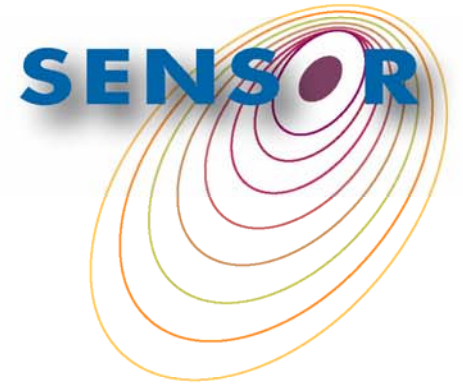# Sustainability Impact Assessment: Tools for environmental, social and eoconomic effects of multifunctional land use in European Regions

FP6 Integrated Project
Consortium with 38 Research Institution in 15 European Countries
and 4 Extra European Countries
Project duration: Dec 2004 – Nov 2008

Scientific Co-ordination:
Leibniz-Centre for Agricultural Landscape Research (ZALF) Germany

Project aim

To deliver ex-ante Impact Assessment Tools (SIAT) to support decision making on policies related to multifunctional land use in Europe.
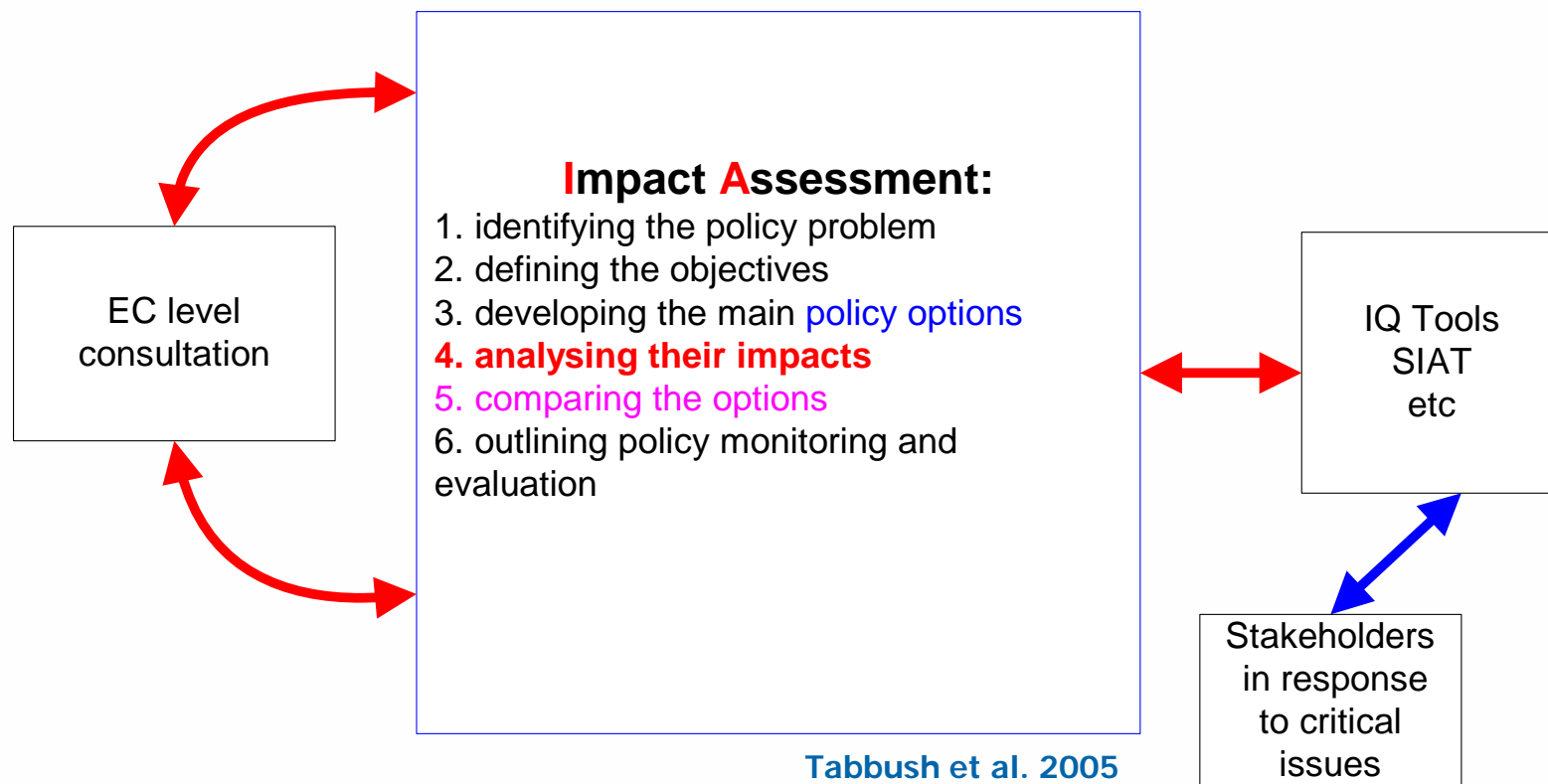
Frame conditions:

Purpose: **EU policies related to land use and rural development**

Enduser: **EU Policy makers**

Scale: **Regional (NUTS2/3) scale with European coverage**

          (EU 27+2+1)

Constraint: **Use existing pan-European data**

Extension: **3 partners from Latin America and 2 from China**

Ex-ante Impact Assessment

The role of Impact Assessment for European Policy Making

IA Guidelines, June 2005

Impact Assessment:
1. identifying the policy problem
2. defining the objectives
3. developing the main policy options
4. **analysing their impacts**
5. comparing the options
6. outlining policy monitoring and evaluation

