

Contingency planning: A framework for dealing with contingencies in food security



**Eco
Ready**

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Executive Summary

This report has been prepared within the European project ECO-Ready and is published as deliverable 5.2 of the project. It deals with the challenge of providing a framework for contingency planning related to food security and biodiversity which (a) can support the cooperating Living Labs of the project in developing their own contingency plans and (b) will be used in digital format in service offers provided within the observatory created through the project.

Contingency planning deals with short term, suddenly emerging situations which require immediate **'contingency actions' for 'repair'**. It is complementary to a long-term approach, enabling to anticipate and mitigate shocks intensity, improving overall the resilience of the food system. A typical complementary long-term approach would reflect on preservation and investment towards biodiversity within our production models. In following up on this view, the report places primary focus on contingency planning for assuring responses to short term threats.

For meeting the challenge, the report is divided into 2 parts. The first part (Part A) provides the basis for the framework through an analysis of documentations dealing with contingency planning in the context of the project prepared within the European Community, other international organizations and selected scientific literature. As has been mentioned by Rudloff et al. (2012), **contingency planning is a "puzzle of existing approaches" which makes it difficult to reach a coherent view.** However, when analyzing the different views it becomes apparent that the principal understandings are quite similar and differences are primarily due to differences in focus, priorities, and detail of planning concepts. It concludes with a summary of experiences from international planning processes related to food security which are pre-conditions for a successful engagement in a planning process outlined in part B of the report.

The discussion in Part B transforms the conceptual framework into a managerial concept and develops (1) a scheme for a hands-on planning process and (2) a guide for developing contingency plans by groups with contingency planning responsibility and in case of the project, the Living Labs cooperating with the project. This part outlines a stepwise planning process with 4 functional process lines and discusses issues for consideration in moving through the functional process lines. The overview discussed in part A provides the basis on which the stepwise planning process is organized. A process issue asking for coordination of activities can link up with coordination discussions in policy documents analyzed in part A.

In providing guidance on principal sources of information for use in the stepwise planning process, traditional sources like databases, stakeholder involvement, and expert knowledge can be complemented, with appropriate care and for a very first impression only, with feedbacks from recent developments of Large Language Models (LLM) from Artificial Intelligence. Their use still requires appropriate expertise in search as well as in evaluation of feedbacks, but we need to acknowledge that they are here to stay. The report includes some examples for raising awareness of the support potential of LLMs but also of the reservations and limitations in their use.

This report is linked to an internal supplement for Living Labs where an initial contingency plan for a selected scenario is developed demonstrating the potential of interacting with LLMs making people aware of the potential but also of the paramount need for critical reflection and evaluation.

Disclaimer

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Table of content		page
Executive summary		3
Table of content		4
Part A	Conceptional Basis for the Contingency Planning Framework	6
1	Introduction into conceptional basis	6
2	European policies and guidelines on food contingency planning	7
	2.1 Farm to Fork Strategy and related guidelines	
	2.2 Common agriculture and fisheries policies	
	2.3 EU Biodiversity strategy for 2030	
3	Food system, food security and biodiversity - conceptual relationship	14
	3.1 Studying interactions of food systems with environmental change	
	3.2 The integrated model	
4	Crises in the food system and in food security	18
	4.1 Crises in food systems	
	4.2 Food crises, food emergencies, and famines	
5	Contingency planning initiatives	22
	5.1 Contingency planning beyond food security	
	5.2 Contingency planning focused on crises in food systems	
	5.3 Planning responses through adaptive social protection systems	
	5.4 Planning anticipatory actions to increase opportunity	
	5.5 Lesson learned in contingency planning for food security	
6	Conclusion and Reflection	32
Part B	Moving from Framework to Practical Use	33
7	Moving towards practical use	33
8	Basic Framework of contingency planning components	34
	8.1 Introduction	
	8.2 Contingency and resilience	
	8.3 The components of a basic framework model	
9	Organizational Environment of Risk Management	38
	9.1 Early Warning System	
	9.2 Coordination of actors and mechanisms in risk management	
	9.3 Target groups	
10	Risk Management	43
	10.1 Identification of future risks	
	10.2 Risk analysis	
	10.3 Management of risks	
11	Towards a Hands-on Contingency Process	48
	11.1 Overview	
	11.2 Utilizing expert judgement and LLM support	

Table of content (continued)		page
12	Implementing the Operational Process: Hands-on	51
	12.1 The basic operational process	
	12.2 Focus activity 1: region, target group, product, and hazard	
	12.3 Focus activity 2: actors and activities	
	12.4 Focus activity 3: costs and benefits incl. balancing of negative side effects	
	12.5 Focus activity 4: coordination	
	12.6 Coordinated information collection	
13	The CANVAS Documentation Scheme	59
	13.1 The documentation templates	
	13.2 Link between contingency process and CANVAS documentation	
	13.3 Interacting with LLMs	
	13.4 Useful documentary templates	
	13.5 Consolidated contingency planning scheme	
14	Conclusion	65
	References	67
	Appendices	73
	Table of content	73
	Appendices Part A	74
	A1: EU guidelines related to Farm to Fork Strategy	74
	A2: EU guidelines related to CAP and CFPs	81
	A3: EU biodiversity strategy for 2030	83
	A4: Contingency planning guidelines with focus on food security	84
	A5: Contingency planning with focus on food crises	86
	A6: The Farm to Fork strategy and its subsequent documents	88
	A7: Agriculture and fishery policy, related documents	89
	Appendices Part B	90
	B1: Operational process	90
	B2: The CANVAS documentation scheme	93
	B3: Interaction with LLM during operational process	99
	B4: Examples of LLM feedback related to operational process	104
	B5: Documentary templates (examples)	117

1 Introduction into Conceptual Basis

This part of the report aims at assuring that the contingency planning concepts developed in this report are in line with the present status of contingency views in the European Commission and related international organizations which have published extensively regarding the food system, its resilience and the need for being prepared for contingencies in food security. The analysis is complemented by an incorporation of basic literature serving these documents.

The selection and analysis of documents and literature distinguishes between four different groups:

1. Document focus: European views on food security and contingencies. The first group (chapter 2) does focus on European documents with relevance for food security and contingency. The analysis is based on an inventory of European Union guidelines and documents divided into three categories encompassing

- a) documents directly related to food security (Chapter 2.1),
- b) documents related to strategies on agriculture and fisheries (Chapter 2.2), and
- c) documents related to the Biodiversity Strategy (Chapter 2.3).

The analysis categorizes views and concepts related to contingency planning according to the priorities of the *Sendai Framework* (UNISDR, 2015) and provides detailed summaries in extended appendices.

2. Document focus: Model of a comprehensive Food Ecosystem. The second group (chapter 3) **basis its discussion on the project's understanding of** (1) the complexity of maintaining food security and (2) the need for identifying visible and hidden factors that may influence food accessibility and the economic stability of food producers. Integrating this understanding into a common view on the food system, the chapter introduces an established model for the food ecosystem, its drivers and its outcomes as a socio-ecological system that is further used throughout the document.

3. Document focus: Crises in food security. The third group (chapter 4) discusses views of crises with relevance for food security in Europe. It links food security shocks (contingencies) with possible crises in the food system which, in turn, might be triggered by changes in external drivers. It introduces levels (scales) of severity of food security crises from a global perspective expressed in terms of livelihood and specifies urgencies in mitigation activities. This approach will later be used in the hands-on contingency planning process and in decisions on how and when to act.

4. Document focus: Contingency planning concepts and experiences. The fourth group (chapter 5) places the focus on contingency planning concepts and operations discussed in European and international organizations. It differentiates between concepts targeted directly to food security and concepts with a broader perspective. It introduces *adaptive social protection systems* as a concept for structuring contingency plans and the concept of *anticipatory action* as a trending topic in the development of responses to emergencies and crises. Experiences from using contingency planning for food security in international organizations provide lessons for establishing new contingency schemes.

2 European Policies and Guidelines on Food Contingency Planning

In alignment with the *Sendai Framework directives on Disaster Risk Reduction Preparedness* (UNISDR, 2015; p. 21), the European Union has established a set of regulations and guidelines to ensure food security for European citizens during crises affecting the food system.

This chapter specifically examines the aspects of European guidelines aimed at contingency response planning for crises impacting food systems, with a focus on ensuring short-term food supply and security in the European Union. The review of these documents underpins the development of the Contingency Planning Framework, detailed in Part B of this report, assuring its alignment with European standards.

The EU's goal of achieving a climate-neutral society by 2050 is outlined in the *Green Deal* (EC, 2019), a policy encompassing expectations, strategies, and plans for a more environmentally and socially sustainable society. It is anticipated that all EU policies, strategies, plans, and programs will contribute to achieving this vision.

This report has selected several major policy sets, crafted in alignment with the Green Deal, for a detailed analysis concerning their consideration of contingency planning for food-related crises. These include (figure 2.1):

1. The *Farm to Fork Strategy* (EC, 2020a) and associated documents,
2. The *Common Agricultural Policy* (EC, 2022a) and *Common Fisheries Policy* (EC, 2023b, 2023c), along with related documents,
3. The *Biodiversity Strategy for 2030* (EC, 2020b; 2020c).

The analysis is based on the analysis proposal provided by the *Sendai Framework* (UNISDR, 2015) which identifies four Disaster Risk Reduction (DRR) priorities (UNISDR, 2015, p. 9):

1. Understanding disaster risk;
2. Strengthening disaster risk governance to manage disaster risk;
3. Investing in disaster risk reduction for resilience;
4. Enhancing disaster preparedness for effective response, with a focus on 'Building Back Better' in recovery, rehabilitation, and reconstruction.

The analysis utilizes the priorities one, two, and four of the Sendai Framework as a classification tool in the analysis tables throughout this chapter referring to them as *Sendai DRR 1*, *Sendai DRR 2*, and *Sendai DRR 3*.

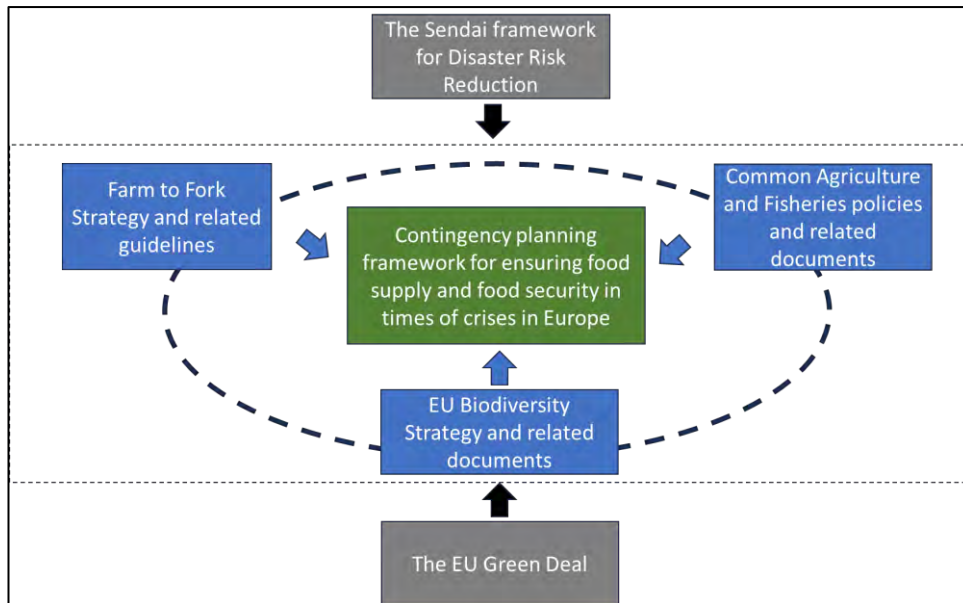


Figure 2.1. The EU contingency planning framework and aligned sets of guidelines (Source: authors)

2.1 Farm to Fork Strategy and related guidelines

The *Farm to Fork Strategy* for a fair, healthy, and environmentally friendly food system (EC, 2020a) emphasizes long term strategies for resilience of the food system.

For short-term contingency planning, 4 directives are provided (EC, 2020a; pp. 12-13):

1. Enhance the “*...coordination of a common European response to crises affecting food systems in order to ensure food security and safety, reinforce public health, and mitigate their socioeconomic impacts within the EU...*”.
2. Develop a “*...contingency plan for ensuring food supply and food security to be put in place in times of crisis...*”.
3. Revitalize the “*...Agricultural Crisis Reserve to its full potential...*” to be used during agricultural market disruptions.
4. Establish a “*...food crisis response mechanism coordinated by the Commission and involving Member States...*”.

In its commitment of developing a contingency plan for food supply and food security and the implementation of a supranational mechanism for coordination in case of crises affecting the food systems in Europe as defined in the *Farm to Fork strategy* (EC, 2020a), the European Commission has further developed its approach involving expert panels (Matthews, 2021) and the publication of further documents. Figure 2.2 illustrates the relationships among these documents with an enlarged version accessible in appendix A6.

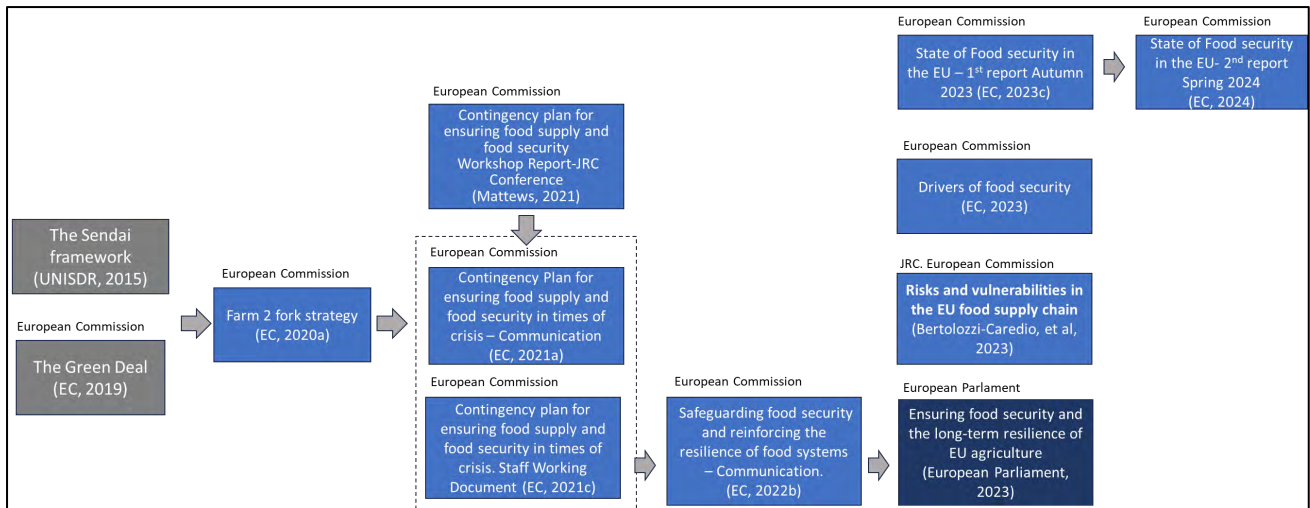


Figure 2.2. The *Farm to Fork* strategy and its subsequent documents (Source: Authors)

2.11 Document overview

The documents include an *EC Communication* (EC, 2021a) and its accompanying *Staff Working Document* (EC, 2021c) with further guidance directed to the European Parliament and the European Council.

Building on these documents, the European Commission developed a *Communication* focused on bolstering food system resilience to protect food security (EC, 2022b). In addition, the *European Food Security Crisis Preparedness and Response Mechanism* (EFSCM) has published two versions of its report on *State of Food Security in the EU* (EC, 2023c, 2024), detailing the current food security landscape.

In 2023, the European Commission released documents examining food security drivers (EC, 2023) and assessing risks and vulnerabilities within the EU food supply chain (Bertolozzi-Caredio et al., 2023). Furthermore, the European Council issued a resolution on *Ensuring Food Security and Long-term Resilience of EU Agriculture* (European Parliament, 2023).

Most of these documents focus primarily on resilience (long term) aspects of food security assurance against changes in external drivers. However, they still introduce some aspects related to contingency planning which are summarized in the tables of this chapter. An exception are a few documents which focus specifically on contingency planning such as EC (2021c, 2021a) and Matthews (2021).

2.12 Document analysis

Table 2.1 (and the extended version in appendix A1) summarizes key issues from the *Farm to Fork Strategy* and its subsequent documents in relation to the 3 selected Disaster Risk Reduction (DRR) priorities derived from the *Sendai Framework* (UNISDR, 2015, p. 9). The issues can be summarized as follows:

1. **Sendai DRR 1:** Effective contingency planning for food security begins with risk analysis to identify and understand vulnerabilities within the food system. Literature mentioning ‘drivers of food security’ commonly highlights how sudden or evolving changes in these

interconnected drivers can create hazardous situations in the food system with potential for food security crises for affected populations.

While Europe’s food system is generally robust and a net exporter, making widespread food crises unlikely, the impact of rising prices often affects economically vulnerable communities who cannot absorb price increases. Thus, while the common market benefits most EU citizens, some groups remain at risk. These and other potential vulnerabilities within the EU food system have been thoroughly analyzed (EC, 2021c, pp. 28-43).

Table 2.1

Guidelines collected from the Farm to Fork strategy and its subsequent documents structured along the 3 selected Sendai DRR priorities (Source: authors)

Sendai DRR 1: Understanding disaster risk
<ul style="list-style-type: none"> Identify the threats, risks and vulnerabilities of the food system (EC, 2021c) List and detailed analysis of drivers of food security (EC, 2023a) Crises affecting the food systems, can/cannot create a food crisis (EC, 2020a) Europe is a net food exporter with some exceptions (EC, 2021c) Food supply (availability) is not a current problem; however, “food affordability for low-income persons is” (EC, 2022b) Potential vulnerabilities on the EU food system (EC, 2021c, pp 28-43)
Labour is fundamental to supply chain functionality (Matthews, 2021; EC, 2021a, 2024)
Early warning systems have been developed in the EU (Matthews, 2021) (EC, 2021c): Market imbalances should be monitored and quickly addressed (EC, 2021a)
Sendai DRR 2: Strengthening disaster risk governance to manage disaster risk
<i>“...A food crisis response mechanism coordinated by the Commission and involving Member States...”</i> (EC, 2020a)
Communication and coordination with international organizations like FAO, OECD, etc. (EC, 2021c)
Ex-ante and ex-post coordination (Matthews, 2021)
<i>“...Planning should focus on coordination and coherence...”</i> (Matthews, 2021) (EC, 2023c)
<i>Contingency planning should be seen as a continuous process with the aim to build crisis management capabilities”</i> (EC, 2021c)
A collaborative approach between all public and private parties being part of the food supply chain is crucial (EC, 2021a, 2021c)
Sendai DRR 3: Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction
Institutional currently functioning mechanisms are key for planning responses (EC, 2021a, 2021c, 2022b):
<ul style="list-style-type: none"> Regulations, alert systems, contingency funds, frameworks for crisis management and mechanisms Policies and strategies (EC, 2021c) The Agricultural crisis reserve (EC, 2020a) Single Market Emergency Instrument (EC, 2022b)
Tax exemptions (EC, 2022b)
<i>“...Particular attention should be given to the most vulnerable...”</i> (EC, 2022b, 2023c, 2024)
The main capability for crises response in EU is the common market (EC, 2021c)
<ul style="list-style-type: none"> Keeping trade open (Matthews, 2021)
Responses should be sustainable economically, environmentally, socially (Matthews, 2021; EC, 2021a))
Additional allocation of funds from government besides normal transfers (Matthews, 2021)
Business responses are a key element (Matthews, 2021)
Effective social protection instruments as safety nets are critical to minimize food security impacts (Matthews, 2021)
<i>“...early, regular and transparent communication to the stakeholders and the public is necessary...”</i> (EC, 2021a):

2. *Sendai DRR 2*: The European Commission has established a *Food Crisis Response Mechanism* coordinated by the Commission and involving Member States and has emphasized disaster risk management governance. In line with these efforts, early and coordinated communication between the public, key stakeholders in the food value chain, and international organizations (such as FAO and OECD) has been prioritized to enhance transparency and coherence in contingency planning (Matthews, 2021; EC, 2020a, 2021c).

3. *Sendai DRR 3*: In preparing effective responses, it is essential to understand established European mechanisms (EC, 2021a, 2021c, 2022b), including regulatory frameworks, alert systems, contingency funds, crisis management frameworks, as well as policies and strategies (EC, 2021c) including the *Agricultural Crisis Reserve* (EC, 2020a) and the *Single Market Emergency Instrument* (EC, 2022b).

With the *Common Single Market* serving as the primary source of food resilience in the EU, keeping trade routes open is crucial, especially for vulnerable populations. Thus, a pragmatic approach considering social, economic, and environmental sustainability that incorporates social programs (e.g., safety nets) and business continuity plans from private actors is essential for sustainable, effective responses.

Appendix A1 provides a detailed table of relevant comments and excerpts from analyzed documents that the authors deem crucial for contingency planning to ensure food security and supply during crises.

2.2 Common agriculture and fisheries policies

Following the publication of the *European Green Deal* in 2019, various policies and regulations related to EU agriculture and fisheries were developed and published (figure 2.3 with an enlarged version in appendix A7).

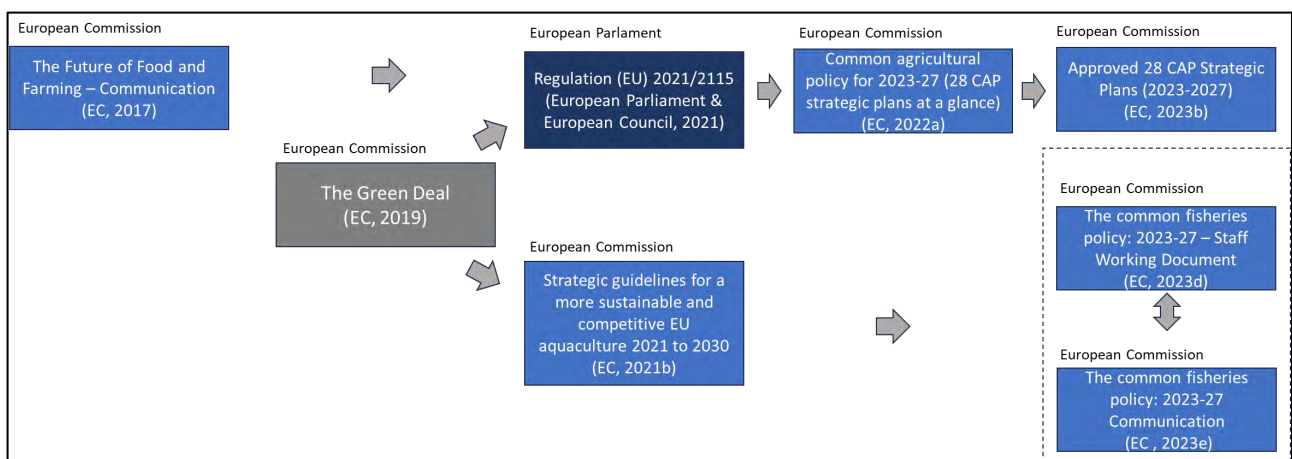


Figure 2.3. Agriculture and fishery policy, related documents (Source: authors)

The *Future of Food and Farming* document (EC, 2017) sets the strategic foundation for agriculture, followed by *Regulation (EU) 2021/2115*, which established rules on strategic plans by Member States under the *Common Agricultural Policy* (CAP) (European Parliament & European Council, 2021). Additional documents, such as the *Common Agricultural Policy*

Strategic Plans at a Glance (EC, 2022a) and the *Approved 28 Strategic CAP Plans* (EC, 2023b) were subsequently aligned with this regulation.

Similarly, the analysis of fisheries and aquaculture policies began with the *Strategic Guidelines for a Sustainable and Competitive EU Aquaculture* (EC, 2021b), leading to the publication of documents on the *Common Fisheries Policy* (EC, 2023d; 2023e). These policies largely aim to bolster the resilience of the EU food system, with limited references to contingency planning.

Table 2.2 (and the extended version in appendix A2) presents key issues from the agricultural and fisheries policies that could be linked to the design of the Contingency Planning Framework.

Table 2.2.

Guidelines derived from agriculture and fishery policy documents structured along the 3 selected Sendai DRR priorities (Source: authors)

Sendai DRR 1: Understanding disaster risk
“ <i>the high prices of energy and inputs and the disruptions in trade flows due to the geopolitical context and how these factors have had an impact on implementation of the CFP...</i> ” (EC, 2023d)
Main forms of pollution of marine ecosystems are described in EC (2023d): <ul style="list-style-type: none"> • <i>eutrophication (excess of nutrients pollution/ agricultural runoffs);</i> • <i>contaminants (chemicals, pesticides, heavy metals, toxins);</i> • <i>underwater noise (oil drilling, shipping); marine litter (plastic, wood, metal etc)</i>
Sendai DRR 2: Strengthening disaster risk governance to manage disaster risk
Producer Organizations in the aquaculture sector can be of great help in terms of a participative contingency planning process (EC, 2021b)
“ European Market Observatory for Fisheries and Aquaculture ” (EC, 2023d)
Sendai DRR 3: Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction
Institutional currently functioning mechanisms are key for planning responses (EC, 2021a, 2021c, 2022b): <ul style="list-style-type: none"> • Funds: European agricultural guarantee fund (EAGF) • Instruments: Recovery and Resilience Facility (RRF) or the European Structural and Investment Funds (ESIF)
Effective (with strong information systems and delivery mechanisms) policy instruments as the CAP are critical to minimize impacts on agricultures (EC, 2017) (European Parliament & EC, 2021) and compensate operators in the fishery and aquaculture sectors (EC, 2023d)
The New CAP introduces conditioning to green practices the receiving of direct payments (EC, 2017, 2022a)
Finance agricultures participation in the development of risk management tools (insurance, fund, etc.) through direct payments (European Parliament & EC, 2021)
Farm advisory services should include risk prevention and management tools (European Parliament & EC, 2021)

The issues can be summarized as follows:

1. **Sendai DRR 1:** Understanding the complexities of disaster risk is crucial to food security, especially considering elevated costs of energy and materials and the disruptions in trade caused by geopolitical factors. These elements have significantly influenced the implementation of the *Common Fisheries Policy* (CFP), as highlighted by the European Commission (EC, 2023d). Additionally, there are several major pollutants affecting marine ecosystems, such as nutrient overload from agricultural runoff,

chemical contaminants like pesticides and heavy metals, underwater noise from oil drilling and shipping, and marine litter including plastics and metals.

2. *Sendai DRR 2*: To effectively manage these risks, reinforcing disaster risk governance is essential. As indicated by the European Commission, producer organizations (EC, 2021b) or the *European Market Observatory for Fisheries and Aquaculture* (2023d) can play a vital role by participating in the contingency planning process.

3. *Sendai DRR 3*: Improving disaster preparedness to ensure an effective response and to facilitate recovery and reconstruction requires robust institutional mechanisms, as outlined by the European Commission (EC, 2021a, 2021c, 2022b) which specifies a.o. financial support through the *European Agricultural Guarantee Fund (EAGF)* and instruments such as the *Recovery and Resilience Facility (RRF)* or the *European Structural and Investment Funds (ESIF)*.

Crucial policy instruments such as the *Common Agricultural Policy (CAP)* are necessary to mitigate impacts on agriculture and to compensate those in the fisheries and aquaculture sectors (EC, 2017; European Parliament & EC, 2021). The reformed CAP emphasizes the importance of adhering to green practices to qualify for direct payments (EC, 2017, 2022a) and to provide funds for the development of risk management tools for farmers, such as insurance schemes and funds (European Parliament & EC, 2021). In addition, advisory services should encompass tools for risk prevention and management (European Parliament & EC, 2021).

2.3 EU biodiversity strategy for 2030

The *EU Biodiversity Strategy for 2030* (EC, 2020b; 2021d) seeks to halt and reverse biodiversity loss across Europe.

- The strategy rests on four pillars:
1. Protecting nature within the EU;
 2. Restoring nature across the EU;
 3. Enabling transformative change;
 4. Fostering a global biodiversity agenda.

Given the European food system's reliance on natural resources and its role in biodiversity loss, a review of documents related to these pillars identifies relevant elements for the Contingency Planning Framework (figure 2.4).



Figure 2.4. The EU Biodiversity strategy in relation with contingency planning for ensuring food supply and food security in times of crises in Europe (Source: Authors)

Table 2.3 (and the extended Version in appendix A3) presents key issues from the *EU Biodiversity Strategy for 2030* relevant to the framework's design.

Table 2.3.
Guidelines collected from the EU’s Biodiversity strategy structured along the 3 selected Sendai DRR priorities (Source: authors)

Sendai DDR 1: Understanding disaster risk
“Biodiversity loss threatens our food systems, putting our food security and nutrition at risk” (EC, 2020b)
“The biodiversity crisis and the climate crisis are intrinsically linked” (EC, 2020b)
Sendai DDR 2: Strengthening disaster risk governance to manage disaster risk
None
Sendai DDR 3: Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction
None

Although biodiversity is acknowledged as being linked to food system sustainability and food security, the focus of the *EU Biodiversity Strategy* is primarily on the long-term transformation of European food systems to improve resilience and biodiversity and to reduce negative impacts on biodiversity. Few elements are immediately relevant to contingency planning.

Biodiversity loss is recognized as a potential hazard impacting food systems and, ultimately, food security in a longer horizon. Diversity among species of animals or plants is vital for complex food production ecosystems of feed and food production, offering essential services such as pollination and predator-prey but also a variety in genetic characteristics that enhance, e.g., crop adaptability and productivity.

As changes in climate patterns are closely linked with crises of biodiversity the following chapter analysis conceptual relationships between the food system, food security, and biodiversity.

3 Food System, Food Security and Biodiversity - Conceptual Relationship

The ECO-Ready project *Achieving Ecological Resilient Dynamism of the European Food System through Consumer-Driven Policies* (ECO-Ready Consortium, 2022) explores the resilience of food systems by addressing both, immediate issues and long-term challenges. While consumer-driven policies are essential for long-term resilience, they are beyond the immediate scope of short-term contingency planning, which is the focus of this report.

The concept of "resilient dynamism" is defined as the ability to manage both urgent challenges and prolonged issues simultaneously (ECO-Ready Consortium, 2022; p. 3). In this context, contingency plans act as tools to realign food systems when ecological problems **disrupt the system’s internal balancing mechanisms, potentially impacting food security.**

Key objectives 1 and 2 within the project emphasize food security and its influencing drivers as focal points for study and analysis. The introductory project overview highlights this perspective, stressing the complexity of maintaining food security, which results from

a multifaceted balance of factors. The project underscores the need to identify both, visible and hidden factors influencing food accessibility and the economic stability of food producers (ECO-Ready Consortium, 2022, p1):

Food security in Europe relies on a complex holistic equilibrium that is the outcome of a multifactorial balance. To provide counterbalance and ameliorate the damaging effects on food accessibility for consumers, as well as the economic protection for producers [in the cases it endangers food security in the short term], there is a compelling need to identify and quantify evident and hidden factors while quantifying their overall influence.

To effectively support food security, the project seeks to mitigate the adverse effects of climate change on external factors which have an impact on the food system, particularly agricultural components. This asks for a holistic approach based on a common understanding of the food system as a pre-condition for ensuring the economic well-being of all food system stakeholders.

A common understanding of the food system is vital for creating a framework for contingency planning which could positively influence the system and its expected outcomes. It could be captured in conceptual models which characterize the food system, its drivers, and its outcomes including food security.

3.1 Studying interactions of food systems with global environmental change

A framework of interactions of the food system with global environmental change has been presented by Ericksen (2008). It links environmental and socioeconomic variables with natural drivers that affect food system stability and its ability to deliver outcomes, including food security, environmental health, and social welfare (figure 3.1).

Ericksen's (2008) normative approach posits an equilibrium between three primary outcomes: food security, environmental welfare, and social welfare, emphasizing sustainable food systems. Biodiversity is included as a vital environmental driver within the *Global Environmental Change (GEC)* in Ericksen's approach, highlighting its influence on food system stability.

Ericksen's conceptualization has been simplified in Oxford Martin Program's framework on the *Future of Food* (2024). It allows the linkage of principles to the development of the contingency planning framework. It centers on food security as the primary outcome of a resilient food system integrating natural drivers into the broader category of '**Global Environmental and Climate Drivers (GEC)**'. **We build on this** concept but complement it with socio-economic driver feedbacks which are omitted in the Oxford framework (figure 3.2). This balanced view on drivers is in line with the extensive review of external drivers of food security in the European Union as outlined in the document *Drivers of Food Security* (EC, 2023a).

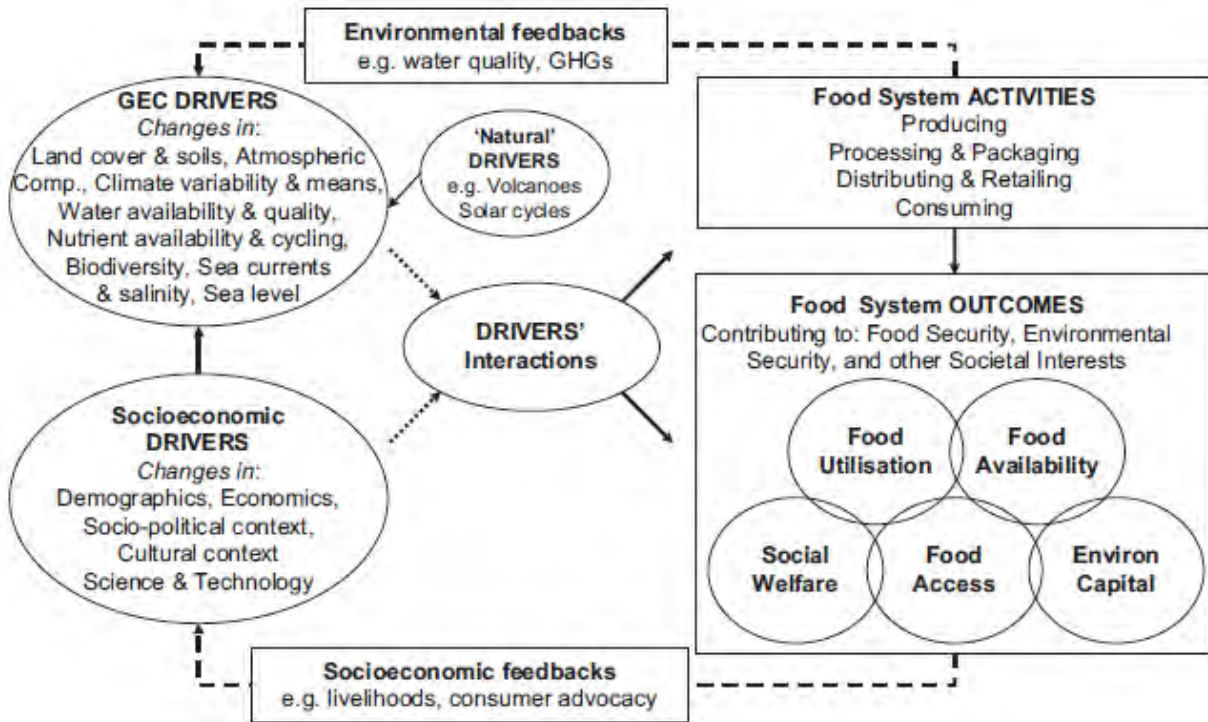


Figure 3.1. Conceptual framework for studying the interactions of food systems with global environmental change (Source: Ericksen, 2008)

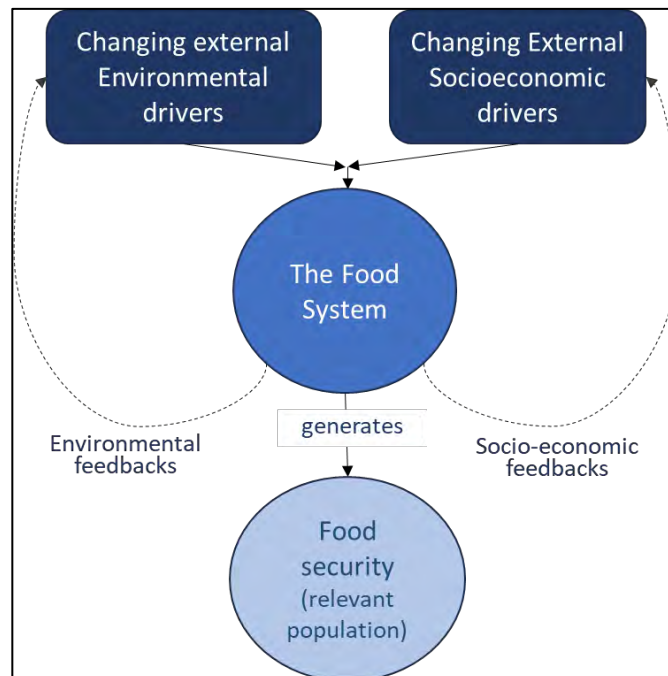


Figure 3.2. The Food System, its drivers and food security as its main outcome (Source: Authors, adapted from Oxford Martin Program on the Future of Food (2024) and Ericksen (2008))

3.2 The integrated model

The integrated model outlined in figure 3.2 establishes links between the food system, environmental and socioeconomic drivers, and food security.

