Seeking policy-relevant knowledge: a comparative study of the contextualisation of participatory scenarios for the Narew River and Lake Peipsi

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ABSTRACT

Using participatory scenario-making has become increasingly common in environmental assessments that aim for policy impact. In this development, ‘social work’—i.e., construction and usage of the scenarios—has received only a little analytical interest. In this paper, we contribute to filling this gap of knowledge by focusing on the construction of scenarios and asking what kind of policy relevant knowledge these kinds of participatory experiments can provide for the resolution of environmental problems. We draw on experiences gained from a SCENES scenario-making experiment wherein a comprehensive set of scenarios for the future management of European freshwater resources was developed in a highly participatory manner. The SCENES work aimed at providing policy-relevant knowledge for implementation of the European Water Framework Directive (WFD). In this paper, we analyse and compare how issues were formulated and articulated as public concerns during the scenario-making process for the Narew River Basin, in Poland, and Lake Peipsi, in Estonia. The empirical narratives highlight that scenario-making assisted in articulation of the critical entanglements between the water systems and regional socio economic development. The implementation of the WFD has been largely unable to address these issues. In this sense, SCENES engaged in the articulation of public concerns. In SCENES there was, however, a latent tension in seeing scenario-making as either informing or forming social choices for water management. The epistemic principle of informing guided many of the methodological choices made during SCENES, whilst attempts aimed at issue formulation characterised the panellists’ way of developing scenarios. Resolving this tension is decisive for the future governance of European freshwater resources. We close the paper by discussing why.

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1. Introduction

The resolution of environmental problems sets a challenge for the use and production of knowledge in policy-making. In order to address the challenges, attempts at opening knowledge production to the wider public and, simultaneously, a move from the consideration of causes to consequences of environmental problems have emerged. It is argued that these parallel shifts could assist in making environmental questions meaningful and the related knowledge relevant for policy-making. In this paper, we examine one scientific experiment wherein such policy-relevant knowledge was sought. When put on trial, the methodologies used in this experiment raised an array of tensions between science and politics, as they are conventionally understood. In this paper, we concentrate on these tensions and consider their relevance for the resolution of environmental problems. In particular, we deliberate upon the challenges related to the use and management of water resources.

Amongst other fields, the consideration of consequences in collaboration with a widening group of ‘stakeholders’ has gained a foothold in integrated environmental assessments (see, for example, Alcamo, 2008; Parson et al., 2007; Reid, 2006; Rotmans, 1998). Considerable academic and policy resources have been devoted to the development of participatory scenario-making methodologies (e.g., Kok et al., 2007; Patel et al., 2007; Rotmans, 1998; Schwartz, 2006; van Vliet, 2011). High on the list of challenges of this methodological development has been how to address issues, such as the use and management of water resources, that affect the lives and livelihoods of many kinds of people in many uncertain and complex ways. A further challenge has been how to address these issues in such a form that could ultimately have an impact on policy-making.

This methodological development, however, tends to suffer from ‘a growing imbalance between the increasing technical sophistication of the modelling elements of scenarios and continued simplicity of our understanding of the social origins, linkages, and implications of the narratives to which they are coupled’ (Garb et al., 2008:1). The social construction of scenarios has gained fairly little attention, although the complexity of social, economic and political developments is as analytically demanding as that of the ecological systems. Even less attention has been paid to the use and implications of scenarios in policy-making and the surrounding society (see however e.g. Parson et al., 2007). In this article, we claim that if we are to develop scenario-based environmental assessments and improve their usability in policy-making, this very social work of scenarios needs more analytical scrutiny and investigation.

In this article, we investigate the social work of scenarios by drawing on one particular scientific experiment, in which a comprehensive set of scenarios for Europe’s fresh waters were developed in a highly participatory manner, namely SCENES (Kämärä et al., 2008, 2011). SCENES is a timely attempt to provide policy-relevant knowledge for the implementation of the Water Framework Directive (WFD) of the European Union. This directive was designed to achieve a good ecological status for European freshwaters by 2015/2027 (CEC, 2000). Achieving this aim and identifying workable policy measures most certainly requires an understanding of how various ecological, socio-economic and political developments may affect the use and management of European freshwater resources in the future.

