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Gouverner par les métriques: enjeux et politiques des connaissances de la sécurité alimentaire

Allison Marie Loconto

INRA SAE2 – UMR LISIS



Gouverner par les métriques

- Les enjeux environnementaux au niveau global:
 - Une complexité croissante
 - Interdépendance entre les sciences et les politiques (par ex., evidence-based policy-making, expertises, prospectives)
 - Grande incertitude sur les liens entre les enjeux environnementaux et la sécurité alimentaire – la question de la temporalité et interactions entre les vulnérabilités des populations et changement environnemental
- Les modèles d'usage des sols sont utilisés pour 'prédire' certains actions et ils guident des décisions
 - « gouvernement » réfère à une conduite ou à une activité destinée à **modeler, guider ou influencer la conduite** des personnes (...) La rationalité, en tant que forme de pensée qui s'efforce d'être systématique et claire sur la manière dont les choses se passent ou devraient se passer, suggère enfin **qu'avant de pouvoir contrôler ou diriger une personne ou une chose, il faut pouvoir la définir**. L'État, par conséquent, va concevoir des systèmes permettant de définir les populations, c'est-à-dire de les **rendre connues et mesurables**. (Foucault 1978)

Les modèles de l'usage des sols – simplement un outil?

- « We define 'model' broadly, to refer to a **schematic description of a system or phenomenon** that accounts for its key properties and may be used as the **basis for further exploration or prediction**. Modelling takes many forms, shedding light on complex patterns and processes from different perspectives (...) yet such models themselves need to be understood as having **social and political lives**. » (Leach and Scoones, 2013b: 10)
- Théorisation des objets techniques et leurs circulations:
 - Gouverner par les instruments (Lascoumes et Le Gales 2004)
 - Du mode d'existence des objets techniques (Simondon 1958)
 - Les objets-frontières (Star & Griesemer 1989)
 - Les standards, les classifications et la circulation des objets techniques (Bowker & Star 1999; Busch 2011)
 - Les effets de filtrage (visibilité/invisibilité) de ces outils (Bowker & Star 1999; Loconto 2014; Rajao 2014, Silva 2012)
 - Valuation (évaluer et valoriser) (Vantin 2009) et Performativité (Callon 1999)
 - Souvent, les modèles économiques façonnent les comportements plus tôt que de les refléter (Callon, 1999);

Le cas du modèle Green et al. 2005

... ou bien, comment un modèle vient d'influencer l'action publique et l'usage des sols?

.... on suit les traces du modèle

La controverse Land Sparing / Land Sharing

SPECIAL REPORT

The effects of growth

The long view

Contrary to popular belief, economic growth may be good for biodiversity



Print edition | Special report >

Sep 13th 2013



“Many greens argue that intensification of agriculture harms biodiversity. It is true that pesticides and fertiliser tend to reduce the number of species where they are used, but **intensive agriculture employs less land than extensive farming to produce the same amount of food.** The question, then, is whether the net benefits to other species of “land-sharing” (farming extensively on a larger area) outweigh those of “land-sparing” (farming intensively on a smaller area). A couple of recent papers—a theoretical one by David Tilman of the University of Minnesota and an empirical study by Ben Phalan of Cambridge University, looking at data from Ghana and India—suggest that **land-sparing wins.**”

Figure 1: Number of Publications in the Land Sparing vs. Land Sharing Controversy (2005-2016)

