

Is there no gap between decision-making and science in sustainable urban planning?

Rien van Stigt, Utrecht University of Applied Sciences, Faculty of Science and Technology,
Research Center for Technology & Innovation

Peter Driessen, Utrecht University, Faculty of Geosciences, Copernicus Institute for
Sustainable Development

Tejo Spit, Utrecht University, Faculty of Geosciences, Department of Human Geography and
Spatial Planning

Abstract

The role of expert knowledge of the environment in decision-making about urban development has been intensively debated, largely in terms of a so-called '*science-policy gap*'. Most contributions to this debate have studied the use of knowledge in the decision-making process from the knowledge providers' point of view. In this paper, we reverse the perspective and try to unearth how decision-makers use scientific knowledge in decision-making about an urban plan. We confronted municipal administrators, responsible for local urban development, with conceptions of the use of knowledge that were derived from the literature on this issue. From the reactions obtained, we conclude that, in the context of urban redevelopment, local administrators hardly perceive a barrier between themselves as decision-makers and experts – both environmental scientists and urban designers. They do, however, acknowledge that experts and decision-makers have distinct roles: unlike experts, local administrators have to balance all interests relevant to an urban plan. It is argued, therefore, that experts should engage in providing better decision frameworks rather than more or better knowledge.

1. Introduction

How do decision-makers responsible for urban planning perceive and use scientific knowledge about the environmental impacts that intended developments may have? Scientific literature suggests a pronounced divide between decision makers and environmental quality specialists, who feel that their scientific input to the urban planning process is underused

(Brown 2003, Evans 2006, Owens, Rayner et al. 2004). Siew (2008) has pointed out that three major problems concerning the science – policy interface can be identified: first, scientists and decision-makers have rather different views of the world. Second, scientists and decision-makers are part of distinct epistemological communities. And thirdly, as opposed to science, decision-making is characterised by bounded rationality. Moreover, it has been acknowledged that public decision-making is inherently political in nature and involves values and power (Richardson 2005).

By and large, the perspective adopted in the contributions to this debate has been that of the *providers* of knowledge. Little is known about the *demand* side, i.e. how decision-makers feel that knowledge can be of use to them. In this paper, therefore, we change perspective and investigate how expert knowledge about the environment is perceived and used by decision-makers. Exploring this issue is important for two reasons: first it may shed a new light on the recurring question why expert knowledge is found to be underutilised in everyday practice of decision-making. Second, it may help improve the ways in which experts engage with decision-makers, rendering their advice more useful.

Reviewing recent literature on the science – policy divide in urban planning we characterised the views about the role of science that have been expressed by scholars. Next, we had municipal administrators, who are responsible for urban development in their towns, comment on those views. Results indicate that the barriers described in the literature are only partly felt in local administrators' practice.

The paper is structured as follows: First we review recent literature on the gap between knowledge and decision-making and the ways that have been proposed to bridge this divide, merging these findings into five stereotypes about the role of knowledge in decision-making. After describing our research method we present our findings, which we discuss in the final section, drawing conclusions, particularly with regard to the question whether opportunities for better environmental quality are being missed in today's practice.

2. Conceptions of scientific knowledge for decision-making

In this paper, we distinguish *knowledge* from *information*, i.e. data that is used to answer a specific question. Knowledge, then, can be understood as information that, through some

theoretical relationship, reveals some hitherto unknown aspect of reality (Krizek, Forysth et al. 2009). Different types of knowledge are known to play a role in urban planning (Rydin 2007). This paper focuses on object-bound knowledge, obtained from natural and technical science, that is used to describe environmental processes and to predict their behaviour as a consequence of a spatial plan. Here, this type of knowledge is referred to as 'expert knowledge'.

Now, what is the dominant view of the role of expert knowledge in decision-making and, particularly, urban planning? In much of the literature about the science-policy divide, most notably contributions about 'evidence based policy' (e.g. Nutley, Morton et al. 2010), it is presupposed that science contributes to better decision-making. From the administrators' perspective, however, it is not at all straightforward that they need or use expert knowledge (Douglas 1995 pp. 15). Also, in the context of urban redevelopment, it might be contested that expert knowledge is useful for decision-making (Brown 2003).

