

# Climate Change and Food Security in Eastern Europe

## Scenario Report

Achim Maas with contributions of Raul Daussa, Tamara Kutonova and Elena Santer

Organised by



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Produced with financial support of the Office of the Co-ordinator of Economic and Environmental Activities of the OSCE, and the Environment and Security Initiative.

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## Executive Summary

Few countries expected the wave of uprising in the Middle East in early 2011. Partly they are explained by growing socio-economic disparities, to which the sharp rise in food prices contributed in the past years. The rise in food prices also contributed to closed markets and export restrictions around the world, contradicting the trend of increasingly liberalised and globalised markets. With climate change and parallel population growth from 7 to 9 billion by 2050, the world is likely to face more risk of food scarcity and price hikes.

Without early and comprehensive action, Eastern Europe may face similar political upheaval and societal friction. This is a key finding of a scenario-building process on the impacts of climate change on food security in Eastern Europe, namely Belarus, Moldova including Transnistria, and Ukraine. This paper reports on two workshops with experts and regional stakeholders which were conducted in 2011: In Lviv in February 2011 to develop scenarios on implications of climate change and various levels of market liberalisation on food security; and in Kyiv in May 2011 to assess the consequences of the scenarios and develop policy recommendations for the countries. It is part of a project launched by the Organisation for Security and Co-operation in Europe (OSCE) at the Chairmanship conference in Bucharest in October 2009 and jointly implemented with the European Environment Agency (EEA). The workshops in Eastern Europe have been financially supported by the Environment and Security Initiative (ENVSEC).

Invariably it was identified that food security will be imperilled by the combination of climate change and market forces: Both will significantly impact food affordability, which is particularly problematic as Eastern European citizens already need to spend large parts of their household income on food products. Adaptation to climate change in the agricultural sector will be necessary. Open markets may create strong pressures on food prices, yet closed markets are a significant obstacle to the needed substantial financial investments and the application of new technologies. A well-balanced approach is necessary, as well as good natural resource governance, as a way to use the window of opportunity climate change is offering for improving regional food security and reap socio-economic benefits.

In supporting this, 25 regional recommendations in addition to national level recommendations were developed over the course of the scenario process to support Eastern Europe in mastering the challenges of climate change for food security.

## List of Contents

<b>List of Contents</b>	<b>2</b>
<b>List of Abbreviations</b>	<b>3</b>
<b>1 Introduction</b>	<b>4</b>
<b>2 Implementation</b>	<b>5</b>
<b>3 Climate Change and Food Security: Scenarios for Eastern Europe</b>	<b>8</b>
3.1 Scenario 1: Unite to Survive	9
3.2 Scenario 2: Hang Around	11
3.3 Scenario 3: Light at the End of the Tunnel	12
3.4 Scenario 4: Opportunity Knocks	13
3.5 Scenario Matrix	16
<b>4 Reflection</b>	<b>17</b>
4.1 Observations	17
4.2 Review	18
<b>5 Recommendations and Mitigation Options</b>	<b>19</b>
5.1 Current Activities	19
5.2 Overall Recommendations for Eastern Europe	20
5.2.1 Environmental Policies and Natural Resource Management	21
5.2.2 Adaptation with a Focus on Agriculture	21
5.2.3 Economic Policy	21
5.2.4 Energy Policy	22
5.2.5 Good Governance	22
5.2.6 Emergencies and Disaster Preparedness	22
5.2.7 Information, Research, & Education	22
5.2.8 International Cooperation	22
5.3 Specific Recommendations for Belarus	23
5.4 Specific Recommendations for Moldova	23
5.5 Specific Recommendations for Ukraine	24
5.6 Recommendations for International Partners	25

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<b>References</b>	<b>26</b>
<b>Annex 1: Lists of Participants</b>	<b>27</b>
<b>Annex 2: List of Driving Forces</b>	<b>29</b>
<b>Annex 3: Agenda Lviv Workshop</b>	<b>32</b>
<b>Annex 4: Agenda Kyiv Workshop</b>	<b>34</b>
<b>Annex 5: Selected FAO Data for Eastern Europe</b>	<b>35</b>
<b>Annex 6: Summary of Evaluations for Lviv and Kyiv Workshops</b>	<b>38</b>

## List of Abbreviations

<b>EEA</b>	European Environment Agency
<b>OCEEA</b>	OSCE Co-ordinator for Economic and Environmental Affairs of the OSCE
<b>OSCE</b>	Organisation for Security and Co-operation in Europe
<b>STEEP</b>	Social, Technological, Economic, Environmental, and Political Driving Forces
<b>UN</b>	United Nations

## 1 Introduction

The 2007 Madrid Ministerial Declaration on Environment and Security (OSCE 2007) recognizes that “climate change is a long-term challenge” and acknowledges that “the United Nations climate process is the appropriate forum for negotiating future global action on climate change, and the Organisation for Security and Co-operation in Europe (OSCE), as a regional security organization under Chapter VIII of the United Nations (UN) Charter, has a complementary role to play within its mandate in addressing this challenge in its specific region.”

Launched at the Chairmanship conference in Bucharest in October 2009, the Office of the Co-ordinator of OSCE Economic and Environmental Activities (OCEEA) established an extra-budgetary project – which will run until 2012 – to address the security implications of climate change in the OSCE region. The project is divided into two main phases: First, conducting a scoping study on climate change’s possible security implications in the OSCE region. Second, producing regional scenarios on and identifying how the OSCE could contribute to mitigating these challenges. The project is jointly implemented with the European Environment Agency (EEA).

This paper reports on the scenario-building process in Eastern Europe. It presents the findings of two workshops, the first of which was conducted on 14-16 February 2011 in Lviv and the second on 25-26 May 2011 in Kyiv. The chief objective of the workshops, as well as its accompanying activities, was to provide the conditions to develop a comprehensive analysis of the security implications of climate change in Eastern Europe with the aim of raising awareness, providing early warning and recommending measures for ensuring security and stability, and promoting co-operation within the region.

For the workshop in Lviv, the guiding focal question was:

### **WHAT ARE POTENTIAL LONG-TERM CONSEQUENCES OF CLIMATE CHANGE IMPACTS ON FOOD SECURITY IN EASTERN EUROPE?**

In the second workshop in Kyiv, the findings of the Lviv-workshop were re-examined, further analysed, and recommendations were developed. Both workshops were attended by experts from Belarus, Moldova, Ukraine, and elsewhere. They were organised by the OSCE and the EEA with the financial support of the inter-agency Environment and Security Initiative (ENVSEC). Adelphi served as an implementing partner.

The report is structured as follows:

- Chapter 2 briefly outlines the actual implementation of the workshop.

- Chapter 3 provides an overview of the four developed scenarios and subsequently explores each of them individually.
- Chapter 4 reflects on the scenario-building exercise.
- Chapter 5 outlines the key recommendations and how to mitigate possible negative developments identified within the scenarios.

## 2 Implementation

Many studies have identified climate change as a threat multiplier which may contribute to insecurities and destabilisation. Climate change particularly affects water availability and food security, but also energy security and economic development. Under certain conditions, this may lead to regional political instability and crisis (WBGU 2007). These issues, among others, were highlighted by the UN Secretary-General (UNSG 2009).

The likelihood of regional destabilisation and armed conflicts depends on given socio-economic and political circumstances, as well as interactions with other regional and global developments. For example, global and regional governance, international and national institutions, globalisation, and open markets have a significant role in the mediation of resource scarcities and therefore in prevention of resource competition. Given the high level of uncertainty with regard to the pace of climate change, its impacts on agricultural systems, as well as uncertainties related to global change and the regional capacity to adapt, a scenario approach was chosen as a tool for gaining insight into the range of possible risks lying ahead.

In addressing these issues, the OSCE commissioned a desk-based scoping study on the possible security implications of climate change in the OSCE region (Maas et al. 2010). As a follow on, more detailed regional scenarios will be developed with the aim of raising awareness, providing early warning, recommending measures for ensuring security, and promoting co-operation. The first region that received closer attention was Eastern Europe, which includes Belarus, Moldova (incl. Transnistria), and Ukraine.

The first step involved developing a background paper building on the scoping study. It outlined the regional context, current climate trends, and their possible implications on a variety of sectors. The background document served as the main input to the Lviv-Workshop, and was accompanied by starter materials to familiarise the participants with scenario development.<sup>1</sup> The background paper's focal question was:

### **WHAT ARE THE POTENTIAL LONG-TERM (I.E. 2050) CONSEQUENCES OF CLIMATE CHANGE IMPACTS ON FOOD SECURITY IN EASTERN EUROPE?**

<sup>1</sup> For English or Russian versions of both documents, please contact Raul Daussa at OSCE.

The workshop subsequently focused in particular on food security, as the basic linkages are comparatively well known. Against the backdrop of globally diminishing agricultural output due to climate change, yet simultaneously increasing demand due to population growth and changing consumption patterns, food security's criticality is apparent. Also, it may lead to social friction, as particular poor populations are more impacted because they have already spent a large part of their income on food products – small price increases can have disproportional effects on societies. The unequal impacts are thereby not only between different income levels, but also affect societal groups as well as men and women unequally (see WBGU 2008, UNDP 2009).

