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A Resilience-Enabling Environment for Farming Systems

Patterns and Principles

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18.1 Introduction

Farming systems (FSs) operate in biophysical, political, social, economic and cultural environments, which are often far from stable. Frequently or unfavourably changing conditions can affect FS performance, i.e., the delivery of FS functions (such as food production or ecosystem services). The dimension and direction of the changes of the environment are often uncertain and there are many unknown unknowns, i.e., events that cannot be imagined currently nor their likelihood. This also means that it is not always clear how FSs have to evolve to perform well in the future, since we do not know how that future will look like. Hence, the institutional and socio-economic environment in which FSs are embedded should at the same time provide some direction to FSs, but also help FS actors keep their options open and facilitate their flexible and smooth responses (Mathijs and Wauters, 2020). An important policy implication is that to address the resilience issues of FSs, it is not enough to transfer a constant stream of transfer payments to compensate for the lack of resilience of these systems, as is the approach taken in the Common Agricultural Policy (CAP) where most resources are devoted to income support through direct payments. Rather, policy but also private agri-food actors should assist FS actors to build resilience capacities,

starting with coping capacity (robustness) (see Chapter 1) – which can, amongst others, be enhanced through some kind of safety net but could be done through other approaches as well – but extending to responsive capacities (adaptability and transformability) through creating an enabling environment that supports adaptations and transformations (Buitenhuis et al., 2020).

A FS is a system hierarchy level above the farm at which properties emerge resulting from formal and informal interactions and interrelations among farms and non-farm actors to the extent that these mutually influence each other (Meuwissen et al., 2019). The environment can then be defined as the context of a FS on which FS actors have no or little influence. Hence, actors belonging to the environment may be food processors, retailers, financial institutions, technology providers, consumers, policy makers, implementation agencies, the judicial system, etc. This concept corresponds to the institutional environment, as defined by Lynggaard (2001), who has distinguished three domains of farmers' institutional environment: (1) the farmer/market domain that is preoccupied with exchange between economic actors, (2) the farmer/policy domain that entails public intervention into the farming sector and (3) the farmer/farming community domain that encompasses professional aspects of farming, such as associations, schools, advisory bodies and research institutions. The aim of this chapter is to formulate principles for an enabling environment that fosters the resilience of FSs in Europe based on a retrospective analysis of concrete challenges and responses to them. The chapter also seeks to translate these principles into recommendations on how public and private actors and institutions in the enabling environment can support the resilience of FSs.

18.2 Methodology

To investigate how the institutional environment enables or hinders FS resilience, we expanded the original SURE-farm resilience framework to analyse how resources and institutions were mobilised in both the FS and environment and how they affected resilience capacities in the past, i.e., following a set of challenges and adverse events in the past ten years. For this, a five-step methodology was followed. The analysis was performed for eleven case studies: large-scale arable farming in Northeast Bulgaria, intensive arable farming in Veenkoloniën, the

Netherlands, arable farming in the East of England, large-scale corporate arable farming with additional livestock activities in the Altmark in East Germany, small-scale mixed farming in Northeast Romania, intensive dairy farming in Flanders, extensive beef cattle systems in the French Massif Central, extensive sheep farming in Northeast Spain, high-value egg and broiler systems in Southern Sweden, small-scale hazelnut production in Lazio (central Italy) and fruit and vegetable farming in the Mazovian region, Poland.

Step 1: Identification of the FS and enabling environment actors and institutions

This step details the first step of the SURE-farm resilience framework (i.e., the identification of FSs in their own locality, see Chapter 1), by identifying all relevant actors and institutions in the enabling environment. In order to ensure that all relevant actors and institutions are included in the analysis, both formal and informal institutions on the one hand and public and private institutions on the other were considered. Formal institutions include legally codified rules and regulations (e.g., fiscal policy, private standards, CAP, nitrate directive); informal institutions equally guide actors' practices and interactions between them but not formally codified (e.g., local customs with regards to cooperation, level of representation in policy design, common visions on the ideal farm). Public (including all government levels and domains) as well as private (including business actors such as processors, retail, farmers) institutions and civil society organisations in both the FS and the enabling environment were considered.