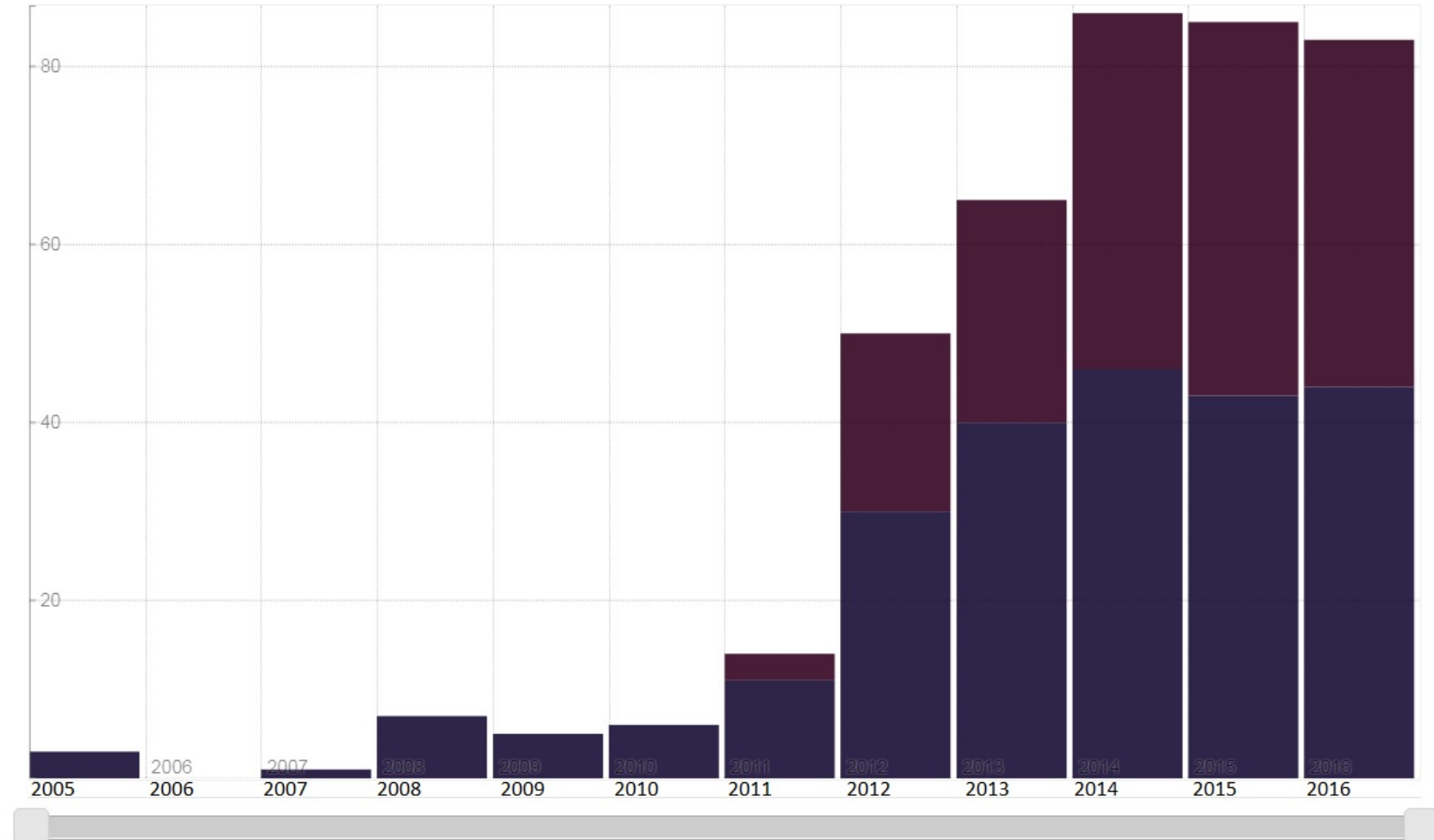
Field Evolution

- land sharing
- land sparing



- stack
- stream
- pct
- value
- cardinal
- linear
- step

Smoothing

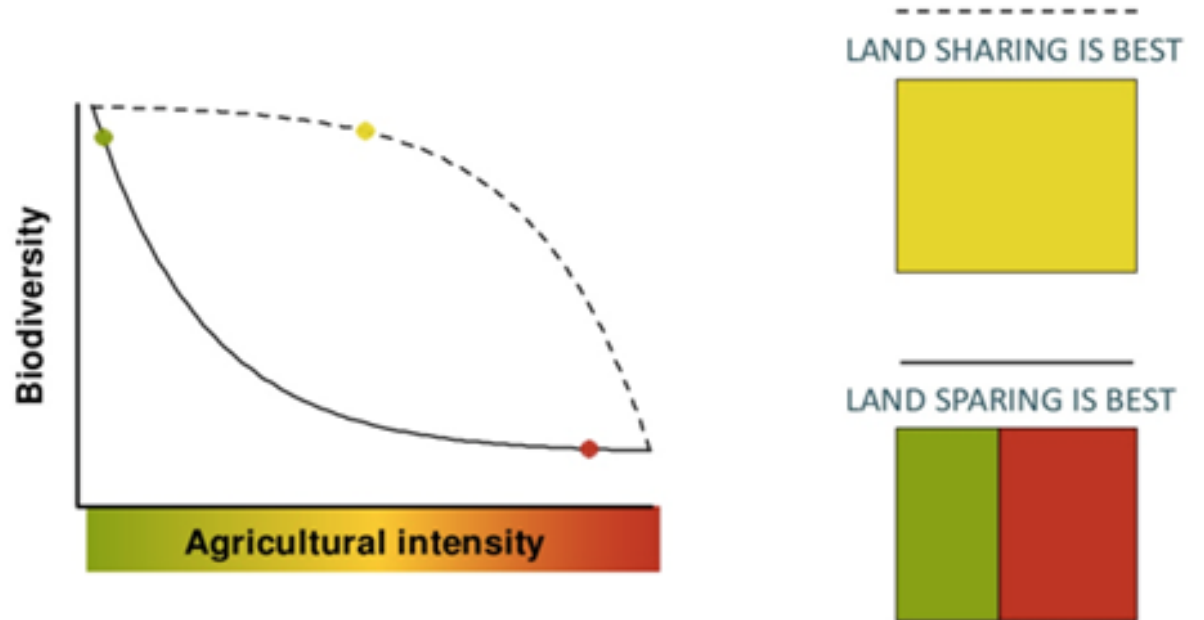


NB: Small scientific corpus representing the LSS Controversy (142 LSP / 111 LSH)

Green et al. (2005), Farming and the fate of wild nature, Science.

Postulats:

- Utilisation alternative d'une agriculture à haut rendement ou à faible rendement
- Un indicateur unique de biodiversité
- Quel type d'agriculture est le meilleur pour la biodiversité lorsque l'on cherche à atteindre un objectif de production donné ?



Source: Green et al., 2005

Tout dépend de la forme de la relation entre biodiversité et rendement ...

Cites:

- ‘area saved by yield increase’ (Borlaug, 1985: 392)
- ‘sparing land for nature’ (Waggoner, 1994)

Figure 2.1 Compositionism and Land Sparing

chi2 score: 79.0 (sign. with p-value 3.08e-04)

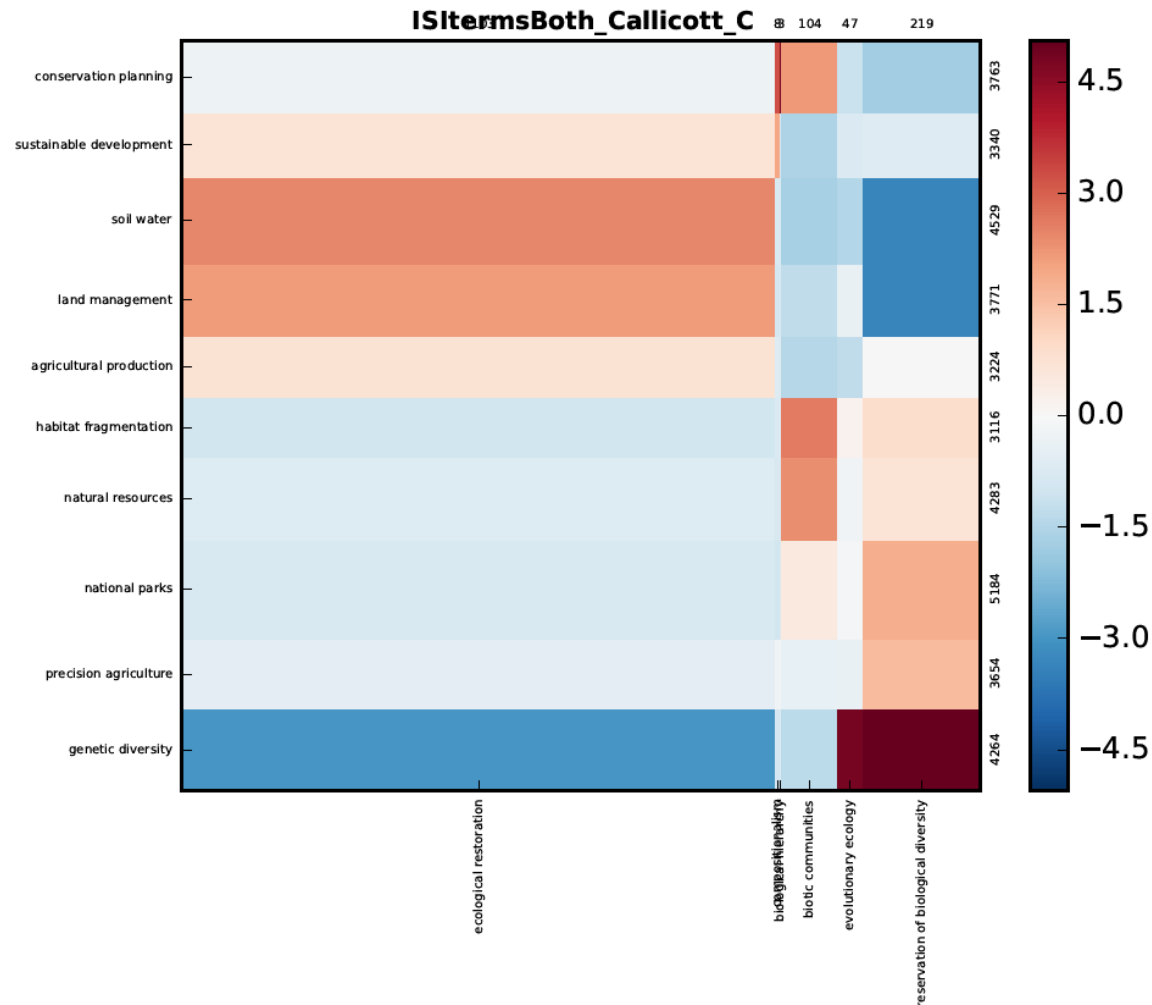


Figure 2.4 Functionalism and Land Sparing

chi2 score: 229.5 (sign. with p-value 1.30e-16)

