



Climate and Value Products

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Overview

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- The indirect and multifunctional role of agri-food sector
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Agri-Food Sector's Role

As mentioned by EU
(http://ec.europa.eu/agriculture/capexplained/index_en.htm):

- Agriculture and forests cover the vast majority of EU territory and play a key role in determining the health of rural economies and rural landscape. (my comment: general health of people and economy)
- Farmers perform many different functions ranging from food and non-food agricultural products to countryside management, nature conservation, rural economic activities and tourism.
- Europe is both a major exporter and the world's largest importer of food, mainly from developing countries;

The multifunctional role of food sector

- Multifunctionality is usually defined as the **multiple roles or objectives** that the society assigns to agriculture, including economic, social and environmental roles (De Bon et al., 2010).
- As argued by Sinabell (2009), agriculture is more than just the production of food and fibre; it is multifunctional in the sense that several outcomes of its output are produced intentionally **but also several unintentionally spillovers are associated with them.**
- The role of agriculture beyond the traditional one and its contribution to rural development and to the generation of environmental and amenity services for which there are often no or very imperfect markets is acknowledged and recognized (OECD, 2005; Van Dijk, 2001).

The broader (indirect) role of agri-food sector

- One of the most important potentials of agriculture and food sector is **their indirect interconnections** with all other sectors in the economy; it is a feature that most times is **undermined** in favor of only the direct interconnections
- Thus, important connections and impacts with upstream and downstream industries that induce significant interlinkages in the economy responsible for billion euros of output and analogous job positions are avoided
- An enfeeblement of agriculture's output will **induce the output, income and employment** levels not only agriculture's but of sectors such as many secondary sectors (food, textile, chemicals, machinery, seeds, packaging, etc.) and services sectors (transportation, trade, etc) that deliver the final products to millions of consumers

The indirect role of agri-food sector

I-O multipliers and elasticities of the Greek economy

Sector	OM*	EM	IM	OE	EE	IE
Agriculture	1.64 (25)	1.26 (49)	2.05 (12)	0.0192 (15)	0.0149 (27)	0.0261 (12)
Forestry	1.47 (34)	1.22 (52)	1.39 (42)	0.0005 (57)	0.0037 (50)	0.0084 (36)
Fish	1.44 (39)	1.33 (44)	1.79 (22)	0.0037 (39)	0.0093 (35)	0.0219 (18)
Food and tobacco	1.72 (18)	3.58 (6)	2.04 (14)	0.0776 (3)	0.1012 (3)	0.0691 (4)
Textiles	1.26 (53)	1.23 (51)	1.36 (45)	0.0143 (17)	0.0158 (24)	0.0193 (23)

Source: Loizou et al., (2012)

* OE= Output multiplier; EM= Employment multiplier; IM=Income multiplier; OE=Output Elasticity; EE=Employment Elasticity; IE= Income Elasticity

* *Numbers in parentheses indicate the rank of food sector among the total number (62) of sectors.

The indirect role of agri-food sector

Sectoral reduction in intermediate sales due to Agriculture, Food and Textiles sectors elimination

Sectors	Agriculture, forestry, fisheries	Food, tobacco	Textiles	Total
Wood products	0.04%	7.31%	0.30%	7.65%
Oil, chemicals	18.32%	16.83%	2.70%	37.86%
Metals and Machinery	3.21%	14.88%	4.20%	22.29%
Electricity power, gas	17.27%	7.90%	2.04%	27.21%
Trade	17.11%	37.68%	3.14%	57.93%
Finance	3.46%	8.28%	2.46%	14.20%
Economy GVA total reduction				11.8%

Source: Authors' calculations from the Greek I-O table 2007.

The indirect role of agri-food sector

Input-Output Multipliers of the food sector at regional EU level .

Region	OM*	EM
Greece (Anatoliki Makedonia & Thraki)	1.374 (15/33)**	3.407 (15/33)
Germany (Kassel)	1.643 (2/23)	2.010 (3/23)
Hungary (Southern Great Plain)	1.735 (6/30)	2.005 (21/30)
Italy (Emilia Romagna)	1.9447 (3/30)	2.8668 (3/30)

Source: Mattas et al., (2008)

* OE= Output multiplier; EM= Employment multiplier

* *Numbers in parentheses indicate the rank of food sector among the total number of sectors.

Strengths

Positive spill-over effects of agriculture on the upstream and **Downstream sector**

- A large part of agricultural production undergoes some degree of transformation between harvesting and final use.
- Non-food industries have a wide variety of end uses and almost all non-food agricultural products require a high degree of processing.