For the purpose of the workshop, the Food and Agricultural Organisation's (FAO) definition of food security was used (FAO 2006):

**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 food preferences for an active and healthy life.**

The FAO developed several sub-categories and dimensions of food security. For the purpose of the workshop, they were simplified and partly merged, and food security was discussed in the context of the following areas:

- **Production:** Refers to the amount of food locally produced, which is dependent on climatic conditions, seed varieties, irrigation possibilities, technology, energy sources, land tenure, and farm size.
- **Distribution:** Includes the ways in which food is made accessible and includes questions of infrastructure, transportation, storage, and others.
- **Exchange:** Encompasses the rules of distributing food, such as market mechanisms, trade policy, and social arrangements, but also the availability of markets and governmental restrictions.
- **Affordability:** Reflects financial capacities of households and individuals to purchase food, and is related to questions of income, and pricing policies and fluctuations, among others.
- **Preferences:** Refers to the social norms that influence food choices, e.g. cultural and religious norms prohibiting certain food or the need for certain food stuffs for specific social or cultural events.
- **Nutritional value & food safety:** Refers to (1) actual value of foods in terms of energy, vitamins, proteins, micronutrients and related aspects, and (2) health and safety standards, as well as available facilities to prepare food.

An overview to the food security situation in Eastern Europe based on selected FAO data can be found in the Annex.

The scenario workshop itself was designed to be exploratory and stakeholder-driven. It consisted of a mixture of plenary and working groups and was divided into five sessions which served the following purposes:

- Sessions 1, 2, and 3 were used to identify driving forces, uncertainties, and the scenario logic. Following the STEEP<sup>2</sup> framework, participants identified two main driving forces and also key uncertainties. These uncertainties included (1) openness or globalisation of agricultural markets and (2) pace of climate change identified, which also provided the main scenario logics leading to four distinct scenario working groups (see also chapter 3).
- Session 4 focused on developing scenario storylines with respect to the two key uncertainties noted above.
- Session 5 focused on identifying the implications of food security under each of the four scenarios.

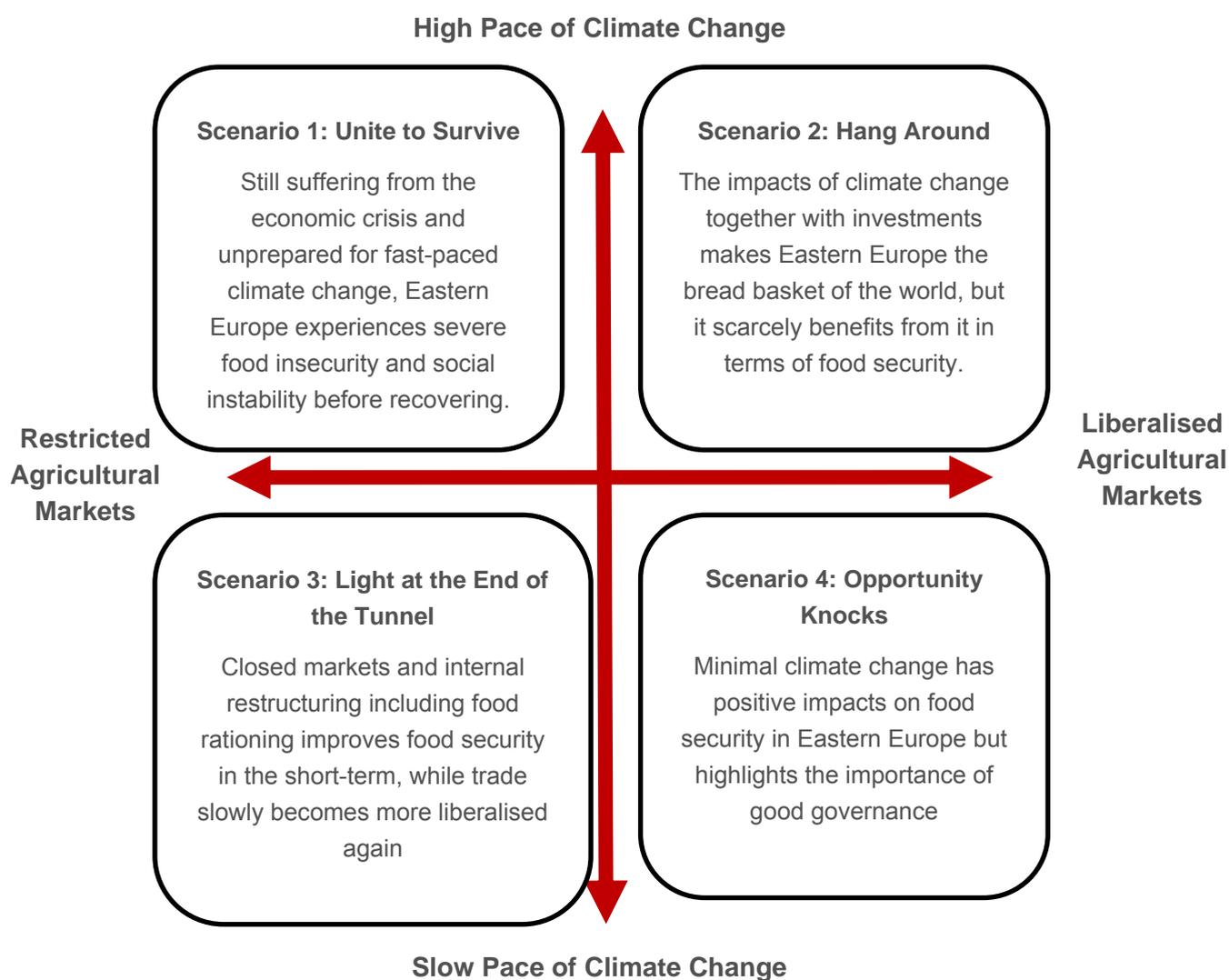
The full agenda, including the list of participants, is provided in the Annex. The results of the workshop were subsequently discussed at the follow-up workshop in Kyiv to identify policy measures and implications. Additional people who did not participate in the workshop in Lviv were invited to provide a fresh perspective.

<sup>2</sup> STEEP: Social, Technological, Economic, Environmental, and Political driving forces. The driving forces and short descriptions can be found in the Annex and are based on EEA 2010.

### 3 Climate Change and Food Security: Scenarios for Eastern Europe

The following chapter outlines the scenarios developed during the workshop. Applying the STEEP framework, the workshop participants selected two main uncertainties in addressing the focal question (what are the long-term implications of climate change on food security in Eastern Europe) as scenario logics: (1) openness or liberalisation of agricultural markets and (2) pace of climate change. Using these two uncertainties as scenario axes, four main scenarios were developed and further investigated during the workshop. The axes and key aspects of the scenarios are outlined in Figure 1:

**Figure 1: Scenario Logic**



Though these two main axes were selected, a number of other issues remained and participants took time to discuss several of them. For instance, whether average global warming of 2°C would indicate a “slow pace” of climate change or if additional issues

(such as carbon uptake by oceans) would be necessary to take into account. Similarly, there was debate about the extent to which liberalised or restricted agricultural markets relate only to issues of trade, or whether other regulations may indirectly relate to open or closed behaviour such as safety regulations.

As a consequence, the scenarios differ considerably in their details. They also differ because the working groups included different events in different scenarios. For instance, in the two scenario groups focusing on the slow pace of climate change, one group highlighted the need for a strong post-Kyoto agreement, while the other group did not discuss global mitigation measures, even though it assumed a continuing economic crisis.

These four scenarios were developed based on Sessions 4 and 5 (see Section 2 above and the Annex for the agenda) of the workshop by drawing upon the notes taken from the discussion from the working group and plenary sessions, as well as photo documentation taken from charts and graphs produced by the participants during the workshop. These scenarios were subsequently provided to the working group facilitators and participants for feedback.

The next four sections outline the four scenarios following a common approach: First, the key driving forces are reiterated. Second, a summary is provided describing the general thrust of the scenario. Subsequently, an outline of the scenario storyline is presented, followed by an interpretation of the likely impacts on food security. Where applicable, the sections close with a “caveat”: An issue or condition identified by the participants, which may change the scenario. Finally, additions made at the Kyiv workshop during the review of the scenarios are outlined.

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### **3.1 Scenario 1: Unite to Survive**

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#### **Scenario Logic**

Agricultural markets are restricted and the pace of climate change is high.

#### **Summary**

Still suffering from economic crisis and unprepared for fast climate change, Eastern Europe experiences severe food insecurity and social instability before recovering.

#### **Outline**

In this scenario, the world continues to struggle with the aftermath of economic crisis. While global population continues to grow, the working population (particularly in the agricultural sector due to the combination with rural-urban migration, which is accentuated because of the large agricultural work force) continues to diminish in Eastern Europe. In one possible result, relative household incomes decrease, impairing the ability to purchase food.

