C.44/ I.09 – Improving farm resilience: Index

- **Agriculture sector resilience indicator – the context**
- **Measuring agricultural sector resilience**
- **Indicator and analysis of components**
- **How would the composite indicator look like**
- **Discussion**

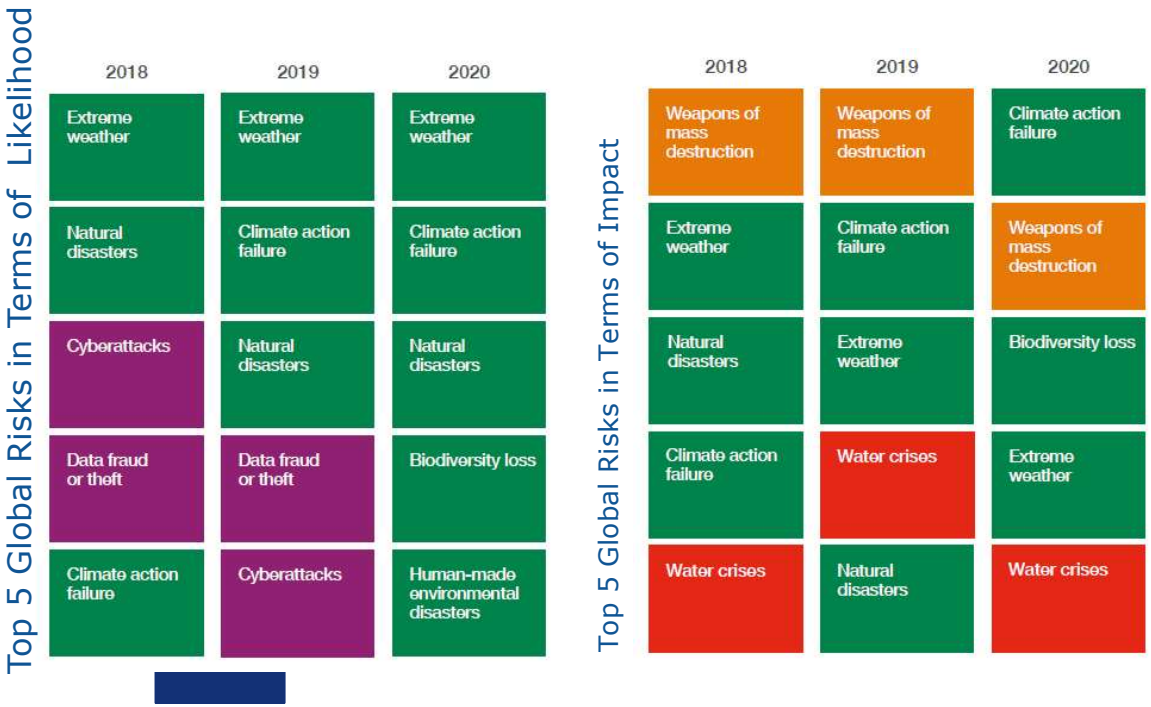
Contacts: Thaïs Leray (CLIMA); Frank Dentener (JRC); Nicola di Virgilio (AGRI)

Agriculture sector resilience indicator, the context

Policy context

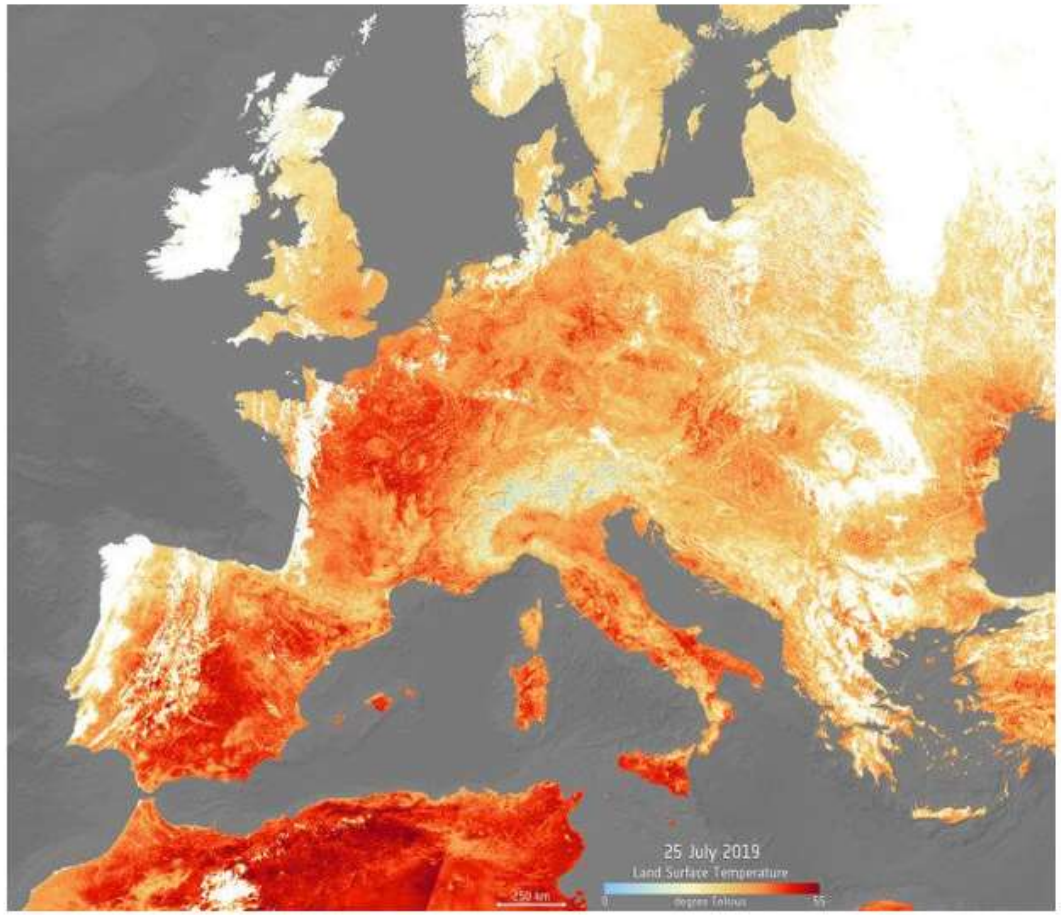
- *EU Adaptation strategy & European Green Deal*
- *Evaluation studies: adaptation strategy, CAP, climate mainstreaming…*
- *CAP objectives*