The SCENES experiment draws from the ideas proposed around ‘post-normal science’ (Ravetz, 1971; Funtowtiz and Ravetz, 1993; see also Turnpenny et al., 2011). The two most prominent developers of post-normal science, Funtowitz and Ravetz, (1993:751), have argued that in situations of great uncertainties, ‘public agreement and participation, deriving essentially from value commitments, will be decisive for the assessment of risks and setting of policy’. They call for an extended peer community, which should bring extended facts into the knowledge base used in decision-making; whilst at the same time serving as enhanced ‘quality control’ for that knowledge base (see also Ravetz, 1999). In SCENES, the extended peer community was called together to contextualise a particular set of global scenarios of societal development to various spatial and societal environments in order to identify uncertainties related to water use and management and to develop robust policy actions. The contextualisation was carried out in a highly interdisciplinary and participatory manner by involving the affected parties and the users of the scenarios in their production, along with scientists from various disciplines. In order to support the implementation of the WFD, pan-European, regional, and river basin levels were chosen as the operational units for contextualisation.

In this article, we examine this process of contextualisation by following how the scenario-making methodologies, as applied in SCENES, produced their respective outcomes. At the heart of contextualisation lies the question of whether participatory scenario-making is seen as contributing to informing or forming the social choices for the use and management of water resources—to use a distinction proposed by Stirling (2008). In the first, the aim is to develop clear, authoritative, prescriptive recommendations informing decisions in a situation where the problem is already defined beforehand. The contextualisation, in this case, is to provide information for effective decision-making by conveying clear, practical justification for management. The latter position, on the contrary, implies an ontological take on the issues at hand. In this case, the aim is to examine the degree to which the scenarios ‘are sensitive to different framing conditions and assumptions’ (Stirling, 2008:289–280) and to reveal any ‘inherent indeterminacies, contingencies or capacities for agency’ (Stirling, 2008:279) therein.

This tension between informing and forming social choices has been recognised to characterise the many attempts of collaborative knowledge production carried under the wide umbrella of post-normal science (Turnpenny et al., 2011; Wesselink and Hoppe, 2011). In their analysis, Wesselink and Hoppe (2011) have concluded that although the post-normal science approaches recognise the need for convergence with politics, they try to ensure that this takes place on their own terms. Collaboration in knowledge production is mainly approached as informing the given problems and ontological bases. In this paper we investigate how this tension manifested itself as SCENES methodologies were put on trial.
We strongly believe such an understanding is indispensable in our search for tangible knowledge for sustainable social choices.

A growing number of researchers within science and technology studies have claimed that environmental problems and radical uncertainties, such as the impact of climate change on water systems, tend to question the ontological bases of science to such an extent that simply improving evidentiary bases of science is not enough (Callon et al., 2009; Jasanoff, 2003; Latour, 2004; Marres, 2007; Pellizzoni, 2001; Wynne, 2006). Marres (2007), in particular, has reminded that it is the commitments – which grow out of using, knowing, feeling and acting with the environment – that people deliberate on in environmental debates. These commitments arise from (sometimes even incommensurable) different socio-material ways of being in the world (see also Callon et al., 2009; Mol, 2002). Hence, when thinking about collaborative knowledge production and its policy-relevance, maybe we should pose the question other way around: how could it assist in bringing the critical socio-material entanglements and commitments to public deliberation (Kaljonen and Varjopuro, in press)?

In this article we study how the various socio-material entanglements were articulated in the SCENES scenario-making process and how the tension between informing and forming was resolved. We compare two cases of contextualisation. We follow how water scenarios were composed for Poland’s Narew River Basin (Gielczewski et al., 2011) and Lake Peipsi in Estonia (Jital et al., 2011). We start by giving some background to the two scenario-making processes, after which we move on to comparative analysis. Our results stress that the consideration of consequences requires special methodologies, which should assist in the articulation of public concerns. We close the article by discussing what such a take on policy-relevant knowledge would mean in the field of water management and governance.