Starting in 2018 and continuing through 2020 and beyond, the economic crisis is coupled with environmental crisis, as weather extremes and temperature increases start to unfold quicker than expected as the pace of climate change accelerates. The geographic distribution of agricultural productive land becomes quickly altered in Eastern Europe and the rest of the world. Globally, water scarcity and soil degradation accelerate, which also intensifies the economic crisis.

As a consequence, deglobalisation commences, global cooperation declines, and regionalisation sets in, leading to a deliberalisation of (agricultural) markets. There are precedents for this in the region, as, for instance, Ukraine and Moldova created export quotas for wheat in the past.

Eastern Europe, still suffering from the economic crisis, is not prepared for the emerging climate crisis, which leads to a drastic reduction in food availability. The governments design emergency plans and ration food, but with limited success. Black markets for food emerge. Similar to post-Soviet times, people fight for their survival through multiple means, including moving back to rural areas and growing their own food on small-scale farms. Still, by 2025 social instability escalates as inequalities between societal groups increase.

However, beginning in 2030, people increasingly start to adapt and cope with the situation, even if climate change continues unabated. Food security also starts to improve again, though still far from the level of 2011 and immediate afterwards.

### **Food security implications under this scenario**

Unfavourable. Food security is strained in the pre-crisis years 2011 to 2017 because of diminishing relative household income. Yet, with cessation of global cooperation and accelerating climate change, food insecurity reaches a low point in terms of availability and affordability in the mid 2020s. Though food safety and nutritional value is also low, people accept whatever food is available, regardless of any cultural preferences. The situation—particularly with regard to production, availability, and affordability—begins to improve again in 2030, yet remains below the level of the already difficult pre-crisis years 2011-2017.

### **Caveat**

Should agricultural markets (again) become liberalised, this scenario may move to the “Hang Around” scenario.

### **Additions from the Kyiv Workshop**

A lack of foreign investments would make it necessary for the country to rely on domestic resources and would likely lead to a shift to cheaper food products. Also, reduction of consumption, further decreasing population, and political repression were identified as possible consequences. However, it was also discussed that this scenario is unlikely to emerge: There would be external pressures to open markets if the world faces a severe and protracted food crisis.

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Conflicts over water resources are likely in this scenario, particularly in the southern parts. This would be problematic in this scenario and governments may resort to force to address these issues.

Finally, there are significant intra-regional differences, hence, on the sub-national level, this scenario may play out differently in different countries.

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## 3.2 Scenario 2: Hang Around

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### Scenario Logic

Agricultural markets are liberalised and the pace of climate change is high.

### Summary

The impacts of climate change together with investments makes Eastern Europe the bread basket of the world, but the region scarcely benefits from its own assets in terms of food security.

### Outline

While some amount of global warming may be beneficial for Eastern Europe's agricultural sector, fast paced climate change and significant levels of warming will certainly be detrimental for the region. However, even if Eastern Europe's food production capacity becomes negatively impacted, it will remain relatively well off compared with other regions in the world.

Negative impacts elsewhere, coupled with continuing liberalisation, could lead to an inflow of capital and technology transfer, further improving Eastern Europe's productivity. Indeed, the region may even face pressures to open its markets and intensify agricultural productivity. On the other hand, the impacts of climate change may also lead to stronger environmental policies, thereby reducing degradation and promoting more efficient use of resources.

This will also lead to an increase in regional agricultural output, albeit at a slow pace. Still, due to integration in global markets, the production of other agricultural products but also their prices in the region will increase due to rising global demand and converge with global prices.

Southern Ukraine and Moldova will be most affected with regard to food production and the agricultural sector as a whole. In addition, with export pressures increasing, food security in these areas—but also elsewhere in the region—may degrade. Social and geographical inequality in accessing food is likely to increase as a consequence. The political situation, however, will not change in much of the region, though Transnistria may become further isolated while the region at large opens its borders.

**Food security implications under this scenario**

Generally less favourable. Though global per capita food production may decrease, regional production will increase. However, due to export pressures, availability and affordability will decrease in the region. Nutritional value is also likely to decrease, as cost reduction measures are implemented in food production. The use of genetically modified organisms in agriculture will also increase. Food preferences will follow food availability in this regard.

**Caveat**

If technology and investments are unavailable or insufficient, Eastern Europe may be more severely impacted and Scenario 2 may even transform to Scenario 1.

**Additions from the Kyiv Workshop**

Open markets may lead to large land purchases by foreign companies. However, it is mentioned that governments would only hesitantly allow this, despite the need for investments and technologies. In addition, opening of markets may increase the risk of spreading diseases which would require further international cooperation.

Conflicts over water resources are likely in this scenario, particularly in the southern parts. However, this could be addressed through market mechanisms in this scenario.

Finally, there are significant intra-regional differences, hence, on the sub-national level, this scenario may play out differently in different countries.

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**3.3 Scenario 3: Light at the End of the Tunnel**

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**Scenario Logic**

Agricultural markets are restricted and the pace of climate change is slow.

**Summary**

Closed markets and internal restructuring including food rationing improves food security in the short-term, when trade slowly becomes more liberalised again.

**Outline**

Scenario 3 can be divided in two main periods: First, the period from 2011 to 2035, and second, the period from 2035 to 2060.

The first period is characterised by a closing of food markets following the continued economic downturn. The relative importance of trade regimes such as those administered by the World Trade Organisation (WTO) decreases and economic growth

continues to be slow, if it occurs at all. Concurrently, the EU and Russia – key trading partners of Eastern Europe – start to close their markets in an effort to protect domestic economies.

Demographically, the population continues to decline and becomes increasingly elderly, yet emigration drops as prospects abroad are less attractive. Similarly, infrastructure is ageing and scientific progress within or technology transfer to Eastern Europe is almost nonexistent or very complicated.

Though climate change remains at a slow pace, adaptation is not a priority. Environmental degradation continues, and resource use is inefficient and undeveloped. Finally, the state continues to regulate the food market in a way which could be described as “semi-authoritarian”.

In the second period, after 2035, agricultural markets liberalise again as the economic crisis slowly eases, attracting immigration, and investments for innovation and refurbishing the agricultural sector. Funds also become available for adapting to climate change. As a consequence, the agricultural market becomes a source of growth and income; it also becomes more diversified. Environmental degradation reduces and even stops, while internal regulation of food markets becomes less restrictive.

### **Food security implications under this scenario**

Generally favourable. Food production is maintained in the first period and increases in the second period. Food is made available and kept affordable through the state in the first period, despite degrading infrastructure in the first period. It changes, however, in the latter period with liberalisation, as global demands impact regional markets. Nutritional value and food safety increases in the second period. Preferences for cheaper food exist in the first period, yet become more diversified in the second period.

### **Caveat**

It is assumed that agricultural markets start to liberalise again after 2035, leading this scenario to more closely resemble the “Opportunity Knocks” scenario in the second period.

### **Additions from the Kyiv Workshop**

Though food security may be more stable on average, it is unclear to what extent this would be the case during crisis periods.

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## **3.4 Scenario 4: Opportunity Knocks**

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### **Scenario Logic**

Agricultural markets are liberalised and the pace of climate change is slow.

### **Summary**

Minimal climate change has positive impacts on food security in Eastern Europe, but highlights the importance of good governance.

### **Outline**

The scenario begins with the conclusion of a strong post-Kyoto agreement in 2012 or very soon thereafter, thus limiting the pace of climate change. Even then, if for instance global average warming remains limited to 2°C, many regions of the world will suffer from reduced agricultural productivity. Eastern Europe, however, may face some beneficial impacts in terms of productivity, and become a net exporter of food and other products.

Harnessing this opportunity requires liberalising markets and improving human, institutional, and technical capacities, leading to the development of political roadmaps for the period of 2015 to 2020 to improve education, research, and capacity building. Ultimately, Belarus joins the WTO in 2020, bringing all three Eastern European countries into the global trade regime.

In parallel, harmonisation and rapprochement between Eastern Europe and the EU continues, leading to similar standards with regard to food safety and quality. Ukraine and Moldova have begun negotiations on deep and comprehensive free trade agreements with the EU, which will include food safety issues. This, coupled with the “favourable climate”, leads to a competitive advantage in global agricultural markets if additional investments occur.

A key issue emerging over the next decades and particularly 2030 onwards are questions of good governance related to income distribution and sharing of profits: Though agricultural sectors and Eastern European economies may profit from these developments, food security and social stability do not necessarily. Should global demands continue to increase, the relative affordability of food and agricultural products will diminish. This may lead to a paradox development, as food production goes up yet the local population hardly benefits.

It is uncertain whether this may fuel emigration or lead to protests or political crisis, but, regardless, a transition to good (agricultural) governance is necessary to make populations profit from this situation further.

### **Food security implications under this scenario**

Generally less favourable. Though depending on investments and applications of new technologies, food production is likely to go up. The integration of the region into global markets, however, leads to a convergence of regional and global prices, making food less affordable due to increasing global demand. With increasing export orientation, the availability may increase along major transport infrastructures – and in particular cities – but decreases in rural areas. Accordingly, there may be an urban-rural and rich-poor

divide in food security. On the other hand, to maintain competitiveness, food safety and quality will increase, though globalisation of food markets may also lead to an increase occurrence of “junk food” (leading to reduced nutritional value).

