Resilience and the Transformation of Food and Land Use Systems

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Abstract: The transformation of food and land use systems has been recognized in its central importance of attaining sustainable development paths. Recent shocks and crises events, such as the COVID-19 pandemic, the Ukraine war and protracted conflicts, weather and climate extremes, have revealed the vulnerabilities of the current food and land use systems architecture. To secure long-term development gains, the resilience of food and land use systems needs to be strengthened. Reflecting on the evolution of resilience concepts, we argue that resilience building efforts must be seen as an integral part of sustainability transformations of food and land use systems. Resilience should not be understood as a static but as a dynamic, iterative process, which combines elements of absorptive, coping, adaptive and transformative capacities and is evaluated over time in its effectiveness to ensure continuous functionality of food and land use systems in times of rapid change. Here we offer a number of considerations for building resilience into food and land use systems in a dynamic world.

Contents

1. Introduction 3

2. Resilience thinking 4

2.1. Resilience of ecological and social-ecological systems 4

2.2. Policy contexts 5

3. Why our food and land use systems need to be resilient 6

4. Embedding resilience into food and land use systems transformations 8

4.1. Clarify the purpose of resilience thinking 9

4.2. Ensure a holistic focus 9

4.3. Consider the interplay between efficiency, redundancy, and diversity 10

4.4. Apply a dynamic and iterative approach to building resilience 10

5. Measuring and gauging progress 13

6. Concluding Remarks 13

References 14

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1. **Introduction**

Meeting basic human needs and advancing welfare for a growing world population while averting global ecological crisis will require deep transformation of human systems. The Sustainable Development Goals (SDGs) provide benchmarks for an ambitious global agenda, seeking to capture the social, economic, and environmental dimensions of development in an integrated and indivisible manner (UN 2015a). Building on the Millennium Goals (MDGs), the SDGs were formulated in 2015 with great optimism and ambition against a backdrop of sustained progress towards alleviating poverty and hunger. In the same year, the Paris Agreement committed the international community to limiting global warming to well below 2 °C and to pursue efforts to constrain warming to 1.5 °C above pre-industrial levels (UN 2015b).

Since 2015, the challenges in realising the SDGs have increasingly come to light. Several assessments have highlighted the potential trade-offs embedded in the SDGs (ISC 2017). Assessments illustrate that progress towards the SDGs has been uneven within and across countries. The rate of progress towards eliminating poverty and hunger has slowed and both the prevalence of hunger and poverty have even begun to increase in recent years (UN 2021). The state of the environment continues to deteriorate, as evident in the continuous rise of global greenhouse gas (GHG) emissions, ongoing loss of biodiversity and ecosystem destruction, and pervasive levels of pollution (GEO 2019; IPCC 2022). This has led to renewed calls from the scientific community for the urgent transformation of human systems (TWI2050 2018; Sachs et al. 2019).

Sitting squarely at the interface of human and natural systems, the transformation of food and land use systems will play a central role in putting humanity on a sustainable path. The Food and Land Use Coalition (FOLU) has outlined ten critical transitions needed to deliver on food security, healthier diets, inclusive and resilient rural economies, while addressing climate change and biodiversity (FOLU 2019). If this action agenda can be realised, it could yield an annual societal return estimated at USD 5.7 trillion by 2030. This is more than 15 times the annual additional investment costs required of USD 300-350 billion. It could also create new business opportunities worth up to USD 4.5 trillion per year (FOLU 2019). Research initiatives are underway which explore how national interests can be reconciled with global sustainability constraints (e.g. FABLE 2020).

In 2020, the fragility of our development model was further revealed by COVID-19, which rapidly developed from a local to a global shock. The global health crisis also quickly became a social and economic crisis, illustrating the interdependencies of societies, human and natural systems. With the pandemic still ongoing at the time of writing (in 2022), it is clear that the social and economic recovery pose major challenges in the joint pursuit of a more sustainable and just world. The drop in greenhouse gas emissions observed in the preceding year due to the pandemic have rapidly rebounded and reached new record highs in 2021 (IMF 2022 a), while funding levels – despite some promising commitments – have been found inadequate overall for catalyzing sustainability transformations (O'Callaghan and Murdock 2021). The onset of the war in Ukraine in March 2022 has caused profound human suffering in the region, whilst also further constraining the economic recovery from the pandemic (IMF 2022 b). Acute food insecurity is on the rise in light of conflicts, compounding impacts of climate extremes, economic downturns, and many low-income countries in particular being dependent on food imports from Ukraine and Russia (WFP and FAO 2022). The food price index reached record highs in 2022 (FAO 2022), while the IMF has revised growth projections downward and highlighted the concern that the unfolding geopolitical crisis triggered by the war threatens the stability of our international political and economic system (IMF 2022 b).