WEF – The Global risks report 2020



Climate change

- *21 warmest years occured in the last 23 years.*
- *5 warmest years on record: 2015, 2016, 2017, 2018, 2019 !*



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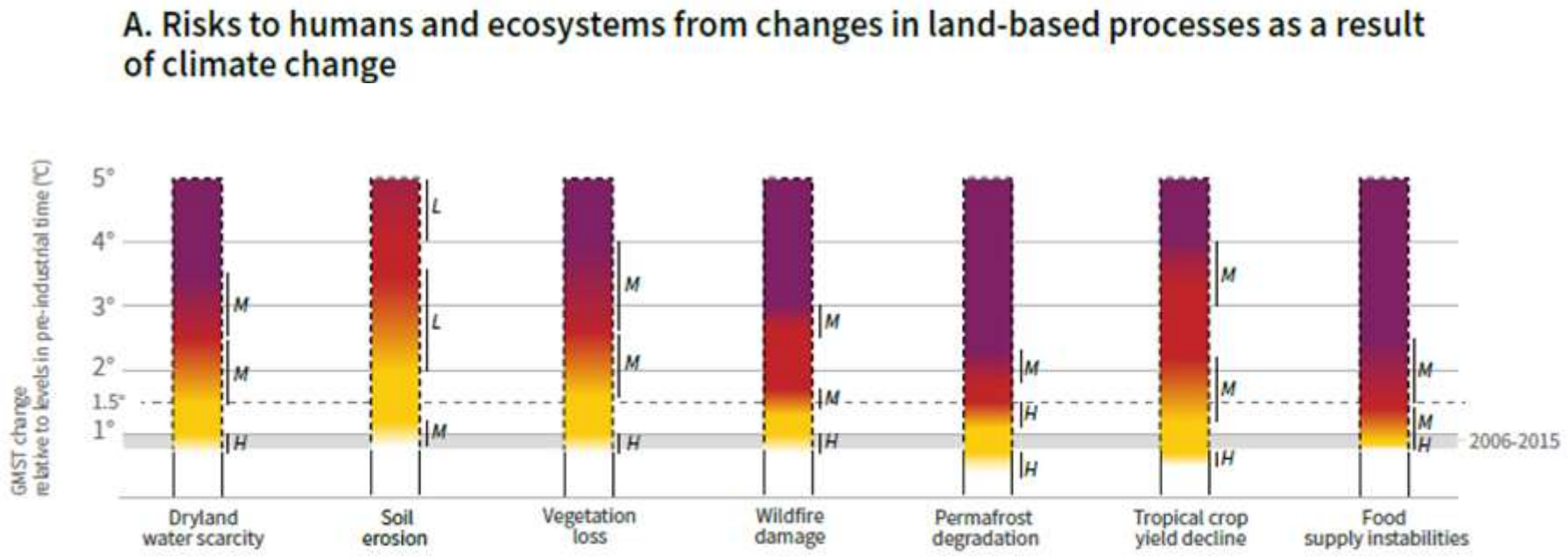
Climate change impacts

- *Scientific reports: IPCC, IPBES*
- *Projected climate impacts: on ecosystems and economy*



IPCC Special report on land (2019)

Agricultural sector climate resilience indicator

- **Composite *impact* indicator** to measure good status or progress of MS wrt to climate resilience of agriculture sectors
- Resilience, complex and multidimensional concept, implying short-term adjustment of existing practices and management, and long-term transformational change

Selection of components:

- financial, social/innovation, governance, biophysical.
- Use of already available indicators and data

Define «relative progress» toward resilience of each component:

- Ad-hoc methodology for each component.
- Comparing the evaluation period to a reference period
- 0 = no progress; 1= good status or progress

Synthesis of components' progresses

+ dashboard

Initial set of components

Framework for a comprehensive resilience analysis.
Initially based on a limited amount of sub-indicators (available data)

