Land Use Policy 63 (2017) 140–148

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

An extended peer communities' knowledge sharing approach for environmental governance

Yeray Hernández-González, Serafín Corral*

Department of Applied Economics and Quantitative Methods, Universidad de La Laguna, Campus de Guajara, s/n. 38071 La Laguna, S/C de Tenerife, Spain

ARTICLE INFO

Article history:
Received 16 August 2016
Received in revised form
21 November 2016
Accepted 23 December 2016
Available online 31 January 2017

Keywords:
Extended peer communities
Knowledge
Sensitivity analysis
Social sensitivity analysis
Multi-criteria evaluation
Focus group
Robustness

ABSTRACT

This paper is devoted to propose an approach to implement the idea of extended peer knowledge to environmental governance by means of engaging the «extended peer communities». Socially robust knowledge relies on transparency and citizen participation. These two underlying elements take the form of both assessment and post-assessment decision support systems. Initially, during the assessment process citizens and stakeholders are engaged in the framing, proposal of alternatives, and evaluation criteria. Then the analysts assessed the alternatives proposed by means of DSS. Then, in a second stage, the analysts inspired in the idea of transparency, gave back the assessment result to the «extended peer community» who were able to give their opinion regarding the results and suggest potential parametric changes that were used for sensitivity analyses. The authors explore the proposed extended peer communities' knowledge sharing for environmental governance assessment using a case study applied to a sustainable mobility planning process carried out in Tenerife (Canary Islands). The results gathered highlight that this approach is of use for guaranteeing the robustness of complex environmental decisions under high levels of uncertainty.

1. Introduction

Environmental governance might be characterised as processes where, typically, facts are uncertain, values in dispute, stakes are high and decisions urgent (Funtowicz and Ravetz, 1991). These values in dispute are, furthermore, aggravated by the uncertainties related to the environmental systems (Corral-Quintana, 2004; Funtowicz and Ravetz, 1993; Funtowicz and De Marchi, 2000; Giampietro et al., 2006). All these elements complicate the traditional scientific work, where a mixture of (partial) knowledge, assumptions, and ignorance are involved. In these cases, science should look for solutions to these boundaries by means of public participation (Ravetz, 2004).

There are key dimensions of uncertainty in the knowledge base of complex environmental problems that need to be addressed, such as technical (inexactness), methodological (unreliability), epistemological (ignorance), and societal (social robustness) (Van Der Sluijs et al., 2005). In those situations where different interests prevail, dealing with technical uncertainties (like the ones related to data availability, the input data, and the model applied itself) is not enough. In these cases, the legitimacy of planning processes are rather affected by epistemological and social uncertainties, that complicate the own process and make decision-making difficult. Therefore, assessments should be expanded to more inclusive approaches where the decision processes become more relevant than the scientific practice itself (Munda, 2005). For instance, decisions need to be taken as to who decides on the criteria to be used in a multi-criteria assessment project, or even what criteria should be used to assess a range of alternative options. In complex environmental problems, many issues are raised as to who decides the selection and weight of criteria or in the case of motorisation or mobility rates, whether they should increase or decrease. Certainty, these are all decisions that are beyond scientists and, therefore, should be collectively decided through a new social contract between the scientific community and the society (Gibbons, 1999).

In the last decades, several authors suggested that scientists should have a new contract with society when developing their scientific affairs (Funtowicz and Ravetz, 1993; Gibbons, 1999; Nowotny et al., 2006), since the increasing complexities of modern societies involve uncertainties that cannot be controlled using mainstreaming approaches, meaning those mathematical tools aimed at dealing with inexactness and unreliability, such as error bars and confidence intervals respectively (Funtowicz and Ravetz,

* Corresponding author.
E-mail address: scorral@ull.edu.es (S. Corral).

http://dx.doi.org/10.1016/j.landusepol.2016.12.023
0264-8377/

1990). Higher levels of uncertainty, are produced when facts are uncertain, values in dispute, stakes are high, and decisions urgent; involving an accumulation of scientific boundaries that cannot be coped with mathematical precision (Funtowicz and Ravetz, 1991). One proposal to deal with this level of uncertainties has been the use of «extended peer communities» (Funtowicz and Ravetz, 1993). It refers to the extension of environmental governance to new participants in the policy dialogues, involving "*the participation of people other than the technically qualified researchers; indeed, all the stakeholders in an issue form an 'extended peer community' for an effective problem-solving strategy for global environmental risks*" (Funtowicz and Ravetz, 1993, p. 744). The «extended peer community» is a necessary condition to develop «socially robust knowledge». However, there are different levels of involvement, as suggested by several authors (i.e. Arnstein, 1969; Guimarães-Pereira and Corral-Quintana, 2002) evolving from non-participation to citizenship empowerment engagements. Moreover, such involvement might take place at different decision-making stages, from informing or supporting decision-making assessment to finally evaluating the results of those assessments. The objective of this article is to discuss the advantages of integrating inclusionary processes in different phases of environmental assessment processes based on citizen participation and transparency aimed at developing more robust governance processes. In this sense, it is argued that such engagement is crucial not only during governance issue assessment phases but also once these processes are concluded. Thus, inclusionary exercises should be set up to evaluate the robustness of the obtained results as well as the assessment process itself. Consequently, a methodological framework, in which society is involved during both, assessment and post-assessment processes is proposed and applied in a case study regarding the implementation of a participatory decision support process on sustainable mobility issues.