3.21 The Food System

The European Commission's definition of food systems (EC, 2021a), originates from Von Braun et al. (2021) as

Food systems encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and food industries, and the broader economic, societal and natural environments in which they are embedded.

This concept of food systems including “the broader economic, societal and natural environments in which they are embedded” reflects the need for food systems which are sustainable from an economic, environmental, and social view in order to generate food security for current and future generations (FAO, 2018).

Actors within the food system interact with environmental and socio-economic drivers to achieve their goals, creating feedback loops that can influence environmental and socioeconomic drivers in positive or negative ways. Sustainable and resilient food systems are expected to maintain these feedbacks in a balanced manner.

3.22 Drivers of food security

According to the document *Drivers of Food Security* (EC, 2023), external environmental and socio-economic drivers encompass the following groups:

External Environmental Drivers:

Referred to as *biophysical and environmental drivers* in European Commission documents (EC, 2023a), these include a.o. land cover and soil health, atmospheric conditions (pollution), climate patterns (and climate change), water availability and quality, nutrient availability and cycling, biodiversity, sea currents and salinity, sea level, pests **and diseases**, and **“natural drivers” such as volcanic activity and solar cycles** (Ericksen, 2008; EC, 2023a).

External Socioeconomic Drivers:

These encompass a.o. demographics, economic conditions, socio-political context, cultural factors, science and technology, land use competition, energy and input costs (e.g., fertilizers, pesticides), workforce availability, and access to financing (Ericksen, 2008; EC, 2023a).

Drivers do not operate in isolation; rather, their combined effects on the food system are critical in the analysis and design of resilient food systems. Understanding cascading effects is crucial for hazard analysis within contingency planning activities.

Beyond external drivers, certain drivers inherent to the food system also impact food security, including access to innovation, production intensity, generational renewal, supply

chain performance, food loss and waste, prices, household income, consumer food choices, and trade practices like speculation (EC, 2023a).

3.23 Food Security

The ECO-Ready project's contingency planning efforts adopt the European Commission's definition of food security, suggested in the *Contingency plan for ensuring food supply and food security in times of crisis* (EC, 2021c) and originating from the FAO's Committee on World Food Security stating

“Food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active and healthy life.”

This general view is further specified by the European Commission in EC (2023a, p.4) into 6 dimensions based on 4 dimensions specified by FAO in 2006 (Policy Brief, 2006) including availability of food, access to food (including affordability), food utilization (including quality and diversity), and stability, extended in the Commission document by agency and sustainability:

1. *Food availability* refers to the availability of sufficient quantities of food of appropriate quality, supplied through domestic production, imports or food aid.
2. *Food access* refers to individuals having adequate resources to acquire appropriate foods for a nutritious diet.
3. *Utilisation* **relates to an individual's nutritional well-being** reached through adequate diet, clean water, sanitation, and healthcare.
4. *Stability* is the condition by which the dimensions of availability, access and utilisation are sufficiently met, and in which the whole system is stable, thus ensuring that households are food secure at all times.
5. *Agency* describes **the capacity of the food system's actors to make their own** decisions about food.
6. *Sustainability* is the long-term ability of food systems to provide food security in a way that does not compromise the economic, social, and environmental bases that generate food security for future generations.

While the project acknowledges all six dimensions of food security, the contingency planning view will have its primary focus on the first four of the dimensions which are relevant for immediate crisis response.

4 Crises in Food System and in Food Security

In recent years, the European food system has faced several crises that have stressed food security by disrupting supply and affordability, impacting specific populations, and challenging the economic and environmental sustainability of the system. However, these have not amounted to a generalized food crisis across Europe.

Crises within European food systems often result from environmental or socioeconomic disruptions such as pests outbreaks (Chammem et al., 2018 p 11-12; EFSA & EAB, 2020), armed conflicts (Di Ciommo et al., 2022), natural disasters (EC, 2021e), extreme weather conditions (Toreti et al., 2024), epidemics or pandemics of human diseases (Barcaccia et al., 2020), global supply chain disruptions, economic shocks (Di Ciommo et al., 2022), or even accidents with radiologic materials (Pursiainen, 2020) to mention the most relevant categories.

These events exemplify how external shocks can lead to crises in the food system, which **may or may not translate directly into food security issues, depending on the system's resilience and the effectiveness of contingency actions.**

4.1 Crises in food systems

A crisis in the food system refers to any significant disruption to the food system's balance, caused by abrupt changes in environmental or socioeconomic drivers, or interactions among these drivers, that result in food system stress. Such crises can impact food security, leading to a range of outcomes from minor disruptions to a full-scale food crisis, emergency, or famine (see Table 4.1).

Previous European Commission studies on food systems (Subchapter 2.1) **highlight Europe's dependency on external drivers,** many of which are undergoing rapid or gradual changes. These shifts can destabilize interactions within the food system, potentially endangering food security for targeted populations.

However, not every food system crisis will necessarily impact food security. The degree of **food security impact depends on the crisis's magnitude, the food system's resilience, and the readiness of contingency measures** aimed at mitigating negative effects and fostering a resilient recovery (EC, 2022b; UNISDR, 2015).

4.2 Food crises, food emergencies, and famines

The *Global Report on Food Crises* (GNAFC & FSIN, 2024; p. 1) defines a food crisis as a situation requiring urgent action to protect lives and livelihoods when acute food insecurity surpasses local resources and response capacity. Table 4.1 outlines different stages of acute food insecurity, with emergencies and famines representing the most severe stages.

In 2023, no EU country was classified as experiencing a food crisis. Nevertheless, certain vulnerable households in Europe continue to face food insecurity due to factors like COVID-19, the Ukraine conflict, and environmental disruptions.

While these factors have impacted food security, the resilience of the EU's Single Market has largely shielded Europe from widespread food crises within its borders.

Globally, food crises are more prevalent in regions like Africa, the Middle East, and Central and South America, where drivers of food insecurity often include extreme weather, conflict, and economic instability (GNAFC & FSIN, 2024; p. 12 and figure 4.1).

Table 4.1.
IPC/CH acute food insecurity phase description and response objectives
(Source: GNAFC & FSIN (2024, p 3)).

Phase	Phase description and priority response objectives
Phase 1 None/Minimal	Households are able to meet essential food and non-food needs without engaging in atypical and unsustainable strategies to access food and income. Action required to build resilience and for disaster risk reduction.
Phase 2 Stressed	Households have minimally adequate food consumption but are unable to afford some essential non-food expenditures without engaging in stress-coping strategies. Action required for disaster risk reduction and to protect livelihoods.
Phase 3 Crisis	Households either: <ul style="list-style-type: none"> ▪ have food consumption gaps that are reflected by high or above-usual acute malnutrition; or ▪ are marginally able to meet minimum food needs but only by depleting essential livelihood assets or through crisis-coping strategies. URGENT ACTION required to protect livelihoods and reduce food consumption gaps.
Phase 4 Emergency	Households either: <ul style="list-style-type: none"> ▪ have large food consumption gaps which are reflected in very high acute malnutrition and excess mortality; or ▪ are able to mitigate large food consumption gaps but only by employing emergency livelihood strategies and asset liquidation. URGENT ACTION required to save lives and livelihoods.
Phase 5 Catastrophe/ Famine	Households have an extreme lack of food and/or cannot meet other basic needs even after full employment of coping strategies. Starvation, death, destitution and extremely critical acute malnutrition levels are evident. (For Famine classification, area needs to have extreme critical levels of acute malnutrition and mortality.)* URGENT ACTION required to revert/prevent widespread death and total collapse of livelihoods.

The difference between a crisis as a specific event and a crisis as a process was a subject of discussion in an expert workshop (Matthews, 2021) organized by the European Commission as part of the development of a contingency plan for ensuring food supply and food security in times of crises (EC, 2021c).

Understanding crises as processes offers the advantage of gaining deep insights into how variables within the system evolve and identifying the drivers that trigger crisis events with varying degrees of severity. This approach enables the development of proactive responses, helping to mitigate the risk of a crisis escalating into a catastrophe.

The European Commission (EC, 2022b) has noted that food availability is generally secure within the EU, though food affordability remains a concern for low-income households. **Europe’s** advanced social protection systems are designed to assist these groups by enhancing their access to adequate and safe food. However, disruptions within the food system due to changes in environmental (Ericksen, 2008, p. 241) or other drivers may not always lead to immediate food security issues, as other factors, such as external trade dynamics and financial stability, play a role as well.



Figure 4.1. Drivers of acute food insecurity in countries with food crises in 2023
Source: GNAFC & FSIN (2024, p 12)).

Although a widespread food crisis, emergency, or famine within the EU is unlikely, global geopolitical, environmental, and economic trends suggest that European citizens are not immune to future food security impacts if external drivers shift significantly. Figure 4.2 illustrates the food system, its drivers, and food security as the primary outcome in relation to food system crises and food security status.

Disruptions can stem from both external and internal drivers, or from combined impacts resulting from interactions between these factors. Due to the complexity of food systems, the precise effects of specific disruptions—and their timing—are often difficult to predict, which poses challenges for contingency planning. As noted by the European Commission (EC, 2021c), *‘...One of the challenges of contingency planning is to be prepared to deal with unknowable future shocks and their consequences...’*

Europe’s food system is generally reliable, ensuring most consumers can access affordable, nutritious, and diverse food options even during crises. However, vulnerabilities remain, especially among economically disadvantaged groups. As sudden or gradual changes in food system drivers continue, effective response plans are essential to maintain food security for all segments of the population.

The EU’s *Contingency Planning Framework to ensure food supply and food security in the EU in times of crises* aims to address instances when sudden or sustained changes in food system drivers (shocks) predictably threaten food security. These plans are particularly relevant for managing food system disruptions with potential impacts on specific EU territories or vulnerable populations.

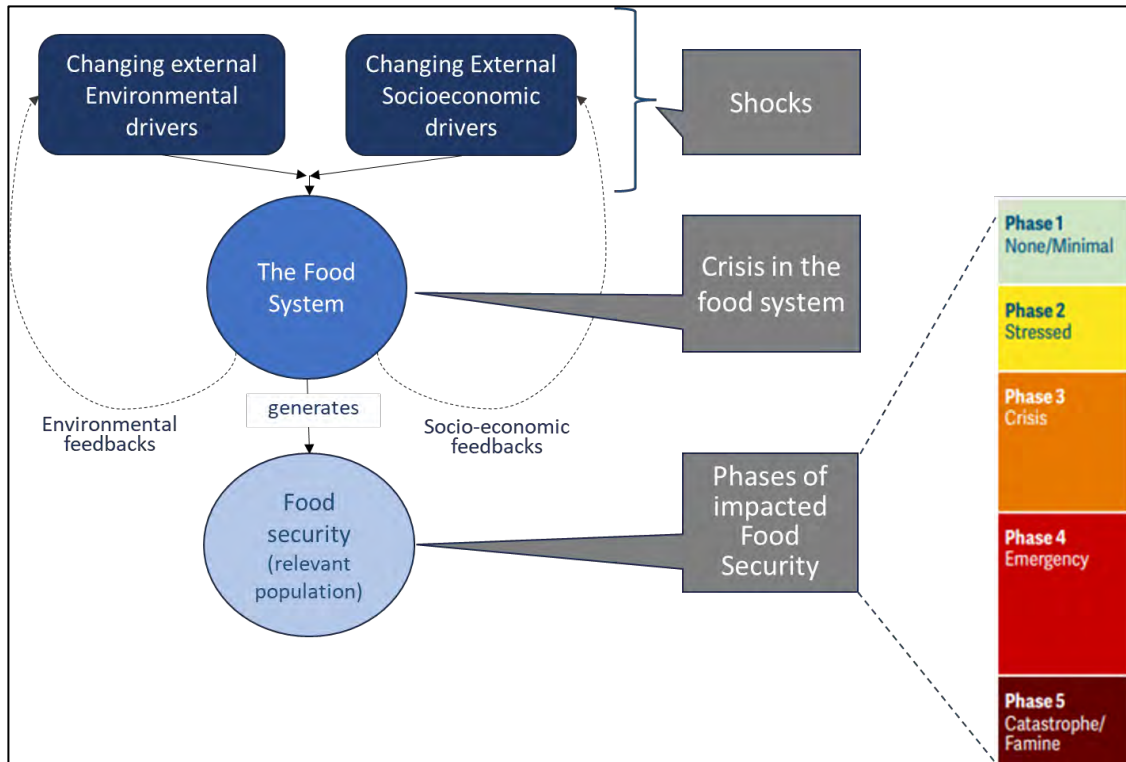


Figure 4.2. Positioning shocks of external drivers, crises in the food system, and the different phases of impacted food security
 (Source: Adapted by author from figure 3.2 (with sources listed there) and GNAFC & FSIN (2024, p 3).

5 Contingency Planning Initiatives

Pursiainen (2020), citing Hermann (1963), describes the challenges of contingency planning as being confronted with ‘...numerous unpredictable events or uncertainties connected to the [crisis] situation, making it difficult to form a clear picture of the potential outcomes of decisions...’. This complexity may question the value of contingency planning, given the unpredictability of crisis situations. Nevertheless, it is widely accepted that advance planning, even under uncertainty, significantly improves crisis outcomes. Preparedness enables key actors to develop capacities, establish agreements on governance issues, and create provisions that can be activated when a crisis occurs.

The Sendai Framework for Disaster Risk Reduction (UNISDR, 2015) underscores the importance of **Enhancing disaster preparedness for effective response and to ‘Build Back Better’ in recovery, rehabilitation, and reconstruction**, stating on page 21:

...the need to further strengthen disaster preparedness for response, take action in anticipation of events, integrate disaster risk reduction in response preparedness and ensure that capacities are in place for effective response and recovery at all levels...

The United Nations Office for Disaster Risk Reduction (UNDRR) further defines contingency planning as ‘...a process that looks at disaster risks and sets up plans to respond quickly and effectively...’, noting

...Contingency planning results in organized and coordinated courses of action with clearly identified institutional roles and resources, information processes and operational arrangements for specific actors at times of need. Based on scenarios of possible emergency conditions or hazardous events, it allows key actors to envision, anticipate and solve problems that can arise during disasters. Contingency planning is an important part of overall preparedness. Contingency plans need to be regularly updated and exercised...

A literature review on contingency planning for food-related crises reveals diverse **approaches, resulting in what Rudloff et al. (2012) term a “puzzle of different approaches.”** For shedding light on the puzzle, the documents reviewed in this report were categorized as representing a contingency planning concept with a focus on

- a) a *broad perspective*, covering multiple perspectives beyond food security, or
- b) a *focused perspective*, targeting food system crises with specific impacts on food security.

Regardless of the type of crisis, when food security is compromised, an *Emergency Food Supply System* must be established to meet basic nutritional needs. Liu et al. (2022) propose a *Framework for an Emergency Food Supply System*, identifying seven action domains to facilitate rapid food distribution in crises: food demand, food reserves, transportation, supervision, and information systems for emergency food supply.

Figure 5.1 illustrates the integration of the Emergency Food Supply System as an essential element within the broader contingency planning framework and links the different categories of planning concepts discussed in the documents analyzed in this report. The food system itself is part of a complex socio-ecological system that includes other vital systems like energy, transportation, sanitation, and health. All these systems can be affected by sudden or gradual changes in external drivers, which the contingency framework must account for in its planning processes.

5.1 Contingency planning beyond food security

5.11 Variations of contingency planning views

In the humanitarian sector, response planning often spans multiple sectors crucial for emergency relief: Water Supply, Sanitation, and Hygiene Promotion; Food Security and Nutrition; Shelter; and Health (Sphere Association, 2018).

Organizations like the International Federation of Red Cross and Red Crescent Societies (IFRC) and other international and national organizations have developed their own broad-based contingency planning guidelines for managing a wide array of emergencies. As an example, the International Federation of Red Cross and Red Crescent Societies (IFRC) defines contingency planning as a process (IFRC, 2012; p. 8) which involves

... anticipating a specific hazard based on specific events or known risks at local, national, regional or even global levels (e.g., earthquakes, floods or disease outbreaks), and establishing operational procedures for response, based on expected resource requirements and capacity...

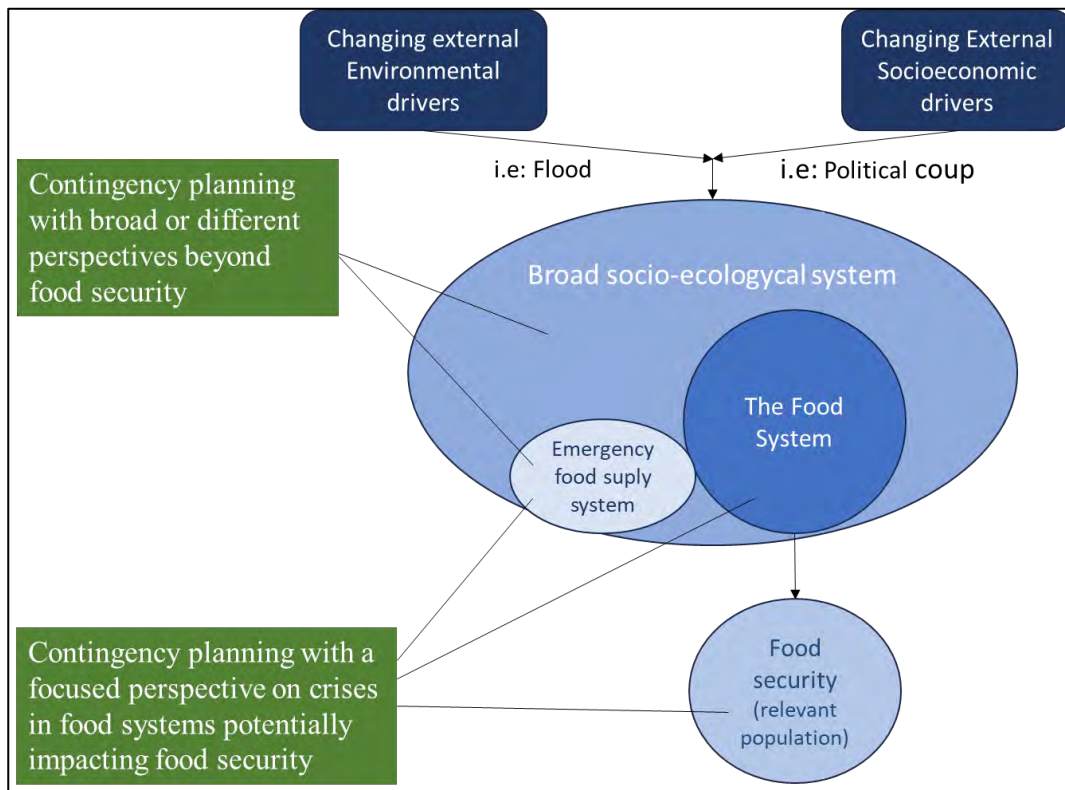


Figure 5.1. Approaches of contingency planning in relation with food systems and food security (Source: author, adapted from figure 3.2 and sources listed there).

It is based on responding to three main questions (EC, 2021c), specified as ‘what could happen’, ‘how will we respond’, and ‘how can we prepare in advance’?

The UN Interagency Standing Committee (IASC) similarly describes contingency planning as a management tool (IASC, 2001)

...used to ensure adequate arrangements are made in anticipation of a crisis. This is achieved primarily through the participation in the contingency planning process itself, as well as through follow-up actions and subsequent revisions of plans...

Emergency food supply planning is commonly integrated into such general emergency response frameworks. For example, the Sphere Handbook (Sphere Association, 2018) outlines standards for humanitarian action, including Food Security and Nutrition, with seven standards designed for effective response. Appendix A4 lists these standards. Table 5.1 highlights the focus and goals of contingency planning guidelines that span various sectors, including food security.

Table 5.1.
Contingency planning guidelines with a broad or different to food security perspective
(Source: authors)

Framework	Main goal
Inter-Agency contingency planning guidelines for humanitarian assistance (IASC, 2001)	“...to facilitate common understanding, to avoid duplication of activities and gaps in humanitarian response.” (p 3)
Contingency planning guidelines (WFP, 2002)	“to help to ensure that, if and when a crisis occurs, response will be rapid, appropriate and effective.” (p 2)
Contingency Planning for Emergencies: A Manual for local government units (NDCC Philippines & UNHCR, 2003)	“to strengthen and enhance the operational capabilities of the local government units in responding to any emergency situation in their localities” (p 5)
Inter-Agency contingency planning guidelines for humanitarian assistance (IASC, 2007)	For country teams “to increase their level of preparedness and enhance their ability to respond to emergencies.”(p 5)
Contingency planning guide (IFRC, 2012)	“...to prepare an organization to respond well to an emergency and its potential humanitarian impact” (p 7)
Emergency Response Preparedness (ERP) (IASC, 2015)	“to improve collective response readiness” (p 5) with 3 levels of preparedness: Inter-agency, Sectorial and Organization specific
Contingency Planning Guidebook - Phillipines (NDRRMC & NSC, 2016)	“to integrate the contingency planning process for managing natural and human-induced hazards” (p 1)
WHO Guidance for Contingency Planning (WHO, 2018) (focus health)	“to coordinate international action to prevent, prepare for, detect, rapidly respond to, and recover from outbreaks and emergencies in order to reduce the mortality and morbidity of affected populations.” (p 2)
The Sphere Handbook (Sphere Association, 2018)	To define standards for humanitarian response on all sector, being one of them Food security and nutrition

5.12 Coordination of contingency plans

The *Reference Group on Contingency Planning and Preparedness* of the Inter-Agency Standing Committee of the United Nations developed specific guidelines (IASC, 2001) for coordination of contingency planning at an aggregated (inter-agency) level of response enhancing resource allocation and ensuring coherent responses across sectors. They provide an umbrella view based on individual contingency plans of individual agencies. The guidelines state that

...Inter-agency contingency planning does not supersede nor replace the need for the contingency planning and preparedness measures of individual agencies. Rather the inter-agency contingency planning process builds upon and brings together individual agency planning, in order to facilitate common understanding, to avoid duplication of activities and gaps in humanitarian response. Inter-Agency contingency planning acts as an umbrella that consolidates agency or sector-specific plans in a coherent framework...

An updated version of an inter-agency contingency planning framework, developed by the *UN Interagency Standing Committee* in collaboration with IFRC and various NGOs, emphasizes the broad concept of *Emergency Preparedness Response* (UNHCR, 2020). This framework includes key topics such as risk analysis, minimum preparedness, advanced preparedness, and contingency planning.

5.13 Common patterns

Common patterns across different guides can inform the development of an effective contingency planning framework for food security crises. Key components include the following:

1. **Risk assessment and analysis:** Thorough risk evaluation is critical, involving the identification of threats, population vulnerabilities, and potential food security impacts. The *Inter-Agency Contingency Planning Guidelines* (IASC, 2001) and the *WFP Contingency Planning Guidelines* (WFP, 2002) emphasize stakeholder participation in this process.
2. **Inter-Agency coordination:** Establishing clear communication and coordination mechanisms among various agencies ensures a unified response. The *Inter-Agency Contingency Planning Guidelines* (IASC, 2007) and the *Emergency Response Preparedness* (IASC, 2015) stress the importance of collaboration across government, NGOs, and the private sector to optimize resources and avoid overlap.
3. **Community participation:** Involving local communities in planning and execution ensures culturally appropriate and sustainable responses, as emphasized by the *Contingency Planning for Emergencies* published by NDCC Philippines & UNHCR (2003) and the *IFRC Contingency Planning Guide* (IFRC, 2012).
4. **Capacity building:** Training response teams and communities is essential for capacity building and effective implementation. The *WHO Guidance for Contingency Planning* (WHO, 2018) and the *Philippines Contingency Planning Guidebook* (NDRRMC & NSC, 2016) underscore the value of capacity-building initiatives.
5. **Financial and material resources:** Efficient management of resources, including funding and supplies, is crucial. This is highlighted in the *Emergency Response Preparedness* (IASC, 2015) and the *Sphere Handbook* (Sphere Association, 2018).
6. **Monitoring and evaluation:** Regular monitoring and post-crisis evaluation enable continuous improvement. Both the *WFP Contingency Planning Guidelines* (WFP, 2002) and the *IFRC Contingency Planning Guide* (IFRC, 2012) highlight the importance of learning from past experiences to adjust future plans.
7. **Adaptability and flexibility:** Contingency plans must be flexible and adaptable to respond to dynamic situations. This is a common feature in all guides. As examples, the *Inter-Agency Contingency Planning Guidelines* (IASC, 2007) and the *Sphere Handbook* (Sphere Association, 2018) recommend plans that can be quickly revised as new threats arise.
8. **Effective communication:** Clear communication among stakeholders is vital. Both, the *IFRC Contingency Planning Guide* (IFRC, 2012) and the *WHO Guidance for Contingency Planning* (WHO, 2018) emphasize maintaining reliable channels for informing stakeholders and communities about ongoing plans and actions.

5.2 Contingency planning focused on crises in food systems

The *Famine Early Warning System Network (FEWS)*, a project of the United States Agency for International Development (USAID), developed a comprehensive framework for contingency planning for *Slow-Onset Food Crises* (FEWS, 2000), which remains a cornerstone of food security contingency planning since more than 20 years. The framework is designed for proactive planning and response, incorporating objectives, threat identification, scenario building, price projections and classification of acute food insecurity.

The FEWS framework emphasizes structured contingency planning, including the use of Early Warning Systems and setting thresholds for escalating threats. This proactive approach aligns with the common elements identified in broader guidelines, such as risk assessment and coordination. The FEWS model also emphasizes logistics planning, including understanding local logistics capacity and securing resources in advance.

Other notable resources for food-focused contingency planning presenting specific actions or tactics for use at local or national levels include

- a) FAO document about High and Volatile Food Prices: *FAO Support for Country-Level Contingency Planning* (FAO, 2012) and
- b) Tactics for Emergency Food Planning: ***A Roadmap for Creating Your City’s Emergency Food Response and Recovery Plan*** (Nordine & Zeuli, 2022).

Responses for good nutritional levels are outlined in document

- c) *Food and Nutrition Needs in Emergencies* (UNHCR et al., 2002).

Table 5.2 summarizes these documents, their focus, and primary goals. For more details on processes covered in these guidelines, see Appendix A5.

Table 5.2.
Contingency planning with a focused perspective on food security (Source: authors)

Framework	Main goal
Framework for food crises contingency planning and response. (FEWS, 2000)	<i>“propose pre-emptive actions for preventing immediate and future famine.”</i>
High and volatile food prices: FAO support to country level contingency planning (FAO, 2012)	Short term: <i>“to assist those at risk of food insecurity due to high food prices”</i> Medium term: <i>“increasing the efficiency of various aspects of agricultural systems to reduce the impact of high and volatile food prices on domestic consumers”</i>
TACTICS TO TRY FOR EMERGENCY FOOD PLANNING: A Roadmap for <i>Creating Your City’s Emergency Food Response And Recovery Plan</i> (Nordine & Zeuli, 2022)	<i>“for city leaders—to catalyze their journey towards creating their own emergency food response and recovery plan.”</i>
Food and Nutrition Needs in Emergencies (UNHCR et al., 2002)	<i>“to promote timely, coordinated and effective action through improved understanding of food and nutrition needs during emergencies” (p 1)</i>

5.3 Planning responses through adaptive social protection systems

Adaptive social protection systems (Bowen et al., 2020) leverage existing infrastructure, such as social registries, information systems about social programs, institutions and potential actors, direct payment capabilities, and agreements with financial institutions, for rapid response in emergencies.

By using these established systems, emergency programs can quickly adapt to provide food assistance, nutritional support, and other services, tailored to affected populations.

Social protection programs can be expanded *horizontally* by including new beneficiaries in response to specific crises or *vertically* by temporarily enhancing benefits for current participants. This adaptability ensures that responses are timely and relevant to the needs of vulnerable groups (figure 5.2).

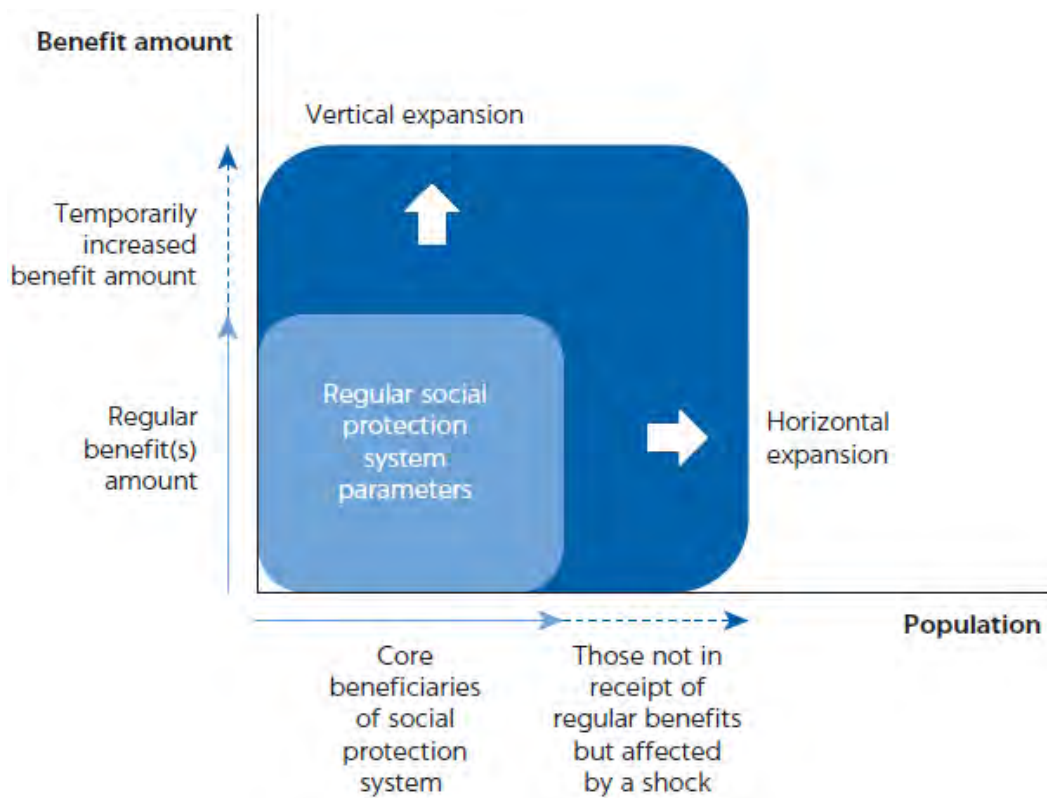


Figure 5.2. Social protection programs: Vertical and horizontal expansion (Source: Bowen et al. (2020))

In addition, these capabilities can be used to create new programs on top of them, leveraging existing infrastructure to address emerging needs swiftly and effectively. For instance, during a food crisis, adaptive social protection systems can facilitate the rapid deployment of food assistance programs, nutritional support, and other critical services. This flexibility ensures that the response is not only timely but also tailored to the specific needs of affected populations.

Moreover, adaptive social protection systems can enhance coordination among various stakeholders, including government agencies, non-governmental organizations, and international bodies. By integrating data and resources, these systems can provide a comprehensive response that maximizes the impact of available support.

In summary, the integration of adaptive social protection systems into contingency planning for food-related crises offers a robust framework for mitigating the impacts of such crises. By utilizing existing social protection infrastructure, these systems can provide immediate relief and support to vulnerable populations, ensuring food security and resilience in the face of emergencies.

5.4 Planning anticipatory actions to increase opportunity

Anticipatory action involves taking preventive steps based on early warnings to reduce humanitarian impacts before they fully materialize. The G7 statement of 2022 on support of Anticipatory Action defines it as

acting ahead of predicted hazards to prevent or reduce acute humanitarian impacts before they fully unfold. This requires pre-agreed plans that identify partners and activities, reliable early warning information, and pre-agreed financing, released predictably and rapidly when an agreed trigger-point is reached.

(<https://www.auswaertiges-amt.de/en/newsroom/news/g7-anticipatory-action/2531236#:~:text=We%20commit%20to%20support%20the,areas%20of%20high%20disaster%20risks>)

Organizations like the *World Food Program* (WFP, 2024) have led initiatives promoting anticipatory action, collecting evidence of its cost-effectiveness and positioning it as a relevant instrument for mitigating the impact of shocks on food security and other relevant human welfare issues. Figure 5.3 depicts anticipatory action as bridging the gap between preparedness and response in the *Disaster Risk Management Cycle*.

Table 5.3 presents the three key components of anticipatory actions: early warning (**‘forecast triggers’**), pre-agreed action plans, and pre-arranged financing. Combining anticipatory action with social protection measures can be particularly effective in the EU, where social protection systems are well-established. They could support communities, households and individuals in increasing resilience to shocks induced by changes in biodiversity, the climate and other environmental or socio-economic drivers.

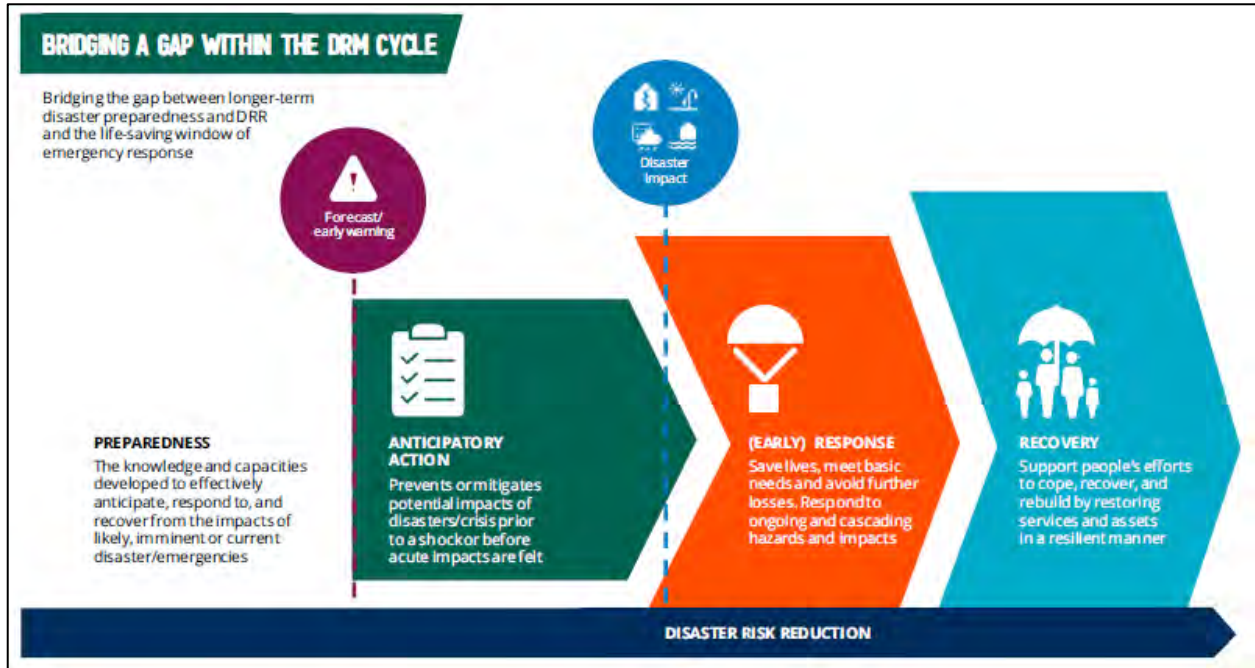


Figure 5.3. Anticipatory actions for bridging a gap within the Disaster Risk Management Cycle (DRM cycle, source: WFP (2024))

Table 5.3. Core components of anticipatory action (Source: Adapted from WFP (2024)).

Forecast triggers	Pre-agreed action plans:	Prearranged finance:
A specific event which was subject to consensus among all relevant stakeholders. Normally it is when a variable of interest is forecasted with a certain level of likelihood of crossing an agreed threshold or when it crosses it.	The set of activities, responsible persons and institutions, beneficiaries, required information and costs that will be triggered before the actual occurrence of the contingency.	Committed funds with specific destination to finance the anticipatory action. Also see Tozier de la Poterie et al. (2023).

Social protection tools may include, as categorized by Loewe and Schüring (2021), ‘...social transfers, social insurance, labor market policies, social services, and micro-insurance...’. These tools can be deployed throughout the Disaster Risk Management cycle to enhance resilience and mitigate shock impacts.

5.5 Lesson learned in contingency planning for food security

The *World Food Program* has implemented contingency planning to strengthen its humanitarian response. An evaluation conducted from 2002 to 2008 (WFP, 2009) provided insights into the effectiveness and limitations of these efforts, which are still valuable today.

The report lists main “requirements” that were considered relevant for effective contingency planning at an institutional level in a specific territory (WFP, 2009; p 6). Adapted from the report, they include:

- a) the need for strong leadership and commitment from senior decision-makers, recognizing contingency planning as a management function rather than just a technical task,
- b) the implementation of a participatory process involving all stakeholders, including finance, administration, human resources, ICT, and operational staff, to enhance coordination,
- c) an initial assessment of humanitarian needs, combined with a capacity analysis to identify and address potential gaps,
- d) the integration with national systems and existing disaster management practices, ensuring alignment with community-based efforts and government plans,
- e) the implementation of regular reviews and updating of the planning process,
- f) the integration into ongoing planning processes,
- g) the linkage with early warning systems and decision-making frameworks,
- h) the need to be facilitated by experienced planners who possess strong contingency planning and facilitation skills,
- i) the design of a concise, user-friendly final plan with separate components for decision-makers, specialists, and donors,
- j) the limitations in planning details required to inform about needed actions and response capacities for resolving **anticipated problems, avoiding ‘over-planning’ or the ‘consolidation trap’, and**
- k) the identification of triggers for specific preparedness and response actions.

