Think global:

Global trade of Ecosystem Services

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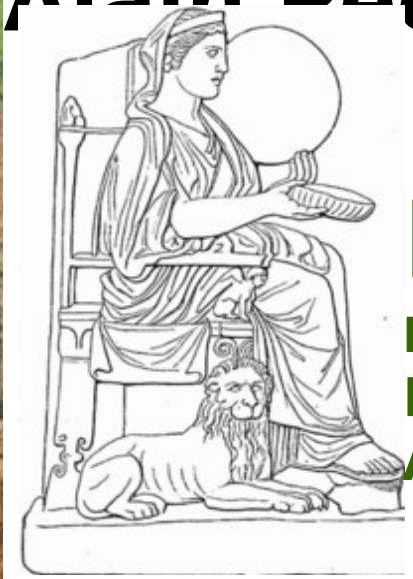

RHEA

NATURAL RESOURCES, HUMAN ENVIRONMENT AND AGRONOMY

THE ECONOMICS OF ECOSYSTEMS & BIODIVERSITY BELGIUM

Universiteit Antwerpen

ECOSYSTEM MANAGEMENT RESEARCH GROUP

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Global trade is important

20 major food commodity exporters in 2009 (FAOSTAT)

Area	Commodity	Value (Billion $)
United States of America	Soybeans	16.5
Brazil	Soybeans	11.4
Indonesia	Palm oil	10.3
.....		
Malaysia	Palm oil	9.3
United States of America	Maize	9.1
Argentina	Cake of Soybeans	8.1
...		
Brazil	Cake of Soybeans	4.6

Extra-EU-27 import trade in 2008 (EUROSTAT)
9 main commodities

	Value (Billion Euro)
Fossil energy	427.9
Metals and steel	113.8
Chemicals	44.2
Medicinal and pharmaceutical products	38.2
Vegetables and fruit	21.2
Fish, crustaceans, molluscs	16.1
Coffee, tea, cocoa, spices	11.1
Feeding stuff for animals	8.8
Oils, oil seeds and oleaginous fruits	7.5

Case studies of economic activities having major impacts on ecosystems

Some examples:

- Soybean production
- Palm oil production
- Agro-fuel production
- Flower and vegetable productions
- Shrimp and fish farming
- Over-fishing in oceans
- Tourism

Soybean

von Witzke and Noleppa (2010) estimated that the EU imported the equivalent of 35 million ha of 'virtual land' (land necessary for producing a given tonnage of commodity on the basis of regional yields) in 2007/2008

This area is equivalent to about twice the size of the Utilized Agricultural Area of Germany.

Soybean represented in 2008 the largest 'virtual land' import in the EU with 19

Global trade is developing very rapidly

3 examples

TRANSPORT

Between 1972 and 2000, the number of international air passengers worldwide rose from:

88 million to 700 million (Gössling 2002)

ANIMAL FEED

Between 1961 and 2008, feed imports have increased in the 27 countries of the present EU by about 400% (in tonnes) (FAOSTAT)