EC level consultation

IQ Tools SIAT etc

Stakeholders in response to critical issues

Tabbush et al. 2005

Land use types

Agriculture **Forestry** **Nature Conservation** **Transport Infrastructure** **Energy** **Tourism**

Multifunctionality

Production
e.g. food, renewable resources

Environmental
e.g. water, air, soil quality & quantity, biodiversity

Economic
e.g. income, employment, growth

Social
e.g. equity, health, security

Cultural
e.g. aestethics, cultural heritage

Ecological
e.g. robustness, flexibility, elasticity

Land use functions

Sustainability Impact Assessment of multifunctional land use

Land Use
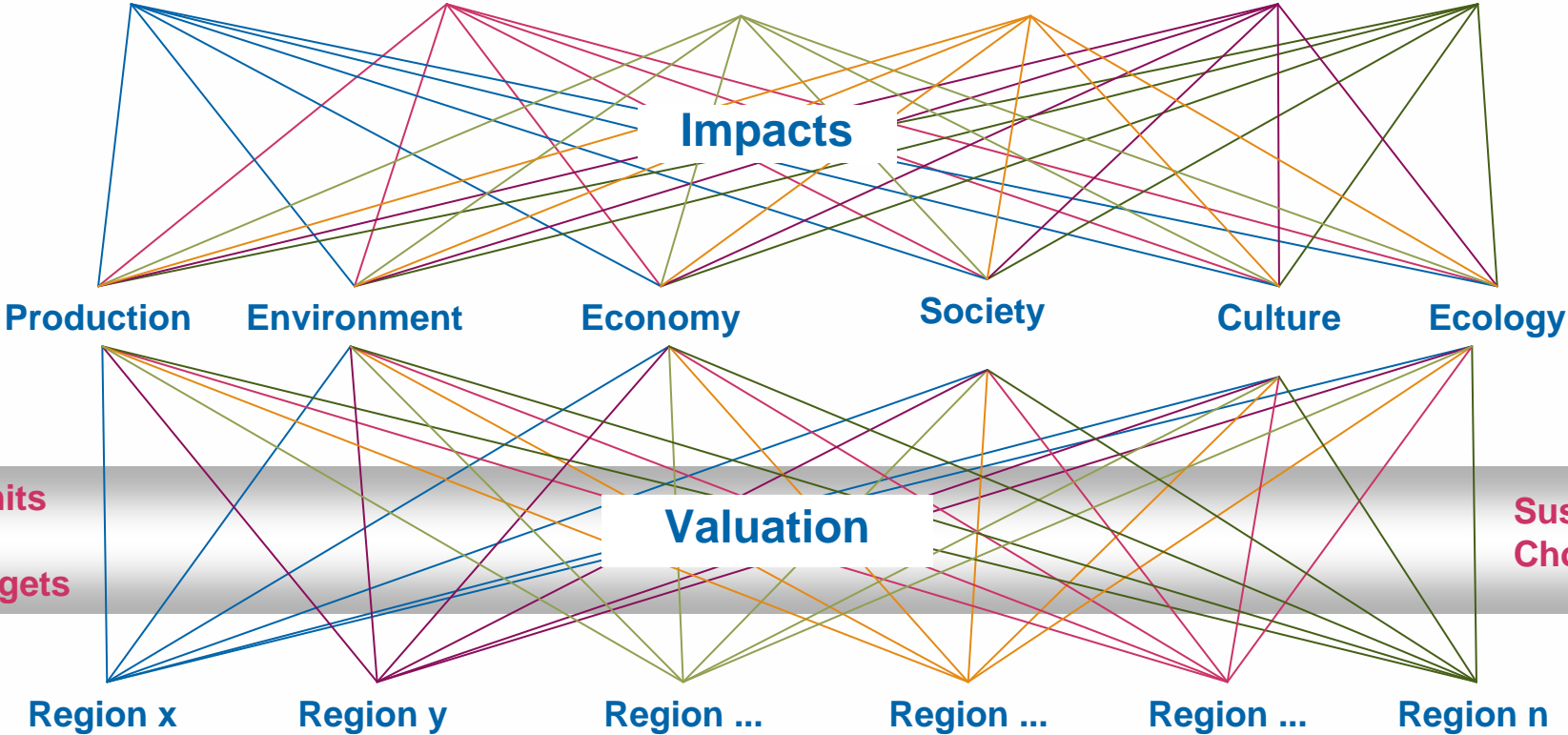

Agriculture **Forestry** **Nature Conservation** **Transport Infrastructure** **Energy** **Tourism**

Impacts

Production **Environment** **Economy** **Society** **Culture** **Ecology**

Limits

Valuation

Sustainability Choice Space

Targets

Region x **Region y** **Region ...** **Region ...** **Region ...** **Region n**

Stakeholder

Sustainability Impact Assessment of multifunctional land use

König et al. 2006

SENSOR Structure
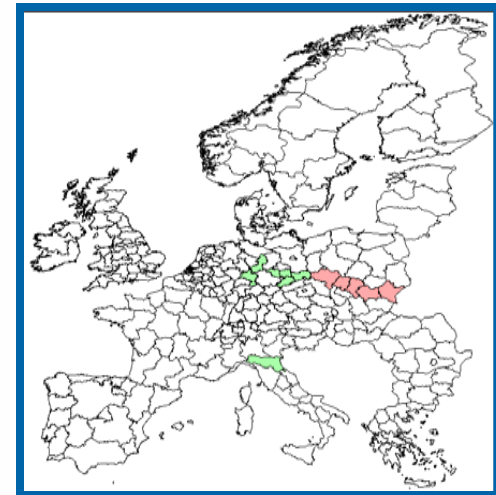
The 3 SENSOR Assessment Streams

1.) Data driven European analysis

■ „Are there changes?"

