



FORESEE SERIES 4C

REPORT 4

The Agri-Food Systems Transformation Protocol

Mapping Agents and Drivers of Transformation



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Cover photo: Coffee day laborers picking over the red coffee cherries in the Lake Kivu region of Rwanda. **Photo credit:** Ilene Perlman



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Acronyms

AGRA	Alliance for a Green Revolution in Africa	
CBD	United Nations Convention on Biological Diversity	
CFS	Committee on World Food Security	
CLIF	Climate Impacts of Food	
DC	District of Columbia	
EU	European Union	
FAO	Food and Agriculture Organization	
F2F	Farm to Fork (Strategy)	
GMO	Genetically Modified Organism	
HLPE	High Level Panel of Experts (on Food Security and Nutrition)	
iPES-Food	International Panel of Experts on Sustainable Food Systems	
SAFA	Sustainability Assessment of Food and Agriculture systems	
SDGs	Sustainable Development Goals	
UN	United Nations	
UN FSS	United Nations Food Systems Summit	
UN FSS +2	United Nations Food Systems Summit Stocktaking Moment	
UNCCD	United Nations Convention to Combat Desertification	
UNFCCC	United Nations Framework Convention on Climate Change	
USA	United States of America	
USDA	United States Department of Agriculture	

Glossary

Actors	All individuals and institutions that are expected to engage in transformative action in agri-food systems.
Agents	The actors of agri-food systems that are entrusted with responsibility for bringing about transformative change.
Conditions	The overall state of agri-food systems in the region of interest based on various parameters.
Drivers	The factors that create enabling conditions for transformative change in agri-food systems.
Factors	All variables that are expected to influence the transformation at different stages of the process.
Indicators	The different qualitative or quantitative measurements or observations that are used to assess the state and condition of agrifood systems.
Pathway	A transformation pathway is the individual realisation or application of the step-by-step transformation process in a specific context.
Process	A series of steps that constitutes transformation and is common to different contexts.
Protocol	A step-by-step approach that guides actors on how to lead a transformation process.
Stakeholders	All entities that are directly or indirectly affected by transformative actions, for example, in terms of financial or social capitals.
Solutions	Solutions are individual transformative actions or clusters of transformative actions that constitute a transformation pathway.



Foreword

How can we turn the tide?

In April 2023, UN Secretary General Antonio Guterres issued a stark warning as the 2030 Agenda reached mid-term: It appears increasingly unlikely that the Sustainable Development Goals (SDGs), which were unanimously adopted by the UN General Assembly eight years ago, will be achieved. "Unless we act now", Guterres cautioned, "the 2030 Agenda will become an epitaph for a world that might have been."

If current trends continue, by 2030 almost 600 million people will suffer from chronic undernourishment (SOFI 2023), and the health and mortality costs of diet-related non-communicable diseases will exceed USD 1.3 trillion per year (SOFA 2023). Furthermore, around 30% of all plant and animal species are likely to be threatened by or driven to extinction by 2100 (Front Ecol Environ 2023). It is hard to maintain courage in the face of the multiple crises that confront us. However, the decisive word in all of these forecasts is if. If we continue to pursue 'business as usual', we will leave a planet incapable of supporting future generations. But we still have a window of opportunity in which to turn the tide or at least mitigate the damage we cause.

Agri-food systems are increasingly perceived as a major part of the problem of unsustainable development, but they can also be part of the solution. A global shift to healthier diets could reduce health costs by up to 97%, and the money saved as a result could be used to subsidize more nutritious foods (SOFA 2023), thus breaking the vicious cycle of poor nutrition and health. Concerted and sustained investments in conservation could remove the threat of extinction from one in three species that are otherwise severely endangered (Front Ecol Environ 2023).

There is growing consensus that a radical shift is needed in how we produce, process, distribute, store, and consume food. Yet, the term agri-food systems transformation is being used in an inflationary way and thus is at risk of losing its substance. Countless conferences have shed light on different aspects of the transformation, and different players with varying degrees of power

articulate their priorities for change. However, those priorities rarely address the specific steps required to put this complex endeavour into practice. It is high time we got specific. Who needs to transform what on which level and how? What are the important drivers and who are the agents? These are the questions this report sets out to answer.

Actions to transform agri-food systems must be coordinated within and between different levels of governance and administration – global, national, and operational. This report proposes a multi-level governance framework to orchestrate the transformation of agri-food systems. In the absence of an international agreement on food systems transformation, existing global goals – primarily the three Rio Conventions (CBD, UNCCD, UNFCCC), the Sustainable Development Goals (SDGs), and the Paris Climate Agreement ¬– must provide the overall direction and suitable monitoring mechanisms. The second level of the governance structure corresponds to national transformation pathways that guide country-specific actions, and the third operational level refers to implementation and is tailored to specific contexts. Monitoring and evaluating transformative actions, for example through True Cost Accounting (TCA), is a crucial factor in achieving progress on food systems transformation.

In order to identify who (agents) and what (drivers) are needed for successful agri-food systems transformation, the report compiles case studies from five continents. These show that the most promising conditions are provided by a combination of government support, community leadership, and adherence to agroecological principles. Moreover, successful transformation pathways require an enabling environment marked by coherent and inclusive political commitment.

As for the how, the Expert Advisory Group behind this project agree that, irrespective of context, all transformation pathways must follow a rights-based approach. The Human Right to Food and the 2004 Voluntary Guidelines on the Right to Adequate Food endorsed by the United Nations Committee on World Food Security (CFS) must serve as the standards for implementation. Furthermore, the process of transformation must incorporate systems thinking, and it must align with the 13 principles identified by the CFS High-Level Panel of Experts on Food Security and Nutrition.

The Agri-food Systems Transformation Protocol proposed in this report provides a concise guide to developing transformation pathways in different contexts and at different levels. It

is designed to help a wide variety of decision-makers, stakeholders and actors – including agri-food producers and businesses, grassroots groups, practitioners, researchers, national policymakers, and international organizations – gain a clearer understanding of what must be done and in which sequence. The protocol is intended as a first step in developing a theory of transformative change for agri-food systems. Use of the protocol is, on its own, no guarantee for successful transformation. Many pitfalls must be cautiously negotiated, including the challenges of administrative change and dealing with private interests and political will. The protocol is not a magic bullet but it has the potential to provide structure and coordination for the complex endeavour of transforming agri-food systems.

This report is part of the <u>FORESEE (4C) series</u>, which aims to develop a systematic understanding of how food systems can be transformed. After a first set of three reports focusing on the state of debate, this report explores key actors and drivers. A fifth and final report will be launched in 2024 examining strategies for political and structural pathways to transformation.

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Overarching message

The transformation of agri-food systems is a profoundly complex and challenging task. It involves an attempt to overhaul diverse systems at global scale that currently generate a total value of more than USD 9 trillion annually while incurring hidden costs of approximately USD 12.7 trillion per year. This endeavour holds paramount significance for the lives and well-being of all people and shapes humanity's interaction with the natural and societal realms. Tackling systemic challenges, notably the transformation of energy and food systems, necessitates comprehensive systems thinking and – equally importantly – appropriate governance mechanisms to achieve international goals and to navigate the intricate landscape of trade-offs.

Key messages

The international community has established a framework of agreements, including the Sustainable Development Goals, Paris Climate Agreement, and the three Rio Conventions, with varying legal statuses. In the absence of a dedicated agreement on sustainable food system transformation, regional, national and local pathways must be guided by these existing overarching global goals and agreements.

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In addition, we propose the establishment of a "multilevel governance system for food systems transformation" to steer and manage the transformation. The proposed global-level governance can be achieved through international agreements and appropriate monitoring, reporting and valuation, accompanied at national level through national transformation pathways developed and implemented in a transparent and participatory way and supported by scientific evidence.

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A clearly defined decision support guide, akin to the Transformation Protocol presented here, that delineates the specific steps of the transformation process, can serve as the operational cornerstone of governance for transformation, provided that resolute political will for the transformation is present. Transformation pathways are not always replicable or scalable across contexts and therefore a successful transformation process must allow for specificities. However, an analysis of the different proposed pathways and their implementation provides insights into the role of different actors, factors, and processes in an ideal transformation process.

The principles of preserving the rights of people, preserving the ecosystem, and preserving the integrity of the process should guide transformation pathways worldwide.

A rights-based, place-based, systems approach is essential to develop a pathway towards healthy, equitable, inclusive, resilient, and sustainable agri-food systems – with the internationally agreed right to food at its core.

Transformation should follow an iterative process to ensure continuous performance assessment and adaptation to new realities arising out of transformative action.

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The first step in a transformation pathway should be the uncovering and identification of barriers, needs, and triggers of transformation. The context-specific identification and mapping of the agents and drivers of transformation is an integral part of the process.

The role, scope and mandate of multi-stakeholder consultations at the different levels needs to be clearly defined in order to address power asymmetries among the different stakeholders.

State-supported and community-led implementation of transformation pathways often leads to success in achieving transformative goals.

The performance of transformative actions must be continually monitored and assessed in order to adapt the pathway to dynamic needs.

True Cost Accounting can be a practical approach to assess the performance of transformative actions in different contexts.

A bottom-bottom and a bottom-up approach can lead to widening scope and impact of the transformative actions with each iteration.

Executive summary

There is a broad consensus that agri-food systems need to be transformed to address the mounting global challenges including food and nutrition security, environmental degradation, and socioeconomic inequities. However, agreement is lacking on what is needed to drive this transformation. This report builds on a sustainability analysis of different proposed pathways and approaches to address transformative needs. It also serves as a study of the drivers and agents that support the implementation of these proposed pathways in different cases around the globe.

We recommend the **adoption of a multi-level governance framework** to coordinate the transformation of agri-food systems, **guaranteeing the attainment of transformation goals across all levels**. This includes global agreements and international goals at the international level, national transformation pathways at the country level, and the operational level embedded in local governance. This report introduces the Agri-food Systems Transformation Protocol as a decision-support protocol at the desired operational level serving different actors within agri-food systems.

The Agri-food Systems Transformation Protocol **proposes a four-stage and nine-step iterative process that can guide the development of transformation pathways** in different contexts and at different levels of implementation. It was conceived during a workshop of the Expert Advisory Group of the Assessment and Communication of Climate Impacts of Food (CLIF) project in June 2023. The aim was to develop a **step-by-step guide to transforming food systems that is not prescriptive and follows a rights-based, place-based, systems approach**. The protocol was informed by background research on different case studies from the agri-food sector and advances the three principles of preserving the rights of people, ecosystem integrity, and integrity of the process. The background study identified the main drivers and agents of transformation by analysing 14 case studies from five continents, a selection that was finalized at the expert workshop. A transformation matrix that maps the agents and drivers with different steps of transformation process is also presented to aid the implementation of the protocol. This protocol is intended to be the **first step in developing a transformative theory of change for agri-food systems**, with the methodologies for each step being the subject of further development.