2. Comparison of the two scenario-making processes

Lake Peipsi and the Narew River Basin were two of the sites where SCENES methodologies were tested (Picture 1). In both cases the scenarios were crafted by using the same methodological framework; the context and motivation for the scenario-making, however, differed.

In the Narew River Basin, the scenario-making was to provide input for the water management plan of the basin (Council of Ministers of Poland, 2011) as well as insights into public and stakeholder engagement. In Poland, public participation in water management is promoted on a political level but has gained practical content only recently (Chammas, 2009; Nachlik and Zaleski, 2010). Given this context, SCENES was seen as an opportunity to develop and test methods for public and stakeholder engagement. The regional water management board, which is responsible for the water management in the basin, was a co-organiser in the process.

The organisers saw scenario making as an opportunity to gain knowledge collaboratively on how relations between water use, quality, agricultural production and tourism might develop (Gielczewski et al., 2011). The ecological status of the Narew River is relatively good (Gielczewski, 2003; Taboryska et al., 2007). Many stretches of the river do, however, suffer from poor water quality. Whilst agricultural production is not so intensive in this region, the geographical conditions create pressure for intensification (Gielczewski, 2003). The region has a high proportion of nature areas in the river valleys and a specific lake district which attract tourists (Gielczewski, 2003). The way in which these regional trajectories will develop is bound to have an effect on the ecological conditions of the Narew River as well. The organisers invited a variety of people, mainly in regional and national public administration, to discuss these

Picture 1 – The geographical location of Narew River and Lake Peipsi as compared to other sites in SCENES.
The participants came mainly from water management or environmental protection units. There were only a few representatives of agriculture and forestry. People from the regional water management board were also involved as panellists. Researchers, people from environmental NGOs and representatives of the region’s nature parks also took part.

For Lake Peipsi, respectively, the organisers saw scenario-making as a tool for broadening views on eutrophication (Rital et al., 2011). This topic is well recognised in a management plan for the East-Estonian river basin district that involves Lake Peipsi and its catchment area (Keskonnaministeerium, 2010; see also Kangur and Mõls, 2008). The purpose of the scenario-making was to broaden the discussion toward more systemic elaboration of socio-economic and political trajectories for combating nutrient enrichment. In this respect, the situation in the area is interesting. Lake Peipsi is one of the largest surface water bodies in Europe and the catchment area covers parts of Estonia, Russia, Latvia and Belarus, making cross-border cooperation a topical issue. The number of inhabitants in the area has been decreasing, as the population has become concentrated in the major cities (Kurs et al., 1999).

In addition, agricultural developments are undergoing major structural changes. The organisers invited people from public administration, research and associations to discuss these issues in their panel. Those invited worked mainly with water management or environmental protection. Representatives from the energy and agricultural sectors were invited too, as was a journalist to the first workshop. A representative of the Estonian-Russian cross-border water commission was present on the panel; otherwise, it was decided not to invite any representatives from outside Estonia.

In both cases, the aim of the scenario-making was to contextualise a set of given global scenarios to their particular environments in order to identify uncertainties related to water management and to develop robust policy actions. The two panels were given the same global scenarios (GEO-4, UNEP, 2007) to work with. These scenarios focused on capturing general societal development wherein either solidarity or self-interest prevails and either the global or regional dimensions of development are emphasised. Such a differentiation produced four scenarios, namely Sustainability First, Markets First, Policy First, and Security First, for the panels to develop further (Figure 1). These scenarios were to perform a set of exploratory scenarios, where comparisons between them were sought for (Kok et al., 2011). The explorations were carried out using a four-step methodological approach, which was designed to form a logical continuum from the consideration of present-day problems to the exploration of alternative futures, and the identification of policy actions. The steps were carried out in three sequential workshops, which each gathered 15 to 30 participants, at half-year intervals between 2008 and 2010.

In the first step, the panels were to think of the current problems and develop fuzzy cognitive maps (FCMs)

![Fig. 1 – The global scenario framework (Kok et al., 2011).](image)

3 Fuzzy cognitive mapping is a particular mind-mapping technique aimed at describing causal relationships between clusters of issues. This method has been used for comparing different individuals’ thinking or enhancing collaborative work in groups. In SCENES, it was used as a method for group work (van Vliet et al., 2010).