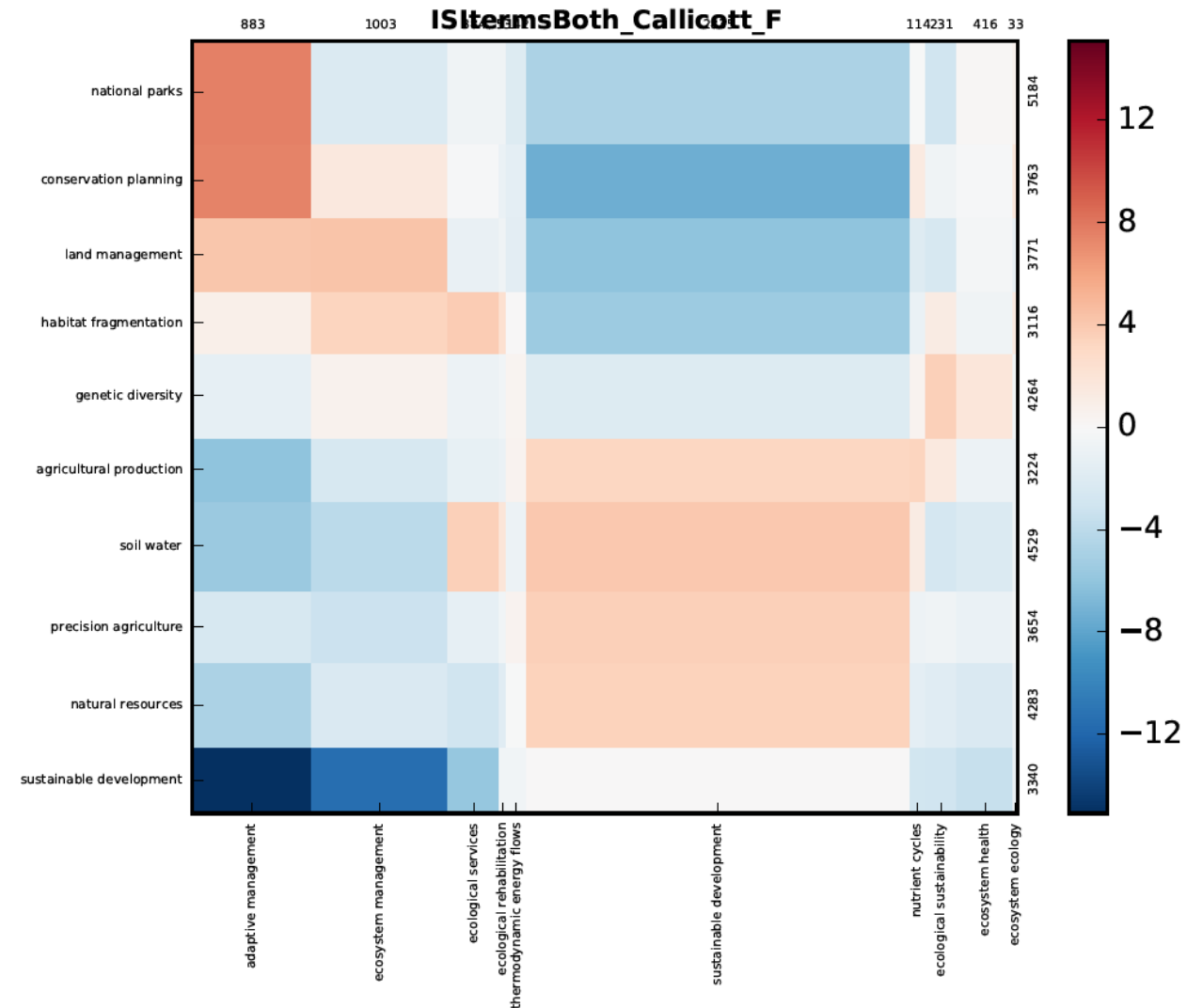


Figure 2.3 Compositionism and Land Sharing

chi2 score: 47.3 (sign. with p-value 3.88e-02)

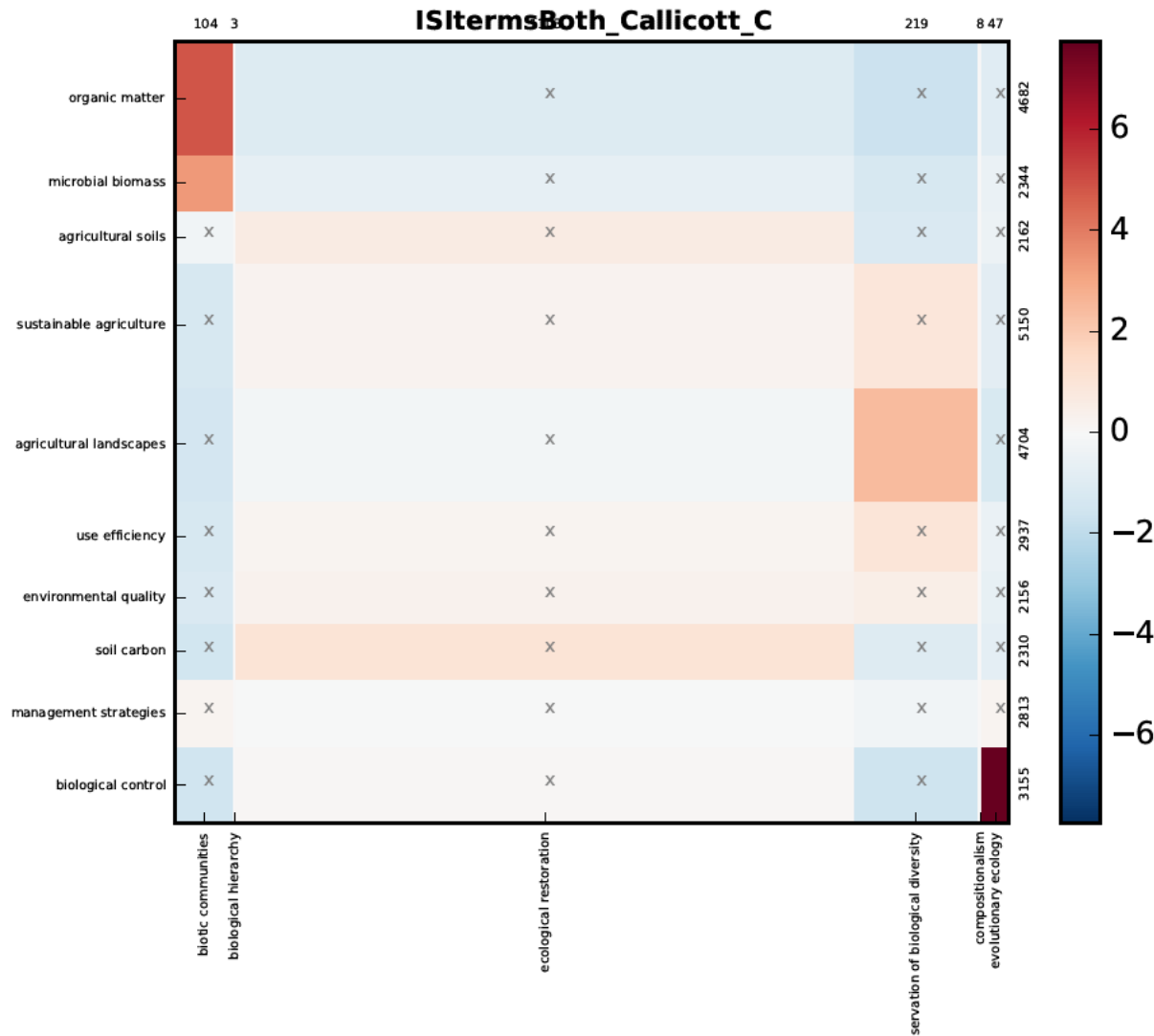
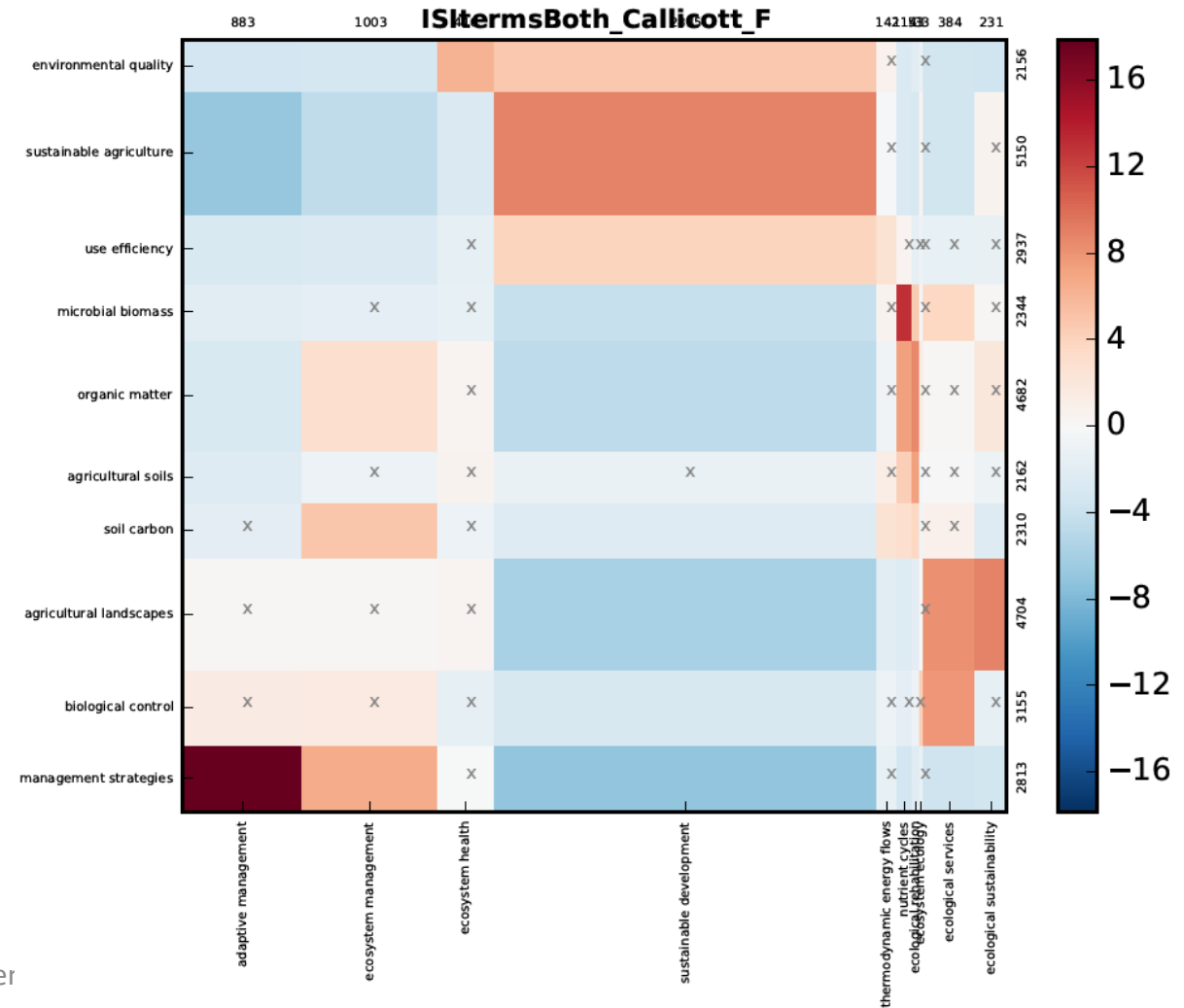