State of agrifood systems transformation

A large volume of evidence points to the failure of agri-food systemsⁱ to provide nutritious and safe food for all and to the detrimental effects of agri-food systems on the environment, human health and society as a whole.^{1,2}

These effects relate to challenges in the areas of nutrition, livelihoods, resource exhaustion, environmental degradation (of climate, biodiversity, and land), inequity, market power consolidation, trade shocks, and the lack of resilience.

This dysfunctional nature of current agri-food systems is not the result of a single missing piece of a puzzle but reflects a systemic problem involving multiple challenges at different scales and levels. There now exists a consensus that we cannot afford to pursue 'business as usual' in agri-food systems in view of worsening social, environmental, and economic, and health indices and the stagnant progress on the UN Sustainable Development Goals (SDGs). This consensus is supported by a vast body of research. The message that piecemeal action will not adequately address systemic, global challenges has been reiterated at various international forums, such as the Conferences of Parties of the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD), The United Nations Convention to Combat Desertification (UNCCD), and the United Nations Food Systems Summit Stocktaking Moment (UN FSS +2).

Challenges that are systemic in nature need solutions that are developed through a systemic approach, taking into account a variety of relationships and dependencies, synergies and tradeoffs in the system rather than focusing on a single parameter or index of change. A transformation of the agri-food systems is needed to make them more healthy, inclusive, equitable, resilient, and sustainable.^{3,4} The widespread consensus regarding the need to transform agri-food systems does not, however, translate to a common understanding of the trajectory of the transformation process. In this regard, it is crucial to clearly articulate the goals of the transformation in terms of the context-specific needs for the potential success of the transformation process. The broader aims of transforming agri-food systems revolve around the shift towards healthy, inclusive, equitable, resilient, and sustainable, resilient, and sustainable agri-food systems.⁵

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We use the term 'agri-food systems' rather than 'food systems' in order to be more inclusive of the non-food products of agriculture, food products of non-agricultural origin, and the forestry component of agriculture. This follows the widely accepted FAO definition of <u>agri-food systems</u> as, "systems [that] encompass primary agricultural production of food and non-food products (from crops, livestock, fisheries, forestry and aquaculture), the production of food of non-agricultural origin (e.g. synthetic meat), the food supply chain from producer to consumer and the final consumer of food."

Analyses of agri-food systems have made it clear that singular and linear actions cannot lead to transformative change, although they can sometimes be considered as elements supporting transformation^{6,7,8}. Transformative action hence refers to those aimed at addressing the different challenges faced by agri-food systems in a systemic way. This is not to argue in favour of 'silver bullet' do-it-all solutions but to think of pathways that are rooted in principles that counter these challenges. For example, one of the principles underlying a proposed transformation pathway should be to reduce the externalized costs of agri-food systems, including those related to greenhouse gas emissions, biodiversity loss, land degradation, socioeconomic indicators, and human and environmental health. One of the ways this can be achieved in agricultural systems is through the promotion of equitable resource-conserving production systems and sustainable consumption patterns.

Many actions presented in the debate about the future of agri-food systems are erroneously labelled as transformative, when in fact they only entail improvements to the existing system. Across the wide spectrum of actors and institutions – and associated interests – in agri-food systems, many solutions are being proposed aiming at achieving the different aspirations of transformation. These proposed pathways for food system transformation relate essentially to different food production approaches, with a few implying a transition towards soil-less and sea-less diets. Table 1 provides an overview of the different production systems (pathways and practices), ranging from farmer-centric agroecological solutions to farmer-less lab food movements, and presents them in chronological order of appearance in the global food and agriculture agenda, without any ranking.

While some of the proposed solutions have been successfully applied in individual cases, they are difficult to transfer to other contexts or to apply on a broader scale. This is evident from the lack of progress on achieving the SDGs related to hunger and nutrition and from the state of agri-food systems at the global level. According to the UN Secretary General, the world is "tremendously off-track" to reach the goals set out in Agenda 2030. Moreover, the sustainability and resilience of agri-food systems are under serious threat.⁹ The central role that the transformation of agri-food systems plays in the achievement of the SDGs has been widely discussed. The key here is to make agri-food systems a decisive part of the solution rather than presenting them as a problem. To achieve this, it is vital to disincentivize those parts of the systems that feed on or contribute to inequality and environmental degradation through transparent initiatives on the ground.¹⁰

The global interconnectedness of food systems, including the inherent linkages with other systems such as the economy and energy and the sheer number of actors and institutions involved at different levels of the systems, require coordinated action at different levels. There is a clear need for paradigm shifts within the different sectors (production, distribution, trade, etc.) of agri-food systems to shape the new discourse on transformation and respond to current and anticipated challenges.¹¹ However, under the current scenario, inaction is fuelled by the ongoing debates around how the transformation must take place. These debates are contested by those advocating for the continuation of corporate-driven industrial food systems and those advocating for a rights-based agroecological transformation of food systems.¹² The Secretary General's call for action at the conclusion of the UN FSS +2 rightly points to the need to reach agreement and expediate the transformation.²

TABLE 1 An overview of different proposed pathways to transform agrifood systems on the production side.

Proposed pathway	Transformative element
Biodynamic agriculture	Considering the farm as a whole self-regulating organism where the task is to regenerate soils through bio-stimulants, allowing plants and animals to grow in harmony with cosmic cycles, and producing healthy vital foods.
Organic agriculture	Enhancing natural growth processes instead of using external agricultural inputs to deliver healthier nutrition, soils, plants, and animals.
Holistic planned grazing	Leveraging the symbiotic relationships between farm animals and grasslands for regenerating land and growing soil and biodiversity.
Permaculture	Ecosystem mimicry and spatial landscape strategies to optimize energy and nutrient flows to enhance the diversity, stability and resilience of agricultural systems.
Agroecology	An ecological, socio-cultural, technological, economic and political approach to food systems, from production to consumption, with food sovereignty a core principle.
Regenerative agriculture	Land and ecosystem regeneration with a focus on soil agroecology.
Vertical farming	Indoor farming using controlled inputs of nutrients to increase resilience to weather disruptions and land scarcity.
Lab-grown foods	Artificial culturation of animal proteins as an alternative to reduce greenhouse gas emissions associated with meat-based products.
Nature-based solutions	Protecting and restoring ecosystems while safeguarding biodiversity.
Digital and robotic agriculture	Optimization of food production through digital agriculture to reduce labour intensity and increase yields.
Insect farming	Alternative sources of nutrients to take pressure off natural agroecosystems due to intensive footprint of agricultural activities.

The United Nations Food Systems Summit (UN FSS 2021) was an example of an international effort to address food systems transformation, albeit organized in a format that highlighted the challenge of negotiating the power imbalances between the different stakeholders. However, despite its intended purpose as a comprehensive assessment of previous actions taken, it fell short in delivering a dependable overview of the progress made in achieving the food system-related SDGs and identifying gaps in action. Furthermore, it lacked the guidance necessary for the formulation of a robust strategy for food systems transformation. For instance, despite the fact that, since 2021, 155 countries have appointed food systems convenors and 126 countries have adopted national pathways in various forms, just approximately 15% of countries are making satisfactory progress towards achieving the modest SDG targets.¹³ This raises questions about the effectiveness of such processes for attaining ambitious transformation objectives. The Committee on World Food Security (CFS) of the Food and Agricultural Organization (FAO), in contrast, is an example of an institutionalized international multi-stakeholder effort aimed at guiding policy discussions on issues related to food security and nutrition.

While consensus largely exists on the necessity of agri-food systems transformation, it is important to acknowledge that specific transformative goals can differ significantly across various contexts and regions, driven by localized needs. The inherent complexity of agri-food systems, varying across regions and locales, renders the adoption of a universal template for system-wide transformation unfeasible.¹⁴ A step-by-step approach based on shared principles, rather than rigidly prescribed practices and technologies, can serve as a guide for transformation pathways tailored to different contexts.

The following chapter (Chapter 2) maps the actors and factors involved in a potential transformation process. This is followed by Chapter 3, which presents a step-by-step decision-support protocol that delineates the different steps of transformation process without being specific to a particular context. It also includes the transformation matrix which situates the different agents and drivers in the different stages and steps of transformation.

Drivers and agents in the transformation landscape

The background study conducted for this report identified and analysed 14 case studies from different regions of the world demonstrating various elements of transformative action in agrifood systems. Although none of these case studies represents a total transformation of agrifood systems, each presents individual actions or policies that can form part of a successful transformation pathway. Across the different studies, human and environmental health, resilience, sustainability, and equity appear to be the common thread that the drivers of agrifood systems transformation are expected to follow.¹⁵ Figure 1 describes the process that was followed in the compilation of this report, including the scoping study and the workshop with the CLIF Expert Advisory Group.



FIGURE 1 The process behind the compilation of this report.

The aim of the case study analysis was to identify drivers and agents of transformation, based on the roles they played in the case studies. These were then the subject of discussion and validation during the expert workshop. The discussions also led to the development of a protocol that can be used to guide the implementation of a transformation process in different contexts and at different levels. The case studies are presented in Table 2 and further details of the analysis are presented in the Appendix.

TABLE 2 An overview of the case studies corresponding to the proposed transformative pathways analysed in the background research for this report.

Case study	Location	Transformational claim
SEKEM	Egypt	Transforming desert lands into fertile lands through biodynamic farming.
Holistic planned grazing	Zimbabwe	Holistic management of degraded ranch land through integrated agriculture.
Sikkim State Organic Mission	India	The first completely organic regional state in the world.
Alliance for a Green Revolution in Africa (AGRA)	Africa	Transforming subsistence agriculture into business-oriented agriculture through technological interventions.
Nature-based solutions in Mekong	Vietnam	Halting land degradation and soil erosion through enhanced management of land and water resources in agriculture.
EU Farm to Fork Strategy	European Union	Accelerating the transition to fair, healthy, and environment-friendly European food systems and ensuring sufficient, affordable, and nutritious food within planetary limits.
DC Central Kitchen	USA	A social venture to address hunger and poverty in urban contexts.
Seikatsu Club Consumers' Cooperative Union	Japan	An integrated community development programme started by a women's cooperative aimed at responsible production, distribution, consumption and disposal of food.
Brazil's Zero Hunger Strategy	Brazil	Integrating 30 different government programmes aimed at eradicating hunger and poverty.
United States Department of Agriculture's (USDA) Know Your Farmer Know Your Food (KYF2)	United States of America	An initiative to coordinate the siloed work of 17 USDA agencies aimed at expanding access to fresh and local food and cultivating healthy eating.
Cultivated Meat Initiatives	Singapore	Reducing the environmental impact of meat consumption through the lab-based cultivation of meat alternatives.
Digital Agriculture Transition	Australia	To tap the vast potential for digital technologies to increase the efficiency of agricultural production and supply chains.
Climavore	United Kingdom	Harnessing cultural institutions to trigger sustainable consumption in a rapidly changing world.
Fishing Transformations	Uruguay	To catalyse transformative changes in small- scale fisheries through transdisciplinary co- creation and collaboration.

