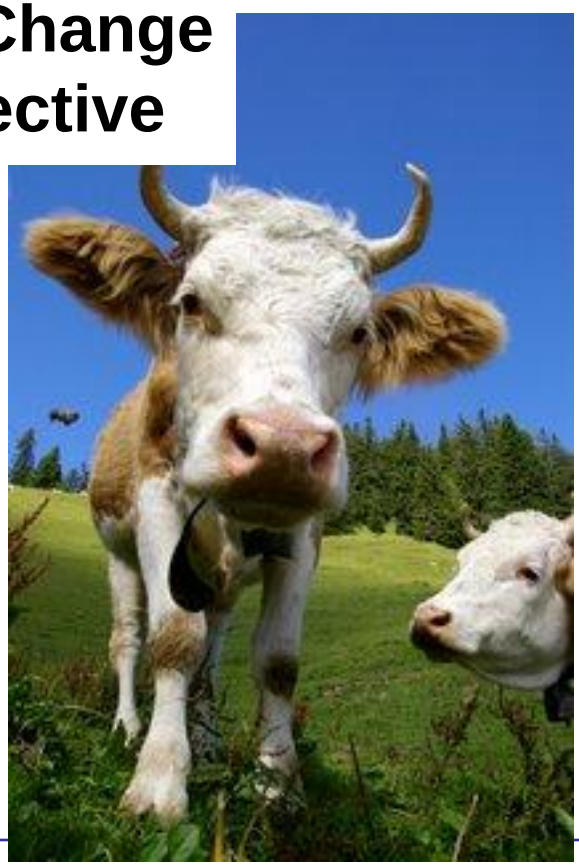
Agriculture and Climate Change from a European perspective



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The challenge: Mitigation and Adaptation

- Agriculture contributes to GHG emissions and Climate Change
- Agriculture is more dependent on the weather and climate than any other sector (extreme weather events, changes in hydrological regimes → too much vs. too little water, income loss etc.)

Arctic
Temperature rise much larger than global average
Decrease in Arctic sea ice coverage
Decrease in Greenland ice sheet
Decrease in permafrost areas
Increasing risk of biodiversity loss
Intensified shipping and exploitation of oil and gas resources

