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People and Environment

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Associate Professor

Department of Environment
University of the Aegean

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an interaction & a balance

- People rely on the environment to fulfil a variety of needs (water, food, energy, fibers)
- Environment, culture and needs affect the way people use their lands (cities, rural areas)
- Increased population → increased urbanization (cities) and industrialization
- ~50% of word population lives in big cities

Environmental problems ?

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Too many..

- Climate Change
- Agricultural waste
- Water use and water pollution
- Air pollution
- Ozone depletion
- Loss of biodiversity
- Loss of habitat
- Hazardous chemicals
- Energy and energy use
- …

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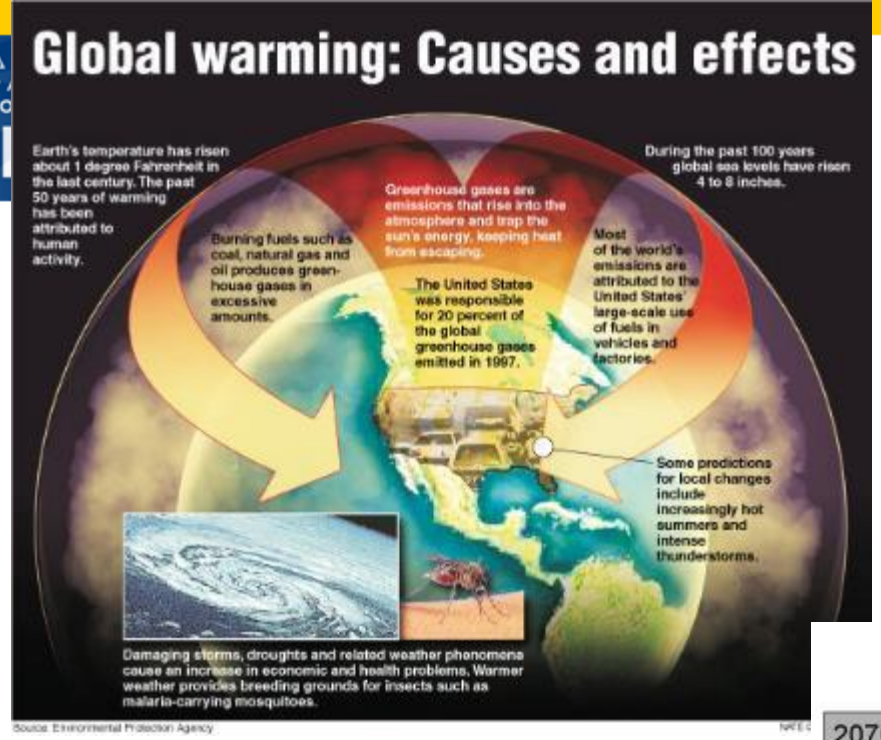
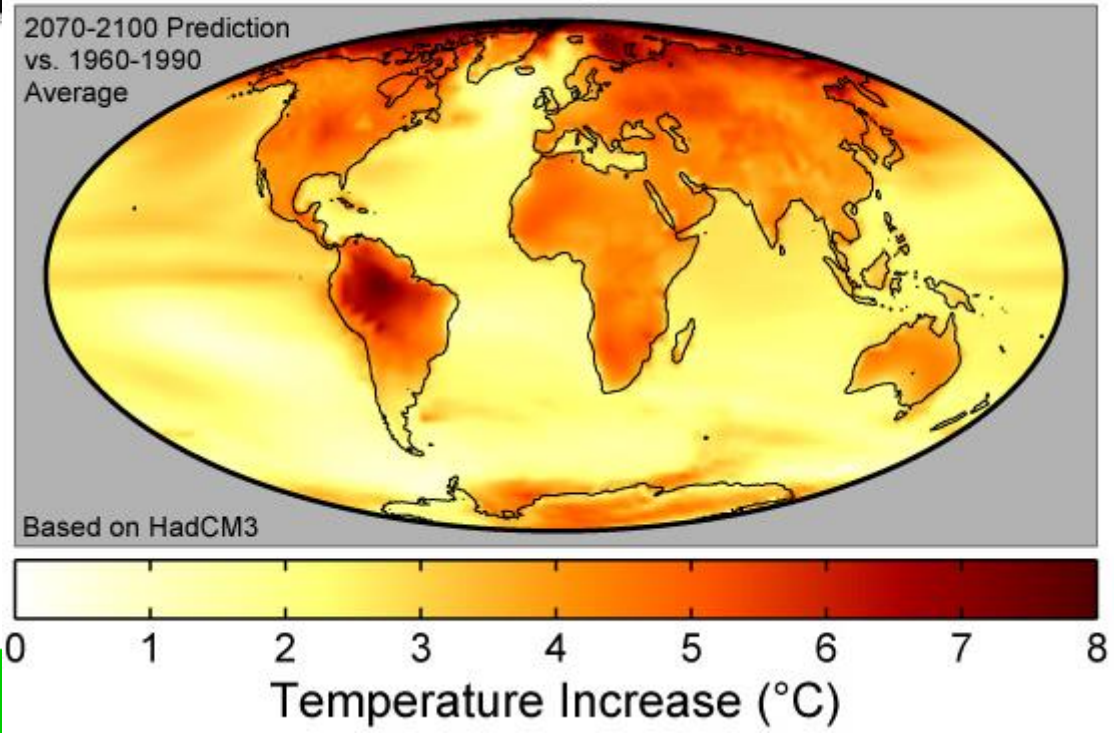
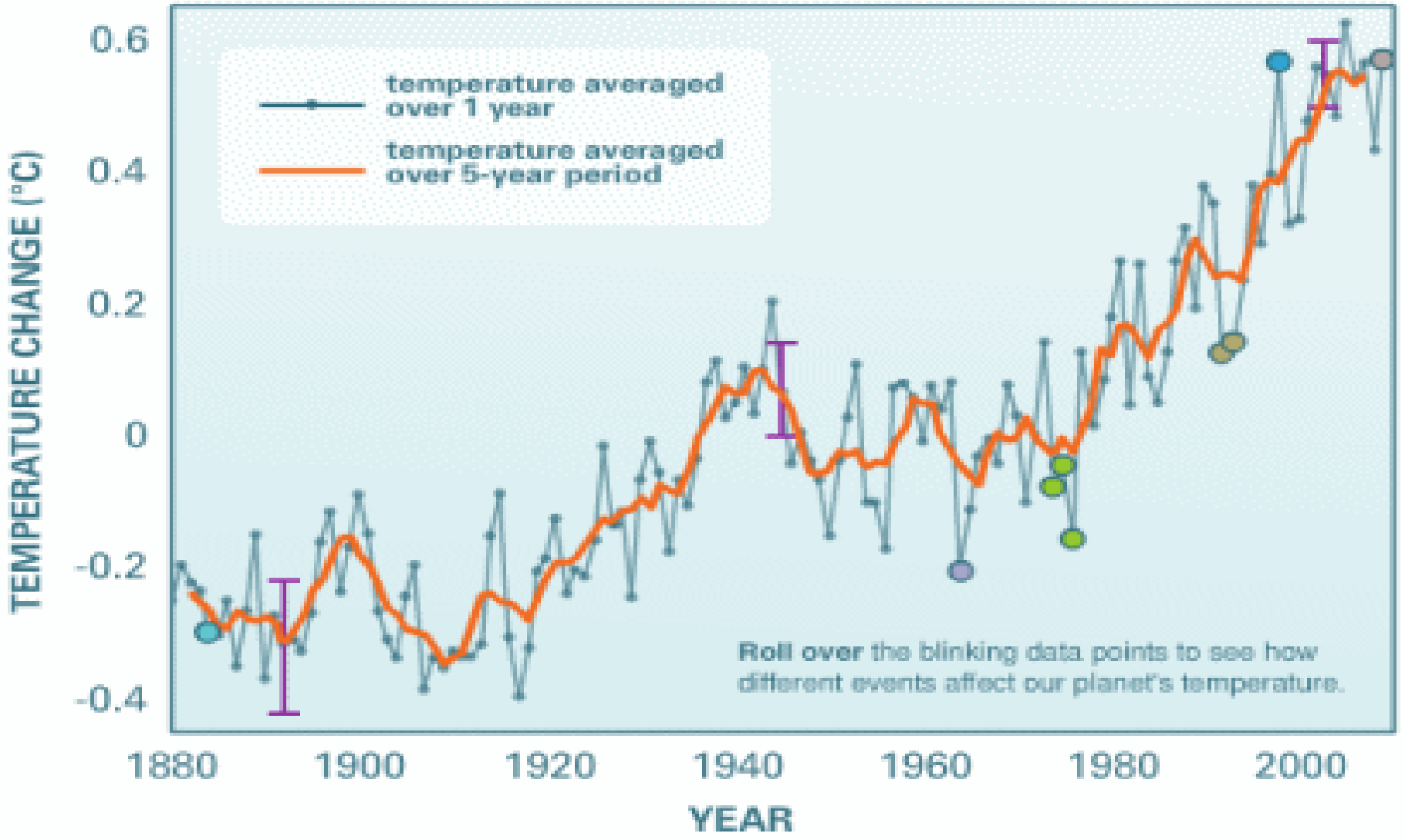