Table 1: Enterprises/holdings, persons employed and value added in the EU-28 food chain, 2012

2012	Enterprises /Holdings	Persons employed	Value added
	Million	Million	EUR million
Total for EU-28	15.4	47.4	826 921
Agriculture*	12.2	25.5	207 925
Food processing, beverages and tobacco industry**	0.3	4.6	216 184
Food retail and food services	2.8	17.3	402 811

Sources: [National accounts, Eurostat](#), [Farm Structure Survey](#), [Economic accounts for agriculture](#) and [Structural Business Statistics](#)

* 2010 data for holdings and persons employed in agriculture.

** Estimated EU-28 total for 2012.



The multifunctional role of food sector

- The **urban and peri-urban** potentials' of agriculture is another undermined important role that revives amid the economic crisis, with many benefits either it is applied in developing or developed countries.
- In developing countries peri-urban agriculture became the hope for the majority of people; more than half of Africa's population lives in cities and rely on agriculture for employment and income support.
- The same is the situation nowadays in developed countries, with economic stagnation, the lack of employment opportunities in the manufacturing and services sectors made agriculture essential. Family gardens and urban agricultural production provide food security and social insertion.

Agri-food sector and economic crisis

- In any turbulent economic environment, sectors of economic activity behave and resist differently depending on the causes of the turbulence. Though, some sectors present a unique resistance in economic aberrations, have a resilient attitude and play the role of the stabilizer supporting growth and employment. In the current economic crisis such are agriculture and food sector .
- Thus, becomes more indispensable to see the broader role of agriculture and along with movements' towards efficient and competitive production to support it analogously, as it can offer economic and social solutions in the crisis.