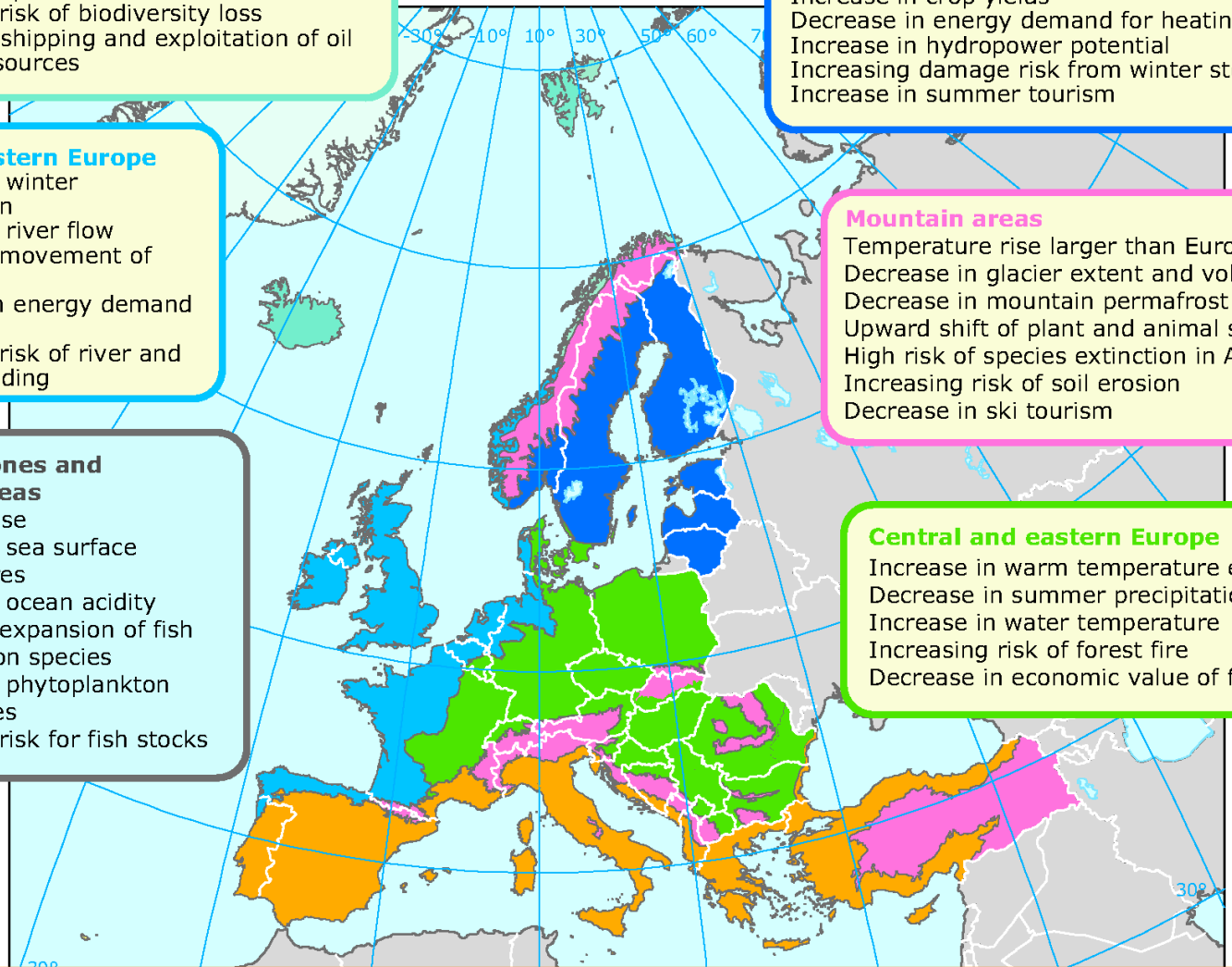
Northern Europe
Temperature rise much larger than global average
Decrease in snow, lake and river ice cover
Increase in river flows
Northward movement of species
Increase in crop yields
Decrease in energy demand for heating
Increase in hydropower potential
Increasing damage risk from winter storms
Increase in summer tourism

North-western Europe
Increase in winter precipitation
Increase in river flow
Northward movement of species
Decrease in energy demand for heating
Increasing risk of river and coastal flooding

Mountain areas
Temperature rise larger than European average
Decrease in glacier extent and volume
Decrease in mountain permafrost areas
Upward shift of plant and animal species
High risk of species extinction in Alpine regions
Increasing risk of soil erosion
Decrease in ski tourism