The transformation of agri-food systems involves a wide array of actors and stakeholders who operate within the context of various factors, both general and specific, influencing the functioning of these systems and the relationships among the actors and within the systems. Interventions made during the transformation process can also impact these relationships. Therefore, the transformation process should be a multi-step, multi-level, participative, and iterative endeavour.

In order to successfully design such a transformation process, it is first necessary to identify, explore, and map the different actors, factors, and their interrelationships. The following sections outline the relevant actors and factors for the transformation process and describe their interactions at different stages.

2.1 Drivers of agri-food systems transformation

Agri-food systems are influenced by the major mega-drivers of our time: climate change, population dynamics, economic dynamics, and technological innovations (see Figure 2). These are also commonly included among the 'drivers of (agri-) food systems' in acknowledgement of the significant impact these drivers have on agri-food systems worldwide, although their influence is not restricted to agri-food systems.^{9,11} As much as agri-food systems are influenced by these mega-drivers, agri-food systems in turn affect these to some extent.



FIGURE 2 The four overarching mega-drivers and their constituent factors that affect the functioning of agri-food systems.

However, there is a lack of consensus and clarity about the definition of food system drivers, which often results in long lists of drivers being published without adequate data supporting their role. Furthermore, there are no standard criteria by which to classify different processes or factors as drivers. While some studies enlist worldwide trends that are theoretically expected to have an effect on the functioning of agri-food systems as drivers¹⁶, others present crises or shocks as drivers. The fixation on preparing lists of drivers of food systems feeds back to the analysis part of the discourse where the focus is only on analysing the problem and deliberating on the what (are the challenges?) and why (is change needed?) of the problem without going into the how (to transform systems?).¹

A significant portion of literature classifies drivers as exclusively external to the systems, such as the analytical framework employed in the 2017 report of the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security (HLPE) that distinguishes only those factors as drivers that are external to agri-food systems.^{11,17} However, given the complexity of agri-food systems, it has been argued that drivers can be either external or internal.¹⁸ In addition to the classification into external and internal drivers, they can further be classified as intended (actionable) and unintended (accidental) drivers, and positive and negative drivers (see Figure 3).

In the context of transformation of agri-food systems towards healthy, equitable, resilient, and sustainable systems, the key drivers of such a process are those that contribute positively towards achieving the desired outcomes of transformation and are actionable (see Figure 4) through different governance mechanisms. It is worth mentioning that the effect of different drivers can be different in different contexts, with local conditions buffering, intensifying, scattering, or concentrating them. Furthermore, the drivers of transformation are defined as contributing to a particular aspect (aim) of transformation without duplicating or negating the effect of other drivers.¹⁸ To highlight this, Bene et al. (2019) performed a critical review of 155 different drivers. They concluded that more than 80% of these drivers effectively replicate one another or do not have a well-defined indicator across different contexts.¹⁸

Drivers of Transformation

From all the drivers that can affect agri-food systems, this report focuses on the drivers that have a positive effect, accelerating the transformation and that are actionable, which are called Drivers of Transformation





In this report, we will identify the factors that can drive the transformation of agri-food systems, not just their intended or unintended functioning (Figure 3). We identify the actionable drivers that can propel agri-food systems to being more healthy, equitable, resilient, and sustainable, which we term as drivers of transformation. Hence this report focuses on the drivers that can potentially drive (or hamper, by their absence) the transformation of agri-food systems.

The FAO (2018) has proposed a set of five principles that can guide the drivers of transformation: (i) value addition, (ii) resource protection, (iii) equitable growth, (iv) resilience, and (v) adaptive governance.¹⁹ The FAO's Urban Food Agenda (2019) proposes four cross-cutting principles for the drivers of transformation. These are (i) resilience and sustainability, (ii) social inclusion and equity, (iii) rural–urban synergies, and (iv) food system interconnectedness.^{20,21}



FIGURE 4 The drivers of agri-food systems transformation identified in this study.

- **D1: Political will and coherent policy:** Policy measures and supportive political action are required to create an enabling environment, afford legitimacy to the transformation efforts, and create the supporting mechanism for the transformation.
- **D2: Integrated governance:** A successful transformation effort requires governance based on a systems analysis of interdependencies, synergies and trade-offs among the different constituents of the agri-food system.
- D3: Community-led inclusive action: A review of transformation cases shows that community-led implementation with an active participation of local farmers, fisherfolk, and indigenous communities leads to the long-term success of the transformative actions.
- D4: Public investment and private-sector involvement: The financing of the transformative actions must ideally occur through public channels accompanied by a noninvasive, non-dominant yet crucial participation of the private sector.
- **D5: Innovation and diversification:** Innovations need to be employed in the production, distribution, consumption, and marketing systems that mitigate the negative externalities and hidden costs through diversification and socially leveraged technological support.
- **D6: Capacity building:** Capacity building of the relevant actors needs to be undertaken to prepare and train them for implementation on the ground.
- **D7: Public awareness:** The public should be made aware of the need for transformation, the new policies and the transformative process and its advantages in order to cultivate widespread support for the transformation.
- D8: Iterative and participatory development: The implementation of transformative actions should not and cannot happen in one go; the process needs to be subject to continuous recursive analysis and adaptation to changing conditions.

- D9: International development targets: Synergies between the transformation goals and different internationally agreed goals such as the three Rio Conventions, inequality reduction targets, and the SDGs needs to be harnessed to streamline efforts and avoid duplication.
- DIO: Fair playing field: Addressing power asymmetries and resource inequality in food systems is crucial to mitigating the vested interests of corporations (e.g., seed sovereignty, resource appropriation) and deploying speculative technologies.

For effective strategizing, not only the drivers of the transformation but also the other factors influencing the process need to be clearly defined and considered. These include factors acting as barriers and enablers of transformation. Barriers are the factors that stand in the way of transformative action while enablers are actions that contribute to dismantling, bypassing or overcoming the barriers.¹⁵ Barriers and enablers usually appear in pairs in a system, as mirror images of each other; the barrier is typically the absence of the enabler. For example, gender-based discrimination could be a barrier to more equitable land ownership, which can be overcome by enabling factors such as changes to land ownership laws. The drivers of transformation proposed in this report address the five types of factors (barriers) listed in HLPE 14 that could hamper transformation (see Figure 5).²²



Overcoming the barriers of agri-food transformation

The drivers of transformation that are identified in this study help overcome the barriers that can hamper or slow-down the transformation of agri-food systems, as listed by HLPE

FIGURE 5 The identified drivers of transformation and the barriers to transformation that they overcome.

Drivers of the transformation are connected to hindering and enabling factors by virtue of creating the conditions necessary for the action of enablers. Thus, drivers empower the enablers to act. As an example of this relationship, environmental regulations may act as a driver while economic incentives for those who comply with regulations might act as an enabler. A barrier could also result from a lack of drivers or point to the importance of certain factors as enablers and drivers. Thus, the need to overcome a barrier can become a driver.²¹ It is pertinent to mention here, however, that in the reviewed literature, drivers and enablers are often used interchangeably or in a manner that does not differentiate between the two.^{15, 21, 23}

2.2 Agents of agri-food system transformation

The success of the drivers of transformation of agri-food systems hinges on the proactive role of the different actors and stakeholders involved in their functioning. The actors and stakeholders that play a key role in ensuring the functioning of the drivers are termed the 'agents of transformation'. Agents make sure that drivers steer the transformation in the intended direction. Based on the different challenges and requirements highlighted at international forums and by expert reports (e.g., FAO, HLPE, UN FSS, iPES-Food)^{2,9,22,23}, we have identified the following key agents in the transformation of agri-food systems:



FIGURE 6 The agents of agri-food systems transformation identified in this study.

- Al: Champions and advocates: Individuals who introduce an idea (a proposal) with the enthusiasm and charisma to guide transformative action on the ground. These either drive the initiative to success, leverage their influence by advocacy and training, or are tasked with supporting change in various ways.
- A2: Political actors and government organizations: Individuals in a position of power and influence or heads of a permanent or semi-permanent public agency funded by the government, with established organizational knowledge and access to legal and administrative measures that govern society.
- A3: Grassroots networks and civil society: These include a broad range of non-profit groups, voluntarily organized or part of a formally structured institution at local, national or international levels, working closely with the actors on the ground. Civil society groups are characterized by experience in their field of action and resistance to hardship, such as constant search to financially sustain their activities.

- A4: International organizations: Organizations and foundations providing logistical and fundraising support (loans or grants), along with technical and administrative capacities to assist development, with or without conditionalities (e.g., the World Bank's structural adjustment conditions to governments).
- A5: Corporate sector: Corporate organizations endowed by law with the rights and liabilities of an individual at national or international levels. Thus, corporations have limited liability (i.e., owners' private assets are not at risk if the company fails) and their strong economic role in society confers their influence on workers and increasingly, on decisionmaking of governments, including regulatory agencies.
- A6: Researchers and practitioners: These include individuals and organizations involved in the research and development of innovative practices and processes in the different stages of the agri-food value chain.

The different drivers and agents of transformation are linked in unique ways to achieve the aims of transformation in the different contexts. Furthermore, as mentioned previously, the same drivers can have impacts that vary in scope or intensity depending on the context. In order to develop a pathway for transforming agri-food systems across contexts, a decision support protocol has been developed. This proposes a step-by-step iterative transformation process that can guide the development of transformation pathways in different contexts. This protocol is presented in the next chapter.

B Agri-food Systems Transformation Protocol

The state of our agri-food systems reveals an inability of current governance mechanisms to ensure a transformation to healthy, inclusive, equitable, resilient, sustainable agri-food systems. Furthermore, the gaps identified in the analysis of the different proposed pathways and their case studies point to the role of different agents and drivers in the transformation process. A multi-level governance mechanism that builds on existing governance structures is required to coordinate and ensure the transformation of agri-food systems (see Figure 7).