Figure 2.2 Functionalism and Land Sharing

chi2 score: 293.4 (sign. with p-value 2.80e-26)



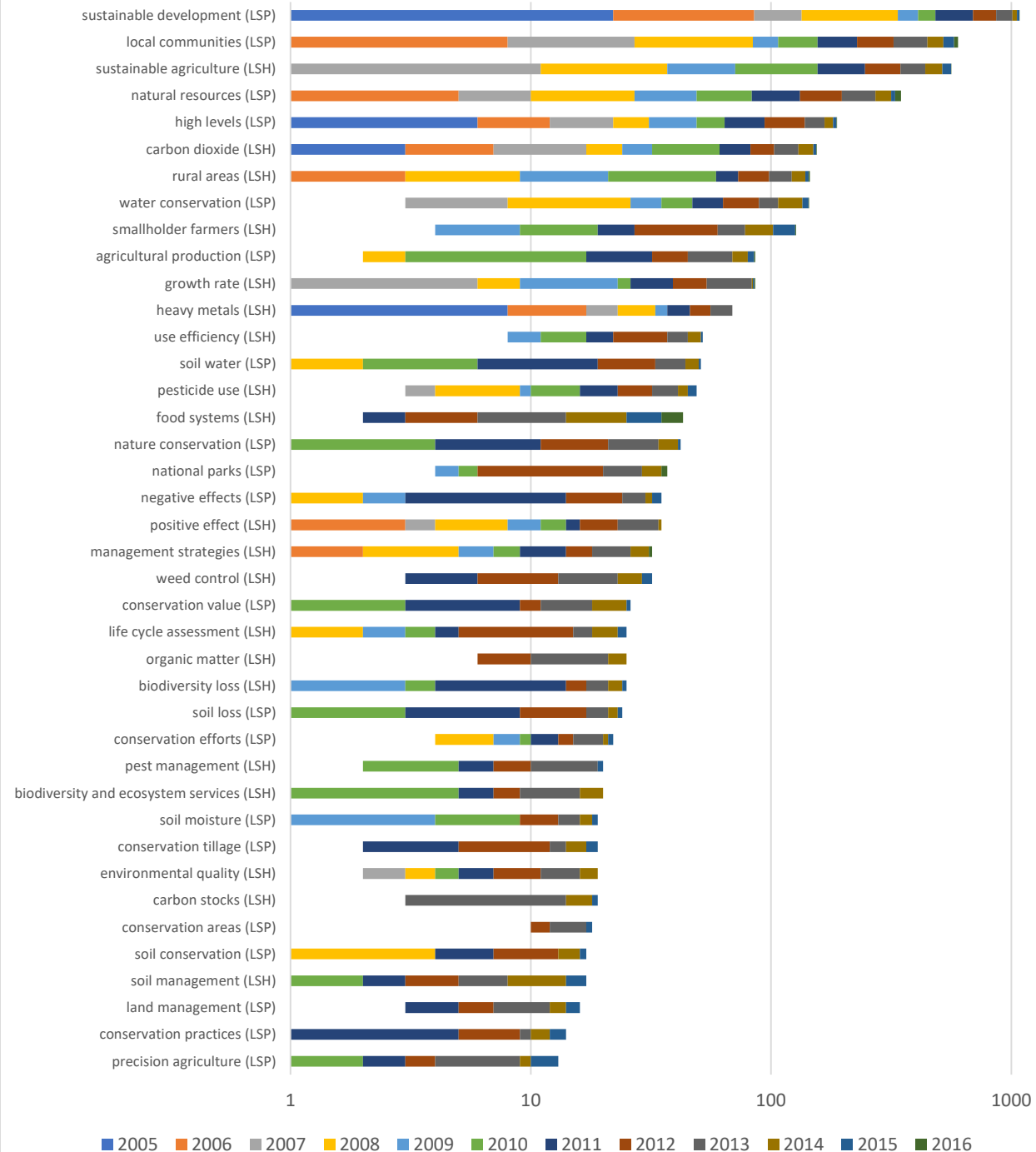
L'application du concept par l'industrie

La base de données 'industrie'

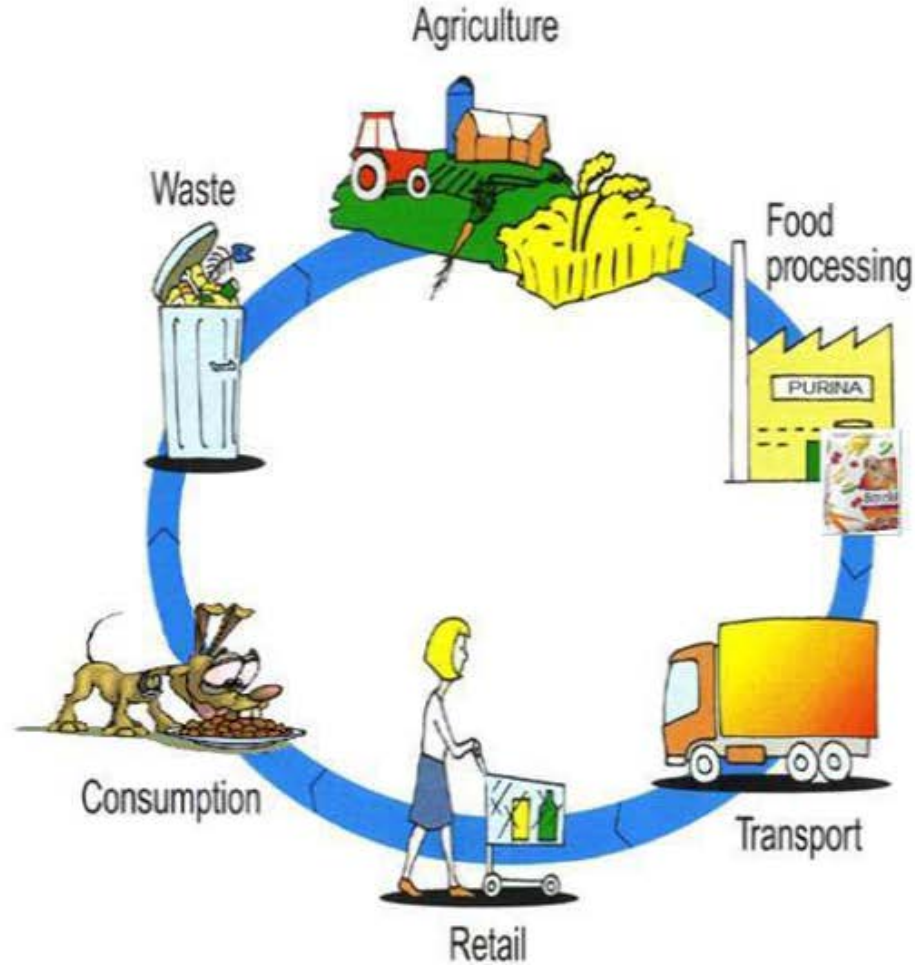
Table 2: Sample of agri-business and agro-chemical firms in the industry corpus