Result features:

➢Land use changes as related to policy scenarios

➢Changes of indicator values at regional level

➢Costs of changes (Externalities)

Impact Assessment
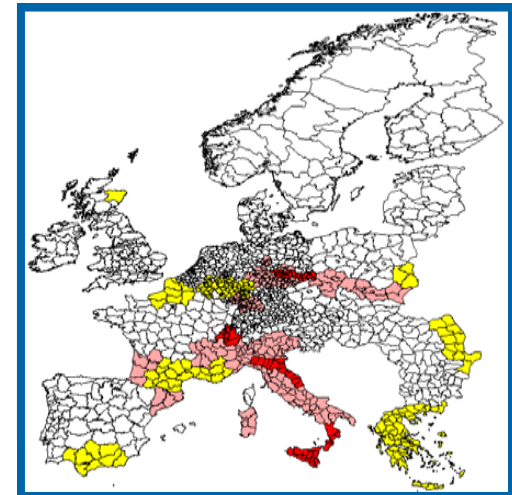

🟩 No change
🟥 change

2.) Regional stakeholder analysis

- „Do the changes matter?"

Sustainability Tolerance Limits:

➤Spatial Reference Frame

➤Sustainability Thresholds (Experts)

➤Sustainability Targets (Stakeholders)

Risk Assessment

☐ no risk

🟨 low risk

🟪 medium risk

🟥 high risk

Sustainability Impact Assessment of multifunctional land use

3.) Case study based sensitive area assessment

- „Have key problems of sustainability and related impact issues been identified?"

  - **Identification of threshold (experts), targets (stakeholders) and limits (standards) for impact indicators in each (cluster) region**
  - **Identification of "Sustainability Choice Spaces" for land use functions**

    Stakeholder and expert knowledge is used to identify what dimensions of sustainability are important in a given space and time
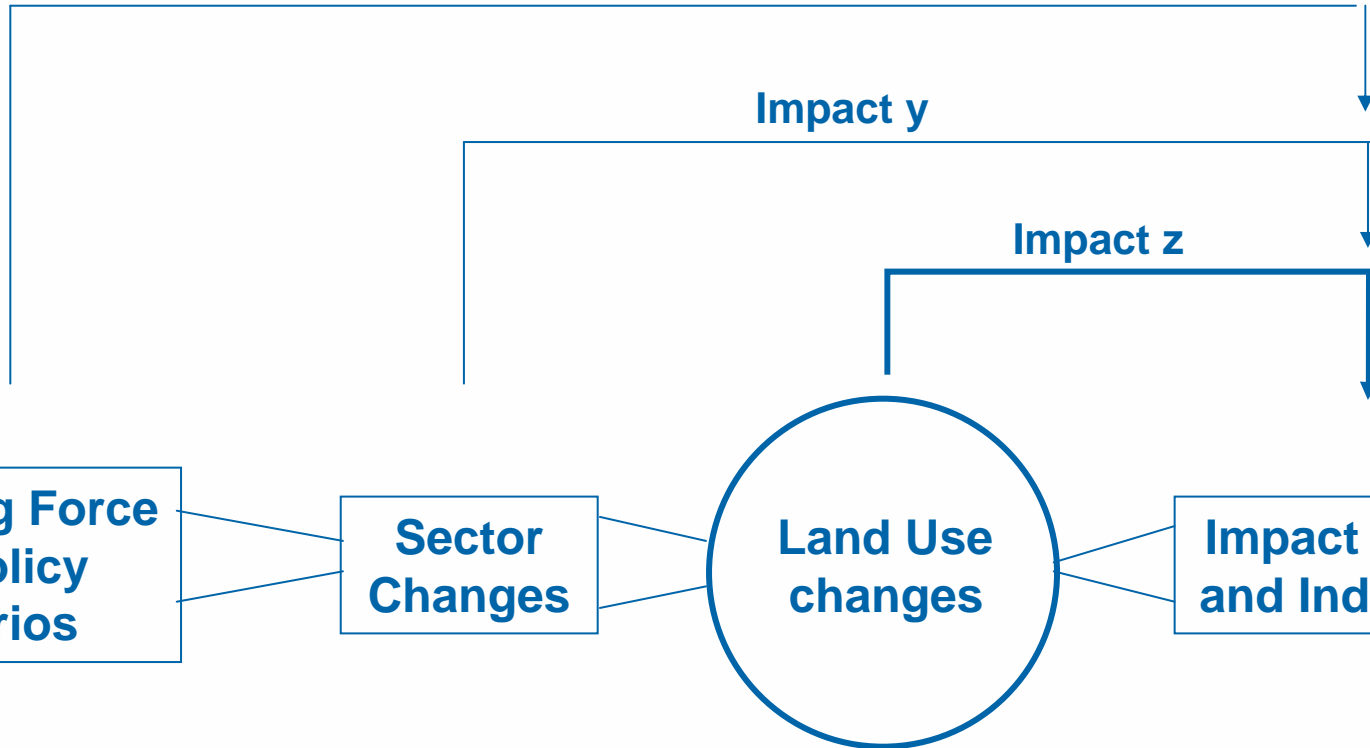
Valuation
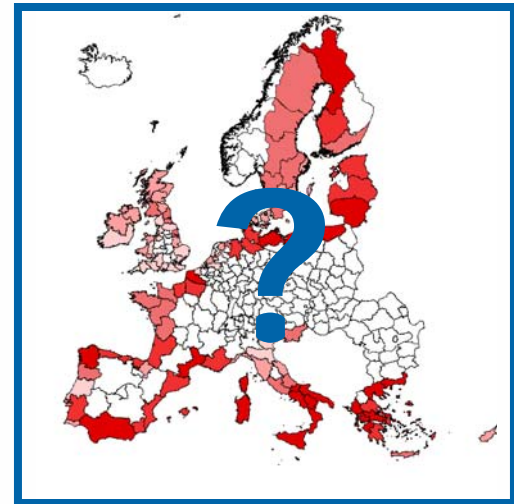
Sustainability Impact Assessment of multifunctional land use