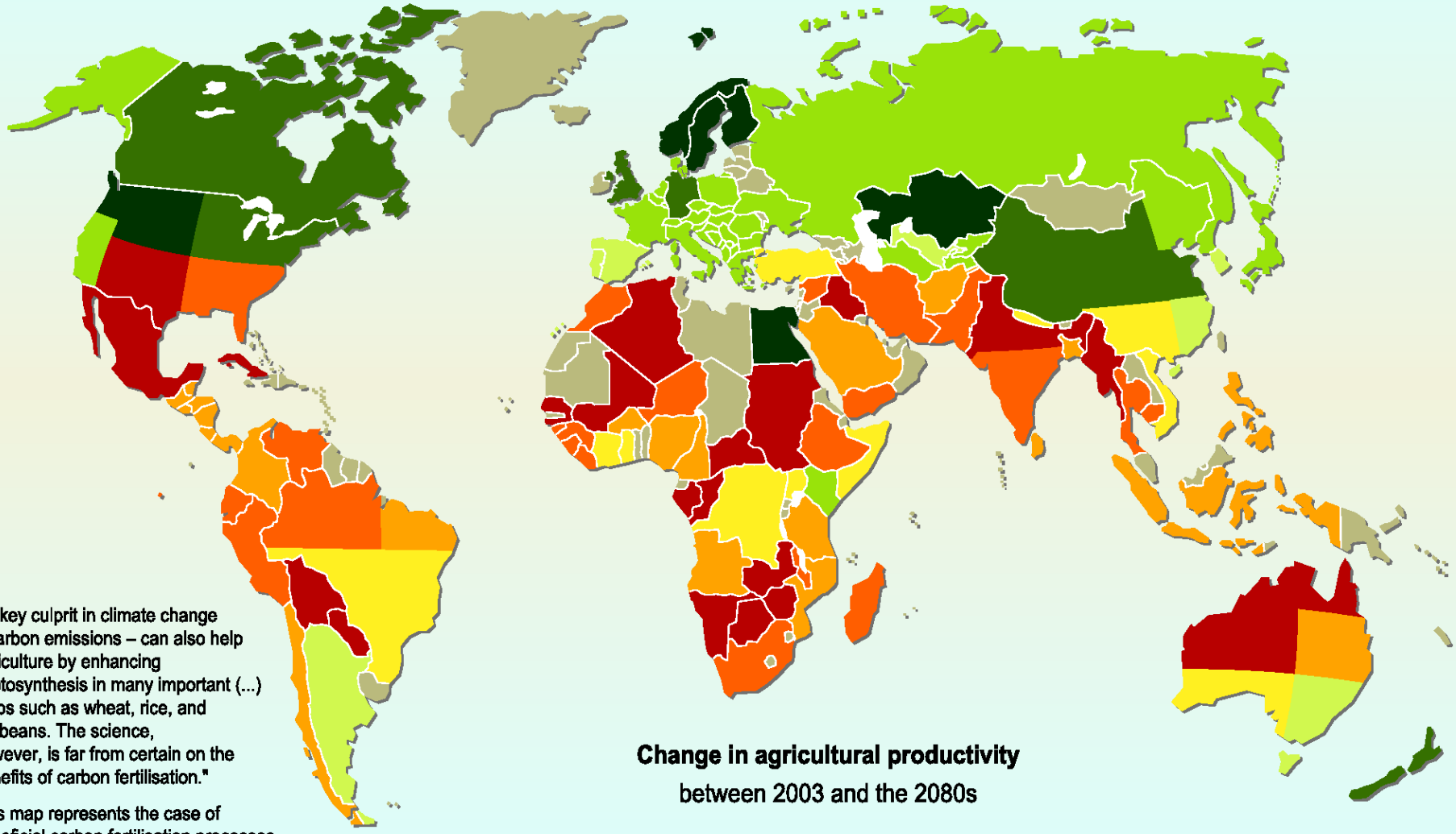
Coastal zones and regional seas
Sea-level rise
Increase in sea surface temperatures
Increase in ocean acidity
Northward expansion of fish and plankton species
Changes in phytoplankton communities
Increasing risk for fish stocks

Central and eastern Europe
Increase in warm temperature extremes
Decrease in summer precipitation
Increase in water temperature
Increasing risk of forest fire
Decrease in economic value of forests