4 For Lake Peipsi, no collages of pictures were used; the organisers saw them as departing too much from the customary ways of working in Estonia.

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questionnaires and scenario-making material.\textsuperscript{5} Gielczewski and Iital took part in the processes as organisers.

3. Bringing local water issues into global scenarios

3.1. Articulation of socio-material entanglements: desired visions and robust issues

In the Narew River Basin and for Lake Peipsi, rather different kinds of socio-material entanglements were articulated during the scenario-making. The panellists considering the Narew River Basin directed their efforts at articulating how to achieve and assure sustainable water management. These efforts allowed desired visions to become articulated. For Lake Peipsi, on the contrary, comparative articulations between various future paths were sought. What took place eventually was interplay between issues relevant for local and pan-European contexts. During this process, for Lake Peipsi, particular socio-material entanglements truly showed their robustness.

In the Narew River Basin, the organisers invested all their efforts in helping the panellists to envisage their own desired futures. To build a basis for visioning, first the present problems were discussed at length with the aid of FCM. After that, the participants were given a chance to choose which of the GEO-4 scenarios they wanted to develop. The participants unanimously chose to work with the Sustainability First scenario and developed four different versions of it in groups. Two of the groups discussed developing the Policy First scenario, but agreed finally that in all of the scenarios the elements of the Sustainability First scenario prevail, but some elements, such as legal improvements derived from the global Policy First scenario, will be essential for the realisation of this vision.

All of the scenarios drafted by the Narew panel relied upon small-scale agriculture and environment-friendly tourism. The groups, however, articulated slightly differently how sustainable developments may occur and the relative importance of various trajectories within. One group just acknowledged that all of their wishes could come true, the second group highlighted the importance of European agricultural policy, the third outlined the need for restricted areas in preventing the negative effects of tourism, and the fourth group stated that the ‘entire area will be ordered from the ecological point of view’. The issues of spatial planning were discussed at length by all of the groups. Spatial planning was seen as not functioning appropriately at present and therefore required stricter execution according to some, or new legal regulations according to others.

All groups spoke favourably of education and green technologies. Raising environmental awareness was seen as necessary for building a sustainable society; the articulations, however, differed somewhat as to the education level at which the focus should be placed and where to start in enhancing green technologies. The panellists also had different understandings of how the population will change. According to some, the attractiveness of the Narew region will stimulate immigration in future, whilst others thought that slow economic development will lead to out-migration. Two of the groups concluded that today’s poor economic situation, in fact, will be the salvation of the future. No new industry should arrive in the Narew Region. The region should still be acknowledged as the Green Lungs of Poland.\textsuperscript{6}

After these first articulations, the Narew River Basin panel was given a chance to revisit their visions. They were offered an alternative, the Markets First scenario, to compare and articulate the divergent future paths further. The organisers presented a basic outline for the scenario, which was based on the ideas developed by the pan-European panel. As the groups reworked their visions, something interesting happened. They articulated the Markets First scenario as an ‘implausible’ vision; an opposite to the desirable Sustainability First scenario. In the articulations of the Markets First scenarios, both agriculture and tourism strive toward intensification and mass consumption, which again increases the pressure on water. In the Sustainability First scenarios, by contrast, these two sectors are seen to co-evolve mutually (e.g. with tourists visiting small farms), ensuring sustainable development and low impact on water resources. In the Sustainability First scenario, the natural and cultural resources are seen as vital regional assets for development, something to be taken care of. In the Markets First scenario, these two sectors compete with one another and for the natural resources of the region, such as water and space. It is worth noting that, in their discussion, the panellists saw only strong external factors as capable of pushing the region in the direction of the Markets First scenario.

With Lake Peipsi, the approach to contextualisation was somewhat different. The panellists were asked to give local input on the pan-European scenarios rather than develop their own desired vision(s). They developed three scenarios from GEO-4 and chose to leave out the Security First scenario, since it was seen as too unrealistic to work with.