Meanwhile, a growing number of weather and climate extremes in recent years can clearly be attributed to climate change,[1] further exacerbating vulnerabilities and compounding the impacts of the recent shocks and crises.

Against this backdrop, we urgently need to strengthen risk anticipation and management capacities to secure development gains. While the confluence of shocks has further focused attention on the need to build resilience into development processes, there are diverse applications of what this means and how this aligns with the demand for sustainability transformations. Food and land use systems will need to respond to the immediate crisis events, but must not lose sight of the long-term sustainability challenges. This paper seeks to offer a perspective on resilience thinking, with a particular focus on food and land use systems. It begins with a brief reflection on the evolution of the concept and the shifting food and land use systems risk landscape, before arriving at a set of guiding principles for defining and tracking resilience in the context of food and land use systems in an increasingly dynamic world.

2. Resilience thinking

Resilience is an amorphous concept which has its roots in multiple disciplines. Variations of the concept have been applied in human health, psychology, natural and environmental sciences, engineering, economic and social sciences (e.g. Berkes and Ross 2013; Luthar 2006; Norris et al. 2008; Welsh 2014; Gunderson and Folke 2005; Hallegate 2014). Recent crisis events have given resilience further prominence, but interpretations vary of what it actually means and how it relates to sustainability concerns. While this has led to widespread recognition of resilience as a term, the lack of a single definition or interpretation poses challenges to policy formulation and implementation, as underlying assumptions may not be sufficiently clarified.

2.1. Resilience of ecological and social-ecological systems

Situated at the interface of human and natural systems, the evolving understanding of ecological and socio-ecological resilience concepts is of particular relevance to food and land use systems. Discussing the resilience of ecological systems, Holling (1973) emphasised the importance of the capacity to persist and recover in the face of the shocks. Focusing on models of species interactions, he highlighted that resilience is essentially about survival. He contrasts this with an understanding of resilience as a notion of stability, i.e. the ability to maintain or return to an equilibrium, whereas ecological resilience might embody considerable fluctuation and shifts between domains (Holling 1973). This interpretation differs from engineering perspectives on resilience, where stability is aligned with the aim to minimise oscillations around the general mean state of the system, ensuring its consistent functioning. According to Holling (1996), the fundamental difference between ecological

[1] See https://www.worldweatherattribution.org/ for an overview of climate extremes and their attribution to climate change.

and engineering resilience is that the former is focused on securing the existence of function, while the latter is about maintaining the efficiency of function.

From a human perspective a key concern is ensuring that natural systems deliver the ecosystem goods and services upon which humanity depends. As this perspective is driven by a stability focus, its objective may not necessarily be aligned with the more dynamic, fluctuating characteristics of some ecological systems, which should be accommodated in management considerations (Holling 1973).

With human activities altering natural systems across a variety of spatial and temporal scales, and in return being affected by them, resilience research is increasingly targeting these inter-dependencies. This is reflected in a broadening of resilience concepts, with a key initial concern being the ability of socio-ecological systems to recover their functions after a shock (Walker 2004). Accounting for the dynamic and complex risk landscape confronting many systems, it has become clear that resilience building may require a spectrum of measures, ranging from interventions focused on the stability of a given system by strengthening its coping capacities, to efforts aimed at changing the flexibility and overall characteristics of the system by strengthening its adaptive and/or transformative capacities. The persistence and adaptability of a socio-ecological system in the face of disturbance will determine its capacity to stay within a given stability domain, while transformation will shift a system to a new stability domain, which may be guided by resilience considerations (Folke et al. 2010). Hence resilience must be built across a continuum that pays attention to absorptive, adaptive, and transformative capacity (Tanner et al. 2017).