Climate Change Impacts

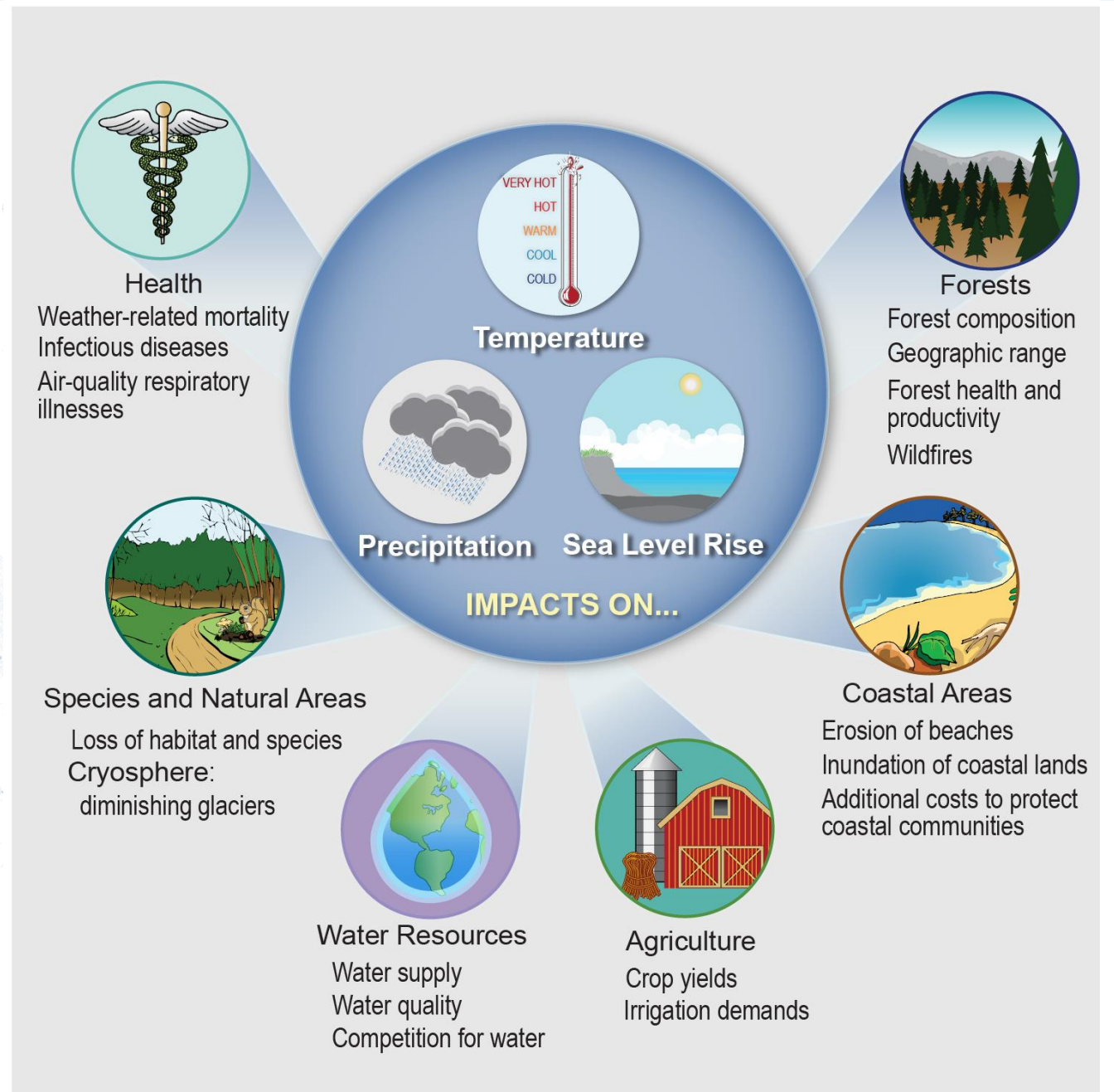
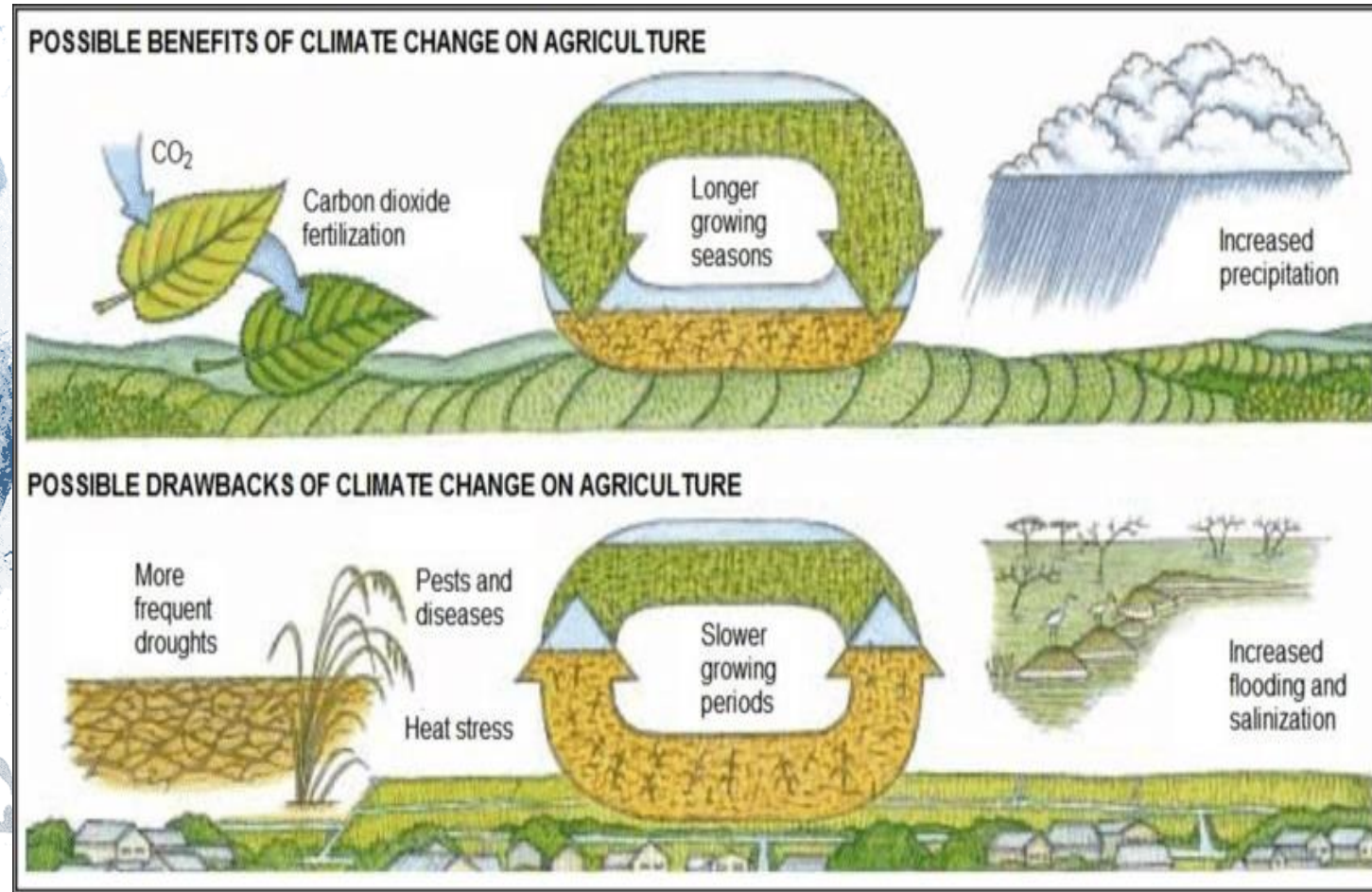