In their articulations of the present state, Lake Peipsi is presented with one major environmental problem: eutrophication. The panellists were unanimous on this as well as on the most pressing social problem: out-migration from rural areas. These two persistent issues and solutions to them were deliberated upon in all three scenarios. With respect to avoiding out-migration from rural areas in the future, further economic growth was seen as necessary. Developments in Russia were conceived as necessary for economic growth, but also as involving major uncertainties. In both the Markets and the Sustainability First scenarios, the panellists emphasised the demand for agricultural products in the St Petersburg region as

\textsuperscript{5} We have highlighted the concepts and direct discussion of the panellists with italics. Otherwise, the case study narratives are our synthesis of the scenario-making process. The narratives focus on the critical junctures relevant for the contextualisation.

\textsuperscript{6} This concept was formulated in the 1980s, and a functional area of Green Lungs of Poland (GLP) was established in the 1990s (Wysocka et al., 1998). GLP describes a strategy for sustainable development in the north-eastern part of Poland, where the Narew River Basin is situated. According to GLP, small-scale tourism and agriculture – based on the sustainable use of natural resources – should compose the major sectors of the economy in the region’s future development.
a strong driver for growth in agricultural production. This development was seen as one which would lead to improved economic conditions but also to increasing nutrient emissions, even under the sustainability scenario. Cross-border cooperation in water management was expected to improve in all of the scenarios. In addition, the slow response within the lake’s ecological system, as a result of internal loading, constitutes an integral part of the way in which the problem of eutrophication was articulated in the scenarios.

In the second workshop, an interesting alteration in these articulations occurred. The organisers asked the panellists to revisit their scenarios by comparing the Lake Peipsi factors they had agreed upon in the first workshop with the drivers developed by the PEP at pan-European level, and to draw new FCIs for each of their three scenarios (Table 1). The existing concern with eutrophication in Lake Peipsi, however, was not easily articulated with the PEP drivers. The European-level PEP drivers addressed mainly macro-economic and population concerns and their implications for water quantity and consumption. For example, the developments in agricultural production, which the Lake Peipsi panel saw as decisive for eutrophication, could only be articulated under the driver ‘other policies’. The PEP drivers caused problems, especially when working with the FCIs; the narrative storylines allowed more flexibility.

For Lake Peipsi, the attempt to harmonise the local scenarios with the pan-European ones caused a major detour in the articulation of the context-specific socio-material entanglements. The panellists’ commitment to combating eutrophication was, however, robust enough to resist the harmonisation attempts. In the end, the panellists managed to reorganise and reformulate the PEP drivers in such a way that their main concern, eutrophication, could be articulated.

In their scenarios, the two panels articulated how water systems are entangled with the particular socio-economic structure of the region and how their trajectories may be developing. In the Narew River Basin, the panellists worked out a sustainable vision wherein the current low economic performance of the region is turned into a virtue in the future. Commitment to such a vision was high from the beginning but, according to our analysis, the introduction of the alternative, implausible Markets First scenario even fostered it. Their commitment to the Sustainability First scenario was not only dictated by its desirability; the participants, in many ways, found the present situation operating on a sustainable basis and wanted to find ways to maintain and take this further. During scenario-making, the panellists developed strong ownership of the Sustainability First scenario, which motivated them to seek articulations for a very special kind of co-development of social and ecological systems. For Lake Peipsi, respectively, working with three different scenarios at multiple levels did not lead the panel to commit to one particular vision; comparative explorative scenarios were sought and developed. As said, if anything, these explorations strengthened their commitment to combating eutrophication in Lake Peipsi.

3.2. Creating linkages from scenarios to policy actions: entanglements become more firmly articulated

The last part of the scenario-making shifted the focus toward policy actions for bringing the visions to pass. The panellists for both Lake Peipsi and the Narew River Basin identified policy actions needed to reach the chosen end point in the scenarios. In both cases, the end point was chosen to be the target set out in the official river basin management plans – i.e. good ecological status of waters. This choice was to ensure the policy-relevance of the exercise.