Driver
- **Socio economic drivers (**demographic change, the participation rate in the labour force, world economic growth, the world oil price, and expenditure on research & development **)**
- **Policy cases**

Pressure
- **Land use change**

State
- **Bio-geophysical conditions**
- **Socioe-conomic conditions**

Impact
- **Impact issues**
- **„impact identification" and „impact valuation"**
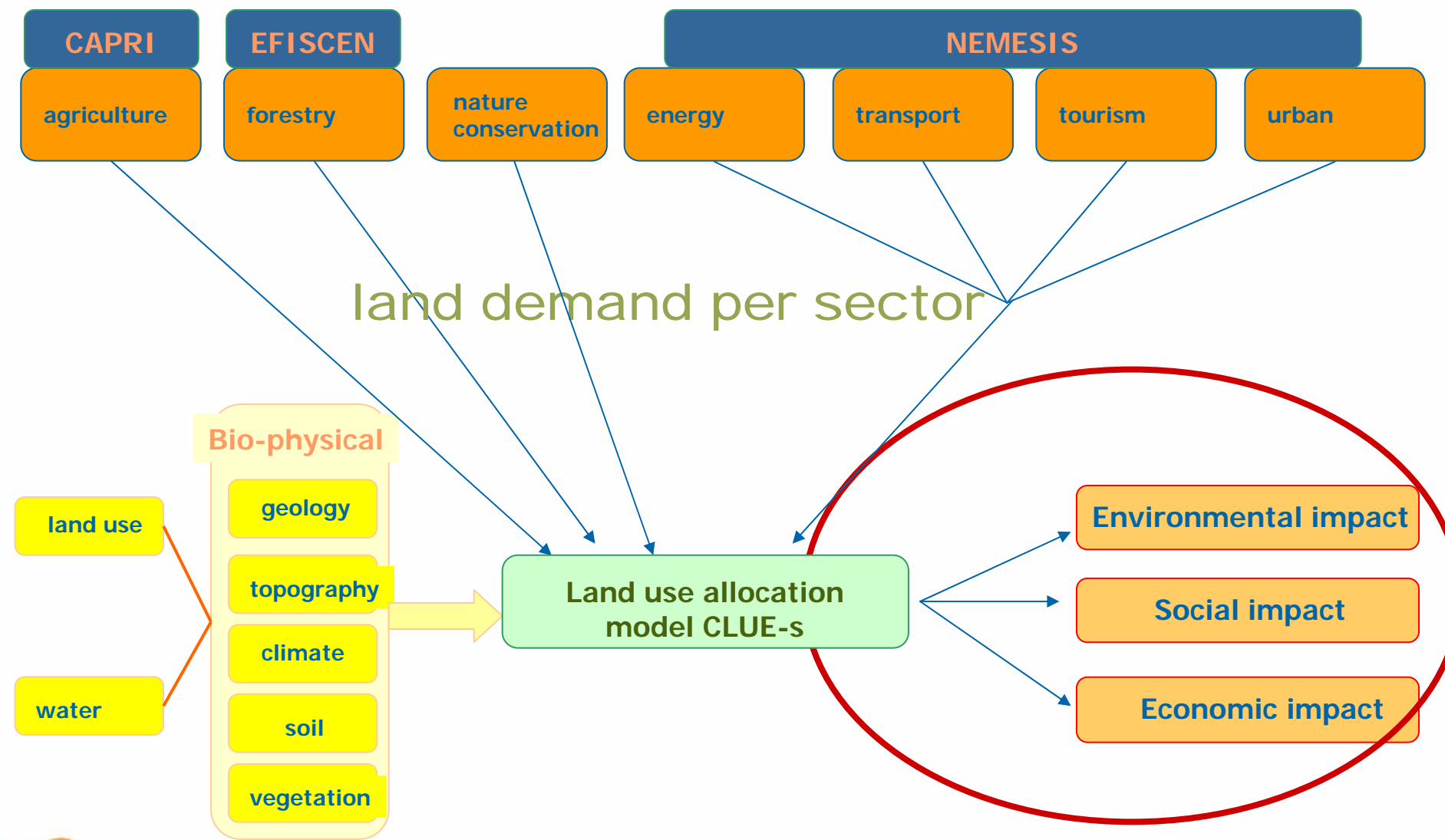- **Relation to landscape function;**

