



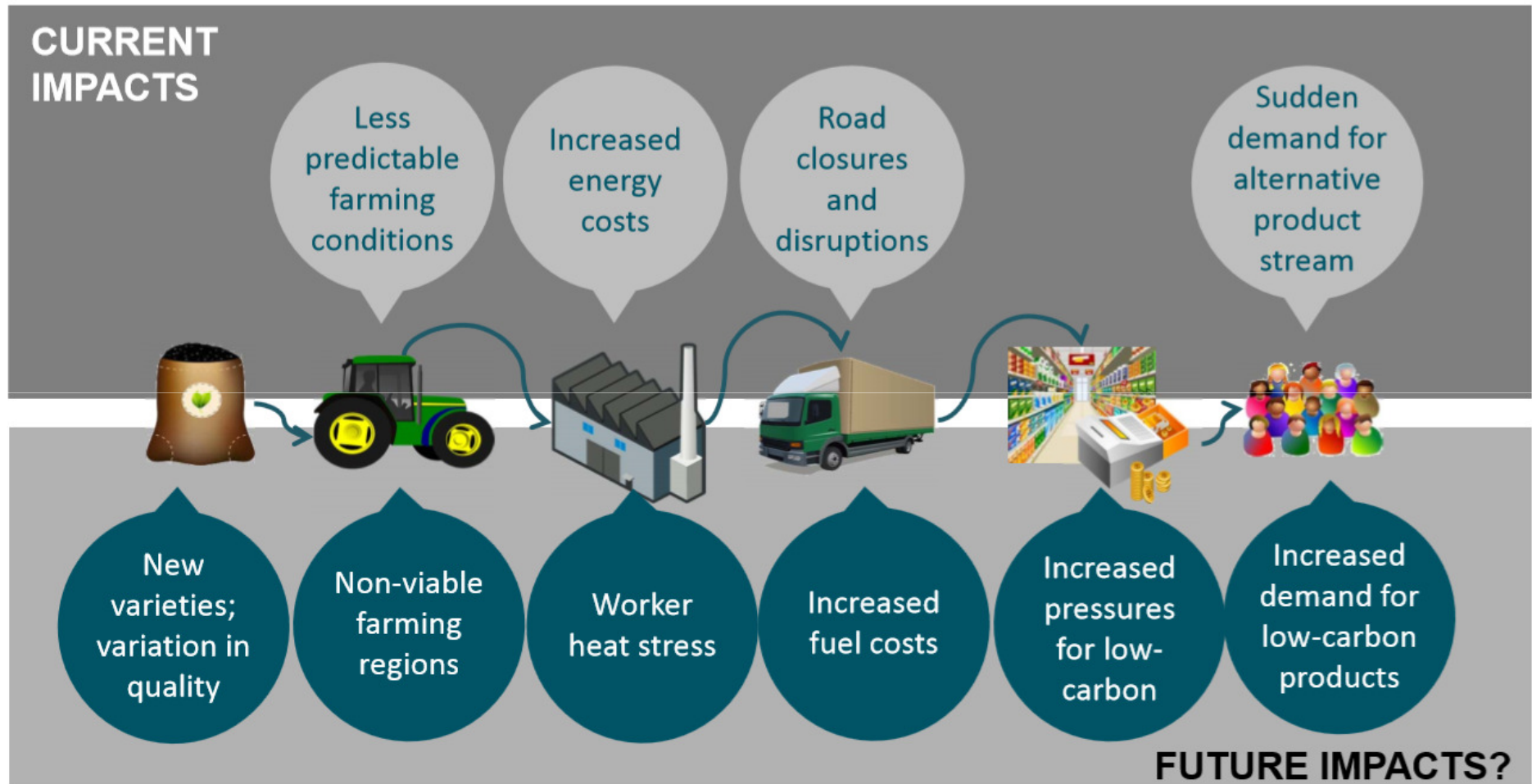
Challenges of Climate Change Adaptation in Agriculture

Lučka Kajfež Bogataj

Outline

- Climate change and agriculture :
State of the art
- Principles of adaptation
- Adaptation in EU
- Adaptation in Slovenia
- Conclusions

Climate change impacts on food systems



Scientific literature

- A lot written about potential impacts, a smaller but growing literature about adaptation
- Very little on actual implementation and almost nothing on evaluation of adaptation actions
- Similarly, lots written about barriers to adaptation but little about practically overcoming these
- Few studies that integrate adaptation, mitigation and food security

Climate change adaptation

Widely acknowledged guiding principles for all levels of decision making are still lacking.

Guiding principles adaptation process

List of Guiding Principles

Important to address in following phases:

	Planning	Implementation	Evaluation
1. Initiate adaptation, ensure commitment and management			
2. Build knowledge and awareness			
3. Identify and cooperate with relevant stakeholders			
4. Work with uncertainties			
5. Explore potential climate change impacts and vulnerabilities and identify priority concerns			
6. Explore a wide spectrum of adaptation options			
7. Prioritise adaptation options			
8. Modify existing policies, structures and processes			
9. Avoid maladaptation			
10. Monitor and evaluate systematically			

The guiding principles are strongly interlinked and should be understood in an integrated way.

UK (HM Government, 2010)

- Any adaptation needs to be **sustainable** (responses should not add to climate change)
- Actions should be **flexible** (not to lock us into inflexible pathways).
- Action needs to be **evidence-based** – (use of the latest research, data and practical experience)
- Response to climate impacts should be **prioritized**
- Adaptation measures need to be
 1. **effective** (reducing the risks from climate change without introducing perverse effects),
 2. **efficient** (the long-term benefits of adaptation actions should outweigh the costs),
 3. **equitable** (the effects of the activity on different groups and where the costs should fall should be taken into account).

Climate change adaptation

Different narratives

Four types of adaptation options (EEA, 2013)

- 'Soft' adaptation options are managerial, legal and policy approaches that aim at altering human behaviour or styles of governance (early warning systems, financial infrastructure that can insure against damage from natural disasters).
- 'Grey' adaptation options are 'hard' options used to reduce vulnerability to climate change and enhance resilience (dyke building, beach restoration to prevent coastal erosion).
- 'Green' adaptation options make use of nature (introducing new crop and tree varieties, allowing room for rivers to naturally flood onto floodplains, restoring wetlands).
- 'Combined' options make use of all of these three types (the best results?)