Global warming: Causes and effects
Earth's temperature has risen about 1 degree Fahrenheit in the last century. The past 50 years of warming has been attributed to human activity.
Burning fuels such as coal, natural gas and oil produces green-house gases in excessive amounts.
Greenhouse gases are emissions that rise into the atmosphere and trap the sun's energy, keeping heat from escaping.
The United States was responsible for 20 percent of the global greenhouse gases emitted in 1997.
During the past 100 years global sea levels have risen 4 to 8 inches.
Most of the world's emissions are attributed to the United States' large-scale use of fuels in vehicles and factories.
Some predictions for local changes include increasingly hot summers and intense thunderstorms.
Damaging storms, droughts and related weather phenomena cause an increase in economic and health problems. Warmer weather provides breeding grounds for insects such as malaria-carrying mosquitoes.
Source: Environmental Protection Agency


1928
2004


GLOBAL
WARMING


Global Warming Predictions
2070-2100 Prediction
vs. 1960-1990
Average
Based on HadCM3
0
1
2
3
4
5
6
7
8
Temperature Increase (°C)

CLIMATE CHANGE



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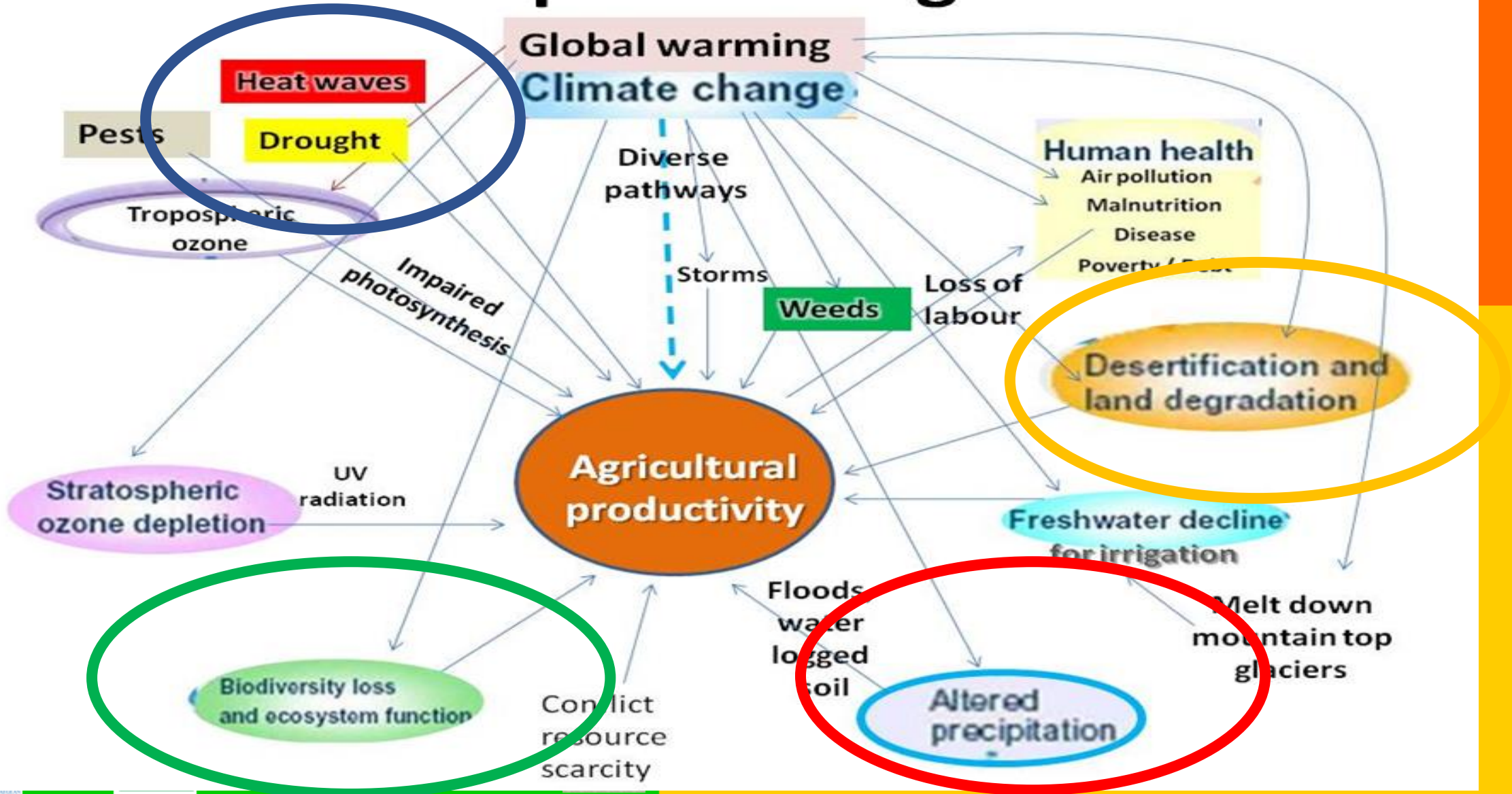
Multiple impacts of global warming and climate disruption on agriculture