Response
- **Up to desicion maker**
- **Not requested from SENSOR**


Land Use Policies

Sector analysis and land-use modelling

CAPRI	EFISCEN		NEMESIS			
agriculture	forestry	nature conservation	energy	transport	tourism	urban

land demand per sector

Bio-physical

- land use
- water

- geology
- topography
- climate
- soil
- vegetation

Land use allocation model CLUE-s

Environmental impact

Social impact

Economic impact

List of impacts: according IA guidelines

Sustainability dimensions	Impacts on
Economic	•ECO1: Competitiveness, trade and investment flows •ECO2: Competition in the internal market •ECO3: Operating costs and conduct of business •ECO4: Administrative costs on businesses •ECO5: Property rights •ECO6: Innovation and research •ECO7: Consumers and households •ECO8: Specific regions or sectors •ECO9: Third countries and international relations •ECO10: Public authorities •ECO11: The macoeconomic environment
Social	•SOC1: Employment and labour markets •SOC2: Standards and rights related to job quality •SOC3: Social inclusion and protection of particular groups •SOC4: Equality of treatment and opportunities, non – discrimination •SOC5: Private and family life, personal data •SOC6: Governance, participation, good administration, access to justice, media and ethics •SOC7: Public health and safety •SOC8: Crime terrorism and Security •SOC9: Access to and effects on social protection, health and educational systems
Environmental	•ENV1: Air quality •ENV2: Water quality and resources •ENV3: Soil quality or resources •ENV4: The Climate •ENV5: Renewable or non-renewable resources •ENV6: Biodiversity, flora, fauna and landscapes •ENV7: Land use •ENV8: Waste production / generation / recycling •ENV9: The likelihood or scale of environmental risks •ENV10: Mobility (transport modes) and the use of energy •ENV11: The environmental consequences of firms´ activities •ENV12: Animal and plant health, food and feed safety

„Impact Issues"

(IA Guidelines)

Sustainability Impact Assessment of multifunctional land use

Land use changes
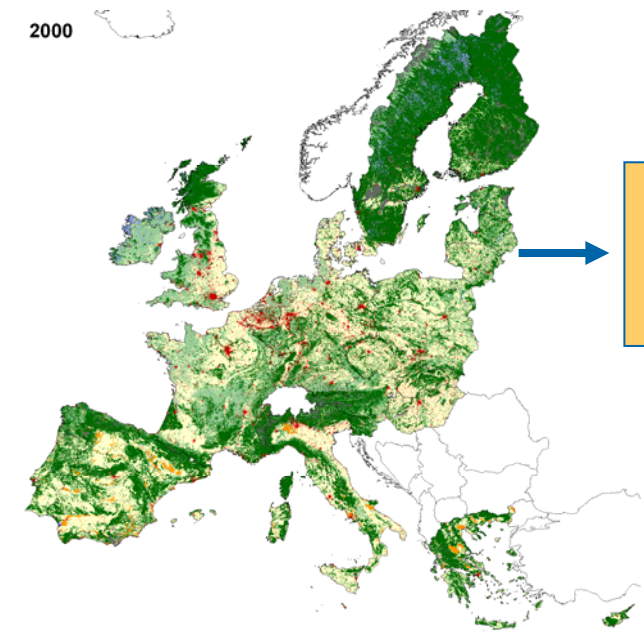
Land Use Functions

Indicators

- Residential and non-land based industries and services
- Infrastructure
- Land based production
- Provision of work
- Human health in addition to recreation
- Cultural landscape identity
- Provision of abiotic resources
- Support and provision of habitat
- Maintenance of ecosystem services

Land Use Functions
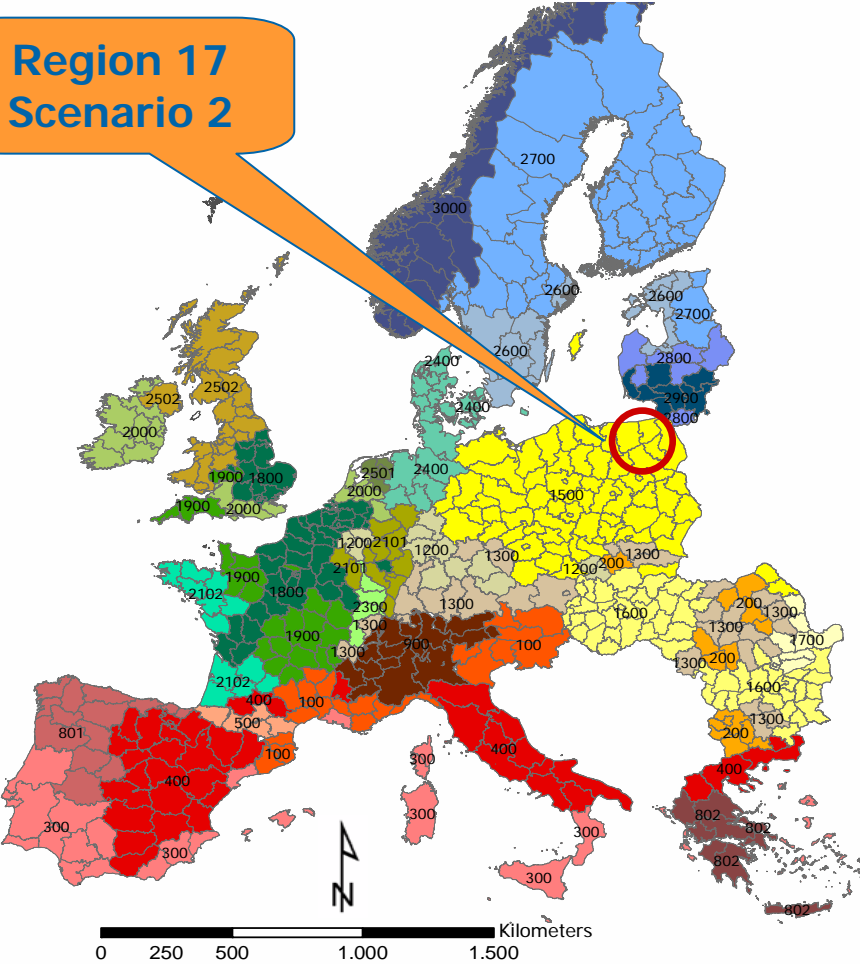
Mainly SOCIETAL   **Mainly ECONOMICAL**   **Mainly ENVIRONMENTAL**