Adaptation Technologies: types, their synergies and complementarities

Three types:

- **Hardware** (physical tools),
- **Software** (processes, knowledge and skills required using the technology)
- **Orgware** (the ownership and institutional arrangements pertaining to a technology).



United Nations
Framework Convention on
Climate Change

Adaptation Technologies: types, their synergies and complementarities

In the agricultural context

- **Hardware** (different crop varieties),
- **Software** (farming practices or research on new farming varieties)
- **Orgware** (local institutions that support the use of agricultural adaptation technologies).

Enablers and barriers of adaptation technologies for agriculture

Adaptation Technology	Seasonal Forecasts	Water-Saving Irrigation	Resilient Crop Varieties	Farmer-led Sustainable Agriculture
Suitability of the Technology	For supporting agricultural and relevant planning decisions and early warning for preparedness	For tackling farmer vulnerability to the effects of drought and variable rainfall patterns	For enhancing crop resistance to a variety of stresses such as water and heat stress, salinity and new pests; for food security	For ensuring farmer ownership and sustainability of agricultural techniques in context
Enablers	Effective stakeholder collaboration; access to information and comprehensive communication approaches that engage all stakeholders and target audience	Context-aware planning, management and governance; multi-stakeholder collaboration; application in areas that rely on rain-fed agriculture; accessible and ongoing troubleshooting support	Institutional engagement in policy dialogue to speed up process and access; in-situ testing with flexible, bottom-up cropping methods; affordability for intended users	Comprehensive farmer engagement; use of locally available resources; local applicability; policy support to encourage diffusion;
Barriers	Communication barriers including channels used, language and „climate change literacy“ issues; understanding and awareness of technology	Availability of water resources; soil type; top-down site governance and management; opportunity costs & cost effectiveness of irrigation;	Perceptions of and access to markets and new varieties; expense of resistant varieties	Local-level financial, cultural, natural and institutional barriers; lack of information; climate change impacts on effectiveness and efficiency of implementation

Needs for relevant policies

- Policies for the strengthening of relevant institutions and infrastructure
- Iterative risk management
- Policies to strengthen Research and Development of technologies in situ (on-farm testing of technologies and research networks)
- Comprehensive participatory frameworks integrating all involved stakeholders, from farmer groups and NGOs, to government services, such as agricultural extension networks, and private sector organisations
- International and regional cooperation via cross-cutting policies

Financing instruments for adaptation

- **Project-based public support:** public funding on the basis of projects (e.g. research projects, test cases), financing adaptation measures to be implemented regionally/locally).
- **Explicit budgetary allocations:** A dedicated part of public finance is earmarked to finance adaptation implementation (may overlap with project-based public support)
- **Insurance mechanisms:** To equitably transfer the risk of a loss, insurance helps to avoid or minimise human and economic losses following climate change related events.
- **Public-private-partnerships :** A venture between a government service and the private sector, a useful tool to combine financial and knowledge resources from both the public and private sectors on specific projects.

Status of national adaptation strategies and national adaptation plans



EEA member countries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Austria											Implementation
Belgium											Implementation
Bulgaria											Formulation
Croatia											n/a
Cyprus											Formulation
Czech Republic											Formulation
Denmark											Implementation
Estonia											Formulation
Finland											Monitoring and evaluation
France											Monitoring and evaluation
Germany											Implementation
Greece											Agenda setting
Hungary											Decision
Iceland											n/a
Ireland											Decision
Italy											Formulation
Latvia											Formulation
Liechtenstein											Formulation
Lithuania											Monitoring and evaluation
Luxembourg											n/a
Malta											Implementation
Netherlands											Implementation
Norway (*)											Monitoring and evaluation
Poland											Decision
Portugal											Decision
Romania											Decision
Slovakia											Formulation
Slovenia											Formulation
Spain											Implementation
Sweden											Formulation
Switzerland											Implementation
Turkey											Decision
United Kingdom											Implementation

Note: ☐ No policy

☒ National adaptation strategy (NAS) in place

☒ National adaptation strategy (NAS) and national and/or sectoral adaptation plans (NAP/SAP) in place



Climate-ADAPT

European Climate Adaptation Platform

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Search the website

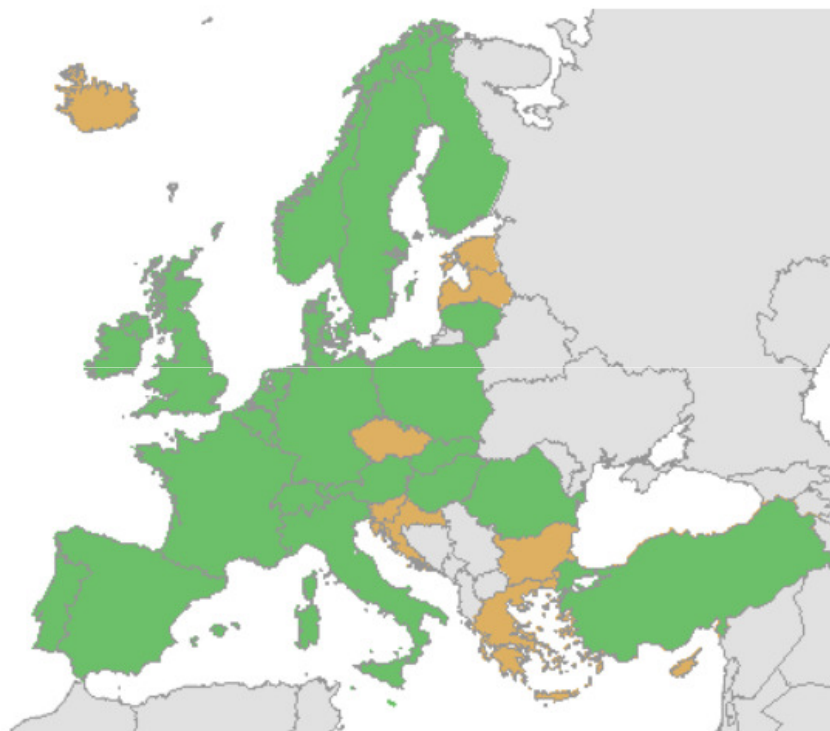
[Home](#) | [Adaptation information](#) | [EU adaptation policy](#) | [Countries, regions, cities](#) | [Tools](#) | [Links](#) | [Search the database](#) | [Newsletter](#)