	Component
Financial	Risk management (R.5)
	Agricultural Factor Income (C.5/I.3)
Social Innovation	Not included
Biophysical	Water exploitation Index (WEI+) adapted to agriculture (I.17)
	Soil Organic Carbon in agricultural land (I.11)
	Crop Production stability (FAO/Eurostat).
	Crop diversification (Eurostat tbd)
Governance	Not included

Defining relative progress toward resilience of each component (JRC)

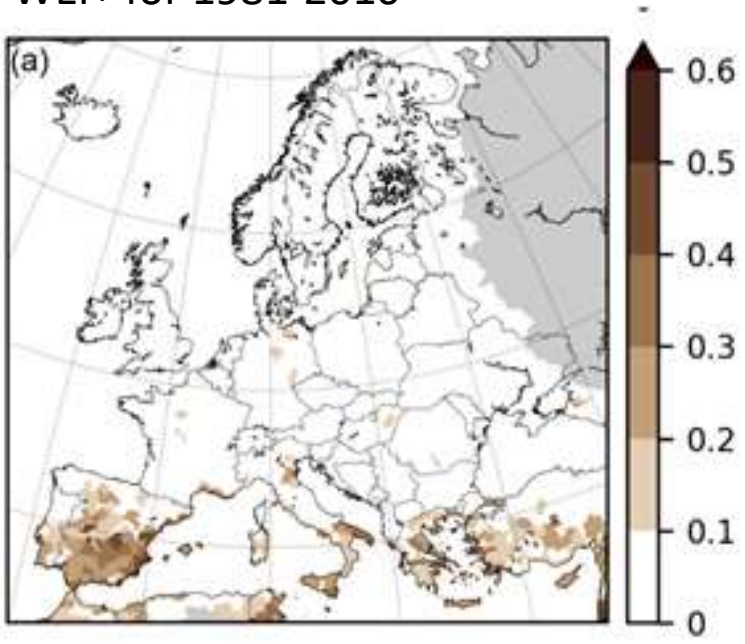
Harmonized analysis logics.

1. Important to separate variability from climate change. For some aspects of climate vulnerability it is best to use data for 30 years or longer. Likewise it is better to analyse regional data (e.g. NUTS2, NUTS3) than MS aggregated data to capture regional differences in farming systems, and climate.

2. In other cases it is more useful to compare the progress from current to next MEF. For some proposed components data collection will only start with new CAP. More work needed.

WEI+ Water exploitation sustainable water abstraction

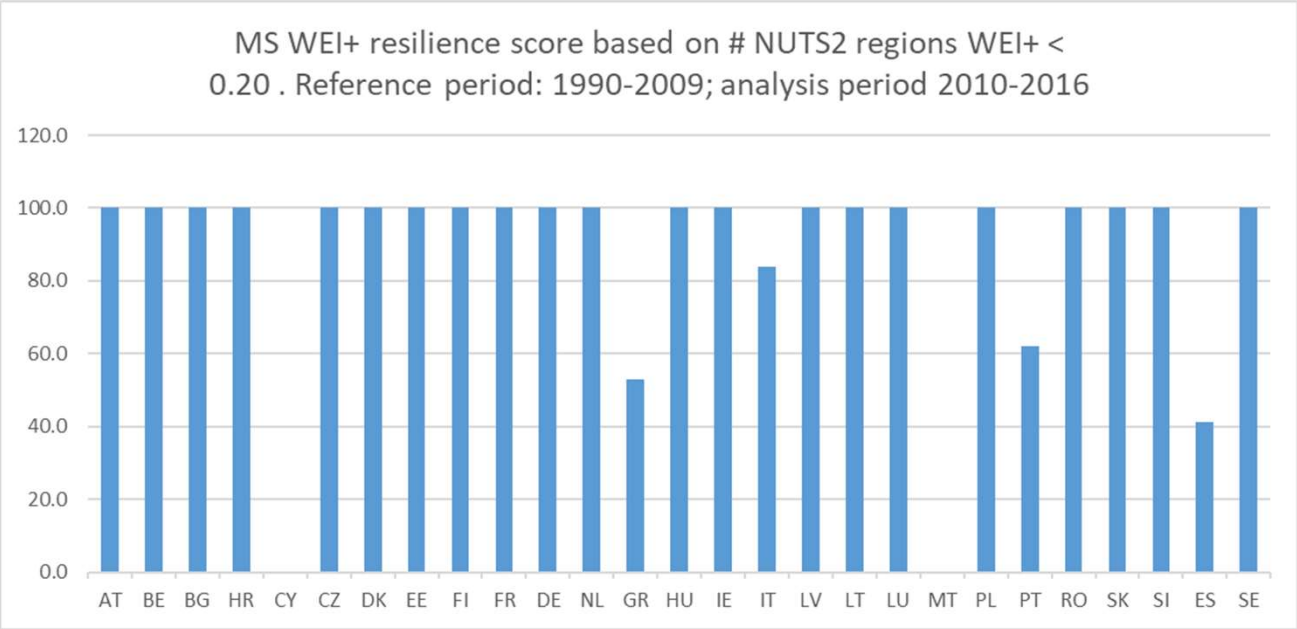
WEI+ for 1981-2010



- Reported by MS to EEA- annual MS aggregated For agriculture higher spatial resolution (NUTS2/3) and focus on cropping period more relevant
- Example here: LISFLOOD (@JRC) to assess the number of years exceeding WEI+ warning level (e.g. 0.2) on NUTS2
- Accounting for variability (wet years; dry years). Statistical approach to determine when progress is significant. Reference period 1990-2008 (29 years) versus recent period 2009-2016 (8 years)

