that de-facto limit States' capacity to regulate in the public interest and comply with their duty-bearer obligations to respect, protect and fulfil human rights.

The combined effect of these dynamics creates complex obstacles and deeply rooted political economies that may impede the paradigm shift towards agroecology. Not only do these processes contribute to the dispossession of peasant knowledge and their secure access to resources, but, by widening the gap between producers and consumers, they facilitate the concentration of economic and political power into the hands of a new set of remote actors that master information and financial means. This reframes class struggle away from the traditional tension between labour and the ownership of physical capital as the new masters of extreme inequalities do not engage in the real economy but rather in the immaterial realm of finance and information, completely by-passing democratic accountability.

This *cul de sac* imposes a reflection on science and its accountability to peoples and their communities. It is imperative to place science at the service of our human, social and ecological challenges, and this requires much more extensive *ex-ante* assessment of which research needs to be undertaken and how to ensure that knowledge so generated remains a public good rather than a source of citizens' manipulation and dispossession. This means finding new ways to subject the direction of future research to public scrutiny and democratic accountability.

The real SDG challenge is to realign the production model with sustainable development

Some of the conclusions outlined in this chapter point at fundamental dynamics that can be generalized beyond the food domain. Indeed, an unsustainable production model is at the core of many of the

challenges to which the SDGs respond. From a narrow profit perspective, it is not surprising that the maximizing returns equation led business to overuse under-priced and often untaxed natural resources and minimize the input of labour, often made relatively more expensive by the employment-linked approach to taxation and social security provisions. The relative cost of the factors of production also led technological innovation to focus on labour substitution and production localization strategies to ride on cheap labour sites, often penalizing workers' rights and conditions. The onset of robotics and artificial intelligence is exacerbating the production and distribution conundrum.

Another dimension of the unsustainability of the production model relates to the profound externalities it generates, for instance in environmental and health terms. As mentioned, for every US\$ 1 consumers pay for industrial food, society needs to bear US\$ 2 of related health and environmental costs. At the same time, corporate taxation continues to fall short of compensating societies for these negative externalities also thanks to the combined effect of deregulation, liberalization and detaxation of capital as well as the smart corporate tax dodging strategies that exploit the loopholes of national tax regimes and concentrate profits within favourable jurisdiction and tax havens. In a nutshell, high profits often correspond to significant socialization of risks and costs on societies.

The challenging dimension of this situation is the fact that, in most cases, this is perfectly legal. Indeed, the gap between what is legally possible and what is sustainable has never been so large. Trapped by resource scarcity and deep political economies, many governments became extremely reluctant to apply policy and legal levers towards market regulation. Liberalization and deregulation allowed a process of unprecedented economic power concentration, leading to the paradox of the market the State wanted to enhance almost disappearing in some sectors.

As exemplified by the needed transformation of food systems, the real challenge of the sustainable development agenda is therefore a policy one: the urgent need for a paradigm shift in the current unus-

tainable production model. This is a cross-cutting issue which rarely surfaces in the re-emerging silos created by the SDG fragmentation despite the rhetoric of integration of the 2030 Agenda. Furthermore, policy debates are often dominated by a reassuring technological euphoria that generates illusions of comfort zones where science is expected to walk in with solutions that allow the challenging necessity for production and consumption readjustments to simply go away. And lastly, the call by the World Bank and others to unlock trillions of dollars of private resources to ensure the implementation of the SDGs evokes the idea that we could address these problems by throwing money at them.

The harsh reality is that, while technology and resources can definitely help, the fundamental challenge is one of devising policies and regulations that progressively but unambiguously reorient the production model and realign it with the imperatives of sustainable development. In a globally integrated economy, no single country can advance such a process in isolation and a concerted global effort is required. The notion that such process can happen through the enlightened self-interest of corporations devising voluntary guidelines is nothing else than a fairy tale – one that reflects the abdication of political responsibility by the State as well as the capture of the State apparatus by powerful economic elites.

Some may consider all this to be fairly utopian in today's geopolitical context, also given the attempts by some administrations to further inject high dosages of steroids into the already hyper pattern of economic globalization. But this is precisely the challenge of the 2030 Agenda: to restore the primacy of people and planet over our economies and find a new balance across all dimensions of sustainable development. This cannot happen if the production model rests unchanged. But this also requires the redesign, or creation, of legitimate institutional policy spaces that can address the common roots of the different development challenges, rather than continuing to treat the symptoms of the problems in well-established silos.

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