According to the WFO evaluation report, contingency planning should strategically be harmonized with other institutional processes, linked to local, national, and European authorities for accountability, and supported by training programs and the utilization of positive experiences from field work to build implementation capacity.

Certain recurring crises, such as seasonal cyclones, are ideal candidates for contingency planning, given their known probability and high potential impact. For instance, Bangladesh frequently uses contingency plans for cyclone response due to the predictability and severity of these events.

An evaluation by Bonsignore (2013) of contingency planning efforts led jointly by the World Food Program (WFP) and the Food and Agriculture Organization (FAO) in Bangladesh provides valuable insights:

1. **Joint Needs Assessment (JNA)**: Collaborative information gathering among government and humanitarian actors ensures efficiency, synergy, and local capacity building. This method can be effective for food and nutrition needs assessment, helping avoid redundant tasks while ensuring a comprehensive response.
2. **Utilizing Government Clusters**: Governments commonly use sectoral clusters to coordinate policy interventions on specific issues. Incorporating contingency planning into these existing frameworks allows for faster response times by leveraging pre-existing collective capacities. Using government networks that include community groups and NGOs is advised for all stages of contingency planning and response.

3. *Collaboration with Private Food Retailers*: Food retailers may play a critical role in implementing contingency measures. As an example, during the COVID crises retailers in China played an important role by transferring food from one city to another and the allocation of quotas of food reserve to specific cities in need (Zhong et al., 2021).

6 Conclusion and Reflection

The common elements identified across contingency planning guides provide a strong foundation for designing an actionable framework for food security crisis response. Key components such as risk assessment, inter-agency coordination, community participation, capacity building, resource management, logistics, monitoring and evaluation, adaptability, and effective communication are essential to any contingency planning strategy for food security crises. These elements not only ensure a more effective and coordinated emergency response but also strengthen community and institutional resilience against future crises.

Two approaches of contingency planning have been reviewed, those with a focus on crises affecting food security only, and those with a broad spectrum of focus, including food security, but also health, shelter, water supply, sanitation, hygiene, and others.

Each approach offers unique benefits. Broad-spectrum planning enables coordinated resource allocation across sectors, while a targeted focus allows for in-depth analysis of specific populations, capabilities, and risk factors. Both approaches contribute valuable insights to contingency planning, and depending on the situation, combining elements of both may provide the most comprehensive response.

For effective food security crisis response, leveraging existing institutional mechanisms—such as social protection systems, policies, and emergency funds—is essential to reduce food system impacts. A multi-faceted approach that prepares for crises at different stages—before, during, and after their occurrence—is crucial. Anticipatory actions, supported by *Early Warning Monitoring Systems*, can mitigate risks before they fully materialize. During a crisis, orchestrating responses among public and private sectors ensures comprehensive support, while post-crisis recovery efforts build resilience and prepare systems for future disruptions.

7 Moving Towards Practical Use

Providing management support in contingency planning requires a major step from general guidelines and concepts towards a hands-on guide for use in actual crises situations. The following chapters provides guidance for institutions which have responsibility for contingency planning and contingency activities dealing with situations (risks) with the potential for disrupting the food system and creating hazards with negative impacts on target groups or the organization of the food system.

It is based on discussions in previous chapters which provide background information for the operation of the hands-on managerial process. Where appropriate, the presentation will pick up some sources from preceding chapters and integrate them into the process discussion.

Chapter 8 introduces a consolidated framework model for contingency planning which transforms earlier discussions into a scheme which already incorporates all components relevant for the organization of a hands-on management process. Chapters 9 and 10 elaborate on various components in more detail focusing on the following issues:

1. *Early Warning Systems (EWS)*: They support organizations responsible for initiating contingency measures in case a hazard with potential negative effects on food security and/or biodiversity is about to emerge or is already creating negative impacts on target groups of interest. EWS provide suggestions on when contingency measures should be implemented.
2. *Coordination challenge*: It is more common than an exception that the initiation of contingency measures requires the engagement and/or approval of different actors with responsibility in or for the food system. The identification of these actors and their integration in some kind of coordination mechanisms ahead of any contingency situation is a pre-condition for swift action in times of need.
3. *Target group*: Any contingency plan needs to identify the target group(s) it is supposed to support. Usually, different target groups are affected differently by emerging hazards and may require different contingency support measures. In consequence, responsible institutions may develop different contingency plans dealing with a similar hazard but focusing on different target groups.
4. *Risk Management*: Risk management usually prepares in time for risks that may create hazards. It includes the identification of risks, the analysis of risks regarding probability of occurrence and the potential hazards they may evoke, and the specification of actions that may support target groups in a contingency situation. Risk management is at the core of a contingency planning process. Risk management may also include efforts to avoid risks through appropriate organization and responsiveness of the food system. It **this sense it is improving the system's resilience** as outlined in chapter 8.2.

Chapter 11 guides users from the model discussions to the hands-on management process by elaborating on the information needs and information sources linking the model with the planning process. It highlights the need for expert judgement beyond the use of data from the past and introduces the new opportunities provided by Artificial Intelligence and

Large Language Models for supporting the planning process. Data bases, expert knowledge, stakeholder engagement, and Large Language Models together constitute the information services required for operating the managerial planning process.

Chapters 12 and 13 provide a detailed step-by-step introduction into the stages of a proposed *management process* that could guide responsible institutions in designing contingency plans. The process is based on 4 functional process elements which are discussed in more detail. They deal with the risk situation, with actors and activities, costs and benefits of activities, and coordination needs. The management process is linked to a *CANVAS documentation* system which provides transparency on the information used and the decisions made in developing the contingency plan.

8 Basic Framework of Contingency Planning Components

8.1 Introduction

In a contingency situation, the ability for swift action is a pre-condition for a successful limitation of the negative consequences a contingency situation is developing. However, **“being prepared” for hazards that may occur is a pre-condition** for swift action which, in turn, is a result of planning.

Agriculture and the food system have to deal constantly with risks. They may create problems in food security, in biodiversity or the economic performance of the food system actors. For mitigating the effects of emerging hazards, contingency planning could identify suitable activities of actors with influence on the food system. This chapter provides the basis for a contingency planning framework scheme will subsequently be developed further and integrated into a hands-on planning process that can be used as a guide for getting prepared for potential future hazards. For further literature on contingency planning see Biehl et al. (2018), Liu et al. (2022), Engel et al. (2012), IFRC (2012), and USAID (2000).

The framework scheme and hands-on process are suitable for any kind of hazards, agriculture and the food system may have to deal with. However, in the specification of details we have our main focus on activities assuring food security which, if endangered, requires immediate action and the coordinated engagement of different groups. Such activities may have, however, negative or positive impacts on biodiversity and/or the sustainability of the food system. For dealing with such “side effects”, the hands-on planning process places emphasis on their identification and the evaluation of activities considered for implementation in a food security contingency situation.

When dealing with food security, the focus of interest could be any or all of the food **security dimensions specified by FAO (2006) such as “availability”, “access” (including e.g., affordability), “utilization” (including e.g., safety, quality, and diversity), and “stability”.**

The food system may have the inherent ability to cope with situations (risks) that potentially have a negative effect on the **food system’s ability to assure food security. If**

such risks have the potential to disrupt the organization or performance of the food system beyond its ability to continuing assuring food security, responsible institutions need to plan for contingency activities that limit the negative effects on food security.

For the assurance of food security, one needs both,

- a) a food system with sufficient *resilience* coping with the majority of potential risks and
- b) a system of *contingency plans* which could step in, in case of needs.

The relationship between efforts for improving resilience and efforts for providing for contingencies is discussed in more detail in the following chapter.

8.2 Contingency and resilience

Agriculture and the food system are dependent as no other sectors on changes in environmental and socio-economic conditions in regions, countries, and on a global scale. They could not only affect agricultural production and the processing and delivery of food on a regional or national scale but affect global trade, linking the regional or national availability of food with global developments

In this scenario, *contingency planning* is dealing with the sudden emergence of hazards **that could not be dealt with through the food system's resilience or long-term** adaptation. However, the long exposure of agriculture and the food system to risks and the experience of all involved has resulted in an agricultural production, a food processing industry, and a food delivery system with a high degree of *resilience* against the most frequent risks. The resilience is based on appropriate organization and operation of agriculture and the food system but also on appropriate management of food security deficiencies the food system could not deal with through its production, processing and trading activities. For resilience measurement see Béné et al. (2023).

Comparing contingency activities with system resilience is like comparing a “repair action” (contingency activities) with a “maintenance activity” representing the resilience of a system. Usually, a “repair” activity is more costly than a “maintenance” activity. It is therefore in the interest of system actors to avoid contingency situations by improving a system's resilience as much as possible with the assumption that

- a) **the costs of assuring a system's resilience are lower than the**
- b) **benefits of avoiding the need for contingency activities.**

This has been demonstrated in the past by the differences in interest placed on contingency planning as compared to interest in resilience improvement initiatives (figure 8.1). Research into food system resilience spans numerous disciplines, including ecology, economics, and sociology. As a result, scientific literature on resilience in food systems is still extensive (Béné et al., 2023), while research into contingency tends to focus more narrowly on short-term crisis management or specific contingency planning mechanisms for disruptions in the food supply chain. Resilience has seen a marked increase in publications since 2010, with a significant surge in recent years. Contingency planning, while still

growing, has a more gradual rise and remains lower compared to resilience related publications.

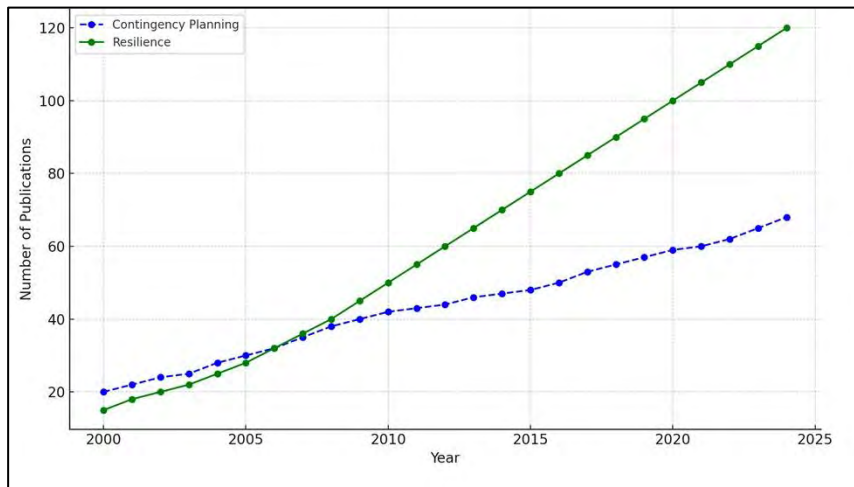


Figure 8.1. Indication of number of publications featuring contingency planning compared to publications featuring resilience 2000-2024 (Source: ChatGPT, Oct. 2024).
 (Prompt: Provide an overview on the number of articles or documents that deal with contingency planning as compared to articles and documents dealing with resilience related to the food system since the year 2000).

Apart from a system’s interest in moving from contingency activities to resilience improvement, there are engagements in place for improving a system’s ability and flexibility to act in contingency situations by

- a) improving the awareness of risks,
- b) increasing the number and efficiency of opportunities to act,
- c) improving the coordination mechanisms for action in times of need, and
- d) establishing easy to use, efficient and intelligent planning concepts.

The following chapters will focus on the last issue and provide a framework and hands-on guide for use within the ECO-Ready project in an experimental setting for broader use beyond project duration.

8.3 The components of a basic framework model

The need for contingency planning may arise in situations when

- a) a hazard situation has already occurred and authorities need to come up with appropriate action on short notice or, alternatively, in
- b) preparing for future hazards that may evolve from risks and where actions based on contingency plans could assure food security and limit the negative consequences of hazards.

The planning challenge is the same for both situations with the exception that in a preparatory contingency planning, one needs to identify possible future risks as well as actors and actions that might be available in the future for dealing with a risk situation.

We will concentrate in the following on preparatory contingency planning which asks for a wider view and involves the consideration and management of risks that may emerge in times of change considering climate change or political and social instability.

In food security, activities that could mitigate the effects of emerging risks include (figure 8.2) the following:

1. Activities mitigating direct effects on drivers. Such activities are relevant if *disruptions in drivers* result in effects on the food system and subsequently on food security.
- b) Activities mitigating direct effects on food system. Such activities are relevant if emerging risks result in effects on the *food system* and subsequently on food security.
- c) Activities mitigating direct effects on food security. Such activities are directly reducing or eliminating the effects of emerging risks on food security.

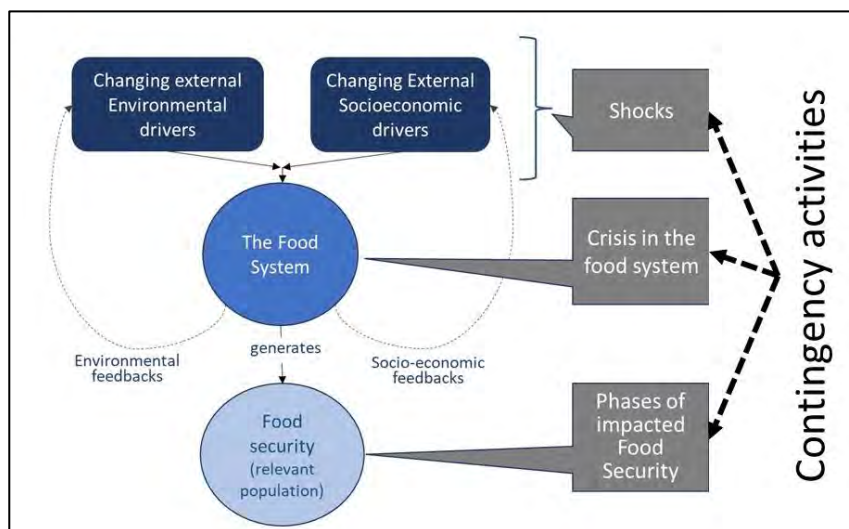


Figure 8.2. The focus of contingency planning in mitigating effects of risks on food security. (Source: author, adapted from figure 3.2 with sources listed there)

The challenge is to translate this principal approach into a *contingency planning process*.

The contingency challenge involves the management of risks that may create (or are already creating) hazards for food security. The management of risks depends for its implementation on its organizational environment including

- a) an initiating process such as an *early warning system*,
- b) *actors* that may contribute to reducing the negative effects of hazards on food security and their appropriate coordination in times of need encompassing
 - actors *external or internal* to the food chain who could influence drivers (such as e.g., shortage of water in agricultural production), and
 - *actors of the food chain* in their capability of producing and providing food, and
- c) *beneficiaries* of actor activities encompassing
 - *consumers of food* and especially vulnerable groups such as low-income people, and
 - enterprise stakeholders in the food chain.

It should be noted, that enterprise stakeholders in the food chain could either engage as actors in mitigating negative effects of risks or receive support from other actors in mitigating negative effects on their own operations which could reduce their capability of producing and delivering food.

Building on the various concepts developed so far, the contingency challenge related to food security could be captured in a general model as outlined in figure 8.3.

In the following chapters we elaborate in more detail on the major components of this general model including its organizational environment (chapter 9) and its management core dealing with the management of risks (chapter 10).

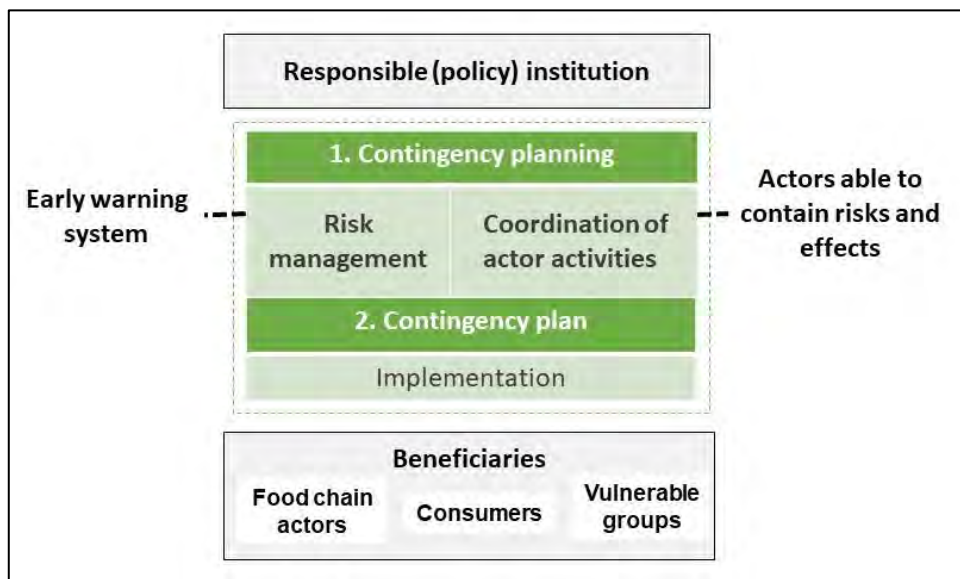


Figure 8.3. A general model of a contingency planning process embedded in the planning environment involving early warning systems, actors and beneficiaries (Source: author).

9 Organizational Environment of Risk Management

9.1 Early Warning System

With the emergence of a risk situation, a contingency plan could provide information on how to react and what activities to initiate. However, an activation of a contingency plan needs an *initiation process*. Somebody or something **has to provide the “go”**. **An approach towards an objective specification of the “go” builds on embedding contingency planning and contingency plans into a complete *contingency system*** in which an agri-food system is continuously monitored for signs of emerging risks that allowed timely initiation of the contingency plans developed before, or for initiating a contingency planning process for developing a contingency plan on the spot.

Such a monitoring system is referred to as an *early warning system* (EWS). A suitable early warning system could be integrated together with the contingency planning and contingency plan in a process management system as has been developed in the business concept of “quality management”.

It builds on the 7 HACCP principles (Hazard and Critical Control Point; FDA, 2022) which are a standard procedure in general process control for assuring food safety in food production, food processing, and food delivery along the food chain from producer to retail.

The 7 HACCP principles involve in short:

1. HACCP 1: Analysing and prioritizing hazards.
2. HACCP 2: Identifying critical control points.
3. HACCP 3: Defining control variables and critical control limits.
4. HACCP 4: Monitoring control variables.
5. HACCP 5: Establishing corrective action.
6. HACCP 6: Establishing procedures for verification.
7. HACCP 7: Establishing documentation.

The HACCP principles 1 and 5 directly relate to *contingency planning* and the establishing of a contingency plan while the HACCP principles 2 to 4 refer to an *early warning system* and the HACCP principles 6 and 7 to the embedment of contingency planning and early warning system into a self-contained *contingency management system*.

Early Warning Systems for food security are becoming more advanced through the use of technology, scientific approaches, and local community engagement. There are three different types of Early Warning Systems which are technology-based, science-based, and community-based.

Technology-based EWS use satellite monitoring, mobile applications, and artificial intelligence to predict risks like droughts, floods, and pest outbreaks, *Science-based EWS* incorporate climate and agricultural models, pest and disease tracking, and nutritional surveillance to forecast food security threats, *Community-based EWS* leverage local knowledge and community participation to enhance early warning systems at the grassroots level, ensuring that alerts are relevant to local needs and contexts.

By combining these approaches, EWS are able to provide more comprehensive and localized warnings supporting actors in taking preventive actions against food insecurity. Table 9.1 provides a summary of the alternatives with some key features and examples at European level.

Table 9.1.
Typology of EWS and European examples
(Source: author, from various sources).

System Type	Key Features	European Examples
Technology-Based EWS	Remote sensing, mobile apps, big data, AI for real-time monitoring	European Space Agency’s (ESA) Earth Observation Data, Copernicus Programme (EU’s Earth monitoring)
Science-Based EWS	Climate models, pest/disease tracking, nutritional surveillance	European Commission’s Joint Research Centre (JRC) for agricultural monitoring, European Food Safety Authority (EFSA) for food security assessments
Community-Based EWS (CBEWS)	Local knowledge integration, participatory planning, mobile reporting	Participatory Monitoring and Response Systems (PMRS) in Europe’s rural regions, EU Civil Protection Mechanism for localized community-level responses

9.2 Coordination of actors and mechanisms in risk management

9.21 Actor groups

The European food system is characterized by a multitude of actors that have a direct or indirect influence on the operation of the food system or could have a direct impact on food security. This is a complexity which makes it difficult to deal with and places high requirements on coordination engagements. The actors may include various policy institutions on community, regional, country, European or global level, enterprises along the food chain, business groups, NGOs, consumer groups and others (table 9.2).

These actors

- a) may act independently of other actors or are
- b) integrated into networks that support their coordination with other actors within the networks.

It is the challenge for an institution taking up responsibility for assuring food security, usually represented by a public institution on European, national, regional or local level, to identify the existing coordination mechanisms, to use them for reaching coordinated activities. If coordination is not sufficient, it needs to establish and maintain additional coordination mechanisms which links different actors with suitable support activities and organizes coordination, considering costs and benefits of the various activities at hand.

Table 9.2 lists a few principal actor groups that may play a role in assuring food security and their role in contingency planning.

9.22 Coordination mechanisms

Coordination mechanisms present a wide range of alternatives from very simple ones to **sophisticated structures**. *“Knowing the phone number of the next retailer”* (a comment made by a contingency research expert in private) or of whoever who could provide necessary support in a contingency situation is a simple but possibly effective approach.

The other end of the scale is represented by high-level European coordination mechanisms. They include a.o.

- a) the *European Civil Protection Mechanism* which facilitates resource pooling and mobilization among member states (https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/eu-civil-protection-mechanism_en),
- b) the *European Food Security Crisis Preparedness and Response Mechanism* which coordinates public and private actors in stabilizing markets and manage food supply disruptions (https://agriculture.ec.europa.eu/common-agricultural-policy/agri-food-supply-chain/ensuring-global-food-supply-and-food-security_en),
- c) the *Integrated Political Crises Response* which enables rapid decision making during cross-sectoral crises including food security (<https://www.consilium.europa.eu/en/documents-publications/publications/ipcr/>), and
- d) the *European Food Banks Federation* which supports redistribution of food to vulnerable groups during a food security crisis (<https://www.eurofoodbank.org/our-mission-impact-values/>).

Table 7.2.
Overview of possible actors in support of food security and their relevance
(Source: author).

Actor	Role in Contingency Plan	Importance
Government Agencies	Policy development, coordination, and resource allocation	Lead national efforts and mobilize public resources
International Organizations	Provide technical assistance, funding, and logistical support	Offer expertise and resources for global and regional coordination
Non-Governmental Organizations (NGOs)	Implement interventions, distribute food aid, advocate for vulnerable groups	Provide rapid on-the-ground response and direct assistance
Private Sector e.g. -> Retailers -> Importers	Maintain supply chains, provide logistics, stabilize markets Sell food to consumers and maintain access during crises Source and supply food from international markets	Ensure continuous food supply and efficient distribution Act as the final point of food distribution Ensure sufficient supply when domestic production is disrupted
Financial Institutions and Donors	Provide financial support and funding mechanisms	Fund contingency plans and long-term resilience programs
Research and Academic Institutions	Provide research, data, and technological solutions	Support evidence-based decision-making and innovation
Media	Raise awareness and communicate information	Inform the public and stakeholders, ensuring timely action

However, apart from these European schemes, local and regional formal and informal coordination mechanisms may play a decisive role in dealing with a contingency situation. The documentation of existing schemes even informal ones is a pre-requisite for allowing swift action in times of crises.

9.3 Target groups

9.31 Food chain members

In dealing with food security, food chain members have a decisive role in assuring supply through production, import, processing and trade. In this role they are part of the actor group that can support initiatives for reducing the negative effects of hazards on food security.

However, food chain members are also a target group of contingency planning initiatives. Food chain companies work together in a complex network of production, processing, and trade which is prone to any kind of disturbances with potential consequences for food security (figure 9.1). This network ensures that food is available and accessible to consumers from production through to the final retail point. Each actor plays a critical role in maintaining a stable and efficient food supply chain.

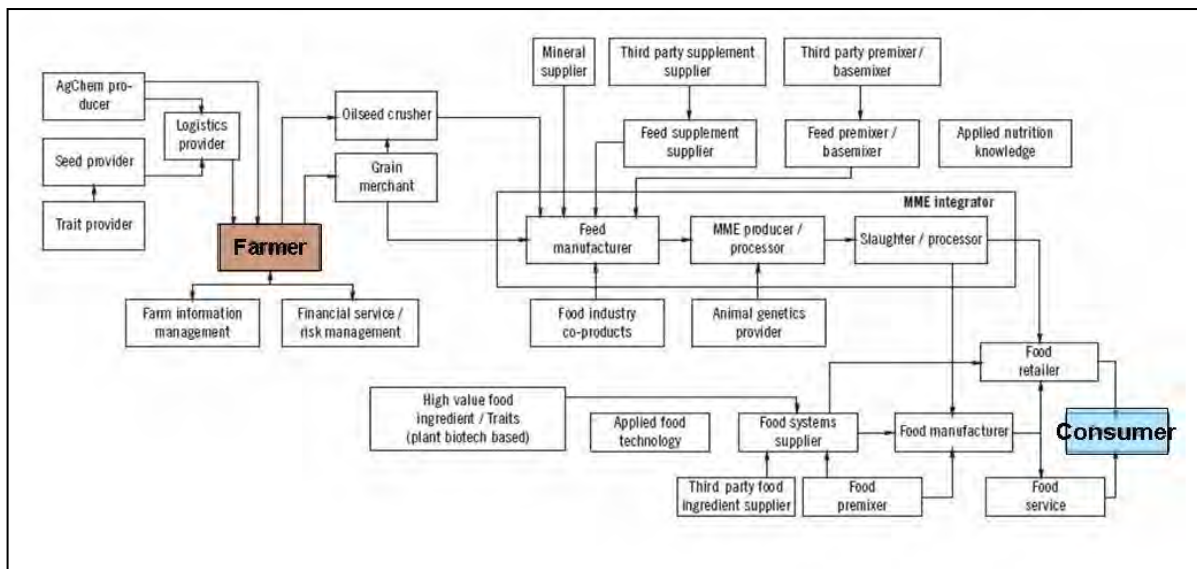


Figure 9.1. Complexity of the Agri-Food Network (Source: author).

There is a wide discussion of hazards due to climate change that may affect agricultural production. However, hazards may inflict all members of the food chain including

- a) input suppliers who provide seeds and fertilizer
- b) importers who complement local production,
- c) processors who convert agricultural products into consumer-ready products,
- d) distributors who transport and store food, and
- e) retailers who sell directly to consumers.

Taking the provision of fertilizer as an example, hazards may involve natural hazards such as weather extremes which disrupt production, transportation or distribution of fertilizer, supply chain disruptions, geo-political factors such as conflicts or sanctions, environmental regulations or sustainability concerns, and more. This limited example exemplifies the sensibility of the food production network and the potential need for contingency initiatives.

In addition to these hazards there are hazards that evolve out of the companies themselves. Examples include the disruption of trading routes, company closures or quality deficiencies in food production leading to a closure of companies which may have severe consequences for food security asking for the initiation of contingency initiatives.

9.32 Consumers and vulnerable groups

Consumers as the final recipients of food are a very diverse group whose members are not equally affected by deficiencies in food security. It affects various population groups more severely due to a combination of economic, social, geographic, and health-related challenges. These vulnerable groups often struggle to access enough nutritious food, making them more susceptible to hunger, malnutrition, and its related consequences. Addressing food insecurity for these groups requires targeted interventions, stronger social safety nets, and coordinated efforts from governments, international organizations, and civil society.

Table 9.3 provides a rough overview of examples of groups that may be more severely affected by food insecurity. Each of these groups faces unique barriers to securing food, requiring tailored policy and program responses to alleviate their food insecurity and improve overall access to safe and nutritious food.

Table 9.3
Examples of vulnerable consumer groups
(Source: Author).

Vulnerable Group	Key Challenges
Low-Income Households	Limited financial resources, reliance on food assistance, price sensitivity
Children	Nutritional needs, reliance on school meal programs
Elderly People	Fixed incomes, mobility issues, social isolation
Single-Parent Households	Economic pressure, caregiving burden, reliance on food assistance
Unemployed/Underemployed	Income instability, lack of food aid eligibility
Rural Populations	Market access, dependence on local agriculture, poor infrastructure
Immigrants and Refugees	Legal barriers, economic disadvantages, language barriers
People with Disabilities	Physical access barriers, economic challenges, special dietary needs
Homeless/Housing-Insecure	Lack of cooking facilities, dependence on food aid

Contingency planning for food security will have to focus specifically on these and related **groups as discussions on “average” food security could overlook the real needs and** problems. For specifications on vulnerable groups, consumption, and dietary patterns see Besamusca et al. (2019), EFSA (2022, 2024), Slimani et al. (2002), and Birt et al. (2017).

10 Risk Management

10.1 Identification of future risks

Looking into the future has always been a challenge and is bound to failures. In stable situations one might take experiences from the past and consider them as relevant for the

future. However, this approach is of limited value in times of change and especially in times of *climate change* which is directly affecting agricultural production and, in turn, food security but also biodiversity.

For looking into the future beyond a very limited time horizon, one is confronted with the need for clarifying developments in a multitude of relationships in the food system. The **challenge is to not only “speculate” on the development of individual parameters** in production, trade or sales but on the simultaneous development of different parameters considering their dependencies and relationships.

This challenge is too complex for a comprehensive analysis. A suitable approach developed in recent years is the *scenario approach* which analyses systematically potential futures (scenarios) and the embedded risks. One could imagine that there are just a few scenario studies dealing with possible futures related to the future of the food system and food security. However, there are many studies which open different views but make it difficult to focus. A selection of some of them is summarized in figure 10.1.



Figure 10.1. Web site examples of scenario studies related to food for demonstration purposes (Source collection: author, web site ident not relevant here and not provided).

The main reason behind the high number of views into the future is the study base. For reducing the complexity of the view into the future, scenario studies usually focus on two crucial drivers and their envisaged development in the future. The selection of crucial drivers is a decision based on expert opinion on what drivers will be the driving force in the **sector’s future development. A few examples are described in figure 10.2.**

They encompass as crucial drivers:

- a) sustainability vs equality,
- b) regulation vs innovation,
- c) connectivity of markets vs shifts in demand and use of resources,
- d) trade and markets vs sustainable diets.

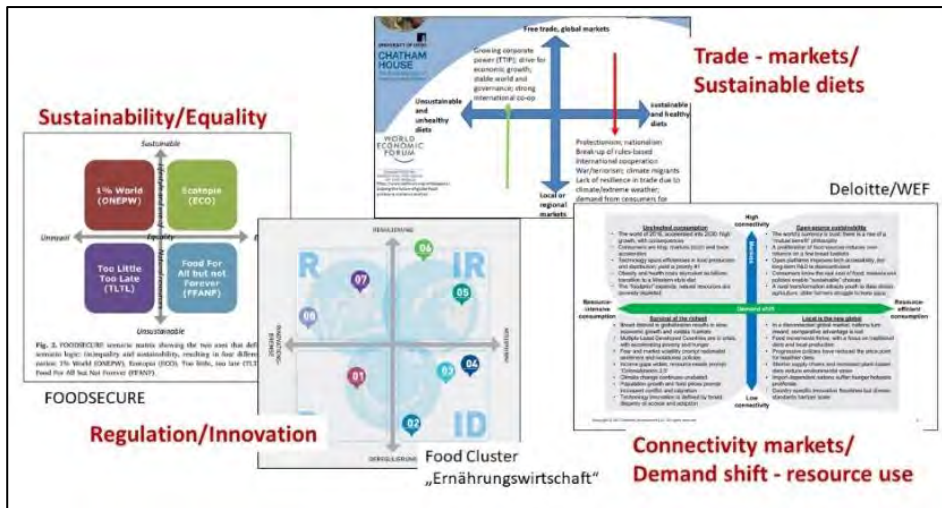


Figure 10.2. Drivers selected for example scenario studies (Source collection: author from Deloitte/WEF (2017), van Meijl et al. (2020), Brenton (2021), Food Cluster (2017)).

The examples demonstrate the wide range of alternative drivers and, in consequence, the wide range of possible futures identified by scenario studies.

10.2 Risk analysis

The variety of possible futures has direct implication for the identification of risks, contingency planning should deal with. Fortunately, the spectrum of risks related to agricultural production and food system operation is limited. What changes is the relevance of a certain risk, i.e., its likelihood and impact, and the need to develop contingency measures for its containment.

As an example, pests are a major risk in today's farm production. However, in a possible future with primarily indoor farming and a controlled production environment, the relevance of pests and especially its likelihood might be reduced substantially.

The challenge is to identify the risks that are not covered by the food system's resilience and are characterized by a major impact on food security. In times of change and especially change in climate, this needs again to build on expert opinion. A traditional forecast based on past data collections can only provide hints on expectations if trends of the past continue into the future.

Judgements on future risks related to food security can be delineated from scenario studies. They can act as a base on which expert opinion can build, adjusting its judgement to the specific situation in a community, a region, a country or on a global scale.

An example with a global view has been provided by the World Economic Forum (see figure 10.3). The example highlights the approach for identifying the risks, contingency planning could focus on. The positioning of the risks in the matrix relates to their likelihood (horizontal view) and to their potential impact (vertical view).

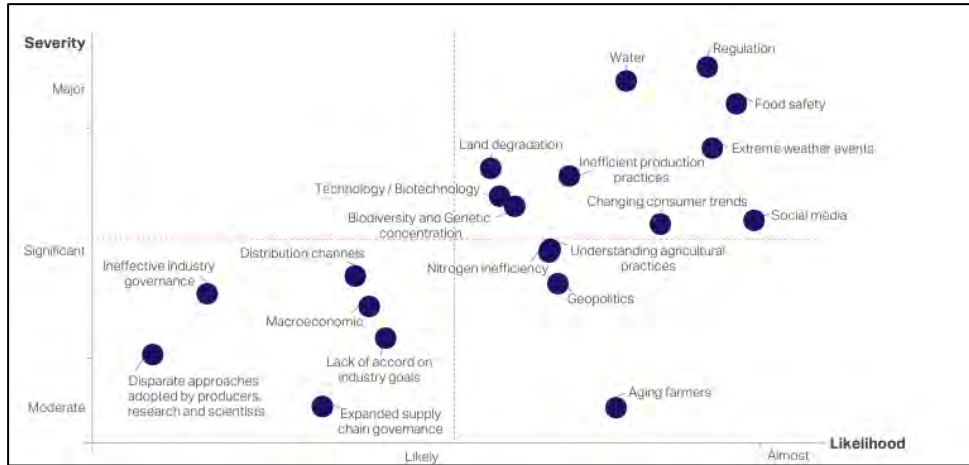


Figure 10.3. Global risks for the food system.

(Source: WBCSD (2020). An enhanced assessment of risks impacting the food and agricultural sector. https://docs.wbcsd.org/2020/01/WBCSD_An_enhanced_assessment_of_risks_impacting_the_Food_and_agriculture_sector.pdf.)

Recent publications allow the allocation of risks to food security in Europe to a variety of factors that can affect both, the availability and access to food:

1. *Climate Change*: Increasingly unpredictable weather patterns, such as droughts or floods, can disrupt crop production. By 2050, crop yields in Southern Europe could decline by up to 50% for key crops like wheat and maize due to extreme weather events (e.g., Alexander, 2022)
2. *Geopolitical Tensions*: Conflicts, trade restrictions, or disruptions in global supply chains (e.g., energy or key agricultural imports) could affect food availability. The probability varies depending on political landscapes, but impacts can be severe, leading to price volatility and shortages. In 2022, disruptions in global food supply chains caused European wheat prices to spike by 30-40%, affecting affordability and food availability (e.g., Aminetzah et al., 2023).
3. *Economic Instability*: Inflation, rising input costs (like energy and fertilizers), or economic downturns can reduce affordability of food for consumers. The probability is moderate but has high impact, particularly for low-income populations.
4. *Biodiversity Loss*: Declining biodiversity and soil degradation (Ford, 2024) lower agricultural resilience, increasing vulnerability to pests and diseases. Probability is high with long-term severe consequences on productivity, estimated at about 12% over the next 20-30 years.

Overall, these risks, when combined, create a high likelihood of disruptions, and the severity of their impact on **Europe's food security could range from moderate to severe**, depending on the scale of each risk factor.

10.3 Management of risks

The management of risks involves the identification and selection of suitable activities for reducing or eliminating the negative impacts of emerging risks. The key goal is to minimize damage or avoid risks altogether by implementing specific strategies.