Step 2: Identification of challenges and adverse events in the last ten years

This step coincides with step 2 of the SURE-farm resilience framework, but details broaden the characterisation of stresses following Maxwell (1986) to obtain better insight into the dynamics of challenges:

- A shock: sudden changes that are usually difficult to predict, such as the COVID-19 crisis or the Russian embargo.
- A trend (or stress): gradual changes that are usually easier to predict than shocks but not necessarily less important. Examples are increasing societal pressure to produce more sustainably, declining

real farm gate prices, and increasing pressure on land from non-agricultural stakeholders.

- Noise (normal variation): the kind of variation that occurs regularly, unlike a shock, and usually less challenging than stress (trends). Examples are typical weather variability, moderate price volatility and typical rainfall variability.
- Cycles. This is a type of change which does not often occur (any more) in socio-ecological systems such as FSs, but some challenges could be in this category. Commodity price cycles are an example. Hence, this category is mentioned here for the sake of completeness.

Between 5 and 10 challenges or adverse events that the FS had faced in the last decade were described in each case study. The type of challenge may matter as the dynamics of reactions in the FSs and the enabling environment may be different for different types of challenges.

Step 3: Analysis of reactions

This step replaces steps 3, 4 and 5 of the SURE-Farm resilience framework by taking a more dynamic perspective. More specifically, for all or a sub-set of identified challenges, a number of analytical steps were taken. The following questions were used for orientation:

- How were challenges perceived to influence the delivery of FS functions and did this threat materialise, i.e., what has been the actual impact?
- To what extent were challenges anticipated by actors in the FS and in the enabling environment?
- How did the FS cope with challenges (referring to robustness)? Here, for the ease of analysis and interpretation (as data are often only available at farm level) the FS is narrowly defined as the set of farmers in the FS, classifying the other actors as part of the enabling environment. A further question was, what role the enabling environment played in these coping reactions?
- How did the FS (so mainly the farmers) respond (referring to adaptation and/or transformation) to the challenges, and again were they assisted (or hindered) by the enabling environment?

Step 4: Pattern analysis

In order to explore the resilience-enabling or constraining effect of the environment (and more specifically its impact on resilience

capacities), the identified actions were interpreted using systems archetypes. Kim (2000: 2) defines systems archetypes as a ‘class of tools that captures the “common stories” in systems thinking – dynamic phenomena that occur repeatedly in diverse settings. They are powerful tools for diagnosing problems and identifying high-leverage interventions that will create fundamental change’. Archetypes capture the vicious circles in acting and thinking that are usually depicted as causal loop diagrams, and explain how these vicious circles lead to undesirable outcomes. For instance, Brzezina et al. (2017) have used systems archetypes to analyse the development of organic farming in Europe. Oberlack et al. (2019) carried out a systematic review of archetype analysis in sustainability research, including the main motivations for and limitations to carrying out this type of analysis. The reader is referred to Kim (2000) for an overview of systems archetypes used in this analysis.

Step 5: Cross-case analysis

Cross-case analysis was carried out using all eleven cases to investigate whether the same patterns or systems archetypes were found, but also to match these patterns to the type of challenge. In other words, do patterns of acting and thinking differ when reacting to shocks or trends. This allowed us to identify leverage points or principles for the enabling environment to change from hindering to fostering FS resilience, for each archetypical problem has a set of archetypical solutions that break the vicious circle. These principles were illustrated by examples of an enabling environment identified in the various case studies.

18.3 Patterns in the Enabling Environment

In this section, we discuss the archetypes that occurred most often in the case studies. We refer to Mathijs et al. (2021) for an analysis by case study. Four archetypes were found across a number of case studies: (1) a pattern in which mitigating symptoms prevail over finding structural solutions (fixes that fail/shifting the burden), (2) a pattern in which actions are taken to downplay the challenge itself (eroding goals), (3) a pattern in which the enabling environment inhibits FS action (limits to success) and (4) a pattern in which too much attention is given to particular solutions (success to the

successful). We illustrate each of these patterns with examples from the various FS case studies.