2.2. Policy contexts

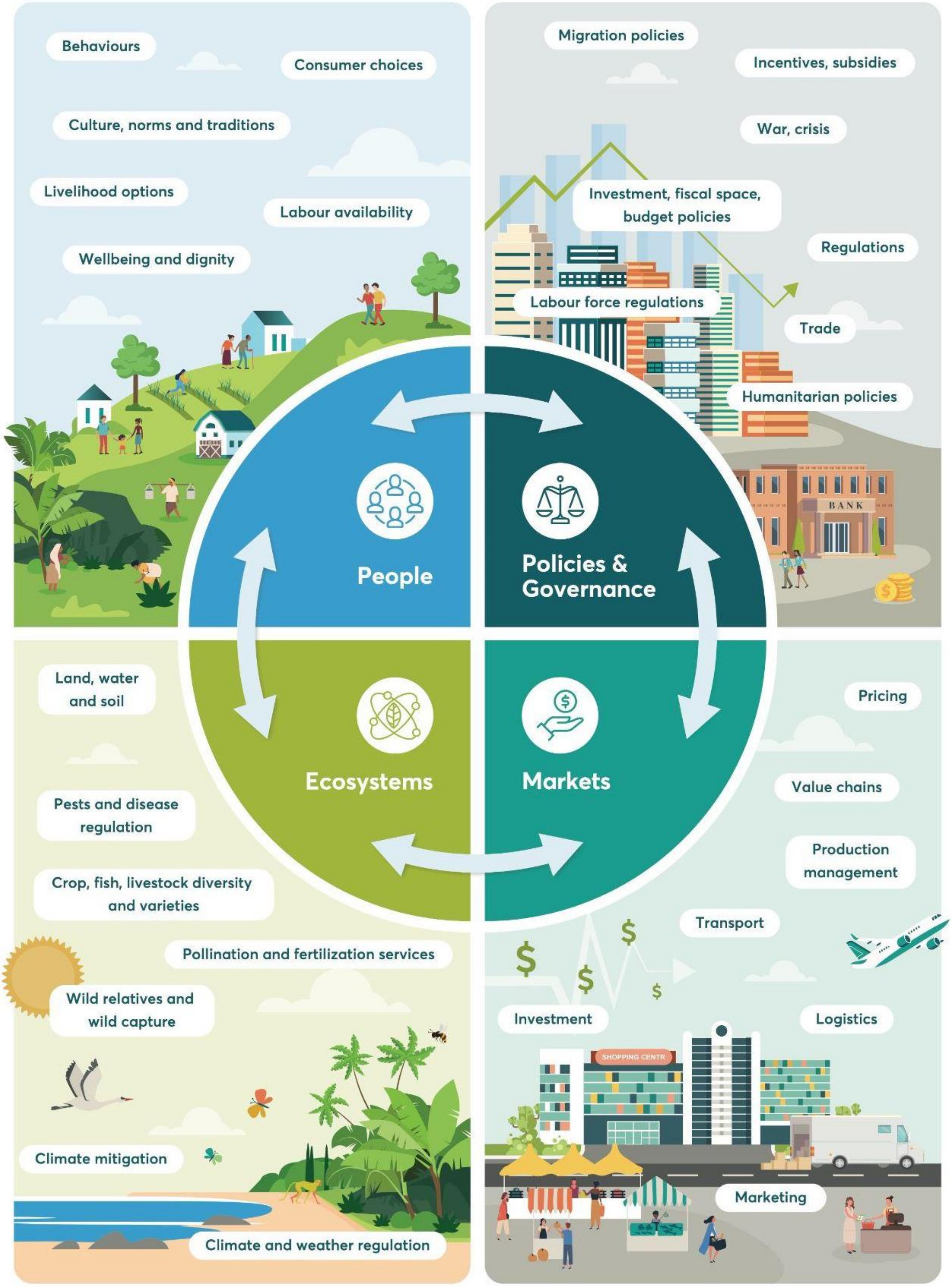
Resilience concepts have found growing attention in areas where shocks, vulnerabilities and risks are critical, such as disaster risk mitigation (Klein et al. 2003, Grafton and Little 2017) and climate change adaptation (Pelling and Manuel-Navarrete 2011). With an increasing emphasis on a more cyclical approach to managing disasters, the United Nations Office for Disaster Risk Reduction (UNDRR, formerly UNISDR) has developed approaches aimed at disaster prevention and vulnerability reduction. Resilience has featured increasingly prominently in relevant policy frameworks, such as the Hyogo Framework for Action from 2005 and 2015 (HFA) and subsequently the Sendai Framework for Disaster Risk Reduction 2015-2030. With converging agendas on vulnerability reduction, there was an opportunity to strengthen conceptual and operational linkages between disaster risk reduction and climate change adaptation efforts (Sperling and Szekely, 2005). Resilience has increasingly entered the debate within the United Nations Framework Convention on Climate Change (UNFCCC), featuring alongside adaptation in the Paris Agreement (UN 2015) and reflecting the emphasis on improving the comprehensive management of the risks arising from climate change. Resilience considerations are also integrated into Agenda 2030, featuring in several of the Sustainable Development Goals (SDGs), thereby expanding the international policy attention on resilience beyond disaster and climate risk management to include the social, economic and environmental dimensions of development (UN 2015b). The United Nations Food Systems Summit (UNFSS), held in 2021, established a specific action track on resilience, further elevating the issue within the context of food and land use.