→ [General](#)

→ [Countries](#)

→ [Transnational regions](#)

→ [Cities and towns](#)



Adaptation strategies

EEA member countries are at different stages of preparing, developing and implementing adaptation strategies. This development depends on the magnitude and nature of the observed impacts, the assessment of current and future vulnerability and the capacity to adapt. All countries have submitted information on their adaptation plans and actions in their National Communication (NC) to the United Nations Framework Convention on Climate Change (UNFCCC). Most have submitted their 6th NC to UNFCCC (due on 1 January 2014). Increasingly, additional actions and measures are being taken at regional and local levels.

- Adaptation strategy adopted
- No adaptation strategy adopted

Slovenia

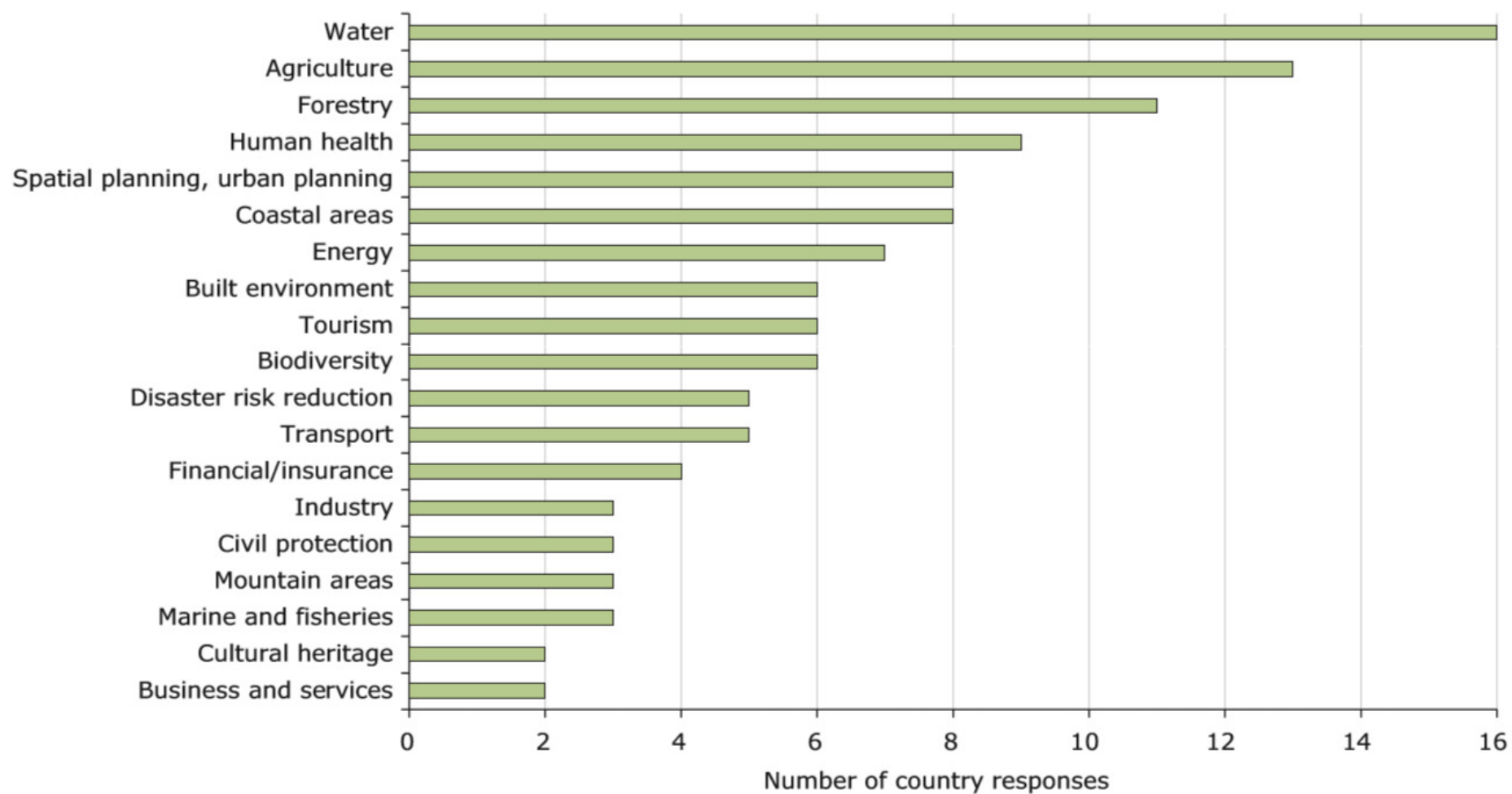


European Commission



European Environment Agency

Priority sectors for adaptation implementation



Adaptation in Slovenia

Prehojena pot – več kot 15 let

ZAČETEK
1999

**Sprejeta
STRATEGIJA**

junij 2008

marec 2010

Pred letom 2002

Oktober 2002 Zasedanje CAgM-
Komisije za agrometeorologijo
SMO v Sloveniji

2003-2004

Januar 2003 sklep vlade o
pripravi ranljivostne študije
vpliva PS na kmetijstvo in
akcijskem načrtu;
- januar 2004 sprejeto poročilo
o ranljivosti in sklep o drugem
delu Strategiji prilagajanja
kmetijstva in gozdarstva na PS

EU
Zelena
knjiga
2007

2009
delo
Medresorske
skupine (sklepi o
imenovanju)

EU
Bela
knjiga
2009

- Študije „Spremembe in trendi v Sloveniji izmerjenih meteoroloških in fenoloških količin ter priprava scenarijev“
- Prvo nacionalno poročilo UNFCCC
- Prve konzultacije
- Sodelovanje različnih inštitucij