Sector	Agrochemicals	Food and Beverage	Food Retailers	Food Production
Ranking 2014	Syngenta : 11.4	Nestlé : 99.5	Walmart : 476.2	ADM : 89.8
revenue in millions of USD	Bayer : 10.2	PepsiCo : 66.4	Cargill : 134.9	Bunge : 62.5
	Basf : 7.2	Unilever : 66.1	Tesco : 103.2	Wilmar : 44.1
	Dow Chemical : 5.7	Coca Cola : 44.3	Carrefour : 101.7	JBS: 43
	Monsanto : 5.1	Danone : 28.3	Kroger : 98.3	
	DuPont : 3.7			

Source: Adapted from Fortune Global 500, 2016



The entire life cycle is taken into account



Different aspects of the environment are taken into account



Global Warming (kg CO₂eq)



Water Consumption (m³)



Non-renewable Energy Use (MJ)



Ecotoxicity (PDF×m²×year)



Acidification (PDF×m²×year)



Land use (m²)

L'outil permet aux entreprises de prendre des decisions qui selectionnera les fournisseurs qui utilisent moins de terrain par ingredient

Ecodesign delivers results much faster than conventional LCA

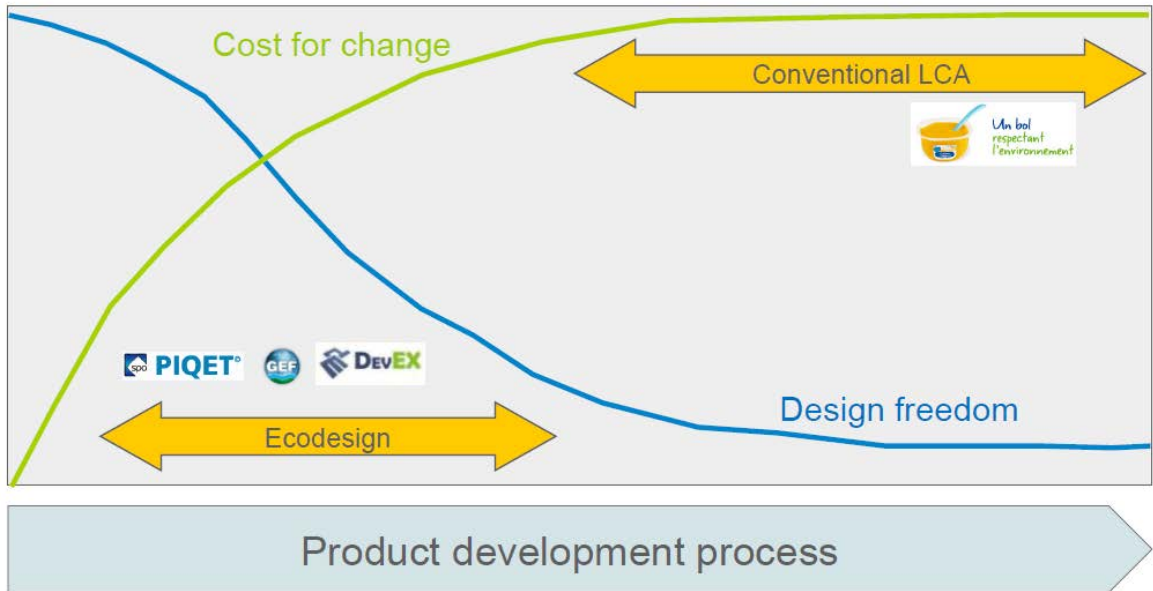


Good Food, Good Life

PIQET allows streamlined LCA on every packaging innovation & renovation project



Good Food, Good Life



Ecodesign makes LCA cheaper, faster, and more efficient

PIQET allows streamlined LCA on every packaging innovation & renovation project

- Web-based interface to SimaPro
- Adapted to food and beverage packaging development
- Further information:
 - <http://www.sustainablepack.org/>



Reproduction du concept dans les politiques 'publiques'

10 YFP SFS Core Initiative on Biodiversity

- What Success Looks Like: We want to
 - demonstrate feasibility to take biodiversity into account
 - simplify & operationalize biodiversity assessments for business & policy making
 - identify gaps / open questions / issues to further work
- Multi stakeholder initiative with very broad participation
- Three workstreams on which we focus
 - Methods and data for biodiversity assessments
 - Monetization & natural capital
 - Guidance and standards used for biodiversity communication



Nestlé contributes to harmonized guidelines for LCA in the food industry



- EU Food Sustainable Consumption and Production Roundtable
 - Methodological alignment for food sector, initiated by European Commission & CIAA
- “A global Language for Packaging and Sustainability “ Report (June 2010)
- Sustainability Consortium in the US
 - Global alignment of approach and methods
- French Grenelle II law evaluation