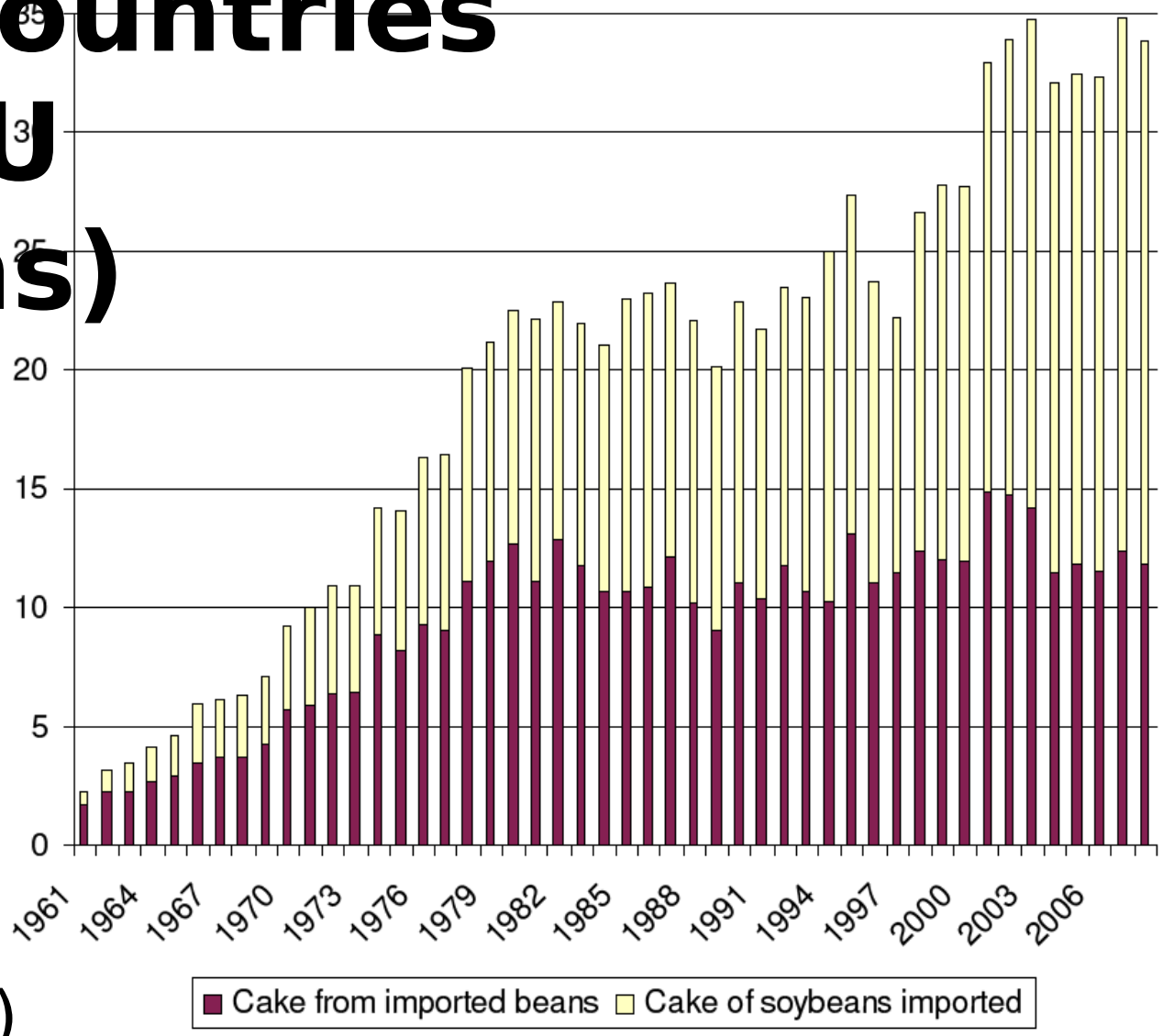
Soy became the main product (83% in 2008)