Another matter is whether only expert knowledge counts. Many authors distinguish expert knowledge from lay (or stakeholder) knowledge (Edelenbos, van Buuren et al. 2004, Juntti, Russel et al. 2009) and bureaucratic knowledge (Edelenbos, van Buuren et al. 2011). These distinctions have led authors to suggest other ways of knowledge production. Scholars have recognised that for science to answer the questions that are crucial to decision-making, both scientists and decision-makers must engage in a process of joint knowledge creation (Edelenbos, van Buuren et al. 2004, Hegger, Lamers et al. 2012, van Buuren, Edelenbos 2004, Van den Hove 2007).

Siew (2008) mentions two more reasons why expert knowledge is underused in decision-making, namely uncertain and sometimes even contradictory results. In general, if such uncertainties are not specifically addressed, tensions may arise that undermine trust in scientific advice (Van den Hove 2007). Expressly acknowledging uncertainty may, however, render any advice worthless to decision-makers who prefer building decisions upon firm evidence.

Decision-making is often considered to be a bounded-rational process (Nilsson, Dalkmann 2009, Owens, Rayner et al. 2004), in which power and values may determine the outcome, rather than expert advice. Also, plans that may technically be fully rational, sometimes lack

public support. In the experts' view, then, a decision to abandon such a plan may be irrational if it takes into account any 'unscientific' worries of lay stakeholders. Nevertheless, to any local administrator, seeking support from these stakeholders may well seem rational (Gezelius, Refsgaard 2007).

In the European planning tradition, the linear approach (formulation of goals; design of alternatives; evaluation; establishing the plan) has been widely replaced by other planning methods (e.g. Khakee, Stromberg 1993), that regard the planning process as being cyclical and continuous. However, in other countries, e.g. China, a linear approach has up till now been *en vogue* (Zhang, de Roo et al. 2012, He, Bao et al. 2011). Also in environmental assessment literature, decision-making is often still treated as a linear and rational process (e.g. Cerreta, De Toro 2010).

Thus, the following stereotypes about the science-policy divide can be derived from the literature:

- Expert knowledge is indispensable for sound decision-making.
- Decision-makers and experts belong to different epistemological communities; joint knowledge creation is necessary to bridge the gap between them.
- Expert knowledge is inherently uncertain and undetermined and therefore of limited use to decision-makers.
- Decision-making about urban plans is a bounded-rational process.
- Planning, at least in recent European practice, is regarded as a non-linear process.

Now how do local administrators comment on these stereotypes? And what do their opinions signify for the way in which they use expert knowledge in order to decide about urban development?

3. Method

Our research focuses on local administrators because they are ultimately politically responsible for decisions made by local government. We contacted local aldermen, responsible for urban redevelopment, in the 32 largest and 35 average-sized municipalities in the Netherlands. Aldermen from twenty-one municipalities, ranging in population size between 30.000 and over 300.000 inhabitants were willing to participate. Respondents

belonged to different political parties: Liberals (8), Social Democrats (4), Christian Democrats (3), Green Party (3) and other, mainly local, parties (3). Interviews were conducted by telephone between April and September 2013 and lasted about 40 minutes on average.

Prior to the interviews, respondents were issued thirty statements about the stereotypes derived from literature (see previous section), to which they could respond using a five point Likert scale (Monette, Sullivan et al. 2002); Table 1 shows the statements that were used to operationalize these stereotypes. Respondents were asked to elaborate on their answer, providing examples from their own experiences.

Finally, with four of the respondents, who were willing to participate, we organized a focus group discussion in which we reflected upon the initial conclusions.

4. Results

Most respondents agree to the view that expert knowledge is necessary for decision-making, commenting that environmental quality is a boundary condition for any spatial plan (See Table 1, statement 1). However, ascertaining that a plan meets legal standards is not the sole purpose of obtaining expert knowledge (statement 2). Environmental assessment by means of model calculations is deemed useful (statement 3) and such calculations are, as a rule, not repeated with more favourable assumptions. (statement 4).

Surprisingly, environmental impact assessment (EIA) was deemed indispensable by only a minority of the aldermen interviewed. Most respondents commented that in many cases a more common-sense approach to planning is appropriate (statement 5).

Expert knowledge is valued for enabling decision-makers to better understand the problem at hand (statement 6) and to be able to explain choices to stakeholders or to the public. This is true to a lesser extent if the problem concerns health impacts (statement 7). Many respondents referred to peoples' worries about the health effects of UMTS antennas, but there was no mention of additional research being commissioned to take those away. In contrast, those who disagreed with the statement feel that national standards should provide sufficient protection against health effects.