Common risk management techniques include:

- a) *risk avoidance*: Completely eliminating risky activities or engagements,
- b) *risk reduction*: Lowering the likelihood or impact of risks through preventive measures or specific activities,
- c) *risk transfer*: Shifting the responsibility for risks to a third party (e.g., insurance or cooperative),
- d) *risk acceptance*: Accepting low-level risks where negative impacts are lower than costs of activities.

Contingency planning may come up with a plan, proposing initiatives in any of the management techniques. However, the main focus is on the reduction of negative impacts of emerging risks while the other initiatives are more linked to developing the resilience of the food system.

In general, the management of risks is a straightforward process based on the identification of a certain risk and involving the following commonly accepted major steps related to food security:

1. Specifying feasible and suitable *actions* for assuring food security and avoiding negative side effects.
2. Analysing *costs* and *effects* of actions.
3. Integrating all suitable actions into a *contingency plan*.

Implementing the process in a real planning and decision situation requires its embedding into the actual scenario situation. This involves the specification of its risk-related focus regarding

- a) space (location of emerging risks and of food security interests),
- b) target group regarding food security interest; and
- c) food security objectives.

The *spatial view* requires the delineation of agricultural production and/or the food system in a certain region (representing a local, country or global view) which is affected by the risk with consequences for food security in the region of the target group which may differ from the region affected by the risk.

The view on the *target group* needs to specify consumers with specific characteristics which the contingency plan should protect from food security problems such as low-income families in the region area of interest.

The view on *objectives* asks for a specification of food security dimensions the contingency plan should primarily focus on. In a European context, food availability is not of major concern but the other dimensions could be.

11 Towards a Hands-on Contingency Process

11.1 Overview

A *process system view* provides the link between the real operational system and an operational planning process which guides users in the development of a contingency plan. The performance and especially reliability of a contingency planning process depends on a clearly defined and tested standardized step-by-step operational process which can easily be repeated in case of need and irrespective of the actual contingency situation at hand.

Each contingency situation is unique and, as a consequence, cannot be dealt with by a blueprint action plan. However, the contingency planning process should and could be developed as a *blueprint process* which can be picked up in times of need and followed routinely for developing a contingency plan in response to an actual contingency situation.

The necessary information about the actual contingency situation and the opportunities for dealing with it, depends on external input specific for any single planning situation. This external input is traditionally provided through databases about the past, through documentaries of alternatives (e.g., lists of possible risks) from which one can choose, and through expert opinion. This list is recently complemented by the utilization of Large Language Models a subset of artificial intelligence (figure 11.1).

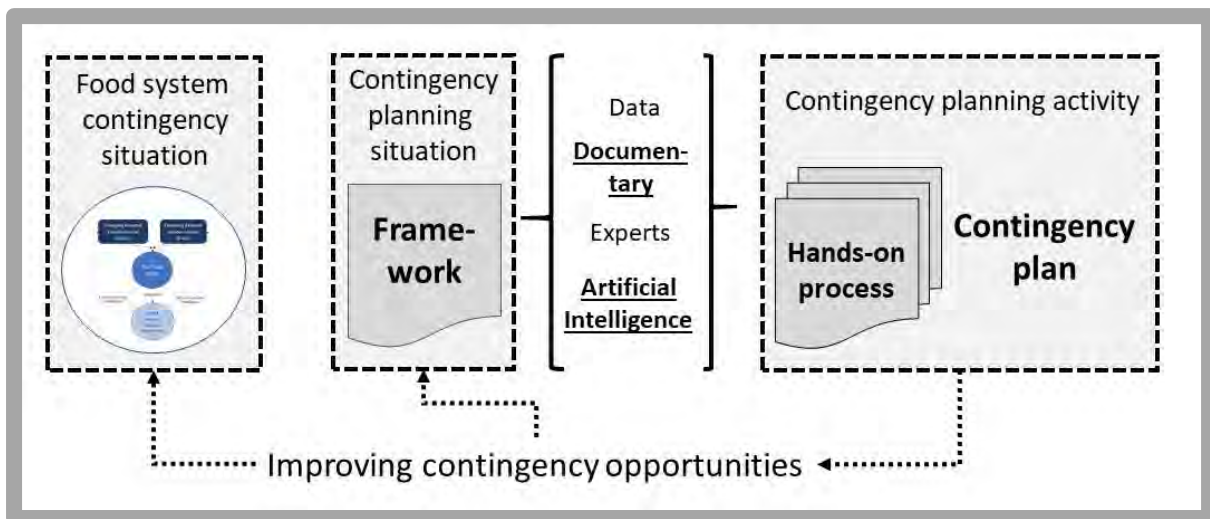


Figure 11.1. Process system view linking the food system situation with the planning activity (Source: author; food system graph based on figure 3.2).

The relevance of alternatives is as follows:

1. Relevance of databases: A unique contingency situation cannot be dealt with within a daily routine and can only scarcely rely on routinely collected data and databases of the **past. An “automatic” response procedure based on data (experiences) of the past is,** therefore, not a suitable approach. However, the databases have still value in issues independent of actual and past situations such as the delineation of regions, etc.
2. Relevance of expert judgement: Contingency planning with a view on the future requires the incorporation of expert judgement. Traditionally expert judgement is collected through inquiry with human experts who rely on their ability for logic reasoning combined with experience, speculations about the future and the capturing of a potential or actual risk situation.
3. Relevance of documentaries: Documentaries involve lists of alternatives from which the planning institutions may choose. Examples include lists of potential risks, of vulnerable groups, of potential actors and/or activities for dealing with hazards, etc. They are provided through experts who provide information for a range of possible contingency situations and reduce the need for expert involvement in a specific situation.
4. Relevance of Large Language Models (LLM): New developments in LLMs can utilize the combined expert experience of the past with logic reasoning and provide a very first **“Artificial Intelligence Expert Judgement”** which could be linked with information about the emerging risk situation for arriving at suitable decisions for managing a potential future or actual risk situation.

In contingency planning, the process follows the step-by-step process procedure, interacts with the listed information sources listed above, documents the decisions made at the various process steps, and summarizes the results in the contingency plan.

11.2 Utilizing expert judgement and LLM support

The embedment of expert judgement and LLM support in the planning approach now and in the future is outlined in figure 11.2. With a look into the future, the traditional information sources will be replaced by LLM support which not only includes the combined data sources and expert documentations available from the past but also provide in a transparent manner logical reasoning which a human expert could evaluate and, if deemed necessary, overrule.

However, this future has not arrived yet. The communication with Large Language Models requires expert knowledge. This involves both, the extraction of knowledge from the LLM **sources through the formulation of appropriate questions (“prompts”) which supports** LLM search and the evaluation of feedbacks from the LLM sources (figure 11.3).

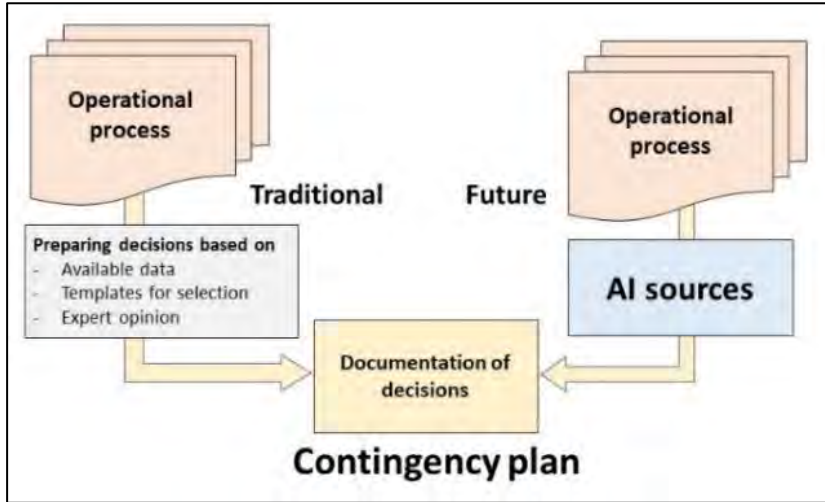


Figure 11.2. Moving from planning process to a contingency plan now (traditional approach) and in the future (Source: author).

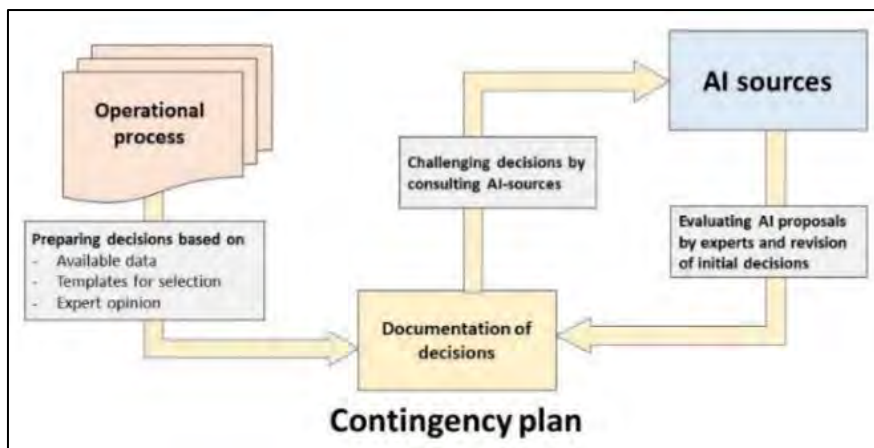


Figure 11.3. Integration of LLMs into the planning approach as is suitable today (Source: author).

A further integration of LLM sources concerns (1) the opportunity to complete the identification of a contingency situation providing information about, e.g., the diets of vulnerable groups or the probability of certain hazards and, in addition, (2) the use of documentary templates. Traditionally, documentaries are provided by experts ahead of planning activities, supporting the identification of issues by offering lists to choose from. Large Language Models offer the opportunity to create such lists on the fly, i.e., at the time of need.

This has two advantages, the lists are up-to-date, consider latest knowledge, and can be best adjusted to the specific situation they are needed for (figure 11.4).

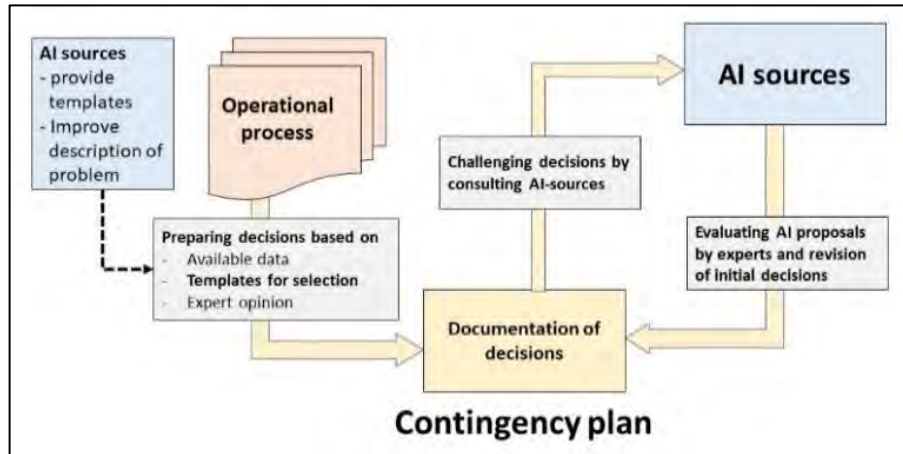


Figure 11.4. Complete integration of LLMs into the planning approach possible today (Source: author).

12 Implementing the Operational Process: hands-on

12.1 The basic operational process

The operational planning process as developed on the basis of the general framework scheme discussed in chapter 8 needs to build on 4 main focus activities of decision needs:

1. Focus activity 1: the specification of the *region*, the *product* and *target group* of interest, and the *hazard* to be dealt with.
2. Focus activity 2: the identification of *objectives* and of suitable *actors* that could provide activities for mitigating the effects of hazards.
3. Focus activity 3: the calculation of the *benefits and costs* of selected activities.
4. Focus activity 4: the specification of *coordination* needs and opportunities for allowing timely realization of necessary activities.

The various stages of the focus activities are differentiated in figure 12.1 into a step-by-step planning process scheme addressing the various variables that require specification and decision by the responsible institution.

Region/group/hazard/	Actions	Cost/Benefit	Coordination
Where	Objectives	Side effects	Coordination schemes in place
Target group	Suitable actors	Reducing side effects	
Product(s)	Action Opportunities	Cost benefit	Establishing coordination schemes
Hazards		Resources	
Impact	Action impacts	Finance	

Figure 12.1. Scheme of the operational planning process

As had been outlined before, the specifications and decisions could build on information from the past, from scenario developments, from documentaries listing possible answers for selection, from expert judgement or from LLM support.

Guided by a stepwise process with support from any of the various support elements listed above is a standard feature in contingency planning guides and some of the support elements could be provided within the ECO-Ready project as contingency planning support. This includes the provision of documentary templates for various variables and especially the incorporation of LLM support through the provision of LLM prompts for utilizing Large Language Models in creating **documentary templates on demand and for extracting “Large Language Model based expert judgement”**. **An example is provided in appendix B4.**

The variables in the global process outlined above can be differentiated in more detail almost without limits. For remaining feasible one needs to find a level of detail which best supports the responsible institution in line with the management capability of users but is condensed enough for keeping the overview and not getting lost in too many details.

For this project we have chosen a level of detail which is outlined in figure 12.2 as a basis for discussion and communication with user groups. It is accessible in more detail in appendix B1.

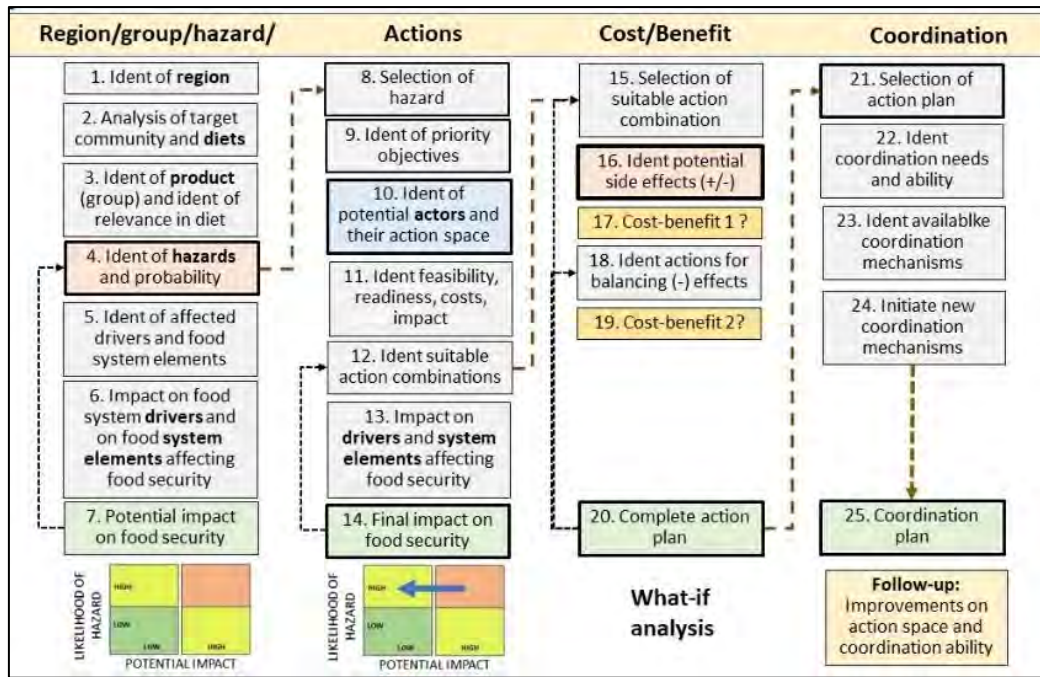


Figure 12.2. An outline of the operational process with the 4 focus activities.

12.2 Focus activity 1: region, target group, product, and hazard

The focus activity 1 sets the basis for the contingency plan. It clarifies the contingency situation, the contingency plan is supposed to deal with. At this point one needs to clarify, if the situation is a contingency situation that requires or warrants the development of a contingency plan.

12.21 The region

The delineation of the region is a tricky issue. One needs to identify the region where the risk may emerge with consequences for the target group:

1. The risk may be limited to the region of the target group.
2. The risk might emerge in an area reaching beyond the region of the target group.
3. The risk might emerge in regions different from the region of the target group.

The first alternative allows to reduce the impact of an emerging risk through regional activities and, in addition, through trading activities with other regions not affected by the risk. The second alternative may reduce opportunities for reducing the impact of a risk through new trading activities with other regions. The third alternative may have an impact on present import activities and, in consequence, have a negative impact on food security in target group regions with high dependency on imports.

12.22 The target group

The vulnerability of the target group regarding food safety could focus on all dimensions of food security as discussed by FAO and outlined in chapter 3. It is obvious that different target groups may be affected differently by deficiencies in any of the characteristics. While the affordability of food may be a problem for low-income families, it would not affect high income people in a similar way. People with certain dietary requirements will be affected by deficiencies in food quality or limitations in diversity.

In summary, analysing potential effects of emerging risks on the target group may ask not just about the size of the target group and its part in the consumer group but identify the **group's vulnerability characteristics related to the various dimensions of food security including, e.g., the identification of the target group's diet, the dietary requirements, the interchangeability of food products in the diet, the food expenses in relation to the total income, and more.** These issues require intensive analysis and are further aggravated if they need to relate to a future scenario without any statistical or past experience.

12.23 The product

A target group is usually bound to a certain diet in its consumption. As a hazard may affect different products differently, as, e.g., an animal disease may not affect plant production, the relevance of a certain product within the diet in terms of quantity, taste or health considerations is crucial in relation to food security. In principle, the higher the relevance, the higher the negative impact of risk-based food product deficiencies.

However, the relevance is not just restricted to its value for the diet but also its relevance from a cultural point of view. If the product can easily be exchanged by other products, the impact on food security is reduced.

Example: In an experimental study by the author dealing with meat shortages and focusing on low-income families as target groups, it was assumed that families could easily switch to plant-based alternatives. The analysis resulted in healthier family diets and lower expenses for food. As a result, the risk-based food shortage was a dual win for the target group (if maybe not for meat producing companies) and the food security issue was no longer a problem one needed to deal with.

12.24 The hazard

The hazard is affecting the target group usually but not necessarily located in a certain region. There are different types of hazards one needs to look at in efforts for assuring food security. Hazards may be linked to any actor engaged in the food chain starting with farms and involving food processing, food trade and retail. However, they may also be linked to socio-economic and environmental drivers behind the activities of the actors. In agricultural production this may refer to water, drought, pests or diseases. In food chains it might involve the breakdown of transportation routes or a quality contamination in processing industries. For some discussions on drivers see WEF (2022) or EC (2023).

The examples demonstrate the multitude of possible risks which might not be dealt with within the resilience of the system but might have major effects on food security within the target group. This asks for prioritization in further pursuing a contingency planning

process. The analysis across the range of possible risks leads to a matrix in which risks are marked according to their likelihood and potential impact on food security (figure 12.3).

In general, low impact risks have no priority for contingency planning and should be covered by a system’s resilience operations. The matrix identifies in its upper right corner the risks with high impact but also high likelihood. From a relevance point of view, their incorporation into a system’s resilience would be of high interest. However, cost-benefit considerations might limit this opportunity placing highest priority on developing appropriate contingency plans.

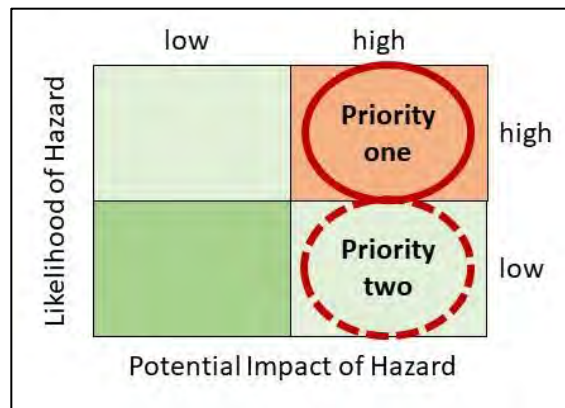


Figure 10.3. Matrix of risks (Source: Author).

Hazards in the lower right corner have a high potential impact but a low probability of occurrence which limits interest in adapting a system’s resilience to covering these risks where the low probability lowers the benefit in cost/benefit considerations. However, the high impact of hazards, even of low likelihood hazards places high priority of developing appropriate contingency plans as well.

12.25 The impact

The impact of hazards on food security can affect any of the various dimensions of food security. Getting all dimensions together for measurement in a common index is complex and could involve different weights for the various dimensions of food security. It has been proposed to identify the impact on a scale between 1 to 5 using the “*IPC/CH acute food insecurity phase description and response objectives*” (<https://www.ipcinfo.org/ipcinfo-website/ipc-overview-and-classification-system/ipc-acute-food-insecurity-classification/en/>). It is adapted in table 12.1 for use in the planning process.

Table 12.1.
A measurement scale for food security
(Source: Adapted by author from table 4.1).

Food Security Phase	Identification	Contingency action required	Judgement mark
Phase 1	None/minimal	None	1
Phase 2*	Stressed	Protection of livelihood**	2
Phase 3*	Crises	Urgent action for protection of livelihood and reduction of food consumption gaps	3
Phase 4*	Emergency	Urgent action required to save lives and livelihoods	4
Phase 5	Catastrophe	Urgent action required to revert/prevent widespread death and total collapse of livelihoods	5
* Phases 2, 3, and (less) 4 are the most likely ones in dealing with food security contingencies in Europe			
** By definition, means of livelihood are food, income and assets; any negative developments on any aspects of food security as well as on expenditures for food have a negative impact on livelihood			

12.3 Focus activity 2: actors and activities

The focus activity 2 marks the opportunities of responsible institutions to react and reduce or eliminate the negative impact of risks. They could have own activities at their disposal or be able to initiate appropriate activities by other actors in the food system including members of the food chain such as trading companies.

The identification of suitable activities needs to be related to objectives regarding the intended effect on the various dimensions of food security such as food availability or food affordability for target groups.

Based on the objectives and the analysis of opportunities, activities and the actors responsible for carrying out the activities could

- a) deal with food *security deficiencies* directly such as providing extra funds to vulnerable groups,
- b) deal with relevant environmental or socio-economic *drivers* for food security such as fighting a plant disease,
- c) change (as food chain actors) *food chain operations* towards improvements in food security through e.g. increased import or
- d) get *food chain actors* (through institutions with influence on food chain actors) change food chain operations through e.g. the payment of subsidies to provide appropriate support.

In an actual crises situation, the first priority is with activities directly reducing food security problems, while activities aimed at reducing deficiencies in drivers or food system activities will need to follow later. With an early warning system in place and the opportunity for initiation of activities before food security is endangered, priority is with

activities that eliminate the negative effects on drivers and support the food chain actors in keeping their operation running without interruption.

The second focus activity, specifying the impact of a certain risk within a defined region on a selected target group and after suitable activities of selected actors on reducing or eliminating the negative impact have been carried out, leads to an updated matrix demonstrating the effect of activities (figure 12.4).

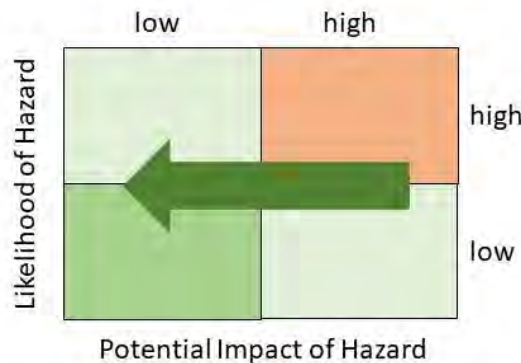


Figure 12.4. Change of impact through initiation of activities for mitigating effects of risks.

12.4 Focus activity 3: Costs and benefits including balancing of negative side effects

Any initiation of activities for mitigating the effects of emerging risks on food security must assure that the costs and effects are in a positive balance. The calculation of the balance is not limited to comparing monetary costs with monetary benefits but includes non-monetary costs and benefits as well. This involves a judgement element which is difficult to measure and might differ between different groups. In addition, the costs occur with actors such as policy institutions which are different from those who reap the benefits, such as consumers.

In this context, it might be helpful to do the cost-benefit calculation for different actors and target groups and integrate them in a complete picture for a final decision on the initiation of activities.

In summary, common cost-benefit views may involve comparing

- a) monetary values,
- b) scale values grading costs and benefits in scales such as, e.g., 1 to 10, or
- c) rough expert judgements such as considering “costs and benefits in balance”, or “costs may outweigh benefits” or “benefits may exceed costs”, etc.**

However, whatever difficulty, the overall judgement has to assure that benefits exceed costs and that a balance of costs and benefits between all those concerned takes place.

In a proposal provided by ‘Preparecenter’ (<https://preparecenter.org/activity/gdpc-research-activities/participatory-cost-benefit-analysis/>) it is suggested to following an approach in cost-benefit analysis of activity alternatives as indicated in table 12.2, first in

terms of qualitative judgements (words) or in terms of scales (added by author) and second in their transformation into monetary terms. Table 12.3 allows the comparison and selection of alternatives. While the proposal provided by ‘Preparecenter’ propagates the transformation of qualitative judgements into monetary terms, the approach would also support decisions based on scaling and the understanding of relationships in scales between costs and benefits.

This need to balance costs and benefits between actors is closely linked to the consideration of *negative side effects of activities* initiated for assuring food security.

The elimination of negative side effects is an element in balancing of costs and benefits. As an example, reducing risk-related shortage in food production through an increase in imports has a negative impact on farms who cannot offset their loss in production through an increase in prices. By providing subsidies for farmers, negative side effects of imports can be eliminated. In this example, costs which farmers would have to deal with, are taken up by political institutions and, in turn, by society.

Table 12.2.

Cost-benefit template

(Version A: Qualitative judgements (words), Version B: Transformation into scales (added by author), Version C: Transformation into monetary terms)

	Costs			Benefits		
Activity Option 1	Economic	Social	Environment	Economic	Social	Environment
One time						
Recurring						

Table 12.3.

Summary cost-benefit template for selection based on monetary terms or scaling judgements

	Costs				Benefits				Ratio
Activity Option 1	Economic	Social	Environment	Total	Economic	Social	Environment	Total	
One time									
Recurring									
Activity Option 2									
One time									
Recurring									

12.5 Focus activity 4: Coordination

The coordination challenge has been outlined above in chapter 9 in more detail. The ability to coordinate activities is closely linked to the competence of the responsible institution. In dealing with a contingency situation on short notice, the competence of the responsible institution is of major relevance and might limit coordination efforts. There are examples, where actors accepted coordination initiatives by a responsible institution in a contingency situation much beyond the institution’s formal competence space. However, there are also

examples where a contingency situation could not be dealt with appropriately due to competence deficiencies.

An **institution's competence may not be restricted to regulatory influence but may be** extended to include influence through requests, voluntary agreements, network coordination, pressures by NGOs and/or media, and others.

In preparatory contingency planning, the coordination needs could be clarified irrespective of formal competences. This assures that coordination mechanisms will work in times of need.

Coordination activities are basically *policy initiatives*. This is exemplified by the larger number of official European documents provided by the European Commission or related groups. Part A of this report deals extensively with these reports. We refer to this part for further discussion.

12.6 Coordinated information collection

Moving through a planning process is not a singular initiative. With the variety of information sources necessary for reaching a contingency plan, one needs to integrate them into a structured approach, a planning system. Most relevant information sources include information collection from available data and literature sources, the involvement of stakeholder and actors in focus groups, and the consultation with experts.

As experts' understanding of the future usually differs, it is suggested to incorporate them in repeated feedback schemes such as proposed by the *Delphi method* (Row and Wright, 1999) which tries to harmonize expert opinions about the future as much as possible. Such processes are established procedures in forecasting efforts. In Europe, the Eklipse approach, initially created for governmental decision support on biodiversity issues provides an example on how the various information and communication efforts could be successfully combined. It evolved from a European project and is widely used in Europe as it draws from a wide range of established forecasting methods available from social and natural sciences. For further information we refer to <https://eklipse.eu>.

13 The CANVAS Documentation Scheme

13.1 The documentation templates

The documentation of specifications and decisions prepared during the step-by-step operational process relates to the CANVAS documentation system established for business management. We propose a related CANVAS documentation system which documents information and decisions that evolve from following the operational planning process. It is proposed to use CANVAS templates for documentation which are linked to certain stages of the planning process.

All CANVAS templates are connected through the hazard in consideration, the region and product of focus, and the target group of interest. Beyond this, the CANVAS templates include the following schemes:

1. Target Group CANVAS: It deals with the consequences of a hazard on the target group and specifically on food security;
2. Food System CANVAS: Its focus is on the impact of the hazard on food system drivers (environmental and socioeconomic) and on food chain partners with, eventually, consequences for food security;
3. Actor/action CANVAS: It allows to specify the actors/actions that could help to reduce the impact of the hazard on food security;
4. Implementation CANVAS: It (i) analyses negative side effects of actions, (ii) identifies initiatives for reducing these side effects and (iii) compares the final costs of coping with a hazard with the positive effects (benefits) of actions on food security as compared to not acting at all (cost-benefit analysis);
5. Coordination CANVAS: It clarifies the needs and opportunities of coordinating actors in case of a contingency situation.

As an example, the ‘Target Group CANVAS’ is outlined in figure 13.1. A complete overview on the different CANVAS templates is attached in appendix B2.

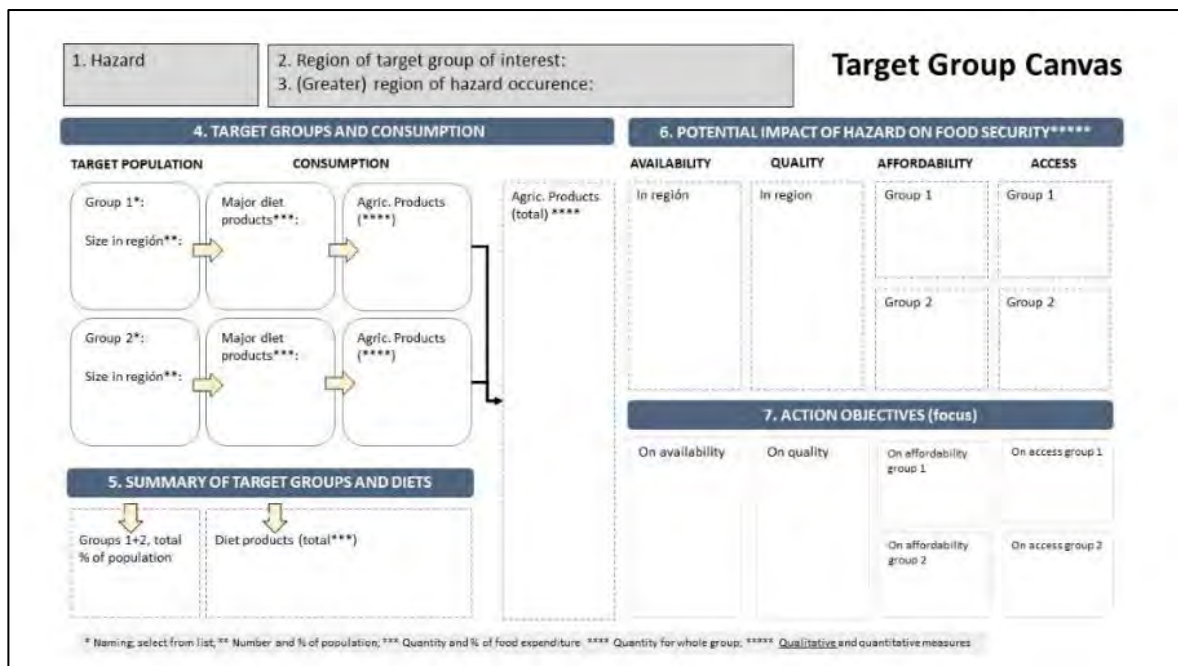


Figure 13.1. Target Group CANVAS.

The CANVAS system is comprised of boxes that provide space for documenting all information used and decisions made during the planning process. However, the CANVAS system does not necessarily have to provide space for all information used and decisions made during the planning process. It might be complemented by other documentation elements such as tables, lists, graphs, videos, etc. The CANVAS boxes would then provide space for references to the complementary documentation elements, assuring that documentation is complete.

13.2 Link between contingency process and CANVAS documentation

The various Canvas templates are linked to the 4 focus activities as outlined in figure 13.2. A more detailed linkage between individual steps of the planning process and CANVAS partitions is provided in table 13.1. In a contingency planning situation, table 13.1 supports moving information or decision outcomes of each step of the planning process directly into the CANVAS system, guiding users in the documentation.

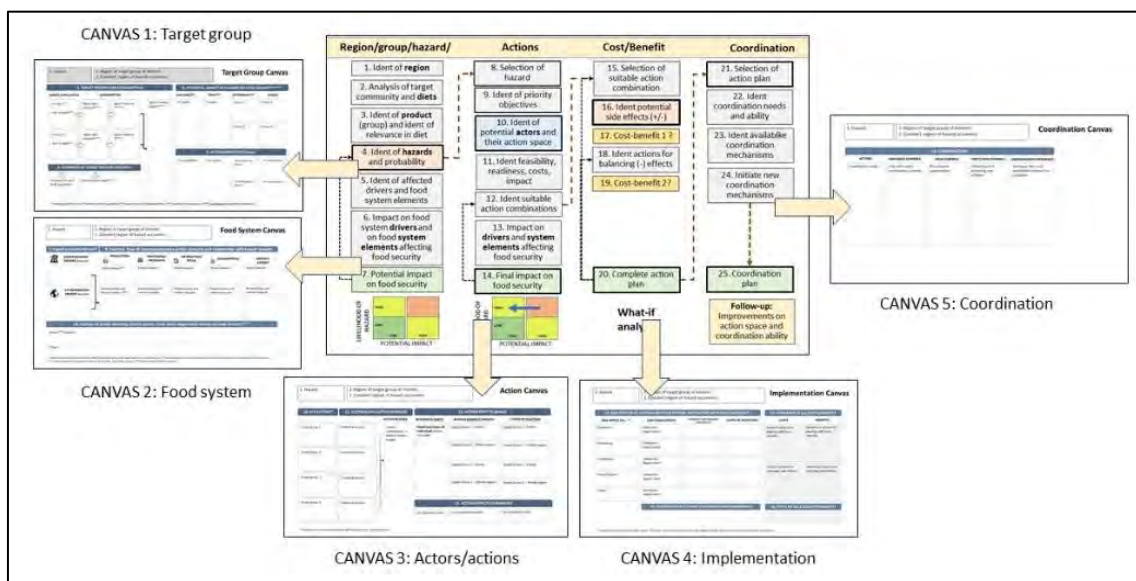


Figure 13.2. Linkage between the CANVAS templates and the focus activities of the operational process.

Table 13.1.
Linking process activity results to CANVAS documentation tables

CANVAS (C*) document space	Process activity steps	Focus activities			
		I	II	III	IV
C1-1	Hazard	X			
C1-2	Region of target group of interest	X			
C1-3	(Greater) region of hazard occurrence	X			
C1-4	Target groups and consumption ¹	X			
C1-5	Summary of target groups and diets	X			
C1-6	Potential impact of hazard on food security	X			
C1-7	Action objectives (focus)		X		
C2-8	Impact on external drivers	X			
C2-9	Flow of interdependencies within industry and relationship with hazard impacts	X			
C3-10	Key actors		X		
C3-11	Actions and action bundles		X		
C3-12	Action effects (detail)		X		
C3-13	Action effects (summary)		X		
C2-14	Actions of actors affecting drivers and/or food chain stages with effects on food security		X		
C4-15	Side effects of actions on food system, supportive initiatives, and costs			X	
C4-16	Costs side effects and costs initiatives (summary)			X	
C4-17	Summary of all costs and benefits (details)			X	
C4-18	Total of all costs and benefits			X	
C5-19	Coordination				

* Steps and colors relating to CANVAS documentation stages

13.3 Interacting with Large Language Models

The interaction with the LLMs follows the flow of the operational planning process but is focused on improving the information documented in the various CANVAS templates.

For guiding users into employing LLMs into their planning routines, the report lists a few basic prompts as outlined in figure 13.3 for focus activity 1.

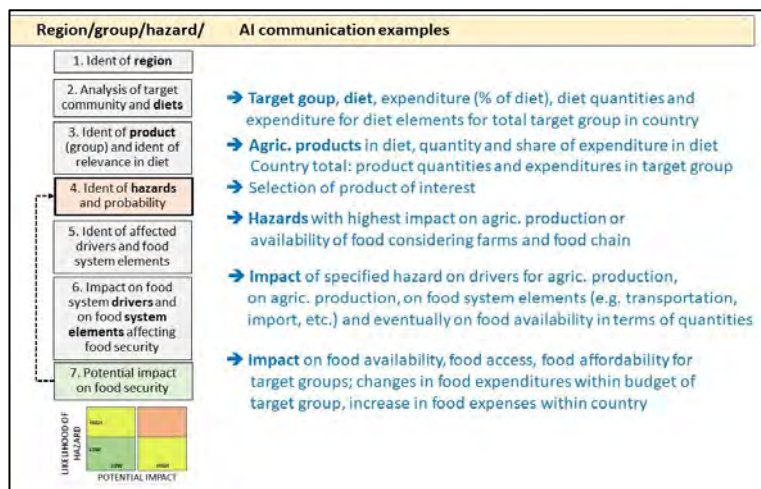


Figure 13.3. LLM prompt proposals linked to the first focus activity of the planning process.