CLIMATE CHANGE

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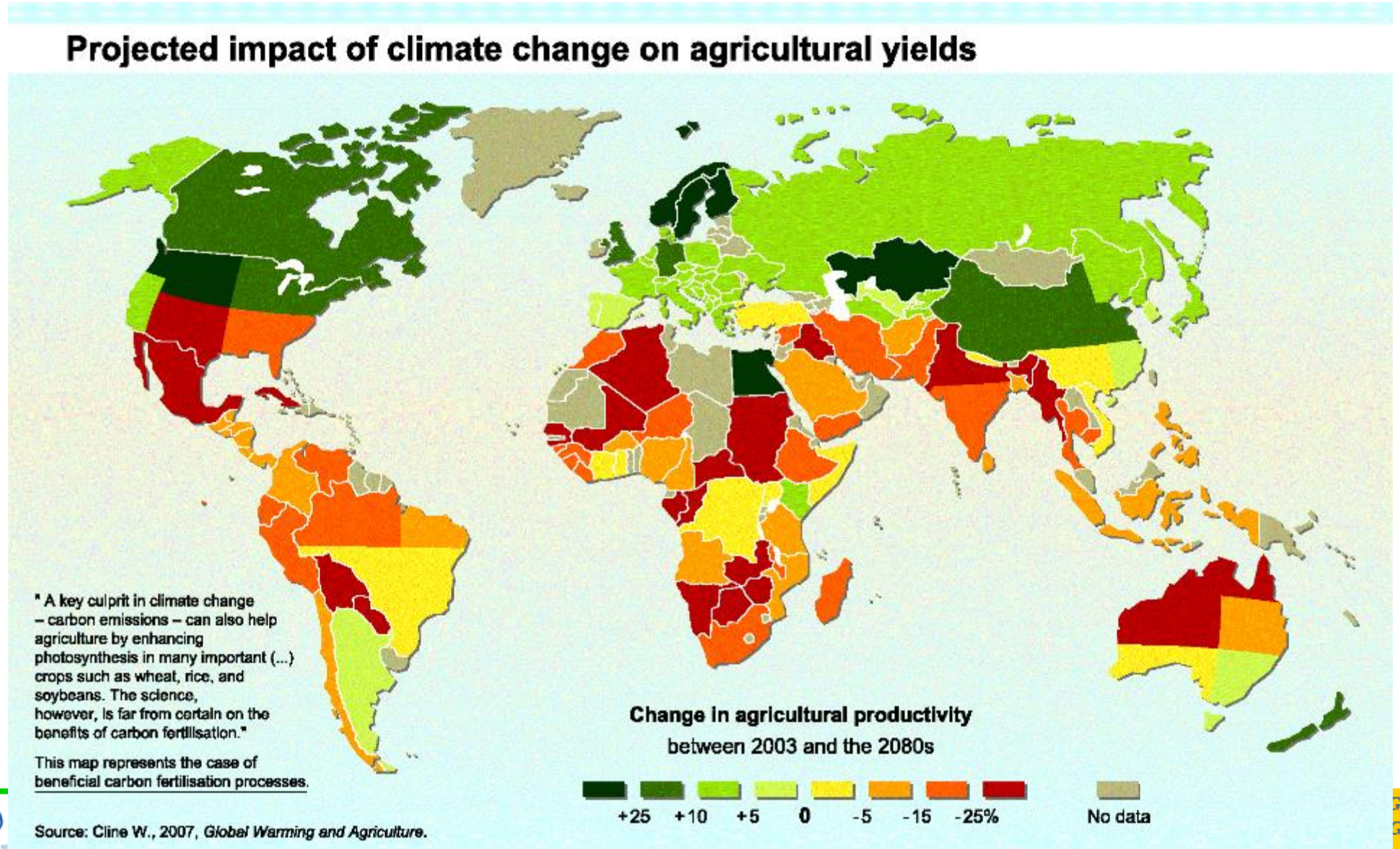
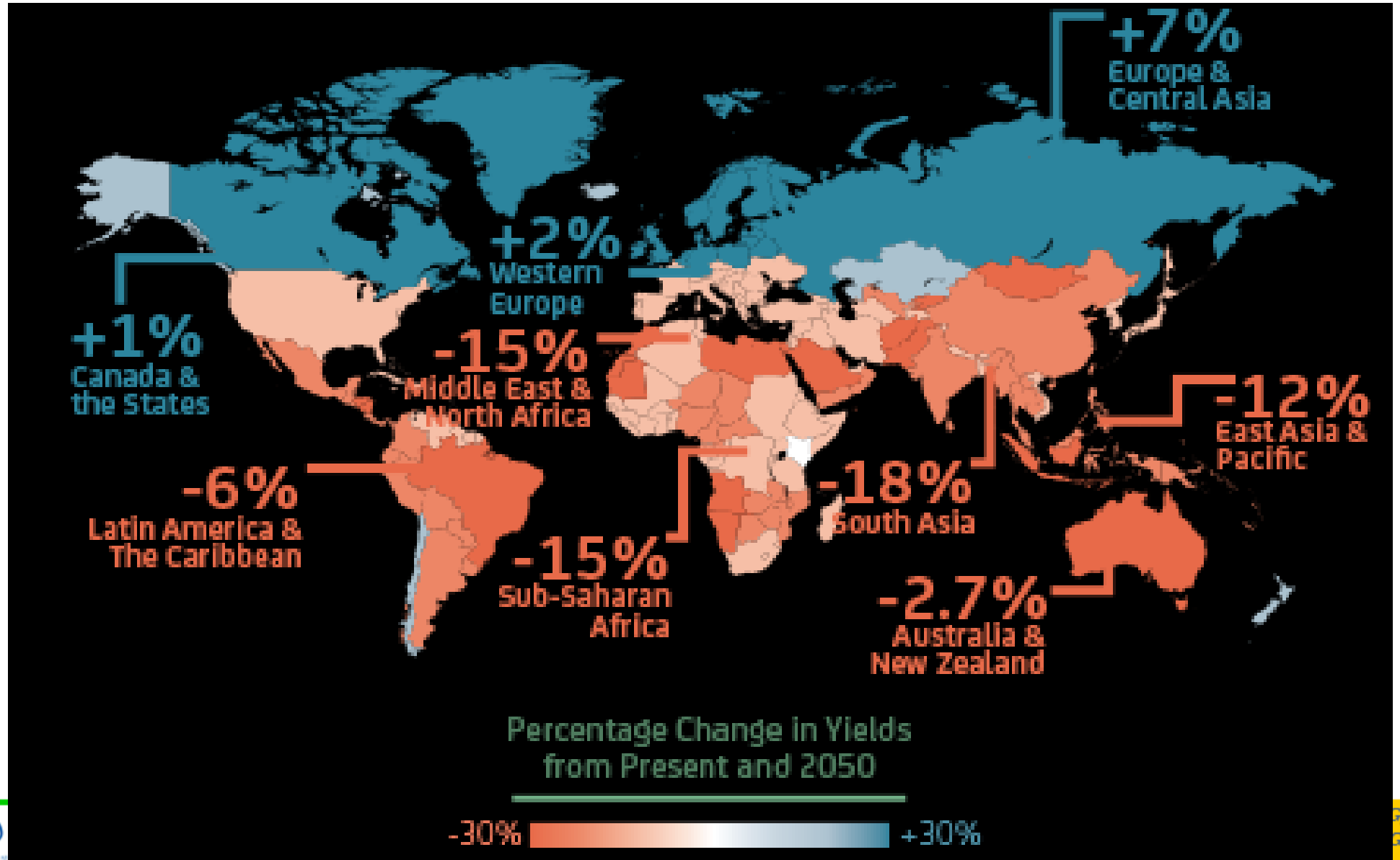