Strategija prilagajanja kmetijstva in gozdarstva na PS

- Finančne ocene (8 mio EUR za 2010, 10 mio EUR za 2010 in 15 mio EUR za 2011)
- Brošure slovenska 2004, angleška 2006

Akcijski načrt za prilagajanje kmetijstva na PS

2 osnutka
- 2009-2011
- 2010-2011

18

Adaptation in Slovenia


Prehojena pot – več kot 15 let

ZAČETEK
2010

Sprejeta
STRATEGIJA



Leta 2009 Služba Vlade RS za podnebne spremembe



REPUBLIKA SLOVENIJA
SLUŽBA VLADE REPUBLIKE SLOVENIJE
ZA PODNEBNE SPREMEMBE

English
Državne ustanove
Natisni

ARHIVSKO
SPLETNO MESTO

PODNEBNE
SPREMEMBE

PODNEBNI UKREPI

SVET ZA TRAJNOSTNI
RAZVOJ


MEDIJSKO SREDIŠČE

ZAKONODAJA IN
DOKUMENTI

O SLUŽBI

WWW.SVPS.GOV.SI

AKTUALNO



Ukinjena 2012
in dopolnitvah Zakona o
Vlade RS za podnebne
spremembe ukine. Področje podnebnih sprememb prevzema
Ministrstvo za kmetijstvo in okolje.
Vsebinska spletna stran bo v naslednjih tednih ustrezno
prilagojena. Nova spletna stran www.mko.gov.si bo v kratkem
začela delovati.

NOVICE

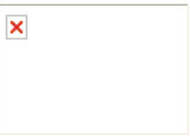
31. 3. 2012
[Druzi osnutek Strategije prehoda
Slovenije v nizkoogljeno družbo do leta
2050](#)

1. 3. 2012
[Implementacija vodika in gorivnih celic v
Sloveniji zanimiva in prepoznavna tudi po
svetu](#)

15. 2. 2012
[Vseevropski natečaj U4energy v drugem
letu s podporo programa Ekošole](#)

[Več ▶](#)


**Proces priprave dolgoročne
podnebne strategije**



Mednarodni projekt ALPSTAR



**Demonstracijski projekt za
električna baterijska vozila in
polnilna mesta**



NAPOVED DOGODKOV

Prilagajanje vidno tudi navzven

Pomembno osveževanje stanja in sledenje ciljem



The screenshot shows the 'CLIMATE-ADAPT European Climate Adaptation Platform' website. The navigation bar includes links for Home, Adaptation information, EU Adaptation Policy, Countries, regions, cities, Tools, Links, Search the database, and Newsletter. A search bar is also present. Below the navigation bar, there are tabs for General, Countries, Transnational regions, and Cities and towns. The 'Countries' tab is selected, and the page displays information for Slovenia. A map of Europe highlights Slovenia, and a dropdown menu allows users to choose a country. The main content area for Slovenia includes a 'Legal framework' tab, a brief overview of climate change adaptation activities, and a list of four long-term goals for Slovenia's adaptation strategy. The goals are: 1. long-term goals of Slovenia to adaptation to climate change; 2. vulnerability assessment of the country to the effects of climate change; 3. funding of climate-related measures in developing countries; and 4. reporting and monitoring of progress. The page also mentions the draft 'Strategy for the transition of Slovenia to a low carbon society by 2050'.

To maintain the vulnerability to the adverse effects of climate change at the present level, in view of the expected increase in exposure, the adaptation measures proposed in the draft strategy are aimed at increasing the resilience and adaptive capacity of society, economy and nature. Proposed ways to increase resilience are as follows:

- through increasing understanding of climate change and its predictions and knowledge on methods of adaptation,
- by integrating adaptation objectives and measures into sectoral policies, programs and projects,
- through sustainable spatial planning,
- by strengthening the resilience of local communities,
- by providing resources for adaptation measures,
- by raising awareness through training and education.

The National Climate Strategy currently in public consultation, proposes sectoral objectives and policy guidelines for 13 sectors. Adaptation objectives and policy guidelines are particularly proposed for the following sectors: agriculture, forestry, sinks and biodiversity; water; health; and natural disasters. Due to above-average exposure of agriculture and forestry to the effects of climate change, the national adaptation strategy [2] for these two sectors was adopted in 2008, followed by an action plan for years 2010 and 2011 [3].

The second draft of the National Climate Strategy – Strategy for the transition of Slovenia to a low carbon society by 2050 [4] has been published in March 2012 and its adoption is foreseen by the end of the year 2012 by the Government. On the basis of this strategy, a medium-term operational programme for climate change adaptation should follow.

[1] On the 1st of April 2012 the environment department of the former Ministry of environment and spatial planning merged with the Ministry of agriculture, forestry and food into new Ministry of agriculture and environment whereas the Government Office of Climate Change ceased to exist and climate change is now dealt with solely at the ministry.

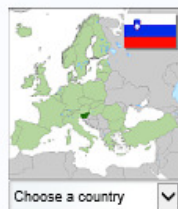
[2] Full text of the National adaptation strategy for forestry and agriculture is available only [in Slovene](#).

[3] Available only [in Slovene](#).

[4] Available only [in Slovene](#).



European Environment Agency



Slovenia

Last update: 30 July 2015

Summary Policy & legal framework Information & assessments Sectors & actions Engaging stakeholders