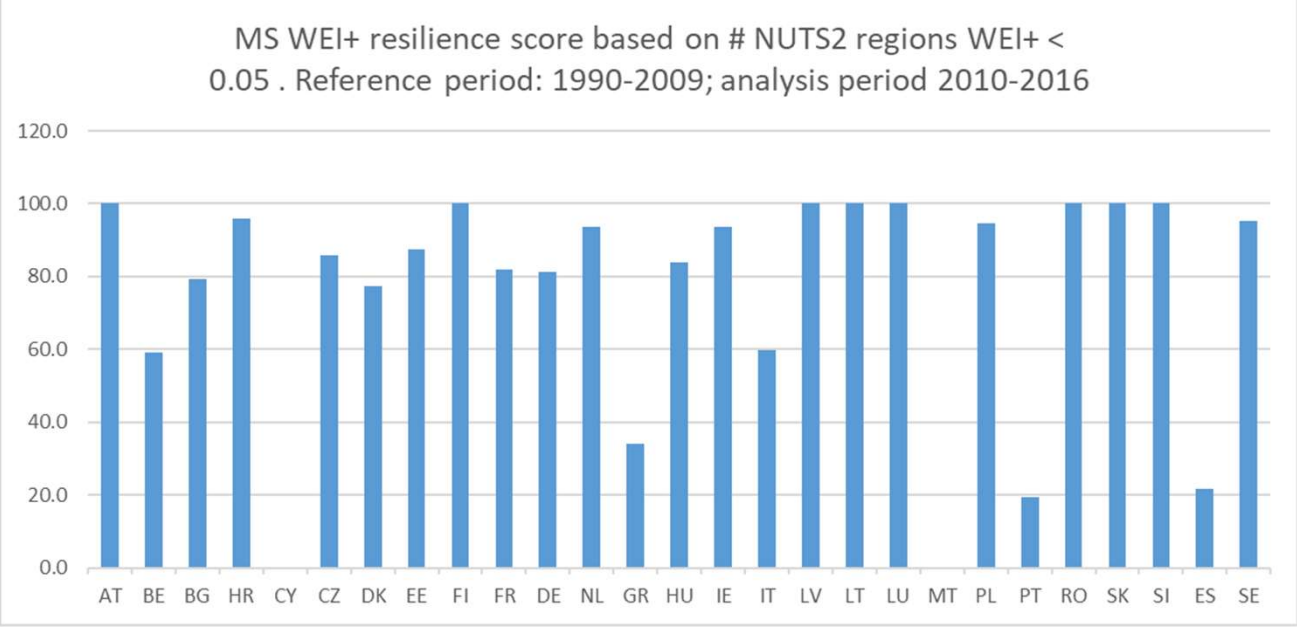
- Performance is **good** when in 8 year period a NUTS2 region has no exceedance of WEI+ threshold; it is improving if significant decline of # exceedance years compared to reference period.
- MS performance counts the # of NUTS2 regions that are good or improving.

WEI+ towards a progress index.



Threshold 0.2:

- 21 MS full resilience.
- 6 NUTS2 regions improved by a factor of two.



Threshold 0.05:
only 8 MS full resilience.
11 regions improved

threshold	#MS resilient
0.05	8
0.1	22
0.2	22
0.3	23
0.4	26
0.5	27

WEI+ towards a progress index

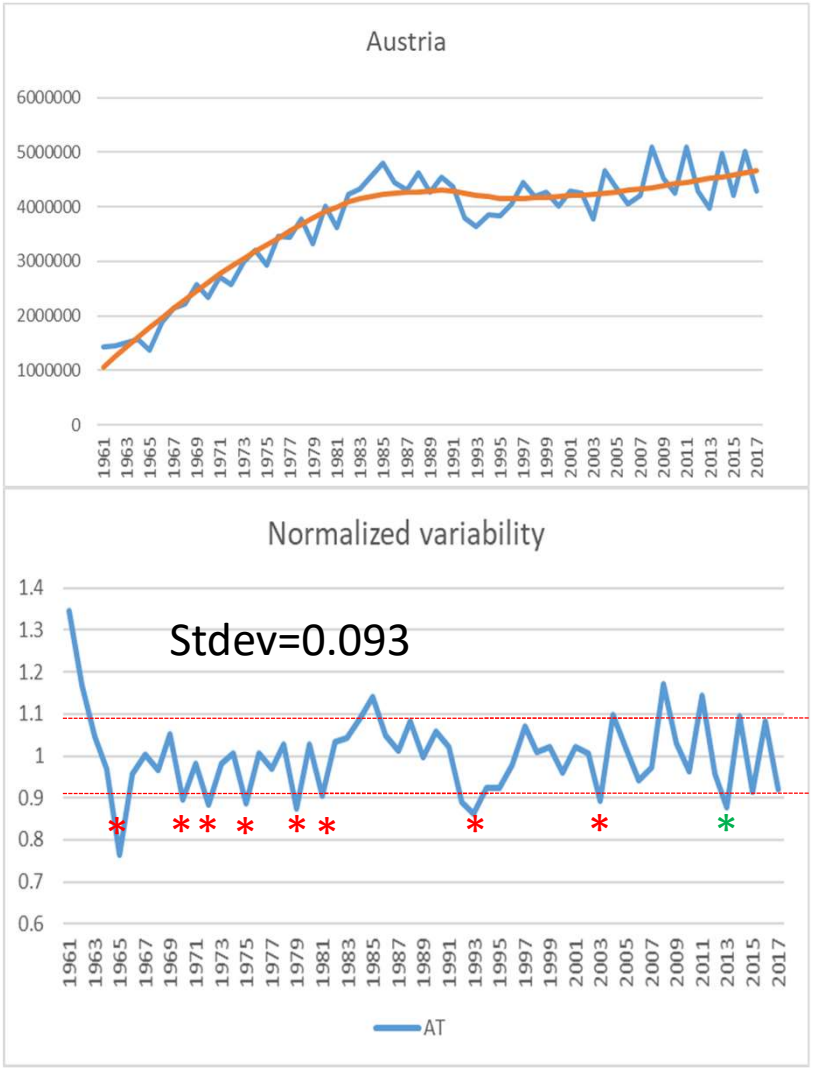
Possible improvements.