CLIMATE CHANGE



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CLIMATE CHANGE

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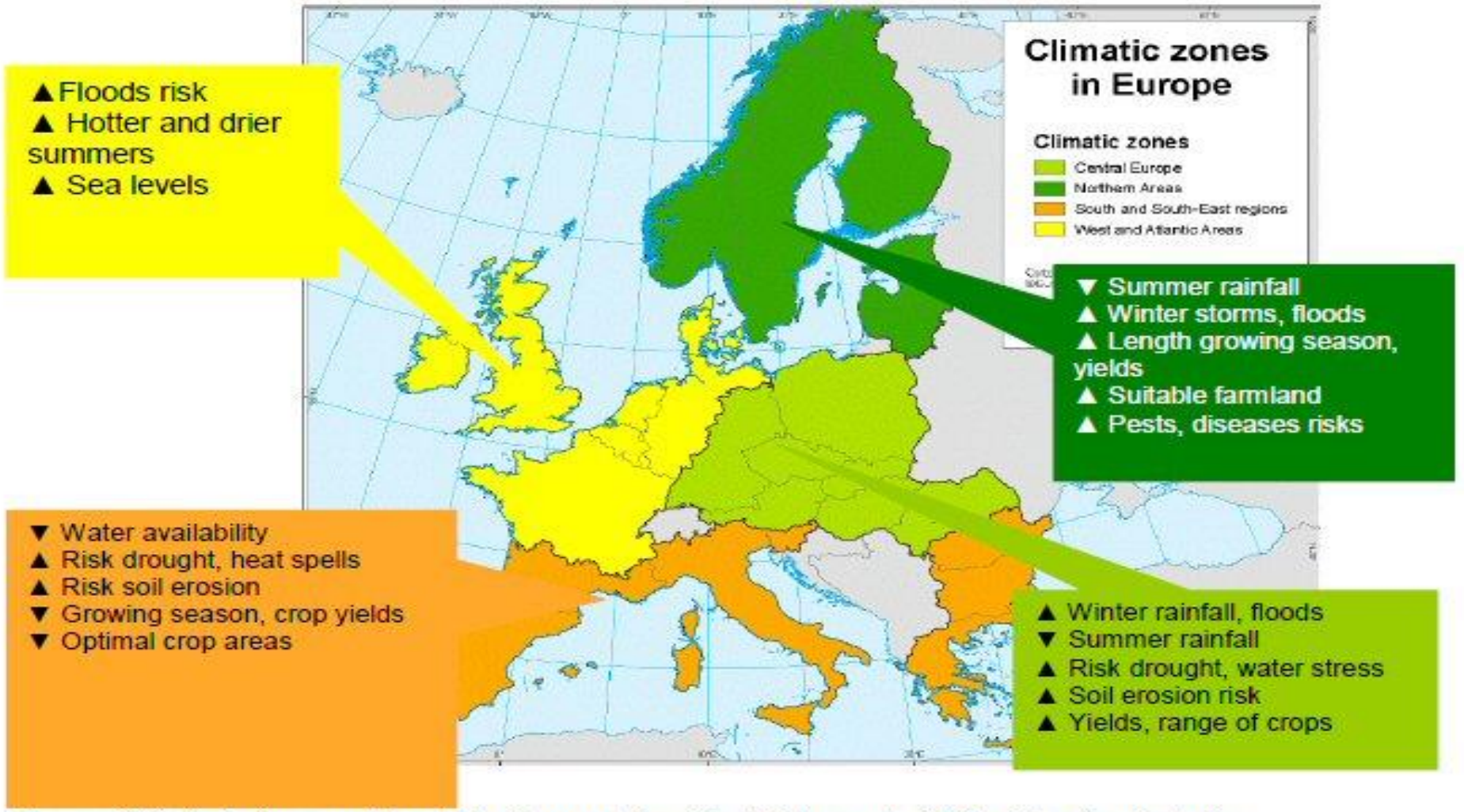
Climate change – Possible impacts on EU agriculture



Source: DG Agriculture and Rural Development, based on EEA reports, JRC and academic studies

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Agricultural waste

Agricultural waste

- Agricultural waste is waste produced as a result of various agricultural operations. It includes manure and other wastes from farms, poultry houses and slaughterhouses; harvest waste; fertilizer run- off from fields; pesticides that enter into water, air or soils; and salt and silt drained from fields.