Brazil, Argentina and USA = main export countries for the EU-27

WOOD

Between 2001 – 2007, the global trade of wood

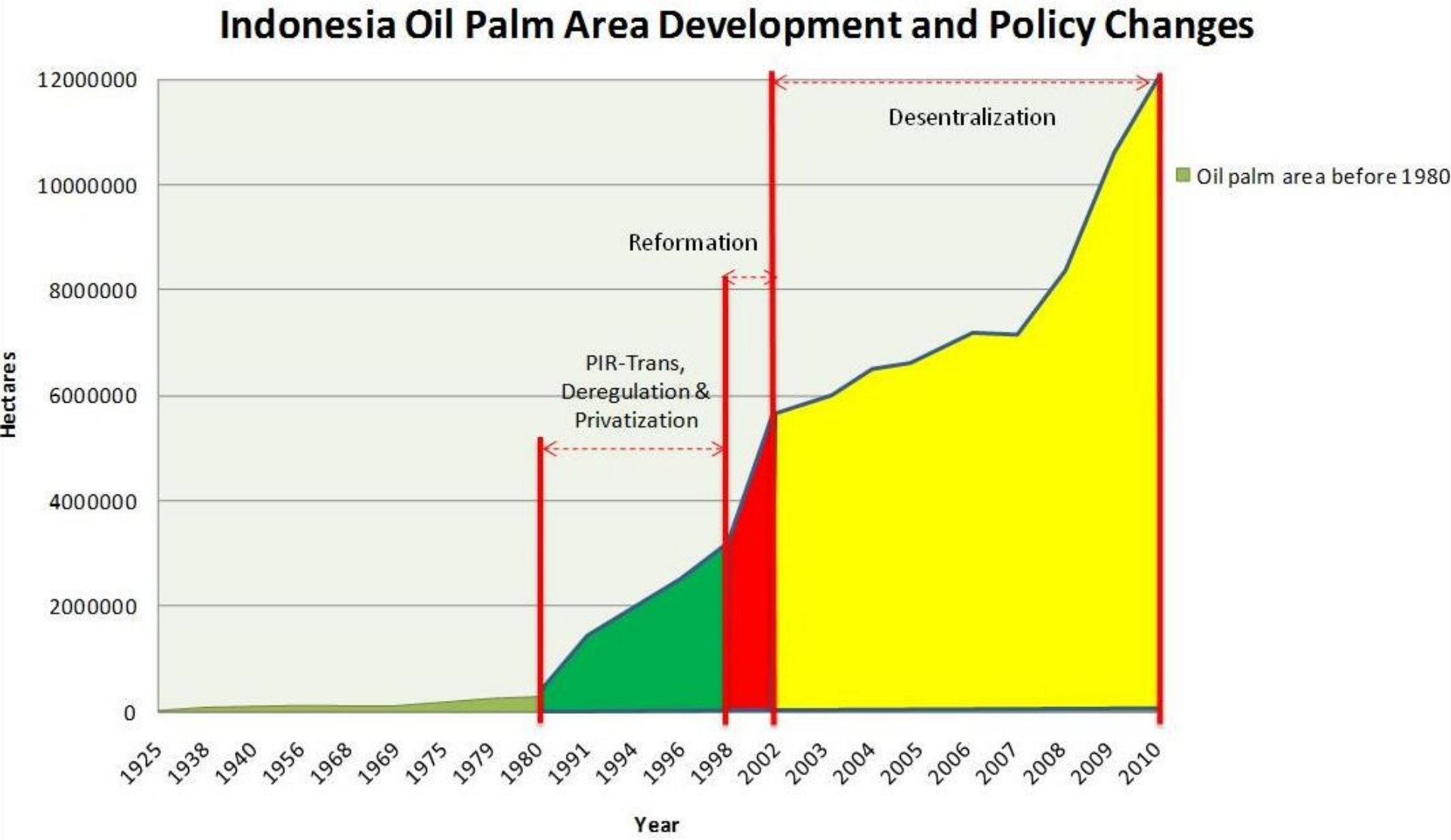
Net imports of soybean in the 27 countries of the EU (Mio tons)



(Swolfs 2011)

Compiled from: FAO TradeSTAT Crops and livestock products

Oil palm area evolution



Global trade has huge impacts in Developing Countries

Soybean

Soy cultivation expands at the expense of (Fearnside 2001):

- **the last remains of the Atlantic forest**
- **the Cerrado savannahs**
- **the Amazonian forest**
- **the Campos and the Pampa, two subtropical or temperate grassland biomes**

Atlantic forest only currently covers 7.5% of its original extent in 2010.

The Cerrado savannah covered about 1.7 million km2 in the centre of Brazil. Since 1970, more than half of the Cerrado's

Soybean

The Cerrado savannahs contain 10,000 plant species and 1,268 vertebrate species of which 44% and 9% are endemic respectively (Myers *et al.* 2000)

Cerrado savannah

Emblematic mammal species like

the jaguar

the maned wolf

the giant anteate

the giant armadi

Soybean

The deforestation in the Amazonian Basin is well documented.

The Campos grasslands covered more than 14 million ha in 1970 but, mostly due to conversion to cropping, it is estimated that only 6 million ha is currently left (Carvalho and Batello 2009).
It is the habitat for 3,000 vascular plants, 385 species of birds and 90 terrestrial mammals.

Deforestation of the Amazonian and the Atlantic forests: about 18,5 Mio ha

Global trade has huge impacts in Europe

Soybean

Feed imports are equivalent to about 20% of the total EU-27 grassland area (in crude protein) or 13.4 million ha (Swolfs 2011 and own calculations)

Soybean imports in the EU represented in 2008 19 million ha of virtual land (von Witzke and Noleppa 2010)