As discussed before, the extraction of knowledge from the LLMs through appropriate prompts as well as the evaluation of results requires expert knowledge.

Basic prompts for focus activities 2, 3, and 4 are provided in appendix B3. It is envisaged that the Living Labs will further develop these prompts according to their needs in their own planning activities.

A limited demonstration example for a potential support through LLMs in a move through the planning process is outlined in appendix B4. The tables in the appendix represent summaries of more extended responses of the *Large Language Model* source. An overview on the headings that are considered in LLM responses are provided in table 13.2. It provides an overview on the depth of the responses covering the following issues:

1. Identification of vulnerable groups in food safety situations
2. What are the most common risks in farming?
3. Which actors could support low-income families in case of a drought in Germany (example)?
4. Contingency plan in support of low-income families in case of droughts in Germany (example)
5. What are the costs of the plan?
6. What can be reached with a budget limit of 10 million?

13.4 Useful documentary templates

Documentary templates as specified here involve expert knowledge prepared for use in different situations. They show possible decision alternatives relevant for a specific step in the planning process from where users select the one(s) relevant for the situation at hand. As discussed before, LLMs may produce such documentary templates on demand. However, the responses from LLMs may have deficiencies or are incomplete.

At this stage we have prepared a few documentary templates as examples including (appendix B5)

- a) examples of potential hazards related to environmental and socio-economic drivers,
- b) examples of potential actions for food security provided from selected literature.

For risks related to climate change impact, geopolitical tensions, soil degradation, target groups, and drivers, we have listed some literature in the reference list that could provide information for documentary templates. During the planning initiatives with different Living Labs, documentary proposals for different Living Lab regions could be developed. A specific documentary concerns the identification of European regions with statistical data as outlined on the European level (Eurostat 2024a, 2024b, 2024c). Table 13.3 summarizes a condensed version of regions delineated within the Czech Republic.

Table 13.2.

Response structure of LLM use in a process exercise (Source: adapted by author).

Q: Identification of vulnerable groups in food safety situations

A: In food safety situations, vulnerable groups are populations that are more susceptible to the adverse effects of foodborne illnesses due to physiological, health, or social factors. Here are some of the key characteristics and categories of vulnerable groups in food safety contexts (More in appendix B4b...)

1. Infants and Young Children, 2. Pregnant Women, 3. Elderly Individuals, 4. Individuals with Chronic Illnesses
5. Immunocompromised Individuals, 6. Low-Income Populations 7. Refugees and Displaced Persons

Q: What are the most common risks in farming?

A: Farming involves a variety of risks that can affect productivity, profitability, and sustainability. These risks can be broadly categorized into the following types (More in appendix B4c...)

1. Weather and Climate Risks, 2. Pest and Disease Risks, 3. Market and Price Risks, 4. Financial Risks
5. Operational and Management Risks, 6. Environmental and Regulatory Risks, 7. Social and Political Risks
8. Human Health Risks

Q: Who could support food security for low-income families in case of a drought in Germany (example)?

A: In the case of a drought in Germany that threatens food security for low-income families, various organizations, government agencies, and community initiatives could play a crucial role in providing support. Here's a list of potential supporters and their roles (more in appendix B4d...)

1. Government Agencies, 2. Non-Governmental Organizations (NGOs), 3. Community-Based Organizations
4. Agricultural Cooperatives and Farmers' Associations, 5. Private Sector, 6. International Organizations
7. Academic Institutions and Research Centers, 8. Community Volunteers and Grassroots Movements

Q: Create a contingency plan in support of low-income families in case of droughts in Germany (example)

To create a contingency plan for food security that specifically supports low-income families in Germany during droughts, it is essential to address the unique vulnerabilities and needs of this demographic group. Here's a tailored plan (more in appendix B4e...)

Step 1: Risk Assessment for Low-Income Families, Step 2: Develop Response Strategies

Step 3: Communication and Coordination, Step 4: Implementation and Monitoring, Step 5: Review and Adaptation

Q: What are the costs of the example

A: Estimating the costs of implementing a contingency plan for food security, especially in support of low-income families during droughts in Germany, involves several components. The costs will depend on various factors, including the scale of implementation, the extent of existing infrastructure, and the resources required to execute each part of the plan. Below is a breakdown of potential cost components and some considerations for estimating overall expenses.

1. Food Assistance Programs, 2. Economic Support Measures, 3. Community-Based Solutions
4. Nutritional Support and Education, 5. Communication and Coordination, 6. Monitoring and Evaluation

Total Estimated Costs

The total estimated annual cost for implementing this contingency plan ranges between €100 million and €200 million.

This is a rough estimate and could vary significantly based on:

- The severity and frequency of droughts, - The scale of implementation across regions.
- The efficiency of resource allocation and management.

Funding Sources

1. Government Funding, 2. International Aid and Grants, 3. Public-Private Partnerships, 4. Community Contributions

Q: What can be reached with a budget limit of 10 million?

A: With a budget limit of €10 million, the contingency plan for food security in support of low-income families during droughts in Germany needs to be highly focused and strategic. Prioritizing cost-effective measures and leveraging partnerships can maximize impact within this budget constraint. Here's a streamlined plan:

Focus Areas and Strategies

1. Targeted Food Assistance, 2. Community-Based Solutions, 3. Nutritional Support and Education
4. Economic Support Measures, 5. Communication and Coordination, 6. Monitoring and Evaluation

Cost-Effective Measures and Partnerships

- Leverage Partnerships, - Volunteer Mobilization, - Digital Solutions, - Focus on High-Impact Areas

Conclusion

With a limited budget of €10 million, this streamlined plan focuses on the most critical and cost-effective interventions to support low-income families during droughts. By prioritizing partnerships, community engagement, and targeted assistance, it is possible to make a significant impact within financial constraints.

Table 13.3
European regions of the statistical office in the Czech Republic

Country code	NUTS Code	NUTS label	NUTS level	Country order	#
CZ	CZ0	Česko	1	3	101
CZ	CZ01	Praha	2	3	102
CZ	CZ010	Hlavní město Praha	3	3	103
CZ	CZ02	Střední Čechy	2	3	104
CZ	CZ020	Středočeský kraj	3	3	105
CZ	CZ03	Jihozápad	2	3	106
CZ	CZ031	Jihočeský kraj	3	3	107
CZ	CZ032	Plzeňský kraj	3	3	108
CZ	CZ04	Severozápad	2	3	109
CZ	CZ041	Karlovarský kraj	3	3	110
CZ	CZ042	Ústecký kraj	3	3	111
CZ	CZ05	Severovýchod	2	3	112
CZ	CZ051	Liberecký kraj	3	3	113
CZ	CZ052	Královéhradecký kraj	3	3	114
CZ	CZ053	Pardubický kraj	3	3	115
CZ	CZ06	Jihovýchod	2	3	116
CZ	CZ063	Kraj Vysočina	3	3	117
CZ	CZ064	Jihomoravský kraj	3	3	118
CZ	CZ07	Střední Morava	2	3	119
CZ	CZ071	Olomoucký kraj	3	3	120
CZ	CZ072	Zlínský kraj	3	3	121
CZ	CZ08	Moravskoslezsko	2	3	122
CZ	CZ080	Moravskoslezský kraj	3	3	123
CZ	CZZ	Extra-Regio NUTS 1	1	3	124
CZ	CZZZ	Extra-Regio NUTS 2	2	3	125
CZ	CZZZZ	Extra-Regio NUTS 3	3	3	126

13.5 The consolidated contingency planning scheme

In summarizing the use of the operational planning process, the documentation of information and decisions in a CANVAS template and the improvement of the documentation through interacting with Large Language Models, the complete contingency planning process encompasses 3 phases which can be described as outlined in figure 13.4. Planning activities in line with the operational planning process (phase 1) lead to results that are documented in the CANVAS file templates (phase 2) which, in turn, are further improved through interaction with the LLM communication process (phase 3) and finally lead to a contingency plan reducing negative effects of emerging hazards on a selected target group.

14 Conclusion

Contingency planning in support of food security and biodiversity is an initiative that needs to be dealt with pro-actively and in case of emergency.

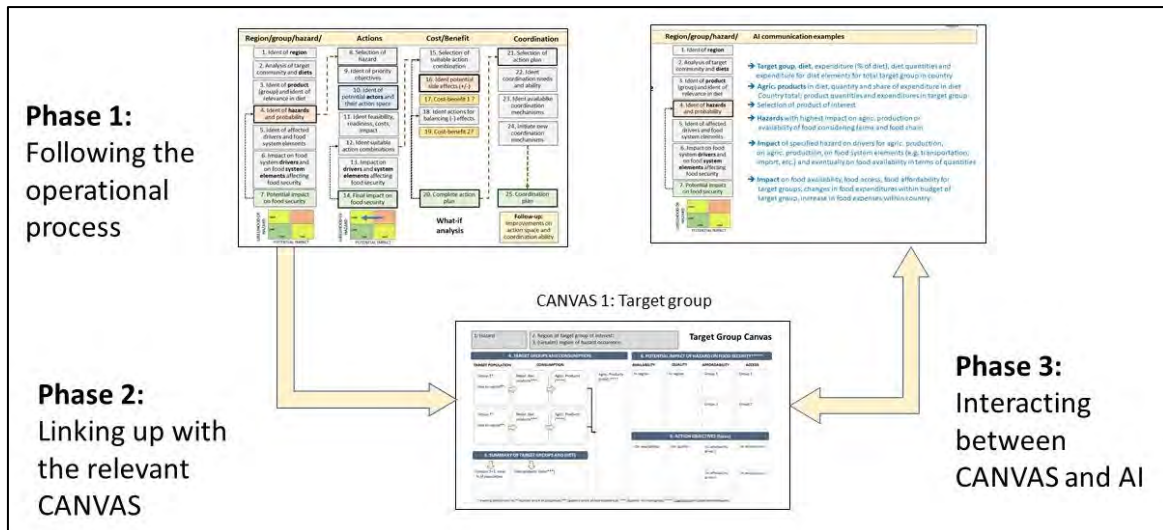


Figure 13.4. The flow of planning activities in contingency planning

The pro-active approach needs to deal with the most relevant hazards regarding likelihood and impact. This allows organizations and people with responsibility for dealing with hazards to be prepared and to swiftly react in case a hazard turns up and, in turn, a contingency situation evolves.

However, in case a hazard turns up, the contingency plan that had been developed pro-actively provides a first-hand guide but might need to be updated for fitting the actual situation. In this situation, the incorporation of LLM support could provide a quick check and update proposal which, after evaluation by available experts, could help to implement a best focused contingency plan. In this case, LLMs are not only supporting information provision but provide added flexibility to process organizations (Schiefer, 2024).

This report is being prepared during a time, when *Large Language Models* have reached the public. These models are still in an experimental stage but are being improved consistently. However, it has been shown that even at this early stage of LLM development, LLMs can provide substantial support in contingency planning by searching available and (if requested) selected sources for relevant information. There is more skepticism in using LLMs for their reasoning capability which, however, is not of prime interest in contingency planning. Irrespective of this, LLMs should still be used with care and with appropriate background checks by experts in the field. Furthermore, communication with LLMs requires experience for reaching the results that are being required. Results are sometimes incomplete or build on information sources of questionable reliability.

The deficiencies in communication with LLMs can be reduced by building on prompts that have been developed by experts in the field and tested for reliability and completeness of return. The development of prompts requires expertise, trial and error activities, and finally extensive testing as somebody would do with a new software program. The task of developing contingency plans for and with Living Labs will be used to develop and test such prompts for further use.

References

- Alexander, P. (2022).** How climate change threatens Europe's food. University of Edinburgh. <https://impact.ed.ac.uk/opinion/how-climate-change-threatens-europe-s-food/#:~:text=In%20Europe%20and%20around%20the,more%20limited%20and%20less%20effective> (accessed Oct. 2024)
- Aminetzah, D., et al. (2023). A reflection on global food security challenges amid the war in Ukraine and the early impact of climate change. McKinsey and Company. <https://www.mckinsey.com/industries/agriculture/our-insights/a-reflection-on-global-food-security-challenges-amid-the-war-in-ukraine-and-the-early-impact-of-climate-change#/> (accessed Oct. 2024).
- Barcaccia, G., D'Agostino, V., Zotti, A., & Cozzi, B. (2020).** Impact of the SARS-CoV-2 on the Italian agri-food sector: An analysis of the quarter of pandemic lockdown and clues for a socio-economic and territorial restart. *Sustainability*, 12(14): 5651.
- Béné, C., Frankenberger, T.R., Nelson, S. et al. (2023). Food system resilience measurement: principles, framework and caveats. *Food Security*, 15: 1437-1458. <https://doi.org/10.1007/s12571-023-01407-y>.
- Bertolozzi-Caredio, D., Severini, S., Pierre, G., Zinnanti, C., Rustom, R., Santoni, E., & Bubbico, A. (2023). *Risks and vulnerabilities in the EU food supply chain: Mapping and analysis based on a stakeholder survey*. JRC Publications Repository. <https://doi.org/10.2760/171825>
- Besamusca, J., Steinmetz, S. (2019). Vulnerable groups in European datasets - An inventory of the measurement of vulnerable groups in 27 data sets covering the European area. Report 11.3, European project Ingrid. https://www.inclusivegrowth.eu/files/Output/D11.3_inventory_report.pdf (accessed Oct. 2024).
- Biehl et al. (2018). Planning for a Resilient Urban Food System: A Case Study from Baltimore City, Maryland. *Journal of Agriculture, Food Systems, and Community Development*, 8(B): 39-53. DOI: 10.5304/jafscd.2018.08B.008.
- Birt, Ch. et al. (2017). Healthy and Sustainable Diets for European Countries. European Public Health Association - EUPHA. https://eupha.org/repository/advocacy/EUPHA_report_on_healthy_and_sustainable_diets_20-05-2017.pdf (accessed Oct. 2024).
- Bonsignore, V. (2013). *Lessons Learned & Good Practices in the Bangladesh Food Security Cluster*. https://www.academia.edu/25018402/Lessons_Learned_and_Good_Practices_in_the_Bangladesh_Food_Security_Cluster
- Bowen, T., Del Ninno, C., Andrews, C., Coll-Black, S., Gentilini, U., Johnson, K., Kawasoe, Y., Kryeziu, A., Maher, B., & Williams, A. (2020). *Adaptive Social Protection: Building Resilience to Shocks*. The World Bank. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/579641590038388922/Adaptive-Social-Protection-Building-Resilience-to-Shocks>
- Brenton, T. (2021). The future of food: scenario analyses. University of Leeds, Chatham House. Presentation provided by EFSA at https://www.efsa.europa.eu/sites/default/files/event/180918-conference/presentations/21-0_02_Benton.pdf (accessed Oct. 2024).
- Chammem, N., Issaoui, M., Almeida, A., & Delgado, A. (2018). Food Crises and Food Safety Incidents in European Union, United States, and Maghreb Area: Current Risk Communication Strategies

and New Approaches. *Journal of AOAC International*, 101. <https://doi.org/10.5740/jaoacint.17-0446>

- Deloitte/WEF (2017). Shaping the future of global food systems: a scenario analysis. <https://www2.deloitte.com/tr/en/pages/consumer-industrial-products/articles/shaping-the-future-of-global-food-systems.html> (accessed Oct. 2024).
- Di Ciommo, M., Rampa, F., & Koen, D. (2022). *The EU's capacity for crisis response: A look at the 2022 food crisis*. ECDPM. <https://ecdpm.org/work/eus-capacity-crisis-response-look-2022->
- EC. (2017). *The Future of Food and Farming (Communication)*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52017DC0713>
- EC. (2019). *The European Green Deal—Communication*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN>
- EC. (2020a). Farm to fork strategy: For a fair, healthy and environmentally-friendly food system. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*, 381: 1-9.
- EC. (2020b). *Communication—EU Biodiversity Strategy for 2030*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020DC0380>
- EC. (2021a). *Communication—Contingency plan for ensuring food supply and food security in times of crisis COM/2021/689 final*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0689>
- EC. (2021b). *Communication—Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0236>
- EC. (2021c). *Contingency plan for ensuring food supply and food security in times of crisis*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021SC0318>
- EC. (2021d). *EU biodiversity strategy for 2030: Bringing nature back into our lives*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2779/677548>
- EC. (2021e). *Overview of natural and man-made disaster risks the European Union may face: 2020 edition*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2795/1521>
- EC. (2022a). *COMMON AGRICULTURAL POLICY FOR 2023-2027: 28 CAP STRATEGIC PLANS AT A GLANCE*. https://agriculture.ec.europa.eu/system/files/2022-12/csp-at-a-glance-eu-countries_en.pdf
- EC. (2022b). *Safeguarding food security and reinforcing the resilience of food systems—European Commission*. https://rea.ec.europa.eu/publications/safeguarding-food-security-and-reinforcing-resilience-food-systems_en
- EC. (2023). *Drivers of Food security*. Commission Staff Working Document. https://commission.europa.eu/system/files/2023-01/SWD_2023_4_1_EN_document_travail_service_part1_v2.pdf (accessed Oct. 2024).
- EC. (2023a). *Analysis of main drivers on food security—SWD*. https://commission.europa.eu/publications/analysis-main-drivers-food-security_en
- EC. (2023b). *Approved 28 CAP Strategic Plans (2023-2027): Summary overview for 27 Member States Facts and figures*. <https://agriculture.ec.europa.eu/system/files/2023-06/approved-28-cap-strategic-plans-2023-27.pdf>
- EC. (2023c). *State of Food Security in the EU A qualitative assessment of food supply and food security in the EU within the framework of the EFSCM. Autumn 2023 - Nr 1*. https://agriculture.ec.europa.eu/system/files/2023-11/efscm-assessment-autumn-2023_en.pdf

- EC. (2023d). *Common Fisheries Policy—State of play -STAFF WORKING DOCUMENT Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL The common fisheries policy today and tomorrow: A Fisheries Pact towards sustainable, science-based, innovative and inclusive fisheries management, SWD/2023/103 final* [Website]. Publications Office of the EU; Publications Office of the European Union. <https://op.europa.eu/en/publication-detail/-/publication/235bfa6c-b1e9-11ed-8912-01aa75ed71a1/language-en/format-PDF/source-335658653>
- EC. (2023e). *The common fisheries policy today and tomorrow: A Fisheries and Oceans Pact towards sustainable, science-based, innovative and inclusive fisheries management. COM/2023/103 final*, [Website]. Publications Office of the EU; Publications Office of the European Union. <https://op.europa.eu/en/publication-detail/-/publication/192c8e6b-b1e9-11ed-8912-01aa75ed71a1/language-en/format-PDF/source-search>
- EC. (2024). *State of Food Security in the EU A qualitative assessment of food supply and food security in the EU within the framework of the EFSCM. Spring 2024 - Nr 2*. https://agriculture.ec.europa.eu/document/download/a91b3841-6021-489e-b877-7f0f5278c88c_en?filename=efscm-assessment-spring-2024_en.pdf
- ECO-Ready Consortium. (2022). *ECO-Ready project Overview*.
- EFSA & EAB. (2020). Cooperation in crisis preparedness for *Agilus planipennis* in the European Union. *EFSA Supporting Publications*, 17(12). <https://doi.org/10.2903/sp.efsa.2020.EN-1985>
- EFSA (2022). Food Consumption Data. <https://www.efsa.europa.eu/en/data-report/food-consumption-data> (accessed Oct. 2024).
- EFSA (2024). Food consumption survey database. <https://www.efsa.europa.eu/en/microstrategy/foodex2-level-2#> (accessed Oct. 2024).
- Engel, A. et al. (2012). Contingency planning for food crises: A puzzle of existing approaches. Working paper FG 2, No. 3. <https://www.swp-berlin.org/publikation/contingency-planning-for-food-crises> (accessed Oct. 2024).
- Ericksen, P. J. (2008). Conceptualizing food systems for global environmental change research. *Global Environmental Change*, 18(1): 234-245. <https://doi.org/10.1016/j.gloenvcha.2007.09.002>
- European Parliament & EC. (2021). *Establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R2115>
- European Parliament & European Council. (2021). *Regulation—2021/2115—EN - EUR-Lex establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013*. <https://eur-lex.europa.eu/eli/reg/2021/2115/oj>
- European Parliament. (2023). *European Parliament resolution of 14 June 2023 on ensuring food security and long-term resilience of the EU agriculture (2022/2183(INI))*.
- Eurostat (2024a). Nomenclature of territorial units for statistics (EU 2024), <https://ec.europa.eu/eurostat/web/nuts> (accessed Oct. 2024).
- Eurostat (2024b). European Commission Regions (NUTS level 2) <https://ec.europa.eu/eurostat/cache/digpub/regions/> (accessed Oct. 2024).

- Eurostat (2024c). European Commission regions by topic. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Regions_and_cities (accessed Oct. 2024).
- FAO (2006). Food Security. *Policy Brief*, June 2006, issue 2. https://www.fao.org/fileadmin/templates/faoitally/documents/pdf/pdf_Food_Security_Cocept_Note.pdf (accessed Oct. 2024).
- FAO (2012). *High and volatile food prices: FAO support to country level contingency planning*. <https://www.fao.org/3/i2688e/i2688e00.pdf>
- FAO (2018). *Sustainable Food Systems - Concept and Framework |Policy Support and Governance| Food and Agriculture Organization of the United Nations*. <https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1160811/>
- FDA (2022). HACCP Principles and Application Guidelines, Food and drug Administration (FDA). <https://www.fda.gov/food/hazard-analysis-critical-control-point-haccp/haccp-principles-application-guidelines> (accessed Oct. 2024).
- FEWS (2000). *Framework for contingency planning and response*. Famine Early Warning System. https://pdf.usaid.gov/pdf_docs/Pnacj232.pdf
- Food Cluster (2017). Die Zukunft der Ernährungswirtschaft. Report Cluster Ernährung. Available at <https://www.cluster-bayern-ernaehrung.de/ueber-uns/publikationen/> (accessed Oct. 2024).
- Ford, A. (2024). Europe's soil emergency. Politico Europe.** <https://www.politico.eu/article/soil-degradation-eroding-europe-agriculture-harvest-crops-flood-drought/> (accessed Oct. 2024).
- GNAFC & FSIN. (2024). *Global Report on Food Crises (GRFC) 2024. Global Network Against Food Crises & Food Security Information Network*. <https://www.fsinplatform.org/grfc2024>
- IASC. (2001). *Inter-Agency Contingency Planning Guidelines for Humanitarian Assistance*. Inter-Agency Standing Committee. <https://reliefweb.int/report/world/inter-agency-contingency-planning-guidelines-humanitarian-assistance>
- IASC. (2007). *Inter-Agency Contingency Planning Guidelines for Humanitarian Assistance*. Inter-Agency Standing Committee. <https://interagencystandingcommittee.org/preparedness/documents-public/iasc-inter-agency-contingency-planning-guidelines-humanitarian>
- IASC. (2015). *Emergency Response Preparedness (ERP): Risk analysis and monitoring, minimum preparedness, advanced preparedness and contingency planning. Draft for field testing*. https://emergency.unhcr.org/sites/default/files/Emergency%20Response%20Preparedness%20July%202015_3.pdf
- IFRC. (2012). Contingency planning guide. <https://www.ifrc.org/document/contingency-planning-guide> (accessed Oct. 2024).
- Liu et al. (2022). Establishing a Multidisciplinary Framework for an Emergency Food Supply System Using a Modified Delphi Approach. *Foods*, 11(7): 1054. <https://www.mdpi.com/2304-8158/11/7/1054> (accessed Oct. 2024).
- Liu et al. (2022). Establishing a Multidisciplinary Framework for an Emergency Food Supply System Using a Modified Delphi Approach. *Foods*, 11(7): 1054. <https://www.mdpi.com/2304-8158/11/7/1054> (accessed Oct. 2024).
- Matthews, A. (2021). Contingency plan for ensuring food supply and food security. *Workshop Report-JRC Conference, Luxemburg*.
- Meijl, van H. et al. (2020). Modelling alternative futures of global food security: insights from FOODSECURE. *Global Food Security*, 25: 100358. <https://www.sciencedirect.com/science/article/pii/S2211912420300110> (accessed Oct 2024).

- NDCC Philippines & UNHCR. (2003). *Contingency Planning for Emergencies: A Manual for local government units*. <https://www.humanitarianlibrary.org/resource/contingency-planning-emergencies-manual-philippino-local-government-units-0>
- NDRRMC & NSC. (2016). *Contingency Planning Guidebook—Philippines*. https://www.google.com/search?q=NDRRMC+%26+NSC.+%282016%29.+Contingency+Planning+Guidebook+Philippines&oeq=NDRRMC+%26+NSC.+%282016%29.+Contingency+Planning+Guidebook+Philippines&gs_lcrp=EgRIZGdIKgYIABBFdKyBggAEEUYOdIBCDI1OTdqMGo0qAIAAsAIB&sourceid=chrome&ie=UTF-8
- Nordine, K. & Zeuli, K. (2022). *Tactics to try for emergency food planningh: A Roadmap for Creating Your City's Emergency Food Response And Recovery Plan*. https://foodfoundation.org.uk/sites/default/files/2022-01/FOOD%20CITIES%202022_S2_Webinar%205%20Case%20Study%20doc_A4.pdf
- Oxford Martin Program on the Future of Food. (2024). *WHAT IS THE FOOD SYSTEM?* [Institutional web site]. <https://www.futureoffood.ox.ac.uk/what-food-system>
- Pursiainen, C. (2020). Arctic food crisis management. *Food Security in the High North* (pp. 159-183). Routledge. <https://doi.org/10.4324/9781003057758-12>
- Rowe, G., Wright, G. (1999). The Delphi technique as a forecasting tool: issues and analysis. *International Journal of Forecasting*, **15**(4): 353–375.
- Rudloff, B., Engel, A., & Oberländer, L. (2012). *Contingency planning for food crises: A puzzle of existing approaches*. <https://www.swp-berlin.org/publikation/contingency-planning-for-food-crises>
- Schiefer, G. (2024). Combining process efficiency with process flexibility: the promise of artificial intelligence. *International Journal on Food System Dynamics*, **15**(4): 342-343.
- Slimani, N. et al. (2002) Diversity of dietary patterns observed in the European Prospective. *Public Health Nutrition*, **5**(6B): 1311-1328. DOI: 10.1079/PHN2002407.
- Sphere Association. (2018). *Food Security and Nutrition in The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response, fourth edition, Geneva, Switzerland*. www.spherestandards.org/handbook
- Toreti, A., Bavera, D., Acosta, N. J., Acquafresca, L., Azas, K., Barbosa, P., De, J. A., Ficchi, A., Fioravanti, G., Grimaldi, S., Hrast, E. A., Magni, D., Mazzeschi, M., McCormick, N., Salamon, P., Santos, N. S., & Volpi, D. (2024). *Drought in Europe July 2024*. JRC Publications Repository. <https://doi.org/10.2760/420832>
- Tozier de la Poterie, A., Castro, E., Rahaman, H., Heinrich, D., Clatworthy, Y., & Mundorega, L. (2023). Anticipatory action to manage climate risks: Lessons from the Red Cross Red Crescent in Southern Africa, Bangladesh, and beyond. *Climate Risk Management*, **39**: 100476. <https://doi.org/10.1016/j.crm.2023.100476>
- UNHCR, UNICEF, WFP, & WHO. (2002). *Food and Nutrition Needs in Emergencies*. <https://iris.who.int/bitstream/handle/10665/68660/a83743.pdf?sequence=1>
- UNHCR. (2020). *Emergency Response Preparedness contingency planning (IASC)*. <https://emergency.unhcr.org/emergency-preparedness/interagency-tools-preparedness/emergency-response-preparedness-contingency-planning-iasc>
- UNISDR. (2015). *Sendai Framework for Disaster Risk Reduction 2015-2030 (A/CONF.224/CRP.1)—World | ReliefWeb*. https://reliefweb.int/report/world/sendai-framework-disaster-risk-reduction-2015-2030-aconf224crp1?gclid=CjwKCAjww7KmBhAyEiwA5-PUStf5_Fe1dw7MhXQRpQSSw4fBBKZGI01hP4rLf4f6qRDtNS-eDBtUmRoC55YQAvD_BwE
- USAID (2000). Framework for contingency planning and response. https://pdf.usaid.gov/pdf_docs/Pnacj232.pdf (accessed Oct. 2024).

- USAID (2000). Framework for contingency planning and response. https://pdf.usaid.gov/pdf_docs/Pnacj232.pdf (accessed Oct. 2024).
- Von Braun, J., Afsana, K., Fresco, L., Hassan, M., & Torero, M. (2021). Food systems-definition, concept and application for the UN food systems summit. *Science and Innovation*, 27. https://agroavances.com/img/publicacion_documentos/ScGroup_Reader_UNFSS2021_compressed.pdf#page=40
- WEF (2022). The Global Risk Report, Vol. 17. <https://www.marshmcclennan.com/content/dam/mmc-web/insights/publications/2022/global-risks-report-2022/global-risks-report-2022.pdf> (accessed Oct. 2024).
- WFP. (2002). *Contingency Planning Guidelines*. World Food Program - UN. <https://reliefweb.int/report/world/contingency-planning-guidelines>
- WFP. (2009). **Strategic Evaluation of WFP's contingency Planning 2002–2008**. World Food Programme. <https://documents.wfp.org/stellent/groups/public/documents/reports/wfp223517.pdf>
- WFP. (2023). *Anticipatory Action and Social Protection (Guidance) | World Food Programme*. <https://www.wfp.org/publications/integrating-anticipatory-action-and-social-protection>
- WFP. (2024). *Scaling up anticipatory actions for food security: Anticipatory Action Year in Focus 2023 | World Food Programme*. <https://www.wfp.org/publications/scaling-anticipatory-actions-food-security-anticipatory-action-year-focus-2023>
- WHO. (2018). *WHO Guidance for Contingency Planning*. <https://www.who.int/publications/i/item/WHO-WHE-CPI-2018.13>
- Zhong, T., Crush, J., Si, Z., & Scott, S. (2021). *COVID-19 and Emergency Food Security Policies in Urban China*. No 48. Discussion Papers. Hungry cities Partnership. <https://hungrycities.net/wp-content/uploads/2021/03/DP48.pdf>

Comment: EC - European Commission

Appendix

Table of content

pages

Table of content	73
Appendices Part A	73
A1: EU guidelines related to Farm to Fork Strategy	74
A2: EU guidelines related to CAP and CFPs	81
A3: EU biodiversity strategy for 2030	83
A4: Contingency planning guidelines with focus on food security	84
A5: Contingency planning with focus on food crises	86
A6: The Farm to Fork strategy and its subsequent documents	88
A7: Agriculture and fishery policy, related documents	89
Appendices Part B	90
Appendix B1: Operational process	90
B1a: <u>Overview</u> operational process	
B1b: Process detail	
B1c: Core process inputs	
Appendix B2: The CANVAS documentation scheme	93
B2a: <u>Overview</u> : Links between process and CANVAS documentation templates	
B2b: Target group CANVAS	
B2c: Food system CANVAS	
B2d: Action CANVAS	
B2d: Implementation CANVAS	
B2e: Coordination CANVAS	
Appendix B3: Interaction with LLM during operational process	99
B3a: <u>Overview</u> : AI integration into planning scheme	
B3b: LLM in focus activity 1 - region, target group, hazard	
B3c: LLM in focus activity 2 - actors, actions, impact	
B3d: LLM in focus activity 3 - side effects, cost-benefit	
B3e: LLM in focus activity 4 - coordination	
Appendix B4: Examples of LLM feedback related to operational process	104
B4a: <u>Overview</u> : examples of condensed AI feedback related to operational process	
B4b: Vulnerable groups in food safety situations?	
B4c: Common risks in farming and mitigation options?	
B4d: Who could support food security for low-income families in (example) case of a drought in Germany?	
B4e: Create a contingency plan for food security in support of low-income families in case of droughts in Germany	
B4f: What are the costs of this plan?	
B4g: What can be reached with a budget limit of 10 million?	
B4h: How can we prioritize interventions	
Appendix B5: Documentary templates (examples)	117
B5a: Potential food security risks related to environmental and socio-economic drivers	
B5b: Potential literature-based actions for improving food security	

Appendix A1: EU guidelines related to Farm to Fork Strategy

More relevant aspects to contingency planning
Document: Farm to Fork Strategy: For a fair, healthy and environmentally friendly food system
Introduces the concept of crises affecting the food systems, they can or cannot create a food crisis (EC, 2020a; pp 12-13)
States the responsibility to develop: “a contingency plan for ensuring food supply and food security to be put in place in times of crisis”
States the responsibility to: “revamp the Agricultural crisis reserve to its full potential” to be utilized in case of crisis of agricultural markets
States the responsibility to create “a food crisis response mechanism coordinated by the Commission and involving Member States”
Document: Contingency plan for ensuring food supply and food security - JRC Workshop report (Matthews, 2021)
<p>Concludes about lessons learned from past food crises in the EU and other countries to keep food supply active and prevent food security to be threatened; particularly the COVID-19 crisis:</p> <ul style="list-style-type: none"> • Keeping trade open is a crucial goal while crises develop because markets are able to find responses • “...all elements of sustainability - economic, environmental and social - are present in crises and need to be present in the solutions” (p 8) • “there is potential to improve ex ante and cross-policy coordination.” (p 8) • Private sector agility and government measures to protect income of producers, value added operators, and consumers were key in the food supply chain resilience. (p 8) • Government measures have required significant allocations of public funds in addition to the common transfers. (pp 9 & 10) • Highlights the distinction between crises and emergencies (p 11) • “One relevant example for discussion might be whether pre-agreed trigger rules would make the activation of the agricultural reserve more or less effective” (p 11) • There is a trend of threats and risks to impact systems through geographic, political and sectorial boundaries creating complexity for coordinated responses (p 11) • A crises management cycle is presented with the following phases: Risk management, Prevention, Preparedness, Response, Recovery and Learning. Each phase is explained in detail. (pp 14-19) • “The role of contingency planning is to ensure the supply of food when the system can no longer cope due to a crisis”(p 21) • Early warning systems focused on agriculture have been developed in the EU • Scenarios are not tools for predicting the future but opportunities for the key actors to collaborate and test their plans through different potential outcomes • Presents Insights from business responses to food crises (pp 31 & 32) • “Labour is fundamental to supply chain functionality, and the potential impact of a cascading crisis on labour supply deserves particular attention” (p 35) • “Effective social safety nets are critical to minimise food security impacts from crises given the important role played by income” (p 36) • “Do not neglect the importance of training.” (p 48) • The crisis management team should be properly resourced (p 48) • “Planning should focus on coordination and coherence” (p 48)

Appendix A1: EU guidelines related to Farm to Fork Strategy (continued)

Document: Contingency plan for ensuring food supply and security - Communication (EC, 2021a)
<p>Presents what the document calls “an EU contingency plan for food security” which is composed of:</p> <ul style="list-style-type: none"> • A set of principles to be followed in times of crises based on the previous experiences and lessons learned in the COVID-19 crisis • The European Food Security Crisis preparedness and response Mechanism (EFSCM) with its main rules of functioning and assigned tasks or actions, including: foresight, risk assessment or vulnerability analysis and monitoring, coordination, cooperation, communication and learning facilitation.
<p>Elaborates on the importance of building responses to contingencies on existing policy frameworks which are already in place and are “operational and reliable”. These frameworks are:</p> <ul style="list-style-type: none"> • Regulation (EU) No 1308/2013 for agricultural markets • Rules on the agricultural reserve • The 2021-2027 European Maritime Fisheries and Aquaculture Fund • Crisis management framework for food safety • ARGUS general rapid alert system • General plan for crisis management in safety of food and feed • Union Civil Protection Mechanism (UCPM) • SMEI (Single Market Emergency Instrument) and the Council Integrated Political Crisis Response mechanism • Fund for European Aid to the Most Deprived (FEAD) • Financial and operational support through the Union Civil Protection Mechanism (UCPM) • Emergency Response Coordination Centre (ERCC) • State aid rules • State strategic reserves
Document: Safeguarding food security and reinforcing the resilience of food systems (EC, 2022b)
<p>The EU is self-sufficient in key agricultural products incl. animal and dairy products (p 1), then food supply (availability) is not a current problem; however, “food affordability for low-income persons is” (p 5).</p>
<p>“The setting up of the Single Market Emergency Instrument will further strengthen the Union’s preparedness and coordinative capabilities and reduce the risks of unjustified restriction (p 6)</p>
<p><i>Particular attention should be given to the most vulnerable, including refugees from Ukraine as well as low-income persons that are already affected by the high energy prices and are still suffering from the socio-economic shock caused by the COVID pandemic. Studies have shown that following the 2008 food price increase, households have on average bought less fruit and vegetables and switched to cheaper foods which tend to be calorie-dense, nutrient-poor foods (i.e. lacking in vitamins, minerals and fibre that are essential for health). (p 6)</i></p>
<p><i>Member States can draw from EU funds such as the Fund for European Aid to the Most Deprived (FEAD) which supports EU countries’ actions to provide food and/or basic material assistance to the most deprived, reaching over 15 million people with food aid. Member States can top up their resources by mobilising the Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU) and can make best use of the additional flexibilities to their FEAD programs provided by the Cohesion’s Action for Refugees in Europe (CARE), as recently proposed by the Commission. (p 6)</i></p>
<p>“To alleviate the impact of high food prices on the most vulnerable, Member States may implement reduced rates of Value Added Tax and encourage economic operators to reduce the price for consumers. In December 2021, the Council agreed on a reform of VAT rates at EU level, which enables Member States to further reduce their rates, down to 0%, on certain goods and services which address basic needs, notably food. Member States may already make use of this possibility, as well as making lump-sum transfers to households as an efficient and effective solution to address affordability.” (p 7)</p>