- Current MS reporting for MS- an average WEI+. Better NUTS2/NUTS3 and focus on agricultural regions.
- More relevant to focus on summer exceedances, e.g. using exceedance days.
- Eurostat uses a warning threshold of 20% for WEI+ to distinguishes a non-stressed from a water scarce region. Severe scarcity occurring where the WEI exceeds 40%. Using a threshold of 0.2, identifies only few countries with water scarcity issues. Would this pick-up the summer of 2018 in Northern Europe?
- Rewarding improvement - how much should # exceedance go down to count as progress?
- How to weigh into the composite indicator (i.e. for each MS 0/1; or 70%/80%?)

=> Technically these improvements are possible, but important to hear MS experts views

Production variability

Production variability of sum of wheat, maize, barley



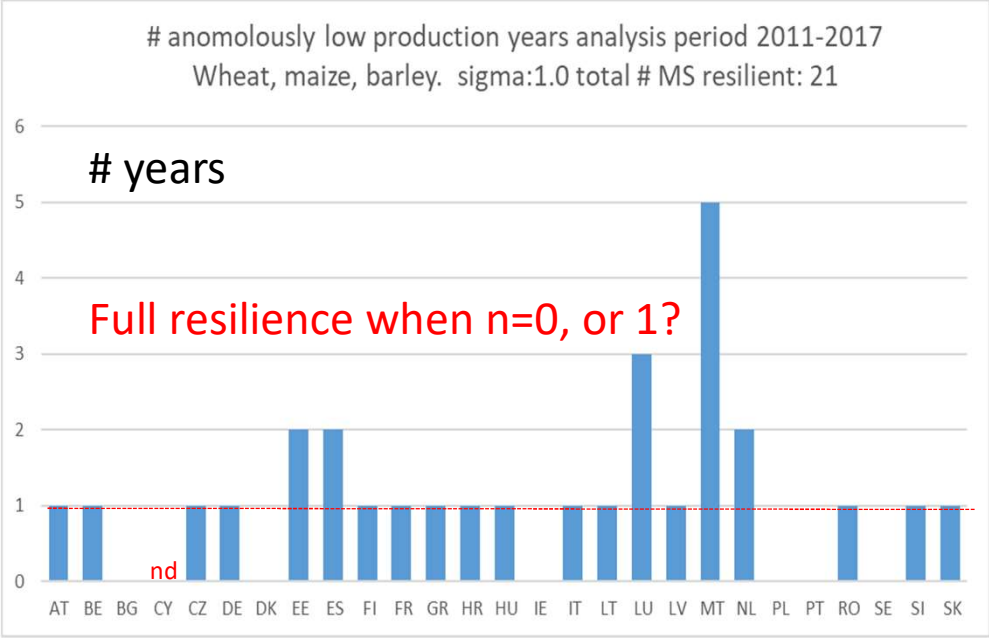
- Reported to Eurostat and FAOSTAT
- Reference period 1961-2010 (50 years), analysis period 2011-2017 (7 years).
- Only few MS provide complete production time series for NUTS2/3 regions
- Normalized production- and determine number of years with 'exceptional' variations.
- If variability in target period is declining compared to reference period, resilience is improving.
- Assume that it is normal to have 0 or 1 year with negative yield fluctuation (resilience=1).
- If substantial improvement wrg to reference period: resilience is 1.