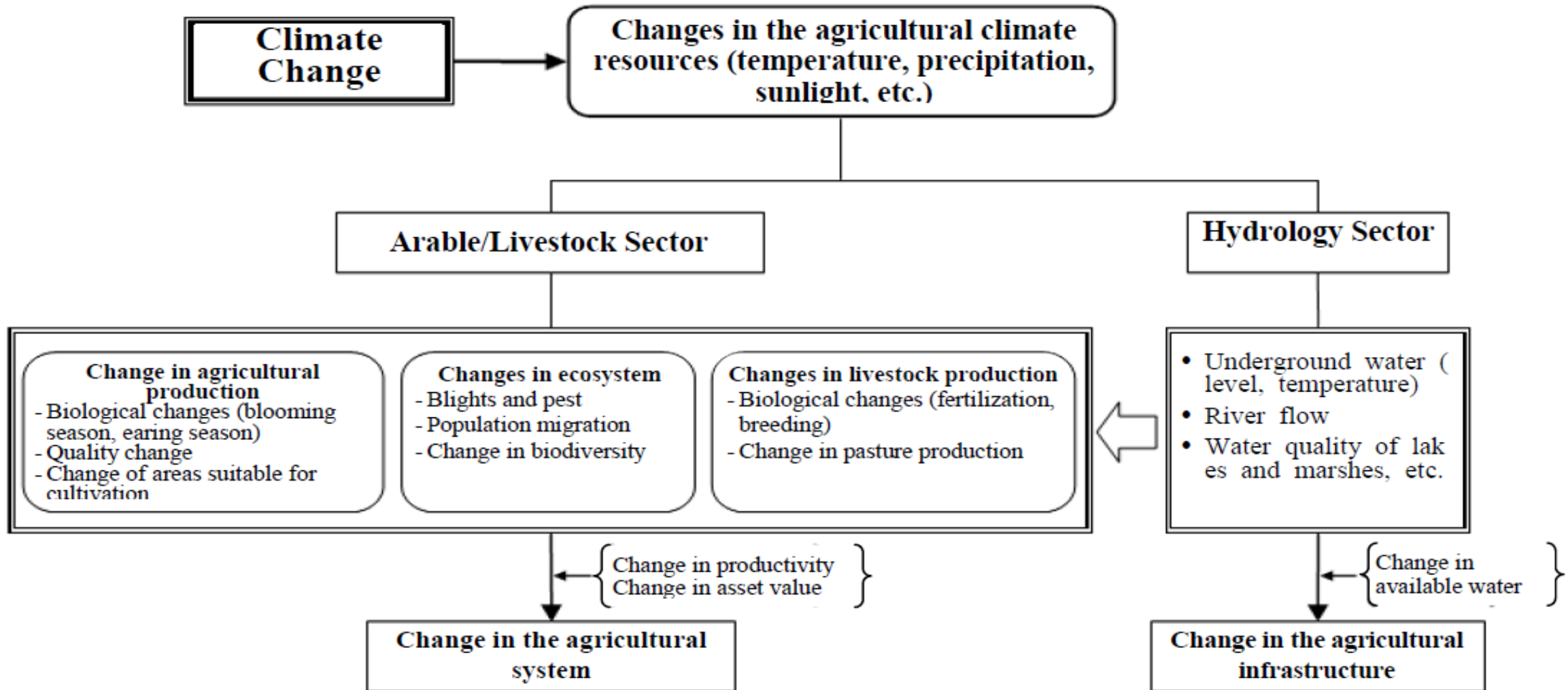
Figure source: adapted from Phillippe Rekacewicz UNEP/GRID-Arendal 2012, "Vital Climate Graphics" collection

Agriculture & Climate Change

Agriculture and climate change are deeply intertwined. Agriculture both contributes to climate change and is affected by climate change.



Flow of the climate change impact on the agricultural sector



Source: Kim, Chang-Gil and et al. (2009), p.36.

Agriculture Contributes to Climate Change

➤ Through GHG emissions:

- Burning of fossil fuel.
- Methane emission through agricultural practices.
- Nitrous oxide through fertilizers.
- Burning of crop residues.
- The livestock sector is another major contributor to production of GHGs.
- Pesticide use

Climate Change Affects Agriculture

- Agriculture sector is highly vulnerable to climate change
 - Some of the observed and likely impacts include:
 - ❖ Biophysical impacts:
 - Physiological effects on cultivated crops, forests, fish livestock
 - Changes in the quality and quantity of land, soil and water resources
 - Increased weed and pest challenge
 - Sea temperature rise causing fish to inhabit different ranges
 - ❖ Socio-economic impacts:
 - Changes in yields and production
 - Reduced GDP from agriculture in the long term
 - Great fluctuations in world market price
 - Increased number of people at risk of hunger and food security
 - Migration of population from warmer prone areas to other places

Climate - Smart Agriculture (CSA)

Productivity, Adaptation, and Mitigation are the three interlinked pillars necessary for achieving food security and development of agriculture through CSA under the new realities of climate change

Productivity:

- CSA aims to **sustainably increase agricultural productivity** and incomes from crops, livestock and fish, without having a negative impact on the environment.