Organisation for Economic Co-operation and Development (OECD)

https://stats.oecd.org/glossary/detail.asp?ID=77

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ALL THE WASTE TYPES GENERATED IN EUROPE

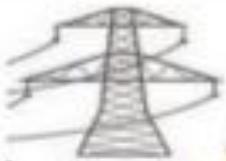
• Agricultural waste	30 – 80%
• Electrical and electronic waste	0.4 %
• Mining waste	28 – 30 %
• Construction and demolition waste	25 %
• Hazardous waste	1 %
• Industrial waste	2 %
• Municipal waste	10 – 15 %

Recycling of agricultural wastes

Fruit & Vegetable Waste

Animal Manure

Automotive Grade Fuel



Power

Heat

Heating & Chilling

Crop Residue

Dairy waste

Poultry Waste

Agriculture / Energy Crops

Hydrolysis

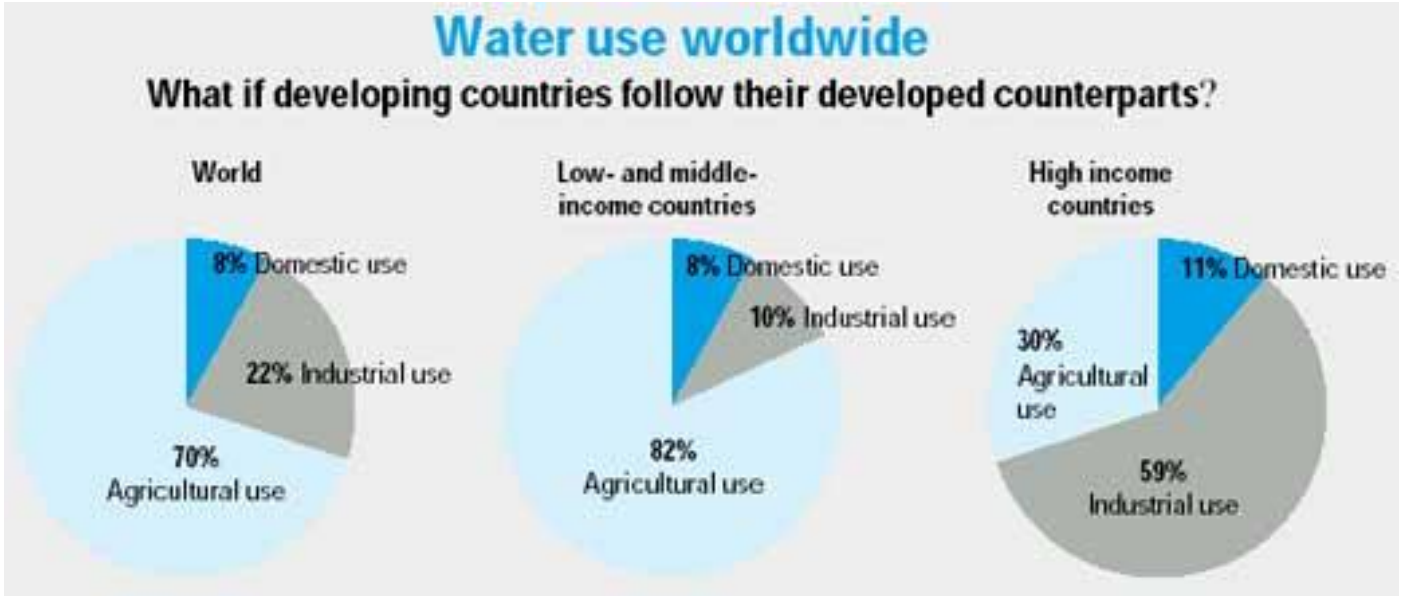
Biogas

Anaerobic Digester

Clean Fuel For Cooking

Nutrient Rich Fertilizer

Water Use & Agricultural water pollution



Food and Agriculture Organization of the United Nations

aquastat

https://www.google.com/url?q=http://www.fao.org/nr/water/aquastat/water_use/index.stm&sa=U&ved=0ahUKEwi3jfHCnujUAhUJXBQKHdcBATEQFggEMAA&client=internal-uds-cse&usg=AFQjCNEG2ONXc6YUOioSrSxf9PmiImKG5g

