



DYNAMIX

Decoupling growth from resource use  
and its environmental impacts

# Policy mix on agricultural land use and related environmental impacts

## Main barriers, drivers and system limitations

*Daniela Russi (IEEP), Maria Elander (IVL), Clunie  
Keenleyside (IEEP), Mary Ann Kong (Bio Intelligence  
Service), Martin Nesbit (IEEP), Graham Tucker (IEEP),  
Evelyn Underwood (IEEP), Robin Vanner (PSI),  
Stephanie Wunder (Ecologic Institute)*

# LAND USE: IN 2007 THE EU-27 USED 1/3 MORE THAN THE GLOBALLY AVAILABLE CROPLAND PC - ABOUT 0.31 HA (BRINGEZU ET AL., 2012).

## Main causes:

1. Increasing consumption of meat and dairy products: the total per capita protein consumption (including vegetable sources) in Europe is about 70% higher than recommended (Westhoek et al, 2011)

Food product	Land requirement (m <sup>2</sup> /MJ)
Beef	2.09
Pork	0.79
Cow milk	0.72
Eggs	0.60
Poultry	0.54
Vegetables (open land)	0.34
Bread	0.19
Apples	0.16
Crop/ cereals	0.12
Potatoes	0.11

Source: Bringezu and Schütz 2009 (p. 139), cited and corrected in SRU 2012 (p.106)

Drivers
Preference for high protein diets that promote weight loss and builds muscle
Low prioritisation of the negative impacts on health of overconsumption of meat and dairy products
Low prioritisation of animal welfare and the environmental impact of intensive husbandry
Personal tastes and habits (e.g. influences by marketing and generational desire for meat due to post-war shortages)
Consumerism (e.g. due to social norms, status and marketing)
Food prices (e.g. due to global markets & production efficiencies from intensive animal farming)
Increasing income and wealth (allowing for an increased share of high-price food products; e.g. meat and dairy products)

Source: own elaboration

## 2. Food waste:

- In the EU27 around 90 Mt of food waste per year -> 179 kg per person (agricultural food waste and fish discards not included) (EC 2010)
- In the EU27 42% generated in the household sector, 39% in the manufacturing sector, 14% in the food service/catering sector and 5% in wholesale/retail (EC, 2010).
- Up to 60% of the food waste is avoidable (WRAP, 2013)

Driver
Packaging issues (e.g. use of packaging not suitable to protect the product during transportation)
Storage issues
Socio-economic and demographic factors
Attitudes
Personal preferences
Portion sizes (e.g. not adjusted for small households)
Planning issues
Labelling issues (e.g. misinterpretation and/or confusion over date labels)
Lack of knowledge (and interest) on the amounts of food waste as well as of the corresponding costs and environmental impacts

Source: own elaboration

## 3. Increasing consumption of first generation biofuels

- In 2010 5.7 Mha of land needed to cover the EU demand for biofuels, out of which 2.4 Mha in the EU (5% of total cropland) and 2.4 Mha outside (Ecofys et al., 2013)
- **Most important drivers:** EU regulations (Directive 2003/30/EC on biofuels; Directive 2009/28/EC on Renewable Energy). Also: need for energy security; increasing oil prices

# ENVIRONMENTAL IMPACTS ASSOCIATED WITH AGRICULTURAL LAND USE

**Two processes responsible for the increasing environmental impact of agriculture:**

1. Agricultural intensification, allowed by
  - technological advances in plant and animal breeding, crop cultivation, pesticides and herbicides
  - mechanisation of agricultural management (->reduced labour requirements),
  - availability of capital
  - access to global markets
2. Abandonment of less productive areas (e.g. mountains, areas with poor soils or remote locations) - mostly semi-natural habitats with very high biodiversity values

**Most important drivers:** Initially CAP payments coupled to production levels (now removed), now mostly the economic signals from the global markets in which farmers buy their agricultural inputs and sell their agricultural products.

# ENVIRONMENTAL IMPACT ASSOCIATED WITH AGRICULTURAL LAND USE - IMPACTS ADDRESSED:

1. Loss of biodiversity (most relevant in semi-natural areas). Causes:
  - land abandonment (in particular of traditional extensive livestock systems) -> natural succession to scrub or forest
  - eutrophication from intensive livestock
  - over-grazing of sensitive habitats in some areas
  - agricultural intensification: fertilisers, ploughing and re-seeding of grasslands with grass cultivars, high grazing densities, cutting for silage, herbicides and pesticides, crop specialisation and reduced crop rotations, changes in timing of agricultural practices, such as crop sowing, removal of boundary habitats and other non-farmed habitats

## 2. Loss of carbon storage in the soil. Main causes:

- Conversion of grassland, wetlands and forests to cropland -> degradation of organic matter and organisms in the soil (45% of soils in Europe have low or very low organic matter)
- Compaction by heavy machinery (around one third of soils are susceptible)
- Erosion by water (1.3 million km<sup>2</sup> are affected in the EU-27) and also by wind
- Landslides triggered by agricultural land abandonment or land use change
- Heavy pesticide and fertiliser use
- Inappropriate cropping methods
- Salinization through inappropriate management of irrigated land
- Soil sealing by change of land use to built development and infrastructure

3. Overconsumption of water for agriculture - agriculture accounts for 24% of total water abstraction in Europe, 80% of water abstraction in Southern Europe. Main causes:
- Choice of crops that are not adapted to the climate conditions
  - Inefficient use of the abstracted water (e.g. spray irrigation during daylight)
  - In some regions (Southern Europe) prices too low and/or not based on consumption but on the irrigated area

#### 4. Degradation of water quality - overall, 30-40% of European water bodies are under significant pressure from diffuse water pollution. Main causes:

- nitrogen compounds and phosphates run-off from agricultural fields resulting from fertiliser use and livestock manure -> eutrophication
- continuous arable cropping and conversion of grassland to cropland
- grazing with high stocking rates during wet conditions -> vegetation loss and soil disturbance
- over-grazing (e.g. through high stocking rates, or inappropriate stock types)
- poor soil management and cultivation techniques (such as leaving soil bare in winter and ploughing up and down slopes) -> increased run-off
- application of fertilisers and plant protection products at higher rates than required by the crop