Archetype 1: Fixes That Fail / Shifting the Burden

In this pattern, a challenge triggers a coping reaction in which the enabling environment provides external interventions to mitigate the symptoms generated by the challenge rather than providing a structural solution to the challenge (fixes that fail). Moreover, such interventions may produce a side effect that undermines the structural solution in the long run (shifting the burden).

This pattern occurs when the following conditions prevail:

- The challenge cannot be sufficiently absorbed by the FS or business actors in the enabling environment without substantial loss of income (insufficient coping capacity), triggering a request to the enabling environment to mobilise resources or change rules.
- The financial losses are large enough, and the interests of those hurt are represented well enough to trigger action by government (a form of connectedness).
- Responsive capacity is insufficient, which can have several reasons: solutions are not known, adjustment costs are too high, vested interests in the status quo, etc.

Actions are primarily taken by government, based on the financial reserves it can mobilise or the amount of leeway that exists to temporarily change certain regulations. This may be enough when the challenge is temporary and/or the impact is relatively small, but when the challenge persists, reappears or spreads, the problem also reappears (e.g., extreme weather events, price drops, lack of labour). Also some private actors may lobby to put resources into fighting the symptoms rather than into structural solutions, due to the vested interests they have in maintaining production at current levels.

Moreover, in this pattern, mobilising resources or changing rules to cope with the challenge undermines the development and implementation of structural solutions. Strictly speaking this is always the case, as resources mobilised for developing symptomatic solutions cannot be devoted for developing structural solutions. However, we could argue that as long as effects are not irreversible, such resource allocation only results in a delay, not in the impossibility of a structural solution.

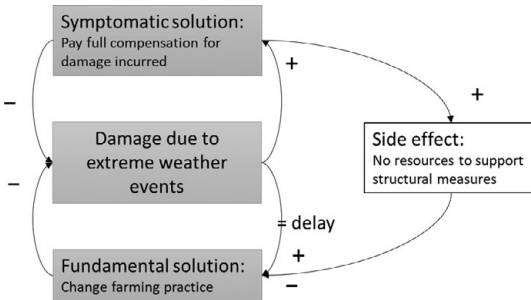


Figure 18.1 Causal loop diagram of the shifting-the-burden archetype.

Hence, an important condition for a shifting-the-burden pattern to occur is that the coping strategy involve actions with implications that are relatively difficult to revert (for instance, the destruction of certain resources or the creation of technical, economic or institutional lock-ins). This pattern has been observed in all case studies, following different types of challenges, both as a reaction to shocks and to trends.

Reactions to shocks such as extreme weather events fit this pattern well. The enabling environment – primarily government – frees up reserves to pay out farmers for income losses. When the government keeps doing this unconditionally, farmers have no incentive to invest in solutions in which they adapt towards a system that is less exposed to these types of events (see Figure 18.1). This was found in the British, Polish, French, Spanish, Dutch and Belgian case studies. For instance, in the French beef FS, droughts induced farmers to change land use and cropping for feed, i.e., they reacted to the decreased grassland productivity by reducing permanent grassland while increasing cereal production and temporary grassland. In addition, farmers increased feed purchases from providers external to the FS. Structural solutions, in contrast, would imply adapting the system towards more drought tolerance through improved practices and technologies and even different cattle breeds.

In the Dutch starch potato FS, the processing cooperative increased prices paid to farmers following a decrease in EU subsidies, so that farmers did not need to adapt their production plan. However, this reduced the incentive for farmers to reduce their specialisation in starch potatoes, which had made them vulnerable in the first place. A similar pattern could be observed in response to nematode pressure: rather

than applying a more extended crop rotation, farmers intensified potato production, using seemingly more resistant varieties. The innovative varieties, however, were later found not to be resistant to new strands of nematodes.