The view that barriers between decision-makers and experts in part arise from epistemological differences is not supported by our interviews; most of our respondents comment that decision-making and expertise are different roles (statement 8). In addition to expert knowledge, decision-makers need knowledge from other sources, such as financial and legal knowledge (statement 9). In particular, knowledge provided by stakeholders is deemed important (statement 10). Although environmental experts take a distinct perspective on an urban plan, this is not perceived by respondents as problematic (statement 11).

Trying to probe whether environmental expert knowledge would be complementary to the input from urban designers, we found that respondents feel that they are not close enough to the actual design process to be able to comment. Results indicate that the designs could be improved in this respect (statement 12) and that environmental experts could also tune in more to urban designers (statement 13), especially in the early stages of planning (statement 14).

Aldermen feel that they should not be involved in the experts' research (statement 15), although, when asked, most comment that design workshops involving experts, designers and stakeholders are being organized and are deemed useful. Unsurprisingly then, only a minority thinks that decision-making can be improved by planning support systems (statement 16).

How do local administrators deal with uncertainty of expert knowledge? When asked about specific uncertainties, most respondents state that they must decide based on what expert knowledge is available (statement 17 and 18). Possible gaps in expert knowledge are not always explicitly accounted for (statement 19). Uncertainties appear not to stand in the way of decision-making (statement 20 and 21).

Decision-making about urban plans is regarded as a rational process: multiple alternatives are considered in early stages of planning and these are weighed using expert knowledge (statement 22) and compared on the basis of rational arguments (statement 23).

Our respondents acknowledge that sometimes urban redevelopment is a reaction to circumstances and previous decisions, but many comment that they have ample instruments to adequately steer such developments (statement 24). Most aldermen agree that decisions may turn out differently from what would be expected to be the result if the decision would rest on

merely expert knowledge. Many comment that this is partly due to other than environmental interests. In particular, respondents mention opposition in the Municipal Council, either based on irrational grounds or politically motivated (statement 25).

The perception of planning being a linear process, in which decisions gradually build on previous decisions, varies among our respondents (statement 26). Most agree that, in urban planning, decisions are frequently reconsidered (statement 27).

Finally, standardisation and regulation of environmental assessment is helpful for building decisions upon that knowledge (statement 28).

5. Discussion & conclusion

How do local administrator's views relate to images of the science-policy divide that, according to the literature, are common among scientists? First, aldermen acknowledge the idea of expert knowledge being useful for decision-making in urban planning. In part, this can be attributed to legal requirements in the European context (Carmichael, Lambert 2011). In addition, however, local administrators find it important to be able to explain choices, in search of public and political support for the plans at hand.

Second, the view of experts and decision-makers being two different epistemological communities is shared by aldermen, but not conceived as being problematic. In fact, as balancing all interests in the planning process is their main role – and theirs alone – they keep a certain distance to the details of planning and design, confiding in their organisations' experts to provide them with what knowledge they need to be able to make a decision.

Whereas most municipalities have workshops where experts, designers and stakeholders are involved in co-design, aldermen are not personally involved. We conclude that any knowledge gathered and created there reaches the decision-making process indirectly, through the workshop-based advice that the organisation's experts convey to the administrators.

Third, the view that the uncertain character of scientific knowledge prevents such knowledge from being used by decision-makers is not shared by the aldermen interviewed. Local

administrators decide using what evidence is available. Long-term effects that to date are not known are not considered in decision-making.

Fourth, local administrators first and foremost require political and public support for decisions they make. Any plan that cannot count on sufficient support will be abandoned, however sound – on the basis of expert knowledge – it may be. It should be noted that this does not mean decision-makers do not use the expert knowledge concerned in their deliberations, only that it gives not enough weight to counterbalance other interests.

What does all of this mean for the challenge of sustainable urban development that scientists face? Brown (2003) suggests that, in order to really contribute to sustainable urban development, scientist must reach out to the other actors in the development arena, by enabling them to think through scenarios and novel solutions. However, our results suggest that this may not be enough. Rather, if environmental interests are being insufficiently considered in urban planning, the most obvious solution is not to supply decision-makers with more or better knowledge about how a plan affects these values, but to have them enhance the weight they attach to those values.

