



The role of Public Participatory Geographical Information Systems (PPGIS) in coastal decision-making processes: An example from Scotland, UK

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ABSTRACT

This paper explores a technical solution (GIS-application) as a possible alternative for public participation in coastal decision-making. Through examination of a Scottish local case study, the paper examines the evidence that Geographical Information Systems (GIS), and more specifically Public Participatory GIS (PPGIS), can lead to or influence greater legitimacy in decision making in public participation in coastal management and waterfront development. Whilst demonstrating that GIS and PPGIS have considerable potential to provide the public with access to accurate data and factual information, to be able to integrate multiple and disparate data sources to allow merging of data, and to use various visualisation techniques, the complexities associated with PPGIS suggest that further research is required to establish if and how participatory GIS can increase legitimacy in a decision-making process.

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1. Introduction

As well as being one of the central principles of Integrated Coastal Zone Management, public participation has been widely discussed and promoted as an important component of responses to environmental policy; for example, in the context of resource management, and spatial planning [1]. It can take various forms, ranging from information giving, to shared decisions and empowerment [2] and uses traditional techniques, such as public hearings, and newer approaches such as participatory Geographical Information Systems (GIS).

This paper considers a technically-based process and focuses on the potential role of Public Participatory GIS (PPGIS) in coastal management as one way to develop greater public participation in the planning and decision-making process. Moreover it focuses on the potential role that such spatial technologies can play in offering greater legitimacy for public participation in the coastal management and planning process. Based on a combination of a literature review, personal communication and personal knowledge, the paper examines PPGIS in coastal waterfront regeneration, referring specifically to an offshore windfarm case study. A case study from Scotland is included where there is a current emphasis on local participation in coastal zone decision-making, possibly through the proposed extension of the role of non-statutory coastal fora and

partnerships which supplement the traditional piecemeal, sectoral approach in the UK and in Scotland, where coastal management has been described as “reactive rather than planned and driven by short rather than long term decisions” [1].

Following an introduction to PPGIS and discussion of the limitations and effectiveness of this technique, a case study is explored before evaluating the overall impact and potential of PPGIS on public participation legitimacy issues.

2. GIS and Public Participation GIS (PPGIS)

Geographical Information Systems (GIS) have been very widely applied to environmental problems and issues over the past twenty years, including many different aspects of coastal management. While there are many definitions of GIS, ranging from simple mapping systems to large corporate organizational systems used for managing multiple databases, many customised examples of GIS have also been developed to provide the basis for applied planning and decision support systems (DSS). Although GIS were often considered to be academic tools that were typically used only by the specialist or scientist their rapid evolution into commercially available and affordable software packages has greatly raised public awareness of the role that geographical or spatial data can play in planning and decision making. Furthermore, it has also led to a broader and more informed GIS end-user community through the many social and environmental applications developed. As a technology, GIS has been used to enhance the more traditional and familiar public participation techniques such as media campaigns,

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guided tours, and group meetings to the use of computer simulation exercises.

The use of GIS technology with a number of different end-user communities and methodologies has ultimately led to a specialised form of GIS commonly referred to as Participatory GIS (PGIS) [3], Public Participatory GIS (PPGIS), or Community Integrated GIS [4]. Public Participation or Participatory GIS or PPGIS/PGIS, a term first coined in 1996 [5], was initially developed to provide the basis for the public or stakeholder to become more actively involved in the planning and decision-making process through better and improved access to local geographical data and information stored in a GIS. More recently, the use of Internet-based GIS has been proposed [6,7]. The Internet is considered by Dunn [5] to open up the potential for online public participation and discussion, and a contribution to decision-making processes through online decision support systems, citizen feedback for system improvement, and enhanced communication and political action.

In direct comparison to GIS, PPGIS are considered to be far more *context-specific* rather than *technology-led*. Dunn [5] also notes that PPGIS include aspects of community development, capacity building and public access to *official* data; inclusion of marginalized groups; organizational application through partnerships and practical implementation through a range of formats and data types; and links to social theory and qualitative research tools. PPGIS are also considered to have the potential for greater social involvement in a number of ways. For example, Sieber [8] observes that the value of PPGIS is that they can be used “to broaden public involvement in policy-making” as well as ... “to promote the goals of non-governmental organizations, grassroots groups and community-based organizations”. Corbett et al. [9] suggest that PPGIS have the potential to: “enhance capacity in generating, managing, and communicating spatial information; stimulate innovation; and ultimately to encourage positive social change”. An important point concerning the potential of PPGIS is highlighted by Dunn [5] who describes PPGIS as a “more socially aware type of GIS which gives greater privilege and legitimacy to local or indigenous spatial knowledge and as a means of integrating local and indigenous knowledge with ‘expert’ data”. Harrison and Haklay (2003) [6] note “the potential of PPGIS lies with extending knowledge networks; issues of data ownership and the responsiveness of data providers to public concerns, and the role that institutional norms and practices play in democratising information availability and the transparency of the decision-making process”.