Contact

Summary table

Item	Status	Links
National adaptation strategy	1) Adopted. 2) completed and submitted for adoption. 3) Being developed.	<ol style="list-style-type: none"> 1. National Adaptation strategy for forestry and agriculture 2. Strategy for the transition of Slovenia to a low carbon society by 2050 3. Slovenia's Development Strategy
Action plans	1) Adopted. 2) Being developed	<ol style="list-style-type: none"> 1. Action plan for 2010 and 2011 of the National Adaptation Strategy for forestry and agriculture 2. National action plan for climate change adaptation
Impacts, vulnerability and adaptation assessments	1) Completed. 2) Currently being undertaken.	<ol style="list-style-type: none"> 1. Vulnerability of Slovenian agriculture and forestry to climate variability and first impact assessment (2004) 2. Climate variability in Slovenia and its impact on the aquatic environment (2010) 3. National Climate Change Risk Assessment (2015-2018) 4. National Disaster Risk Assessment (2015-2018)
Research programs	Currently being undertaken	<ul style="list-style-type: none"> • Slovenian Research Agency: Target Research Programmes
Climate services / Met Office	Established	<ul style="list-style-type: none"> • Slovenian Environment Agency Meteo.si portal
Web portal	Being developed	<ul style="list-style-type: none"> • Slovenian Environment Agency: Climate Change • Atlas of the environment
Monitoring, Indicators, Methodologies	Established, being developed	<ul style="list-style-type: none"> • Indicators of environment in Slovenia – climate change
Training and education resources	Available	<ul style="list-style-type: none"> • Recommendations to reduce the vulnerability of agricultural production in drought • http://www.slovenija-co2.si/
National Communication to the UN Framework Convention on Climate Change	Last National Communication Submitted (2014)	<ul style="list-style-type: none"> • Slovenia's 6th National Communication and First Biannual Report under the UNFCCC



The screenshot shows the DMCSEE website with a red box highlighting the 'Drought monitor' link in the navigation menu. The website content includes a description of the center's mission, a list of founding countries, founding agencies, latest news, and links to related resources.

DMCSEE
Drought Management Centre
for Southeastern Europe

Home Drought monitor Events Links Members section TCP project News Contacts

Drought Management Centre for Southeastern Europe - DMCSEE

Drought is a normal part of climate in virtually all regions of the world. South Eastern Europe is no exception; in past decades the drought-related damages have had large impact on the economy and welfare. Therefore the need to establish a Drought Center for SE Europe to alleviate the problems caused by drought in the area became evident at the end of the past century. The idea was further elaborated by International Commission on Irrigation and Drainage (ICID) and UN Convention to Combat Desertification (UNCCD). The UNCCD national focal points and national permanent representatives with the World Meteorological Organization have agreed upon the core tasks of the Drought Management Center for South Eastern Europe (DMCSEE) and the proposed project document.

The mission of the proposed DMCSEE is to coordinate and facilitate the development, assessment, and application of drought risk management tools and policies in South-Eastern Europe with the goal of improving drought preparedness and reducing drought impacts. Therefore DMCSEE will focus its work on monitoring and assessing drought and assessing risks and vulnerability connected to drought.

[DMCSEE Project Proposal](#)

Latest news

Drought bulletin 10th September 2015
(11.09.2015)

Drought bulletin 12th August 2015
(13.08.2015)

Drought bulletin 15th July 2015
(16.07.2015)

Links

- » [UNCCD](#)
- » [WMO](#)
- » [SEE TCP](#)

Founding countries:

- Albania
- Bosnia and Herzegovina
- Bulgaria
- Croatia
- FYROM
- Greece
- Hungary
- Moldova
- Romania
- Slovenia
- Turkey
- Montenegro
- Serbia

Founding agencies:

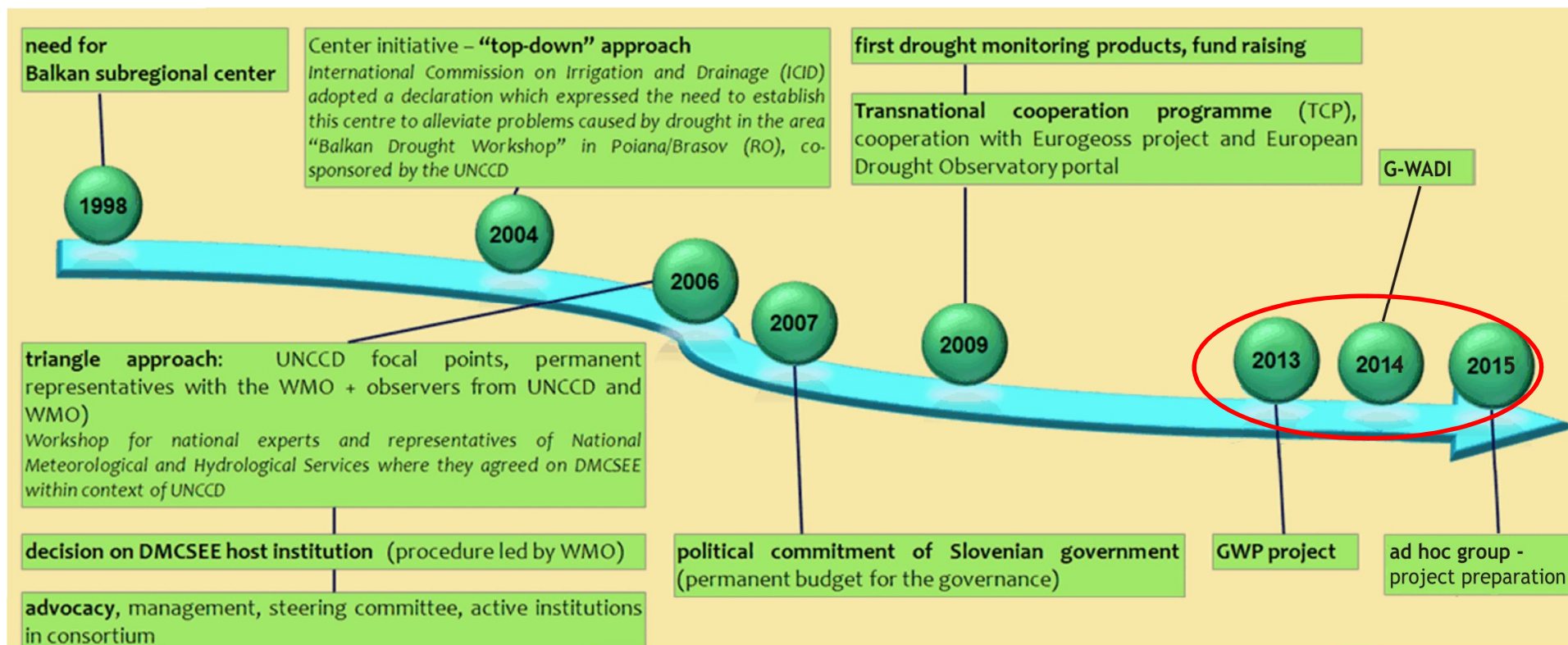
- WMO
- UNCCD

Links

- WMO FP
- UNCCD FP
- Drought researcher

13
countries

www.dmcsee.org



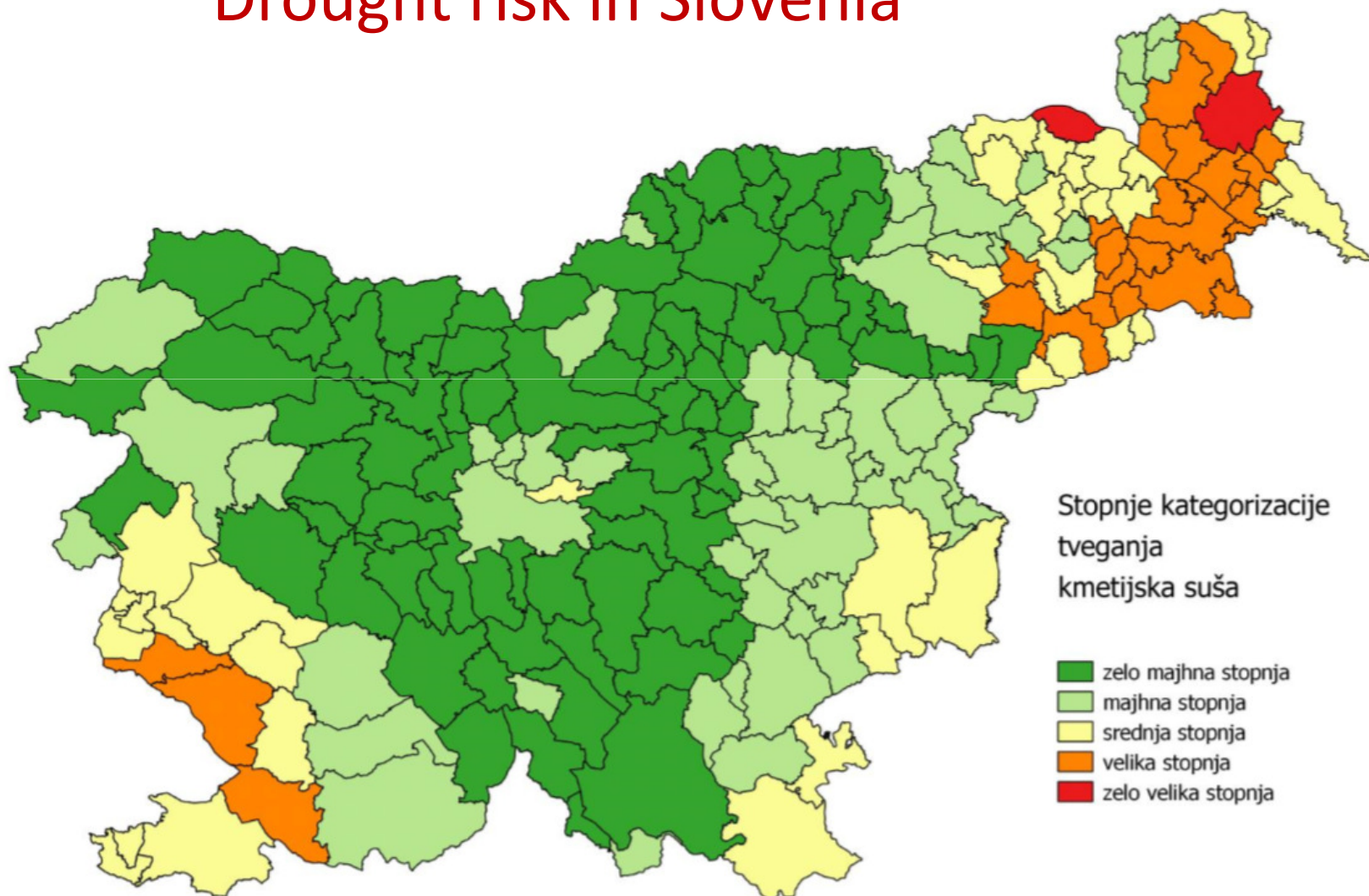
DMCSEE course of activities 2013-2015



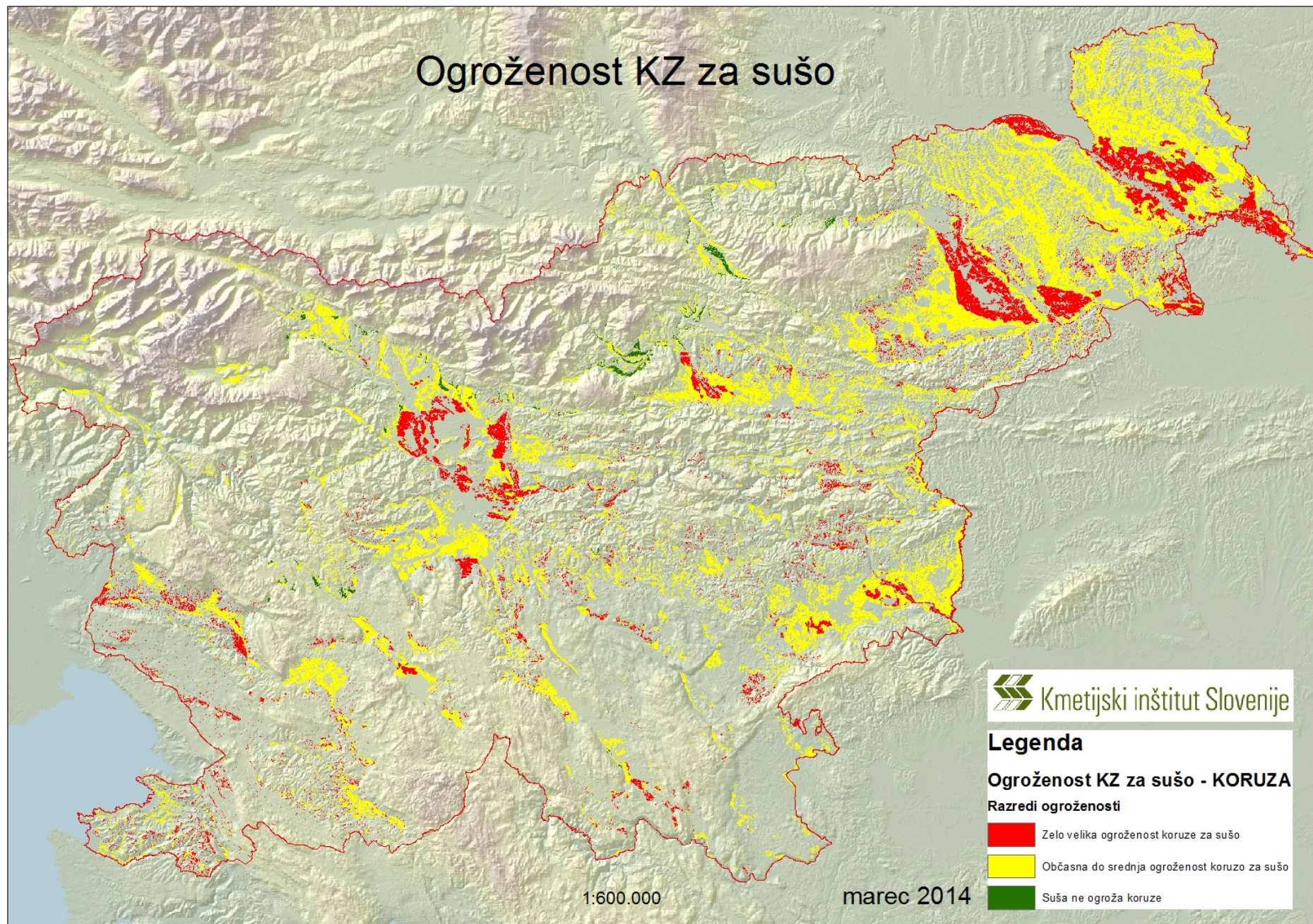


Notranja kategorizacija tveganja

Drought risk in Slovenia



Ogroženost KZ za sušo






 Kmetijski inštitut Slovenije

Legenda


Ogroženost KZ za sušo - KORUZA

Razredi ogroženosti

-  Zelo velika ogroženost koruze za sušo
-  Občasna do srednja ogroženost koruze za sušo
-  Suša ne ogroža koruze

Stakeholders workshop

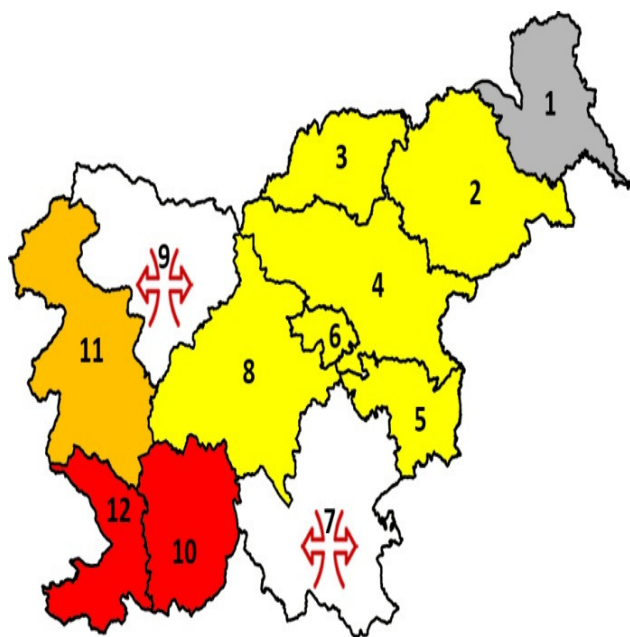
- 30. september 2014 na BF skupaj z Ministrstvom za kmetijstvo in okolje
- Sektorji:
 - kmetijstvo, gozdarstvo,