2. Methods

The proposed approach for an extended peer community creation of knowledge (Fig. 1) consists of a two-phase processes: a first one aimed at carrying out a participatory assessment followed by a social evaluation of the robustness of the decision-making procedure outcomes. It is based on the concepts of participation and transparency: (a) participation is produced in both the assessment and post-assessment processes since stakeholders and interested citizens are engaged in the environmental governance process from the very beginning of the process until the end of it; (b) meanwhile, even though transparency is also produced in both processes, it becomes more relevant in the post-assessment stage of issues, where a social validation of assessment results is considered necessary. This post-assessment process has also been called «social sensitivity analysis» (Corral-Quintana, 2004). See also Corral and Hernández (forthcoming).

Both the assessment and the post-assessment processes are developed by means of the integration of formal and informal techniques, such as Decision Support Systems (DSS) and participatory techniques. Both stages will be explained in the next sections.

2.1. Assessment process

According to Guimarães-Pereira and Corral-Quintana (2002), DSS have been evolving since the early 1970 from technocratic approaches, based on experts' knowledge, to more recent inclusive assessment frameworks, based on the community involvement in policy and decision processes. This last approach pursues the involvement of stakeholders in the decision process, as well as in the policy proposal debate by means of progressive disclosure of information adapted to the different profiles.

Table 1
Context framing research methods and findings.

Press review:	Legal documents:
- Framing the problem	- Framing the problem
- Identify stakeholders	- Identify stakeholders
- Identify policy options	- Recognise decisions already taken
- Identify evaluation criteria	
- Identify stakeholders' positions	
In-depth interviews with experts:	In-depth interviews with stakeholders:
- Framing the problem	- Framing the problem
- Identify stakeholders	- Identify new stakeholders
- Identify policy options	- Identify policy options
- Identify assessment criteria	- Identify assessment criteria
- Fill the gaps	- Identify stakeholders' positions
- Analyse policy option viability	
Focus groups:	
- Discuss the results	
- New proposals and comments	

Source: Corral-Quintana, 2004; De Marchi et al., 2000; Gamboa and Munda, 2007; Hernández-González and Corral-Quintana, 2016; Paneque-Salgado et al. 2009.

The participatory evaluation procedure here proposed consists of an integrated assessment based on two steps (see Fig. 2). The first aimed at framing the problem and identifying alternatives, as well as identifying potential assessment criteria that are used in a multi-criteria analysis (MCA) at a later stage. The second step deals with validating, improving and refining the alternatives and criteria proposed in the first step. In both steps, experts and stakeholders' opinions and knowledge are used to frame the governance issue and to define assessment alternatives and criteria. These alternatives are then evaluated using MCA.

The aim of the first stage is to detect the stakeholders involved, as well as their concerns and position. A historical review of the past 20 years of press articles and legislation, together with two rounds of interviews were carried out. The revision of legislation and local and regional press articles allows a first approximation to the social and political context in which the issue at hand is embedded and which actors have been related to the issue in the past and currently, providing a map of the relevant stakeholders and their positions.

This kind of press analysis follows previous work by Corral-Quintana (2004) and Gamboa and Munda (2007). Corral Quintana stated that this exercise is worthwhile in order to have an extensive and more balanced vision of the problem in hand: extensive because the same issue is presented by different stakeholders and therefore reflects diverse perspectives. It may also be more balanced because different press journals narrate the issue in different ways depending on both their ideology and their scale (local, regional or national).

Together, two rounds of interviews is initially carried out to experts from either the university or research centres (i.e. general overview, key characteristics, impacts and effects, and policy alternatives were collected). They are also encouraged to provide a list of involved stakeholders in the issue. A second round of interviews is directed at those actors identified during the first set of interviews. Similarly, they are asked about their concerns on the issue as well as about any other actor involved in the process. So it is assured that all relevant stakeholders and their positions are clearly elicited. These social techniques help the analysts to identify relevant information as presented in Table 1.

The second stage of the evolution process consists of the application of a multi-criteria tool. In this case the Novel Approach to Imprecise Assessment and Decision Environments (NAIADE) developed by Munda (1995) was used. NAIADE was selected because of its ability to approximate the way human mind expresses and synthesises preferences when faced with multiple contradictory