Mainly SOCIETAL	Mainly ECONOMICAL	Mainly ENVIRONMENTAL
Provision of work	**Residential and non-land based industries and services**	**Provision of abiotic resources**
Human health and recreation (spiritual and physical)	**Land based production**	**Support and provision of habitat (biodiversity, gene pool)**
Cultural Landscape Identity (scenery and cultural heritage)	**Infrastructure**	**Maintenance of ecosystem processes**

Sustainability Impact Assessment of multifunctional land use
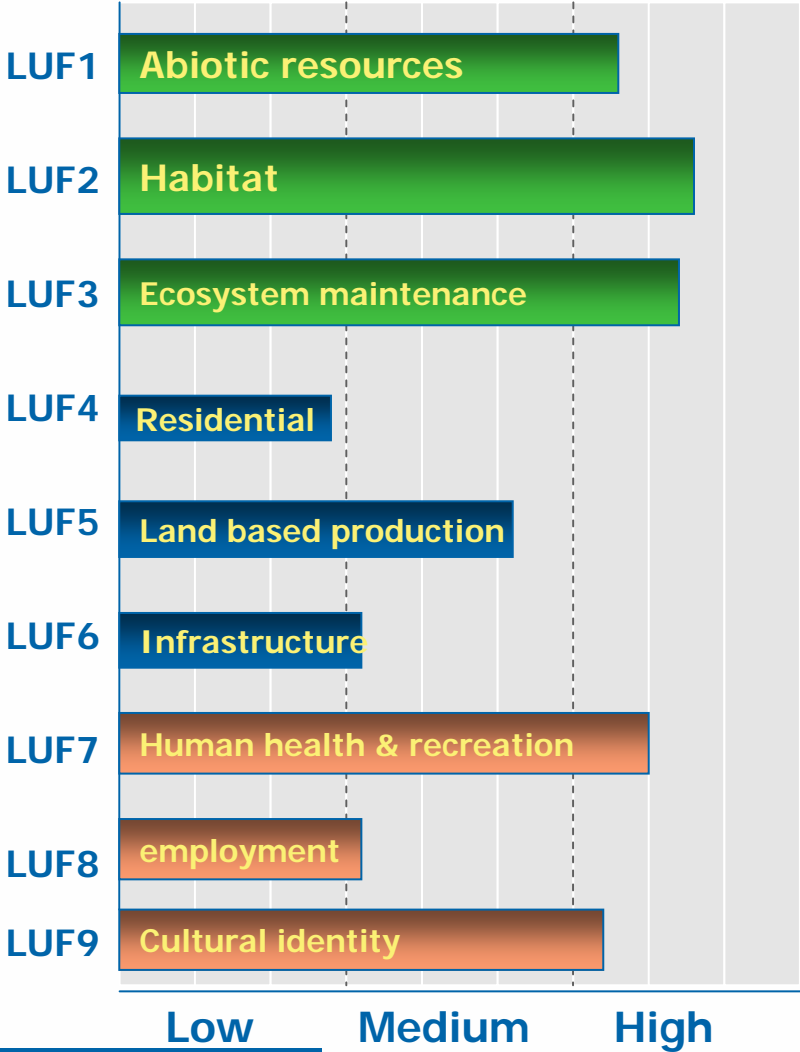
Land Use Change Impacts

**Spatial reference III:
30 region clusters
(Renetzeder, Wrbka et al.)**

Region 17
Scenario 2

Land Use Functions

LUF1	Abiotic resources
LUF2	Habitat
LUF3	Ecosystem maintenance
LUF4	Residential
LUF5	Land based production
LUF6	Infrastructure
LUF7	Human health & recreation
LUF8	employment
LUF9	Cultural identity