Appendix A1: EU guidelines related to Farm to Fork Strategy (continued)

<p>About stabilizing EU agricultural markets and supporting producers:</p> <p>→ “The Common Agricultural Policy (CAP) and Common Fisheries Policy (CFP) provide for a range of measures, incl. a price safety net and the possibility to take exceptional measures. These measures can be deployed to ensure stable markets and to address exceptional circumstances.” (p 7)</p> <p>→ <i>“The Commission adopted a new, self-standing Temporary Crisis Framework on 23 March 2022. This framework allows support for undertakings directly or indirectly affected by the crisis, including farmers and fishers, in the form of liquidity support and aid for increased gas and electricity costs. This framework allows aid, including direct grants, to producers affected by the crisis (such as those affected by significant increases in input costs, in particular feed and fertiliser) as well as aid to energy-intensive undertakings (such as fertiliser manufacturers and the processing industry). (p 8)</i></p>
<p>Document: Contingency plan for ensuring food supply and food security - Staff Working Document (EC, 2021c)</p>
<p>The document presents the definition of relevant concepts related to food security like food security itself, food availability, food access, utilization, stability, food safety, food system resilience, food system, food self-sufficiency and food sovereignty. (pp 6-8)</p>
<p>Describes Europe as a mostly self-sufficient on food products, a net exporter of majority of them and a net importer of some like seafood, coffee, cocoa, oilseeds, vegetable oils, protein crops for feeding, pp 9-12</p> <p>At the national level there are differences in self-sufficiency in different food product categories, then the single market is a key asset to ensure the self-sufficiency at the European level. (pp 15 - 18)</p> <p>Europe also relies on imports of energy and fertilisers</p>
<p>The diverse nature of the actors in the entire food value chain is also a guarantee of resilience, a large participation of Small and Medium Enterprises ensures the risks are pooled in a vast number of actors with high heterogeneity which gives the system the ability to cope with different threats. (pp 19-21)</p>
<p>The foresight on frontier risks by the World Economic Forum and the 14 Megatrends by the European Commission are presented as sources of strategic risks analysis on food security. (pp 21-28)</p>
<p>For each one of the activities in the food supply chain, an analysis of weaknesses and strengths is presented in the frame of COVID, highlighting potential vulnerabilities on the food system (pp 28-43)</p>
<p>Presents a compilation of the more relevant European Union policies on Food Security and instruments:</p> <ul style="list-style-type: none"> • Common Agricultural Policy (CAP) • Common Fisheries Policy (CFP) • Common Market Organization (CMO) • European Maritime Fisheries and Aquaculture Fund (EMFAF) • Common Monitoring and Evaluation Framework - CMEF) • European Market Observatory for Fisheries and Aquaculture Products (EUMOFA) • Rapid Alert System for Food and Feed (RASFF) • EU Research and Innovation (R&I) policy • ARGUS, <i>a crises management coordination process of the European Commission set up in 2005, is responsible for managing transboundary crises that require action at EU level, including crises affecting multiple sectors.</i> • Sectoral contingency plans in specific policy areas with relevance to food security (p 49) • EU Civil Protection Mechanism (ECPM) (p 50) • Emergency Response Coordination Centre (ERCC) • Common Emergency and Information System (CECIS) • Early warning systems focusing on risks indirectly linked to food supply and food security (pp 52 - 53) • EU Industrial Strategy • Single Market Emergency Instrument <p>A survey with the member states has shown how the three major policies on contingency planning at the National level are: Monitoring markets, Crises management, Management of inventories</p> <p>In addition, a collection of relevant cases of policies from EU countries: Germany, Denmark, Finland; non-EU countries: Japan, United States, Switzerland; and the NATO are presented (pp 43 - 64)</p>
<p>“Contingency planning can be defined as one part of many in food system resilience, as well as be defined as separate in nature (for example, contingency planning has a short-term focus, and ‘resilience’ in this narrower sense would be understood from a more long-term perspective)” (p 69)</p>

Appendix A1: EU guidelines related to Farm to Fork Strategy (continued)

Document: Contingency plan for ensuring food supply and food security - Staff Working Document (EC, 2021c), continued
Definition of parameters for food crises is an elusive topic in the EU, also crises could be of different nature, then flexibility in contingency planning should be a design criterium <i>“Contingency planning should be seen as a continuous process with the aim to build crisis management capabilities”</i> (p 72).
To avoid crisis scalation, measures should not add to the problem. For example, including restrictions to free mobility of food products or exhibiting panic behaviour by consumers are non-recommended responses. (p 73)
<i>“The role of contingency planning is to ensure food supply to citizens when a shock to the system is so significant that the existing economic and regulatory structures of the food system find it difficult to ensure food security.”</i> (p 73)
<i>“A first step in contingency planning is to identify the threats, risks and vulnerabilities of the food system”</i> <i>“Given the dynamic nature of threats and vulnerabilities, as well as of crises once they would hit the food system, robust monitoring systems are a requirement for effective contingency planning”</i> <i>“Contingency planning should indeed also be able to be nimble and provide swift responses, to avoid having the crisis escalating”</i> <i>“[Crisis response] happens once the crisis occurs, and involves activating the procedures, tools and measures that were previously put in place. (p 75)</i>
<i>“Effective coordination processes for contingency planning are participatory and collaborative”</i> (p 76)
<i>“Communication and coordination with international organisations (such as FAO, OECD, etc.), neighbouring countries, and major trading partners can be of benefit to the EU, to promote international policy consistency and draw on each other’s expertise”</i> (p 76)
<i>“One key element of collaborative preparation for crises is the opportunity for creating bonds of trust between the individuals who will be called to respond when a crisis occurs”</i> (p 76)
Document: State of food security in the EU: 1 st version (EC, 2023c)
<i>“The mechanism is triggered in case of exceptional, unpredictable and large-scale events or risks that have the potential to threaten EU food supply or security.”</i> (p 1)
<i>“The majority of respondents consider that negative weather events and climate-related disruption of production cycles are the most alarming factor threatening food supply.”</i>
If local production decreases will the food system compensate increasing imported food products, then it could be a risk of delays in the supply and price increments. It leading to vulnerable groups to reduce buying or turning to a non-healthy diet.
Joint and coordinated actions are at the core of food security. Lack of coordination even could lead to increase food insecurity.
Document: State of food security in the EU: 2 nd version (EC, 2024)
<i>“Some respondents also highlighted several factors which could be considered strategic for future developments. These include potential labour shortages in the farming sector and risks of dependencies related to the lack of diversification in imports, especially when an importer has a dominant market power; and dependency on digital technology that could be compromised in case of energy or network cuts.”</i> (p 4)
<i>“Geopolitical conflicts, climate change and related extreme weather events, disruptions across the value chain observed during the COVID-19 pandemic, have put into spotlight the fragility of global food security, including in the EU. In 2022, due to high inflation, 8.3% of EU citizens could not afford a meal, including meat, chicken, fish, or a vegetarian option every other day. This percentage is significantly higher (20%) for households at poverty risk, that comprises households with an income below 60% of the national median equivalised income after social transfers”</i> (p 5)
<i>“Furthermore, EU households with dependent children, especially single parents, women, elderly, and young adults, are at higher risk of poverty than other types of households. In 2022, 12% of elderly persons’ households and 15% of single-parent households with average incomes reported that they were not being able to afford a proper meal every other day.”</i> (p 5)
Variation across EU countries: <i>“ In 2022, the inability to afford a meal for an average-income household varies significantly across the EU, ranging from 1.4% in Ireland to 22.1% in Romania”</i> (p 6)
Information about food security in Europe: https://agridata.ec.europa.eu/extensions/FoodSecurity/FoodSecurity.html

Appendix A1: EU guidelines related to Farm to Fork Strategy (continued)

Document: Drivers of Food security (EC, 2023a)

Elaborates on the following list of drivers of food security, emphasizing on current and future trends, as well as what is at risk and its interlinkages:

- Climate change:
 - Changes in rain patterns with a significant reduction of rain in southern Europe and increase of water precipitations at the north, will have a negative impact on agriculture in both seasons, summer and winter. (p 32)
 - Increasing of frequency and intensity of extreme weather events like droughts and heat waves, negatively impacting the availability of water for agriculture and exacerbates the competition between agriculture and other users of water resources. (pp 32 & 33)
 - The potential effectiveness of adaptation options to increase resilience in the food systems to climate change is contextual to the specific socio-ecological system. (p 33). Furthermore, crisis response is also highly context specific.
 - **Specific “targeted climate services” are an important component of effective adaptation strategies.**
 - **“Largest socio-economic and food security impacts will occur in regions which are highly dependent upon natural resources (Bindoff et al. 2019; Cooley et al. 2022).” (p 34)**
 - Prices in international food markets and could be affected by extreme climate events (p 34)
- Environmental pollution:
 - Biomass production, availability of water for agriculture and drinking water, as well as human and animal health depending on fresh water/marine ecosystems can be diminished by pollution in form of plastics and micro plastics present in water. (p 36)
 - Soil pollution is a concern for agriculture, especially due to bad practices in the use of fertilisers and the inappropriate management of waste. (p 36)
 - EU27 + UK yield loss due to air pollution was estimated in 7,3 Mt. (76% wheat & 21% maize) (p 37)
- Soil health:
 - Unhealthy soils produce less food, have the chance to create contamination in surface and ground water and reduce biodiversity, efficiency in nutrient cycling and the resilience of ecosystems to extreme climatic events (p 39)
 - The European Union Soil Observatory (EUSO) was launched in 2020 (p 41)
 - It is predicted by studies that land degradation on regions with arable lands could lead to a significant reduction of food productivity and an increase in prices of food (p 41)
- Pests and diseases:
 - Being pests a major cause of yield loss (approx.: 40%), pesticide use is extended. Misuse lead to these materials to be found in non-target plants, soil, water, animals and humans. In particular in Europe, concentrations of these residues are normally under the legal limits (p 43)
 - Antimicrobial resistance is a current concern on human and livestock health (p 43)
 - **“...the control of pest invasions is a so-called ‘weakest-link public good’ (Perrings et al 2010)”. In scenarios of multi countries crises of pests or diseases, coordination through a European approach is key (p 46)**
 - Due to high levels of commerce of food, Europe is at risk of suffering unintended costs for the spread of invasive pests. (p 46)
- Biodiversity:
 - **“In the EU alone, around 84% of crop species and 78% of wildflower species depend, at least in part, on animal pollination.” (p 47)**
 - The loss of species which are natural rivals or predators of pests is a concern (p 48), specially because anthropogenic substitutes do not offer comparable results
- Research, innovation and technology:
 - Research and innovation contribute to mitigate the negative effects of climate change and other risk factors and to increase food supply and quality of nutrients in food. (More resiliency)
- Intensity of production:
 - Intensity of production is required for food security but agricultural practices looking for intensity could be damaging in long run. (More related with resiliency)
- Trade:
 - Contributes importantly to food security in terms of availability of food products and by keeping prices lower. (p 57)

Document: Drivers of food security, continued

- Measures to block free trade could threaten food security (pp 57 & 58)
- Countries highly depending on trade are more vulnerable to logistics disruptions (p 58)
- Imports in the EU are more important for seafood products, fruits and nuts, oilseeds and protein crops and coffee and cocoa. (p 58)
- Speculation in agricultural commodity markets:
 - There is no consensus about the effect of speculation on prices of food products in the scientific literature (pp 58-62)
- Energy prices:
 - Europe is highly dependent on energy imports for its food value chain activities. Food commodity prices are directly attached to energy prices. (pp 63 - 65)
 - Storages of energy sources like coal and natural gas are key assets to control prices in seasons of high demand (pp 63 - 65)
- Fertilisers:
 - EU food security is highly dependent on imports of mineral fertilisers. (p 65)
 - Inorganic nitrogen, phosphates and potash nutrients are particularly important fertilisers for the EU. Major suppliers are in Russia and Belarus with potential substitutes in Egypt and Morocco but offering lower quality than EU standards (p 65)
 - Development of precision agriculture practices seems to be the way to deal with high prices in fertilisers due to peaks in energy prices (p 67)
- Pesticide use:
 - Potential negative externalities for the misuse of pesticides can impact unintended flora, quality of food, soil, water and animal and human health (p 68)
- Availability of workers:
 - In the EU there is risk of shortage of agricultural seasonal workers due to conflict or epidemics which impede free mobility towards agricultural regions. This is in the frame of structural lack of enough local agricultural workers in Europe. The same phenomenon affects fishing crews. (p 73)
- Agricultural and consumer food prices:
 - Consumer food prices affect in more extend to households with low incomes (poor households) who use a greater share of their income in food.
 - Social protection measures are key to mitigate the effect of increased food prices in vulnerable households
- Farm income: (More relevant for resilience)
 - Production costs determine farm income as well as prices of food products at the time of selling.
 - Marine fishing fleet has been experiencing reductions on its income due to environmental restrictions to prevent overexploitation (p 77)
- Access to finance:
 - Farmers have difficulties in accessing to credit in the EU, this is particularly worst for small-sized, young farmers, new entrants and innovative investments. (pp 78-79)
 - The Common Agricultural Policy help farmers to deal with these problems to obtain capital for investments (pp 78-79)
- Household income:
 - Low-income households in Europe are at risk of consuming diets poor in nutrients leading to obesity and lack of appropriate nutrition. (p 81)
- Competing land and crop uses: (More relevant for resilience)
 - There is a consensus about the need to privilege the use of arable lands to grow crops for human food, instead of feed or bioenergy (p 83)
- Supply chain performance:
 - Food supply chains are key to bring food products from farms to retail points. The EU is vulnerable to disruptions in international markets and logistic chains particularly for fertilisers, fossil energy and feed protein. Also, for fish, coffee and cocoa (p 86)
 - Fossil fuels are also one important resource to the food chain to move products through long distances and for transformation plants, making food prices depending on fossil fuels
- Food loss and waste:
 - **“In EU legislation, food waste is defined as any food that is disposed of as waste along the food supply chain” (p 88)**
- Governance and legislative framework:
 - **“It is key for food security to have a harmonized set of policies from international, European, national and local levels” (p 91)**

Document: Drivers of food security, continued

- Conflict:
 - The negative effects of conflicts on food security, nutrition and agriculture are worldwide known. (p 93)
 - Displacement of populations, negative affectations on agriculture, disruption of supply chains and banning international aid are some of the main causes behind of food insecurity created by conflict (p 93)
 - ***“In 2018, the UN Security Council unanimously endorsed Resolution 2417, which provides a framework to address conflict-induced hunger by allowing the Council to consider its full range of tools – including sanctions – to ensure that all parties to conflict uphold International Humanitarian Law (IHL). Violations of IHL include starving civilians as a weapon of war, unlawfully denying humanitarian access to civilian populations in need and depriving people of their means to produce food (GRFC, 2019).”*** (p 93)
 - Integrated Food Security Phase Classification scale (IPC) (p 94)
 - ***“The GRFC highlights that all countries/territories with major food crises - mainly driven by conflict - were also affected by either weather extremes, economic shocks or both.”*** (p 95)
- Generational renewal: (More relevant for resilience)
- Food choices:
 - Trends in consuming more and more animal protein are creating less efficient land use. Changing cultivated areas growing feed crops for food crops would increase food security significantly. (p 98)
 - Current trends on food consumption in the industrialized world are creating health problems in humans (diabetes, obesity, cancer, etc.) (p. 98)
 - ***“The highest prevalence of severe food insecurity, often associated with prevalence of undernourishment, is observed in Southern Europe with 2.8%. As regards food poverty in the EU, the percentage of the population that cannot afford a healthy diet (in accordance with national guidelines) across EU countries ranges from 2.5% in Finland to more than 40% in Croatia, Greece, Bulgaria and Romania (Penne & Goedemé, 2021).”*** (p 99)
 - ***“EU citizens consume, on average, 58% of animal-based proteins and 42% of plant-based proteins, this ratio being constant over the last decade. Dairy represents 40% of animal-based proteins intake, pigmeat, 21%, poultry meat, 16%, bovine meat, 10% and eggs, 7%. Reversing the rise in overweight and obesity rates across the EU is critical, including moving to a more plant-based diet.”*** (p 100)
- Demographic trends: (More relevant for resilience)

Document: Risks and vulnerabilities in the EU supply chain: Mapping and analysis based on a stakeholder survey (Bertolozzi-Caredio et al., 2023)

This is the report of a mixed methods study on the perceptions of risks and vulnerabilities of the EU supply chain.

A topology for risk types is proposed:

- Biophysical and Environmental
- Economic and Market
- Socio-cultural and Demographic
- (Geo)Political and institutional
- Supply chain performance
- Information and technology

“Biophysical and environmental risks and Economic and market risks are the most frequently identified by stakeholders, and are those to which the food supply chain seems to be most exposed overall” (p 67)

Document: Ensuring food security and the long-term resilience of agriculture (European Parliament, 2023)

This document is more focused on food system resilience and no direct relevance for contingency planning was found

Appendix A2: EU guidelines related to the CAPs and the CFPs and its contributions to contingency planning for food security

Document: The Future of Food and Farming (EC, 2017)
Some statistics are presented (p 3): <ul style="list-style-type: none"> • Persons working on Europe on the agricultural sector: 22 MM • Persons working in the entire sector including processing and retail: 44MM • Exports: Euro 131 Billion
Recognizes a trend where farmers are losing income in Europe year by year (p 4)
“The Common Agricultural Policy (CAP) should therefore lead a transition towards a more sustainable agriculture.” (p 4)
Information systems and delivery mechanisms to send direct payments to European agricultures could be used in case of emergency: “Direct payments currently shore up the resilience of 7 million farms, covering 90% of farmed land” (p 4)
Main objectives of the new CAP: <ul style="list-style-type: none"> • to foster a smart and resilient agricultural sector; • to bolster environmental care and climate action and to contribute to the environmental and climate objectives of the EU; • to strengthening the socio-economic fabric of rural areas. (p 11)
“The CAP already offers a layered set of tools helping farmers to prevent and manage risks, from direct payments and market intervention to post-crisis compensations and the present second pillar measures in particular an Income Stabilisation Tool (IST) and insurance support.” (p 17)
“The granting of income support to farmers will be conditioned to their undertaking of environmental and climate practices, which will become the baseline for more ambitious voluntary practices.” (p 19)
Document: CSP Regulation (EU) 2021/2115 (European Parliament & EC, 2021)
“Considering the importance of farmers’ participation in risk management tools, Member States should be allowed to assign a certain percentage of direct payments to support the farmers’ contributions to such tools.” (p 9)
“In the light of the need to ensure appropriate risk management tools, support to help farmers manage their production and income risks should be maintained and widened under the EAFRD. Specifically, insurance premiums and mutual funds, including an income stabilisation tool, should remain possible, but support should also be made available for other risk management tools.” (p 14)
“The farm advisory services shall be adapted to the various types of production and farms and shall cover [...] (d) risk prevention and management]” (p 33)
Direct payment instruments used on CAPs Decoupled direct payments shall be the following: <ol style="list-style-type: none"> (a) the basic income support for sustainability; (b) the complementary redistributive income support for sustainability; (c) the complementary income support for young farmers; (d) the schemes for the climate, the environment and animal welfare. Coupled direct payments shall be the following: <ol style="list-style-type: none"> (a) the coupled income support; (b) the crop-specific payment for cotton.
Document: 28 CAP strategic plans at a glance (EC, 2022a)
The CAP with its 28 strategic plans creates incentives through conditional direct payments to farmers in order to create resilience in the agri-food system, socially and environmentally sustainable practices in farms where biodiversity can thrive and the use of technology is a driver for better results, as well as support for agrifood sectors which have more severe market challenges. The implementation of these Strategic Plans combines national and European Union public budgets and looks for an equitable allocation of resources.

Appendix A2: EU guidelines related to the CAPs and the CFPs and its contributions to contingency planning for food security (continued)

Document: Approved 28 CAP Strategic Plans (EC, 2023b)
About financing, the funds come from: <ul style="list-style-type: none"> • European agricultural guarantee fund (EAGF) • European agricultural fund for rural development (EAFRD)
About other instruments: <ul style="list-style-type: none"> • Recovery and Resilience Facility (RRF) or the European Structural and Investment Funds (ESIF)
Document: Strategic guidelines for a more sustainable and competitive EU aquaculture (EC, 2021b)
These guidelines are more centred on resilience. A few points can be considered of relevance to contingency planning: <ul style="list-style-type: none"> • Of particular interest for recovery measures, the document highlights the potential of some aquaculture practices to offer climate-mitigation and climate-adaptation services (p 7) • Producer Organizations in the aquaculture sector can be of great help in terms of a participative contingency planning process (p 8)
Document: The common fisheries policy: 2023-27 [SWD] (EC, 2023d)
<i>“This document looks into the impacts of the triple environmental crisis (biodiversity loss, climate change and pollution) on fisheries and aquaculture management, and other issues. It analyses the socioeconomic challenges stemming from the COVID-19 pandemic, the high prices of energy and inputs and the disruptions in trade flows due to the geopolitical context and how these factors have had an impact on implementation of the CFP.” (p 5)</i>
<i>“The Commission set up the European Market Observatory for Fisheries and Aquaculture Products²⁷⁵ to boost market transparency and provide market intelligence to all bodies in the sector, including policy makers. The Market Advisory Council is very active in providing recommendations on issues concerning the market. The Commission works closely with the Market Advisory Council to better understand market developments, meet its market intelligence needs and globally improve implementation of the CMO objectives. These close and regular exchanges with stakeholders have proven to be crucial assets in times of crisis, in particular to identify needs and frame crisis responses.” (p 93)</i>
Similarly, following Russia’s aggression against Ukraine, in July 2022 a legislative amendment to the EMFF Regulation entered into force to bring in additional crisis measures to allow Member States to support the EU fishery and aquaculture sectors affected by the pandemic. In particular, funding was made readily available to: <ul style="list-style-type: none"> • compensate operators in the fishery and aquaculture sectors for additional costs, for income forgone and for the storage of products; • compensate fishing operators for the temporary cessation of fishing activities due to safety reasons and economic constraints.
<i>“As such, the EMFAF is the ideal financial tool for Member States to build up the resilience of the fisheries and aquaculture sectors, by improving their preparedness for future shocks and strengthening their ability to withstand and overcome crises.” (P 95)</i>
<i>“To foster long-term resilience and boost the capacity of the sector for crisis management, the EMFAF Regulation embeds specific measures and specific conditions and safeguards to ensure an optimal return on investment and increase the leverage effect of public funding.” (P 95)</i>
<i>“Pollution in all its forms poses a particular risk for marine ecosystems, which has consequences on the resilience of the fisheries sector. A clean ocean is an ocean free from all forms of pollution. The main forms of pollution are:</i> <ul style="list-style-type: none"> • eutrophication (excess of nutrients pollution/ agricultural runoffs); • contaminants (chemicals, pesticides, heavy metals, toxins); • underwater noise (oil drilling, shipping); • marine litter (plastic, wood, metal etc.).” (p 32)
<i>“The difficulties for Member States in achieving a detailed and accurate documentation of catches (and discards) in all trips represents a significant risk” (p 54)</i>
Document: The common fisheries policy: 2023-27 [Comm] (EC, 2023e)
The policy is totally focused on resilience and sustainability, nothing can be seen as relevant for contingency planning beyond the mention of the General Fisheries Commission for the Mediterranean (GFCM) which is an actor of importance in the case of participatory contingency planning in Living Labs in the Mediterranean countries.

Appendix A3: EU Biodiversity Strategy for 2030 and its contributions to contingency planning for food security

More relevant aspects to contingency planning
Document: Communication -EU Biodiversity Strategy for 2030 Bringing nature back into our lives (EC, 2020b)
<i>“Over half of global GDP depends on nature and the services it provides, with three key economic sectors - construction, agriculture, and food and drink - all highly dependent on it” (p 1)</i>
<i>“Biodiversity is also crucial for safeguarding EU and global food security. Biodiversity loss threatens our food systems⁶, putting our food security and nutrition at risk. Biodiversity also underpins healthy and nutritious diets and improves rural livelihoods and agricultural productivity⁷. For instance, more than 75% of global food crop types rely on animal pollination”. (p 2)</i>
<i>“The biodiversity crisis and the climate crisis are intrinsically linked. Climate change accelerates the destruction of the natural world through droughts, flooding and wildfires, while the loss and unsustainable use of nature are in turn, key drivers of climate change” (p 2)</i>
Document: EU Biodiversity Strategy for 2030 Bringing nature back into our lives (EC, 2021d)
The document is focused on resilience, no explicit reference to contingency planning nor other relevant information were found.

Appendix A4: Characterization of Contingency planning guidelines with a broad or different perspective to food security

Framework	Main goal	Processes
Inter-Agency contingency planning guidelines for humanitarian assistance (IASC, 2001)	“...to facilitate common understanding, to avoid duplication of activities and gaps in humanitarian response.” (p 3)	<ol style="list-style-type: none"> 1. Co-ordination and preparing for the contingency planning process 2. Context analysis, scenario building and defining planning assumptions 3. Defining strategies and objectives 4. Defining management and coordination arrangement. 5. Developing response plans 6. Consolidating the process and follow-up actions
Contingency planning guidelines (WFP, 2002)	“to help to ensure that, if and when a crisis occurs, response will be rapid, appropriate and effective.” (p 2)	<ol style="list-style-type: none"> 1. Analysing hazard and risk 2. Identifying defining and prioritizing contingencies 3. Developing scenarios for the planning process 4. Preparing a contingency plan for each selected scenario 5. Maintaining and updating the contingency plan.
Contingency Planning for Emergencies: A Manual for local government units (NDCC Philippines & UNHCR, 2003)	“to strengthen and enhance the operational capabilities of the local government units in responding to any emergency situation in their localities” (p 5)	<ol style="list-style-type: none"> 1. Environmental Scan 2. Event Definition 3. Policy Identification 4. Emergency Indicators for Contingency Planning 5. Sectoral Arrangements 6. Coordination 7. Consolidation of Draft Contingency Plan 8. Formulation of Forward Plan 9. Endorsement and Activation
Inter-Agency contingency planning guidelines for humanitarian assistance (IASC, 2007)	For country teams “to increase their level of preparedness and enhance their ability to respond to emergencies.”(p 5)	<ol style="list-style-type: none"> 1. Analysing potential emergencies 2. Analysing the potential humanitarian impact and consequences of identified emergencies 3. Establishing clear objectives, strategies, policies and procedures and articulating critical actions that must be taken to respond to an emergency 4. Ensuring that agreements are recorded and necessary actions are taken in order to enhance preparedness.
Contingency planning guide (IFRC, 2012)	“...to prepare an organization to respond well to an emergency and its potential humanitarian impact” (p 7)	<ol style="list-style-type: none"> 1. Prepare 2. Analyse 3. Develop 4. Implement 5. Review
Emergency Response Preparedness (ERP) (IASC, 2015)	“to improve collective response readiness” (p 5) with 3 levels of preparedness: Inter-agency, Sectorial and Organization specific	<p>Risk analysis & monitoring</p> <ol style="list-style-type: none"> 1. Hazard identification 2. Risk ranking 3. Defining thresholds 4. Risk monitoring <p>Minimum preparedness actions</p> <ol style="list-style-type: none"> 1. Context & gap analysis 2. Prioritize 3. Implement 4. Record <p>Advanced preparedness actions (APAs) and Contingency planning</p> <ol style="list-style-type: none"> 1. Implement APAs 2. Developing a contingency plan 3. Addressing Preparedness Gaps 4. Testing the Contingency Plan

Appendix A4: Characterization of Contingency planning guidelines with a broad or different perspective to food security (continued)

Framework	Main goal	Processes
Contingency Planning Guidebook - Philippines (NDRRMC & NSC, 2016)	“to integrate the contingency planning process for managing natural and human-induced hazards” (p 1)	<ol style="list-style-type: none"> 1. “Sell the Idea” of Contingency Planning 2. Generate Situation Awareness 3. Formulate the Contingency Plan 4. Maintain and Update the Contingency Plan 5. Execute the Contingency Plan
WHO Guidance for Contingency Planning (WHO, 2018) Focus on health	“to coordinate international action to prevent, prepare for, detect, rapidly respond to, and recover from outbreaks and emergencies in order to reduce the mortality and morbidity of affected populations.” (p 2)	<ol style="list-style-type: none"> 1. Developing scenarios and assumptions: what could happen? 2. Mitigation strategy: how can health risks linked to the hazard be reduced? 3. Preparing to respond: how can all health needs of affected populations be addressed? <ol style="list-style-type: none"> 3.1. Health sector preparedness 3.2. Developing a response plan 3.3. WHO specific responsibilities 4. Action plan: how will WHO fulfil its responsibilities? 5. Monitoring: how have the risks evolved? 6. Testing: how can readiness be improved?
The Sphere Handbook (Sphere Association, 2018)	To define standards for humanitarian response on all sector, being one of them Food security and nutrition	Programme cycle: <ol style="list-style-type: none"> 1. Assessment and analysis 2. Strategy development and programme design 3. Implementation 4. Monitoring, evaluation, accountability and learning Standards of Food security and nutrition <ol style="list-style-type: none"> 1. Food security and nutrition assessments 2. Management of malnutrition 3. Micronutrient deficiencies 4. Infant and young child feeding 5. Food security 6. Food assistance 7. Livelihoods

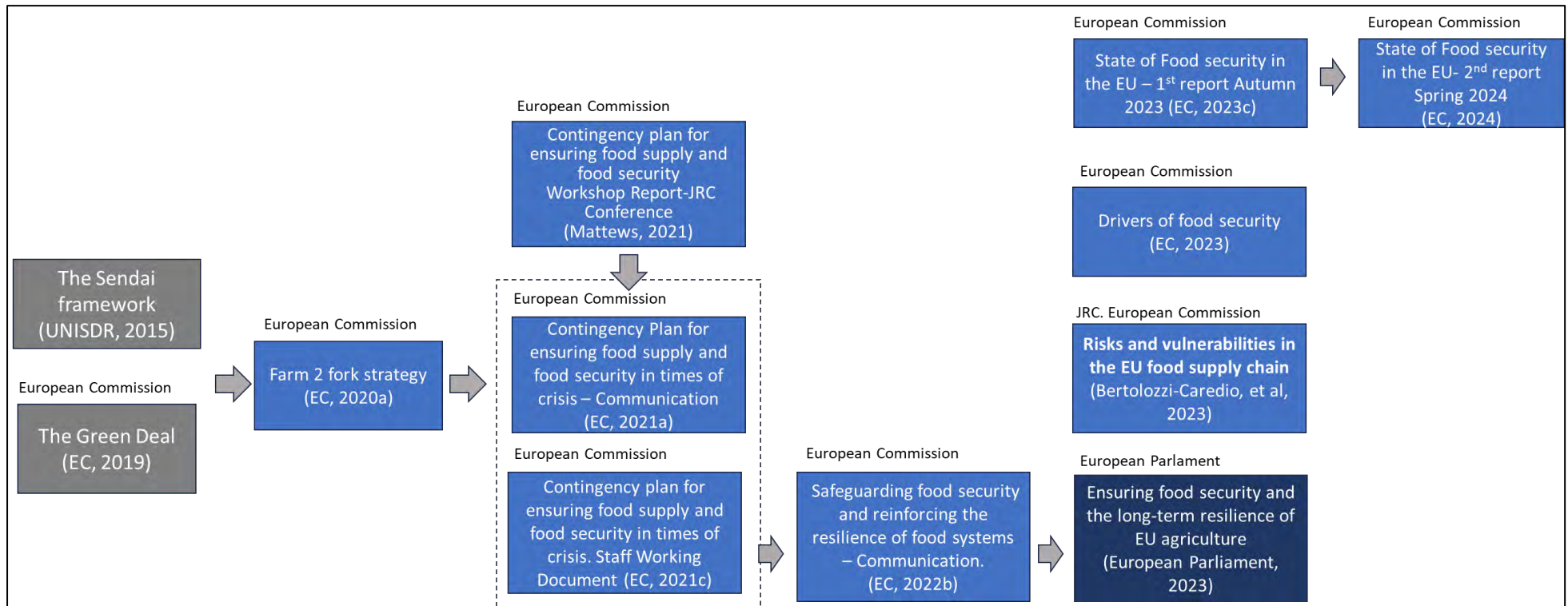
Appendix A5: Characterization of Contingency planning with a focused perspective on food crises

Framework	Main goal	Processes
Framework for food crises contingency planning and response. (FEWS, 2000)	“propose pre-emptive actions for preventing immediate and future famine.”	<ol style="list-style-type: none"> 1. Contingency planning <ol style="list-style-type: none"> 1.1 Set Contingency Planning Objectives 1.2. Identify Sources of Threats to Food Security 1.3. Identify Indicators and Sources of Indicator Information for Monitoring Each Threat 1.4. Trace Out Likely Food Security Outcome Scenarios 1.5. Set Thresholds for Increasing Severity of Threat 1.6. Prepare Prototype Responses 1.7. Strengthen Logistics and Operations 1.8. Modify the Policy and Institutional Environment, as necessary 1.9. Develop Procedures for Disseminating Information and Dealing with the News Media 1.10. Develop Procedures for Issuing Increasingly Urgent Early Warnings 1.11. Plan an Exit Strategy 1.12. Update Contingency Plans and Procedures Routinely 2. Crisis Response <ol style="list-style-type: none"> 2.1. Assessing Impact and Needs 2.2. Implementing a Food Crisis Response
High and volatile food prices: FAO support to country level contingency planning (FAO, 2012)	<p><u>Short term:</u> “to assist those at risk of food insecurity due to high food prices”</p> <p><u>Medium term:</u> “Increasing the efficiency of various aspects of agricultural systems to reduce the impact of high and volatile food prices on domestic consumers”</p>	<ol style="list-style-type: none"> 1. Identifying countries (using a FAO methodology) which are at high risk of acute food insecurity due to food price movements. 2. Identify short and medium term priorities in the food and agriculture sectors through a consultative process between FAO staff and specialists with Government counterparts. (Using a template by FAO) 3. Present contingency plans by country
TACTICS TO TRY FOR EMERGENCY FOOD PLANNING: A Roadmap for Creating Your City’s Emergency Food Response And Recovery Plan (Nordine & Zeuli, 2022)	“for city leaders—to catalyze their journey towards creating their own emergency food response and recovery plan.”	<ol style="list-style-type: none"> 1. Gaining ‘Authorization’ and Coalition Building 2. Establishing Ownership and Leadership 3. Building Communication and Monitoring Infrastructure 4. Securing Resources 5. Planning and Investing for the Long Run

Appendix A5: Characterization of Contingency planning with a focused perspective on food crises (continued)

Framework	Main goal	Processes
Food and Nutrition Needs in Emergencies (UNHCR et al., 2002)	“to promote timely, coordinated and effective action through improved understanding of food and nutrition needs during emergencies” (p 1)	<ol style="list-style-type: none"> 1. Adopt 2,100 kcal/person as a reference figure. 2. Adjust the 2,100 kcal figure based on information available immediately, using the factors outlined in Section II (pages 7-8) 3. Ensure that food ration is adequate to address the protein, fat and micronutrient requirements of the population. 4. Ensure that food ration is adequate to address the nutritional needs of all sub-groups of the population. 5. Outline strategies for collecting information to make further adjustments. 6. Consider food-management issues. 7. Consider food-related conditions. 8. Establish a monitoring system to ensure adequacy of the ration. 9. Through periodic reassessment, further revise and adjust the reference figure based on additional information about all the factors affecting energy requirements specific to the situation. 10. Plan for longer-term assistance or phase-down and phase-out strategies.