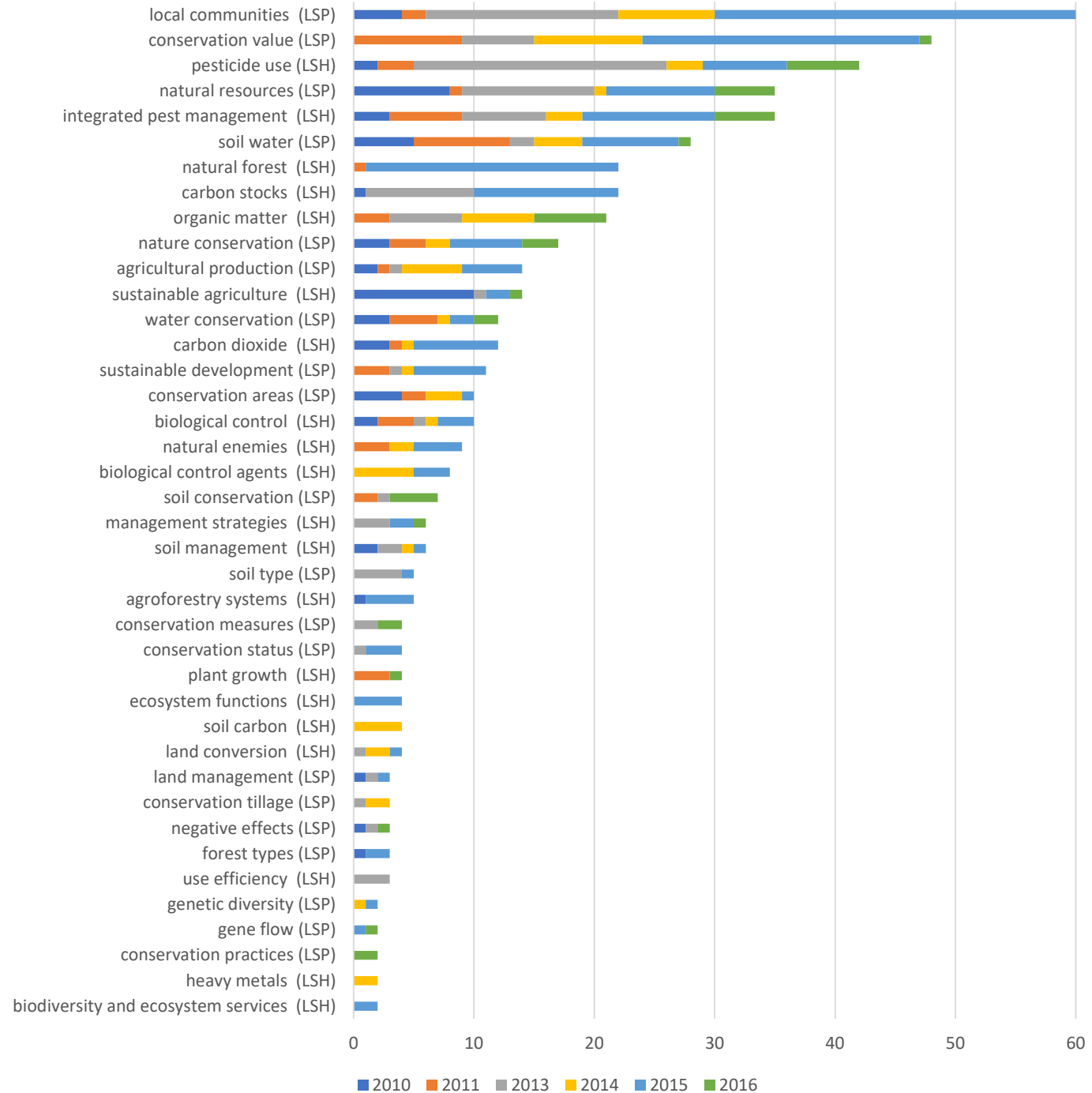
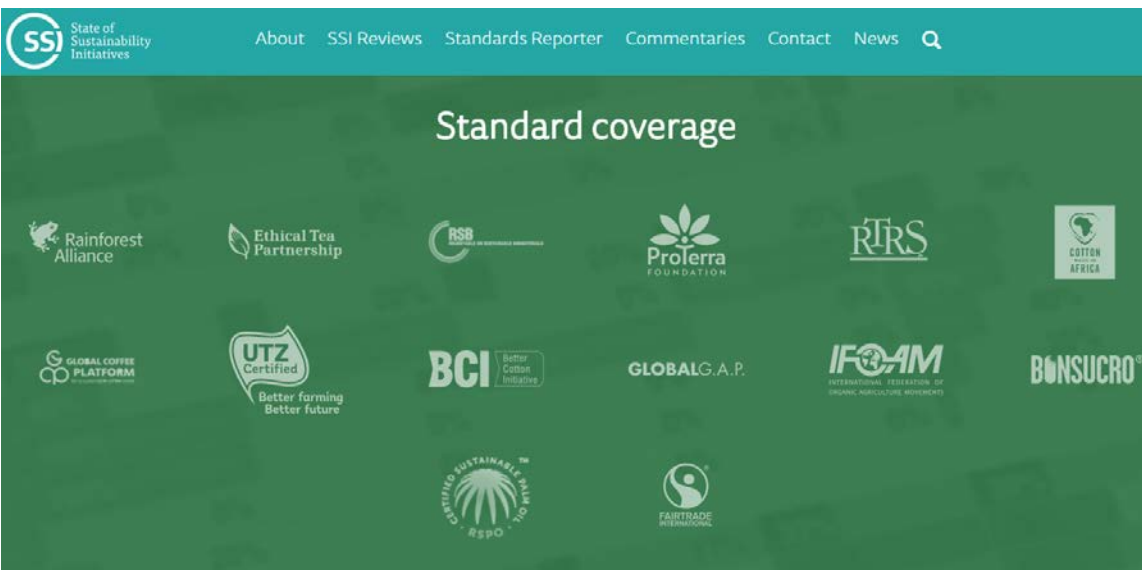


Ecole-chercheurs : Indicateurs de la sécurité alimentaire et nut



L'application du concept par les standards

La base de données des standards



No.	Critical Criteria
2.1	<u>High Conservation Value (HCV) areas</u> have not been <u>destroyed</u> from November 1, 2005 onward.
2.2	Farms <u>conserve</u> all <u>natural ecosystems</u> and have not <u>destroyed forest</u> or other <u>natural ecosystems</u> in the five-year period prior to the date of initial application for Rainforest Alliance certification or after January 1, 2014, whichever date is earlier.
2.3	Production activities do not <u>degrade</u> any <u>protected area</u> .
3.3	The <u>farm management</u> develops and implements an <u>integrated pest management (IPM) plan</u> that is based upon the prevention and monitoring of <u>pests</u> and aims to avoid economically significant crop losses while reducing pesticide risks. The <u>farm management</u> determines pest management steps based on the analysis of pest monitoring records. Pests are managed using biological controls or other non-chemical methods where feasible. When <u>pesticides</u> are used, preference is given to non-restricted low toxicity pesticides, and pesticides are applied only to the parts of the crop affected by pests. All workers involved in pest management activities are trained about the contents of the IPM <u>plan</u> .

“Approaches include the retention of patches of **natural habitat** and extensively farmed semi natural habitats within the countryside and farming in ways that **minimize the negative effects of fertilizers and pesticides** on non-target organisms (...) increase yields on already converted land, thereby **reducing the need to convert remaining intact habitats**, and potentially **freeing up former farmland for restoration to a more natural state**” (Green et al. 2005:551-2).

Performance Level	No.	Continuous Improvement Criteria
C	2.5	Existing native vegetation outside <u>natural ecosystems</u> is maintained, including: <ul style="list-style-type: none"> a) Existing agroforestry shade tree cover; b) Existing vegetated zones adjacent to <u>aquatic ecosystems</u>; c) <u>Large native trees</u>, except when these pose hazards to people or infrastructure.
C	2.6	The <u>farm management</u> and <u>group administrator</u> develop a map that includes <u>natural ecosystems</u> and agroforestry canopy cover or border plantings with estimated vegetation coverage and estimated percentage of <u>native species</u> composition. If the farm or group of <u>member farms</u> have less than 10% total native vegetation cover or less than 15% total native vegetation cover for farms growing <u>shade-tolerant crops</u> , the farm management and group administrator develop and implement a <u>plan</u> to progressively increase or restore native vegetation, including: <ul style="list-style-type: none"> a) <u>Restoration</u> of zones adjacent to <u>aquatic ecosystems</u>; b) <u>Restoration</u> of farmed areas of marginal productivity to <u>natural ecosystem</u>; o c) Incorporation of native trees as border plantings and barriers around housing and infrastructure, <u>live fences</u>, shade trees, and permanent agroforestry systems.
C	2.7	If zones adjacent to <u>aquatic ecosystems</u> are not protected according to <u>Rainforest Alliance restoration parameters</u> , a <u>plan</u> is developed and implemented to restore these zones.
A	2.8	<u>Rainforest Alliance restoration parameters</u> are implemented for all <u>aquatic ecosystems</u> .