This includes international goals and agreements (primarily the Rio Conventions) as the first level, providing the direction and guidance for transformative actions and an independent monitoring and reporting mechanism. This mechanism should inform the further iterations of the national transformation pathways, which form the second level of governance and guides national action on transformation. The third operational level of governance should be a principled process that can be adapted to the desired level or scope of implementation and contextual specificities.

The Agri-food Systems Transformation Protocol was designed as a decision support protocol for agri-food system actors looking to develop a transformation pathway in their specific contexts. These include actors at all scales and levels of the agri-food systems and its governance mechanisms, including agri-food producers and businesses, grassroots groups, practitioners, researchers, national policymakers, and international organizations. It presents the prospective transformation process by dividing it into different stages and steps and describes the challenges that actors can expect to encounter at the different steps. As a descriptive decision support protocol, it aims to guide the actions required at the different stages. The Transformation Protocol has been developed for all actors and institutions involved in transforming agri-food systems.

Multilevel governance of the agri-food systems transformation

The decision-making for the transformation of the agri-food systems is distributed across multiple levels of government and organizations. The Transformation Protocol works at the operational level of governance to guide such system transformation.



Lessons learnt

during the iterative

implementation process

FIGURE 7 The proposed multilevel governance of agri-food systems transformation.

Policy responses

to adjust the MRV

mechanisms

3.1 The framework of the protocol

PRINCIPLE-BASED PROCESS

The transformation of agri-food systems involves a fundamental rethink and reset of the way food is produced, processed, distributed, stored, and consumed. The myriad food systems in different cultural, economic, political and geographical contexts around the world present a unique challenge whereby transformation pathways and trajectories have to adjust to the local realities and the global linkages.¹⁴

Whatever the context, the transformation process must follow a rights-based approach, employ systems thinking, and be guided by the same general principles. The 13 principles outlined by the HLPE to guide the transformation of agri-food systems may serve as the point of departure in this regard.^{23,24} These may be summarized into three overarching principles that guide the Agri-food Systems Transformation Protocol:

Principles and approaches of the Agri-food Systems Transformation Protocol Three overarching principles that guide the Agri-food Systems Transformation Protocol and the three approaches for an effective transformation



FIGURE 8 The overarching principles and approaches that guide the Agri-food Systems Transformation Protocol.

ITERATIVE PROCESS

Transformation processes cannot be linear or algorithmic in nature and need to take into account the responses and reactions from the different involved and affected actors throughout the entire transformation process.^{25,26} The transformation of agri-food systems is hence presented as an iterative process rooted in the above-mentioned principles, which aims to increase the efficiency and widen the scope of impact after each successive iteration (see Figure 9).





FIGURE 9 Transformation as an iterative process with widening scope of implementation and impact with each iteration.

STEP-BY-STEP PROCESS

The Agri-food Systems Transformation Protocol covers four stages (Figure 10). The four stages are then subsequently broken down into nine steps.

The different steps in the protocol are listed in the order they come into play. However, some steps may require significant development before they can become part of the transformation process. For example, political will and an enabling environment must be in place before Stage 2 has come to an end, while a monitoring and assessment mechanism must be in place before the implementation step.

The different steps are described in detail in sub-chapter 3.2 on page 23, including references to the transformative case studies listed in Chapter 2 (see Appendix for more detail).



The Agri-food Systems Transformation Protocol

The Agri-food Systems Transformation Protocol with its four stages and nine steps

FIGURE 10 The four-stage transformation process as presented by the Transformation Protocol and its nine steps.

STAGE 1: EVALUATE

The transformation processes for different agri-food systems invariably necessitate identifying the triggers and prerequisites of transformation, followed by the identification of barriers and obstacles. This includes linking the pressing needs of communities, for example nutrition, health, livelihoods, with the opportunities brought forth by transformation, alongside the driving forces behind this transformation.

STAGE 2: PLAN

An analysis of the different case studies points to the importance of government-supported and community-led approaches for the success of transformative actions and to the importance of political will in creating an enabling environment for transformative actions. Hence, the presence of political will forms the first step of the transformation process. However, merely the presence of an idea with potential and sincere political will is not enough for a transformation to take place, or even for the successful implementation of the idea at scale. This is where many transformation strategies falter: agreement on the need for systemic change and the definition of abstract goals is not enough; planning and implementation of concrete measures and steps, continuous monitoring and the development of appropriate instruments are necessary. In this regard, the roles of the different agents and their areas of action in the transformation processes need to be properly defined as part of the iterative process.

STAGE 3: IMPLEMENT

This stage is characterized by the involvement of on-the-ground actors for the actual implementation of the plans at the planned level and scale. The correct mapping of different actors, public awareness and partnerships, capacity building of the main actors, and financial support for the implementation are the factors that are necessary to drive the implementation of transformative actions on the ground.

STAGE 4: REVIEW

Transformation processes require continuous assessment and adaptation to the conditions emerging during the process, since agri-food systems are shaped by interactions between the natural, institutional, and social systems.²⁶ In order to account for the changes these interactions bring about, iterations need to be done to the implementation plan as the scale of the intervention and transformation is expected to grow.⁷ This requires a multi-step iterative process like the one described above (Figures 6 and 7), which follows a systems approach and gives due consideration to the multi-functional, multi-level, multi-scale, multi-sectoral and multi-actor interdependencies of agri-food systems.^{27,28}

3.2 The different steps of the Transformation Protocol

The steps of the Transformation Protocol correspond to the four stages mentioned above (evaluate, plan, review, implement) and are described as follows:

STAGE 1: EVALUATE – Analysing the baseline situation and preparing a concept document

Stage I entails analysis of causes of concern including costs incurred by society (e.g., allocation of resources, impact of subsidies, trade-offs), evaluation of institutional responses (i.e., the adequacy of policy and institutional structures), and establishment of a process to address needs and challenges. The agents involved in this stage evaluate the baseline situation and prepare a concept document to start the iterative process and communicate with other agents about the necessity of agri-food system transformation. This will form the baseline study for future assessments.

STEP 1: IDENTIFYING THE TRIGGERS AND NEEDS FOR TRANSFORMATION

MAIN DRIVERS

- D1: Political will and coherent policy
- D2: Integrated governance
- D9: International development targets.

MAIN AGENTS

- A2: Political actors and government organizations
- A3: Grassroots networks and civil society
- A6: Researchers and practitioners.

OBJECTIVE

Identify and communicate the triggers and needs to adapt the transformation pathway to the requirements of the region.

REQUIRED ACTION

The conditions (including existing policy measures) that necessitate and trigger the aspiration for transforming the respective agri-food system must be identified. These are representative of the underlying needs of the community resulting from the shortcomings of the current system. The identified issues, although universal in nature to a large extent, can be prioritised differently in the various contexts and that would affect the process of strategizing the transformation.^{13, 29} Figure 11 shows, for example, the different prioritized food systems outcomes in different regions of the world according to an analysis by Dengerink et al. (2021).²⁹

The current state can be assessed with information on the various indices, indicators, and metrics, complemented by community consultations and workshops. These may include qualitative and quantitative metrics on hunger, food security, nutrition, income, environmental conditions, and (youth, women) employment.

EXAMPLES

The problems and challenges that need to be taken into account could be the deteriorating environmental impact of agri-food systems, the fulfilment of national or regional commitments under various international agreements related to climate, biodiversity, and land degradation, which are intrinsically linked to how agri-food systems function. Some of these triggers for transformation include malnutrition, volatile food prices, health issues, decreasing efficiency and incomes from land, loss of agricultural livelihoods, and socioeconomic breakdown.

For example, the measures taken in the Sikkim organic case study are aimed primarily to create new marketing opportunities through organic branding and opened new guaranteed avenues of income for agricultural producers. On the other hand, the strategy in the Upper Mekong naturebased solutions case study is primarily to counter soil erosion due to unsustainable farming practices, and by extension to protect the lives and livelihoods of the people in the region.

Region # Challenge Driver Strategy Market dynamics Nutritional quality Raising productivity Asia & 2. Living income Policies & regulations Poverty reduction the Pacific 3. Sustainability The environment Reducing food waste Availability of food The environment Raising productivity East & Southern Affordability of food Market dynamics Poverty reduction Africa 3. Living income Access to finance Private sector support Living income Market dynamics Raising productivity West & Affordability of food Central 2. The environment Poverty reduction Africa Availability of food 3. Policies & regulations Reducing food waste Food safety Market dynamics Raising productivity 1. Near East North Africa 2 Living income The environment Poverty reduction Europe & Central Asia 3. Nutritional quality Policies & regulations Reducing food waste Market dynamics Poverty reduction **Sustainability** Latin America Raising productivity 2. Living income Power imbalances & the Caribbean 3. Food safety Policies & regulations Balancing power

Key transformation priorities by region

Different regions of the world, prioritize different challenges in agri-food systems, based on their local contexts

FIGURE 11 Different priorities in terms of agri-food system transformation challenges, drivers and strategies of different world regions based on an analysis by Dengerink et al. (2021) (Adapted from the original paper).

STEP 2: ANALYSING THE SYSTEM AND UNCOVERING THE BARRIERS

MAIN DRIVERS

- D1: Political will and coherent policy
- D2: Integrated governance
- D8: Iterative and participatory development
- D9: International development targets.

MAIN AGENTS

- A2: Political actors and government organizations
- A3: Grassroots networks and civil society
- A6: Researchers and practitioners.

OBJECTIVE

Once the workings of the system are clear and needs have been identified, the next task is to identify the barriers that stand in the way of fulfilling those needs. The identification of the barriers will lead to delineating the required enablers and drivers for the transformative actions.

REQUIRED ACTION

This step involves examining the respective agri-food system with a focus on the relationships and dependencies between the different components of the system.

SUGGESTED APPROACH

A study of the linkages and interdependencies that exist in the system can help uncover the barriers in the fulfilment of local needs, and by extension propel the transformation process. The Economics of Ecosystems and Biodiversity for Agriculture and Food (TEEBAgriFood) evaluation frameworkⁱⁱ is an example how systems thinking can be applied to the agri-food value chain despite their complex and extensive nature. Transformation pathways need to proceed with systems analysis on these lines by considering all components of the local agri-food systems. This is a necessary step for devising the transformative actions.