Appendix A6: The *Farm to Fork strategy* and its subsequent documents (Source: Authors)



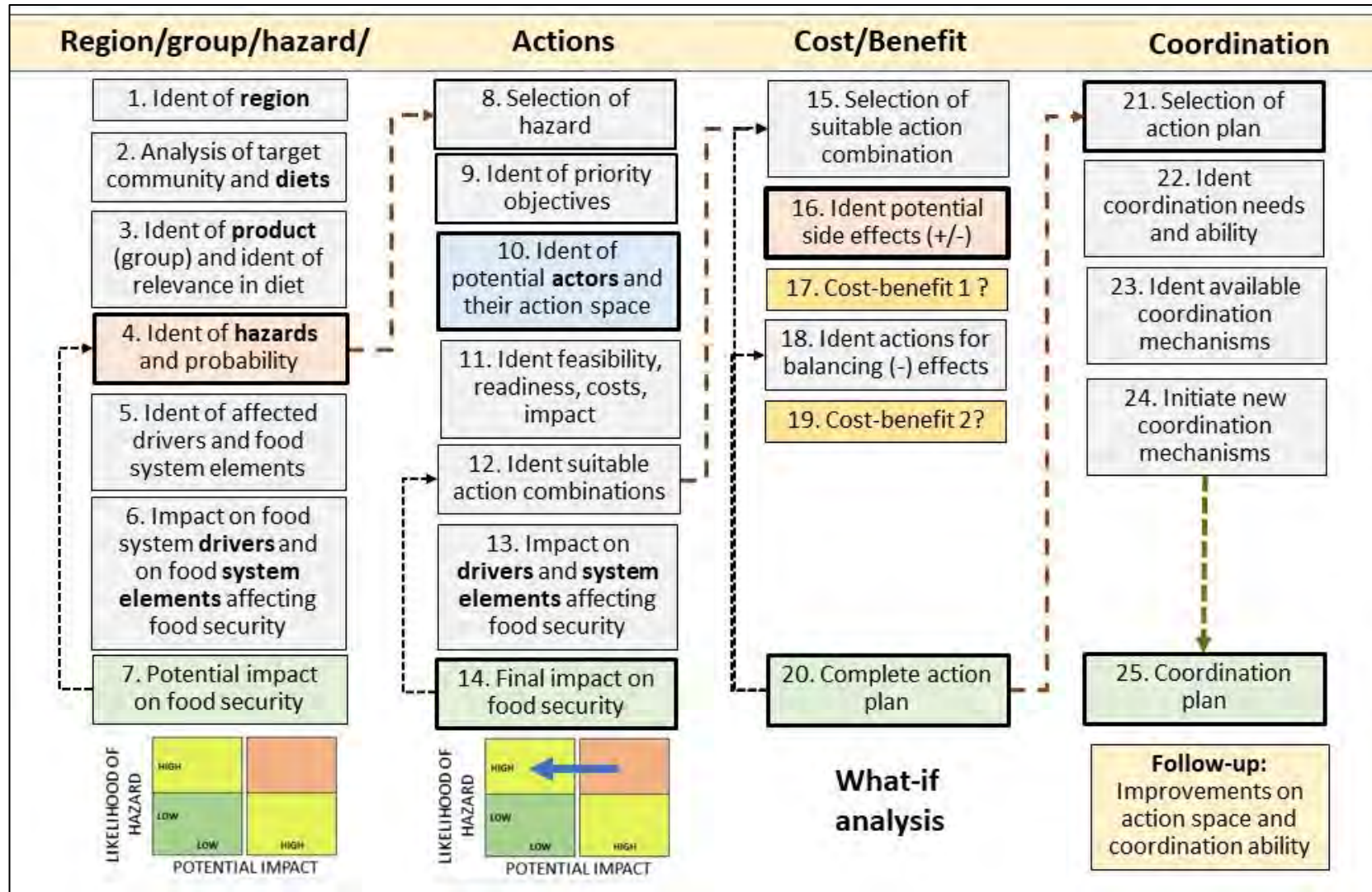
Appendix A7: Agriculture and fishery policy, related documents (Source: authors)



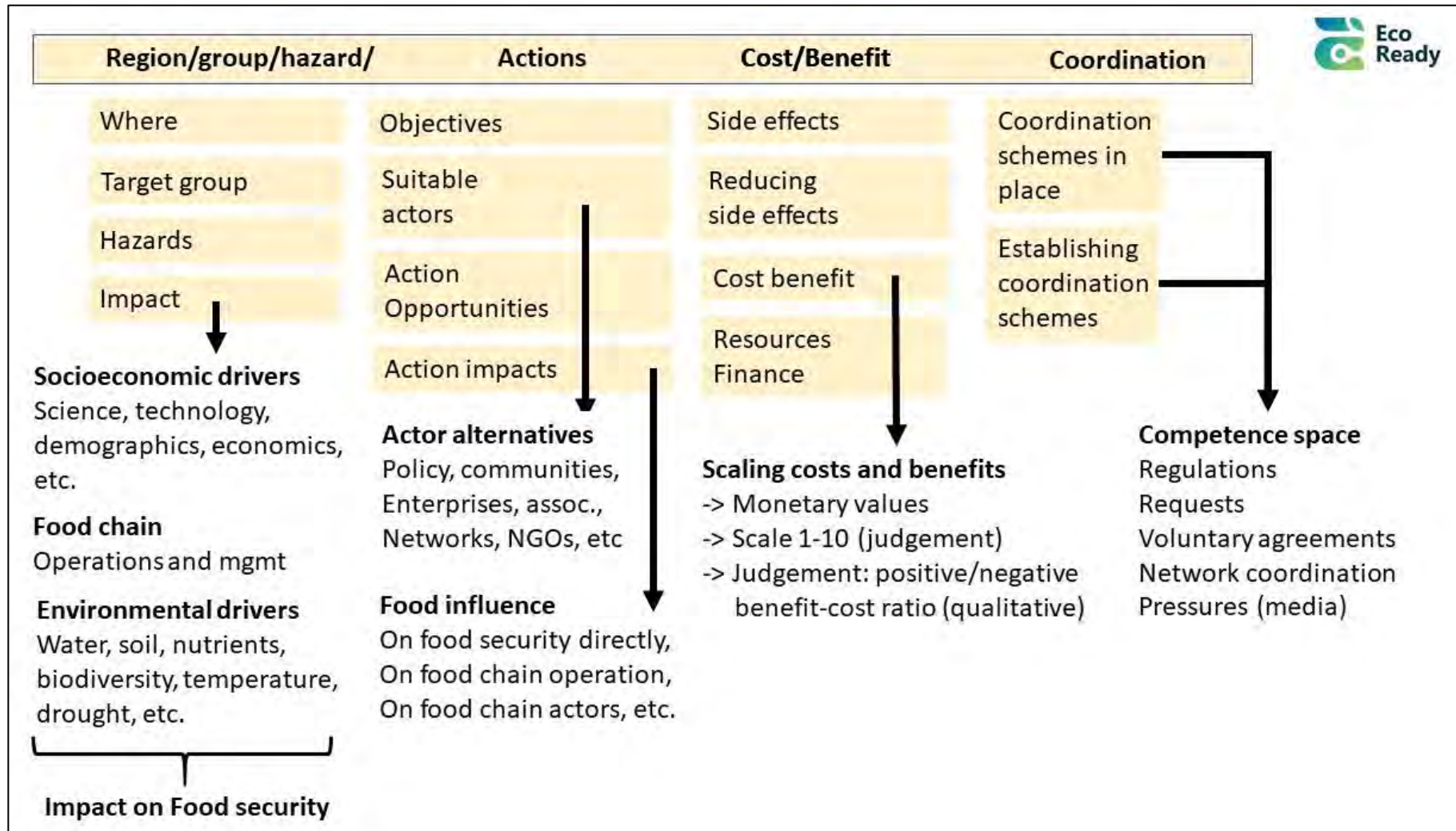
Appendix B1a: Overview operational process

Region/group/hazard/	Actions	Cost/Benefit	Coordination
Where	Objectives	Side effects	Coordination schemes in place
Target group	Suitable actors	Reducing side effects	
Product(s)	Action Opportunities	Cost benefit	Establishing coordination schemes
Hazards		Resources	
Impact	Action impacts	Finance	

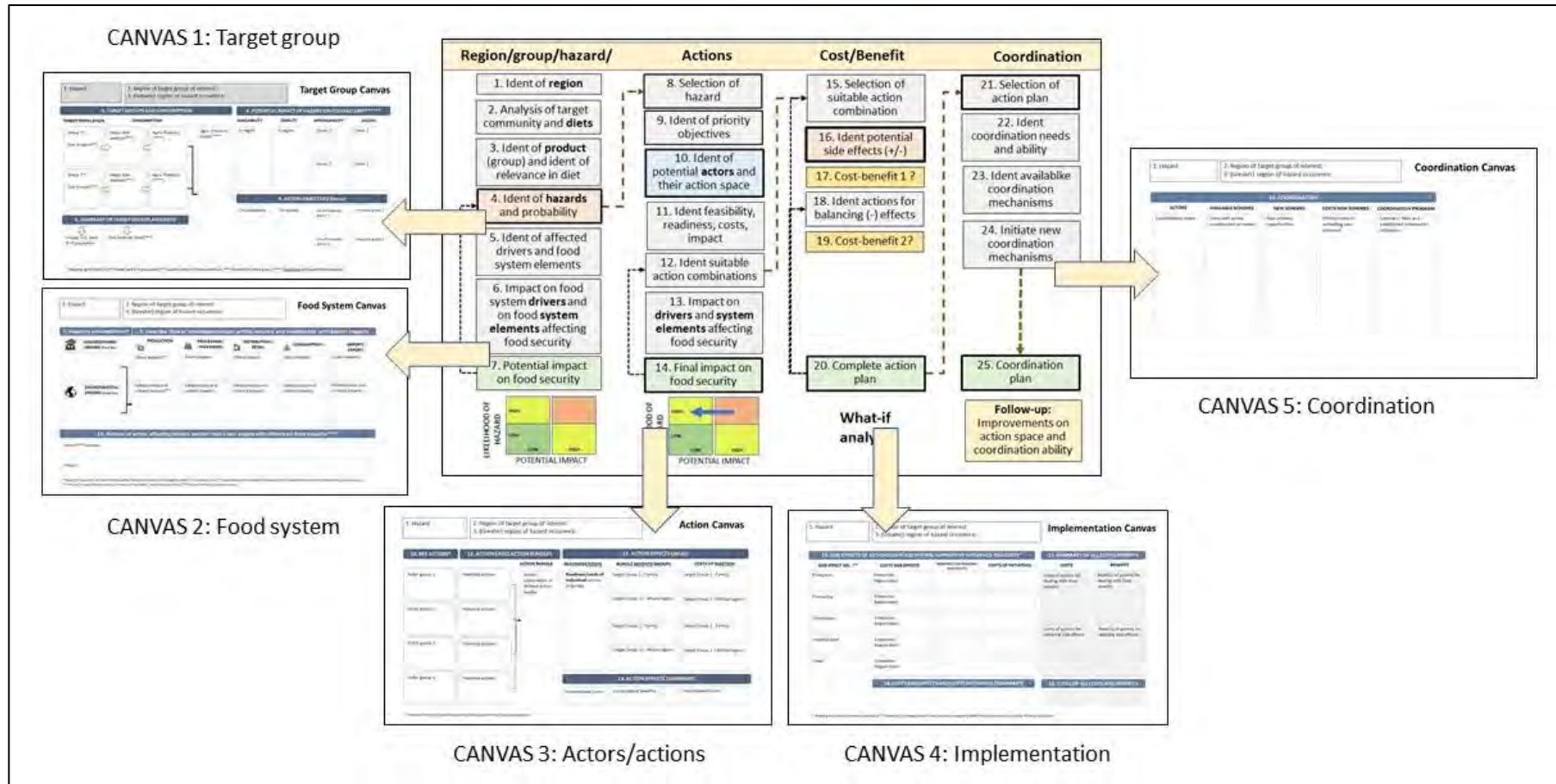
Appendix B1b: Process details



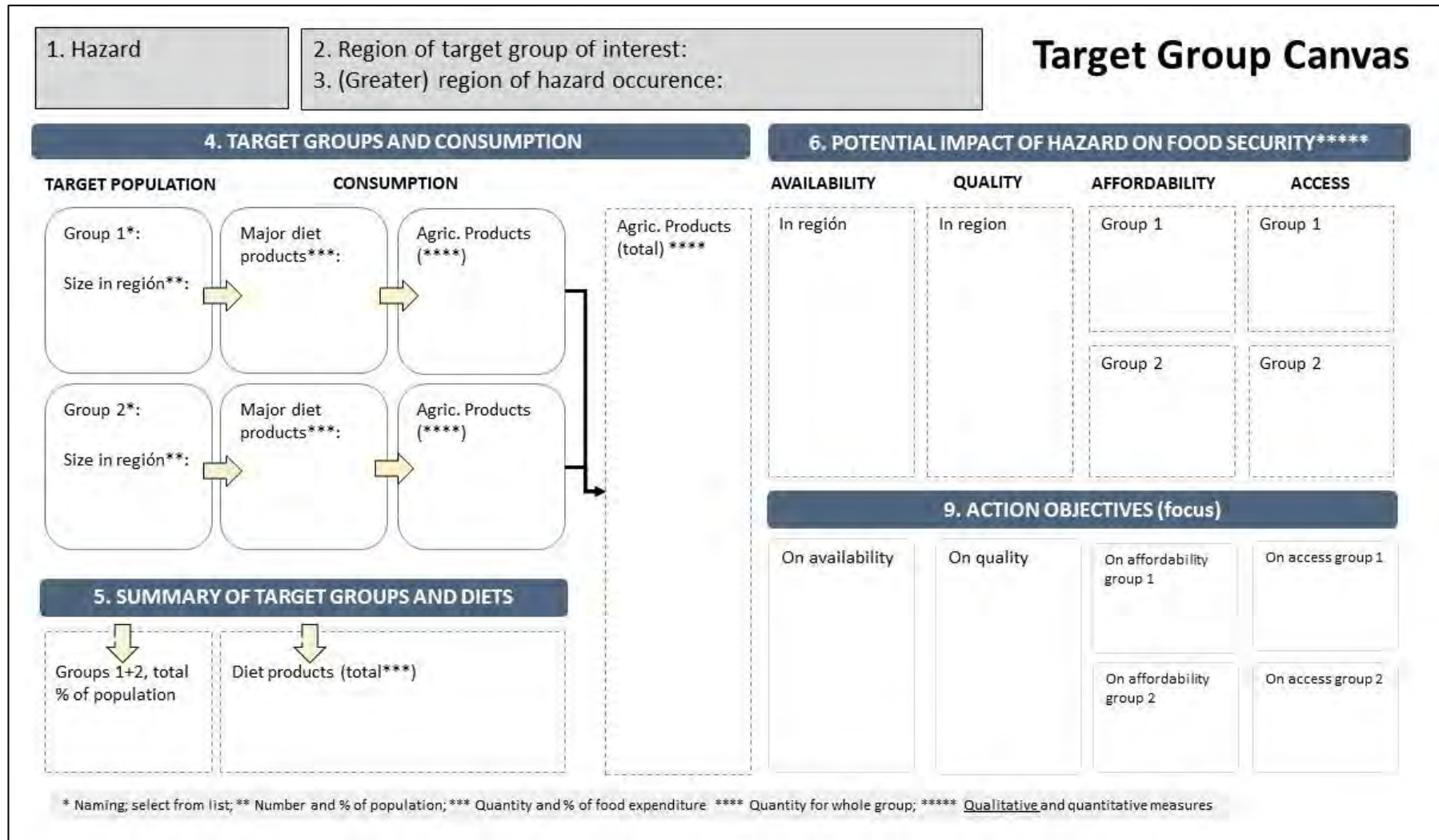
Appendix B1c: Core process inputs



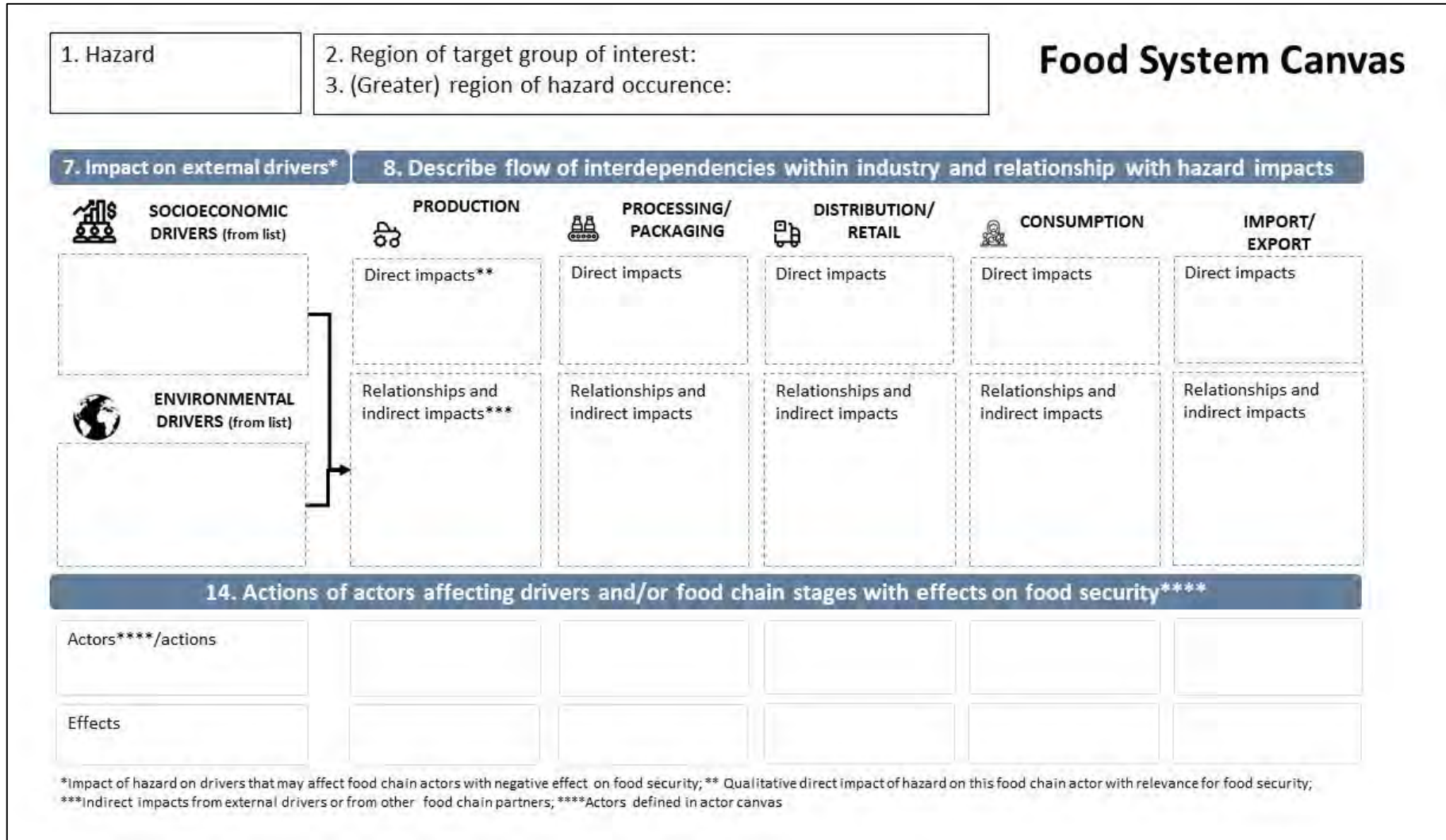
Appendix B2a: Overview: Links between process and CANVAS documentation templates



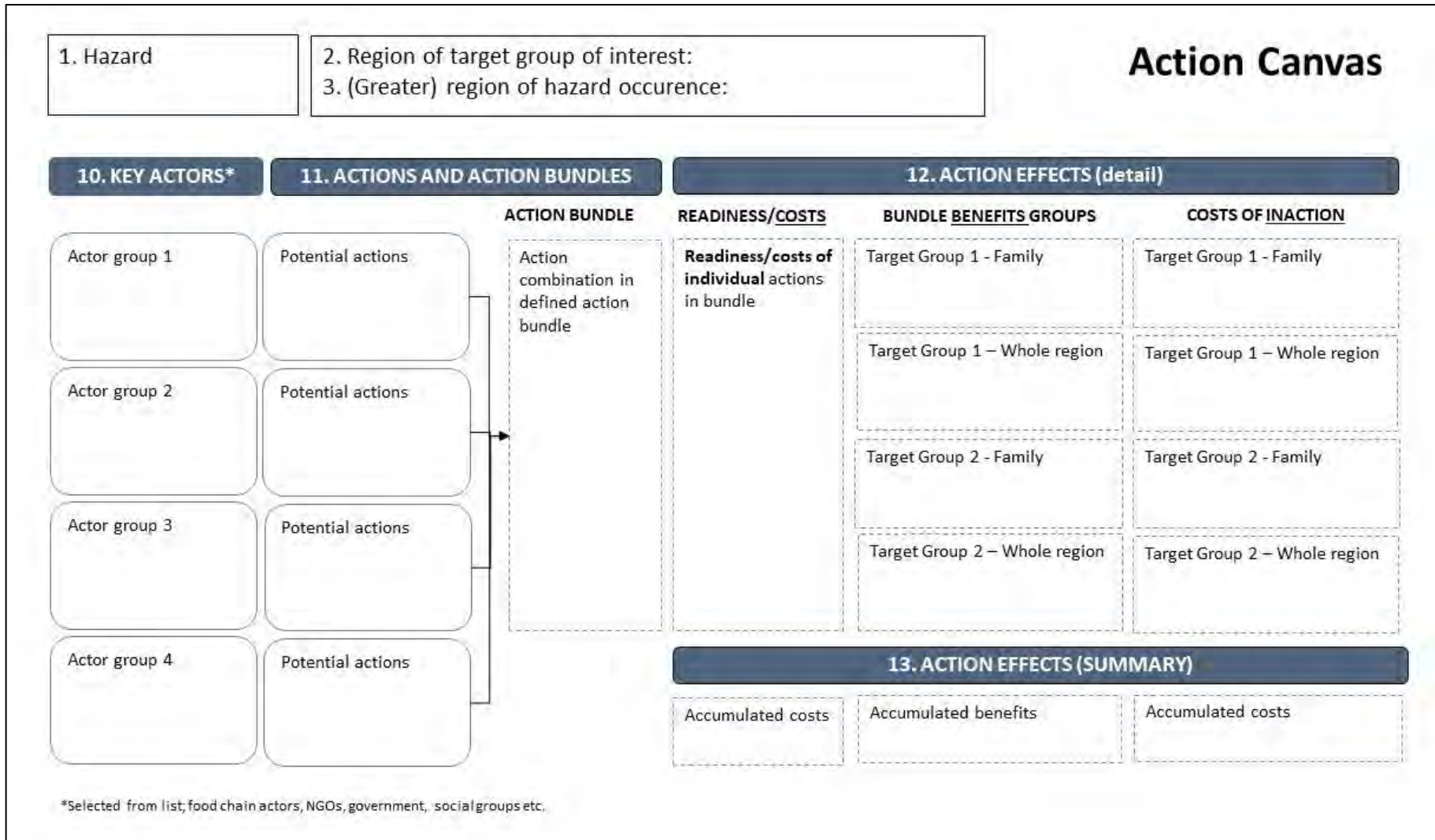
Appendix B2b: Target group CANVAS



Appendix B2c: Food system CANVAS



Appendix B2d: Action CANVAS



Appendix B2e: Implementation CANVAS

Implementation Canvas

1. Hazard

2. Region of target group of interest:
 3. (Greater) region of hazard occurrence:

15. SIDE EFFECTS OF ACTIONS ON FOOD SYSTEM, SUPPORTIVE INITIATIVES AND COSTS*

SIDE EFFECT ON...**	COSTS SIDE EFFECTS	INITIATIVES FOR REDUCING SIDE EFFECTS	COSTS OF INITIATIVES
Production	Enterprise: Region total:		
Processing	Enterprise: Region total:		
Distribution	Enterprise: Region total:		
Import/Export	Enterprise: Region total:		
Other	Enterprise: Region total:		

16. COSTS SIDE EFFECTS AND COSTS INITIATIVES (SUMMARY)

17. SUMMARY OF ALL COSTS/BENEFITS

COSTS	BENEFITS
Costs of actions for dealing with food security	Benefits of actions for dealing with food security
Costs of actions for reducing side effects	Benefits of actions for reducing side effects

18. TOTAL OF ALL COSTS AND BENEFITS

* Naming and costs for enterprises/region; **Example: Increased import (=action) may negatively affect farm prices which could be offset by subsidies

Appendix B2f: Coordination CANVAS

1. Hazard

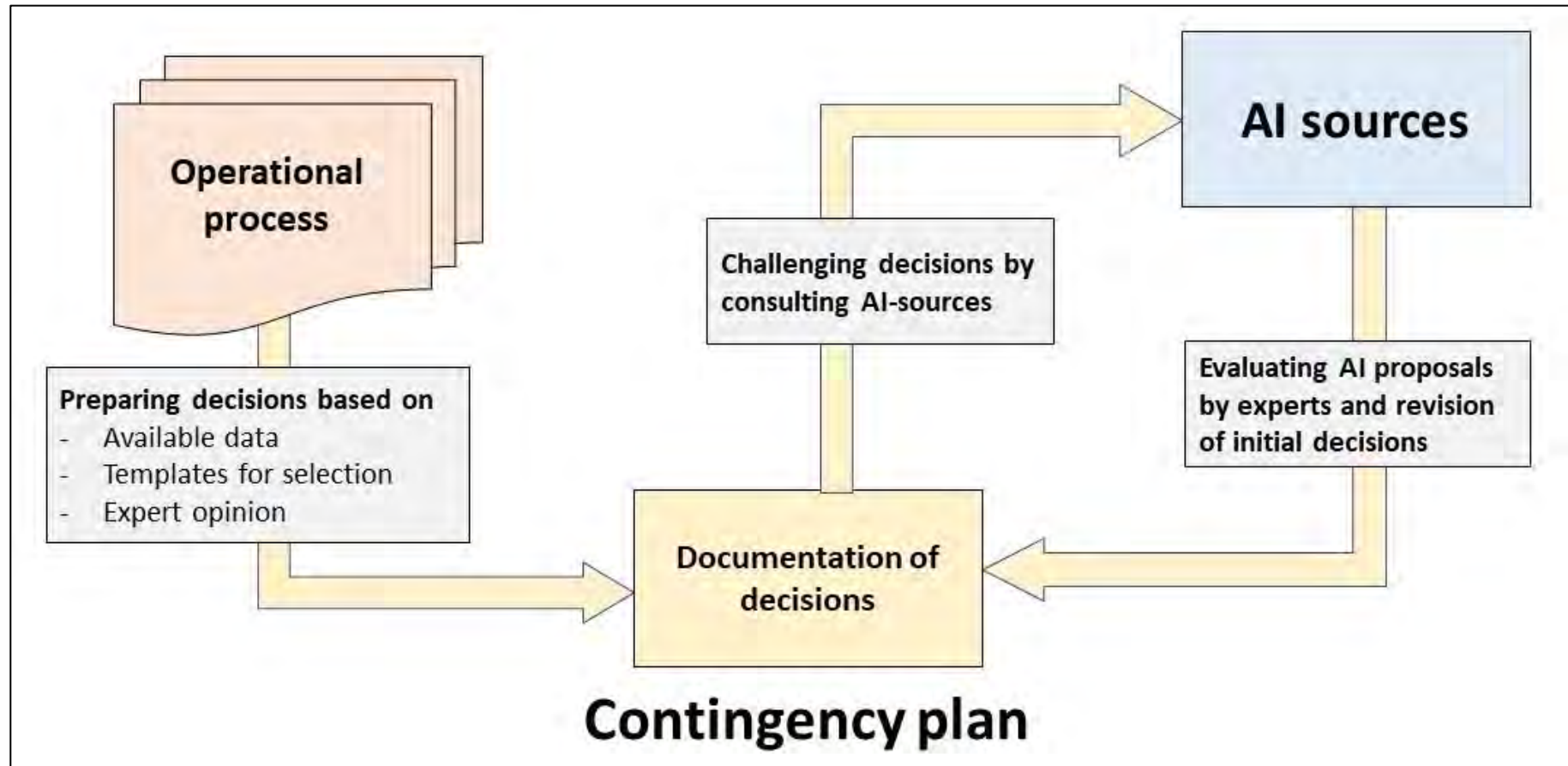
2. Region of target group of interest:
3. (Greater) region of hazard occurrence:

Coordination Canvas

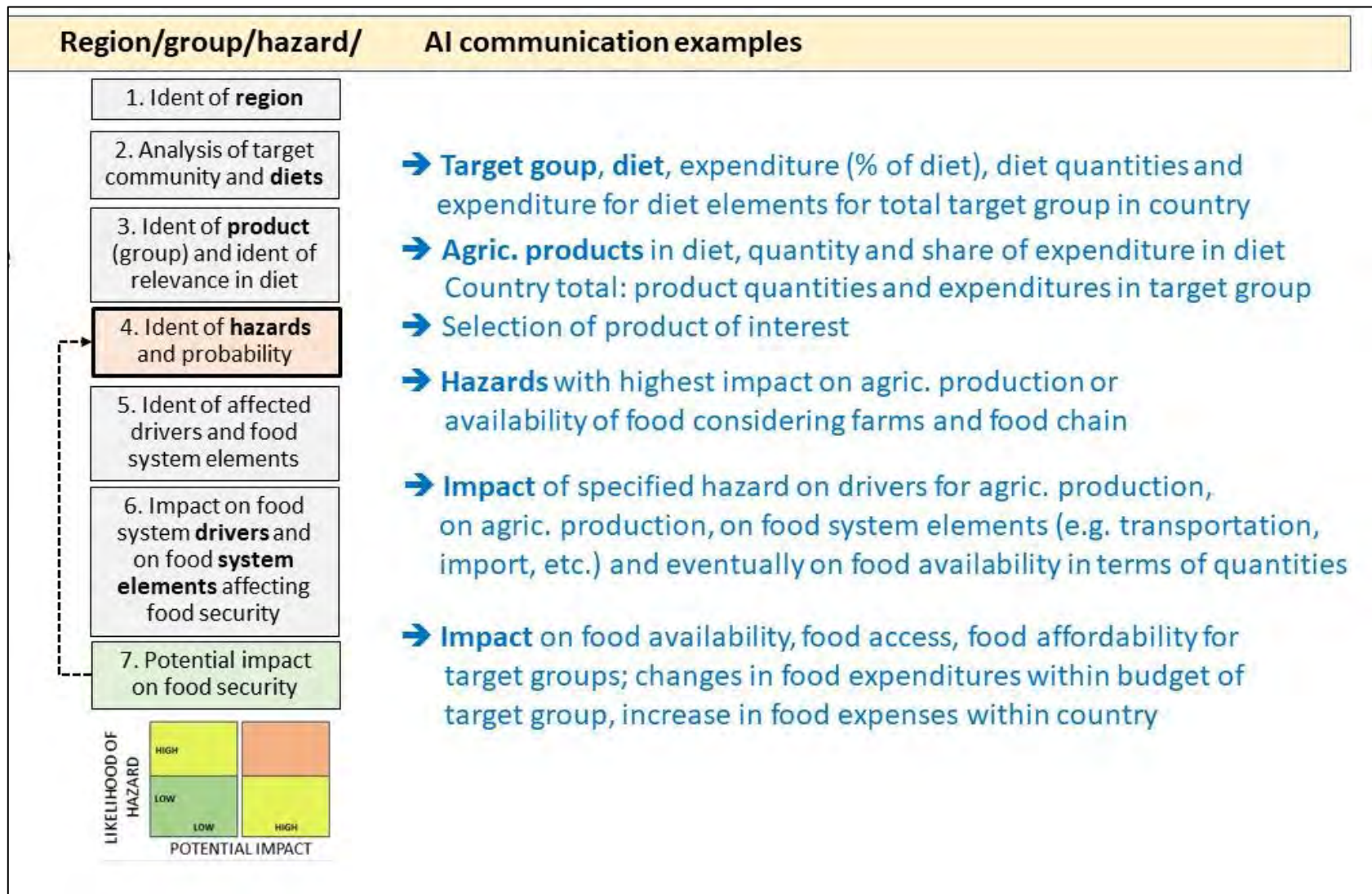
19. COORDINATION

ACTORS	AVAILABLE SCHEMES	NEW SCHEMES	COSTS NEW SCHEMES	COORDINATION PROGRAM
<p>Coordination needs</p>	<p>Links with active coordination schemes</p>	<p>New scheme opportunities</p>	<p>Efforts/costs of activating new schemes</p>	<p>Summary: New and established schemes for utilization</p>

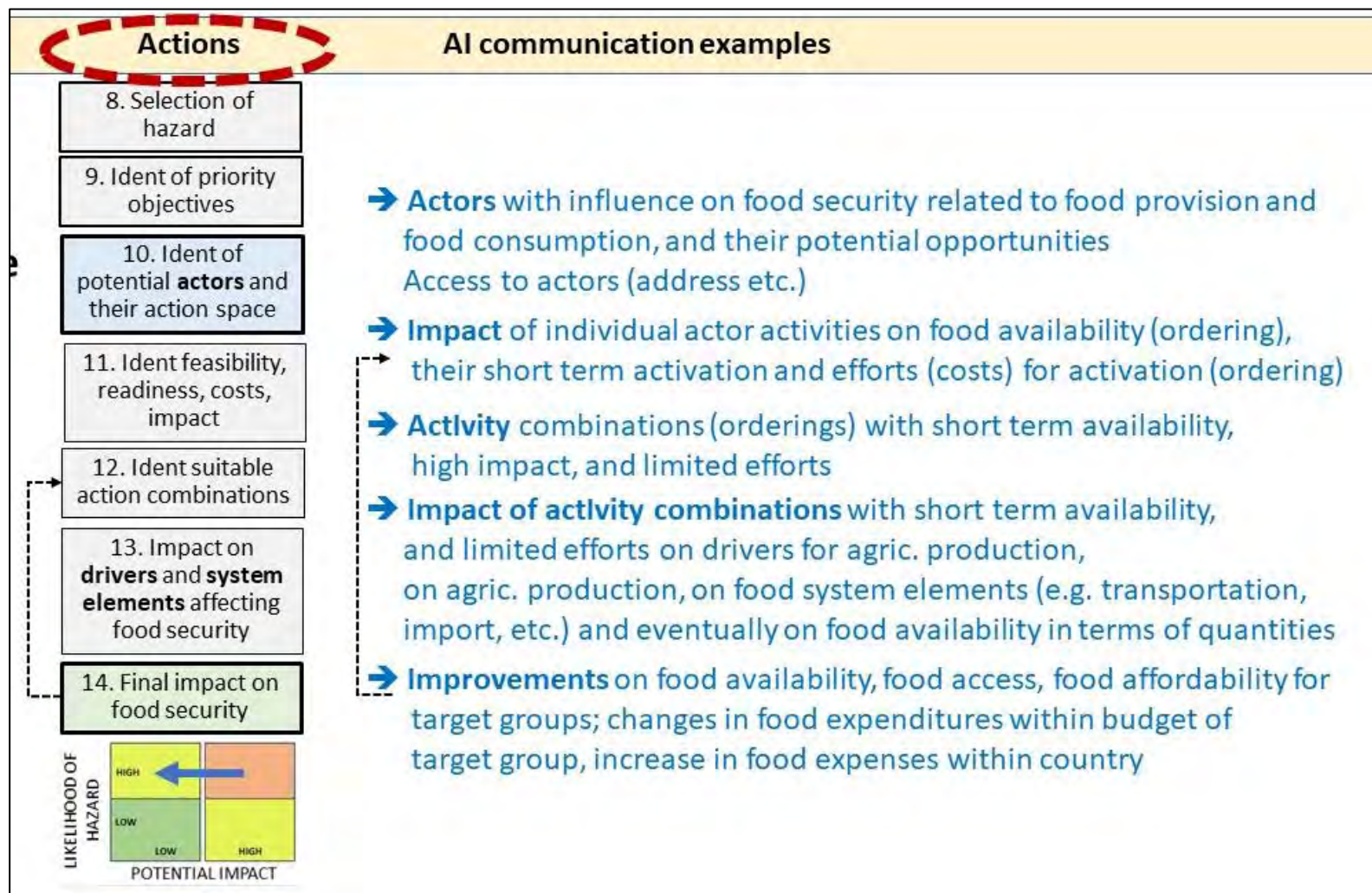
Appendix B3a: Overview LLM integration in planning scheme