The pattern was also observed in the Spanish lamb FS, where income support was identified as a fix that failed. The FS has been under economic pressure due to decreasing national lamb consumption, but this trend was not picked up by the FS and its enabling environment. One reason was that FS actors were too occupied with short-term challenges to notice emerging trends (low anticipatory capacity). At the same time, the enabling environment fostered primarily solutions aimed at increasing robustness, such as marketing campaigns to promote lamb consumption, which failed to compensate the strong counter trend.

Reactions to price volatility also seem to fit this pattern well. For instance, the 2009 milk price drop was regarded as a shock by most actors in the Belgian dairy FS, even though it was part of a long-term trend: dairy farmers in most of the EU were becoming more increasingly exposed to price volatility as a result of market liberalisation and reduced border protection after the CAP reforms since 1992. Farmers exhibited some coping capacity by using buffer capacity (financial reserves, off-farm income), networks and relationships (negotiating solutions with suppliers and banks, possibly including transfer of property), savings on costs, early culling and delayed investments. The enabling environment acted swiftly to increase coping capacity, mainly through the mobilisation of public resources, i.e., market measures intervention and income support measures (EU), bridging loans (Flanders) and a temporary bonus on milk prices paid to farmers (which retailers passed on to consumers). At the same time, limited signs of responsive capacity were observed: the FS did not really adapt or transform.

Another observed example of the fixes-that-fail archetype is when FSs insufficiently deliver public functions, such as keeping natural resources in good condition, e.g., through too many harmful emissions. Technical fixes that reduce the amount of emissions per unit of production are a frequent response, even if their implementation typically requires mandatory regulation. However, over time these kinds of fixes often fail and the challenge remains or even grows more severe. The root cause may be the density of intensive farming practices,

e.g., high spatial concentration of livestock in a certain area, which would require more fundamental solutions than reducing emissions per animal.

A final example are the problems related to land ownership in North-East Bulgaria, where the privatization of state-owned land resulted in land fragmentation and unclear property rights. During the last three decades many solutions have been searched for, but the radical changes which are needed to force land owners to be interested in long-term decisions are still only discussed, e.g., property taxes, to take responsibility in land management and to be accounted for damaging soil quality.

All these examples involve actions by the FS and the enabling environment that aim to strengthen robustness and coping capacity in the short run, but that neither address the challenge itself nor support an adaptation of the FS that would reduce exposure to the challenge. As a result, FS actors may become dependent on external support that reduces the symptoms of an ongoing or exacerbating root problem.

Archetype 2: Eroding Goals

A challenge creates a gap between a goal and the actual condition. In this pattern, rather than taking actions to improve conditions, actors adjust the goals by, e.g., downplaying the challenge or redefining or reinterpreting the problem, in order to justify inaction.

This pattern occurs when the following conditions prevail:

- The challenge is a trend of which the impact has not yet fully materialised, e.g., as a loss of income or public goods, because the effect is delayed or absorbed by the FS.
- The impact is erroneously perceived as small, because, for example, the cause–effect relationship between trend and damage might be ambiguous due to other conflating factors, or the trend itself is being underestimated, or resources are invested in shielding the FS from the challenge.

This pattern not only involves a lack of anticipatory capacity so that the challenge is not adequately identified, but also deliberate action to deflect attention from the challenge. A typical example is the shifting of a deadline for reaching a goal in order to delay action or in the hope that the problem will ‘go away’. This pattern can result in a situation

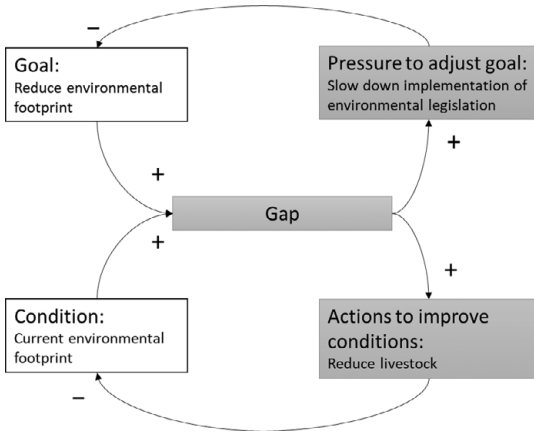


Figure 18.2 Causal loop diagram of the eroding-goals archetype.

that ultimately cannot be solved anymore (which is why it is often referred to as the ‘boiling frog’ archetype).