 - vode, zdravje,
 - energetika, infrastruktura,
 - prostor/poselitev, nacionalna varnost in migracije,
 - gospodarstvo, finance in zavarovalništvo,
 - narava in kulturna dediščina.

BARVA REGIJE	POMEN
	ni vpliva
	možni negativni vplivi
	prevladujejo negativni vplivi
	zaradi negativnih vplivov je ukrepanje nujno
	povzemanje ni možno zaradi nezadostnega števila odgovorov
	nasprotujoče si ocene
	priložnost

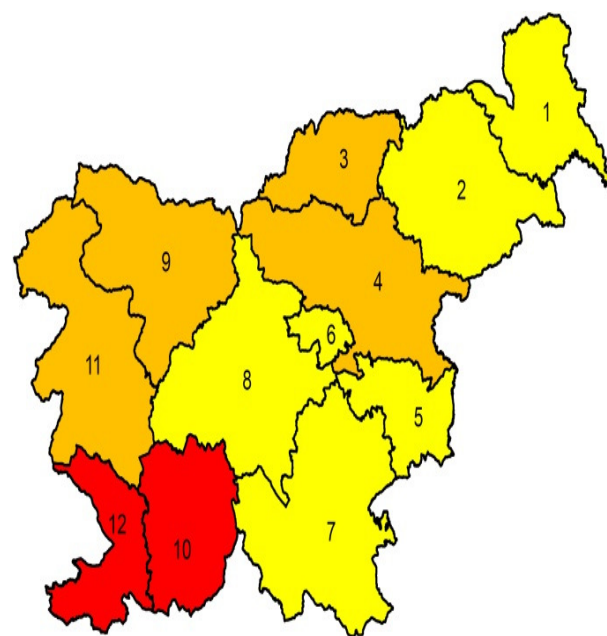
Matrika za povzemanje mnenja
javnosti

- Posamezni vplivi podnebnih sprememb, ki so bili izbrani pred samo delavnico, so se ocenjevali tudi po statističnih regijah.
- Končne ocene udeležencev so na zemljevidih z barvami in se primerjale z „uradnimi“ kartami za posamezen vpliv
- Razlike!