In both Lake Peipsi and the Narew River Basin, the conclusion from this exercise was that reaching good ecological status requires major changes in the socio-economic or political conditions of the regions. In the case of the Narew River Basin, good ecological status was seen as attainable in both the Sustainability First and the Markets First scenario. The target would only be reached with significantly different means and at distinctly different times. For example, in one of the Sustainability First scenarios developed, a Narew River Council and strict legal norms would be established immediately, alongside with major investments in awareness-raising. This was seen to lead to a multitude of changes in the activities affecting the quality of water in the Narew River. In one of the Markets First scenarios, all of this happens only after a major decrease in the region’s attractiveness, which is due to intensification in agriculture, food industry and tourism. The panellists working with this scenario believed that said change will evidently occur after society reflects on itself and people’s attitudes change. The exact moment of reflection, however, will depend upon society’s resistance to negative developments in the region’s attractiveness and on the ways in which this may be balanced with economic growth and prosperity.

All of the other panellists, in their groups, came to rather similar conclusions in their backcastings. For the Narew River Basin, the panellists’ commitment to their original Sustainability vision appeared so vivid that, no matter what, they could turn the world governed by markets into one where sustainability and the good ecological status of the Narew River

<table>
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<tr>
<th>Table 1</th>
<th>Lake Peipsi factors</th>
<th>PEP drivers</th>
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<td>Agriculture (intensification, diffuse load)</td>
<td>Water policies</td>
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<td>Water policy, including water pricing</td>
<td>Water valuation</td>
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<td>Climate change</td>
<td>Population</td>
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<td>Development of industry</td>
<td>Global integration</td>
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<td>Pollution load</td>
<td>Economic consumption patterns</td>
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<tr>
<td>Awareness and education</td>
<td>Other policies (mostly CAP)</td>
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<tr>
<td>Cooperation – regional and institutional (incl. cross-border)</td>
<td>Water and society</td>
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<td>Technology</td>
<td>Public involvement</td>
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<td>Management capacity</td>
<td>Water governance</td>
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<td>Status of water – quality and quantity</td>
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<td>Social aspects</td>
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<td>Ecological impacts</td>
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are eventually achieved. For Lake Peipsi, the conclusion was the opposite: good ecological status simply cannot be reached in all three parts of the lake, not in any of the scenarios and not even by 2050. Reaching that target would require such a dramatic halt in socio-economic development that it was not seen as feasible. On the contrary, the panellists articulated that enhancement of the social conditions requires such investment in the region’s economic – in particular, agricultural – development that a decrease in nutrient load is highly doubtful. The panellists’ understanding of the internal and natural loading within the lake also highlighted the unrealistic nature of the goals.

For Lake Peipsi the panellists articulated two mutually exclusive alternative futures for the socio-material entanglements and chose to favour social sustainability over the environmental. The latter was seen as simply impossible in view of the realities of the former. Identification of feasible policy actions during the backcasting articulated specific socio-material entanglements in very concrete terms and, in effect, shut alternative articulations out – not only as undesirable but also as implausible. One group working with the Markets First scenario for Lake Peipsi did try to find a way out of this dilemma. As they could not find actions to reach the end point, they decided to re-articulate their end point to ‘Lake Peipsi – the eel lake’. By redefining the end point, they articulated the importance of fishing in the socio-material entanglements of Lake Peipsi. This lake has a long and meaningful history as a fishing lake. In this scenario, the development of tourism was also given significant attention. With this scenario, the dynamic entanglements between the regional economy and restoration of the lake eventually started to find their contextual articulations as nutrient reduction goals became combined with other desirable goals.

In both Lake Peipsi and the Narew River Basin, the socio-material entanglements became more firmly articulated during the backcasting exercise. The backcastings explicate that if the WFD cannot touch upon these entanglements, the policy will have no possibility of reaching its targets. In this respect, the backcastings assisted in articulating issues that are largely overlooked by the current policies steering water management.

3.3. Silenced and tamed complexities

For Lake Peipsi and the Narew River Basin, SCENES scenario-making offered one particular kind of platform for articulating context-specific socio-material entanglements. It allowed consideration of ecological, social, and economic development trajectories in parallel. As a result, new relations between these were found and articulated. This is a major achievement.