The pattern was observed in several of the SURE-Farm case studies, often in response to societal concerns. For instance, the Belgian dairy FS is exposed to growing civil society opposition against intensive livestock farming, based on environmental, animal welfare and health concerns. This trend has been present for quite a long time. Whereas initially meat production was the main target, recent years have seen a large increase in opposition and now also milk producers have become a target. Efforts of the FS actors and the enabling environment mainly focused on removing or slowing down the trend. Examples include public relations campaigns to off-set negative images – from communicating about progress being made to attempts to discredit civil society organisations and individuals – and lobbying to delay new environmental or animal welfare regulation, or to lower proposed standards (Figure 18.2).

A similar pattern could be observed in the Spanish lamb FS where neglect of the seriousness of several simultaneously occurring challenges (decreasing consumption, access to land, etc.) led to insufficient response by both FS actors and the enabling environment. One observed reaction – marketing campaigns to increase consumer demand – had the intention to slow down or even reverse the trend.

Archetype 3: Limits to Success

In this pattern, actions taken by the FS actors, for instance to address challenges, are inhibited or slowed down by actions in the enabling environment. FS actors are willing to take coping or responsive actions, but they are constrained by the enabling environment, for instance because of too much bureaucracy ('red tape'), insufficient resources devoted to the proposed solutions, etc.

An example of this pattern was found in the Polish horticulture case. High levels of bureaucracy following the request for more precise data, monitoring and control procedures and variability of regulations have provided an important impediment to developing solutions. The low attractiveness of working in the agricultural sector which leads to a lack of farm successors, can also be explained with the limits to growth archetype, in cases where the enabling environment has a negative impact on the attractiveness of the sector. In several cases, the weak bargaining power of farmers in the value chain was identified as a constraining factor (Figure 18.3).

Archetype 4: Success to the Successful

In this pattern, all resources are allocated to a limited number of apparently successful actions (or actors) while neglecting other, necessary activities (and/or institutions). Here, the FS and the enabling environment allocate resources unequally to different solutions or actors. For instance, allocation of resources may be conditional on the ability to demonstrate earlier success. As a result, underinvestment in other solutions and actors is likely, which may backfire if the supported solution turns out to be insufficient or even detrimental.

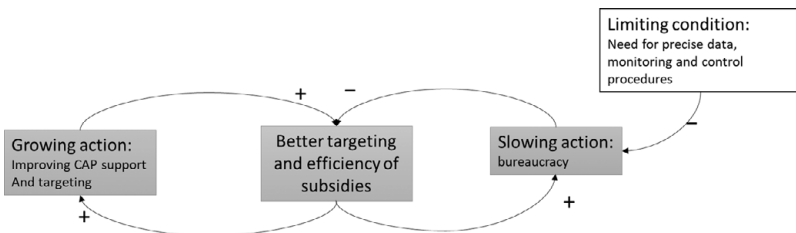


Figure 18.3 Causal loop diagram of the limits to growth archetype.

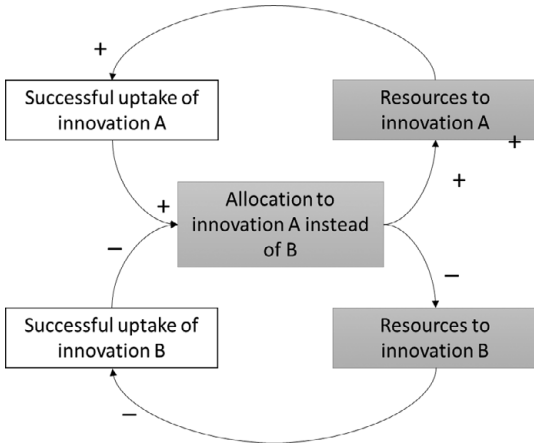


Figure 18.4 Causal loop diagram of the success-to-the-successful archetype.