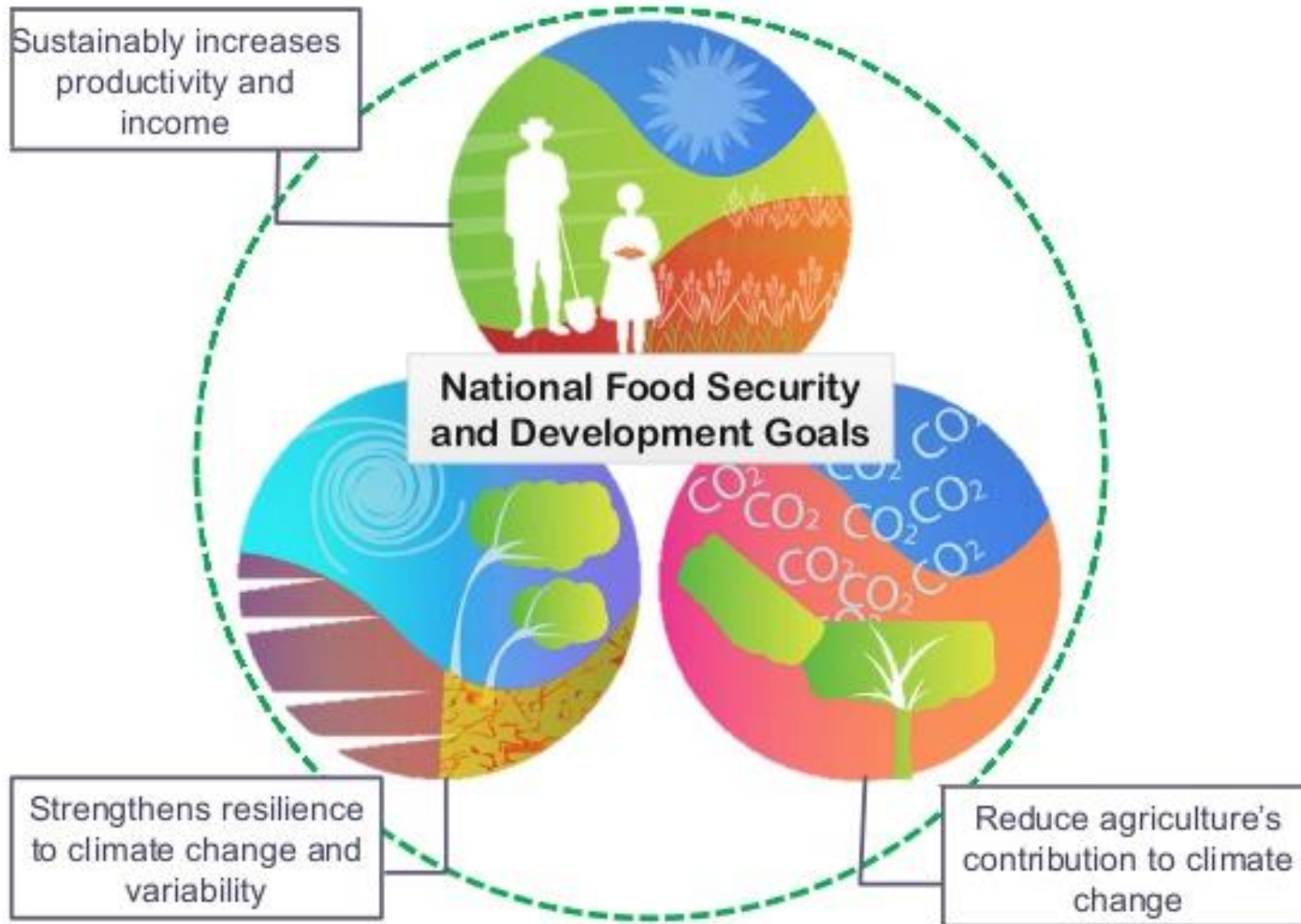
Mitigation:

- CSA should help to reduce and/or remove greenhouse gas (GHG) emissions. **This implies reduction of emissions for each calorie or kilo of food, fiber and fuel that produced. Avoidance of deforestation from agriculture.** Management of soils and trees in ways that maximizes their potential to acts as carbon sinks and absorb CO₂ from the atmosphere.