Source: EEA 2010: The European Environment

Projected impact of climate change on agricultural yields



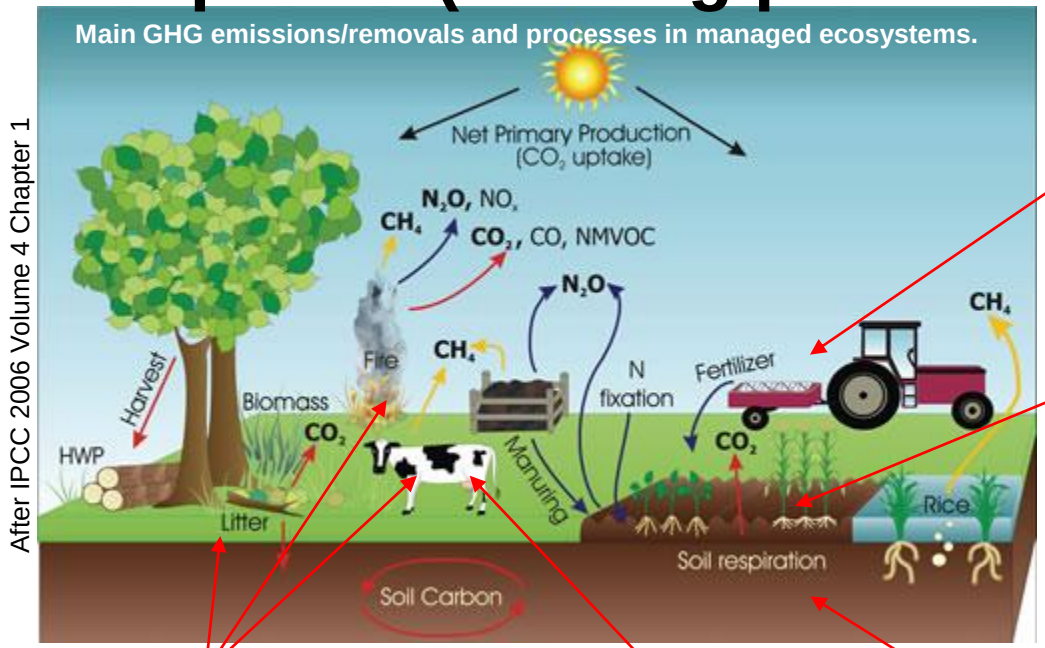
" A key culprit in climate change – carbon emissions – can also help agriculture by enhancing photosynthesis in many important (...) crops such as wheat, rice, and soybeans. The science, however, is far from certain on the benefits of carbon fertilisation."

This map represents the case of beneficial carbon fertilisation processes.

Source: Cline W., 2007, *Global Warming and Agriculture.*

Mitigation options (farming practices)

Offset farm emissions
Wind power
Hydro power
Solar power
Forestry
Agri-forestry



Reduce N inputs
Precision application
Biofertiliser application
N-fixing crops

Improved crop efficiency
Genetic selection
GMO legume cereals

Improved waste management
Biodigesters
Composting
Soil incorporation

Improved cultivation efficiency
Minimum cultivation
Combined cultivation operations
N-fixing crops

Improved energy efficiency
Energy efficient equipment
Green energy

Improved feed conversion
Genetic selection
Improved digestibility

Further environmental benefits of mitigation measures

Mitigation measure	Soil erosion control	Nutrient loss reduction	Soil water conser-vation	Genetic diversity	Micro-climate modify-cation	Land use change
Catch crops etc	+	+	–			
Reduced tillage	+		+			
Residue management	+		+		–	
Extensification						+
Fertiliser application		+				
Fertiliser type		+				
Rotation species	+	+		+		
Adding legumes	+	+		+		
Permanent crops	+	+	–	+		
Agroforestry	+	+			+	
Grass in orchards & vineyards	+	+	–		–	
Optimising grazing intensity			+			
Length and timing of grazing	+					
Grassland renovation				+		
Optimising storage manure						
Application techniques						
Application to cropland vs grassland			+			
Peatland management						+

Adaptation measures (examples)

- Current policy focus on reducing the risk of flooding (from sea level rise or from increased runoff)
- Greater awareness and greater adoption and/or consideration of adaptive measures in the southern Member States (e.g. increase capture and storage of water to ensure adequate supplies)
- Improved water management in irrigated agriculture (traditional open-air channels being substituted by pipes and a centralized water reservoir in Spain)
- Use of wastewater for crop irrigation and water desalination
- Wetland creation and restoration in Sweden (storage basin for irrigation, facilitate nutrient retention, flood prevention etc.)

Adaptation measures (examples)

- Reduce forest fire risk (Spain, Bulgaria): fire precaution strips, provision of water points for fire fighting, construction and improvement of forest roads
- Adapting varieties to diverse and marginal conditions (e.g. drought/heat-tolerant, crops that are less water demanding); modification in the planting of crops
- Controlling farm field drainage (Sweden, Finland)
- Reconstruction of outdated water supply networks in rural municipalities (in new MSs)
- Improvements in irrigation equipment, collection and storage of rainwater and restoration of dams for aquifer recharge (Malta)
- Building capacity of rural stakeholders

Thank you for listening.

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