Low   Medium   High

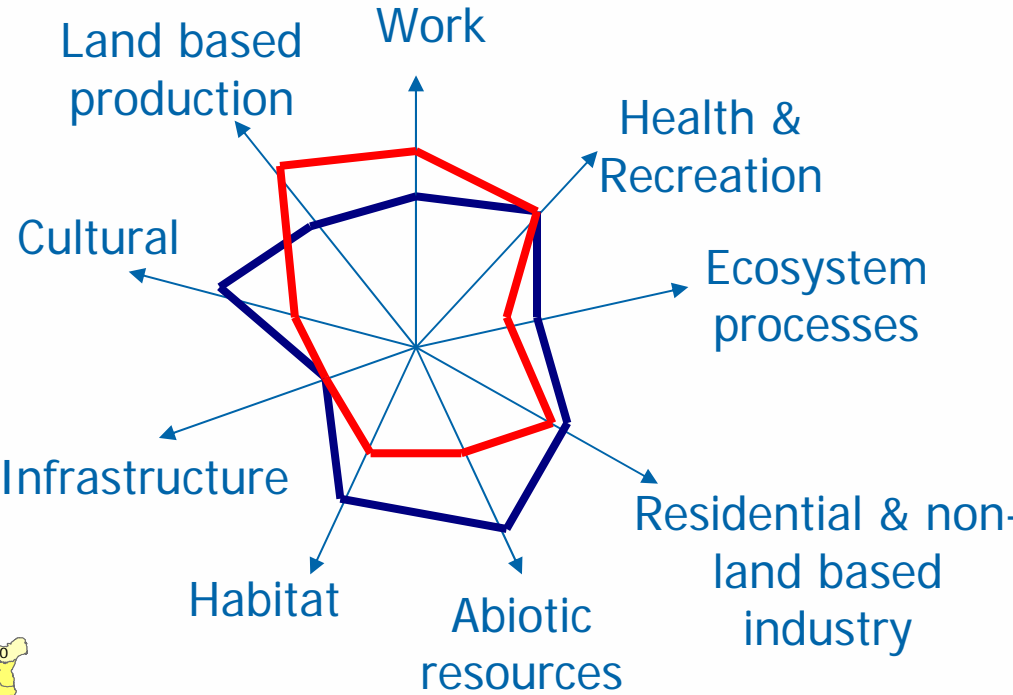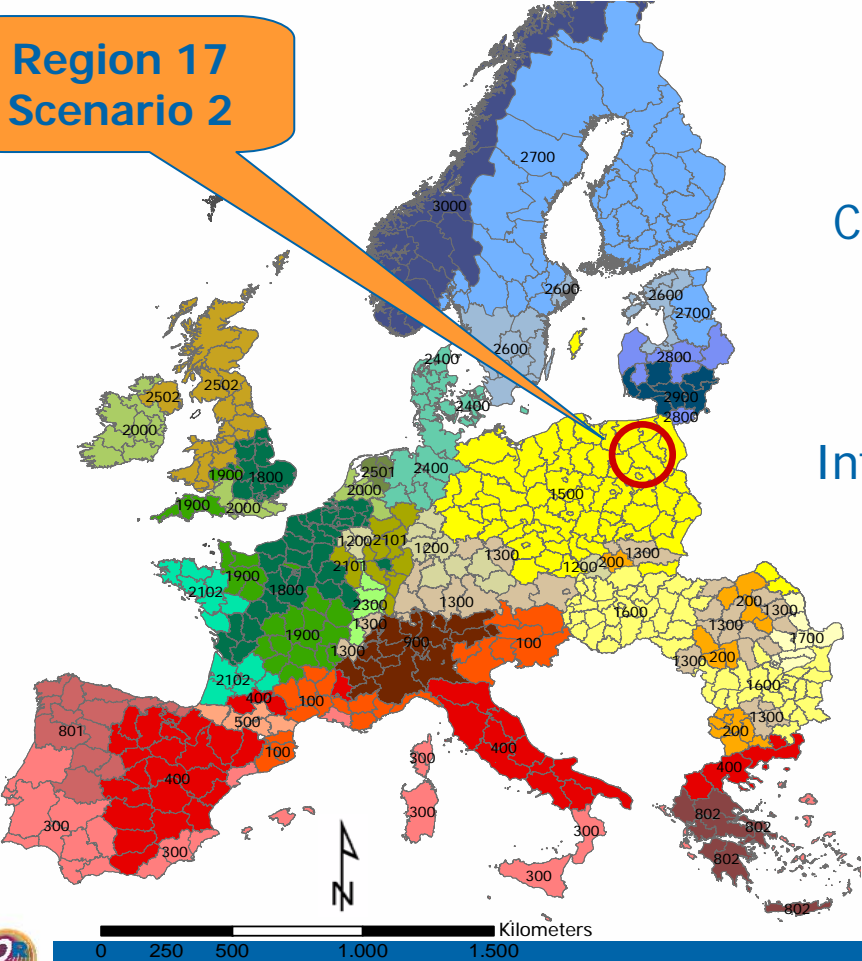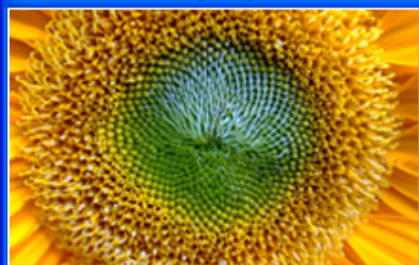Sustainability Impact Assessment of multifunctional land use

Integrated assessment of indicators in LUF

Spatial reference III:
30 region clusters
(Renetzeder, Wrbka et al.)

Region 17
Scenario 2

Reference scenario

High growth scenario

Sustainability Impact Assessment of multifunctional land use

Impact assessment

Increase use of renewable energy
Bio diesel

1 Reference scenario **2** Policy settings **3** Impact indicators **4** Sustainability

Impact assessment

Current state
Project
Simulation
 New simulation...
 Open...
 Remove
● Properties ->
Compare simulations

Methodology

IA regulation

Regional background

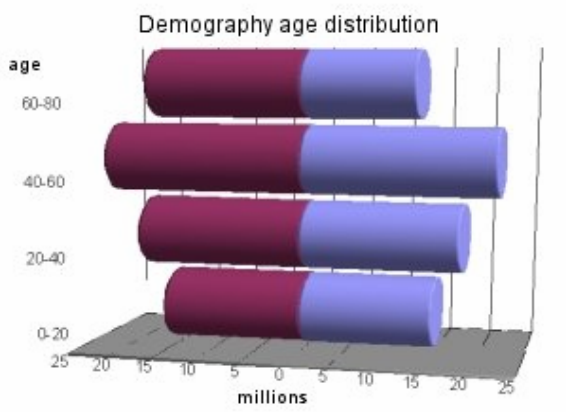**Sensor project**

User manual

SENSOR

Simulation name

Bio diesel

Select a reference scenario for your impact assessment

Business as usual ▼

Business as usual
Low growth
High growth

business as usual scenarios. This type is based on the
extrapolation of existing trends. They assume that those
trends will not change. In this sense, they are projections,
not forecasts. An extrapolating scenario is not a
statement of what is likely to happen, but only what will
happen if recent trends continue to operate. This brings
us to the following set of drivers for the baseline
scenarios:

- demographic change within Europe
- the rate of participation in the labour force (in Europe)
- growth of world demand (outside Europe itself)
- the price of petroleum on the world market
- expenditure on research and development
- institutions
- cultural change.

Demography age distribution

age

60-80

40-60

20-40

0-20

25 20 15 10 5 0 5 10 15 20 25

millions

Reference scenario defines:
-general trends (eg population growth)

A factsheet informs on distinguishing
topics only.
More background information can be
found by selecting the 'more info'
button within the factsheet.