Adaptation:

- CSA aims to reduce the exposure of farmers to short-term risks, while also strengthening their resilience. Protecting the ecosystem services which they provide to farmers and others.

What is Climate - Smart Agriculture



Food Loss - Food Waste

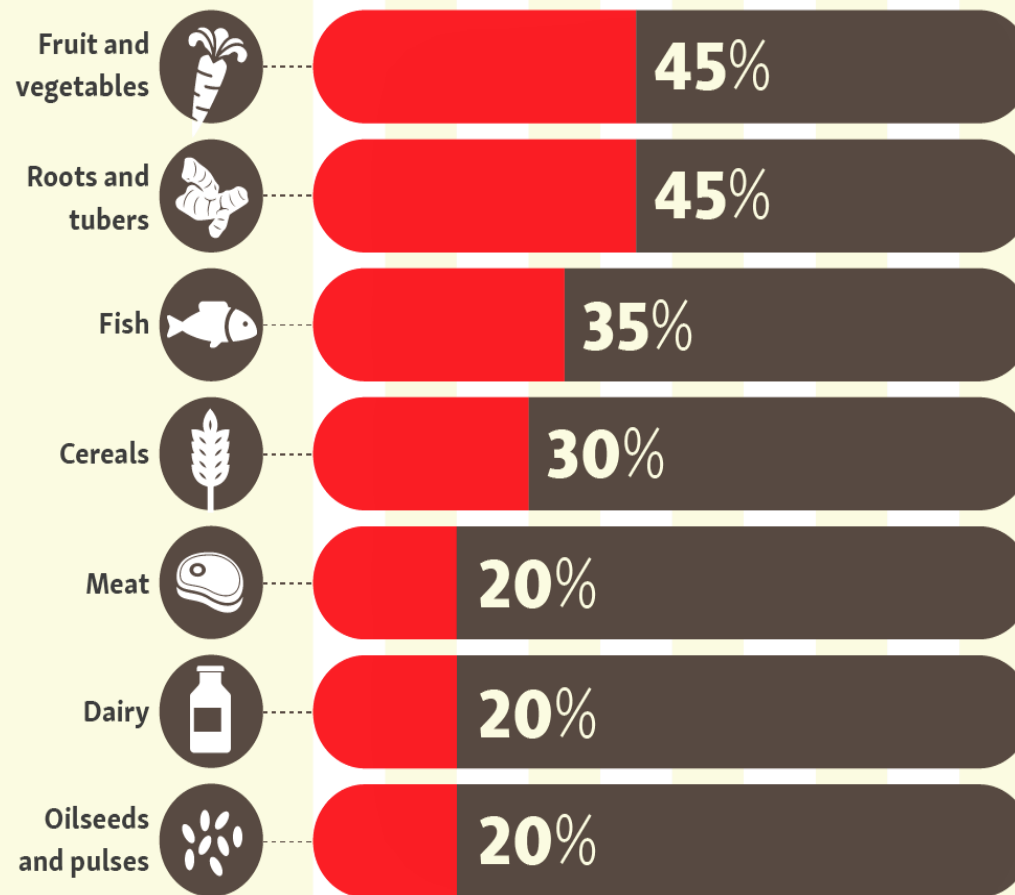
- **Food loss** is defined as a decrease in quantity and quality of agricultural, forestry and fisheries products intended for human consumption that are ultimately not eaten by people. Food losses occur along the supply chain from production, to harvest, post-harvest handling, to storage and processing, and during transportation.. Climatic factors and variability such as extreme events, along with pests and diseases, are also causes of food losses.
- **Food waste** refers to food appropriate for human consumption being discarded, either by choice or after the food has been left to spoil or expire as a result of negligence or oversupply. Food waste occurs predominantly, but not exclusively, at consumption level and is often related to consumer behavior as well as being policy and regulatory driven.
- **Food loss and waste** is defined as a decrease, at all stages of the food system from production to consumption, in mass and/or quality, of food that was originally intended for human consumption, regardless of the cause.

Source: FAO, 2014 and HLPE, 2014.