Soybean

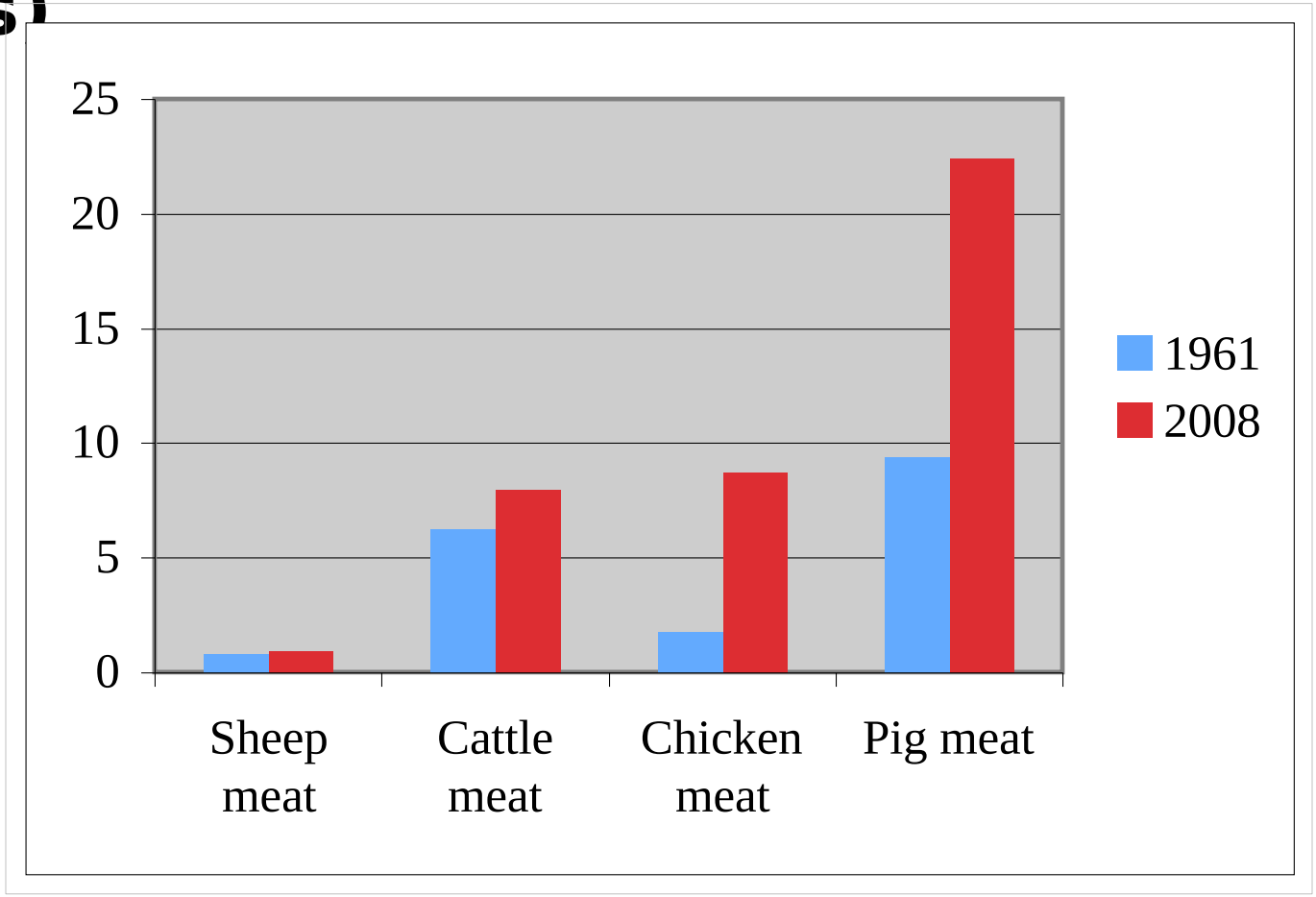
Development of factory farming of pig and poultry

Development of maize (complement of soybean) and cereals

Decrease of permanent grassland area in the EU-27 since 1960: about 60 million ha (Eurostat – FAOstat)