L'influence croissante des standards sur l'usage des sols par les producteurs

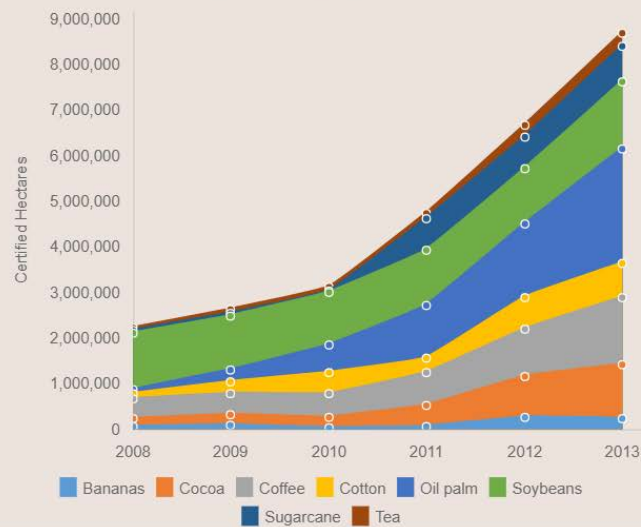
\$50.3 Billion Sustainable Production Value across listed agricultural (2013/2014) and seafood (2015) commodities

Rainforest Alliance/ Sustainable Agriculture Network (RA/SAN): Certified area for all products, 2008-2015

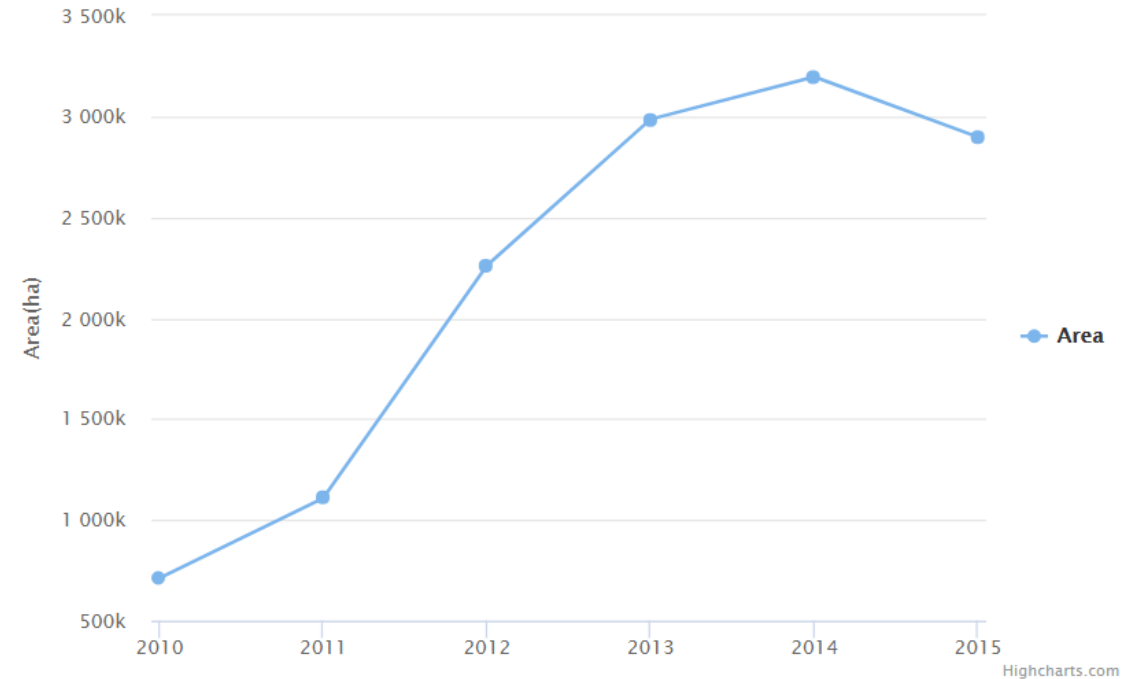
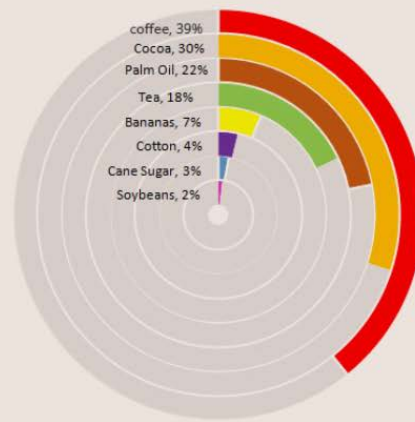
The chart presents the growth of certified land area (fully converted plus under conversion) by a specific Voluntary Sustainability Standard (VSS) from 2008-2015.

Market Performance

Standard Compliant Agricultural Area (hectares)

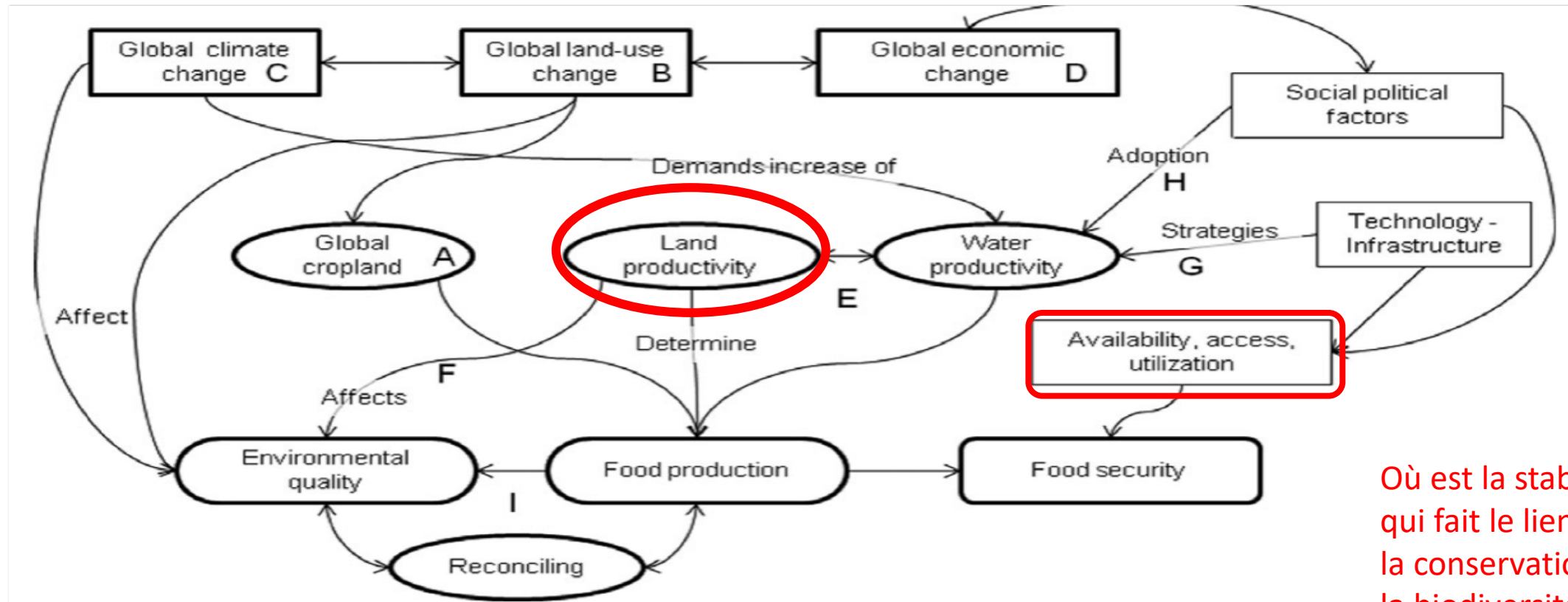


Percentage of Standard Compliant Metric Tonnes in Selected Agricultural Commodities (2013/2014)



Pourquoi c'est important pour la sécurité alimentaire?