- According to FAO 58% of all water pollution is alone from agriculture

http://www.fao.org/nr/water/aquastat/maps/World-Map.WithA.Twith_eng.htm

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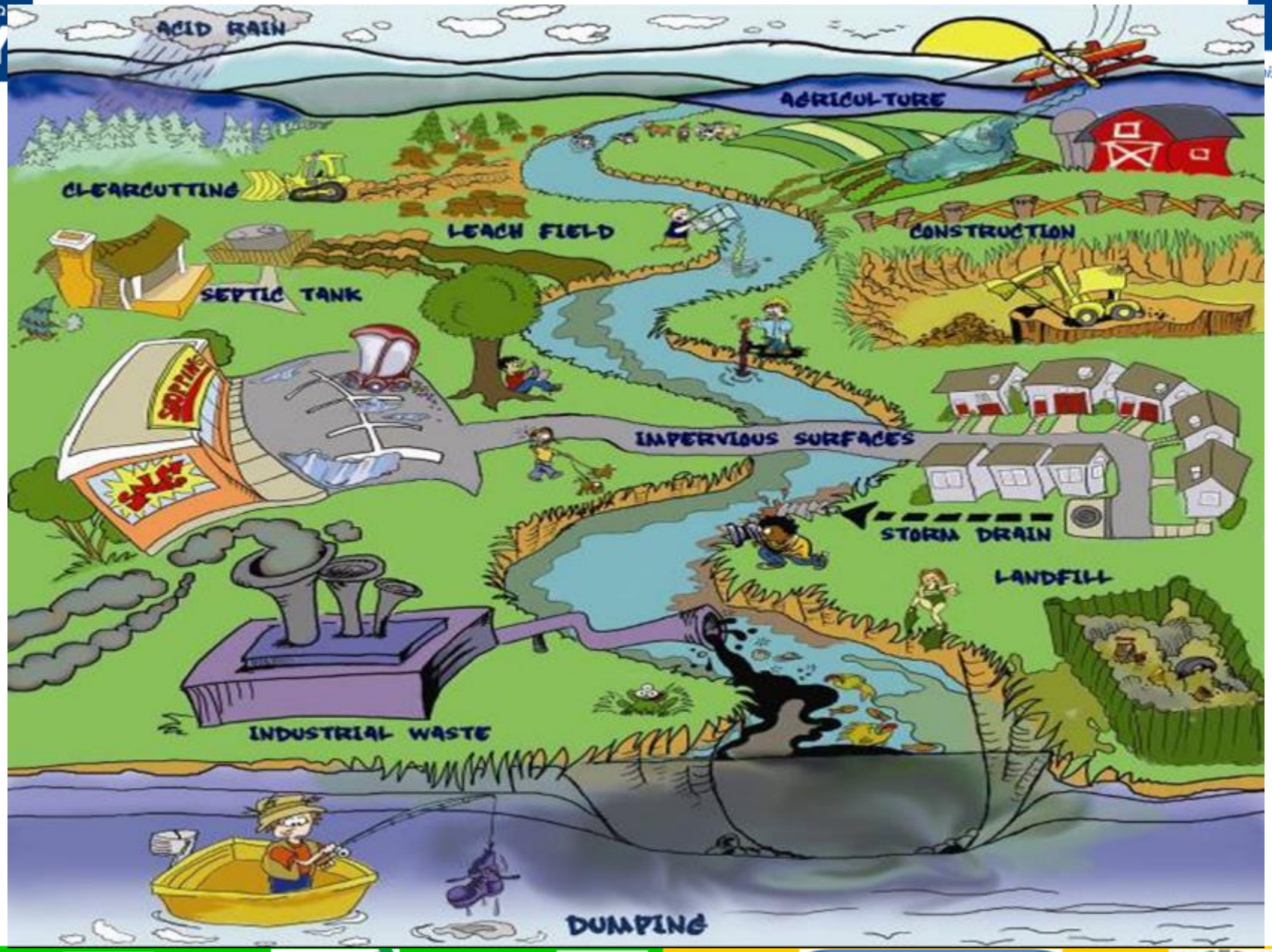
ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ
ΙΚΥ



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Water pollution

- Addition of unwanted wastes in water bodies that can change their characteristics
- Excessive use of fertilizers and pesticides
- Waste water reuse?

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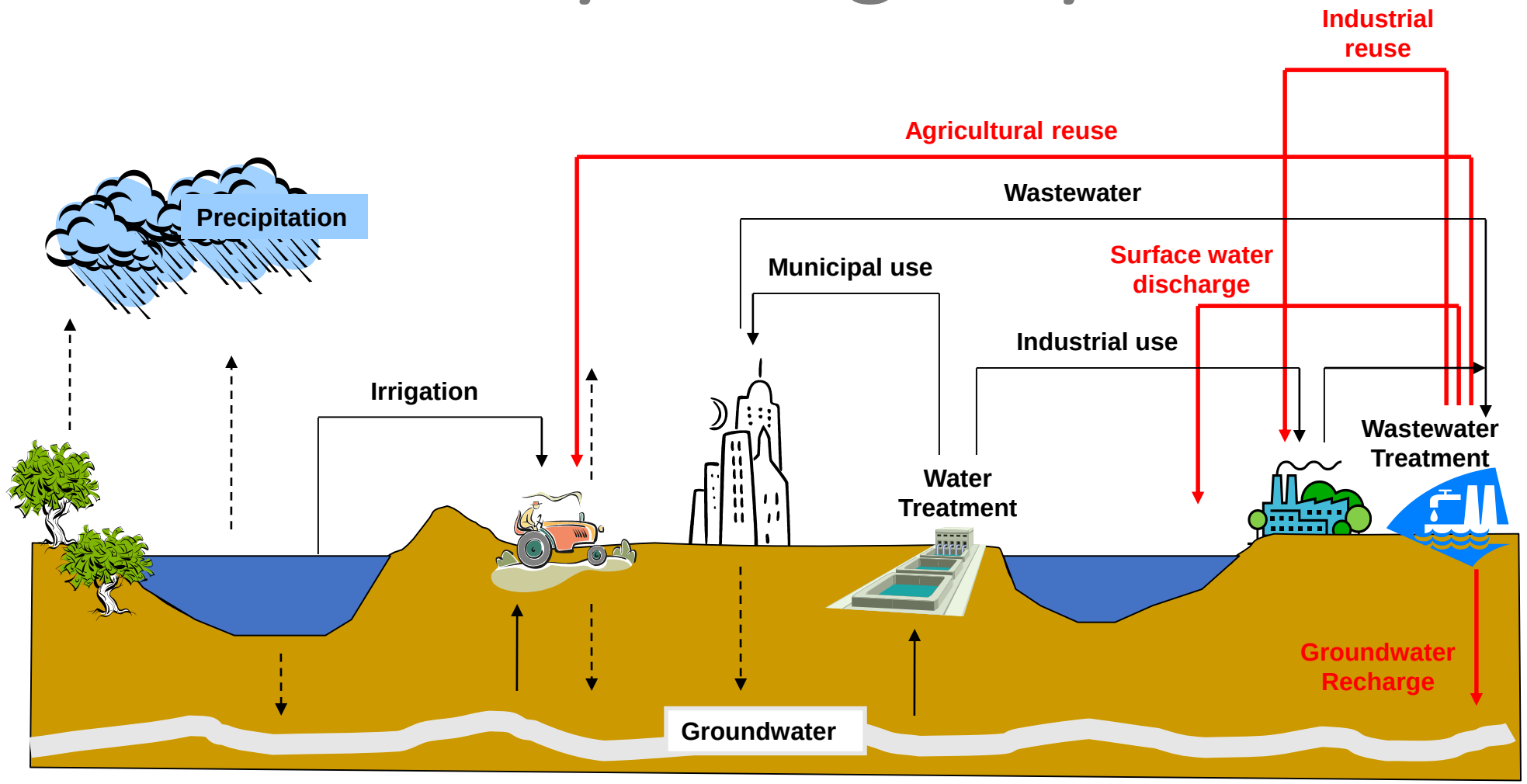
Wastewater Reclamation & Reuse and the Hydrologic Cycle