Development of monogastric productions

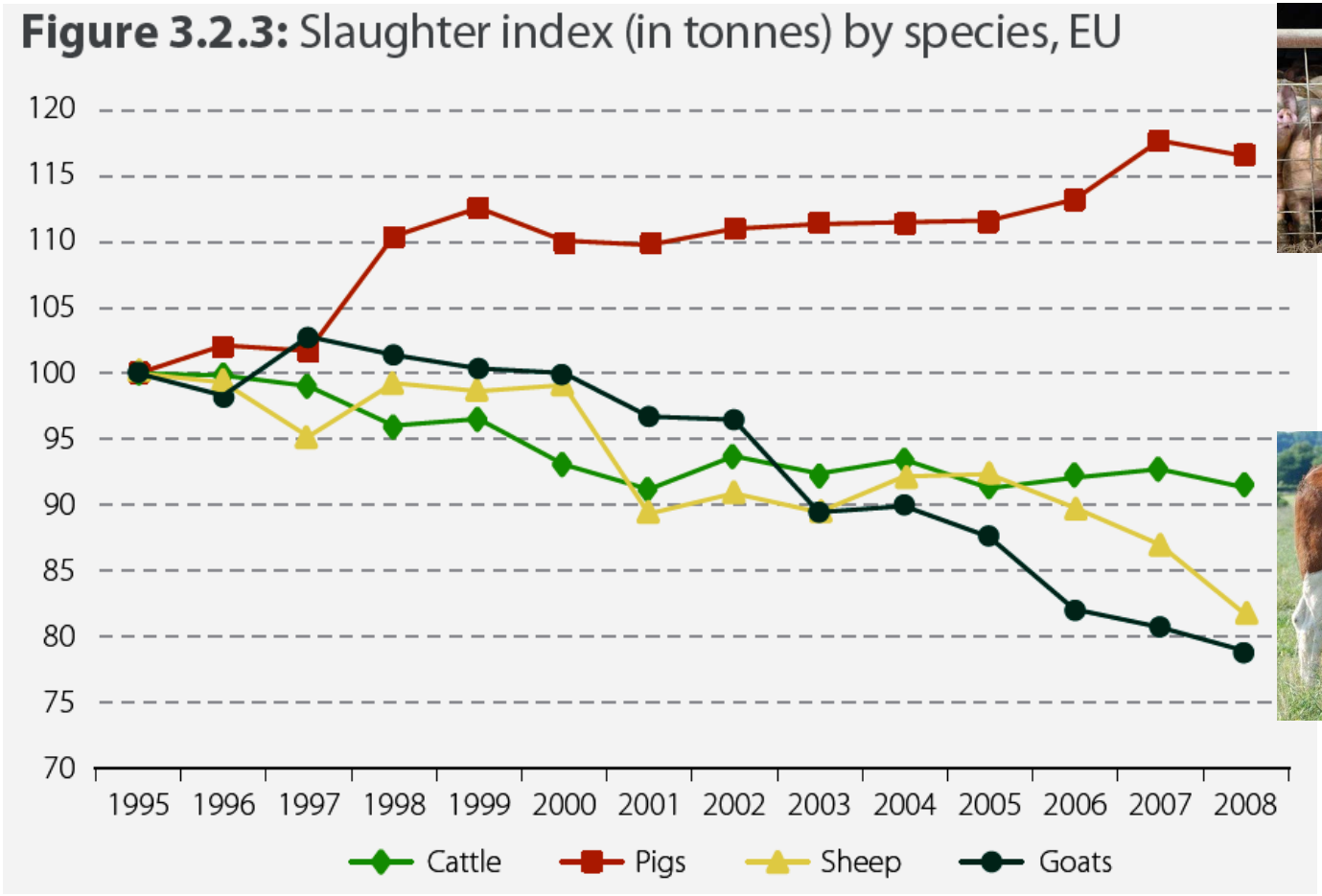
Production in the 27 countries of the EU (Mio tons)



(Swolfs 2011)

Changes in meat consumptions

Between 1995 and 2008 in the EU-27, cattle meat production decreased by about 9% while pig meat increased by 17%



EC, 2009

Changes in meat consumptions

Grasslands + mixed cattle

Imports of feed

Pig – poultry + feed

Specialized cattle + maize + soy

Slurry

Slurry + herbicide

Water pollution: nitrate

Water pollution: Biodiversity

Negative effects: some numbers for 2008

- **Land use changes in the Americas**

  229 million tonnes CO2-eq.

  € 3.2 billion

- **Transport of feeds to EU**

  12 million tonnes CO2-eq.

  € 183 million

- **Cost of Nitrogen purification in the EU**

  340 500 additional tonnes released

  € 442.7 million - € 1,328 million

(Jacobs 2011)

mpact in America

Impact in Europe

- 4.3 Billion $/yr

- 2.7 Billion $/yr

- 102.4 Billion $/yr

- 0.06 Billion $/yr

+ 2.2 Billion $/yr

- 107,2 Billion $/yr

(Jacobs 2011)

Global trade has huge impacts on human health

Nutritional characteristics of grain-based animal products

Compared with grain-fed beef, grass-fed beef is (Duckett *et al.*, 2009):

Lower in total fat (1/4 to 1/3)
Lower in saturated fatty acids linked with CHD
Higher in total omega-3
A healthier ratio of omega-6 to omega-3 fatty acids
(1.65 *versus* 5-14)
Higher in CLA (cis-9 trans-11), anti-cancer

Grain-fed meat → **vascular diseases, inflammatory and auto-immune diseases (allergies), some cancers**

Nutritional characteristics of grain-based animal products

Origin of obesity

- energy dense food (cereals, bread, pasta, rice)
- sugar (bakkery, sweets, soda)
- saturated fatty acid (grain-based animal fat)
- omega-6/omega-3 ratio too high
- reduced physical activity levels