**Caveat**

In this scenario, it is assumed that a strong post-Kyoto agreement is agreed upon and thoroughly implemented.

**Additions from the Kyiv Workshop**

There were not substantial additions from the Kyiv workshop.

### 3.5 Scenario Matrix

Scenario:	1. Unite to Survive	2. Hang Around	3. Light at the End of the Tunnel	4. Opportunity Knocks
<b>Scenario Logic</b>	Fast Climate Change Restricted Markets	Fast Climate Change Liberalised Markets	Slow Climate Change Restricted Markets	Slow Climate Change Liberalised Markets
<b>Summary</b>	Still suffering from economic crisis and unprepared for fast climate change, Eastern Europe experiences severe food insecurity and social instability before recovering.	The impacts of climate change together with investments makes Eastern Europe the bread basket of the world, but it scarcely benefits from it in terms of food security.	Closed markets and internal restructuring including food rationing improves food security in the short-term, while trade slowly becomes more liberalised again.	Minimal climate change has positive impacts on food security in Eastern Europe, but highlights the importance of good governance.
<b>Key aspects and drivers</b>	(1) Climate change accelerates, leading to abrupt changes in weather patterns. (2) Economic crisis continues. (3) Eastern European countries are hardly prepared for climate change. (4) Global regionalisation sets in as economic and environmental crisis unfold.	(1) Climate change accelerates and climate mitigation is insufficient. (2) Agricultural markets continue to liberalise. (3) Global food production declines (but less so in Eastern Europe) while demand increases. (4) Technologies become available to increase productivity.	(1) Climate change continues only at a slow pace. (2) Global economic crisis continues. (3) Agricultural markets become more restricted in Eastern Europe and there is protectionism abroad. (4) Governments prioritize satisfying domestic demands.	(1) Climate mitigation is successful, i.e. a strong post-Kyoto agreement is established and implemented. (2) Harmonisation and rapprochement of Eastern Europe to EU continues. (3) Agricultural markets become more liberalised. (4) Belarus joins WTO.
<b>Implications for Food Security</b>	Initially, affordability starts to drop, but food insecurity rapidly decreases with the onset of crisis. While people start to adapt to the situation, the food security situation remains tense.	Instead of food production, availability and affordability reduces due to export pressures. Social and geographic inequalities with regard to food access increases.	Food security is maintained or improves by focusing on domestic demands before reopening markets, yet inequalities in access remain.	Though in principle sufficient food is available, liberalised markets call for adequate policy measures and income distribution, as affordability goes down due to global food price increases.
<b>Caveat</b>	Should agricultural markets become again liberalised, this scenario would move towards the "Hang Around" scenario.	Technology and investments are critical; without, it moves towards the "Unite to Survive" scenario.	Should agricultural markets liberalise, it would quickly to the "Opportunity Knocks" scenario.	Strong post-Kyoto agreement assumed.

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## 4 Reflection

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### 4.1 Observations

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The scenario workshop was as much about expert and stakeholder consultation as it was about awareness raising and information sharing. The workshop provided an opportunity for experts to discuss the impacts of climate change on a regional level. As such, the workshop provided an important step to further regional networking and exchange of views with regard to food security issues and climate change, thus also touching on capacity building. It eschewed scientific rigour to some extent in favour of achieving other objectives, yet a number of observations and preliminary conclusions can be drawn.

It is interesting to note that the pace of climate change – either fast or slow – was not identified as a critical issue, if agricultural markets remain or continue to liberalise. In these cases, an increase in production has been assumed, but affordability will reduce due to global demand leading also to regional price increases. In these two scenarios (“Hang Around” and “Opportunity Knocks”), food security is more determined by the global market situation and accompanying political and economic measures than by climate change.

Conversely, if Eastern Europe markets de-liberalise, e.g. as result of a prolonged economic crisis, the region may, in the case of fast-paced climate change, face severe food insecurity, similar to the immediate post-Soviet period. It may even lead to social instability and crisis. However, if climate change is slow paced, Eastern Europe may witness an internal consolidation – if sufficient financial resources are available and investments in the sector occur – of the agricultural markets and emerge more food secure once markets liberalise again.

The latter scenario (“Light at the End of the Tunnel”) is thereby the exception. The other three scenarios may experience more food insecurity due to export pressures and reduced affordability (“Hang Around”, “Opportunity Knocks”) and potentially even reduction in production, leading to societal discontent (“Unite to Survive”). However, even in the “Light of the End of the Tunnel” scenario, affordability may decrease if markets liberalise again. It should be noted that the latter scenario requires a slow pace of climate change – by way of either a comprehensive climate mitigation agreement (which appears somewhat less likely if the starting condition of the scenario is continued economic crisis) or an insensitive climate.

Drawing a preliminary conclusion from these observations, it appears that food security is imperilled in Eastern Europe to a lesser or greater degree. In addition, global interests for the region will grow due to negative climate impacts elsewhere. As a consequence, even though climate predictions for the region are generally better than elsewhere in the world and may provide opportunities for economic growth and agricultural exports, appropriate policy actions are required. Otherwise, Eastern Europe’s opportunity may turn into a liability for food security.

## 4.2 Review

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At the second workshop in Kyiv on 25/26 May 2011, the scenarios, including possible limitations, were reviewed by the workshop participants. Overall, it was concluded that:

- Generally, the scenarios were identified as useful and relevant. They would have benefitted from additional time to further detail their peculiarities, relevant factors, and developments, including the implications for agriculture. This is especially the case for Scenarios 1 and 2.
- Scenario 3, in particular, would have benefitted from a more detailed discussion on the implications of the economic crisis as well as its scope, the role of technological developments, migration, and overall policy development.
- Regarding Scenario 4, participants concluded that it was rather “theoretical”, as it was considered unlikely that climate change may remain slow.

In addition, several additions and suggestions for further issues relevant to the scenarios were made (see Chapter 3). Also, it was suggested to rename the scenarios, yet as the two groups consisted of different participants, it was decided to keep the original scenario names.

Additional feedback by the participants is available via the evaluations (see Annex).

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## 5 Recommendations and Mitigation Options

Aside from reviewing the findings of the workshop in Lviv in February 2011, the second workshop in Kyiv in May 2011 focused on developing recommendations as well as activities which are already implemented. The following first section will highlight the latter. Subsequently, recommendations relevant for the region will be outlined, followed by specific recommendations for each country and the international community.

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### 5.1 Current Activities

The participants of Kyiv shared information about existing policy and measures on adaptation to climate change and food security:

- In Belarus (presented by Mr Melnik, with additions from Mr Tchoulba) there is a National Programme to mitigate climate change impacts for the period 2008-2012. Monitoring, reduction of emissions, adaptation of economic sectors (including agriculture) to climate change are sufficiently highlighted in the Programme. The Programme suggests increasing the vegetation season in the south of the country, and introducing new varieties of plants such as melons. The Law of the Republic of Belarus “On Renewable Energy” regulates introduction of renewable energy sources, e.g. wind energy and bio-fuels (in small scale – for instance, grapes). This topic was only discussed briefly, as a Belarussian representative from the Ministry of Agriculture was unable to attend.
- In the Republic of Moldova (presented by Ms Nedelcov) there is a “National Strategy for Sustainable Development of Agro-Industrial Complex of Republic Moldova for the period 2008-2015”, a national programme called “Moldovan Village”, and the Moldova-EU Action Plan (indirectly deals with adaptation policy). All of these indirectly deal with adaptation to CC. General and sectoral national strategies on climate change, combating climate risks and adaptation are not available; adaptation is rarely discussed at the national level.
- An independent assessment of climate change impact, “Climate of Moldova in the XXI century: Projected Changes, Impacts, Responses”, was made by R. Corobov in 2004 in Moldova. The assessment includes a chapter on agriculture.
- There is no legislation dealing directly with food security in Moldova. However, there are laws that relate to grain resources, farmers subsidies, and insurance against risks in agriculture and ecological agricultural production. Overall plans and programmes in Moldova are not sustainable and their enforcement is low.
- There is a State Programme of Stabilization and Development of Agro-Industrial Complex (2010) in Transdnier region of Moldova (presented by Mr Ignatiev). However, it has not been implemented due to the economic crisis. Also, there is a

draft of the State Programme to Ensure Food for Population for the period 2011-2015. A priority of this programme is food security; it identifies funding resources and risks, and pays proper attention to domestic production.