Assumptions for three 3 drivers

		2005	2015	2025
oil price (in constant euros of 2004, per barrel)		46.8	39.8	46.5
world GDP excluding EU25 in mio of constant euros of 2004)		31,389,812	43,153,113	56,707,663
population (number)	EU-25	458,490,171	467,306,493	470,057,265

Next

Impact assessment

Increase use of renewable energy
Bio diesel

① **Reference scenario** ② **Policy settings** ③ **Impact indicators** ④ **Sustainability**

Impact assessment

Current state
Project
Simulation
   New simulation...
   Open...
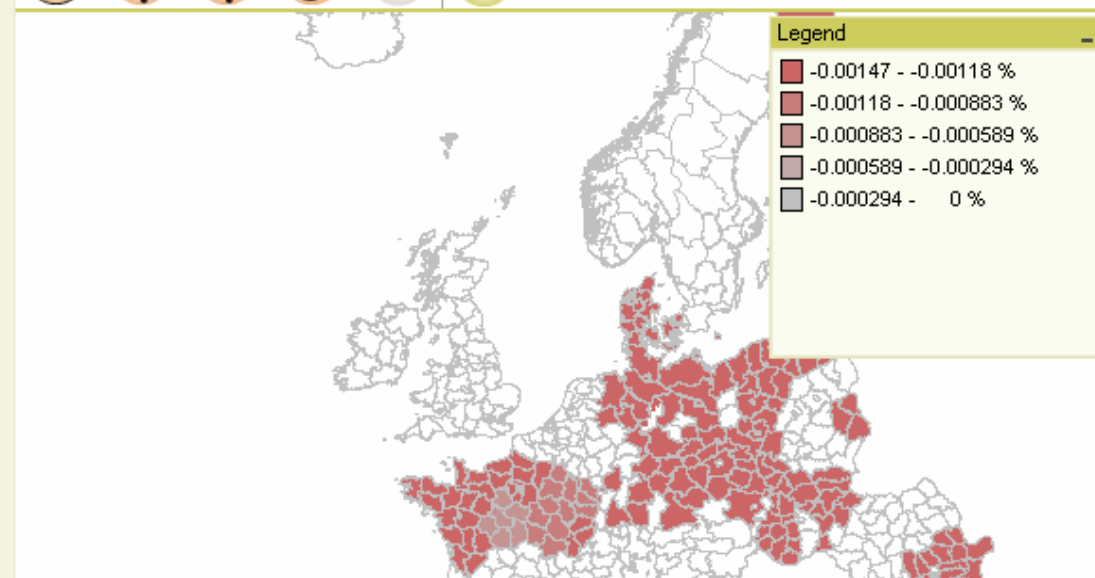   Remove
  ● **Properties** ->
Compare simulations

Methodology

IA regulation

Regional background

Sensor project

User manual

SENS●R

Select map

○ Land use change | Arable land - energy crops   ▼ |

● Indicator | Social - Employment/labour - unemployment rate   ▼ | **Fact sheet**

Select target year | 2025   ▼ |

Sustainability indicator

🌍 🔍 🔍 ✋ ⓘ 📊

Map shows difference between user defined and base scenario

Legend   —
🟥 -0.00147 - -0.00118 %
🟥 -0.00118 - -0.000883 %
🟥 -0.000883 - -0.000589 %
🟪 -0.000589 - -0.000294 %
⬜ -0.000294 -   0 %

Nuts region: FR246

🟩 Quality estimation: good

The quality estimation indicates how reliable the calculated impacts are.

Quality is affected by 1. the available process knowledge, 2. expliciteness of the indicator, 3. data availability and 4. up and down scaling effects

Previous   **Next**

SENSOR innovations

Scaling: Spatial, temporal and governmental scales

Application
- Natural resources
- Management
- Climate change adaptation
- Flood/drought management

DPSIR Interpretations
- Scenarios,
- driving forces,
- Impact analysis steps

International dimension
Latin America, Asia

Top-down modelling and bottom-up participartion

Indicators
From triple-bottom-line to sustainability
- Mutlifunctionality
- Land use functions

Science-policy interfaces
SIAT, Institutions, Meta-modelling

Assessment theories
- EIA, SEA, RIA, SIA
- Green accounting
- Ecological footprint
- Transition management
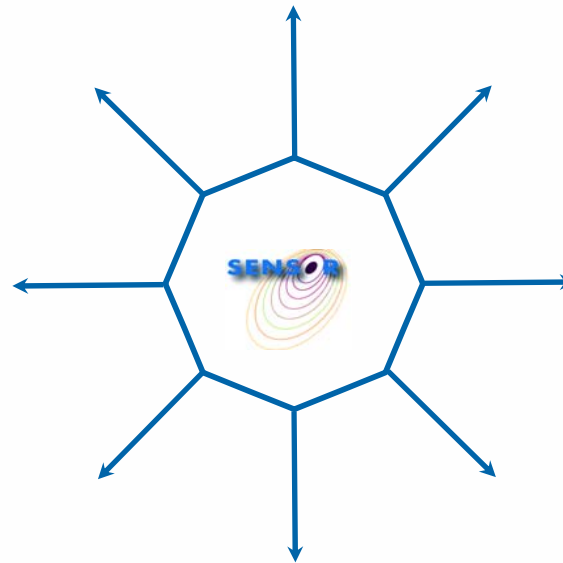
Thank you for your attention

www.sensor-ip.eu

Sustainability Impact Assessment of multifunctional land use

- http://www.sensor-conference2008.eu/