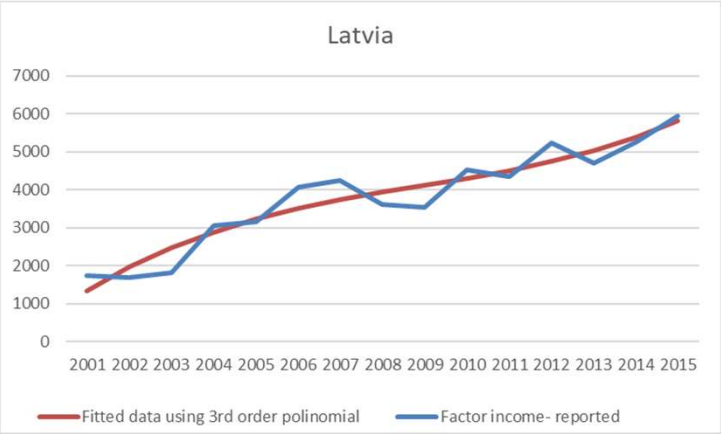
- In this example for AT, there are in 49 years 8 negative events, or every 6 years. It is likely that in the current period there is at least 1 or 2 years such an event (production resilience didn't change)
- Other example: If in the past every 3 years negative fluctuation, and in current period only 0 or 1 year: this is an improvement

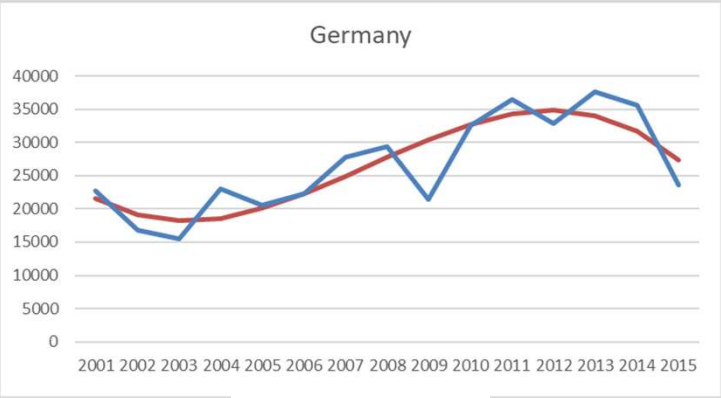
Production variability

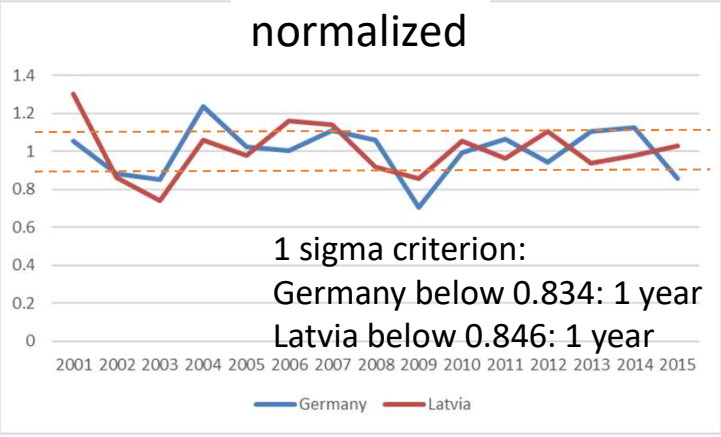
Possible improvements.

- Choice of crop or crops.
- Availability of sufficient and shorter statistics for some MS
- Choice of threshold values.
- Currently most MS do not have exceptionally large production variability, only few MS showed a significant change compared to baseline period.
- But indicator may pick up when climate impacts are becoming substantial.





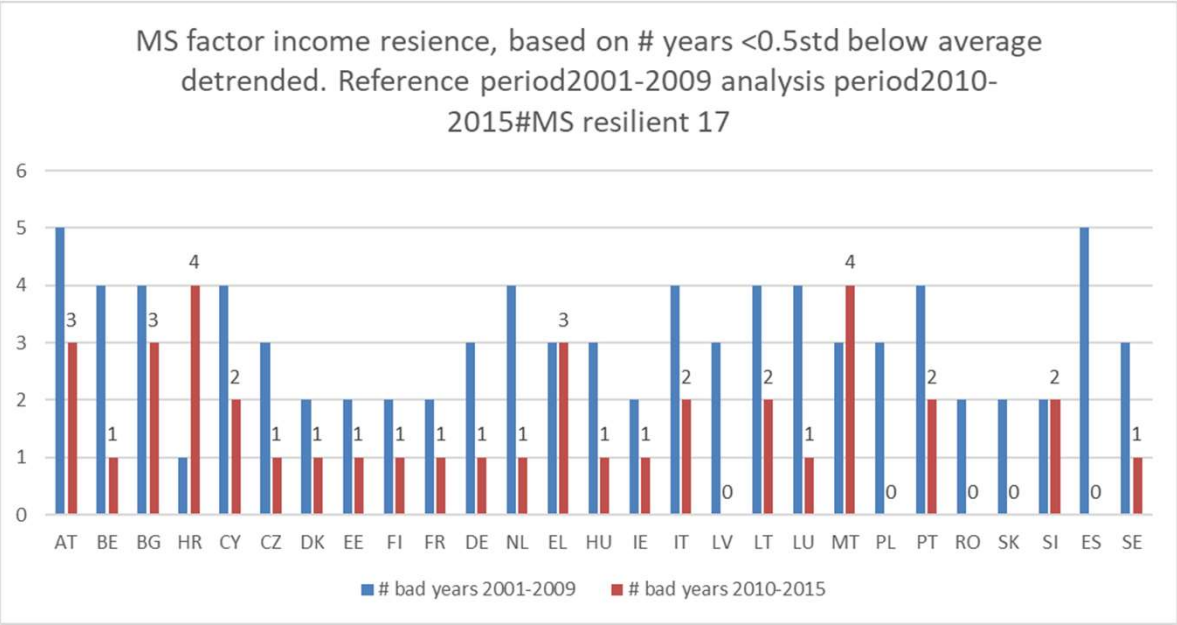




1 sigma criterion:
Germany below 0.834: 1 year
Latvia below 0.846: 1 year

C.5 Factor income

- Data Source Eurostat/AGRI
- Data availability 2001-2015; reference period 2001-2009 (8 years), analysis period 2010-2015 (6 years)
- Same procedure as for production