This archetype can also create path dependencies where it becomes difficult to change the course of action (Figure 18.4).

An example of this pattern could be observed in the German case study. The Altmark region has been allocated relatively few resources for infrastructure and public services by the enabling environment due to its spatial remoteness and low population density, which further exacerbates the marginalisation of the region. Lack of infrastructure, such as fast internet, reduces opportunities (e.g., internet-based sales, precision farming).

18.4 Guiding Principles to Create a Resilience-Enabling Environment for Farming Systems

To derive guiding principles underpinning an enabling environment that fosters (rather than hinders) FS resilience, we identified interventions in the four archetypes that lead to more FS resilience (addressing robustness, adaptability and transformability). On this basis, we derived six principles for a resilience-fostering enabling environment.

Principle 1: When a FS cannot cope with a challenge to avoid loss of FS functions, the enabling environment – and particularly government – should provide temporary resources to cope with the adverse consequences of the shock, but only to buy time while working on a remedy that addresses the causes of the vulnerability.

Before a system can adapt or transform, it first needs to cope with the challenges at hand to survive. When a system cannot cope with challenges in the short run, it can neither adapt nor transform in the long run, as adaptation requires sufficient resources of all types, i.e., financial, legal, human, social. This principle is already very much being applied in most FSs, often to the extent, however, that it gives rise to the ‘shifting-the-burden’ archetype, whereby all resources are allocated to solving the symptoms. This in turn reduces the pressure to implement more adequate solutions. Hence, in line with the subsidiarity principle, it is important to note that resources from the enabling environment should only be mobilised when a FS cannot cope with itself, for instance because the challenge is too systemic and has too large impacts. Ideally, rules should determine when and when not to intervene. Furthermore, the temporary nature of the compensation is crucial, albeit depending on the type of damage. If the compensation pervades, the incentive to adapt decreases. Hence, these temporary resources should only be used to buy time while working on long-term solutions. An example is an extreme weather event, such as drought. When the drought hits, only coping is possible which justifies the mobilization of resources. However, resources should also be invested into structural solutions that reduce the impacts of droughts, such as the development of drought-tolerant varieties or implementing risk-transferring insurance. To the degree that droughts are related to climate change, mitigation of greenhouse gases should also be part of the solution.

Principle 2: Before shocks occur, resources should be shifted towards building anticipatory capacity as well as responsive capacity, to prevent dependence on external solutions and to increase the future coping capacity of the FS. This should be done jointly by all types of actors in the FS and the enabling environment.

Often, unusual or new types of shocks are regarded as a very exceptional event that does not require systemic changes. However, the occurrence of a severe shock should be used to put the development of anticipatory capacities on the agenda. Too often, actors limit their agenda to alleviating the immediate consequences – if they are too severe to be coped with by the FS (Principle 1) – and to discuss whether the same type of event might occur again. Typical failures are that actors in both the FS and the enabling environment underestimate the

likelihood that a severe event occurs again (e.g., the ‘one-in-thousand-years’ flood event) or that they focus on responses to a narrow range of possible shocks from well-known types of events. Instead, actors should increase resilience to a range of possible and accumulating shocks through enhancing adaptability and transformability. Besides anticipatory capacities, responsive capacities should be built.

Examples from the case studies include responses to extreme weather events and price drops. Experiences from previous shocks can be used to better cope with the challenge next time (also by better anticipating the challenge) and to prepare adaptation strategies. Such a pattern can be observed in the EU dairy sector: the first price drop in 2007 was largely unexpected, but the next price drops were better anticipated and more coping strategies (e.g., financial futures instruments) and adaptation or transformation strategies (e.g., shift to organic farming) were applied. However, this only occurred after the third price drop, and, in between, time and resources were lost. Private sector involvement (e.g., the development of distribution channels for organic produce) is important to ensure that these strategies are economically feasible.