3. Why our food and land use systems need to be resilient

The current confluence of international crisis events and compounding local and regional shocks have illustrated the diverse characteristics and origination of risks that food and land use systems are exposed to. The pandemic, Ukraine war and recent climatic extremes reveal the risks, and the complexity and inter-dependencies embedded in our food and land use systems, where local shocks can quickly evolve into regional and global crisis situations with cascading effects and unforeseen outcomes at all levels.

Food and land use system outcomes should fulfil goals towards food security, environmental security, and social welfare goals (Ericksen 2007). The Food and Land Use Coalition's definition of "food and land use systems" covers every factor in the ways land is used and food (including from marine and freshwater aquatic systems) is produced, stored, packed, processed, traded, distributed, marketed, consumed and disposed of. It embraces the social, political, economic and environmental systems that influence and are influenced by those activities. Their definition also includes agriculture for non-food purposes, such as bioenergy, fibres for textiles and plantation forestry products, as these already compete with food for fertile land and the competition could intensify in the future (FOLU, 2019). The interdependencies within and between bio-physical and human interactions need to be considered in how they influence risks, vulnerabilities and the propagation of shocks across the components of food and land use systems (Fig 1).

Figure 1: Factors influencing the resilience of food and land use systems



Global socioeconomic and environmental changes alongside the globalisation of food and land use systems also mean that these systems need to navigate a shifting risk landscape, where the past is no longer an adequate guide for the future. Several trends shaping the architecture of food and land use systems today are modifying the systems' vulnerabilities.

Efficiency and labour considerations have promoted in many instances the homogenization of food and land use systems. This has resulted in a decline of agro-biodiversity at species and genetic level. For example, while there is a great variety of edible plant species, it is estimated that over 60 percent of caloric supply is supplied by four crops: wheat, rice, corn and potatoes (FAO). While the homogenization of our food and land use systems may work at a time when conditions are stable, but the loss of livestock and plant traits in food and land use systems becomes a source of vulnerability in a world undergoing profound environmental, socio-economic, and demographic changes (e.g. Dasgupta 2021).

The progressive globalisation of food and land use systems has led to inter-dependencies and increased the complexity of supply chains. Trade is now critical for the functioning of these systems in many countries, as it allows the distribution of food from regions of surplus production to areas which cannot produce sufficient food or where food production is highly variable. Over the long-term trade may be an important buffer against the impacts of climate change on agricultural productivity in some regions (Janssens et al. 2020). However, countries' growing dependency on food imports may also create new vulnerabilities when these dependencies leave few alternatives. For example, the loss of food exports of wheat and other grains from Ukraine and Russia directly threatened the food security of several least developed countries, particularly in Africa (FAO 2022). Trade therefore modulates risk exposure, i.e. it can either reduce or increase risks, or introduce new risks. Consequently, the quality of food trade has to be considered in terms of its implications for social, human and natural capital and associated vulnerabilities over time.

Food and land use systems drive environmental change, while also being vulnerable to environmental impacts arising from such change. Food and land use systems are major sources of emissions and pollution and also drivers of biodiversity loss and land degradation, as summarised in various assessments of the IPCC, IPBES and GEO. Loss of biodiversity and habitat degradation in conjunction with an increasing number and concentration of livestock, have exacerbated the risk of disease spillovers from livestock to domestic animals and humans (Johnson et al. 2020), increasing the likelihood of epidemics and pandemics.

