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Spatial Perspectives for Food Planning in Metropolitan Landscapes: the SUSMETRO Stakeholder Game

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1. Introduction

In this paper we explore the possibilities to grasp spatial perspectives for food planning within metropolitan landscapes through the development of an interactive game: SUSMETRO. In paragraph 2 we address the current issues that challenge the visualization of metropolitan landscapes with the Netherlands as an example. In paragraph 3 we introduce SUSMETRO as a challenge to provide tool for visualizing Metropolitan Agriculture in the context of nature and recreation. In paragraph 4 we explain the methodological aspects of the game and how it aims to bridge different value orientations and facilitates designing a mix of agriculture innovations for the future. In paragraph 5 we explain how SUSMETRO acts as a boundary object that can facilitate discussions between different value orientations. In paragraph 6 we finish with some concluding remarks on the role of the scientists that facilitate the game.

2. The Netherlands as a challenge for developing for a metropolitan agricultural vision?

As a world leader in the development and establishment of agricultural production systems, the specific geographic and socio-economic characteristics of the Netherlands as one of the global Delta-Metropoles with a large area of peri-urban landscapes pose both challenges and opportunities when setting targets for sustainable development. During the last years, Dutch agriculture has been exposed to a series of challenges at the social, economic and environmental front: severe cases of swine-fever, air and water pollution by excess manure production and disposal as well as decline of traditionally managed landscapes including the associated recreational and biodiversity values.

Metropolitan agriculture is "a deliberately designed system of intelligently connected [agricultural] production sites that uses the available resources, conditions and infrastructure in metropolitan areas to produce material and immaterial demands for the same metropolitan area "(Latesteijn et al. 2007). This description suggests:

1. spatial-functional entities with boundaries which are determined by system integration at the production level thereby defining what constitutes a metropolitan area;
2. sustainable principles, namely the limitation of agriculture's ecological footprint b[illegible]se only those resources, conditions and infrastructure that are available in the same area of demand;

3. a multifunctional approach by covering society's material as well as immaterial demands (commodity and non-commodity goods and services).

Given that virtually all agricultural production systems within the European Union – and certainly those in The Netherlands – are extremely dependent on external resource input (e.g. fossil energy, nutrients and soya-based food stuff for livestock to name just the most prominent), and given that most metropolitan areas are widely recognized by characteristics such as peri-urban settlement structures, accessibility to centres of higher education, hospitals and cultural facilities, and by the presence of leisure and nature parks, the above vision must be considered as rather hypothetical or even a virtual model.

The vision is 'hypothetical' because the above principles are not yet applied and can be considered 'virtual' because such metropolitan areas only exist as logistic and process-dependent configurations without clearly defined spatial boundaries and are not necessarily perceived as such by the occasional visitor or non-expert. At the same time, the above definition does not adequately address the wider international aspirations of Dutch agriculture, namely those projects which target international food chains or the establishment of large-scale 'vital clusters' in the form of Greenports. These TransForum projects go beyond the respective spatial-functional entities considered as metropolitan areas, but seek to link up with the supra-regional and global food market (Nassauer and Wascher 2007).

On the other hand, current trends in Dutch agriculture indicate that tremendous changes have already occurred in the wider countryside around metropolitan centers and that it would be ignorant not to acknowledge that the rural areas as we know them from the past ceased to exist decades ago. The influence of the city on surrounding agricultural production landscape has steadily increased in many ways. In the Netherlands, with the traditional segregation between nature conservation on the one hand (spatially manifested in the implementation of the Ecological Main Structure) and highly intensive agricultural land use on the other hand (manifested by extremely high livestock densities, large-scale glasshouse productions and by high-tech and high-input farm management), certain elements of the above vision such as concentration, segregation and modernisation are indeed already recognizable since quite some time.

3. The Susmetro Project as a way to facilitate the vision on metropolitan agriculture

Exploring the future on Metropolitan Agriculture is a typical example of an activity in which it is very hard to think outside one's own value framework. Based on our own values and interests, we are prone to choose a particular set of innovation options, in line with only one value orientation, instead of keeping a broad playing field. In contrast, Metropolitan Agriculture holds that it is actually necessary to include a broad mix of innovative agricultural options, one that deliberately crosses the boundaries of multiple value orientations. Specific areas may be best suited to specific options, but the metropolis itself is best served with that broad agricultural mix. So how can decision makers be facilitated in exploring a sustainable future for agriculture?