- Transdnister needs to ensure financial recovery of the agro-industrial complex (financial stability, incentives for land tax, etc.), modernization of agricultural production, and insurance against natural disasters. Other issues are fragmentation of agricultural lands and soil degradation (the latter is due to a lack of financial resources and knowledge). In general, food security exists on paper. Solutions are usually temporal; there is no clear vision. Food security is affected by limited resources, particularly water.
- Ms Medvedenko reported that in Ukraine there are many regulations implementation of the Kyoto Protocol. Regulation No 9 of the National Action Plan for Implementation of the Kyoto Protocol to the UN Framework Convention on Climate Change is devoted to development of a national adaptation plan. According to the Plan, the national adaptation plan had to be developed before 2011, though it is still being drafted. Sectoral adaptation plans are not yet developed either. Financing plays an important role in the development of adaptation plans, thus investors are needed. Currently, investments are directed at reduction of emissions. Ms Trofimova added that the adaptation plan had been designed for Donetsk oblast, and the plan would be implemented within existing resources.
- Ms Medvedenko added that a document of the Council for National Security and Defense of Ukraine, "Challenges and threats to national security in 2011", mentions climate change. There are other efforts as well, including the Concept of the National Programme for Protection of Population and Territories from Technological and Natural Emergency Situations for 2012-2016 and legislation on energy savings and housing and communal services.
- Ms Ogarenko briefly presented the draft Law of Ukraine "On Food Security" in which adaptation to climate change is not mentioned.

It was noted during the Kyiv workshop that existing policy and legislative documents in all three countries have a short-term (to 2011/2012) or mid-term (to 2015) character. This, however, may not suffice to efficiently address climate change consequences in the long term.

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## **5.2 Overall Recommendations for Eastern Europe**

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The Kyiv workshop developed 25 recommendations which can be clustered in eight thematic areas. They are presented below.

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### 5.2.1 Environmental Policies and Natural Resource Management

**Recommendation 1:** Environmental policies must be strengthened and more thoroughly implemented, particularly to improve the rational and efficient use of natural resources. In addition, environmental standards need to be included in other sectors.

**Recommendation 2:** Food safety strategies need to be developed. They should also aim to promote a healthy diet from locally available food products.

**Recommendation 3:** Particularly in cases of open/liberalised markets, it is necessary to develop measures for preventing the spread of new diseases to farm animals and plants. Furthermore, water purification needs to be improved.

**Recommendation 4:** Water purification and desalination efforts need to be strengthened, including further developing available technologies.

### 5.2.2 Adaptation with a Focus on Agriculture

**Recommendation 5:** Detailed national adaptation plans including agriculture need to be developed and necessary financial resources identified for their implementation. Furthermore, legal frameworks need to be adapted in the region to promote innovation in agriculture.

**Recommendation 6:** Research, development, and deployment of new technologies for improving efficiency and agriculture despite climate change needs to be accelerated. Furthermore, new plant varieties more resistant to climate change need to be investigated.

**Recommendation 7:** Underdeveloped agricultural niches need to be explored further, such as organic farming or focusing on certain agricultural areas to increase productivity.

### 5.2.3 Economic Policy

**Recommendation 8:** Economic policies should focus on developing open markets and liberalising the economy. However, a reasonable level of regulation – i.e. not complete liberalisation/abandoning of regulations – should be devised and necessary regulatory mechanisms (such as taxes and subsidies) developed.

**Recommendation 9:** Legal framework conditions conducive to investments including the agricultural sector should be developed to attract foreign investments.

**Recommendation 10:** Access to food and food markets needs to be increased by, among other strategies, improving infrastructure for transportation. The aim must be to allow for an uninterrupted supply of foods and buffer rapid changes in food prices.

**Recommendation 11:** Domestic food markets should be strengthened by creating incentives for preventing land degradation and increasing productivity. The introduction of new technologies in the agricultural sector should be facilitated. Furthermore, this should include measures to prevent excessive export of local products at the expense of local food affordability.

**Recommendation 12:** Strategic food reserves, as well as a distribution plan, for times of food crises should be developed.

**Recommendation 13:** Socio-economic development must be accelerated in general to increase the purchasing power of Eastern European citizens and thus mitigate the threat of high food prices.

#### **5.2.4 Energy Policy**

**Recommendation 14:** The use of renewable, domestically available energy should be further developed.

#### **5.2.5 Good Governance**

**Recommendation 15:** Efforts to combat corruption and more evenly distribute the profits of food exports need to be intensified.

#### **5.2.6 Emergencies and Disaster Preparedness**

**Recommendation 16:** Disaster preparedness and preventative safety measures need to be improved to counter possible risks of climate change.

#### **5.2.7 Information, Research, & Education**

**Recommendation 17:** Capacities to forecast climate change impacts and the potential consequences need to be further developed.

**Recommendation 18:** The possible positive and negative impacts of climate change on agricultural need to be further studied.

**Recommendation 19:** Environmental monitoring systems need to be improved.

**Recommendation 20:** Awareness-raising in the agricultural sectors – from small-scale farmers to large businesses – needs to be intensified.

**Recommendation 21:** Financial investments in science and research on climate-related issues and agriculture need to be increased.

#### **5.2.8 International Cooperation**

**Recommendation 22:** New mechanisms on a regional and global level to improve food security should be developed to tackle the challenges of climate change.

**Recommendation 23:** Efforts in reducing greenhouse gas emissions need to be intensified.

**Recommendation 24:** Eastern Europe should seek to develop a coalition to lobby for region-specific food security interests.

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**Recommendation 25:** Eastern European countries should further harmonise their agricultural standards with those of the European Union and the Russian Federation.

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### 5.3 Specific Recommendations for Belarus

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The following specific recommendations for Belarus were made during the Kyiv workshop:

- Market liberalisation should be carefully increased, and an existing trend toward decentralisation should be encouraged.
- The current practice of exporting cheap products and importing expensive agricultural products should be reversed.
- New infrastructure to store food products produced in the country should be developed.
- Improvement of legislation, as well as strict enforcement of laws, is required (e.g. adopting the law on climate protection).
- It is necessary to share information and experience, conduct additional research, and have access to foreign technologies on energy efficiency and alternative energy sources.
- The existing National Programme to mitigate climate change impacts for the period 2008-2012 is not implemented due to a lack of funds. This problem must be solved by creating a long-term programme with more reliable funding. This is also the case for implementing adaptation policies, which should possibly be funded through a state-based adaptation fund.
- International experience in sectoral cooperation should be tapped by enlarging existing cooperation.
- Education and information dissemination on climate change needs to be improved. In addition to the existing capacity building and training system, there should be a system of continuous education on climate change and adaptation for experts in different sectors of the economy.

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### 5.4 Specific Recommendations for Moldova

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The following specific recommendations for Moldova were made during the Kyiv workshop:

- Legislation on land-use in Moldova needs to be adapted and become more flexible, such as grow bio-fuels on private land.

- Framework documents on food security with a clear definition of food security need to be developed on the national level. This should include developing a long-term policy on adaptation to climate change and ensuring food security needs.
- Ensure enforcement of those elements on adaptation which are currently present in national legislation.
- It is necessary to further raise awareness, build capacity, and share responsibilities on adaptation to climate change among different sectors and to improve inter-sectoral dialogue and cooperation.
- It needs to be ensured that national environmental authorities take a lead in the process of adaptation.
- A consultancy centre providing advice for farmers on climate change and adaptation should be developed.
- International organizations should be kept informed by Moldova about climate change and food security issues and monitor relevant international projects.
- Moldova should raise climate change and food security at the Intergovernmental Council for the Issues of the Agro-industrial Complex in the Commonwealth of Independent States and support stimulating regional cooperation.

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## **5.5 Specific Recommendations for Ukraine**

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The following specific recommendations for Ukraine were made during the Kyiv workshop:

- Regulations concerning agriculture and environment should be further developed and adapted.
- The impacts of climate change, particularly for food security, should become a priority issue for the Environmental Investment Agency, Ministry of Environment and Natural Resources, and National Academy of Agricultural Sciences.
- Intersectoral cooperation needs to be further developed by increasing understanding and distributing available knowledge to experts and sector representatives. This requires further capacity building of relevant organisations, such as the NGO Working Group in climate change, which includes 18 organisations. More specifically, adaptation requires regular scientific support and additional funding.
- Education on climate change needs to be intensified. In addition, education and awareness of climate change and adaptation needs to be widely spread among various societal groups and the wider public.
- Financial mechanisms: Ukraine cannot rely on its state budget and international aid (as a state with a transit economy, Ukraine has very limited access to international funds which support mitigation and adaptation). Ukraine needs to

create favorable conditions for business development and investments and more thoroughly implement existing, as well develop, mechanisms to achieve this.

- Continued financial supporting mechanisms are needed to reduce emissions at the production stage. This is particularly necessary to enter specific markets relevant for Ukrainian producers.

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## **5.6 Recommendations for International Partners**

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During the Kyiv workshop, it was highlighted that international partners such as the Environment and Security Initiative, as well as the donor, may greatly support actions taken in Eastern Europe. In particular, international partners could support awareness raising for issues related to climate change and adaptation, support capacity building and dialogue, and identify pathways and advice to overcome existing obstacles in implementing sound policies.