Principle 3: The enabling environment should assist the FS to detect, assess and address long-term trends that challenge the future resilience of the FS in a way that increases future robustness, including through adaptation or transformation to that trend in the long run.

To avoid an eroding-goals pattern, trends should not only be detected, but their potential impact on the future resilience of the FS should also be forecasted in order to raise awareness and create a sense of urgency to invest resources in adaptation rather than in the status quo. This can help to enhance robustness vis-à-vis identified challenges, which often requires the implementation of adaptations or transformations. If FS actors have insufficient resources to invest in such anticipatory capacity, public-private investment is needed. However, private actors should be convinced of the importance of foresight activities. Communication should be improved not only regarding identified challenges but also regarding the potential of possible solutions. An example of this principle has been the consistent approach of the Swedish government towards raising environmental standards in the poultry sector.

Principle 4: The enabling environment should foster a potential diversity of responses, rather than focusing too much on a limited set of actions.

It is important to keep options open and set up learning experiments related to a wide set of structural solutions for several reasons. First, resilience tends to thrive with diversity. Second, focusing on one particular strategy may backfire if the strategy turns out to have negative consequences. Keeping options open and fostering a diversity of potential options does not inherently mean that the actual response should be diverse, as sometimes coordinated action might be preferred. However, the diverse potential of possible solutions should be regarded, instead of focusing only on a limited set. This also refers to Principle 6, which considers a more systemic in-depth analysis of the root causes of challenges on the one hand, and the vulnerability of the FS to these challenges on the other hand. A too superficial analysis of the problem (or even a deliberate redefining of the problem) can cause blindness for possible solutions. For instance, government agencies may request advisory services to analyse multiple strategic options in the framework of the CAP's support for advice.

Principle 5: The ensemble of the FS and its enabling environment should develop a sufficient degree of ambidexterity, i.e., find a balance in putting resources in immediate versus future challenges.

Since structural solutions require time, there is a danger of underinvestment in such solutions. Therefore, a good balance should be achieved between investing resources in strategies enhancing coping capacity of FS on the one hand and in strategies enhancing responsive (and thus future coping) capacities on the other. Unhealthy patterns are situations in which resources are invested in coping strategies only or when decisions are made without having sufficiently invested in adaptation strategies, such as in the neonics and Brexit case in the UK, because this situation can lead to shifting-the-burden problem, whereby the problem returns, possibly even more severe. A healthier pattern occurs when the enabling environment provides the right incentives for adaptation, while spending enough resources to overcome temporary income losses following, for instance, stronger regulation. Examples include the Swedish poultry FS and the French beef FS, where supply chain actors assist the FS by developing quality labels leading to price premiums.

Principle 6: A more systemic, data-driven and in-depth analysis of the root causes of challenges on the one hand and of the drivers of FS vulnerability to these challenges on the other hand needs to be carried out, to avoid a redefinition of the problem and the implementation of solutions that do not fix the real problem.

Often, the identification of solutions to deal with challenges is already largely determined by how the challenge itself and the reasons for vulnerability to the challenge are defined. Such redefinitions (or too superficial definitions) of the challenge lead to fixes that do not solve the real problem, or do only temporarily, and hence lead to archetypes like fixes that fail or to the problems associated with the success to the successful archetype. The advice would be to detect the root causes of the symptoms, which can lead to real solutions that increase FS resilience.

18.5 From Principles to Recommendations

The systems analysis has led to six principles to guide FSs and enabling environment actors on how to stimulate resilience. Translating these principles into concrete recommendations needs to be done through a regional and/or FS-specific approach. Recommendations will mainly relate to actors, resources and institutions. Actors are those within the FS and within the environment of the FS. These actors make decisions on how to use resources (e.g., financial resources, human capital, social capital) and several principles refer to these decisions. Principle 1, for instance, suggests that resources should be used less for symptom-oriented solutions and more for causal solutions. Institutions include formal (e.g., regulation, policy instruments, directives) and informal institutions, which are socially shared rules, usually unwritten and created and enforced beyond formal channels. They can refer to attitudes, routines, ideologies and habits, especially regarding how actors interact with each other. These institutions influence either directly or indirectly which decisions actors are making, amongst others with respect to the use of resources. Hence, concrete recommendations for implementing the principles in practice will also include recommended changes to formal and informal institutions.