EXAMPLES

The European Union (EU) Farm to Fork Strategy is a pertinent example of a food system strategy that is part of a wider systems analysis under the European Green Deal in terms of its inherent linkage and coherence with the EU Biodiversity Strategy, the Organic Action Plan, Carbon Farming Initiative, and Common Fisheries Policy and other policies. The Zero Hunger Strategy in Brazil aimed at integrating thirty different government programmes and leveraging the synergies in order to eradicate hunger and poverty. Both policy strategies are a bundle of programmes and policies aiming to address food systems sustainability holistically and systemically.

STAGE 2: PLAN – Devising a strategic implementation plan

The insights gained on the issues and options identified in the evaluation stage or in the review stage (in case of further iteration rounds) are translated into a specific strategy, including the selection of the tools required to reach the objectives. The agenda includes the following:

- Reasons for adopting a given approach (problem analysis),
- Description of what is intended to be achieved (outcome and scale),
- Main actors involved,
- How the transformation will be measured,
- A coordination mechanism,
- Estimated cost and time.

Details on implementation procedures, schedules, finances, and policy consistency are considered. The plan outlines the sequence within a timeframe of necessary management actions, financial and workforce to implement actions, and mechanisms for monitoring and evaluation, including suitable sustainability and performance indicators. The political actors check whether the strategy and plan are consistent with the existing policies. The necessary adjustments to laws and regulations related to agriculture, trade, food and environmental safety are undertaken.

STEP 3: IDEA INCEPTION AND FINANCIAL FORECASTING

MAIN DRIVERS

- D2: Integrated governance
- D4: Public investments and private-sector involvement
- D5: Innovation and diversificationD8: Iterative and participatory development
- D9: International development targets
- D10: Fair playing field.

MAIN AGENTS

- Al: Champions and advocates
- A2: Political actors and government organizations
- A3: Grassroots networks and civil society
- A5: Corporate sector
- A6: Researchers and practitioners.

OBJECTIVE

This step aims at conceiving transformative actions on the basis of the identified needs, the specific conditions of the place in which the implementation is planned, and considering the potential obstacles to this undertaking. Furthermore, the goal is to devise the implementation plan.

REQUIRED ACTION

This step involves strategizing the process and planning of the transformative actions and how to finance these.

This involves developing answers to the questions below to define the relationships between the different actors and stakeholders of the local agri-food systems³⁰ and between the different constituent systems of the agri-food system:

- 1. What needs to be done?
- 2. How does it need to be done?
- 3. Who will do it?
- 4. Who will finance it?
- 5. Who will take the responsibility?
- 6. What constitutes success of the interventions?
- 7. At what stage is iterative adaptation needed?

EXAMPLES

The importance of this step is highlighted in how the following two case studies addressed the different contextual needs and triggers of their respective communities. SEKEM responded to the need of sustainable livelihoods in a desert landscape with biodynamic community farming, while the District of Columbia (DC) Central Kitchen started community kitchens with on-the-job culinary training to address the challenge of hunger and unemployment in an urban context.

STEP 4: MAPPING ACTORS AND FORMING PARTNERSHIPS

MAIN DRIVERS

- D2: Integrated governance
- D6: Capacity building
- D7: Public awareness
- D8: Iterative and participatory development
- D10: Fair playing field.

MAIN AGENTS

- Al: Champions and advocates
- A2: Political actors and government organizations
- A3: Grassroots networks and civil society
- A5: Corporate sector
- A6: Researchers and practitioners.

OBJECTIVE

This step aims at mapping the different actors and actions involved in the transformative process in order to establish a clear overview of the relationships between them.

REQUIRED ACTION

This step involves mapping the different institutions and individuals involved, including actors and stakeholders with their functions and responsibilities, and drivers and agents with the different measures that need to be taken. This step takes stock of the interests of the different actors and stakeholders and includes deliberations on how to address these.

This step ideally involves a dialogue with and between the different participants of the process. It also needs to define the partnerships between different actors and with different government agencies and private entities necessary for the success of the transformative process. In addition, it needs to make clear the extent to which the community-led implementation affects the transformation process; i.e., to what extent the transformative actions are expected to grow organically and what level of intervention is necessary to increase the scope of implementation.^{30, 31, 32}

EXAMPLES

The case studies of DC Central Kitchen (USA) and Seikatsu Club Consumers Cooperative Union (Japan) show how partnerships at the local community level can dramatically widen the impact of transformative initiatives. The Zero Hunger Strategy (Brazil), through its partnership with credit and insurance organizations and by linking programmes on public acquisition and school meals, highlights the importance of actor mapping and partnerships for transformative actions.

STEP 5: ANALYSING SCENARIOS AND SETTING STANDARDS

MAIN DRIVERS

- D5: Innovation and diversification
- D6: Capacity building
- D8: Iterative and participatory development.

MAIN AGENTS

- Al: Champions and advocates
- A2: Political actors and government organizations
- A3: Grassroots networks and civil society
- A5: Corporate sector
- A6: Researchers and practitioners.

OBJECTIVE

Scenario analysis is carried out to anticipate the outcomes of interventions within the community and among network actors in order to avoid negative unintended consequences.

REQUIRED ACTION

This step involves simulating the transformative actions and their impacts on various actors and factors of the systems, in different scenarios from best to worst cases.

Taking a systems approach in planning interventions requires anticipating and foreseeing the changes the different transformative actions can have in the different sub-systems and associated systems of the agri-food systems, and also on the behaviour of and relationship between the different actors. The strategy also needs to set standard indicators to ascertain when the process is deemed successful and when adaptive changes are needed for course correction or to widen the scope of the interventions. This includes defining the goals and intended outcomes of the transformative intervention. For this a proper analysis and assessment framework needs to be selected or devised to fit the context.

EXAMPLES

One of the main factors affecting the success of transformative initiatives is the political support. In this context, it is important to foresee changes at the government level and hence do the necessary structural changes that can survive such changes. The example of the Zero Hunger Strategy of Brazil is pertinent in this regard, as it did suffered massively owing to the change in the government at the national level.

STEP 6: ADVOCATING AND LEVERAGING POLITICAL WILL

MAIN DRIVERS

- D1: Political will and coherent policy
- D2: Integrated governance
- D4: Public investments and private-sector involvement
- D5: Innovation and diversification
- D6: Capacity building
- D7: Public awareness, D8: Iterative and participatory development, D10: Fair playing field.

MAIN AGENTS

- Al: Champions and advocates
- A2: Political actors and government organizations
- A3: Grassroots networks and civil society
- A5: Corporate sector
- A6: Researchers and practitioners.

OBJECTIVE

The goal of this step is to find political allies to generate political support for the envisioned transformation pathway. Objectives include creating financing mechanisms and identifying resources that can be repurposed for the transformation process, supporting capacity building and infrastructure, bringing about supportive policies to introduce and sustain the interventions, committing to support the actors on the ground, especially in cases when the actions fail to achieve fruition and the actors face loss and criticism, and ensuring the benefits of the transformative actions reach the deserving beneficiaries.

REQUIRED ACTION

A well-planned transformation strategy needs the support of the government to be successful through actively engaging in the public discourse and forming partnerships. Political support starts with creating an enabling environment for the implementation of the plan and is realised by leveraging the policies to put ideas into practice.

SUGGESTED APPROACH

The political actors will need to take stock of, negotiate and address the interests of different stakeholders. This may include some of them giving up on some economic privileges and profits because transformative actions necessitate a realignment of capital and material flows in the agri-food system. The political will to support transformation however cannot be established in a vacuum and enforced from the top down; it needs to be supported by confidence building measures in the community and community-led deliberations with different stakeholders.

EXAMPLES

Considering the example of farming and food production, this might include financing the transition to natural, agroecological farming systems, providing subsidies to the farmers to make the transition, supporting farmers with training and tools, establishing new and innovative marketing strategies for the products, committing to a minimum support price for the products, ensuring fair returns to the farmers, and strengthening the marketing and distribution channels. Many of the case studies highlight the relevance of political will for transformative actions, including the Zero Hunger Strategy (Brazil), Know Your Farmer Know Your Food (USA), Sikkim Organic Transition (India), and the Farm to Fork Strategy (EU).^{31, 32, 33}

STAGE 3: IMPLEMENT - Putting the plan into action

This includes decision-making relative to adopting the plan, budgetary commitment, and monitoring and supervision. During implementation, new information and periodic monitoring and evaluation will lead to revisions of objectives and management interventions. Performance review moves management towards more refined cycles. The agri-food profile of the intervention area (inventory of data), include mapping jurisdictional boundaries between responsible agencies, identifying biophysical characteristics, social issues and economic linkages, embracing laws and institutional characteristics (including structures, policies and financial mechanisms), delineating specific roles of stakeholders, and identifying information requirements (there will be information gaps and research will be needed to fill these gaps).

STEP 7: IMPLEMENTATION

MAIN DRIVERS

- D3: Community-led inclusive action
- D4: Public investments and private-sector involvement
- D5: Innovation and diversification
- D6: Capacity building
- D7: Public awareness
- D8: Iterative and participatory development
- D10: Fair playing field.

MAIN AGENTS

- Al: Champions and advocates
- A2: Political actors and government organizations
- A3: Grassroots networks and civil society
- A4: International organizations
- A5: Corporate sector
- A6: Researchers and practitioners.

OBJECTIVE

This step aims to translate plans and strategies into action at the required scale, and through these achieve the transformation goals.

REQUIRED ACTION

Once the strategy, the plan, and an enabling environment are in place, this step facilitates the implementation of the transformation pathway at the planned level.

SUGGESTED APPROACH

In the case of transformative actions at community level, community-led and communitymanaged implementation on the ground has shown promise to be a successful model, yet a few questions still need to be addressed related to the role of implementation partners on the ground and whether a pilot implementation is required before implementation at scale. The scale at which the initial implementation is planned also needs to be clearly communicated to the different actors and stakeholders since it directly affects the extent of their participation. Finally, confidence- and capacity-building measures are needed for the main set of implementers – farmers, traders, distributors – in order to achieve the desired scale of transformation.³⁰

EXAMPLES

Implementation following the rights-based approach is evident in the case studies of SEKEM (Egypt) which is based on social entrepreneurship supported by community awareness, Holistic Planned Grazing (Zimbabwe) which acts through participatory land governance, and the village level grassroots governance in the case of Sikkim Organic Transition (India).

STAGE 4: REVIEW AND ADAPT – Assessing performance and adapting the process

Due to the long-term character of transformation interventions, a periodic participatory assessment, monitoring and evaluation plan will be useful to provide information on the remaining implementation period and input into the next generation of policy and other measures. Specific contexts will determine the timing, process evolution, choice of methods and contracting of proper resources. The performance review has two foci: to assess the implementation process with special attention to participants and various collaborative relationships; and to evaluate preliminary results, including True Cost Accounting of joint efforts.