Table 1. Decision-makers' views about decision-making and expert knowledge

Decision-makers' views about the usefulness of expert knowledge.		
1	I absolutely need expert knowledge about the environment in order to arrive at a satisfactory decision on urban redevelopment.	
2	The role of expert knowledge about the environment in spatial plans is that it is convincingly demonstrated that the plan meets legal environmental quality standards.	
3	Results of (model) calculations used to assess environmental impacts of plans are not useful for decision-making about a spatial plan.	
4	I sometimes have (model) calculations of environmental impacts repeated with more favourable assumptions if I cannot sufficiently substantiate my decision with the original results.	
5	Environmental impact assessment is indispensable for sound decision-making about inner-city redevelopment.	
6	In decision-making about a plan, I not only need an expert assessment of the environmental impacts of that decision, but also knowledge that enables me to better understand the problem.	
7	In my decision, I weigh knowledge about health effects of the proposed development, even if all environmental standards are met.	
Decision-makers' views about differences in epistemological communities between decision-makers and experts.		
8	In the planning process, environmental experts insufficiently adjust to my own line of thinking as a decision-maker.	
9	As a decision-maker, I need different knowledge from that which is offered by experts.	
10	In making a decision about a plan, knowledge introduced by stakeholders is as important as that presented by experts.	
11	I feel that experts perceive the environmental aspects of spatial planning differently from myself as decision-maker.	
12	In their designs, urban designers sufficiently account for the environmental impact of their plans.	
13	Environmental experts often offer advice on minimizing environmental impacts that is difficult to fit into the plans under construction.	
14	If expert knowledge would be available to the urban designers from the onset, the quality of plans for urban redevelopment would improve.	
15	I can better reach a decision if I am involved in the research to be carried out by the experts from the onset.	
16	If all expert knowledge about environmental impacts of a plan were available in a database and could be inter-actively presented using maps and diagrams, it would be easier for me to decide about the plan.	

Decision-makers' views about dealing with uncertainty of expert knowledge.		
17	Thermal storage is a technique of which adverse effects to the environment are sufficiently known.	
18	Claims to accommodate excess storm and flood water are surrounded with too much uncertainty to fully uphold them in spatial plans.	
19	In my decision, I account for the fact that there may be gaps in the available knowledge on environmental impacts of the proposed development.	
20	Expert advice about environmental aspects of a spatial plan is too equivocal to base a good decision upon.	
21	In making a decision on a spatial plan I would rather have no knowledge about environmental impacts at all than incomplete and uncertain knowledge.	
Decision-makers' views about the rationality of decision-making.		
22	In planning urban redevelopment various alternatives are considered at an early stage; they are compared based on, among other things, expert knowledge.	
23	Available alternatives to a spatial plan are usually weighed on the basis of rational arguments.	
24	Often an urban redevelopment is due to circumstances and previous decisions, without a preconceived plan.	
25	It is not uncommon that decision-making about an inner-city redevelopment for social, economic or political reasons has a different outcome than if I were to decide on the basis of merely expert advice about the environmental impacts.	
Decision-makers' views about the linearity of decision-making.		
26	Planning for urban redevelopment is a fairly linear process in time, in which one always builds on previous decisions.	
27	In planning urban redevelopment it often happens that previous decisions have to be reconsidered.	
Decision-makers' views about local municipalities' room for manoeuvre.		
28	The fact that, in the Netherlands, methods for measuring and modelling of environmental impacts of spatial plans is highly standardized and regulated makes it easier for me to ground decision-making about a plan on such expert knowledge.	

Legend: (dark) green = (fully) agree; (dark) red = (fully) disagree; grey = neither agree nor disagree; white = don't know / not applicable.