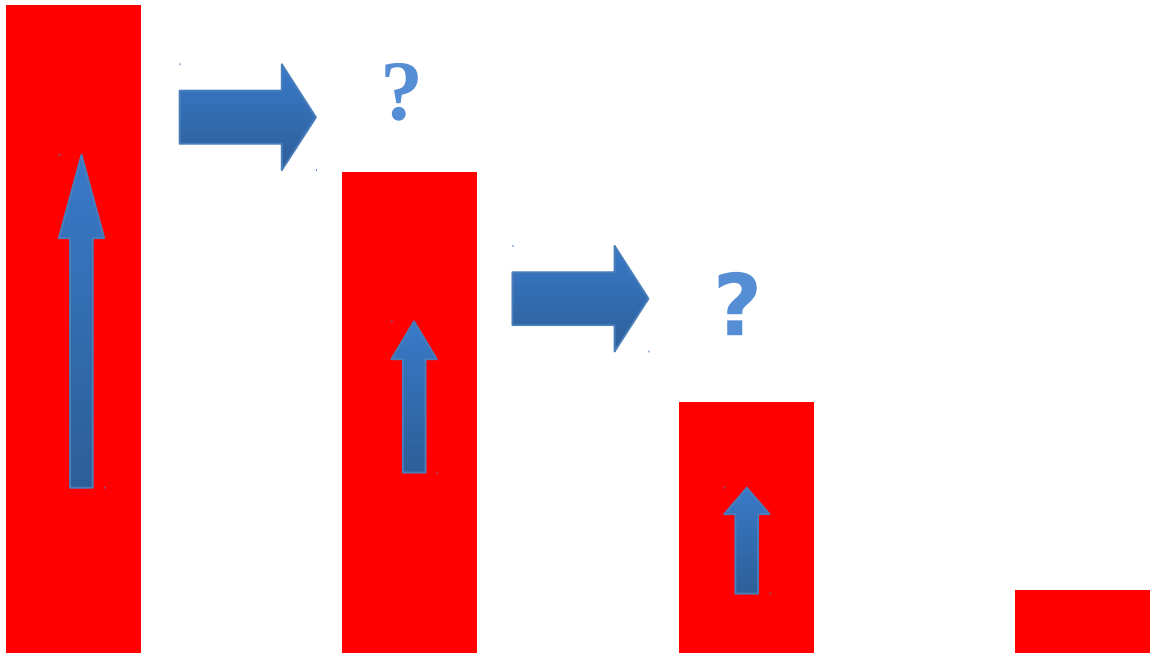
Consequences of obesity

Diet-related chronic diseases, including:

- type 2 diabetes

Nutritional characteristics of grain-based animal products

Obesity occurence (% population)



In the USA, 75% overweight or obese by 2020

Animal feed and human health

Pig – poultry + feed

Specialized cattle + maize + soy

Slurry + herbicide

Water pollution: nitrate + herbicide

Biodiversity loss

High total fat content

High saturated fatty acid content

Low omega 3 fatty acid content

High c

fatty acid content

Obesity, cardio-v

Policy challenges

Goals and problems

Goals

To halt deforestation
To halt conversion of grasslands (ex.: Pampa, Campos, Cerrado, savannahs, Asian steppes) into arable land
To protect coral reef and mangroves
To save and restore fisheries
To protect wetlands and coastal ecosystems
To reduce poverty and improve human health

Problems

Markets fail to capture most ecosystem service value (public goods and services)
Strong link between ecosystem degradation and (rural) poverty

Policy options

Developing an ecological accounting system (improved governance)
Better indicator system of the value of biodiversity and ecosystem services (role of IPBES)
Integration in national accounts SNA = Standard National Account (GDP) <-> SEEA = System of Economic Environmental Accounting

Dialogue and democracy
Roundtable on Sustainable Palm Oil (RSPO) = Association of growers, industrial users and NGOs
Task Force Sustainable Soy (societal organisations (for example the Soy Coalition), producer organisations, the Dutch government

Policy options

Paying for ecosystem services (PES)

Ex.: **Investing in carbon storage**

Ex.: **REDD+ Reducing emissions from deforestation and forest degradation programmes and policies, plus pro-forest activities**

Shaping markets

Product certification (labelling)