Based on the research data from the monitoring and assessment, the changes in the different predetermined indices are analysed in addition to behavioural changes among the different actors and stakeholders. On the basis of this analysis, decisions are made on the iterative changes needed. The planning process is dynamic, with periodic integration of new information, new analysis, and new institutions/participants. The adaptation step mirrors the first step as it sets the direction for the planning step in the next iteration and identifies new needs and modified goals and aims, if any.

STEP 8: MONITORING AND ASSESSMENT

MAIN DRIVERS

- D2: Integrated governance
- D3: Community-led inclusive action
- D5: Innovation and diversification
- D8: Iter²ative and participatory development

MAIN AGENTS

- Al: Champions and advocates
- A2: Political actors and government organizations,
- A3: Grassroots networks and civil society
- A6: Researchers and practitioners.

OBJECTIVE

Continuous monitoring of the performance of the transformative actions aims to keep the goals of transformation in sight and to decide when to start an adaptive iteration.

REQUIRED ACTION

For successful implementation of the transformation process, monitoring and assessment of the transformative actions need to be undertaken.³⁴

SUGGESTED APPROACH

A knowledge-based framework is a precursor for successful evidence-based policymaking. Pertinent questions to be answered include how to access the performance of transformative actions and how to report the numbers. The True Cost Accounting approach can be used to monitor progress on how transformative actions mitigate the externalized costs of agri-food systems. The True Cost Accounting approach offers a way of quantifying externalized costs in easy-to-understand monetary terms, which in turn can be used to estimate and monitor the return on financial investments in transformative actions. Furthermore, the Sustainability Assessment of Food and Agriculture systems (SAFA)ⁱⁱⁱ guidelines can be used to assess progress on the different constituent overarching themes covered under the guidelines – governance, environmental integrity, economic resilience, and social wellbeing. Contextspecific indices can be selected/developed to quantify the performance and data collected accordingly. In addition to monitoring the performance, the behavioural, social, economic, and personal changes as well as those in the natural environment need to be continuously monitored and assessed.

EXAMPLES

The Economy of Love initiative of SEKEM (Egypt) takes into account the True Cost Accounting of the supply chain, aimed at monitoring and assessing the impact of its activities.

STEP 9: ANALYSIS AND ADAPTATION

MAIN DRIVERS

- D1: Political will and coherent policy
- D2: Integrated governance
- D3: Community-led inclusive action
- D5: Innovation and diversification
- D7: Public awareness
- D8: Iterative and participatory development
- D9: International development targets
- D10: Fair playing field.

MAIN AGENTS

- A2: Political actors and government organizations
- A3: Grassroots networks and civil society
- A6: Researchers and practitioners.

OBJECTIVE

This step aims at adapting the transformative actions to the new insights gained during the analysis of the implemented actions, in order to improve the functioning of the process.

REQUIRED ACTION

In order to adapt the transformative actions to best match the requirements, they need to adapt to the dynamics of the system.

SUGGESTED APPROACH

After analysing the assessment and data collected, adaptive changes can be made to the transformation strategy. The following questions need to be asked at this stage:

- What worked well?
- What was the best approach?
- What went wrong?
- Are there activities that need to be discontinued?
- Do new aspects or approaches need to be added?
- Does the scope of some actions need to be expanded or reduced?

The answers to these questions can be found by combining the analysis of the data collected in monitoring and assessment with the findings from dialogues with actors and stakeholders. This can also help in identifying the missing links and blind spots in the transformation strategy. New needs resulting from the previous cycle of transformative actions can also be identified. This step also involves innovating³⁵ for the next implementation loop and planning for implementation, leading to Stage 2 (PLAN) of the next implementation loop. The new lessons and insights gained from the analysis of the monitoring and assessment data guide the process of adapting existing pathway. This might also involve a reshuffle of roles, responsibilities, finances, and relationships. The necessity of a timely review of transformation strategies is reinforced by the ongoing intricate and interlinked crises in the agri-food systems worldwide.¹³

EXAMPLES

The 'Brazil Without Hunger' programme, launched in September 2023, is a successor to the previously discussed 'Brazil Zero Hunger' programme, with many improvements in terms of structure and governance. This is an example of using analysis and adaptation to improve transformative actions.

3.3 Transformation Matrix

The different drivers and agents of transformation come into play at many scales and levels in the process, as described in the Transformation Protocol. On one hand, drivers are factors that create the conditions for overcoming or bypassing the different barriers by providing the measures necessary to fulfil the needs or respond to the triggers. On the other hand, agents are the duty bearers (actors) that act and strive towards achieving the aims of the transformative actions at the different scales and levels, by leveraging the conditions created by the drivers.

The transformation matrix depicts the agents of change and their relationship with the different barriers and drivers of transformation at each step of the transformation process. The transformation matrix aims to serve as a guide and reference for agri-food systems actors involved in the transformation process.

Transformation Matrix

A representative mapping of the main agents of change engaged at the different stages of transformation, with the relevant barriers, drivers and agents at each step of the transformation process

Stage 1: Evaluate			
Steps	Barriers	Drivers	Agents
ldentifying the triggers & needs	Governance factors (BI) Social & cultural factors (B4)	 Political will & policy (DI) Integrated governance (D2) International development targets (D9) 	 Political actors & governmental organisations (A2) Grassroots networks & civil society (A3) Researchers & practitioners (A6)
2. Analyzing the system	 Governance factors (BI) Economic factors (B2) Social & cultural factors (B4) Knowledge factors (B5) 	 Political will & policy (DI) Integrated governance (D2) Iterative & participatory development (D8) International development targets (D9) 	 Political actors & governmental organisations (A2) Grassroots networks & civil society (A3) Researchers & practitioners (A6)

Stage 2: Plan			
Steps	Barriers	Drivers	Agents
3. Idea inception	 Economic factors (B2) Social & cultural factors (B4) Knowledge factors (B5) 	 Integrated governance (D2) Public investments & private sector (D4) Innovation & diversification (D5) Iterative & participatory development (D8) International development targets (D9) Fair playing field (D10) 	 Champions & advocates (Al) Political actors & governmental organisations (A2) Grassroots networks & civil society (A3) Corporate sector (A5) Researchers & practitioners (A6)
4. Actor mapping & forming partnerships	 Economic factors (B2) Social & cultural factors (B4) Knowledge factors (B5) 	 Integrated governance (D2) Capacity building (D6) Public awareness (D7) Iterative & participatory development (D8) Fair playing field (D10) 	Champions & advocates (AI) Political actors & govern- mental organisations (A2) Grassroots networks & civil society (A3) Corporate sector (A5) Researchers & practitioners (A6)
5. Scenario analysis & setting standards	Image: Construction of the construc	 Innovation & diversification (D5) Capacity building (D6) Iterative & participatory development (D8) 	Champions & advocates (Al) Political actors & govern- mental organisations (A2) Grassroots networks & civil society (A3) Corporate sector (A5) Researchers & practitioners (A6)
6. Advocating & leveraging political will	Governance factors (BI) Constraints (B3) Constraints (B4)	 Political will & policy (DI) Integrated governance (D2) Public investments & private sector (D4) Innovation & diversification (D5) Capacity building (D6) Public awareness (D7) Iterative & participatory development (D8) Fair playing field (DI0) 	Champions & advocates (Al) Political actors & govern- mental organisations (A2) Grassroots networks & civil society (A3) Corporate sector (A5) Researchers & practitioners (A6)



Stage 4: R	eview		
Steps	Barriers	Drivers	Agents
8. Monitoring & assessment	 Resource factors (B3) Social & cultural factors (B4) Knowledge factors (B5) 	 Integrated governance (D2) Community-led inclusive action (D3) Innovation & diversification (D5) Iterative & participatory development (D8) 	 Champions & advocates (Al) Political actors & governmental organisations (A2) Grassroots networks & civil society (A3) Researchers & practitioners (A6)
9. Analysis & adaptation	 Governance factors (BI) Economic factors (B2) Social & cultural factors (B4) Knowledge factors (B5) 	 Political will & policy (DI) Integrated governance (D2) Community-led inclusive action (D3) Innovation & diversification (D5) Public awareness (D7) Iterative & participatory development (D8) International development targets (D9) Fair playing field (D10) 	 Political actors & governmental organisations (A2) Grassroots networks & civil society (A3) Researchers & practitioners (A6)



Conclusions

This report is part of the TMG – Think Tank for Sustainability research on transformation of agri-food systems. It builds on the previous FORESEE report series and develops a proposal on how to guide transformation of agri-food systems. It draws on a review of globally existing approaches to food system transformation and proposes a multilevel governance of food systems transformation that involves international agreements like the Rio Conventions as the global level of governance, the national transformation pathways as the national level of governance, and a decision support tool as the operational level of governance. As an outcome of this exercise, a protocol for Agri-food Systems Transformation is proposed as the decision support tool. This protocol aims at leveraging internationally agreed sustainability and climate goals, employing a transparent rights-based process in its development.

The Agri-food Systems Transformation Protocol is based on an analysis of the challenges associated with current agri-food systems regarding the provision of healthy food for all and contributing to the internationally agreed sustainability (SDGs, CBD, UNCCD) and climate goals (Paris Climate Agreement). It recognizes the human right to food and the 2004 Voluntary Guidelines on the Right to Adequate Food as standards of implementation. The Transformation Protocol is a descriptive guide to the steps involved in the transformation process and the action needed at the different stages of a successful transformation.

Transformation pathways must be aligned with context-specific realities. There are no 'silver bullet' solutions. Moreover, even successful transformative solutions are often not scalable across different contexts. However, certain agreed-upon principles that form the basis of the protocol can guide diverse transformation pathways to achieve the transformative goals in different local and national contexts. Furthermore, the protocol builds on our analysis of drivers and agents of transformation as well as their relationships and responsibilities at the different stages of a transformation process. In order to capture the complexity existing both in the structure of the dominant food systems and in the reality of people's daily lives, the results of the analysis are presented in the form of a transformation matrix.

The protocol proposes an iterative process for transforming agri-food systems. This involves a revisioning and revisiting of the process at a specific stage in the pathway to adjust for new realities and changes that may emerge during the transformation process. Many of the transformative case studies analysed point to the view that government-supported, community-led, and agroecological pathways are the most promising approaches to agri-food systems transformation. The hallmark of a successful transformation pathway is the presence of an

enabling environment through strong political will and active participation. A state-supported and community-led process ensures long-term positive effects on multiple forms of capital – natural, human, social, and produced. Further work is needed to describe the role of regulation (at national and international level), markets, and trade in supporting transformation.