Need for Wastewater Reuse:
Mediterranean & Near East Countries examples

Country	Area (Km²)	Total renewable fresh water (Km³/year)	1990		2050[a]	
			Popln. (1000's)	Water availability (m³/capita year)	Popln. (1000's)	Water availability (m³/capita year)
Cyprus	9,250	0.90	702	1282	1006	895
Egypt	1,000,500	58.90	56312	1046	117398	502
Greece	132,000	69.00	10238	5763	8591	6868
Israel	20,700	2.15	4660	461	8927	241
Lebanon	10,360	4.98	2555	1949	5189	960
Spain	504,800	111.00	39272	2826	31765	3494
Syria	185,000	25.79	12348	2089	47212	546
Turkey	780,000	203.00	56098	3619	106284	1910

[a] UN medium projection for population

Need for Wastewater Reuse:
Mediterranean & Near East Countries examples

- Agricultural Production
  - Irrigation: the largest water user (~70-80% of total)
  - 50% of food requirements are imported
  - 30% of cultivated area is irrigated
    - But it accounts for 75% of total agricultural production
- Capacity to Sustain Domestic Food Production
  - 750 m^3 / inhabitant year necessary
  - 1990: 5 countries (Algeria, Israel, Jordan, *Malta*, Tunisia)
  - 2050: 4 more countries (Egypt, Libya, Morocco, Syria)
- Water Availability
  - Temporal and Spatial Asymmetries
    - "..the main problem may **not** be **scarcity** of water in terms of average per capita, **but** the high cost of making **water available** at the **right place,** at the **right time** with the **required quality**..." – (*Angelakis et al., 1999)*
  - "Misguided" agricultural practices

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Biodiversity

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If there are:

- 1[illegible] different species on Earth
- a
- a

Species by the Numbers

Scientists have identified about 1.75 million different species. That includes 950,000 species of insects, 270,000 species of plants, 19,000 species of fish, 9,000 species of birds, and 4,000 species of mammals. This is only a small portion of the total number of species on Earth. There are millions more species yet to be discovered and named.

Biological + Diversity = Biodiversity

Impo

All sp provide homes for anim gi help decompose organ n one plant to anoth , these connections weak m.

https://www.nationalgeographic.org/encyclopedia/biodiversity/

https://www.cbd.int/2011-2020/about

United Nations Decade on Biodiversity

ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ IKY

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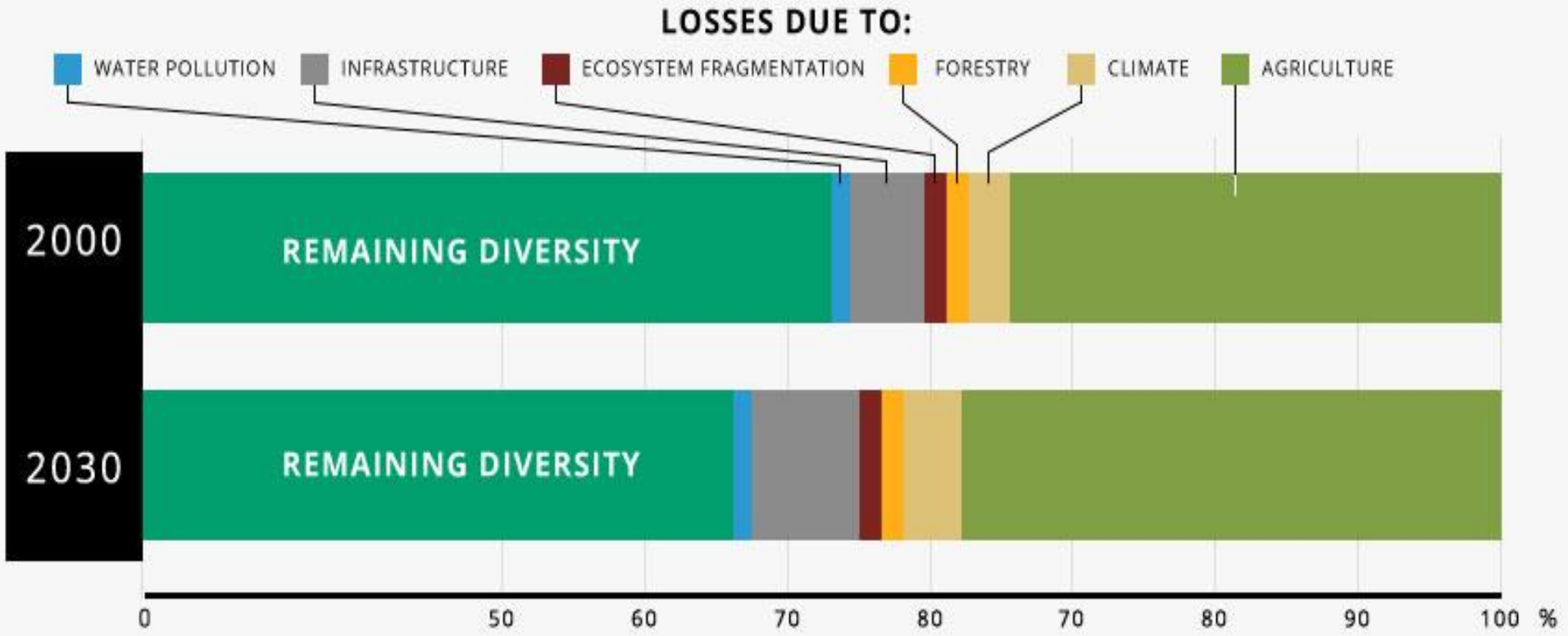
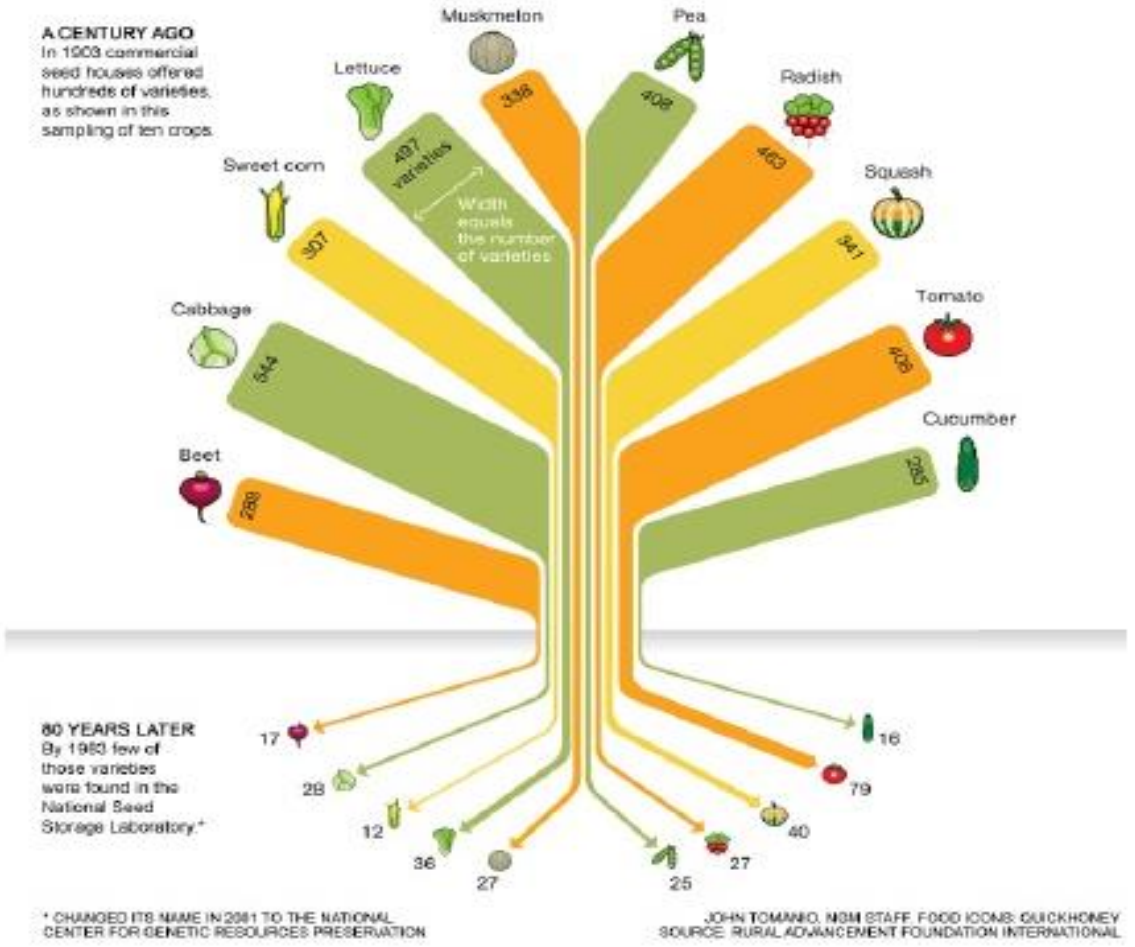
WORLD BIODIVERSITY