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## Annex 1: Lists of Participants

Lviv Workshop	
Name	Organisation
Yaroslav Bekish	Green Alliance
Petr Burduk	Ministry of Agriculture and Food of the Republic of Belarus
Viktor Melnik	Ministry of Natural Resources and Environmental Protection of the Republic of Belarus
Irina Rudko	Ministry of Natural Resources and Environmental Protection of the Republic of Belarus
Igor Tchoulba	UNDP Belarus
Ivan Ignatiev	NGO «Ecospectrum-Bender»
Veronica Lopotenco	Ministry of Environment of the Republic of Moldova
Maria Nedeadcov	Institute of Ecology and Geography, the Republic Moldova
Alexandru Oprunenco	Expert-Group
Ion Sula	Ministry of Agriculture and Food Industry of the Republic of Moldova
Lidia Trescilo	State Hydrometeorological Service
Gennadiy Averin	Donetsk National Technical University
Natalia Zakorchevna	Independent expert
Sergey Karpenko	Taurida National University
Inessa Medvedenko	Council of National Security and Defence of Ukraine
Yuliya Ogarenko	National Ecological Centre of Ukraine
Semen Tanchyk	National University of Life and Environmental Sciences of Ukraine
Irina Trofimova	Institute of Telecommunications and Global Information Space of NASU
Vicken Cheterian	CIMERA
Raul Daussa	OSCE
Nickolai Denisov	UNEP-ENVSEC regional desk for Eastern Europe
Tamara Kutonova	OSCE
Achim Maas	Adelphi
Lesya Nikolayeva	ZOİ Environment Network
Tomasz Oszako	Forest Research Institute
Hanna Plotnykova	OSCE
Elena Santer	European Environment Agency
Johannes Schuhmann	Adelphi
Viktor Simoncic	VIKOS
Brinda Wachs	UNECE

<b>Kyiv Workshop</b>	
<b>Name</b>	<b>Organisation</b>
<b>Republic of Belarus</b>	
Viktor Melnik	Republican Hydrometeorological Centre
Igor Tchoulba	UNDP Belarus
<b>Republic of Moldova</b>	
Ivan Ignatiev	NGO « <i>Ecospectrum-Bender</i> »
Maria Nedeadcov	Institute of Ecology and Geography, the Republic Moldova
Alexandru Oprunenco	Expert-Group
Lidia Trescilo	State Hydrometeorological Service
<b>Ukraine</b>	
Inessa Medvedenko	Apparatus of Council of National Security and Defence of Ukraine
Yuliya Ogarenko	National Ecological Centre of Ukraine
Irina Trofimova	Independent Expert
<b>International Organisations</b>	
Raul Daussa	OSCE
Nickolai Denisov	UNEP/ENVSEC
Tamara Kutonova	OSCE
Hanna Plotnykova	OSCE
Elena Santer	UNEP/GRID-Arenal

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## Annex 2: List of Driving Forces

During the workshop, the participants discussed the list of driving forces below, from which the two key uncertainties – climate change and liberalising food markets – were selected to provide the scenario logics. The trends themselves are derived from EEA 2010.

### Social

- Trend 1: Increasing global divergence in population trends
- The global population will still be growing midway through the 21st century but at a slower rate than in the past. People will live longer, be better educated and migrate more. Some populations will increase as others shrink. Migration is only one of the unpredictable prospects for Europe and the world.
- Trend 2: Living in an Urban World
- An increasingly urban world will probably mean spiralling consumption and greater affluence for many. But it also means greater poverty for the urban underprivileged. Poor urban living conditions and associated environmental and health risks could impact all areas of the world, including Europe.
- Trend 3: Disease burdens and the risk of new pandemics
- The risk of exposure to new, emerging and re-emerging diseases, to accidents and new pandemics grows with increased mobility of people and goods, climate change and poverty. Vulnerable Europeans could feel them keenly.

### Technological

- Trend 4: Accelerating technological change: race into the unknowns (rate of technological progress)
- The breakneck pace of technological change brings risks and opportunities, not least for developed regions like Europe. These include in particular the emerging cluster of nanotechnology, biotechnology, and information and communication technology. Innovations offer immense opportunities for the environment but can also cause enormous problems if risks are not regulated adequately.

### Economic

- Trend 5: Continued Global Economic Growth?
- Rapid growth accelerates consumption and resource use. But it also creates economic dynamism that fuels technological innovation,

potentially offering new approaches for addressing environmental problems and increasing resource efficiency. Slow growth and in particular shrinkage indicate a stagnant economy with reduced efficiency, little innovation, continuation of obsolete processes, and the likelihood of neglecting the environment through lack of funding.

Trend 6: From a uni-polar to a multi-polar world

Global power is shifting. One superpower no longer holds sway and regional power blocs are increasingly important, economically and diplomatically. The role of emerging countries in the world economy and of continuing globalisation is the increasing. When countries grow relatively fast they gain in economic power through the prerogative of controlling their enlarging production and consumption markets. They are able to exercise that power at international negotiations on economic subjects (trade barriers, product standards) but also in a wider sense, including participation in climate change and other environmental negotiations. As global interdependence and trade expands, Europe may benefit from improving its resource efficiency and knowledge-based economy.

Trend 7: Intensified global competition for resources

Economic growth is continuing at the global level and is accelerating in BRIC countries and other newly emerging economies. Demand for fossil fuels and other sub-soil and natural resources is likely to grow in absolute terms despite continuing and partly successful efforts to increase the resource and energy-efficiency of economic activities. Prices of bulk resources (fossil fuels and a selection of metals: copper, aluminium, iron ore, tin, nickel, zinc, lead and uranium) may be seen as reflecting their scarcity. The increased need for strategic resources may stimulate political monopolisation of access (e.g. China/Africa), which may complicate access for other purchasers (e.g. the EU, Eastern Europe).

## **Environmental**

Trend 8: Decreasing stocks of natural resources

A larger and richer global population, with expanding consumption needs, will place growing demands on natural systems to provide food, water and energy. The loss of natural ecosystems and soil degradation damage a wide range of ecosystem services, including carbon and water cycling, and provisioning of food and fibre. Food and water security is a key concern here. The fragility of global food systems has already become apparent over recent years. Driven by recurring food and economic crises throughout 2006 to 2009, the number of undernourished rose to more than one billion in 2009. European resource stocks may likewise face increasing pressures.

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Trend 9: Increasingly severe consequences of climate change  
Accelerating climate change impacts will threaten food and water supplies, human health, and terrestrial and marine life. Europe may also see more human migration and aggravated pressure on resources supplies.

Trend 10: Increasing environmental pollution load

An increasingly complex mix of pollutants threatens the Earth's regulatory mechanisms. Particulates, nitrogen, and ground-level ozone merit particular attention because of their complex and potentially far-reaching effects on ecosystem functioning, climate regulation and human health. In addition, many other chemical substances are released into the environment, with effects — in isolation or combined — that are still poorly understood.

### **Political**

Trend 11: Environmental regulation and governance: Increasing fragmentation and convergence

The world is devising new governance models, including multilateral agreements on numerous issues and public-private ventures. In the absence of global regulation, advanced European standards and procedures have often been adopted worldwide. But will this situation continue in the future?

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## Annex 3: Agenda Lviv Workshop

Scenario-Building Workshop  
"Climate Change and Food Security in Eastern Europe"

Lviv, Ukraine  
14-16 February 2011

### Monday 14 February 2011

- 16:00**      **Arrival and registration of participants**
- 18.00**      **Introduction to the workshop** (conference hall 2)  
**Welcome Dinner**  
**Goals of the Scenario building workshop:** OSCE, European Environment Agency, ENVSEC  
**Climate change impacts in Eastern Europe**  
Security implications of climate change impacts in Eastern Europe, preliminary findings  
Scenario development process

### Tuesday 15 February 2011

- 9:00**      **Session 1.** Scenario development: Driving forces
- 11.00**      **Coffee break**
- 11.30**      **Session 2.** Scenario development: Critical uncertainties
- 13.00**      **Lunch**
- 14.00**      **Session 3.** Scenario development: Scenario logic - working groups
- 15.30**      **Coffee break**
- 16.00**      **Session 4.** Scenario development: Scenario story lines - working groups (continuation)  
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- 18.00**      Plenary: Report of the Working Groups
- 19:00**      Dinner

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**Wednesday 16 February 2011**

<b>09:00</b>	<b>Session 4:</b> Scenario development: Scenario story lines - working groups (continuation)
<b>10.30</b>	<b>Coffee break</b>
<b>11.00</b>	<b>Session 5:</b> Scenario analysis: Food security situation under different scenarios - working groups
<b>12.30</b>	<b>Lunch</b>
<b>13.30</b> –	<b>Session 5:</b> Scenario analysis: Food security situation under different scenarios - working groups (continuation)
<b>15.30</b>	Plenary: Report of the Working Groups
<b>15.30</b> –	<b>Coffee break</b>
<b>16.00</b>	
<b>16:00- 17:00</b>	<b>Joint concluding session with the participants of the ENVSEC Regional meeting on programme development in Eastern Europe</b>  Results of the scenario development workshop – four plausible futures Reflections of the participants and comments of ENVSEC representatives