During this articulation, something else, however, was silenced at the same time (Callon and Law, 2005). We want to draw attention to certain critical moments in the scenario-making at which these ontological boundaries were drawn.

The SCENES methodologies aimed at producing comparative exploratory scenarios. Each scenario was to produce one coherent story, which could then be tested against an alternative scenario. This was a crucial methodological choice that affected the creation of the scenarios in multiple ways. With this methodological choice the differences within one scenario were demarcated out of attention and interest. In the practice of scenario-making the facilitators were forced to cut off the debates over various development trajectories and rush the participants toward consensus in order to compile a coherent story within a limited time.

The use of FCMs provides another illuminating example of how the aspiration toward coherent stories directed the articulation of socio-material entanglements. Both for Lake Peipsi and in the Narew River Basin, the panels started the scenario-making by identifying elements that they saw as key factors influencing their waters. For the Narew River, the panellists, by working individually, first identified 59 factors, which were then clustered into twelve aggregate factors in a plenary to be used in the building of FCMs. When clustering, in Lake Peipsi, factors such as emigration, employment and education were, for example, all clustered under one factor, ‘social aspects’. In the articulation of present problems this complex set of issues thus became described as a single social problem.

The fuzzy cognitive mapping method enforces the description of systems under one hierarchy and rationality with a suitable number of variables. When used as a method for group work, it enforces description of different entanglements with water as one, although there were clear disagreements amongst the panellists on the causalities, temporalities, and functioning of the system. In the Narew River Basin, the use of more or less the same factors in building the FCMs for both the Sustainability First and the Markets First scenarios clearly strengthened the opposing feel of the two scenarios whilst synchronising their inner dynamics into logical wholes at the same time. The problems related to this were also manifested in the transformation of the narrative scenario storylines into FCMs. During this translation, the dynamic articulations of socio-material entanglements easily became lost and articulated as factors influencing the system from outside. In the Narew River case, for example, in one of the FCMs for the Sustainability First scenario, spatial planning and legal and formal issues tend to control everything and set the system going. The system appears rather closed and inward-looking; all of the more dynamic economic or political relations are black-boxed or demarcated as outside the system’s boundaries. The method’s strong emphasis on causal relationships (Giordano et al., 2005; Hobbs et al., 2002) makes it hard to describe nonlinear developments and the emerging factors and relations. Fuzzy cognitive mapping is also incapable of handling

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7 Lake Peipsi consists of three parts: the biggest part, northern Lake Peipsi; the southern part, Lake Pihkva/Pskovskoye; and the narrow Lake Lämmijärve/Teploe, connecting the two. The in-lake nitrogen concentrations have been quite stable on a long-term scale, but the difference in phosphorous concentrations between the northern and southern parts is remarkable and even increasing (Kangur & Möls, 2008). In the backcasting, it was seen that, despite the measures taken, the status of Lake Pihkva/Pskovskoye will remain poor or bad because of the continuing internal phosphorus load.

8 This caused problems in our empirical analysis as well. It was impossible to trace the differences in views or possible points of conflict from the final scenarios.
temporal fluctuations in a dynamic manner (Aguilar, 2005; Hobbs et al., 2002).

Proposing such a strong single frame for the articulation of issues is an act of politics (see also Carolan, 2004; Cashmore et al., 2010; Ramsey, 2009). The objective of the SCENES was to contextualise the global scenarios for various spatial and societal environments in order to identify uncertainties and robust policy actions across the four exploratory scenarios. In its search for comparability, SCENES made an ontological assumption that there are meaningful relations between the global water scenarios and river basin-level developments. From this perspective, developments at different levels are just variations of one overarching trajectory.

Close analysis of the scenarios in the making, however, highlights that during collaborative knowledge production these assumptions and singularities were tested and eventually broke up. When working with the FCM clusters, the panellists were forced to split them up again; they could not work with different future trajectories by relying on such aggregate concepts. According to the analysis, the panellists also found thinking in terms of global explorative scenarios challenging. The global reasoning was self-evidently not seen to capture the critical entanglements in their regional development. For Lake Peipsi, the participants refused to work with one of the GEO-4 scenarios altogether. In the Narew River Basin, the Sustainability First scenario resonated most with their articulations of future visions in the region, even to the extent that the Markets First scenario that was introduced later became strongly fused with sustainability thinking. The panellists tended to approach scenarios as something to long for or fear, not a tool with which to explore future neutrals.