In sum, food and land use systems need to be prepared for managing biophysical (climate, environmental), socioeconomic and political (price shocks, trade wars, conflict) and technological risks (e.g. loss of key infrastructure), which may play out over different spatial and temporal scales and interact in complex ways.

4. Embedding resilience into food and land use systems transformations

Despite the urgency of addressing current crisis events, recovery efforts should go beyond restoring systems to also seize on opportunities for improving adaptation and transformation. With global change processes altering hazard exposure and vulnerabilities over time, resilience building efforts should be forward looking and understand the dynamic environment in which they operate. This particularly applies to food and land use systems if we are serious about achieving the SDGs. Resilience building and transformation must go hand in hand. The following principles are designed to help guide this process, while Table 1 presents a selection of questions for further discussion and exploration.

4.1. Clarify the purpose of resilience thinking

Resilience should not be the end goal in itself; instead, it should be considered as an important supporting element of broader sustainability objectives. Resilience measures should be qualified in their alignment with the SDGs, e.g. the extent to which they are likely to support equity and justice or contribute to the protection and restoration of environmental goods and services. Hence, the purpose of resilience measures and who benefits from them needs to be carefully evaluated. Otherwise, it is conceivable that resilience measures could reinforce power structures, contribute to inequity, or promote structures that support the exploitation of natural resources and thereby are in conflict with the need to advance sustainability transformations. The interplay of resilience concerns across scales should also be considered, as resilience building at one level (e.g. national) may create trade-offs or synergies at another (e.g. community).

4.2. Ensure a holistic focus

Resilience efforts should take a multi-hazard focus (environmental, social, economic, technical). Folke and colleagues (2010) differentiate between a specific resilience and general resilience focus. Under particular circumstances, emphasis on strengthening a particular type of shock may be warranted. However with food and land use systems sitting at the nexus of human and natural systems and involving activities operating across a range of spatial and temporal scales, a holistic awareness of the wider risk envelope will be important.

The potential for trade-offs between resilience building efforts across spatial and temporal scales, within and across systems, means that efforts aimed at strengthening the resilience of food and land use systems should consider impact pathways across the system (production to consumer etc.) to identify and address the most vulnerable elements. Hochrainer-Stiegler et al. (2020) suggest an integrative approach, which first considers possible resilience building measures to individual risks, and then assessing and possibly adjusting the response when considering the measures again in a systemic risk context.

In a contribution to the UNFSS, Hertel and colleagues (2021) highlighted a broad range of resilience-building measures. On the production side, advances in early warning and seasonal forecasting systems (such as FEWSNET) allow farmers to anticipate and prepare for shocks and plan for favourable or unfavourable climatic conditions. On the global scale, warning systems from the FAO and WFP provide early alerts to possible larger-scale threats to food supply and help markets to take anticipatory action.

Insurance schemes can help buffer against some shocks to food systems. For example, the increasing uptake of weather-indexed insurance schemes can help farmers in hedging against production losses as well as incentivizing shifts in practice (Hertel et al. 2021). Expanding social safety nets has been important for protecting consumers and improving food security during the pandemic (e.g. Sperling et al. 2022).

Climate change projections provide insights into possible climatic futures and how they may affect agricultural productivity over the medium to long term. Adaptive measures, such as improving livestock and crop traits and adopting new or under-utilised varieties better suited to the new environment, can help in strengthening resilience in this context.

The opportunity to strengthen the resilience of food and land use systems underlines the importance of sustained focus on research and innovation, particularly in developing countries. Innovation in technologies, practices and processes can strengthen the viability of systems, provided they are accompanied by appropriate efforts to diffuse them and facilitate uptake and diffusion of innovative measures. They may include new genetic varieties, improved planting and water management practices, better financing and risk management, new ways of connecting producers and consumers, improved policy and other interventions that help overcome existing constraints.

Interventions in one system may have positive or negative outcomes for other systems, therefore nexus thinking (e.g. water-energy-food) approaches should be extended to resilience-building efforts, where relevant and possible.