Les liens entre les modèles d'usage des sols et la sécurité alimentaire (au niveau conceptuel)

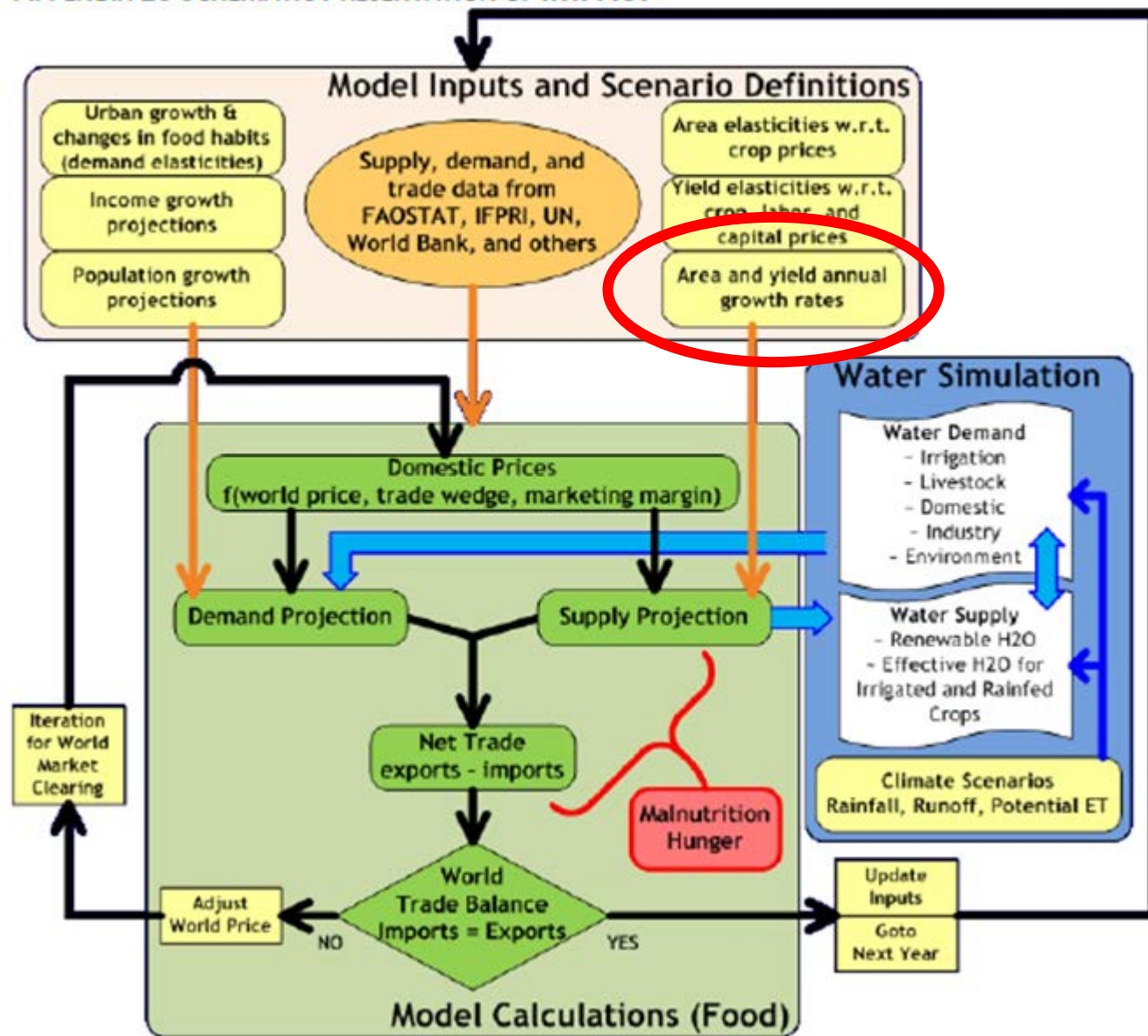


Où est la stabilité – qui fait le lien avec la conservation de la biodiversité

Les liens entre les modèles d'usage des sols et la sécurité alimentaire (au niveau de la modélisation)

Rosegrant, M.W. and the IMPACT Development Team. 2012. International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT): Model Description. International Food Policy Research Institute (IFPRI), Washington, D.C.

APPENDIX 10 SCHEMATIC PRESENTATION OF IMPACT



[Integrated Model]

An example of integrating multiple models to deal with the issues of scale (Verburg et al., 2008: 62, Fig. 62):

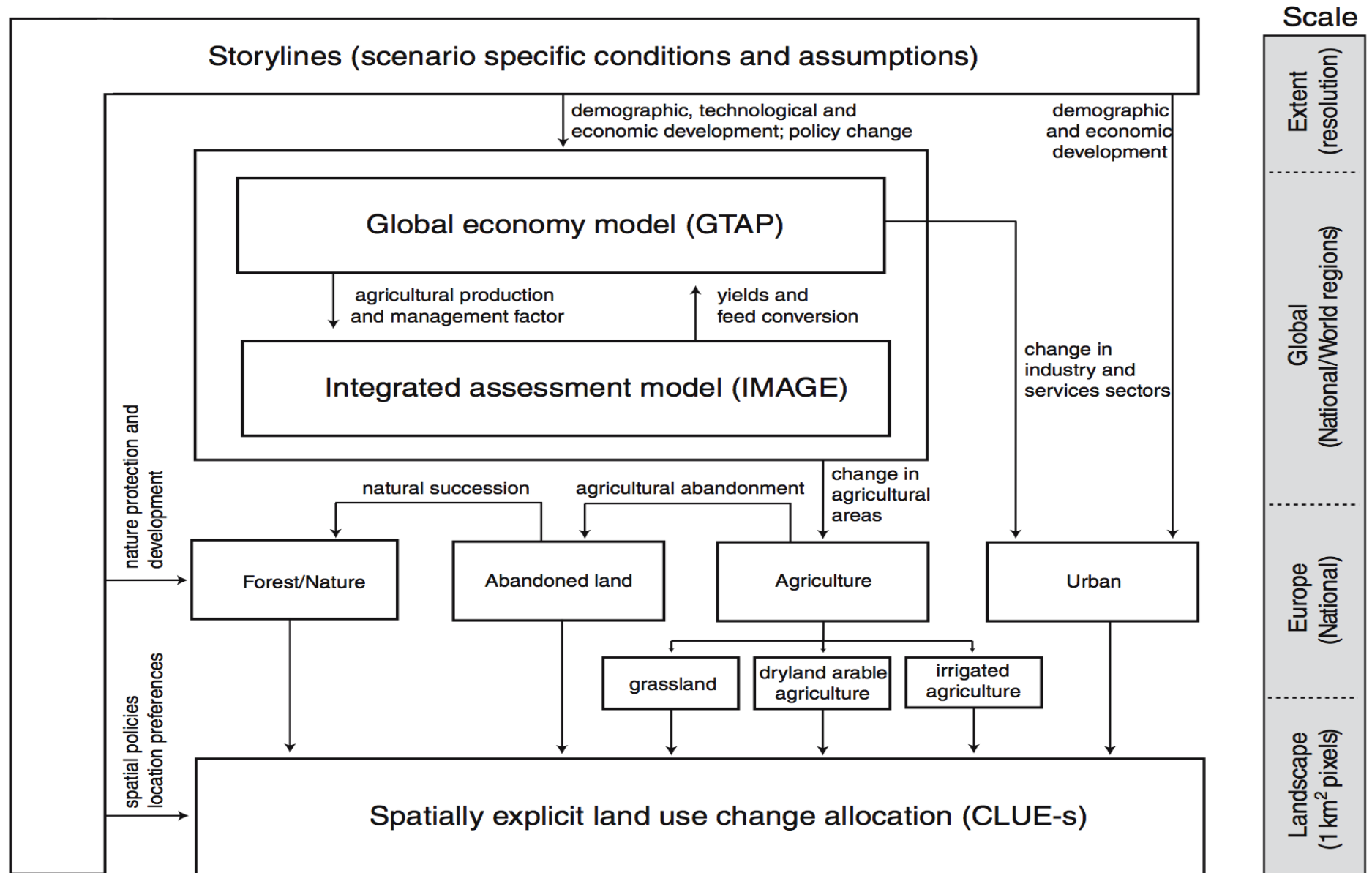


Fig. 2 Schematic representation of the modelling procedure over different scales

Conclusion?

A model should 'satisfice'*

“Reliance on a single model is always dangerous, no matter how careful the modellers. No model can claim to capture everything; reality is too complex to model in full” (Leach and Scoones, 2013c: 16).

“ A model should clarify the issues in the debate; it must be able to enforce a discipline of analysis and discourse among stakeholders; and it must provide an interesting form of “advice,” primarily in the form of what not to do — since a politician is unlikely to do what a model suggests.” (Agarwal, 2002: 1)

... mais les acteurs de l'industrie agroalimentaire, OUI ...

*When 'optimal' is not possible, satisficing entails searching through the available alternatives until an acceptability threshold is met (March and Simon 1958)