## Annex 4: Agenda Kyiv Workshop

### Follow-up Scenario Workshop

#### "Climate Change and Food Security in Eastern Europe"

Conference-hall at 28, Esplanadnaya St, office 7

*Kyiv, Ukraine, 25-26 May 2011*

<b>Wednesday 25 May 2011</b>	
9:00 – 19:00	Arrival of participants
20:00	Welcome Dinner ( <i>Hotel "Rus", 4, Hospitalna St</i> ) Goals of the Scenario building workshop: OSCE Introduction of participants
<b>Thursday 26 May 2011</b>	
9:00 – 11:00	Review of the Workshop Report
11:00 – 11:20	Coffee break
11:20 – 13:00	Analysing existing adaptation strategies and developing robust options for the future – working groups ( <i>continuation</i> )
13:00 – 14:00	Lunch ( <i>Restaurant "Pervak", 2, Rognedinskaya St</i> )
14:00 – 15:30	Analysing existing adaptation strategies and developing robust options for the future – working groups ( <i>continuation</i> )
15:30 – 15:50	Coffee break
15:50 – 17:00	Analysing existing adaptation strategies and developing robust options for the future – working groups ( <i>continuation</i> )
17:00 – 18:00	Conclusions
19:00 – 21:00	Dinner ( <i>Restaurant „Varenichnaya Pobeda“, 14, Sofievskaya St</i> )

## Annex 5: Selected FAO Data for Eastern Europe

### Food Indicators for Belarus from FAO

Selected Food indicators	1990-1992	1995-1997	2000-2002	2005-2007
Consumer price index (2000 = 100)	195,7	3,3	161,1	411,2
Consumer food price index (2000 = 100)	188,4	3,1	156,8	380,1
Proportion of undernourished	Not significant	Not significant	Not significant	Not significant
Average deficit of undernourished (kcal/person(day))	120	120	130	130
Share of food aid in dietary energy supply (DES)	4,1%	0,1%	0%	0%
Consumption of potatoes as part of DES	10,4%	10,4%	10,5%	11%
Production related to consumption	529,1%	483,6%	463%	465%
Consumption flour of wheat as part of DES	11,8%	12,3%	15,1%	10,8%
Production related to consumption	109,2%	89,4%	126%	122,3%
Consumption of flour of rye potatoes as part of DES	18,5%	17,7%	9,7%	8,2%
Production related to consumption	104,9%	100,6%	101,7%	112,5%
Food exports in million USD	2.658	5.887	7.599	19.998
Share in total DES production	1,8%	2,9%	6,5%	7,8%
Food imports in million USD	3.136	7.064	8.675	22.575
Share in total DES production	17,2%	19,3%	19,5%	11,5%
Share of agriculture value added to GDP	22,7%	16,6%	12,6%	9,2%

## Selected Food Indicators for Moldova from FAO

Selected Food indicators	1990-1992	1995-1997	2000-2002	2005-2007
Consumer price index (2000 = 100)	0%	45,8%	109,8%	183,5%
Consumer food price index (2000 = 100)	0%	49,6%	110,7%	183,4%
Proportion of undernourished	Not significant	Not significant	Not significant	Not significant
Average deficit of undernourished (kcal/person(day))	170	190	190	180
Share of food aid in dietary energy supply (DES)	10,6%	7,4%	3,0%	1,0%
Consumption of flour of maize as part of DES	19,5%	21,2%	28,8%	22%
Production related to consumption	108,1%	108,8%	106,9%	112,4%
Consumption flour of wheat as part of DES	24,8%	20,6%	13,8%	14,2%
Production related to consumption	107,1%	111,7%	96,1%	85%
Consumption of sugar refined as part of DES	7,4%	7,2%	7,8%	7,7%
Production related to consumption	130,5%	163,5%	202,9%	149,6%
Food exports in million USD	537	807	561	1.162
Share in total DES production	7,0%	9,3%	12,1%	16,1%
Food imports in million USD	561	1030	903	2.892
Share in total DES production	2,7%	4,0%	4,0%	5,6%
Share of agriculture value added to GDP	43,3%	31,5%	26,4%	16,3%

## Selected Food Indicators for Moldova from FAO

Selected Food indicators	1990-1992	1995-1997	2000-2002	2005-2007
Consumer price index (2000 = 100)	No data	49,6%	112%	160,2%
Consumer food price index (2000 = 100)	No data	46,6%	114,4%	166,5%
Proportion of undernourished	Not significant	Not significant	Not significant	Not significant
Average deficit of undernourished (kcal/person(day))	140	150	140	130
Share of food aid in dietary energy supply (DES)	0,7%	0,4%	0%	0%
Consumption of flour of wheat as part of DES	35,7%	35,5%	32,8%	28,5%
Production related to consumption	106,7%	107,7%	106,7%	104,9%
Consumption sugar refined as part of DES	12%	11,7%	13,3%	12,9%
Production related to consumption	206,6%	191%	101,4%	111,8%
Consumption of potatoes as part of DES	8,3%	8,3%	8,2%	7,6%
Production related to consumption	246,6%	254,4%	276,6%	311,2%
Food exports in million USD	8.852	13.933	16.265	51.523
Share in total DES production	5,6%	9,3%	13,9%	20,7%
Food imports in million USD	9.941	16.928	15.569	63.747
Share in total DES production	1,6%	2,8%	2,9%	1,8%
Share of agriculture value added to GDP	22,9%	14,5%	16%	8,8%

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## Annex 6: Summary of Evaluations for Lviv and Kyiv Workshops

At the end of the workshop, an evaluation sheet was distributed to the participants. Below are the results for the questions. Due to fractions and rounding, results given in percentages may not add up to 100%.

### 1. General

#### 1.1 How did you find the workshop overall?

	Lviv	Kyiv
Excellent:	68%	62.5%
Good:	26%	37.5%
Satisfactory:	5%	0%
Poor:	0%	0%

#### 1.2 How did you find the preparation for the workshop / information received in good time?

	Lviv	Kyiv
Excellent:	53%	75%
Good:	37%	25%
Satisfactory:	11%	0%
Poor:	0%	0%

#### 1.3. What were your expectations of this workshop?

Lviv workshop:

- Making contacts with experts, getting skills in work on development scenario building.
- Learning more on the subject matter, the impact of climate change on food security in Eastern Europe.
- That the workshop would constitute a bridge for further, more far reaching work.
- New evaluation methods, building scenarios, networking, information.
- To get know new tendencies and achievements in the strategy of climate change and food security.

- To discuss different aspects of climate impact on food production in Belarus and neighbor countries and modern situation in the world.
- To hear the opinions of experts from Moldova, Belarus and Ukraine about the impact of global climate change on regional security, including food security.
- Multilateral risk evaluation and search of factors for risk mitigation.
- Interested on the response of the Eastern European (EE) states on the consequences of climate impacts on regional food production. In order that the effect of climate changes may have less damage in this region than in other regions, EE states should be prepared for this challenge particularly related to the safety aspect.

#### Kyiv workshop:

- Exchange of experts' opinions on development of adaptation strategies for climate change (CC) in the context of food security (FS), assessing consequences and solving related problems.
- Discussion and assessment of current situation with adaptation policy and measures.
- Elaboration of suggestions for adaptation and mitigation of CC.
- Regional insight of the problems.
- Development and clarifying scenarios.
- Discussion of connection between scenarios and adaptation policy & elaboration of recommendations.
- Implementation of tasks stated before the workshop.
- Interesting discussions.

#### 1.4 Has this workshop met your expectations?

	Lviv	Kyiv
Yes:	83%	100%
More:	11%	0%
Less:	0%	0%
No:	6%	0%

## 2. Objectives

### 2.1 In general, do you consider the objectives of the workshop clear?

	Lviv	Kyiv
Excellent:	47%	62.5%
Good:	47%	37.5%
Satisfactory:	5%	0%
Poor:	0%	0%

### 2.2 Do you consider the background materials useful?

	Lviv	Kyiv
Excellent:	65%	75%
Good:	35%	25%
Satisfactory:	0%	0%
Poor:	0%	0%

## 3. Workshop contents and programme?

### 3.1 General relevance of contents of scenario development exercise

	Lviv	Kyiv
Excellent:	71%	87.5%
Good:	23%	12.5%
Satisfactory:	6%	0%
Poor:	0%	0%

### 3.2 Are the topics and discussions on the workshop relevant to your day-to-day work?

	Lviv	Kyiv
Excellent:	53%	25%
Good:	42%	62.5%
Satisfactory:	5%	12.5%
Poor:	0%	0%

### 3.3 Usefulness of presentations?

	Lviv	Kyiv
Excellent:	63%	37.5%
Good:	26%	62.5%
Satisfactory:	11%	0%
Poor:	0%	0%

### 3.4 Usefulness of the working sessions?

	Lviv	Kyiv
Excellent:	50%	62.5%
Good:	44%	37.5%
Satisfactory:	0%	0%
Poor:	6%	0%

### 3.5 If topics and discussions are relevant, in what areas and for what purpose?

#### Lviv workshop

- For building development scenarios of Europe and global scenarios.
- For policy development in the countries of Eastern Europe, Russia, and EU
- For regional strategy development for the adaptation to climate change
- In the system of guaranteeing security in food and ecological spheres
- The topic and discussions are extremely important for varied weather dependent branches of economies and firstly – for agriculture. The most important purpose – providing and developing of food security.
- It was confirmed that the weakest link for managing as well daily as very complex problems is in human and institutional capacities.