4.3. Consider the interplay between efficiency, redundancy, and diversity

The relationship between efficiency, redundancy and diversity should be considered in resilience building efforts. It has been noted that economic efficiency has been a major driver of the food system architecture. However, in many other ways food and land use systems are rather inefficient, for example in terms of use of inputs or loss and waste during harvesting, processing, transport and consumption. It is therefore important to consider what purpose efficiency measures serve in a food system. Advances in precision agriculture (Bongiovanni and Lowenberg-Deboer 2004), improvement in storage and cold chains or other interventions which reduce food loss and waste across the value chain can help reduce pressures on land and natural resources and potentially add to the resilience of food and land use systems , although implications for low income suppliers, biodiversity and other effects need to be carefully assessed and weighted with some interventions (Rutten et al 2015). Hence, efficiency improvements in food and land use systems should not only be evaluated against economic criteria alone – they should also be assessed against complementary social and environmental sustainability criteria.

A too narrow focus on efficiency may also foreclose coping and adaptation options. Redundancy and diversity can act as insurance against shocks. Maintaining and restoring diversity and functional redundancy can help buffer food and land use systems against current and emerging risks. It is about maintaining a portfolio of options.

4.4. Apply a dynamic and iterative approach to building resilience

Given the diverse and shifting exposure of food and land use systems to hazards over time, a systemic and iterative approach to resilience building needs to be taken. In light of the complexity of food and land use systems there is debate over the extent to which deliberate interventions can be taken that are also supportive of sustainability transformations over time.

There are limits to resilience and adaptive capacity of systems. With regards to climate change, the IPCC (2022) distinguishes between hard and soft limits. Hard limits means that beyond these limits, the system (or components thereof) will be faced with risks that can no longer be overcome by adaptation and the system (or components thereof) is no longer viable (ibid). Soft limits represent adaptation limits under current conditions, which can possibly be stretched through appropriate adaptive measures in the future.

Focusing on flood resilience, Haasnoot and colleagues (2013) created a framework for dynamic adaptive policy pathways to guide decision making in times of change and deep uncertainty. This has garnered further attention in the recent IPCC (2022) assessment in the context of governing risk management processes, and is also of general relevance for building more resilient and sustainable food and land use systems. Drawing on diverse future scenarios, the dynamic framework maps out initial action and links these with long-term targets to identify possible points of departure which require corrective actions and shifts to alternative pathways over time (Hasnoot et al. 2013). Hence, while some resilience-building measures may be suited to current contexts, helping a system to absorb or adapt to shocks, and shifting contexts, may require further intervention over time or even the abandonment of the existing system overall.

Table 1: Considerations for building resilience into food and land use systems in a dynamic world

Consideration	Guiding questions
Clarity of purpose	**Beneficiaries:** Who is being targeted by resilience building efforts? Are the interventions benefitting the most vulnerable stakeholders in the food system? **Scale and time-frame:** What is the scale and time horizon of the envisioned interventions? How are short term and long term objectives balanced? **Sustainability:** Is the resilience focus aligned with economic, social and environmental sustainability concerns? Have you considered trade-offs with sustainability objectives? What are the implications for social and natural capital? Do the interventions contribute to the SDGs? Are they supporting the objectives of the Paris Agreement on climate change? Or: Is there a risk of lock-in, which reinforces unsustainable structures in food and land use systems?
Holistic focus	**Scope:** Is the focus on building social, economic and environmental resilience? Or is the scope more narrowly defined? **Single or multi-hazard approach:** Are resilience building measures focused on addressing the risks of a single hazard type or is a comprehensive risk management lens applied? If the focus is on managing risks of one hazard, does this potentially increase vulnerabilities to other hazards? **Systems-thinking:** Are resilience building efforts targeting a particular component of food and land use systems? Are possible impact pathways across food and land use systems being considered, e.g. are adjustments on the demand side aligned with changes on the supply side?