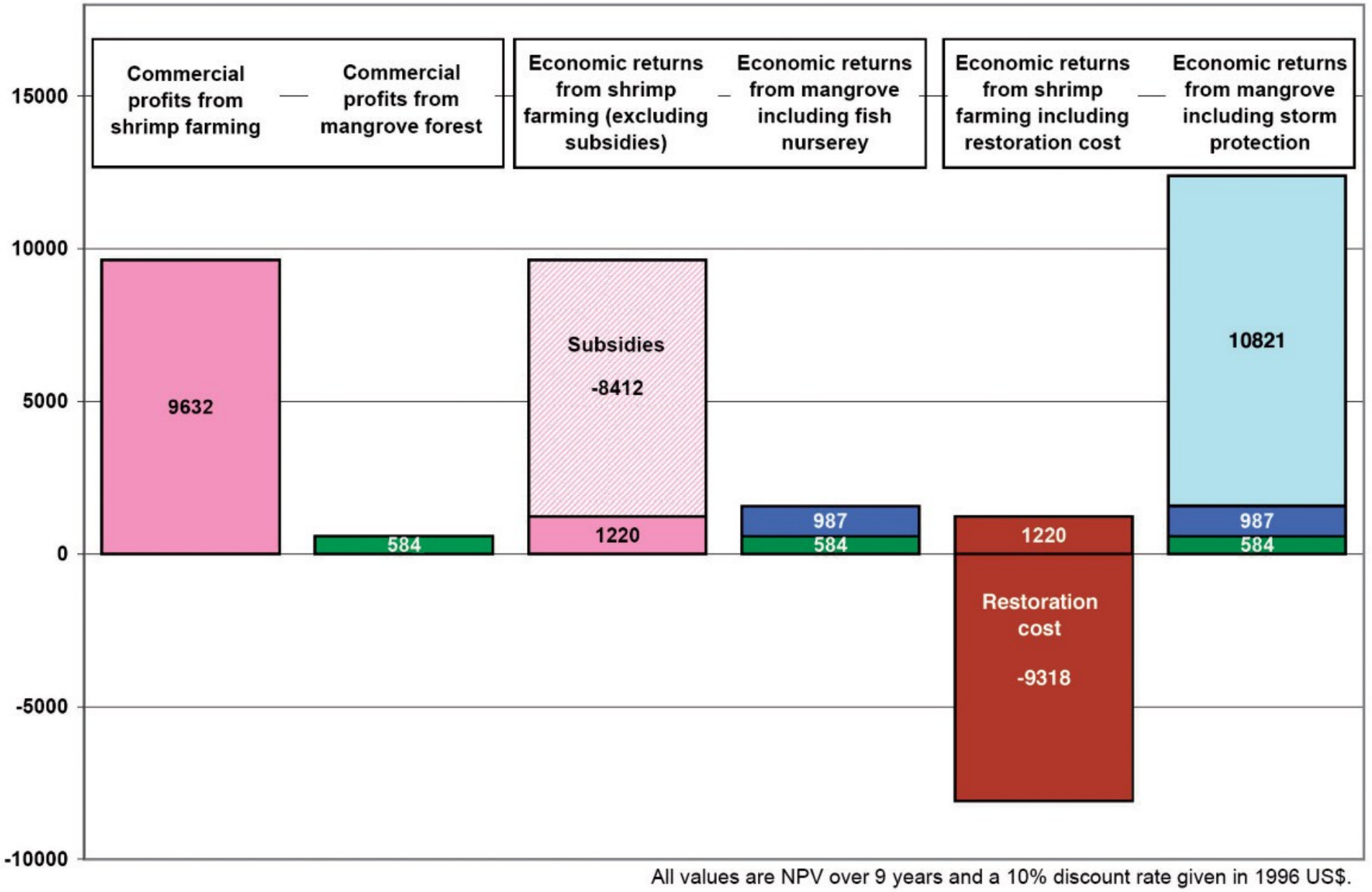
Ex.: Forest Stewardship Council **(FSC)** certification in forests

Green Public Procurements (GPP)

Standards for imported products (Polluter pays, Full cost recovery prin)

Directives, Regulations and Action Plans Ex: **FLEGT** (Forest Law Enforcement, Governance and Trade) Action Plan of the EU + EU Timber Regulation (TEEB 2011)