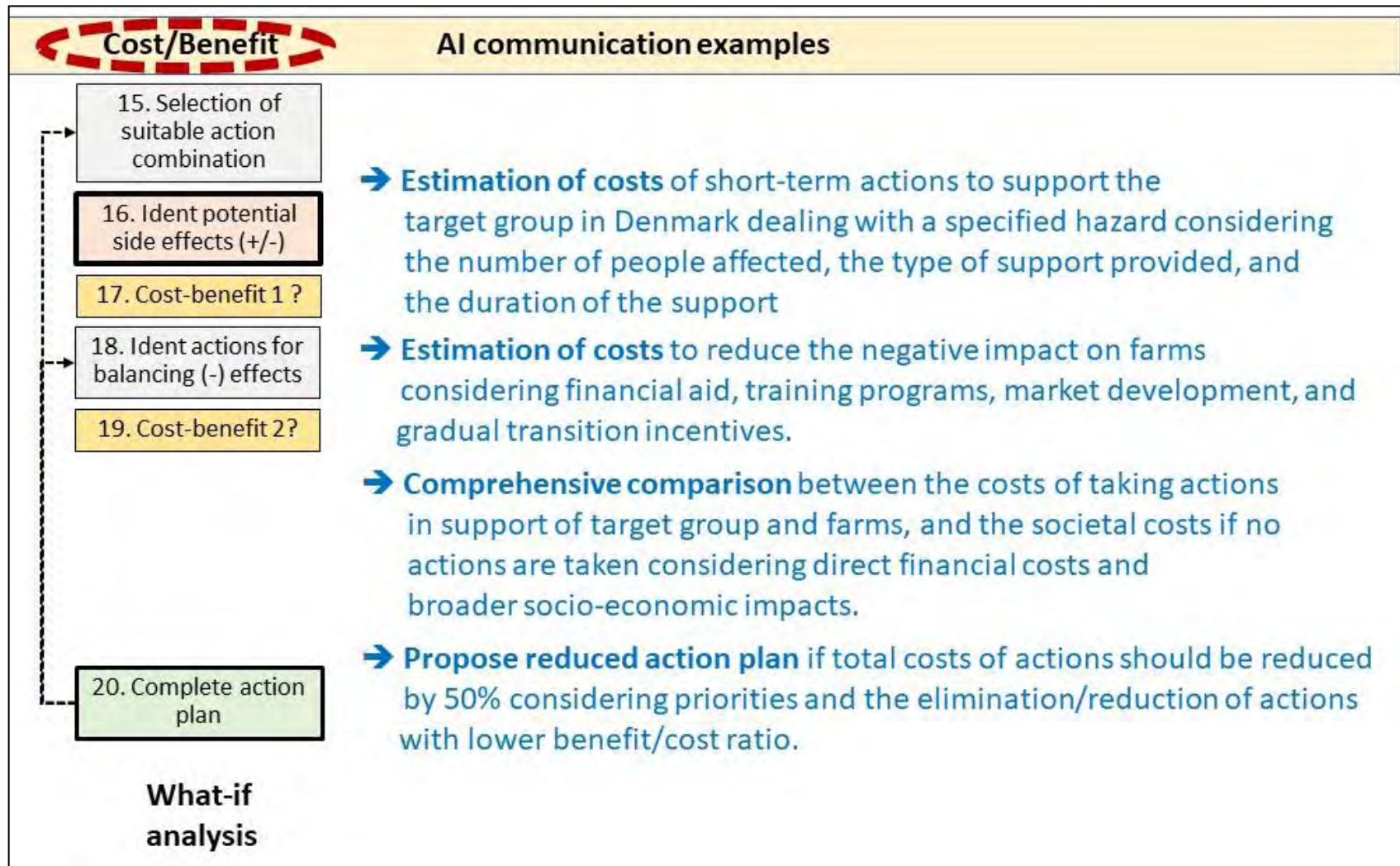
Appendix B3b: LLM in focus activity 1 - region, target group, hazard



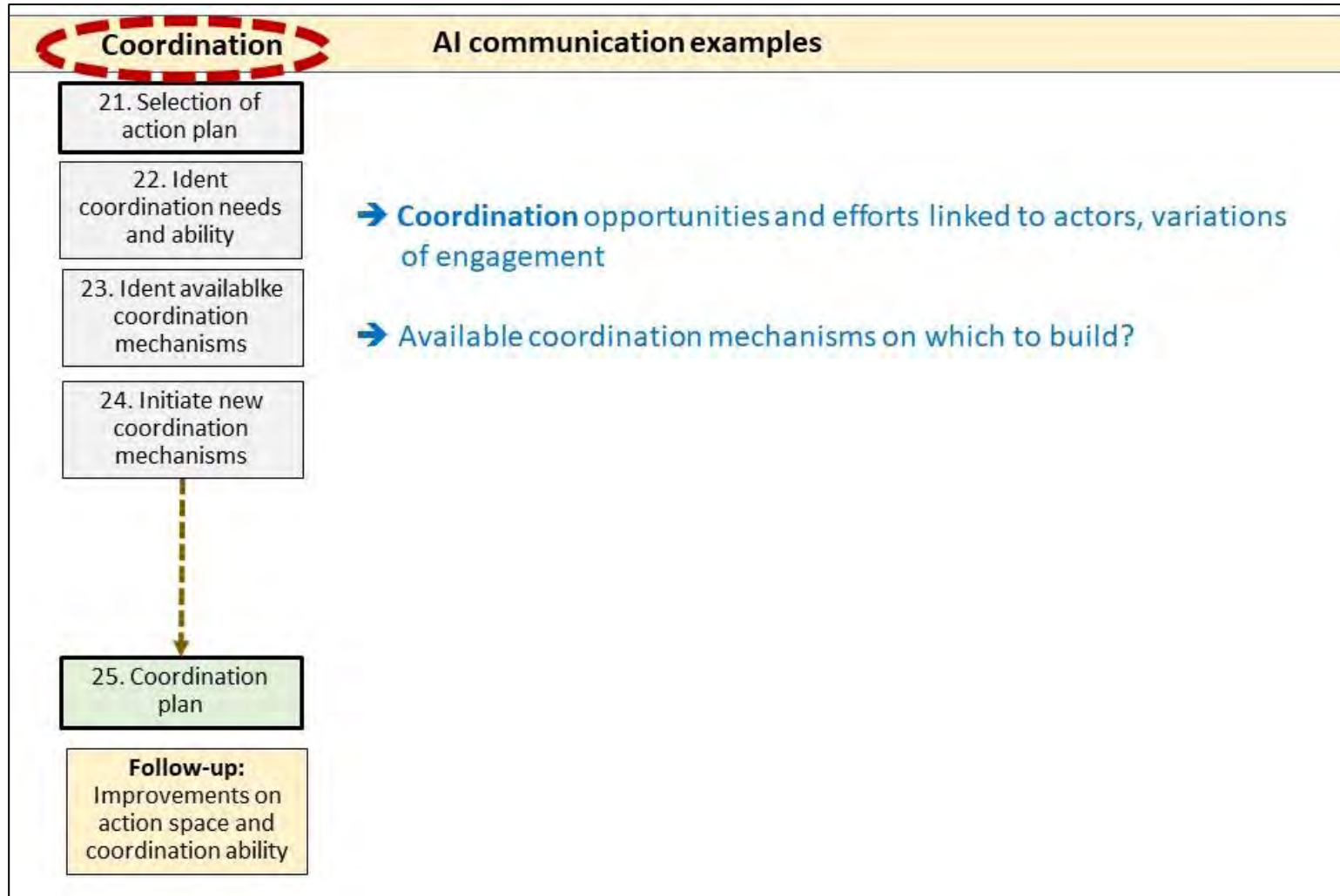
Appendix B3c: LLM in focus activity 2 - actors, actions, impact



Appendix B3d: LLM in focus activity 3 - side effects, costs and benefits



Appendix B3e: Coordination



Appendix B4a: Overview: Examples of LLM feedback related to operational process

Region/group/hazard/	Actions	Cost/Benefit	Coordination
Where	Objectives	Side effects	Coordination schemes in place
X Target group	X Suitable actors	Reducing side effects	
X Hazards	X Action Opportunities	X Cost benefit	Establishing coordination schemes
Impact			
	Action impacts	Finance	

Appendix B4b: Question: Vulnerable groups in food safety situations?

In food safety situations, vulnerable groups are populations that are more susceptible to the adverse effects of foodborne illnesses due to physiological, health, or social factors. Here are some of the key characteristics and categories of vulnerable groups in food safety contexts:

1. Infants and Young Children

- *Physiological Susceptibility*: Infants and young children have underdeveloped immune systems and smaller body sizes, making them more vulnerable to pathogens and toxins.
- *Dietary Needs*: They rely on a limited diet that can be severely affected by contamination.
- *Risks*: High risk of dehydration and malnutrition from illnesses like diarrhea caused by foodborne pathogens.

2. Pregnant Women

- *Physiological Changes*: Pregnancy involves hormonal and immune system changes that can increase susceptibility to certain infections.
- *Fetal Health*: Foodborne illnesses can have severe implications for fetal development, potentially causing miscarriage, stillbirth, or birth defects.
- *Risks*: Increased risk of contracting diseases like Listeriosis, which can harm both the mother and fetus.

3. Elderly Individuals

- *Weakened Immune System*: Aging often leads to a decline in immune function, making older adults more susceptible to infections.
- *Chronic Conditions*: Many elderly individuals have chronic health conditions that can be exacerbated by foodborne illnesses.
- *Risks*: Greater likelihood of severe complications or death from infections like Salmonella or E. coli.

4. Individuals with Chronic Illnesses

- *Immune System Compromise*: Conditions such as diabetes, cancer, HIV/AIDS, and kidney disease can weaken the immune system.
- *Medication Effects*: Some medications can further reduce immune function or affect nutrient absorption.
- *Risks*: Increased susceptibility to infections and prolonged recovery times.

5. Immunocompromised Individuals

- *Immune System Suppression*: Those undergoing treatments like chemotherapy or taking immunosuppressive drugs (e.g., for organ transplants) are at heightened risk.
- *Infection Severity*: Foodborne illnesses can be more severe and life-threatening for these individuals.
- *Risks*: Higher vulnerability to infections such as Campylobacter, Toxoplasma, and Norovirus.

6. Low-Income Populations

- *Access to Safe Food*: Economic constraints may limit access to safe, nutritious food and adequate healthcare.
- *Living Conditions*: Crowded or unsanitary living conditions can increase exposure to foodborne pathogens.
- *Education*: Limited awareness or education about food safety practices.
- *Risks*: Greater risk of exposure to contaminated food and higher rates of food insecurity.

7. Refugees and Displaced Persons

- *Living Conditions*: Often face crowded living conditions with limited access to clean water, sanitation, and healthcare.
- *Access to Resources*: May lack access to diverse and safe food sources.
- *Risks*: Increased vulnerability to foodborne illnesses due to compromised living situations and limited resources.

Protection and Support for Vulnerable Groups

- *Enhanced Food Safety Standards*: Stricter regulations and enforcement to ensure production and distribution of safe food.
- *Education and Awareness*: Programs to educate these groups and caregivers about safe food handling, preparation, and storage practices.
- *Access to Healthcare*: Improving access to healthcare services to promptly address foodborne illnesses.
- *Nutritional Support*: Providing access to nutritious food that meets the dietary needs of these groups.
- *Policy Interventions*: Government and organizational policies that focus on protecting vulnerable populations, such as targeted food assistance programs.

Appendix B4c: Question: Common risks in farming and mitigation options?

1. Weather and Climate Risks
 - Drought:
 - *Impact*: Reduced water availability affects crop growth, leading to lower yields. Livestock may suffer from inadequate water supply and forage.
 - *Mitigation*: Use of drought-resistant crop varieties, efficient irrigation systems, and water conservation practices.
 - Flooding:
 - *Impact*: Floodwaters can drown crops, erode soil, and spread plant diseases. Infrastructure like roads and buildings can be damaged.
 - *Mitigation*: Constructing drainage systems, building levees, and selecting flood-tolerant crops.
 - Extreme Temperatures:
 - *Impact*: Heat stress can cause crop wilting and reduced yields, while cold snaps can damage sensitive crops and harm livestock.
 - *Mitigation*: Use of shade nets, mulching, timing of planting and harvesting, and selecting temperature-tolerant varieties.
 - Storms and Hurricanes:
 - *Impact*: High winds and rain can flatten crops, damage infrastructure, and lead to soil erosion.
 - *Mitigation*: Building windbreaks, securing structures, and implementing soil conservation practices.
2. Pest and Disease Risks
 - Crop Pests:
 - *Impact*: Pests can consume or damage crops, reducing yields and quality.
 - *Mitigation*: Integrated pest management (IPM), use of biological control agents, and resistant crop varieties.
 - Plant Diseases:
 - *Impact*: Diseases like blight, rust, and mildew can spread rapidly, causing significant yield losses.
 - *Mitigation*: Crop rotation, resistant varieties, timely application of fungicides or bactericides, and maintaining field hygiene.
 - Livestock Diseases:
 - *Impact*: Diseases can lead to livestock mortality, reduced productivity, and market access issues.
 - *Mitigation*: Vaccination programs, biosecurity measures, regular health checks, and quarantine practices.
3. Market and Price Risks
 - Price Volatility:
 - *Impact*: Fluctuations in market prices can lead to unstable farm incomes.
 - *Mitigation*: Forward contracts, futures markets, diversification of crops and products, and value-added processing.
 - Market Access:
 - *Impact*: Trade barriers, shifting consumer preferences, and market saturation can limit sales.
 - *Mitigation*: Building local markets, direct sales to consumers, and product diversification.
4. Financial Risks
 - Access to Credit:
 - *Impact*: Difficulty in obtaining loans can hinder investments in inputs, technology, and expansion.
 - *Mitigation*: Building strong relationships with financial institutions, cooperative farming, and government support programs.
 - Interest Rates:
 - *Impact*: Rising interest rates increase the cost of borrowing, affecting profitability.
 - *Mitigation*: Fixed-rate loans, careful financial planning, and seeking alternative funding sources.
5. Operational and Management Risks
 - Labor Availability:
 - *Impact*: Shortages in skilled labor can delay planting, harvesting, and other critical operations.
 - *Mitigation*: Mechanization, training programs, and hiring seasonal workers.
 - Technological Failures:
 - *Impact*: Machinery breakdowns and technology failures can disrupt operations and lead to financial losses.
 - *Mitigation*: Regular maintenance, investment in reliable equipment, and having backup systems.

6. Environmental and Regulatory Risks

- Soil Degradation:

- *Impact:* Erosion, nutrient loss, and contamination reduce soil fertility and crop yields.
- *Mitigation:* Conservation tillage, crop rotation, cover cropping, and organic amendments.

- Water Availability:

- *Impact:* Limited water can constrain crop growth, especially in arid regions.
- *Mitigation:* Efficient irrigation systems, rainwater harvesting, and drought-resistant varieties.

- Regulatory Changes:

- *Impact:* New environmental, labor, and safety regulations can increase operational costs.
- *Mitigation:* Staying informed, adapting practices, and participating in policy discussions.

7. Social and Political Risks

- Land Ownership Issues:

- *Impact:* Disputes and unclear land rights can disrupt farming operations and investments.
- *Mitigation:* Legal assistance, clear documentation, and community engagement.

- Political Instability:

- *Impact:* Conflicts and political changes can affect supply chains, trade, and market stability.
- *Mitigation:* Diversification of markets, maintaining good relationships with stakeholders, and risk assessments.

8. Human Health Risks

- Farmer Health and Safety:

- *Impact:* Injuries, illnesses, and occupational hazards can reduce labor availability and productivity.
- *Mitigation:* Safety training, protective equipment, and health programs.

- Public Health Concerns:

- *Impact:* Issues like foodborne illnesses can affect consumer confidence and marketability.
- *Mitigation:* Strict adherence to food safety standards, traceability systems, and hygiene practices.

Risk Management Strategies

Farmers employ various strategies to manage these risks, including:

- *Diversification:* Growing a variety of crops and raising different types of livestock to spread risk.
- *Insurance:* Crop and livestock insurance to protect against specific risks like weather or disease.
- *Technology Adoption:* Use of precision agriculture, climate-smart practices, and digital tools to optimize productivity and reduce risks.
- *Collaboration:* Cooperatives and partnerships to share resources, knowledge, and market access.
- *Education and Training:* Continuous learning and skill development to adapt to changing conditions and technologies.

These strategies help farmers build resilience and adapt to the complex and dynamic environment of modern agriculture.

Appendix B4d: Question: Who could support food security for low-income families in case of a drought in Germany (example)?

In the case of a drought in Germany that threatens food security for low-income families, various organizations, government agencies, and community initiatives could play a crucial role in providing support. Here's a list of potential supporters and their roles:

1. Government Agencies:

- *Federal Government*: The German government can implement emergency measures, such as food aid programs and financial assistance, to support affected families.
- *Local Governments*: Municipalities can coordinate local relief efforts, distribute food supplies, and provide targeted support to vulnerable populations.

2. Non-Governmental Organizations (NGOs):

- *Tafel Deutschland*: This nationwide network of food banks collects surplus food from retailers and distributes it to those in need. During a drought, they can increase their efforts to reach more families.
- *Diakonie and Caritas*: These large welfare organizations offer various social services, including food distribution and financial support, to low-income families.
- *Welthungerhilfe*: Although primarily focused on international food security, they might redirect some resources and expertise to address domestic crises.

3. Community-Based Organizations:

- *Food Cooperatives and Community Kitchens*: Local initiatives can organize community meals and distribute food directly to those in need.
- *Urban Gardening Projects*: Encouraging urban gardening and local food production can help communities become more self-sufficient.

4. Agricultural Cooperatives and Farmers' Associations:

- Collaborate with farmers to provide surplus produce or financial assistance to affected families.
- Develop programs to encourage sustainable farming practices that mitigate the effects of drought.

5. Private Sector:

- *Retailers and Supermarkets*: Companies like Aldi, Lidl, and Edeka can contribute by donating food, offering discounts, or setting up special programs to aid low-income families.
- *Corporate Social Responsibility (CSR) Programs*: Businesses can fund initiatives that support food security and provide emergency assistance.

6. International Organizations:

- *European Union*: The EU can provide financial aid, resources, and expertise to help Germany manage the drought's impact on food security.

7. Academic Institutions and Research Centers:

- Conduct research on drought-resistant crops and innovative farming techniques that can be applied to mitigate food shortages.
- Provide expertise and support for policy development and implementation.

8. Community Volunteers and Grassroots Movements:

- Mobilize local volunteers to assist with food distribution and support services for affected families.

By leveraging the combined efforts of these organizations and initiatives, Germany can enhance its resilience against drought-induced food insecurity and provide necessary support to low-income families.

Appendix B4e: Question: Create a contingency plan for food security in support of low-income families in case of droughts in Germany (example)

To create a contingency plan for food security that specifically supports low-income families in Germany during droughts, it is essential to address the unique vulnerabilities and needs of this demographic group. Here's a tailored plan:

Step 1: Risk Assessment for Low-Income Families

1. Identify Potential Impacts:

- Increased food prices leading to reduced affordability
- Limited access to nutritious food
- Greater reliance on social support and food assistance programs

2. Evaluate Vulnerabilities:

- Geographic areas with high concentrations of low-income households
- Dependence on food banks and social services
- Access to affordable grocery stores and markets

3. Prioritize Needs:

- Focus on ensuring the availability and affordability of staple foods
- Address nutritional requirements of vulnerable groups (children, elderly, disabled)

Step 2: Develop Response Strategies

1. Food Assistance Programs:

- Expand existing food bank networks and establish additional distribution centers in high-need areas
- Introduce mobile food pantries to reach remote or underserved communities
- Implement voucher or coupon systems for purchasing essential foods at subsidized rates

2. Economic Support Measures:

- Increase social welfare benefits and targeted financial assistance during droughts
- Provide emergency cash transfers to offset increased living costs
- Implement price controls on essential food items to prevent inflation

3. Community-Based Solutions:

- Encourage community gardens and urban agriculture initiatives to boost local food production
- Establish cooperative buying groups to negotiate better prices for bulk food purchases
- Foster community kitchens and meal-sharing programs to improve food access

4. Nutritional Support and Education:

- Promote nutrition education programs focusing on affordable and nutritious meal planning
- Distribute recipes and resources to help families maximize limited food supplies
- Provide nutrition-focused workshops and cooking classes

Step 3: Communication and Coordination

1. Stakeholder Collaboration:

- Partner with local NGOs, community organizations, and social services to coordinate efforts
- Establish a task force dedicated to addressing food insecurity among low-income families

2. Public Awareness Campaigns:

- Conduct outreach campaigns to inform families about available resources and assistance programs
- Utilize social media, community centers, and schools to disseminate information

3. Communication Plan:

- Develop a centralized information hub for updates on food assistance and support services
- Ensure multilingual communication to reach diverse communities

Step 4: Implementation and Monitoring

1. Action Plan Development:

- Define clear roles and responsibilities for government agencies and community partners
- Allocate budget and resources for immediate and long-term support initiatives

2. Monitoring and Evaluation:

- Track food insecurity levels and program effectiveness through surveys and data collection
- Regularly review and adjust strategies based on feedback and changing conditions

3. Drills and Simulations:

- Conduct simulations to test response readiness and improve operational efficiency
- Identify gaps and make necessary adjustments to the contingency plan

Step 5: Review and Adaptation

1. Continuous Improvement:

- Learn from past experiences and integrate best practices into the plan
- Adapt to evolving challenges and leverage new technologies

2. Feedback Loops:

- Gather input from low-income families and community organizations
- Encourage innovation and flexible solutions to meet diverse needs

Additional Considerations

- Policy Advocacy:

- Advocate for policies that support sustainable agriculture and food security
- Promote long-term investments in infrastructure and resources to mitigate drought impacts

- Research and Development:

- Support research into drought-resistant crops and efficient farming practices
- Encourage technological innovation to improve food production and distribution

By focusing on these strategies, the plan can effectively address the needs of low-income families in Germany during droughts, ensuring food security and minimizing socio-economic impacts. This approach emphasizes community engagement, resource mobilization, and continuous adaptation to changing conditions.

Appendix B4f: Question: What are the costs of the example in appendix 4e

Estimating the costs of implementing a contingency plan for food security, especially in support of low-income families during droughts in Germany, involves several components. The costs will depend on various factors, including the scale of implementation, the extent of existing infrastructure, and the resources required to execute each part of the plan. Below is a breakdown of potential cost components and some considerations for estimating overall expenses.

Cost Components

1. Food Assistance Programs
 - Expansion of Food Banks:
 - Infrastructure costs (rent, utilities)
 - Staffing and volunteer coordination
 - Logistics and distribution (transportation, fuel)
 - **Estimated Cost: €10 million - €20 million annually**
 - Mobile Food Pantries:
 - Purchase and maintenance of vehicles
 - Staffing and operations
 - Fuel and insurance
 - **Estimated Cost: €5 million - €10 million annually**
 - Voucher Systems:
 - Administration and distribution costs
 - Subsidies for food purchases
 - **Estimated Cost: €20 million - €30 million annually**
2. Economic Support Measures
 - Emergency Financial Assistance:
 - Direct cash transfers or increased welfare benefits
 - Administrative costs for disbursement
 - **Estimated Cost: €50 million - €100 million annually**
 - Price Controls:
 - Potential subsidies to stabilize prices
 - Monitoring and enforcement costs
 - **Estimated Cost: €10 million - €20 million annually**
3. Community-Based Solutions
 - Community Gardens and Urban Agriculture:
 - Initial setup costs (land preparation, tools, seeds)
 - Training and workshops
 - Maintenance and support
 - **Estimated Cost: €5 million - €15 million annually**
 - Cooperative Buying Groups:
 - Coordination and management costs
 - Bulk purchasing discounts (potential savings)
 - **Estimated Cost: €1 million - €3 million annually**
 - Community Kitchens:
 - Setup and operational costs
 - Staffing and volunteer management
 - Food supplies
 - **Estimated Cost: €5 million - €10 million annually**
4. Nutritional Support and Education
 - Workshops and Educational Programs:
 - Development of materials and resources
 - Trainer fees and venue costs
 - **Estimated Cost: €2 million - €5 million annually**

5. Communication and Coordination

- Public Awareness Campaigns:
 - Media and communication costs
 - Community outreach programs
 - **Estimated Cost: €2 million - €5 million annually**
- Centralized Information Hub:
 - Development and maintenance of the platform
 - Staffing and information dissemination
 - Estimated Cost: **€1 million - €3 million annually**

6. Monitoring and Evaluation

- Data Collection and Analysis:
 - Surveys and research costs
 - Staffing and technology for monitoring
 - **Estimated Cost: €2 million - €4 million annually**
- Drills and Simulations:
 - Training and execution costs
 - Analysis and reporting
 - **Estimated Cost: €1 million - €2 million annually**

Total Estimated Costs

The total estimated annual cost for implementing this contingency plan ranges between €100 million and €200 million.

This is a rough estimate and could vary significantly based on:

- The severity and frequency of droughts.
- The scale of implementation across regions.
- The efficiency of resource allocation and management.

Funding Sources

1. Government Funding:
 - Allocation from federal and state budgets
 - Emergency relief funds
2. International Aid and Grants:
 - EU funding programs for agricultural resilience
 - Contributions from international organizations (e.g., World Food Programme)
3. Public-Private Partnerships:
 - Collaboration with businesses and NGOs
 - Corporate social responsibility (CSR) initiatives
4. Community Contributions:
 - Volunteer involvement and local fundraising efforts

Conclusion

The costs associated with this contingency plan are substantial but necessary to ensure the food security of low-income families during droughts. By strategically allocating resources and leveraging partnerships, it is possible to mitigate the impacts of droughts and support vulnerable populations effectively. Regular assessments and adaptive strategies will help optimize expenditures and improve the plan's efficiency over time.

Appendix B4g: Question: What can be reached with a budget limit of 10 million?

With a budget limit of €10 million, the contingency plan for food security in support of low-income families during droughts in Germany needs to be highly focused and strategic. Prioritizing cost-effective measures and leveraging partnerships can maximize impact within this budget constraint. Here's a streamlined plan:

Focus Areas and Strategies

1. Targeted Food Assistance

- Expand Food Banks and Distribution:

- **Budget Allocation: €3 million**

- **Action:** Strengthen existing food banks in high-need areas through partnerships with local NGOs. Focus on efficient distribution using existing infrastructure and volunteer networks.

- **Activities:** Increase capacity for food collection and storage, and improve logistics for last-mile delivery.

- Mobile Food Pantries:

- **Budget Allocation: €1 million**

- **Action:** Operate a limited number of mobile food pantries targeting remote or underserved communities.

- **Activities:** Utilize rented or donated vehicles to minimize costs, and prioritize areas with the highest food insecurity rates.

2. Community-Based Solutions

- Community Gardens and Urban Agriculture:

- **Budget Allocation: €1 million**

- **Action:** Establish community gardens in urban areas with high-density low-income populations.

- **Activities:** Collaborate with local governments for land access, provide seeds and tools, and offer training workshops. Encourage community participation and self-sufficiency.

3. Nutritional Support and Education

- Nutrition Workshops and Education:

- **Budget Allocation: €0.5 million**

- **Action:** Implement nutrition education programs focusing on affordable and healthy meal preparation.

- **Activities:** Conduct workshops in community centers and schools, distribute educational materials, and promote online resources.

4. Economic Support Measures

- Emergency Financial Assistance:

- **Budget Allocation: €2 million**

- **Action:** Provide targeted financial assistance to the most vulnerable families.

- **Activities:** Coordinate with local social services to identify eligible recipients and disburse funds efficiently.

5. Communication and Coordination

- Public Awareness and Outreach:

- **Budget Allocation: €0.5 million**

- **Action:** Conduct targeted outreach campaigns to inform families about available resources and assistance programs.

- **Activities:** Use cost-effective digital platforms and community networks to disseminate information.

6. Monitoring and Evaluation

- Monitoring and Evaluation:

- **Budget Allocation: €1 million**

- **Action:** Implement a basic monitoring system to assess program effectiveness and gather feedback.

- **Activities:** Use surveys and data collection to measure impact, and adjust strategies based on findings.

Cost-Effective Measures and Partnerships

- Leverage Partnerships:

- Collaborate with NGOs, charities, and private sector partners to share resources and reduce costs.

- Engage local businesses for in-kind donations and sponsorships (e.g., food, transportation).

- Volunteer Mobilization:

- Utilize volunteers for logistics, distribution, and education programs to minimize staffing costs.

- Organize community engagement initiatives to foster local support and participation.

- Digital Solutions:

- Develop an online platform for resource sharing and coordination, reducing administrative costs.

- Use social media and messaging apps for low-cost communication and outreach.

- Focus on High-Impact Areas:

- Prioritize regions and communities with the highest food insecurity rates.

- Tailor interventions to address specific local needs and conditions.

Conclusion

With a limited budget of €10 million, this streamlined plan focuses on the most critical and cost-effective interventions to support low-income families during droughts. By prioritizing partnerships, community engagement, and targeted assistance, it is possible to make a significant impact within financial constraints. Continuous monitoring and adaptive strategies will help optimize the use of resources and enhance the plan's effectiveness.

Appendix B4h: Question: How can we prioritize interventions?

Implementing cost-saving measures is essential to maximize the impact of a contingency plan for food security, especially with limited resources. Here are some effective cost-saving strategies that can be employed:

1. Leverage Existing Infrastructure

- Utilize Existing Facilities:

- Use existing community centers, schools, and local government buildings for food distribution and educational programs.
- Partner with established food banks to expand their reach rather than creating new ones from scratch.

- Optimize Supply Chains:

- Streamline logistics by using local distribution networks to reduce transportation costs.
- Establish partnerships with local suppliers to secure bulk purchasing discounts.

2. Engage Community and Volunteers

- Volunteer Mobilization:

- Recruit volunteers from local communities to assist with food distribution, workshops, and administrative tasks, reducing labor costs.
- Organize volunteer training programs to enhance efficiency and effectiveness.

- Community Involvement:

- Encourage community ownership of projects like community gardens, which can reduce maintenance and operational costs.
- Foster a sense of community responsibility and pride, which can lead to more sustainable outcomes.

3. Partnerships and Collaborations

- Public-Private Partnerships:

- Collaborate with private sector partners for funding, resources, and expertise. Many companies have Corporate Social Responsibility (CSR) programs focused on food security and poverty alleviation.

- NGO and International Organization Support:

- Partner with NGOs and international organizations to share resources, expertise, and funding.

4. Use Technology and Digital Solutions

- Digital Platforms:

- Implement online platforms for communication and coordination, reducing administrative and operational costs.
- Use digital tools for data collection and analysis to improve decision-making and efficiency.

- Mobile Applications:

- Develop mobile apps for beneficiaries to access information about food assistance programs, reducing the need for physical outreach.

5. Focus on High-Impact, Low-Cost Interventions

- Nutrition Education:

- Conduct cost-effective workshops using digital resources, webinars, and printed materials that can reach a broad audience at a low cost.

- Community Gardens:

- Promote urban and community gardening, which can provide fresh produce and improve food security at a relatively low cost compared to importing food.

6. Resource Optimization

- Reduce Waste:

- Implement measures to minimize food waste during distribution and storage, such as better inventory management and cold storage solutions.

- Efficient Resource Allocation:

- Use data and feedback to allocate resources where they are needed most, avoiding overspending in low-impact areas.

7. Advocacy and Policy Support

- Policy Changes:

- Advocate for policy changes that can lead to long-term savings, such as subsidies for water-efficient technologies in agriculture or tax incentives for companies donating food.

- Regulatory Support:

- Work with government agencies to streamline regulatory processes, reducing bureaucratic costs and delays.

8. Shared Services and Cooperative Models

- Cooperative Purchasing:

- Establish cooperative buying groups among beneficiaries to negotiate better prices for food and essentials.

- Shared Services:

- Pool resources among organizations and communities to share transportation, storage, and administrative services.

Conclusion

By implementing these cost-saving measures, the contingency plan can achieve greater efficiency and effectiveness, ensuring that limited resources are used wisely to support low-income families during droughts. These strategies focus on leveraging existing assets, fostering collaboration, and prioritizing high-impact actions, all of which contribute to a more sustainable and impactful plan.

Appendix B5a: Potential food security risks related to environmental and socio-economic drivers (examples)

Risks affecting environmental drivers

Biophysical and environmental

- Changing climate and weather patterns
- Natural disasters
- Extreme weather events
- Land (lack of, degradation)
- Natural resources and biodiversity (loss and degradation)
- Pests, diseases, and invasive species
- Pollution and nuclear contamination

Risks affecting socio-economic drivers

Economic and market

- Input cost increase and reduced availability
- Labour availability and increased cost
- Financial liquidity (lack of)
- Financial and economic crisis
- Market contraction, concentration and (unfair) competition
- Market instability (price fluctuations, inflation, etc.)

Socio-cultural and demographic

- Change in consumers preferences and public image
- Generational renewal and sector attractiveness
- Pandemic and human health
- Population growth, displacement and migration
- Social disorders and unrest

(Geo) political and Institutional

- (Geo) political instability, conflict (war) and terrorism.
- Trade barriers and distortions in trade flows
- Policy changes and regulatory requirements

Supply chain performance

- Food contamination and waste
- Transport, infrastructure and logistics (lack of or failure)
- Up-stream supplies (disruption or availability)

Information and technology

- Information, knowledge and innovation (lack of)
- Technological risk (lack of, new biotechnologies risks, etc.)
- Cyberattacks and internet blackouts

Appendix B5b: Potential literature-based actions for improving food security

Prototype actions	Source
Preparedness	
Analyzing information coming from the Early Warning System	IFRC, 2012
Developing quick procedures to free resources from Reserved Funds in case of Emergencies	IFRC, 2012
Developing a Preparedness Gap Analysis for the execution of contingency plans	IFRC, 2012
Preparation and storage of rapid deployment equipment	IFRC, 2012
Implementing or ensuring Information Technologies and Communications to support the contingency plan implementation	IFRC, 2012
Anticipatory measures	
Identify and upgrade the existing capacity of water and sanitation structures in areas likely to temporarily host displaced people.	IFRC, 2012
Implementing an emergency food supply system	
Facilitating the establishment of an humanitarian response	
Agreeing on procedures for the rapid issuance of visas for [humanitarian organizations' staff taking part in relief operations if wide assistance is required	IFRC, 2012
Issuing Local derogations on packaging and labelling	Morrison, 2021
Nurturing a food liaison of coordinated food organizations	Biehl et al., 2018
Supervising the emergency food effort	Liu et al., 2022
Managing volunteers action	IFRC, 2012
Providing meals to people during an emergency	Biehl et al., 2018; FEWS, 2000
Conducting a rapid demand forecasting (needs assessment) to determine the required types and amount of emergency food needed by the affected populations	Liu et al., 2022; IFRC, 2012; FEWS, 2000
<ul style="list-style-type: none"> - Set objectives for the assessment. - Put assessment teams together. - Determine information needs. - Use multiple methods to gather information. - Draw conclusions about impact and needs. - Issue interim findings and write assessment report. - Continue post-assessment monitoring. 	FEWS, 2000
Map the locations of nutrition rehabilitation centers, supplementary feeding centers, and general food distribution points in all flood-prone areas	IFRC, 2012
Collecting food	Liu et al., 2022
<ul style="list-style-type: none"> - Identification and preparation of adequate warehousing and stock control - Managing food donations - Using reserves - Developing urgent purchasing - Conducting direct expropriations - Producing food during the emergency 	IFRC, 2012 Biehl et al., 2018; Liu et al. 2022 Liu et al., 2022; Rudloff et al., 2012; IFRC, 2012 Liu et al., 2022; IFRC, 2012 Liu et al., 2022 Liu et al., 2022
Transporting food	Liu et al., 2022; IFRC, 2012
Developing a readiness analysis of vehicles and fleets or transportation services	Liu et al., 2022
Food distribution	Liu et al., 2022
Improving the capability of the production component in the food value chain	
Obtain additional seeds and agricultural inputs as a contingency stock for immediate distribution in case of flooding.	IFRC, 2012
Improving access to food for vulnerable and affected groups of consumers	
Direct food transfers	FEWS, 2000
Income (cash) transfers to households or Safety NETS	Rudloff et al., 2012; IFRC, 2012; FEWS, 2000; FAO, 2012
Labor-intensive public works;	FEWS, 2000
Improving access to resources to food producers	
Asset transfers and credit programs; and	FEWS, 2000
Agricultural technology development and transfers	FEWS, 2000
Increasing income of poorer and more vulnerable producers, thus increasing access to food through increased purchasing power.	FEWS, 2000
Stabilising prices and supplies and smoothing income streams for producers.	FEWS, 2000
Approving exemption from taxes and customs duties on items intended for disaster victim	IFRC, 2012
Increasing the availability of domestically produced food, thus reducing import requirements and lowering prices.	
Boosting agricultural production and marketing in the medium term	
Programmes for inputs and related crop production services	
<ul style="list-style-type: none"> - Input market development - Mechanisation and farm equipment - Support to fertility and land management, including conservation agriculture - Crop diversification / high value / horticulture - Integrated Pest Management - Irrigation rehabilitation and development - Water harvesting 	FEWS, 2000
Programmes for animal production and fisheries inputs	
<ul style="list-style-type: none"> - Support to the feed market - Support to breeding stock - Support to veterinary services - Support to aquaculture and capture fisheries 	FEWS, 2000
Reducing post-harvest losses and improving downstream activities	
<ul style="list-style-type: none"> - Improvements in storage and collection centres to reduce post-harvest losses - Improved processing and value addition 	FEWS, 2000
Improving market infrastructure and information	
<ul style="list-style-type: none"> - Rehabilitation of roads and bridges - Construction / rehabilitation of market collection points and storage facilities - Rural radio and mobile phone market information support 	FEWS, 2000
Children sensitive response	
Procure school materials, as well as teaching and learning kits, for rapid distribution	IFRC, 2012
Monitoring and evaluation	
Evaluating during (real-time and after the response)	IFRC, 2012
Collect objective observations to later conduct an evaluation	IFRC, 2012
Using pre-established criteria and indicators to evaluate different aspects of the plan	IFRC, 2012
Maintain supply chain	
Daily review of supply and processing capacity	Morrison, 2021
Monitoring farm input and supply markets	Morrison, 2021
Prioritise raw milk pick up	Morrison, 2021
Secure key worker status for colleagues	Morrison, 2021
Procurement and supplier management	Morrison, 2021
Support EU green lanes	Morrison, 2021
Daily dialogue with key customers	Morrison, 2021
Realign product mix	Morrison, 2021
Relaxation of rules e.g. delivery times	Morrison, 2021