The public environmental administration, associations, and research were well represented on the Lake Peipsi and Narew River Basin panels. It was harder to get the major economic actors involved. In the Narew River Basin panel, for example, the agricultural, food processing and tourism sectors were represented by few individuals. The panel identified development within these sectors as crucial for the water status whilst, at the same time, they had to admit that they were not capable of elaborating upon them in much detail. In their scenarios, the panel put more emphasis on the institutional and legislative changes required in environmental policy. The panellists knew well of the flaws in their current functioning and, accordingly, had strong views on their development. The commitments of the private sector were not articulated in the scenarios. For Lake Peipsi, correspondingly, the Russian side of the catchment remained mainly an outside driver. The system boundaries drawn by the exercise allowed it to be articulated only by affecting the system from outside and characterised by uncertainties. The panellists themselves pointed out that creation of the same scenarios from a Russian perspective would probably result in quite different articulations.

4. Conclusions and discussion

The SCENES scenario-making process for the Narew River Basin and Lake Peipsi produced particular kinds of scenarios. The way in which the tension between informing and forming the social choices for the use and management of water resources was manifested in the making of scenarios greatly affected the outcomes of the process. In SCENES, the epistemic principle of informing guided many of the methodological choices made during the process. Our comparative analysis, however, highlights how attempts at issue formation characterised panellists’ way of working with scenarios. The epistemological choices made during the process and the commitment to issue formation did not give full support to one another. The elaboration of socio-economic trajectories and their entanglements with water was left half-developed.

This casts the quality and durability of the SCENES scenarios into question. If the scenarios cannot tackle the various unique entanglements people and specific economic activities have with water, they are simply not equipped to provide tangible policy advice. In water management and governance, there is a clear need for such knowledge. According to the experiences gained from the implementation of the Water Framework Directive, the policy has been incapable of capturing the complex and non-linear entanglements human actions and water systems hold in specific settings, despite the river basin approach advocated by the policy (Steyaert and Ollivier, 2007; Valve, 2011; Winter et al., 2011). The way in which the ecological status of the water and the sector-specific pressures, management actions, and their costs are defined in a bipolar fashion inhibits the river basin planning from capturing the specific inter-linked entanglements, finding the targeted actions, and dealing with future uncertainties (see e.g. Hering et al., 2010; Howarth, 2009; Moss, 2008; Steyaert and Ollivier, 2007; Uitenboogaart et al., 2009).

When seeking policy-relevant information, we need to abandon the quest for harmonised knowledge and predefined problems (see also Ingram, 2008; Steyaert and Jiggins, 2007). This kind of information can provide answers to how, in this case, the WFD has reached the targets it has set for itself. Use of such information is, however, incapable of addressing issues left unnoticed by the policy or responsible institutions. Marres (2007) has argued that, at its best, public engagement in relation to science and technology can assist in the articulation of issues of public concern that the responsible institutions are unable to address (see also Dewey, 1927). She argues that this kind of pragmatic orientation can help us to better understand why and how precisely dedication to issue formation is crucial for democracy (see also Leino and Laine, forthcoming). This view offers a whole new perspective on how we think about scenarios, their policy-relevance and contextualisation. Contextualisation of knowledge should, in this case, assist the public in bringing forward their concerns and engagement with the environment, finding relations amongst the various concerns, and articulating them as a public concerns. As the content of the SCENES scenarios shows, this kind of knowledge may be decisive for the resolution of environmental problems.

It is precisely here where the social sciences should take a more active role in producing policy-relevant knowledge and developing their respective methodologies for its production. Participants in environmental debates should not be seen as representing certain predefined interests, values or facts; rather, it is these very commitments of the participants that are under deliberation. This also means that the
determination of public concerns and the organisation of affected members of the public are practical achievements of issue articulation and should be approached as such.

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