Comparison of land use values per ha, Southern Thaila



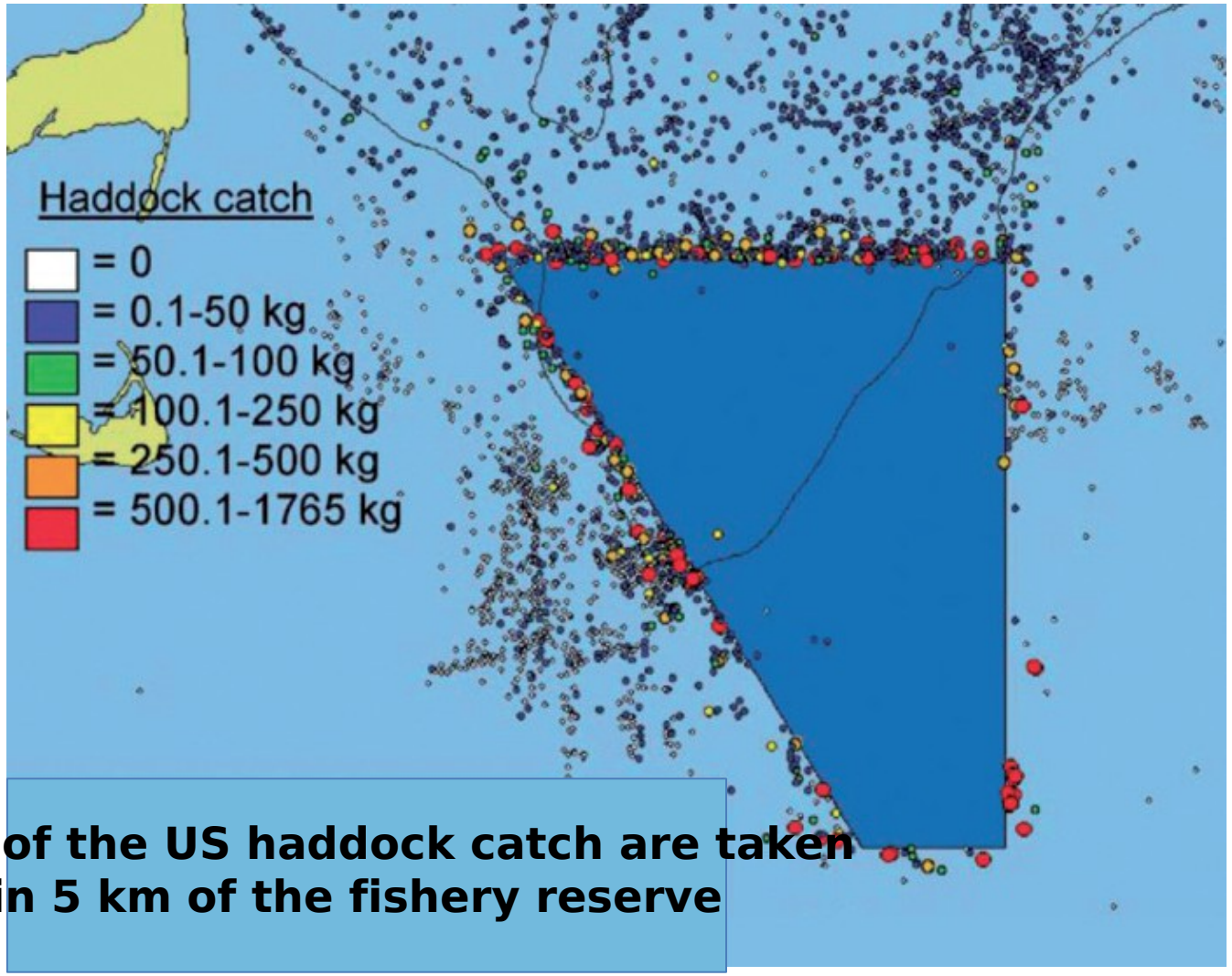
(Hanley and Barbier 2009)

Policy options

Investing in network of protected areas
Increasing their size on continents and seas
Ex.: Borneo WWF Programme in the heart of the island to be achieved through international co-operation led by the Borneo governments, supported by a global effort
Objective: 22 million hectare mosaic of protected areas
Adding value by PES better management, better repartition of benefits
Nature-based tourism
Demonstrating positive effects Ex.: marine reserves for fish population restoration

Restoring degraded ecosystems and developing

Policy options



73% of the US haddock catch are taken within 5 km of the fishery reserve

(Fogarty and Botsford 2007)

Role of research and technology

IPAT equation:

Impact = human Population * Affluence * Technology

average consumption

This equation assumes that, since population and affluence are growing rapidly, the only hope for reducing impacts is a progress or a change in technology.

Need for a TEEBelgium on global trade:

Assessing the impacts of Belgian living standards
on ES, biodiversity and human health in DC and in Belgium

Developing indicators and a System of Environmental Accounting

Defining policy options at EU, federal and regional levels
+ role of public and private sectors

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