Global Food Waste

Global Food Waste

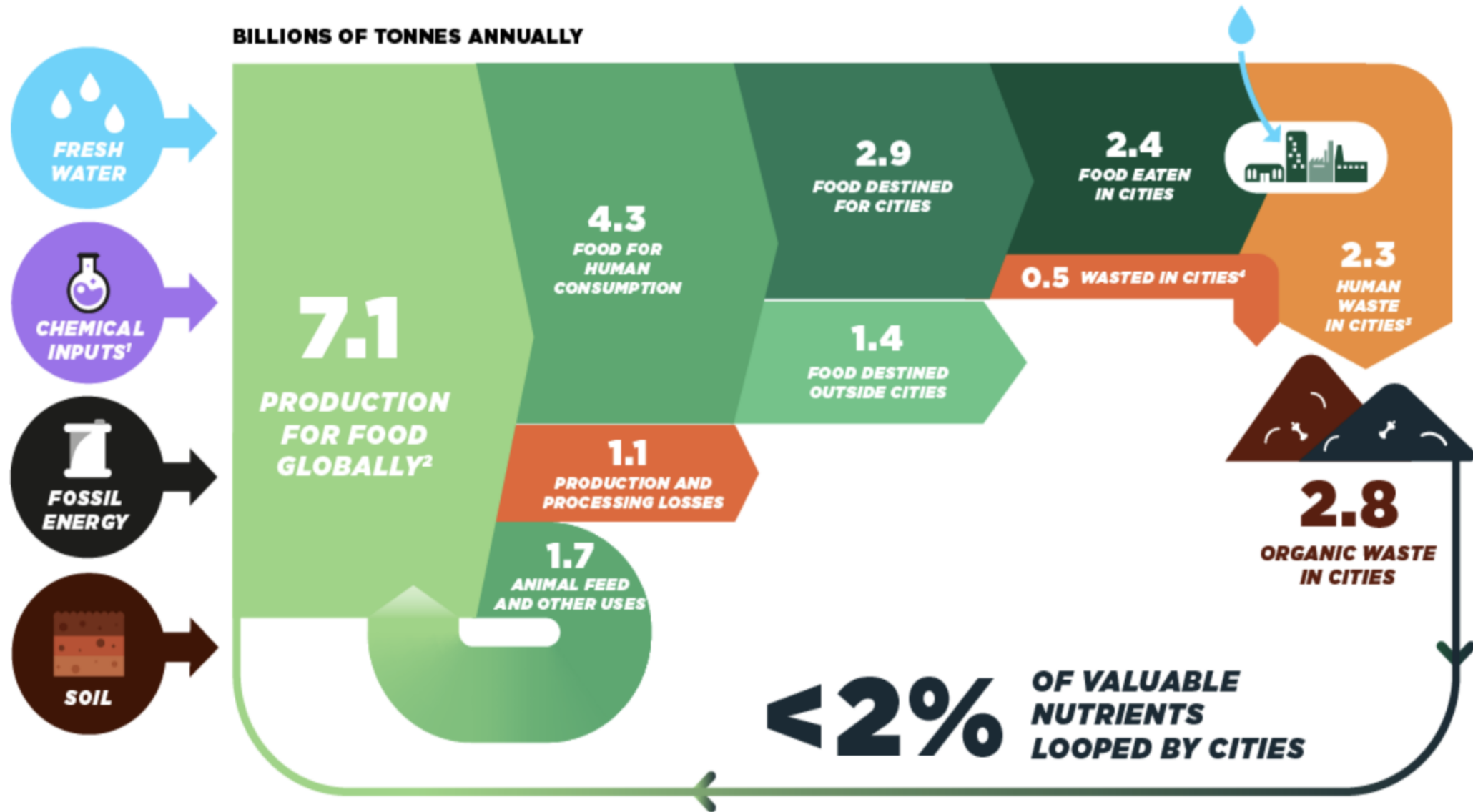
Approximately 1.3 billion tons of food is lost or wasted every year. That is about **one-third** of all the food produced for human consumption in the world.



● Food loss refers to food that is spilled or becomes spoiled before reaching its final stage.

● Large quantities of food are wasted due to quality standards that overemphasize appearance.

The Flow of Materials in the Food System



High Value Products

- A “working understanding” definition of high value agricultural products:
 - *“a crop, fish, livestock or non-timber forest product that returns a higher gross margin per unit of available resources (land, labour, capital, human capacities) than other products within a given location and context.”* (GFAR, 2006).
- High value products (HVP) refers to agricultural products that are high in value, often **but not necessarily due to processing** (United States Department of Agriculture, 2018).