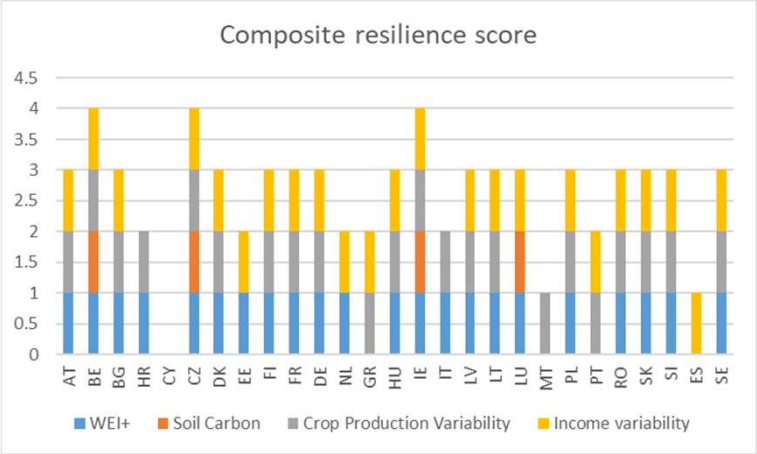
C.5 Factor income

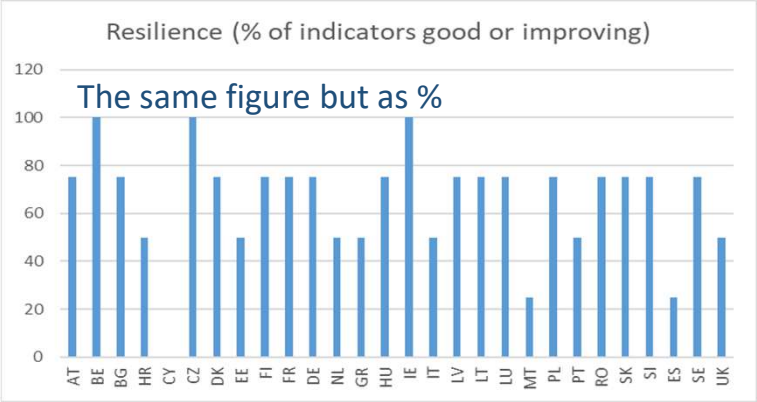
- Most MS had significantly less negative factor income fluctuation in recent compared to past period.

Possible improvements.

- Availability of sufficient statistics for some MS
- Assumes that a stable, predictable income leads to financial resilience and possibility to invest in management technologies.
- For some MS, incomes have increased substantially over the years. Should be factored in?
- Choice of threshold values
- No systematic correlation with production variability