In addition to resources, the type of governance affects the success of transformative actions. Successful transformative interventions need to be anchored in existing and new legal and institutional frameworks to minimize the effects of changes in administration. However, because private interests influence political will and the role of governments addressing power imbalances is an essential and very challenging element of the transformation process.

The protocol sees monitoring and assessment of transformative actions as a vital part of the iterative process and proposes to employ True Cost Accounting to assess and inform progress. We propose to build this comprehensive analysis of the latest research on produced, natural, social and human capital and consider the negative and positive externalities of food systems and transformative changes. Ultimately, the protocol is intended to enrich and intensify the conversations around the transformational theory of change for agri-food systems.

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Appendix

Methodology of case study analysis

In the background study to this report, we selected 13 transformative initiatives from different parts of the world and subjected them to an analysis to identify a common thread in terms of agents and drivers of transformation. The case studies reviewed in this paper are selected from all five continents and different geopolitical contexts, trying to cover most of the transformative solutions on the table today. They include ongoing or recently concluded food system transformation projects that take agriculture as the main entry point (i.e., SEKEM in Egypt, Dinbagombe in Zimbabwe, Sikkim in India, AGRA in Africa, Mekong in Vietnam, Farm to Fork in Europe), or transformation projects that take food economies as an entry point (i.e., DC Central Kitchen in USA, Seikatsu Club in Japan, Zero Hunger in Brazil and Know Your Farmer Know Your Food in USA). In addition, recent soil-less and farmer-less food system paradigms are presented, though they are difficult to assess in the absence of tried and tested implementation (i.e., cultivated meat in Singapore, digital transition for agriculture, Australia).

The different case studies were analysed using the FAO's Sustainability Assessment of Food and Agriculture systems (SAFA - Guidelines). The SAFA guidelines assess the impact of food and agriculture operations on the environment and people. SAFA is a global framework for the holistic assessment of sustainability along food and agriculture value chains, including default indicators and their performance threshold. SAFA establishes an international reference for assessing trade-offs and synergies between all dimensions of sustainability. It has been prepared so that enterprises – whether companies or small-scale producers – involved with the production, processing, distribution and marketing of goods have a clear understanding of the constituent components of sustainability and of the strengths and weaknesses of the systems.

The SAFA framework was chosen as the assessment framework because it was developed by the UN through cooperation with hundreds of practitioners from civil society, public institutions and private enterprises around the world. The five-year development process of SAFA included three expert consultations, two e-forums that invited public contributions, and 30 pilot studies involving almost half a million producers. The SAFA framework is inclusive because it offers a fair playing field, adaptable to all contexts and sizes of agriculture, livestock, forestry and fisheries operations, enabling assessment at different levels depending on the user's role in the food and agriculture sector. For example, farmers, enterprises or governments can use the SAFA Guidelines for conducting an assessment at the level of the framework most relevant to them, that is policy at the theme level, or supply chain management at the sub-theme level.

Although developed before the SDGs, SAFA themes are highly convergent with the targets of the 2030 Agenda. The guiding vision of SAFA is that food and agriculture systems worldwide are characterized by four dimensions of sustainability: good governance, environmental integrity, economic resilience and social well-being. For each of these four dimensions of sustainability, SAFA outlines essential elements of sustainability based on international reference documents and conventions. The 21 themes, 58 sub-themes and 116 default performance indicators allow assessments adapted to geographic, sector-specific and individual conditions. By providing a transparent and aggregated framework for assessing sustainability, SAFA offers a basis for quantitative, qualitative or monetized assessments, depending on the resources available for data collection and computing.

Case study profiles

This section provides an overview of 14 case studies exemplifying initiatives in agri-food systems that are promoted as transformational by their initiators. These were the subject of the background research carried out for this report. The different case studies represent the various transformative solutions that are being proposed by the diverse range of agri-food system actors and are tabulated as follows:

Case Study 1 SEKEM, EG	YPT
Short description	SEKEM (meaning vitality), founded in 1977, has been transforming desert lands near Cairo into fertile lands through biodynamic farming (2,100 ha), providing for the ecological, economic, social and cultural life of some 2,000 workers (of which 700 are farmers) and 8,000 affiliated community members. Farming operations have been fuelling agro-industrial companies producing organic food, textiles and medicinal and aromatic plants for local and international markets, as well as education and health care institutions for the local community.
Transformational claim	Transforming desert lands into fertile lands through biodynamic farming.
Implementation stage	Production and processing
Key drivers	Community awareness, social entrepreneurship, innovation in production and economics
Key agents	Advocates, trainers, grassroots networks
Remarks	40 consecutive years of organic growth, 2,100 hectares of land, over 2,000 workers and 8,000 affiliated community members.

Case Study 2 HOLISTIC PLANNED GRAZING, ZIMBABWE

Short description	In 1994, the Africa Center for Holistic Management took charge of the Dimbangombe ranch, which extends over 40,000 hectares of dry Hwange communal lands. It was to be used as a holistic management demonstration and learning site for the Southern Africa region. The range was previously very deteriorated by cattle; community farmers were short of forage. Through holistic planned grazing, cattle number increased, goats and sheep were introduced, and the multispecies herd moved through 10 unfenced paddocks. Using mobile enclosures, animals were placed on harvested crop fields at night for 7 days, protecting them from predators and benefitting from their hooves breaking the soil and dung deposits. This treatment quadrupled maize yields in 2008 and 2009, made abandoned fields usable again and eliminated labour for manure transportation.
Transformational claim	Holistic management of deteriorated ranch land through integrated agriculture.
Implementation stage	Production
Key drivers	Participatory land governance, innovation in production, international funding
Key agents	Researchers, government organisations, trainers, civil society
Remarks	40,000 hectares of ranch land regenerated. Increase in the number in multispecies herds and improved in crop yields. Less soil runoff into the river.

Case Study 3 SIKKIM STATE ORGANIC MISSION, SIKKIM, INDIA

Short description	In 2015, Sikkim, a small Himalayan state of India, declared itself as the first organic state in the world, with all its 75,000 hectares of farmlands certified organic. Sikkim state policy claims to be transformational for the state and its citizens. This transition, including market expansion through the Sikkim Organic Brand, as well as interventions in education, rural development and tourism benefits more than 66,000 farm households. In January 2023, Sikkim Organic Day was celebrated by authorities with enthusiasm and the government is planning to make Sikkim the organic export hub of India, with a target of raising the value of organic production from USD 1 million currently to USD 1 billion by 2030.
Transformational claim	The first completely organic state in the world.
Implementation stage	Production and trade
Key drivers	Political will, capacity building, public awareness, marketing innovations, trade policy
Key agents	Political actors, trainers, practitioners
Remarks	75,000 hectares of farmland certified organic and 10,000 farmers trained in organic farming practices.

Case Study 4 AGRA, AFRICA	
Short description	Since 2006, AGRA 1.0 has worked to transform Africa's agriculture from a subsistence to a commercial model by using yield-enhancing techniques, namely improved seeds and fertilizers, strengthening capacities for service delivery and output market improvements. The AGRA 2.0 strategy consisted of direct interventions and partnerships with 11 governments and private investors, with a target to double yields and incomes of 30 million smallholders by 2021. The current 2023–2027 AGRA 3.0 strategy is to accelerate transformation of agriculture to build food systems resilient to natural and man-made crises. In addition to its previous strategy of seeds, African government engagement and trade, focus is given to the eventual adoption by 40% of farmers of climate-smart and nutrient dense crop varieties (i.e., biofortified seeds), increasing 25% revenue for gender and youth-led SMEs and transforming African diets in 15 sub-Saharan countries.
Transformational claim	Transforming subsistence agriculture into business-oriented agriculture through technological interventions.
Implementation stage	Production and trade
Key drivers	International funding, private sector involvement, policy.
Key agents	Private sector, international organizations, government organizations.
Remarks	Target to double the income of 30 million smallholders and adoption of climate-smart and nutrient-dense crop varieties.

Case Study 5 NATURE-BASED SOLUTIONS IN MEKONG, VIETNAM

Short description	Since 2016, the World Bank project Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods Project (2016–2024, USD 387 million) is enhancing tools for climate-smart planning of land and water practices. Building on World Bank investments and the 2013 Mekong Delta Plan, and in ahead of a larger-scale and transformative Green Climate Fund (GCF) funded project for the Mekong Delta across 1.4 million hectares of the floodplain, IUCN promoted flood-based wetland agriculture over 139 ha in the Vietnamese provinces of An Giang, Dong Thap and Long An. The Nature-based Solution (NbS) alternative to intensive rice monocropping by poldering that was damaging ecosystem functions in the floodplains, considered floating rice systems, lotus farming systems and rice aquaculture systems to improve climate resilience.
Transformational claim	Halting land degradation and soil erosion through enhanced management of land and water resources in agriculture.
Implementation stage	Production
Key drivers	Institutional support, international funding, innovation in production and marketing, trade policy
Key agents	Government organizations, intergovernmental organizations
Remarks	The Mekong delta loses about 500 hectares of land every year due to erosion, which threatens the livelihood of at least 18 million people.

Case Study 6 EU'S FARM TO FORK STRATEGY, EUROPEAN UNION

Short description	The 2020 Farm to Fork Strategy (F2F) aims to make food systems fair, healthy and environmentally friendly. The main goals by 2030 are to ensure sufficient, affordable and nutritious food within planetary limits; to halve the use of pesticides and fertilisers and sales of antimicrobials; to increase the amount of land devoted to organic farming; to promote more sustainable food consumption and healthy diets; to reduce food loss and waste; to combat food fraud in the supply chain; and to improve animal welfare. In 2021, the Commission presented the action plan on organic farming as part of F2F, with the main goal to convert 25% of lands to organics by 2030. The F2F strategy is reinforced by the 2030 EU Biodiversity StrategyF2F is central to the SDGs in linking people's health to the planet's health. A legislative framework for EU sustainable food system is expected towards the end of 2023.
Transformational claim	To accelerate the transition to fair, healthy, and environmentally friendly European food systems. To ensure sufficient, affordable, and nutritious food within planetary limits.
Implementation stage	Production through consumption and disposal
Key drivers	Policy, integrated governance, systems approach, financial innovation, participation
Key agents	Government organizations, civil society, researchers and practitioners
Remarks	Alignment among multiple policy instruments like Biodiversity Strategy, Carbon Farming, Sustainable Food Framework.