SUSMETRO offers decision support for stakeholders in Metropolitan Agriculture. It is a collaborative approach that helps a group of people to visualize a sustainable agricultural future. SUSMETRO supports decision making by providing a set of maps about the metropolitan region in question. Each map contains information that is important from the perspective of metropolitan agriculture. Furthermore, the stakeholders are provided with a set of descriptions of agricultural innovations and their most important characteristics. Using the maps, they can decide for each innovation where it fits best, and produce their own, new map with their vision of sustainable agriculture. Finally, the SUSMETRO approach use computer models to provide information about the impact of the decision—impacts regarding people, planet, and profit values. In sum, the SUSMETRO approach supports making images of Metropolitan Agriculture.

Sustainable agricultural development implies innovating through a broad range of innovative experiments. Such experiments can differ wildly. Some imply intensifying agricultural production, others build on combining multiple societal functions with traditional agricultural, and again others on transformation of value chains. These types of innovations are in line with very different, sometimes contradictory, value orientations.

4. The methodological framework of the SUSMETRO Project

The research project SUSMETRO has developed a methodological framework for assessing the role of food planning as one of the key services of metropolitan landscapes. By taking an integrated approach, the methodology is geared to take into account other spatial demands such as recreation and nature conservation when asking regional stakeholder to participate in a interactive sustainability impact assessment for their metropolitan region. The objective is to assess the impacts of land use change under different spatial planning regimes by test sites in different European locations.

(1) Status quo assessment of metropolitan regions at various levels of scale (region–country–Europe) making use of Geographic Information Systems;
(2) Assessment models for calculating regional demand vs. carrying capacities, including socio-economic trends and environmental impacts;
(3) Ex-ante policy scenarios as input to sustainable design proposals for future land use planning;
(4) planning and communication tools providing stakeholders with hands-on experiences identifying Landscape Function Areas and proposing Food Strategy Options.

Due to the supra-regional character of many land use trends, any policy decision and planning scheme needs to be evaluated at different scales. Until now, spatial information is mainly available according to mono-disciplinary approaches and sector divisions. However, SUSMETRO cartographic references such as on landscape character types, nature conservation areas of sites of leisure and tourism allow cross-boundary and integrated assessments. The added value of SUSMETRO is that it can assess the spatial-functional implications of urban demand for food, recreation and nature conservation at different levels of scale ranging from the metropolitan region and the European context by making use of state-of-the-art assessment tools, data sets and policy information.

The project is based on a knowledge-based and participative approach by allowing participants to engage in a 'game' for commonly developing sustainable future perspectives for their metropolitan region. Throughout the iterative processes, participants will not only make use of the data and tools that are being offered, they also will establish their on region-specific sustainability criteria and develop own design proposal. In return, SUSMETRO is designed to offer a knowledge-based and participative approach by allowing participants to engage in a 'game' for commonly developing sustainable future perspectives for *their* metropolitan region. Throughout the iterative processes (see Figure 1), participants will not only make use of the data and tools that are being offered, they also will establish their own region-specific sustainability criteria and develop own design proposal. In return, SUSMETRO offers impact assessment techniques to make the results accountable. Playing the game can involve between six and up to twenty stakeholders (parallel sessions) and lasts between 4 and 6 hours.

Preparation

1.	Identification social goal/ problem (related to food planning /multifunctional region)
2.	Identification regional boundaries of the respective metropolitan region
3.	Formation of a stakeholder group
4.	Collection of regional data sets to support game (see as example Table 1).