3. Limitations to Public Participation and PPGIS

Whilst widely advocated as a means to secure greater public involvement in environmental planning and decision making (e.g. Few et al. [10]), there is also other evidence, based on widespread research and experience, to suggest that in practice public participation only offers marginal and token opportunities for public involvement. Much of this criticism hinges around observations about the degree to which the public is actually embraced in the environmental decision-making process. Participation can also mean a wide range of different things as shown in the work of Pimbert and Pretty [11] who defined a sliding scale for public participation ranging from what is considered to be ‘passive participation’, through ‘self-mobilisation’, and finally ‘interactive processes’. At one end of the scale, participation has actually often been found to equate with very little *active* involvement of the public beyond simply offering the chance to attend meetings, examine documents and models, and some involvement in consultations, where interested parties are invited to provide comment and feedback. Unfortunately, as noted by Few et al. [10], much of what often passes for ‘participatory’ is in practice “closer to

educating and informing people and securing their support for plans rather than ceding them a genuine voice in shaping those plans”. In practice control of the decision-making process still continues to remain with the institutional bodies rather than the public. Other problems identified by Few et al. [10] include apathy, social disincentives within a group for collective action, and the time involved in undertaking an activity, much often depending on voluntary input. Ultimately, this equates to participants having a lack of self-confidence, respect within the group, and a general feeling of unease about being involved in the participatory process. It is suggested that this may even be the result of poor previous experiences, lack of knowledge and understanding, and the existence of limited communication channels. It has been observed that despite frequent assumptions about there being a collective and cohesive public or stakeholder body, this group may not in reality be very representative, and there may be inequalities that exist within a group because of internal power relations and politics thereby limiting the extent and effectiveness of their role in the overall decision-making process.

4. How effective is PPGIS in Public Participation?

Questions about the *real* effectiveness of PPGIS as a means to involve the public in the decision-making process have also been raised by many people. Howard [12], for example, lists many important questions that can arise when using GIT (Geographic Information Technology). For example: *Does GIT encourage participation not previously possible or manageable? Does the availability of GIT increase public participation? Can the general public understand and effectively use GIT? What are the experiences of GIT users/participants? How is public input generated through GIT used by decision makers? How does it influence their decisions? Is “spatial empowerment” of citizens a desirable goal of the public participation process?* It is concluded that there is still a need to develop new participatory techniques that would more effectively employ current and evolving forms of GIT. Furthermore, it is not yet known how effective the role and influence of geospatial technology is on the involvement of the public in the participatory process. Dunn [5] notes that *participation in the creation of GIS knowledge does not necessarily give any power to those involved in, and affected by, the decision-making, and may instead open up many more problems than it addresses*. “Spatial marginalization” of people is one such problem. In practice, therefore, it would seem that GIS technology should only be used as and when it is appropriate, and this should be carefully managed to avoid many of the problems that have arisen in practice.

In theory a PPGIS has the potential to play a significant role in involving the public in the decision-making process for any waterfront development. According to Dunn [5], for example, Cinderby [13] ...argues, that “the ability to integrate multiple perspectives in a visual spatial medium offers a powerful representation which should enable local groups to engage in spatial decision-making with ‘official’ agencies on a more equal basis, or at least serve to raise public awareness”. Dunn [5] also notes, however, that successful involvement is also dependent upon PPGIS being viewed as more than just the technology-led approach and should serve to bring the social element to the process through stakeholder involvement in the access to and use of spatial data. A community integrated GIS (Dunn [5]), by contrast, acknowledges the ‘expert’ nature of GIS as a technology but additionally enhances citizen access and participation and the democratic potential. However it is still often quite difficult to involve all of the public in the use of GIS and this can lead to marginalisation of some groups and possibly disengagement from the process. Other criticisms of PPGIS are that active participation in the creation of GIS knowledge

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