#### Kyiv workshop

- Development of adaptation policies and strategies incl. in agriculture (in government).
- Strategic planning including development of different economic sectors.
- Preparation and adaptation to future risks.
- Development of approaches to solve issues of FS under CC (in science).

#### 4. Workshop method

##### 4.1 Was the scenario development method useful for you to generate new insight?

	Lviv	Kyiv
Excellent:	71%	62.5%
Good:	23%	37.5%
Satisfactory:	0%	0%
Poor:	6%	0%

##### 4.2 Was the scenario development method useful for you to build understanding?

	Lviv	Kyiv
Excellent:	63%	37.5%
Good:	32%	62.5%
Satisfactory:	0%	0%
Poor:	5%	0%

##### 4.3 Was the scenario development method useful for you to have structured conversation with other participants?

	Lviv	Kyiv
Excellent:	47%	62.5%
Good:	42%	37.5%
Satisfactory:	5%	0%
Poor:	5%	0%

##### 4.4 Can you give an example of insights you developed?

Lviv workshop

- Consequences for the countries being closed from development of food market
- The overall feeling is that even quality analysis on the level of scenarios may yield the comprehensive new understanding of the problem and the ways to solve problems.
- Such seminars may be very useful for officials on the level of regions (oblast) in the countries.

- The level of adopting capacity to climatic and global changes in different countries deals with high degree of uncertainty which make more difficult the process of making decision.
- The decision of food security which deals with climate change could be found under system approach only.
- It was rather interesting to discuss and to realize the connection between and the impact of various ecological and socio-economic factors on food security and adaptation to climate changes.
- The discussion of “non-realistic” extreme scenarios was useful. It gives the opportunity to express new ideas.

#### Kyiv workshop

- Techniques of scenarios development.
- Development of adaptation strategy for each scenario.
- Development of new approaches to elaborate suggestions incorporating adaptation component into national policy.
- Peculiarities of other countries.
- New vision of a complex of problems related to discussed problem (economy, water use, adaptation measures, etc.).
- Analysis (incl. methodology) of reason-consequences relations between climate change, food security (regional & global) and market liberalization.
- Specific risks which were not considered before.

## 5. Organisational Aspects

### 5.1 Travel arrangements prior to workshop

	Lviv	Kyiv
Excellent:	72%	60%
Good:	28%	40%
Satisfactory:	0%	0%
Poor:	0%	0%

## 5.2 Secretariat support

	Lviv	Kyiv
Excellent:	74%	87.5%
Good:	26%	12.5%
Satisfactory:	0%	0%
Poor:	0%	0%

## 5.3 Working Conditions during the workshop (conference room, facilities, equipment, etc.)

	Lviv	Kyiv
Excellent:	68%	100%
Good:	26%	0%
Satisfactory:	5%	0%
Poor:	0%	0%

## 5.4 Conveniences of the location

	Lviv	Kyiv
Excellent:	50%	100%
Good:	38%	0%
Satisfactory:	6%	0%
Poor:	6%	0%

## 6. Time allocation

### 6.1 Length of the workshop:

	Lviv	Kyiv
Too short:	11%	25%
Fine:	83%	75%
Too long:	6%	0%

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**6.2 Length of time allocated to driving forces:**

	Lviv	Kyiv
Too short:	5%	12.5%
Fine:	79%	75%
Too long:	16%	12.5%

**6.3 Length of time allocated to scenario logic and story line:**

	Lviv	Kyiv
Too short:	10%	0%
Fine:	79%	87.5%
Too long:	10%	12.5%

**6.4 Length of time allocated to analysis:**

	Lviv	Kyiv
Too short:	10%	25%
Fine:	79%	62.5%
Too long:	10%	12.5%

**6.5 Length of time allocated to country level experience**

	Lviv	Kyiv
Too short:	33%	0%
Fine:	61%	100%
Too long:	6%	0%

**6.6 Length of lunch breaks:**

	Lviv	Kyiv
Too short:	10%	0%
Fine:	79%	100%
Too long:	10%	0%

**6.7 Length of coffee breaks:**

	Lviv	Kyiv
Too short:	0%	0%
Fine:	84%	100%
Too long:	16%	0%

**6.8 Time for networking:**

	Lviv	Kyiv
Too short:	21%	12.5%
Fine:	74%	87.5%
Too long:	5%	0%

**7. Positive aspect of the workshop:**

## Lviv workshop

- A very good group of experts was elected.
- Free discussions.
- Experience of moderators.
- Meeting with interesting people, working on similar topics.
- Obtaining understanding on new methods of analysis and specific information in the subject area
- Methods used; use of very advanced techniques for scenario development which basis was borrowed from Shell, but was very changed and is very good for seminars like this.
- Information supply.
- Logistics.
- Good theoretical introduction (background).
- Participants of the seminar were able to study this technique and will be able to use it in their countries
- The stage of problem decision (tasks) which deals with climate change and food security was defined.

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- This seminar provided deeper understanding of the process, created a basis for discussion and exchange of information between participants who were presented different spheres and disciplines, helped in getting actual information, knowledge and experience of foreign countries within the region and which could be applied in Belarus.
  - The positive characteristic of the seminar is a combination of discussions with interactive sessions.
  - Representative character of participants; presentations by participants during the workshop.
  - The links between food security and energy and food prices.
  - The regional variation in the effects of climate change and the fact that some regions will experience positive impacts.
  - The interface between the economic/financial (food and energy prices, plus possible futures market shifts for commodities) and the political environment (i.e. importance of good governance as the key).
  - Selected topic is under-researched, but it can have all-European and even global impact.

#### Kyiv workshop

- Fruitful joint discussions, experience exchange, new knowledge, work in groups.
- Participants of the follow-up workshop performed tasks much quicker than in Lviv.
- Further development of scenarios elaborated at the previous workshop.
- Trying to use scenarios practise in relation to current legislation in the countries.
- Representatives of the countries have been introduced to current legislation base of neighboring countries.
- Level of solving problems related to CC and FS is identified.
- Assessment of adaptation measures.
- Structure and methodology of the workshop was very efficient.

#### **8. Please cite the most important issues which were dealt with during the workshop. How do these affect your day-to-day work?**

#### Lviv workshop

- Threats related to climate change and food security; regional scenarios for climate change in the context of food security

- Tendencies and driving forces of regional development, as well as alternative scenarios.
- The method of building scenarios.
- The high degree of unclearness in developing adaptive measures caused by climate change was underlined.
- Possibilities to adapt were highlighted.
- Necessity of system approach for making decision which deal with consequences of climate change.
- What will happen in the region in 2050.
- Comparative analysis of the countries in the region in the context of food security.
- Expert evaluations; project activities
- The importance of observing for climate change (tendency and rapidness climate change) was underlined to make easy searching of decision and developing of appropriate measures which need for increasing wellness and national security.
- Unexpected consequences of even positive scenarios (in the social sphere).
- Depopulation in the region.
- Weak human and institutional capacities and insufficient awareness of the problem - needs to strengthen all of this aspects.

#### Kyiv workshop

- Discussing, commenting, specification, further elaboration and finalization of scenarios.
- Elaboration of potential development scenarios for countries from the region under climate change.
- Discussion of adaptation measures in each scenario.
- Identification of general measures for all four scenarios.
- Elaboration of future vision.
- Approaches to develop adaptation strategies.
- Discussion of priorities, measures and state of solving problems in CC and FS in the region.
- Analysis of current policies and how to improve national policy in CC incl. adaptation policy.

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- Exchange of practices between countries.

## 9. What suggestions would you like to make to the organisers?

### Lviv workshop

- To inform the executive bodies in the region about the results of the seminar.
- More in-depth presentation on each country, and then try to reflect all together on regional and global levels.
- To conduct a regional seminar of ecological risks related to climate change.
- To pay more attention to available examples of real climate change and their analysis and obtaining objective information (maybe as reference materials).
- More time and serious investment for scenario building would have been needed, which was not available.
- Better structured discussions would have been preferable.
- To add more practical examples of making decisions which deal with implementation of adopting measures in different weather dependent branches caused by climate change.
- Support qualitative evaluations with quantitative research of how far this is possible. That is, to find statistics and available prognoses that would reaffirm qualitative statements.
- Taking into consideration “potential” adaptation strategies.
- Development of overall recommendations on scenarios results.
- Discussion of interim/mixed scenario results.
- The “random conditions” (e.g. in this case impact of climate change on food production in EE region – less negative compared to other regions) should be explained in more details and more emphasised.
- To continue the trainings (in all countries there is a lack of experts).
- To conduct similar workshop on a national level and in other countries.

### Kyiv workshop

- To include analysis of national plans on adaptation and their implementation in developed countries.
- To continue these activities involving more experts and representatives of executive power.

- To extend the workshop to 3 days.
- To relate risks in climate change and food security to ecosystem risks.
- To include successful examples of solutions in national policy of Ukraine or other countries with similar difficult conditions.
- To have more positive attitude while discussing current policy and elaborating recommendations. An attitude “everything is bad, and we could do nothing” does not support creative thinking and elaboration of efficient recommendations.