High Value Products

- High Value Products??
 1. Highly processed products and Semi-processed products, such as fresh and frozen meat, flour, vegetable oils, roasted coffee, cereals, cheese and refined sugar
 2. High-value unprocessed products that are also often ready for consumption, such as fresh and dried fruit and vegetables, eggs and nuts.
 3. **Climate or ecosystem produce (my comment)**

"Trips agreement article"

“ geographical indicator are define as indicators which identify products originating in the territory of a member, or a region or locality in that territory, where a given quality reputations or other characteristics are essentially attributable to their geographical origin”

The territorial dimensions of FQSS

The territory is

- a **place of production** whose specific environmental and socio-economic characteristics (micro-climate and local varieties) are capable of determining the qualitative characteristics of the products
- **The place that**, according to the presence of institutions and methods of interaction between the agents, **facilitates** the provision of the product, **lowers transaction costs** and contributes to the creation of the reputation of the product (for GI)
- **The place of consumption** (for SFSC)
- **The place where different supply management arrangements** generates environmental, social and economic **impacts**

Locally Made Products

- Countless terms can define the unique varied family of regional, territory, local and traditional products.
- The main point is to understand what characteristics and conditions makes those products special
- The characteristics that connect a place with
 - History
 - Culture
 - Environment
 - Social group

Locally Made Products

- Province is the simplest way to link a certain product and its geographical origin
- Products which are related to a place through time and knowledge that passes from one generation to another
- **Natural environmental factors such as soil climate and plant varieties play an important role to the production of unique products**
 - **Micro-climates give the opportunity for a wide range of growing conditions – giving products particular and high-quality characteristics**



EU regulations PDO/PGI

- 1) 2081/92 PDO, PGI, TSG
- 2) 510/2006
- 3) 1151/2012 on the quality of agricultural products and foodstuffs
- 4) 1308/2012 and 665/2014

Protected Designation of Origin (PDO)

- “identifies a product originating in a specific place, region or country, whose quality or characteristics are essentially or exclusively due to a particular **geographical environment** with its inherent natural (raw materials, **environmental characteristics**, location) and human (traditional and artisanal production) factors the production, processing and preparation steps of which all take place in the defined geographical area and in line with the strict production regulations established”
- Produced in the region of reference, with its specific soil and climate conditions that affect the quality of the product
- Traditional methods and **utilization of micro-climate** produce high quality products. (i.e “**masticha Chiou**”)



Protected Geographical Indication (PGI)

- “designates a product originating in a specific place, region or country whose given quality, reputation or other characteristic is essentially attributable to its geographical origin and at least **one of the production steps** of which takes place in the defined geographical area.”
- Has its characteristics ascribed to its geographical origins, like quality, reputation and is produced (and/or) processed (and/or) developed within the geographical area (i.e olive “Chania Kritis”)



Factors affecting PDO and PGI Products

- Environmental factors, different biological resources, types of soil, micro-climates, ingredients, duration and plant varieties contribute in the production of unique products.
- Some places is physically predisposed to the types of production that develop there.
 - Natural environment and physical criteria (soil, climate, topography and water supply) play an important role in the production of local, PDO and PGI products.
- The geographical situation of a region (landscape, vegetation, climate, geology, and soils) lay the bases for the production of quality products.
 - Human activity through particular skills, social patterns and local/traditional practices give value to these products (i.e AOC system for wine)

The case of PDO

- PDO is the European acknowledgment for agricultural products or foods whose entire production process, from raw material to final product, is accomplished in a specific territory.
- EU No. 1151/2012 a 'designation of origin' is a name which identifies a product:
- Originating in a specific place, region or in exceptional cases, a country
- Whose quality or characteristics are essentially or exclusively due to a particular geographical environment including inherent natural and human factors
- All the production steps take place in the defined geographical area.

Number of PDO/PGI olive oils in the European Union in 2017

Italy	PDO:42 PGI:4
Spain	PDO:29
Greece	PDO:19 PGI:11
France	PDO:7
Portugal	PDO:6

Source:Database of origin & registration

Consumer's perspective

- The PDO label functions as an instrument for information on quality. It prevents consumers from the high risk of an unfortunate purchase, minimizes the search cost and helps to build a product's reputation.
- But since the implementation of such labels, consumer welfare has improved a lot since they can clearly see the information on quality so they can find without ambiguities the desired product.
- Another feature of products with geographical indication that contributes to improving consumer welfare in traceability.

Conclusions

- The production of High Value Products in the future potential can have a positive impact in economic, societal and environmental benefits:
 - New value chains for high value products, open new markets, connect organisations and sectors that have not previously worked together.
 - Improve the environmental performance and cost efficiency of the biorefinery process compared to the current one.
 - An integrated process in which raw material valorised into high added value products.
 - Validate new products with a 2-5 times higher value than the current applications of the raw material, leading to a significantly higher total valorisation of the agricultural crops so contributing to rural development and employment.
 - The final consumer products are expected to have a better overall sustainability score than their fossil-based counterparts and meet a clear market demand.
 - Reduce waste and the dependence on fossil-fuels, helping maximise the EU's sustainability, while creating new growth and jobs.



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Thank you...

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