Case Study 7 DC CENTRAL KITCHEN, USA

Short description	Founded by visionary Robert Egger in 1989, DC Central Kitchen is a social venture to combat hunger and poverty through culinary job training and community kitchens in urban areas. It serves scratch-cooked farm-to-school meals in 19 DC schools, and delivers fresh, affordable produce to corner stores in neighbourhoods without supermarkets. Its innovative model involves transforming 'waste' into resources, from food waste to nutritious meals, marginalized people to productive workforce and charity funding into non-profit institutions providing societal services. Food is used as a tool to break the generational cycle of homelessness, addiction, incarceration and ultimately, of poverty. The aim is a national transformative expansion achieved by, among other means, engaging college students in recovering wasted food from dining halls to prepare meals for their own community.
Transformational claim	A social venture to address hunger and poverty in urban contexts.
Implementation stage	Production and waste management
Key drivers	Community participation, public financing
Key agents	Trainers, volunteers, grassroots organizations
Remarks	Providing culinary job training and nutritious meals through community kitchens in urban areas. 60 community and 50 campus kitchens across USA.

Case Study 8 SEIKATSU CLUB CONSUMERS COOPERATIVE UNION, JAPAN

Short description	Founded in 1965 in Tokyo, the Seikatsu Club is led by women who seek to reform their lives and that of their local communities following the motto "autonomous control of our lives", including responsible production- distribution-consumption-disposal, environmental care and social services. Club members are joined by the common intent to distribute safe food, promoting a GMO-free and nuclear-free society and creating mutual aid collectives. Action is currently guided by a 2030 Action Declaration for SDGs, supplying clean food to 416,899 people, as well as other materials (e.g., energy, fabric) valued at JPY 100.45 billion in 2021.
Transformational claim	An integrated community development programme started by a women's cooperative aimed at responsible production, distribution, consumption, and disposal of food.
Implementation stage	Production through distribution, consumption and disposal
Key drivers	Cooperative action, participation, local resources
Key agents	Trainers, volunteers, community
Remarks	The programme has grown to now 33 Seikatsu Clubs across different districts, with results showing progress beyond what is envisioned in the UN SDGs.

Case Study 9 BRAZIL'S ZERO HUNGER STRATEGY, BRAZIL

Short description	In 2003, President Lula da Silva introduced the Zero Hunger program (Fome Zero in Portuguese) with the goal to eradicate hunger and poverty in his country by bringing together 30 programmes divided into four pillars: facilitating access to adequate food, support to family farms, income- generating activities, and social mobilization and partnerships. This included: cash transfer through the family allowance system (Bolsa Familia) reaching 20 million poor; a programme to strengthen 2.2 million family farms through credit and insurance (PRONAF); the public food acquisition programme (PAA) from 160,000 farmers, with 30% bonus for agroecological crops; and a national school meals programme (Bolsa Escola), reaching 47 million children with 30% of the food sourced through PAA.
Transformational claim	A programme to integrate 30 different government programmes with the aim of eradicating hunger and poverty.
Implementation stage	Production and consumption
Key drivers	Integrated governance, systems approach, policy, public awareness, capacity building
Key agents	Political actors, civil society, advocates and trainers
Remarks	In 2009, an estimated 20 million Brazilians emerged from poverty thanks to the Zero Hunger Strategy which halved poverty compared to a decade earlier, with reduced income inequalities, hunger and child malnutrition. The small farmer poverty rate fell from 41% to 24% between 2003 and 2009 and incomes increased by 58%, as the cash transfer programmes raised purchasing power and revived demand in local markets.

Case Study 10 USDA'S KNOW YOUR FARMER KNOW YOUR FOOD (KYF2), USA

Short description	This initiative was launched in 2009 to coordinate the work of USDA's 17 separate agencies and many staff offices that invest in local and regional food systems, from direct marketing to consumers, selling local products to grocery stores, restaurants and schools. The objectives were to expand access to fresh and local food, cultivate healthy eating, foster new opportunities for farmers/ranchers and stimulate agriculture-based economic development. The transformation objective was propelled by the need to create jobs by growing the next generation of farmers via high value crops on small farms and addressing the disconnect between farmers and consumers to the benefits of the whole agriculture sector. A permanent, civil-service position was established towards the end of the Obama administration that created a point person on local and regional food system policies and programming, providing coordination and leadership.
Transformational claim	An initiative to coordinate the work of 17 separate USDA agencies, aimed at expanding access to fresh and local food and cultivating healthy eating.
Implementation stage	Marketing and consumption
Key drivers	Integrated governance, policy, coordination, innovative financial instruments, capacity building
Key agents	Political actors, non-government organizations, private sector, public awareness
Remarks	During the period of its implementation (2009–2017), the number of farmers markets and farm-to-school programmes increased manyfold. A main indicator of success is that access to local food was ensured to Supplemental Nutrition Assistance Program (SNAP) participants: redemptions rose by 620%, from USD 2.7 million in 2008 to USD 20 million in 2015.

Case Study 11 CULTIVATED MEAT, SINGAPORE

Short description	Singapore, a city-state of 720 square kilometres with competing land use, is the first and only country in the world to approve, in December 2020, the commercial sale of a protein grown "out of thin air" (as referred to its marketing tagline). This is aimed at reducing the large environmental footprint of chicken and mutton. Singapore has thus emerged as a global hotspot for the alternative protein industry, with startups flocking to the island to develop and launch animal-free alternatives to traditional animal and fish products.
Transformational claim	To reduce the environmental impact of meat consumption through the lab-based cultivation of meat-alternative
Implementation stage	Consumption
Key drivers	Financing, private investments, innovation, policy
Key agents	Private sector, consumers, government organizations
Remarks	Asia's largest plant for cultivation of meat alternative with a production capacity of tens of thousands of pounds will be opened in 2023 in Singapore.

DIGITAL TRANSITION, AUSTRALIA		
Short description	Half of Australia's vast terrestrial mass is agricultural land, directly employing 300,000 people. The Australian Farm Institute estimates that the uptake of digital technologies would increase the gross value of production of agriculture by more than AUS 20 billion annually (and increase of 25% from 2014–15). Digital agriculture, such as artificial intelligence, robotics and blockchain, promises to help farmers to do more with less through data-driven decisions, creating new services, accessing new markets, and achieving supply chain efficiencies. The 2022 Digital Foundations for Agriculture Strategy of the Ministry of Agriculture will support uptake of digital technologies to achieve national agricultural innovation priorities.	
Transformational claim	A country with half its terrestrial landmass used for agriculture has a vast potential for the uptake of digital technologies to increase the efficiency of production processes and the supply chain	
Implementation stage	Production and marketing	
Key drivers	Policy, public awareness, innovation in production, capacity building	
Key agents	Trainers, practitioners, political actors, grassroots networks	
Remarks	The digital transition in agriculture also aims at making farming a more attractive career prospect and the sector is expected to reach USD 100 billion by 2030.	

Case Study 12 DIGITAL TRANSITION, AUSTRALIA

Case Study 13 CLIMAVORE, UNITED KINGDOM

Short description	CLIMAVORE is a research platform, an agency and a movement that advances how to eat as humans change climates through a cultural shift. New 'seasons' are blurring the lines between spring, summer, autumn and winter, or yearly monsoon events. Instead, periods of polluted seas, soil exhaustion or fertiliser runoff are more influential on our foodscapes. CLIMAVORE, a term coined by London-based Cooking Sections (Daniel Fernández Pascual and Alon Schwabe) in 2015, is a call to rethink the food system, and move beyond a carnivore, omnivore, locavore, vegetarian or vegan diet to adapt to these new seasonalities, while addressing the extractive and intensive agricultural practices that cause them. It uses art and culture to disrupt the broken food supply chain and imagine new future horizons needed both at the producer and consumer levels, incorporating ways not only to grow food, but also cultivate ecologies.
Transformational claim	Exploring the change in human food consumption in a changing world.
Implementation stage	Consumption and waste management
Key drivers	Art, technology, innovation, communication, public awareness
Key agents	Trainers, local community members, civil society
Remarks	CLIMAVORE is a global network of restaurants, canteens and other food spaces in museums, cultural and pedagogical institutions that are adapting their food offerings to the climate crisis. Using the power and freedom of art in spaces where millions of people are fed daily, the network raises social awareness of intensive systems while allowing a wide range of publics to open their senses and taste future alternatives.

Case Study 14 FISHING TRANSFORMATIONS, URUGUAY

Short description	Small-scale fishers in Uruguay face a paradox: while as local and sustainable fishing is valued more and more, fishers struggle to maintain their livelihoods and culture. In response to this, multiple actors linked to the local food system around small-scale fisheries are applying local solutions and articulating innovative initiatives to overcome this challenge. The project "Fishing Transformations" (Pescando Transformaciones in Spanish) aims to co-create a transformative space by identifying and bringing together several innovative initiatives in small-scale fisheries in Uruguay. The project seeks to be a platform for disseminating existing positive changes in local small-scale fisheries through the production and diffusion of communication pieces for broad audiences and interventions to promote small-scale fishing, its products, and its potential in local gastronomy.
Transformational claim	To produce transformative changes in small-scale fisheries in Uruguay, through transdisciplinary co-creation and collaboration.
Implementation stage	Production and processing
Key drivers	Research, private sector
Key agents	Fishers, researchers, trainers
Remarks	The project is led by South American Institute for Resilience and Sustainability Studies, Maldonado, Uruguay and EqualSea Lab, Santiago de Compostela, Spain.



ABOUT THE PROJECT

TMG Research gGmbH is working to help develop a more systematic understanding of how agri-food systems can be transformed through its project on the Assessment and Communication of Climate Impacts of Food (CLIF), which is funded by the International Climate Initiative (IKI) of Germany's Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and implemented jointly with corsus and WWF Germany. This project promotes sustainable consumption patterns and helps companies, policymakers, and consumers choose more sustainable options in relation to food. The main contribution of TMG to this project is publishing a series of strategic reports on the current status of agri-food systems and the likely drivers and agents of their transformation.

This report follows up on the FORESEE (4C) series on The Transformation of Agri-Food Systems in Times of Multiple Crises, which looks at challenges faced by agri-food systems linked to multiple crises (4 Cs: Climate, Covid-19, Conflict, Cost of externalities) and how these intensify the necessity of transforming agri-food systems. This report presents a decision support protocol called the Agri-food Systems Transformation Protocol, which offers a step-bystep guide for agri-food actors in devising transformation pathways in different contexts. This report also describes the agents and drivers of transformation and maps them to the stages of the transformation process described by the protocol. The report was drafted by TMG in consultation with a broad group of experts.



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