	Cross-sectoral relationships: Are interdependencies with other systems being considered, e.g. energy and water?
Balancing efficiency, redundancy and diversity	**Efficiency:** Is efficiency the primary driver of food and land use systems architecture? Is the emphasis on economic efficiency (e.g. just in time)? To which extent does this also promote efficiency in resource use? How vulnerable is the system to disturbances? **Redundancy:** Are a given food system's components overly dependent on a single or few actor(s) or condition(s), e.g. agricultural inputs such as fertiliser from one supplier; food exports to a single country? How exposed are food and land use systems to changes in this relationship (e.g. breakdown of trade agreement, conflict, geopolitical changes)? How prepared for change are food and land use systems? **Diversity:** How diverse are food and land use systems in terms of production (e.g. crop varieties, farming practices)? How does this constrain or facilitate adaptation to changing economic, social and/or environmental conditions? **General:** Where is greater efficiency, redundancy or diversity needed to reduce the vulnerabilities of food and land use systems in a dynamic world? Are there sufficient buffers (e.g. safety nets) in place to prevent catastrophic system failure?
Check enabling conditions	**Capacities:** Are the necessary capacities in place to assess hazards, vulnerabilities and risks? Are risk mitigation strategies and practices identified, tested and implemented? **Coordination:** Does the institutional environment facilitate systems thinking and incentivize cross-sectoral solutions? Are Ministries of Finance and Planning working closely with key line Ministries, e.g. covering agriculture, water, natural resources, energy, environment and infrastructure to build comprehensive approaches to managing risks to food systems and ensure long-term sustainability? **Stakeholder engagement:** Are resilience building efforts informed by comprehensive stakeholder dialogue involving public and private sector and civil society? Are these dialogues and consultations grounded in a strong science policy interface? **Funding and incentive mechanisms:** Are there sufficient funds to support and maintain risk management practices? Are social safety nets in place to buffer the vulnerable stakeholder groups against shocks to the food system? Is environmental stewardship and sustainability incentivized?

5. Measuring and gauging progress

Measuring resilience is challenging because resilience itself is a latent variable that can only be observed once an event (shock) occurs (e.g. Laurien et al. 2020). This has implications for managing food and other systems in practice . Resilience measurement describes the state of the system at a given time, based on the observed impacts and vulnerabilities, and requires a definition of the system boundaries. However, while the system may be resilient to one event it may be vulnerable to another. Hence, resilience building should be seen as an iterative, constant process, where the functionality of the system in times of stress is constantly evaluated and adjustments are made.

It is therefore important that measurements of resilience are integrated with broader development objectives, ideally long-term sustainability objectives such as the SDGs. For example, Béné el al. (2019) constructed a global level sustainability metric for food systems, based on 27 indicators organised across four dimensions (food security/nutrition, environment, social, economic), which allows for comparison of progress over time and between countries.

In general,a suggested first step in measuring resilience would be to characterise food and land use systems in terms of its diversity, internal absorptive, adaptive and transformative capacities; as well as the dependency on other systems (e.g. water, energy, etc.). A list is also needed of the types of risks the system is exposed to (biophysical, social, economic, novel and emerging risks, etc.). Taking stock of risk perceptions and associated mitigation strategies of key stakeholders in food and land use systems will be important in identifying and securing resilience building measures. To better manage and monitor progress towards food and land use systems resilience, a predefined set of primary objectives needs to be established, linked to performance indicators. These will help account for how the performance is achieved and whether resilience to impacts on natural and human capital has materialised over time (Laurien and Keating et al. 2019).

6. Concluding Remarks

Recent environmental, economic and political shocks have raised the calls for building resilient food and land use systems, yet there are a diversity of interpretations of what this means in practice. As it may be impossible to align efforts under one universal understanding of resilience, it becomes important to be transparent and specific about how the concept is applied in specific policy and practice interventions.

As we discussed here, achieving sustainable food and land use systems, calls for an ongoing evaluation and expansion of conceptual and practical approaches to resilience building, which allows for systems transformation, while addressing vulnerabilities along this process. It will require balancing elements of robustness, adaptability and transformability. This is particularly important as food and land use systems are exposed to manifold risks and because risk exposure will also change over time. Resilience per se is neither positive or negative, but the purpose of resilience needs to be qualified in relation to societal goals and needs and how this will support the food and land use systems in delivering on these.

Hence, it will be important to have a dialogue around when it is useful to reinforce or strengthen an existing system and when it is useful to change, adapt or dismantle and transform it. As decision-makers and practitioners are faced with ever more complex demands placed on food and land use systems, a strong science policy interface will be important to identify what aspects of the system need to be preserved (e.g. ecosystem functions, jobs, food prices), what attributes need to be changed in order to manage both known and unknown risks. This will need to be done in context, and iteratively as conditions evolve, with a strong understanding of who benefits and who loses from changes to the system. Clarifying how resilience is interpreted as a concept in specific policy and operational settings and providing transparency of underlying assumptions will help in asking the right questions about how tensions and synergies between resilience and transformation demands on food and land use systems are addressed in a dynamic world.

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