Construction of composite indicator C.44/I.9



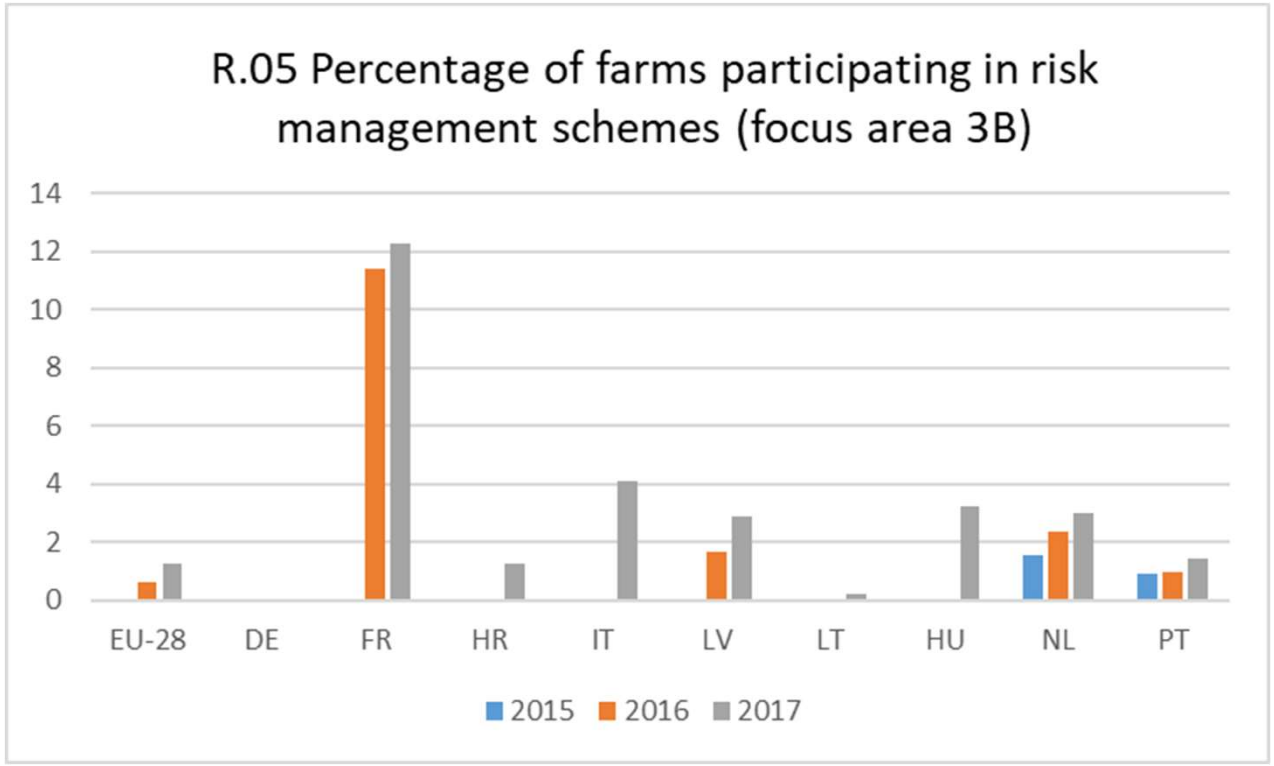


Possible improvements

- Value of composite indicator is mostly to raise awareness wrt resilience issues
- Summarizing needs some harmonization of underlying values - here just 0 or 1, but could be more detailed.
- How to avoid ‘false’ positive or negative statements?
- A variety of options of summarizing in composite indicator: stacked/%, dashboard, spider diagrams, fact sheets.
- What is most useful?

- There are many factors determining resilience; just a few are included now, and there are possibilities to make a more comprehensive framework.
- Indicator provides opportunities for MS to propose improvements, and share experience.

R.5 Risk management tools



- Only few countries report participation in risk management schemes under R.05, and numbers are small.
- Well known that national programs in several countries lead to substantial higher risk management schemes- i.e. insurance (e.g. France, Spain, ….)
- R.05 Continues under new CAP- so keep it included.
- Optionally to complement with national data to get more meaningful statistics?

C.45 – Direct agricultural loss attributed to disasters

- **Indicator presentation**
- **Discussion**

Contacts: Thaïs Leray (CLIMA); Frank Dentener (JRC); Nicola di Virgilio (AGRI)

- *Measures direct agricultural losses attributed to disasters*

= Sendai monitoring framework indicator C2

Impact to agriculture = Direct crop loss + direct livestock loss+ direct forestry loss + direct aquaculture loss + direct fisheries loss

- *Takes into account specificities of each countries and subsector*

- *23 MS engaged on reporting under this framework (all targets)*
- *13 reporting economic loses in the agriculture sector due to disasters*
- *5 have validated their data*

- *UNDRR Technical note on data and methodology (p.36 →)*

European Commission

DISASTER IMPACT ON PRODUCTION	
Items	**Measurement**
Stocks: **Stored inputs** (Seeds, fertiliser, feed, fodder, etc.) **Stored production** (Crops, livestock produce, fishes, logs, etc.) **Perennial trees**	1. Pre-disaster replacement value of destroyed stored production and inputs
Production **Value of lost crops, livestock, forestry, aquaculture production and fisheries capture production** (excluding stored outputs, already stated above)	2. Difference between expected and actual value of production (crops, livestock, forestry, aquaculture production and fisheries capture) in disaster year For perennial crops and forestry: 2. Pre-disaster value of fully destroyed standing crops and trees and Discounted expected value of crop production in fully affected harvested area until full recovery For livestock and aquaculture: 2. Discounted foregone value of livestock products from dead livestock until full recovery 3. Temporary costs incurred towards the maintaining of post-disaster agricultural and farming/fishing activities

DISASTER IMPACT ON ASSETS	
Items	**Measurement**
Machinery, equipment and tools [13] used in crop and livestock farming, forestry, fisheries, aquaculture, apiculture	Total destruction: replacement cost of fully destroyed assets at pre-disaster price Partial destruction: repair/rehabilitation cost of partially destroyed assets at pre-disaster price

Initially proposed list- but some were deleted do not show

	Indicator
Financial	1 R.5 Share of farms with CAP risk management tools
	2 C24 Factor income
	3 Number of farms with other gainful activities
Governance	4 R.12 Adaptation to climate change: Share of agricultural land under commitments to improve climate adaptation
	5 R.23: Environment-/climate-related performance through investment: Share of farmers with support in investments related to care for the environment or climate
Social innovation	6 O.7 Number of beneficiaries subject to enhanced income support for young farmers (or ha)
	7 R.1 Share of farmers receiving support for advice, training, knowledge exchange, or participation in operational groups to enhance economic, environmental, climate and resource efficiency performance
	8 O.1 Number of EIP operational groups
Environmental Climate	9 WEI+ (modified for farming)
	10 Soil carbon
	11 Crop production stability
	12 Crop diversity (rotation)

Questions?