LOSS OF AGRICULTURAL BIODIVERSITY



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Bioversity International

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LOSS OF AGRICULTURAL BIODIVERSITY

- In the United States an estimated **90 percent of historic fruit and vegetable varieties have vanished**.

- In the Philippines thousands of varieties of rice once thrived; now **only up to a hundred are grown there**.

- In China **90 percent of the wheat varieties** cultivated just a century ago **have disappeared**.

- As for the 8,000 known **livestock breeds, 1,600 are endangered or already extinct.**

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Bioversity International

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LOSS OF DIET VARIETY

- The world has over 50 000 edible plants. Just **three of them, rice, maize and wheat, provide 60 percent of the world's food energy intake**.
- Of these 50 000, **only a few hundred contribute** significantly to food supplies.
- Although there are over 10 000 species in the Gramineae (cereal) family, few have been widely introduced into cultivation over the past 2 000 years
- Cereals are high in carbohydrates so they do provide energy, have low to moderate protein but **are low in micronutrients; often poor quality and over processed**.

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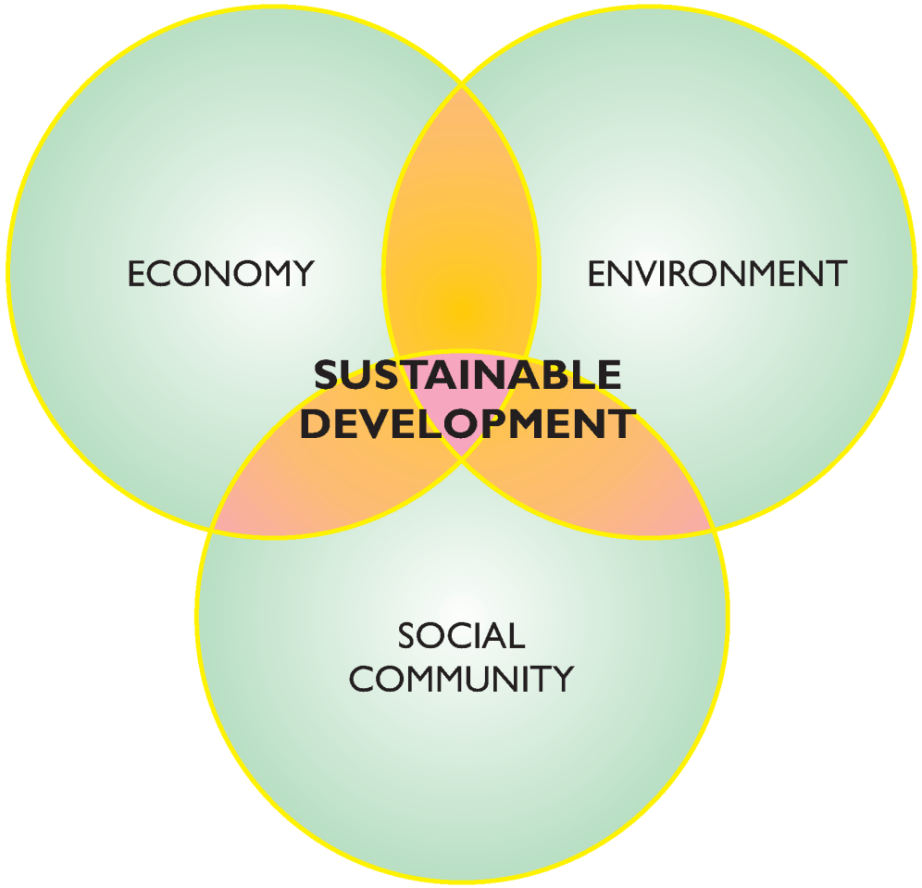
What is Sustainable Development?



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ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ
IKY

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SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

Gymnasio Gerakiou