Implementation

Plenary	**Introduction** 1. The SUSMETRO vision of metropolitan agriculture 2. Presentation of the regional data on the metropolitan region 3. The rules and principles of the SUSMETRO Game 4. Presentation of the Landscape Functional Areas (LFA 1) Nature, Recreation, Agriculture and Urban Fringe.
Stakeholders	**The Big Picture: Landscape Function Areas** 5. Discussion on the location and extend of LFAs in the metropolitan region; possibly alterations and improvements, making use of SUSMETRO maps. SUSMETRO team takes up changes into the LFA-data layer (re-drawing the version from step (4) to arrive at new version (LFA 2).
Plenary	**Sustainability Impact Assessment for LFA 2** 6. Presentation of final LFAs and approximate sustainability scores 7. Discussion on results and underlying assumptions 8. Introduction to the rules for Food Strategy Options (FSOs)
Stakeholders	**Assigning Food Strategy Options** 9. Drawing on the hard copy and map table site-specific allocations for nature, recreation and agricultural strategic options resulting in FSO 1 10. Critical review of FSO rules and references (e.g. bonus point system) as input for Sustainability Impact Assessment FSO 1
Plenary	**Sustainability Impact Assessment for FSO 1** 11. Presentation of FSO 1 with sustainability scores 12. Discuss results and results and decide on re-design
Stakeholders	**Re-Assigning Food Strategy Options** 13. re-draw to improve sustainability (repetition step 9-12/iteration)

Figure 1: SUSMETRO Stakeholder Game step-wise implementation

The SUSMETRO Stakeholder Game is set out to be implemented with a minimum effort for preparations on the side of the host institute or community that has signalled interest to participate. The three main services that are being offered are (1) targeted information on the spatial-functional characteristics of regional food production, recreational opportunities and nature conservation values; (2) a sustainability impact assessment that is based on the principles of the ecological footprint and multi-functional land use; and (3) state-of-the-art mapping and planning techniques.

Table 1: ***SUSMETRO data portfolio for the game*** *(in orange: standard international data set)*

	Environmental	Social	Economic
Agriculture	• Ecological footprint x residents/total ha agriculture • Regional consumption/total ha agriculture	• Share of: – care/health farms/ character area – Share of educational facilities per citizen	• Agricultural competetiveness • Cost and revenues of: – multi-functional farmland – crop production – greenhouse production – Integrated food production & processing (greenports)
Recreation		• Number of – hotel/camping beds per character area – recreational facilities per character area	• Cost and revenues of: – low density recreation – high density recreation
Nature & Landscape	• Share of: – protected areas per character area – Share of EHS+Nat2000 per character area		• Cost and revenues of: – Management by farmers – Management by public organisations
General	• LANMAP2 Landscape Units	• Leisure Urban fringe	• FARO Rural-urban typology

5. The science policy interface in the Susmetro game: the role of the scientist

An explorative study on the potential role of Landscape Character Assessment (LCA) linked with Knowledge Brokerage (KB) tools as the basis of spatial planning in metropolitan landscapes calls for qualitative research methods and hence for a 'grounded theory', a methodology based on abduction. Through the research design building upon a series of well structured stakeholder events, the intention is to undertake a systematic generation of theory from systematic research. The proposed method entails three steps:

1. Preparation: Minimizing preconceptions by designing the LCA-KB as open and non-normative as possible.
2. Data Collection: (1) quantitative data collection on sustainability of selected metropolitan regions by means of GIS analysis (case studies); (2) Stakeholder events employing LCA-KB in selected case studies with participant observation. Initial analysis determines where to go and what to look for next in data collection. Analysis and data collection continually inform one another.
3. Analysis: Building a theory for the contribution of local food systems planning to sustainable development in metropolitan regions, by constant comparative analysis of data and evolving ideas. For this purpose there is need to establish a textual database by means of 'field notes' on the application of LCA. The main body of the research will be based on concrete cases of stakeholder processes around spatial planning towards sustainable metropolitan areas. The learning principles will derive from Landscape Character studies deriving from Natural England (United Kingdom) and are based on both methodological papers as well as practical experiences.