References

- BROWN, A.L., 2003. Increasing the utility of urban environmental quality information. *Landscape and Urban Planning*, **65**(1-2), pp. 85-93.
- CARMICHAEL, L. and LAMBERT, C., 2011. Governance, knowledge and sustainability: The implementation of EU directives on air quality in Southampton. *Local Environment*, **16**(2), pp. 181-191.
- CERRETA, M. and DE TORO, P., 2010. Integrated spatial assessment for a creative decision-making process: A combined methodological approach to strategic environmental assessment. *International Journal of Sustainable Development*, **13**(1-2), pp. 17-30.
- DOUGLAS, P.M., 1995. What Do Policymakers and Policy-Implementors Need from Scientists? *Improving Interactions Between Coastal Science and Policy: Proceedings of the California Symposium 1995*, National Academy Press, pp. 15-32.
- EDELENBOS, J., VAN BUUREN, M.W. and TEISMAN, G.R., 2004. By-passing Barriers in Sustainable Knowledge Production, F. BIERMANN, S. CAMPE and K. JACOB, eds. In: *Proceedings of the 2002 Berlin Conference on the Human Dimensions of Global Environmental Change "Knowledge for the Sustainability Transition. The Challenge for Social Science"*, 2002 2004, Global Governance Project.
- EDELENBOS, J., VAN BUUREN, A. and VAN SCHIE, N., 2011. Co-producing knowledge: Joint knowledge production between experts, bureaucrats and stakeholders in Dutch water management projects. *Environmental Science and Policy*, **14**(6), pp. 675-684.
- EVANS, J.P., 2006. Lost in translation? Exploring the interface between local environmental research and policymaking. *Environment and Planning A*, **38**(3), pp. 517-531.
- GEZELIUS, S.S. and REFSGAARD, K., 2007. Barriers to rational decision-making in environmental planning. *Land Use Policy*, **24**(2), pp. 338-348.
- HE, J., BAO, C.-., SHU, T.-., YUN, X.-., JIANG, D. and BRWON, L., 2011. Framework for integration of urban planning, strategic environmental assessment and ecological planning for urban sustainability within the context of China. *Environmental Impact Assessment Review*, **31**(6), pp. 549-560.
- HEGGER, D., LAMERS, M., VAN ZEIJL-ROZEMA, A. and DIEPERINK, C., 2012. Conceptualising joint knowledge production in regional climate change adaptation projects: Success conditions and levers for action. *Environmental Science and Policy*, **18**, pp. 52-65.
- JUNTTI, M., RUSSEL, D. and TURNPENNY, J., 2009. Evidence, politics and power in public policy for the environment. *Environmental Science and Policy*, **12**(3), pp. 207-215.
- KHAKKEE, A. and STROMBERG, K., 1993. Applying futures studies and the strategic choice approach in urban planning. *Journal of the Operational Research Society*, **44**(3), pp. 213-224.

- KRIZEK, K., FORYSTH, A. and SLOTTERBACK, C.S., 2009. Is there a role for evidence-based practice in urban planning and policy? *Planning Theory and Practice*, **10**(4), pp. 459-478.
- MONETTE, D., SULLIVAN, T. and CORNELL, R.D., 2002. *Applied Social Research: Tool for the Human Services*.
- NILSSON, M. and DALKMANN, H., 2009. Decision making and strategic environmental assessment. In: W.R. SHEATE, ed, *Tools, techniques & approaches for sustainability: collected writings in Environmental Assessment Policy and Management*. World Scientific, pp. 197.
- NUTLEY, S., MORTON, S., JUNG, T. and BOOZ, A., 2010. Evidence and policy in six European countries: Diverse approaches and common challenges. *Evidence and Policy*, **6**(2), pp. 131-144.
- OWENS, S., RAYNER, T. and BINA, O., 2004. New agendas for appraisal: Reflections on theory, practice, and research. *Environment and Planning A*, **36**(11), pp. 1943-1959.
- RICHARDSON, T., 2005. Environmental assessment and planning theory: four short stories about power, multiple rationality, and ethics. *Environmental Impact Assessment Review*, **25**(4), pp. 341-365.
- RYDIN, Y., 2007. Re-examining the role of knowledge within planning theory. *Planning Theory*, **6**(1), pp. 52-68.
- SIEW, T.F., 2008. Connecting science and decision-making: A conceptual framework through organisation knowledge management, *Proc. iEMSs 4th Biennial Meeting - Int. Congress on Environmental Modelling and Software: Integrating Sciences and Information Technology for Environmental Assessment and Decision Making, iEMSs 2008* 2008, pp. 913-924.
- VAN BUUREN, A. and EDELENBOS, J., 2004. Why is joint knowledge production such a problem? *Science and Public Policy*, **31**(4), pp. 289-299.
- VAN DEN HOVE, S., 2007. A rationale for science–policy interfaces. *Futures*, **39**(7), pp. 807-826.
- ZHANG, S., DE ROO, G. and LU, B., 2012. China: What About the Urban Revolution? Rapid Transformations in Chinese Planning and Its Links with a Slowly Emerging European Planning Theory. *European Planning Studies*, **20**(12), pp. 1997-2011.