The approach for moving from principles to recommendations should be on co-creation with the variety of actors that are relevant for a specific FS, and its approach has to be based on the guidelines of a policy dialogue (see Wauters et al., 2021). A policy dialogue is part of the policy- and decision-making process and intends to develop and/or implement a change following a round of evidence-based discussions/workshops/consultations on a particular subject. Policy dialogues bring diverse interest groups to the table, focus on a regulatory, policy,

or planning issue that is of common interest, and seek to formulate practical solutions to complex problems. Policy dialogues, often called roundtables or task forces, are not entirely new, and are in some countries even common practice. We advocate to set up a resilience-enhancing policy dialogue gathering all relevant actors from a FS and its environment.

Several success factors for an effective policy dialogue have been described in the literature (e.g., Dovlo et al., 2016). First, they should have a collectively agreed-upon purpose, in this case, improving the resilience of FSs. It is further important that the issue be 'ripe', meaning that all stakeholders around the table have experienced or at least observed the problem sufficiently and have become frustrated by repeated manifestations of the issue. This means that a policy dialogue to improve the resilience of FSs – hence to improve its anticipating capacities, coping capacities (robustness) and responsive capacities (adaptability and transformability) – should not be confused with a policy dialogue to stimulate adaptations and/or transformations to improve its sustainability. Convincing stakeholders that supporting resilience is more than supporting robustness and protecting the status quo, through evidence and data, will be crucial, otherwise the policy dialogue will not be based on a common understanding of the problem and a shared goal. This aspect will likely be the most critical part of a policy dialogue, since some of the identified system archetypes and the proposed principles suggest that actors will find it difficult to agree on what the issues are and hence what the proposed solutions need to be. Principle 6, for instance, suggests that often too superficial an analysis or even a deliberate reframing of the problem is being done, leading to fixes that fail. The identification of the widespread existence of the system archetype 'eroding goals', whereby actors devote resources to downplaying societal pressure and political restrictions, suggests that not all actors agree that the fundamental issue that challenges their resilience is that the FS does not comply with societal expectations, but rather the societal expectations themselves.

Second, it is imperative that the preparation of the policy dialogue include the gathering of information and data. The presentation of these data can give rise to the co-creation of evidence through a reflection process in which the data is interpreted in a collaborative manner. As such, the co-produced evidence will help justify the implementation of change, referring to the point earlier, and will help in

identifying possible directions of change. The evidence for a policy dialogue to improve the resilience of FSs should be based on a systemic assessment of resilience in its many forms, as described in the framework for analysing resilience by Meuwissen et al. (2019), of which many examples can be found in this book. Specific attention should be given to enhancing trust in data and evidence through improving its quality, internal and external validity and reliability, to avoid different stakeholders using certain evidence to support their own position and disregard or even discredit evidence that is not in favour of their position.

Third, the policy dialogue should be formalised and have a commonly agreed time frame. It should be formalised in order to stimulate subsequent implementation of the changes so that it does not remain a voluntary exercise. An a priori agreed time frame will help in setting priorities, devoting resources and keeping stakeholders engaged. There can (and should) be room for informal dialogues and working groups outside the formal channels and meetings but they should all feed into the formal processes. It should avoid taking decisions outside the official platform.

Fourth, a monitoring and evaluation framework should be agreed upon in order for stakeholders to be able to monitor progress, receive early feedback and observe results of the implemented changes (Bijttebier et al., 2021). The policy dialogue should be used to agree on desired changes and key performance indicators as measures of success. The monitoring and evaluation framework should pay attention not to privilege interests that can easily be linked to clearly measurable – and often pre-existing – indicators, such as profits or production volumes, but also consider aspects such as social well-being, biodiversity and mental health.

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