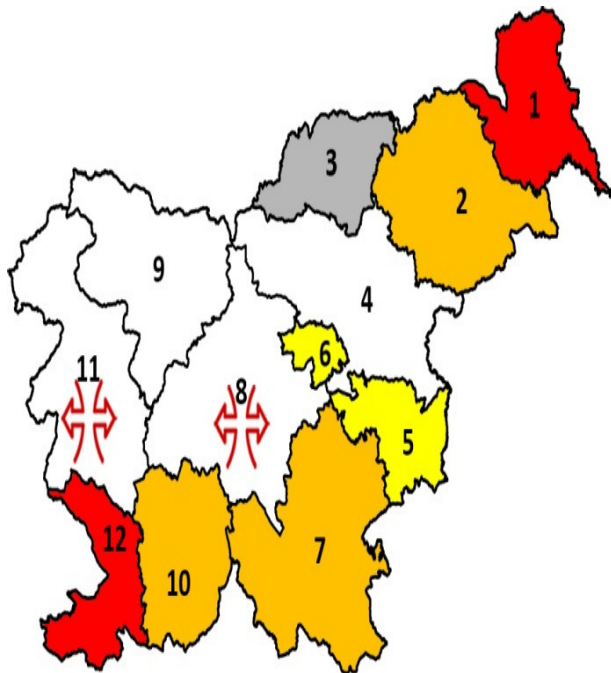
Povečano število požarov v naravi (ocena javnosti).



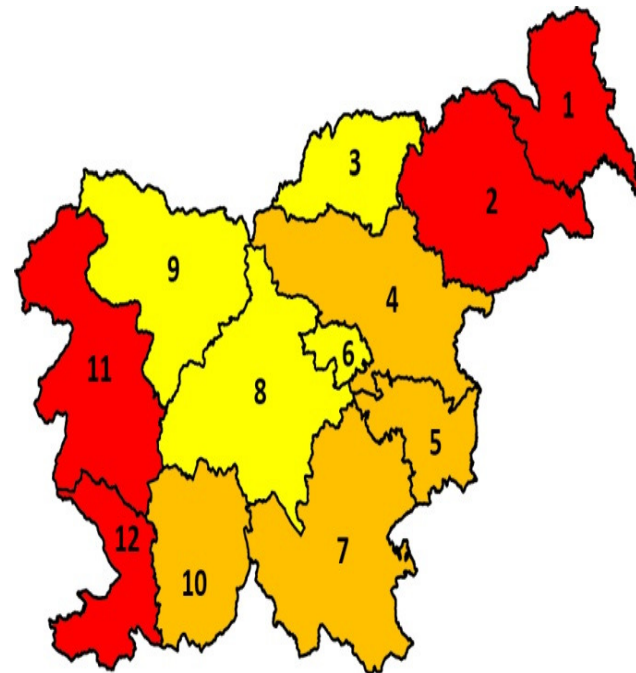
Požarna ogroženost gozdov (vir: Gozdarski inštitut).



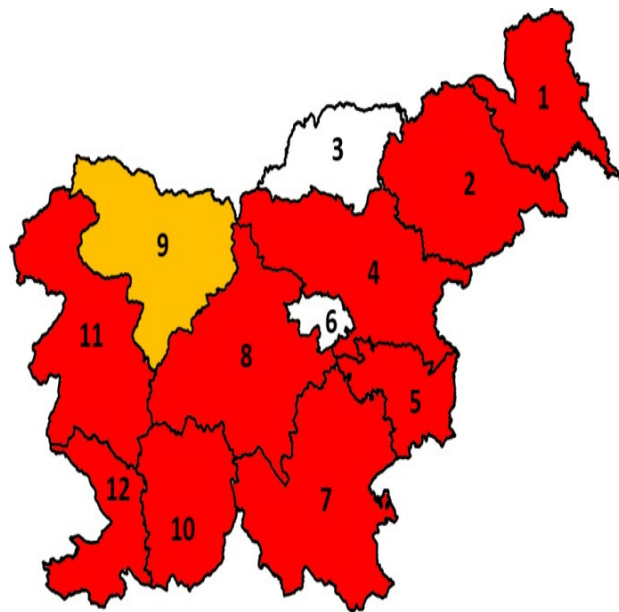
Pomanjkanje vode – potrebni novi vodi, zadrževalniki, omejitve proizvodnje energije (sektor Energetika in infrastruktura, ocena javnosti).



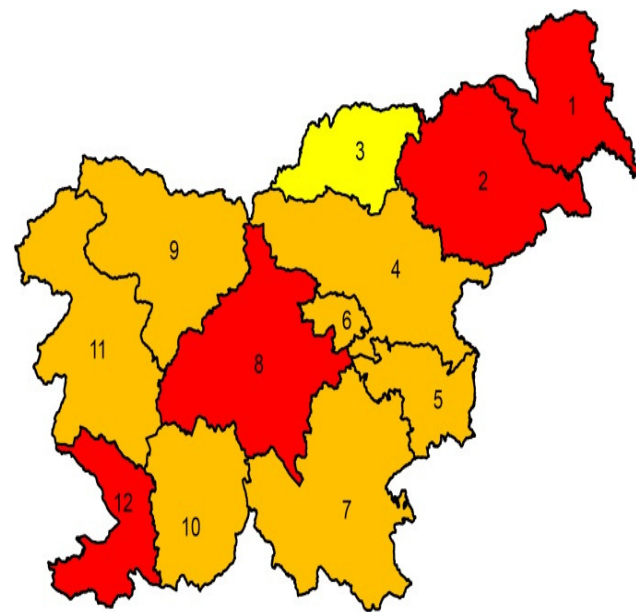
Povečana potreba po vodi in suše (sektor Kmetijstvo in gozdarstvo, ocena javnosti).



**Povečana pojavnost suš in vročinskih valov
(sektor Vode in zdravje, ocena javnosti).**



**Ocena ogroženosti zaradi suše
(karta povzeta po CRP).**



Conclusions

- Agriculture has been and will continue to be significantly affected by changes in climate conditions (quantity, quality, cost of production)
- Existing adaption strategies can help offset many – but not all –effects over the next 20-30 years; effects are very likely to worsen significantly beyond then, especially if GHG emissions remain high
- Improved treatment of uncertainty and risk in climate and adaptation decision-making and policy