Against the background of a differentiated assessment of impacts, effective knowledge brokerage has to fulfill at least four functions, abbreviated in the following "4 Cs":

- Contents: giving easy access to relevant data, information, and knowledge, both in the sense of providing knowledge on "scientific state-of-the-art" for policy makers and Stakeholders;
- Consciousness: setting agendas for sustainability-related problems, both in the policy realm (by raising awareness for the scientific knowledge base underpinning those problems among policy makers, Stakeholders and the broader public);
- Consensus: fostering processes of learning and consensus building on a scientifically defensible and politically acceptable definition, handling, and solution of sustainability-related problems among researchers, policy makers, and civil society actors;
- Capacities: building capacities among all actors operating at the science-policy interface, i.e. those who are responsible for framing and funding research policies, those who are utilising research results in their day-to-day operations, as well as those who coordinate and conduct policy-relevant research projects.

In a major review of knowledge brokerage mechanisms for sustainable development, Cash et al. (2002) found that such mechanisms are likely to be effective when they simultaneously enhance: 1. Active, iterative and inclusive communication; 2. mutual understanding, and 3. Mediation in conflicts that are bound to emerge between the legitimacy, salience and credibility of the information flows between multiple actors.

6. Concluding remarks

Sustainability issues such as these sketched in this paper are characterized by complexity, governance, a high diversity of actors, interests and views and by the presence of risks

and uncertainties (Beck 1992). The move towards sustainability therefore implies new roles for scientists that are considered more helpful in reconciling knowledge demand and supply and dealing with complex environmental issues. This links up with a general trend to move from scientific endeavour in a traditional research context to knowledge production that is engaged with other communities and useful for multiple audiences (Nowotny et al. 2001)
A variety of different roles in knowledge production for sustainability (Turnhout 2009) emerge over the years. Some of these roles are considered to fit well with traditional and straightforward policy issues. In those cases, scientist can act as pure scientists by delivering the facts to serve as the basis for decision making (Pielke 2007). However, in our case, this will not suffice.

Performing the science-policy interface in the SUSMETRO game has implications for the different roles that the involved scientists play and the effectiveness of these roles during the facilitation of the game. While dealing with complex problems such as in the challenge of the SUSMETRO game, the scientists engage with policy makers and other participants in the landscape in order to produce usable knowledge for the future. However, this is not at all unproblematic and the key issue at stake is to avoid accusations of science advocacy (Huitema & Turnhout 2009; Pielke 2007). Thus, in a methodology as SUSMETRO where usable knowledge and the facilitation of knowledge of others are important scientists balance between the expert and the facilitator, being involved and at distance.

Therefore different roles are important:

Examination of knowledge and expertise available
First, there is the new role to (multi-disciplinary) examine and make explicit of the various types of knowledge and expertise that are available during the SUSMETRO Game. The scientists involved in the game need to broaden and deepen their understanding of the potential implications of the spatial options the stakeholders propose. This requires considerably creative and analytical skills considering the high levels of embeddedness of the values and ideas of the stakeholders involved (Eshuis et al. 2001).

Communication of knowledge
Second, there is the challenge how to transfer the knowledge produced during the game to other times and places. There is a risk that its robustness is scrutinized within other policy domains. One challenging aspect in this respect is the fact that the 'social' construction of the knowledge produced during the game is made more transparent to outsiders, and that it becomes clear that scientists are actively engaged in this process even when this is accompanied by struggle and conflicts about competing knowledge claims.

3. Dealing with conflicts
Third, all knowledge production contains processes of conflict and alignment. The conflicts that take place during the game can serve as a good way to discover these

various sources of knowledge and epistemologies. The conflicts sharpen the different standpoints and make the different sources of knowledge and their possible contributions to the visualization of metropolitan landscapes and their policy implications more visible.

Making use of the above techniques and role definitions, SUSMETRO is designed to bridge different value orientations and in the complex field of food planning, nature conservation and recreation at the level of a metropolitan region. Taking a collaborative approach, stakeholders are being offered different planning tools as well as contextual information on agricultural innovations. Throughout the process the stakeholders can decide where and what type of innovation fits best, thereby producing their own vision of sustainable agriculture. As will be demonstrated during the Global Summit in Rotterdam, the SUSMETRO Stakeholder Game will allow stakeholders and scientists to engage in an open and interactive dialogue with the goal to generate sustainable images for Metropolitan Agriculture.

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