

## **New Technologies Promoting Public Involvement: An Interactive Tool to Assist SEA**

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*Information technologies (IT) are advocated as a key tool to enhance public participation. Distribution of information through IT systems such as the internet is gaining popularity as a rapid and, in most cases, accessible way of informing and involving the public. Concerns associated with technology-aided public participation derive from the apparent division of computer-skilled and 'traditional' citizens. Moreover, while it is perceived that public participation and feedback is enhanced through IT systems, feasible methods for effective inclusion of public concerns and interests in environmental assessment have rarely been explored and defined.*

*This research study is currently developing a holistic and interactive method applying Geographic Information Systems as a tool to assist different stages in the Strategic Environmental Assessment (SEA) process. Public involvement is a vital component of this approach. The software contains a user-friendly public consultation tool (that can be distributed through the internet or used at public displays) that systematically queries, gathers and processes submitted comments, proposals and complaints related to the proposed actions, plans and programmes. The software derives results from a statistical analysis of inputs. Consequently, the outcomes of public consultation are added as a value factor to the spatial (and temporal) analysis of environmental, social and economic features relevant to the SEA. This method will help to address inclusion of public perception which represents an important part of the social element in the SEA process.*

### **Introduction**

This paper presents the basic principles behind an ongoing research study on the application of a Geographic Information System (GIS)-based approach to Strategic Environmental Assessment (SEA) that facilitates the inclusion of public perceptions into the assessment process. The research is being carried out at Dublin Institute of Technology (DIT) in collaboration with UCD Dublin, the National University of Ireland, Maynooth (NUIM), and the National Centre for Geo-computation (NCG).

It is anticipated that the proposed methodology will be tested in comparative case studies in relation to SEA of development plans in Ireland and Spain. The results of these pilot assessments will facilitate drawing conclusions on the effectiveness of the tools and will be used for fine-tuning the method by incorporating appropriate adjustments.

The GIS-model for SEA is being developed and this paper discusses current public participation issues to establish the basis for an effective, user-friendly and integrated computerised method. It evaluates the potential benefits of using GIS as a participatory tool and presents the basic steps of the proposed assessment process.

This paper aims to create a debate on the advantages and disadvantages of applying a systematic and standardised approach to including public participation in SEA-related decision-making. Discussion is encouraged by posing key questions to SEA and public participation professionals and experts (Appendix 1).

Although it primarily targets European perceptions, wider international perspectives are also welcomed. Evaluation of the answers, together with issues and concerns that arise during the debate, will be incorporated in future stages of the research.

### **Valuable Public Participation: Reality or Utopia?**

The objective of a participatory programme is to inform the public, give consideration to their concerns and interests, and develop ‘majority public acceptance and support for a valid proposal’ (Connor, 1999). This principle is supported by Directive 1997/11/EC (CEC, 1997) for the evaluation of projects, the 1998 Århus Convention and Directive 2001/42/EC for the evaluation of plans and programmes (commonly known as the SEA Directive), together with the related Directive 2003/35/EC to be implemented by June 2005 (CEC, 2003). Thus, current European legislation emphasises and makes mandatory the provision for public participation in the assessment of potential effects of certain projects, plans and programmes on the environment.

#### *Is public participation common practice in EIA/SEA processes?*

Implementation of public consultation and participation implies developing reciprocal communication between the competent authorities and the general public at all stages of the SEA process. Ensuring effective public participation is crucial as it constitutes an essential component of the assessment procedure. It aims to enhance transparency and legitimacy in decision-making processes and to increase the citizens’ confidence in the measures adopted. Full implementation is proving to be complex. While underlining the necessity for public participation in SEA, the Directive does not give clear guidance on several key operational issues, such as definition of the public consultation in terms of transparency, credibility, implication, legitimacy and integration (Risse *et al.*, 2003). Furthermore, efficient public and stakeholder participation and involvement in Environmental Impact Assessment (EIA) has not always been successful and there is a risk of this conveying into SEA.

#### *Is consequently public participation performance in SEA being hampered?*

The Directive’s participatory objectives have been tested in a number of case studies where stakeholders and general public were consulted at workshops (for example pilot and formal SEAs carried out for the National Development Plan of Czech Republic, the North Somerset Local Area Plan in England, the Falkirk Local Area Plan in Scotland, the Dublin Docklands Regeneration Plan in Ireland, the Integrated Coastal Management Plan of Catalonia in Spain, or the Dutch National Water Supply Plan)<sup>1</sup>. In the majority of the case studies analysed,

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<sup>1</sup> NDP of Czech Republic: [http://www.rec.org/REC/Programs/EnvironmentalAssessment/pdf/Czech\\_SEAofNDPEng.pdf](http://www.rec.org/REC/Programs/EnvironmentalAssessment/pdf/Czech_SEAofNDPEng.pdf)  
North Somerset Local Area Plan: <http://www.n-somerset.gov.uk/living/planning/policy/replacelocalplan/default1.asp>  
Falkirk Local Area Plan: <http://www.falkirk.gov.uk/devservices/planenv/lpfalkirkcouncilsea.htm>  
Dublin Docklands Regeneration Plan: [http://www.ddda.ie/cold\\_fusion/planning/master\\_plan\\_2003/master\\_plan\\_2003.cfm](http://www.ddda.ie/cold_fusion/planning/master_plan_2003/master_plan_2003.cfm)  
Integrated Coastal Management Plan of Catalonia: <http://www.interreg-enplan.org/home.htm>  
Dutch National Water Supply Plan: [http://assess.eic.or.jp/houkokusho/sea0306/0306\\_en.pdf](http://assess.eic.or.jp/houkokusho/sea0306/0306_en.pdf)

informing and involving affected and interested public and government bodies throughout the decision-making process, as well as addressing their inputs and concerns in documentation and decision-making, have been perceived as a key to success and citizen support of SEA. Nevertheless, two important concerns have been identified in current public participation practice that may directly affect SEA:

*Is effective public participation perceived as a general trend in EIA/SEA practice?*

1. Although participation may be viewed as an important awareness-raising activity, some authors argue that the processes fall short of achieving their objectives (Towers, 1997; Siebenhüner and Barth, 2004; Scott and Oelofse, 2005). Limited efforts at citizen involvement may derive from either the lack of trust in citizens (Yang, 2005) or other barriers to community empowerment such as political arrangements and bureaucracy (Kyem, 2002). Public participation practice needs to be redesigned to overcome current difficulties and social structures for it to be valuable.

2. Public participation in environmental decision-making should minimize conflicts and maximise consensus but Peterson *et al* (2005), supported by Helge (2005), yet argue that it has potentially dangerous implications. Although embracing consensus-based approaches attempts to enhance public participation and reconcile the potentially incompatible goals of environmental protection and economic growth, it dilutes socially powerful conservation metaphors and legitimises unsustainable social constructions of reality.

*Is participatory consensus likely to lead to non-sustainable outcomes?*

In any case, successful implementation of SEA is encountering bureaucratic difficulties in some European countries and effective methods for systematic application of SEA (including efficient participation) are still being developed. SEA practice and experience need to be promoted and holistic and inclusive SEA methods developed and tested before determining whether public involvement, at least as part of the SEA process, can be fruitfully put into practice. Successful implementation will ensure that public participation ceases to be simply a bureaucratic requirement and starts enhancing participative decision-making by having influential inputs leading to more democratic and sustainable outcomes.

*Do participatory methods always follow a case-by-case approach or can these be replicated?*

**Information Technologies and Workshops: Methodological Implications for the Public**

Public consultation in environmental decision-making is becoming prevalent practice. As a result, there is a growing need to communicate effectively with both expert and non-expert audiences. Distribution of information through emerging Information Technologies (IT) such as the internet is gaining popularity as a rapid and, in most cases, useful way of informing and involving the public. IT is advocated as a key tool to facilitate and widen participation (Kingston *et al*, 2000).

*Is this approach accessible to all social and educational levels?*

Significant attempts have been made to facilitate public participation in EIA and SEA decision-making through IT-aided workshops and internet-based consultations. However, concerns exist in relation to IT-aided participation (such as e-rule making, online discussion fora, interactive

GIS mapping and other electronic communication techniques). These concerns derive from the apparent division between computer-skilled and 'traditional' citizens, and varying degrees of success with regards to social inclusiveness (Furlong, 2005; Loveridge and Street, 2005; Scott and Oelofse, 2005). This is illustrated by the outcomes of a user-needs survey for the ongoing EU IntelCities project that seeks to integrate electronic governance of cities and urban planning (Curwell *et al*, 2005). The survey identifies a number of implications for electronic planning in terms of increasing the efficiency in e-urban planning and the need to develop digital methodologies for widening public consultation. Nonetheless, the future looks brighter as current educational trends indicate a more computer-literate population leading to a wider e-enabled society.

*Can the gap between e-literate and non-e-literate be bridged in the short-term?*

Current practice suggests that although more time consuming and costly than consultations via the internet, roundtables and open hearings with sufficient time and resources generally facilitate effective stakeholder involvement, greater participation and higher credibility, and are more legitimate for the public (Therivel *et al*, 1992; Risse *et al*, 2003; Schijf, 2005). Effective participatory workshops necessitate measures for ensuring accountability and generally require conflict resolution techniques to yield robust solutions leading to constituent support (Thompson *et al*, 2005).

*How can public participation overcome resources, time and budget constraints?*

Although public participation methods in environmental assessment (EA) have been widely explored (Schroeder, 1997; Cinderby, 1999; Jordan and Shrestha, 2000; Siebenhüner and Barth, 2004; Stolp *et al*, 2004), there is little guidance on how to initiate, establish and support individual groups to ensure adequate engagement in decision-making processes (Speller and Ravenscroft, 2005). Similarly, systems for influential inclusion of public concerns and interests in EA and decision-making have seldom been defined (Gonzalez *et al*, 2005). Public/stakeholder consultation is generally carried out at some stage in the EA process; however successful participation generally proves to be problematic (Morris and Morris, 2005). Its integration, to provide fully representative stakeholder involvement and timely concern and interest incorporation, has not always been effective. In addition, political and/or economic interests have the potential to overrule public consultation (Palerm, 2005).

*How can environmental, economic and social decisions be balanced with other public interests?*

### **Participative GIS Applications in Land Use Planning and Environmental Assessment**

It must be noted that GIS has been used in environmental and urban planning since the early 1970s (Munn, 1975) but that social and cultural information has only recently started to be included in GIS modelling by means of inputs derived from participatory processes. A number of representative participative GIS applications have been identified which have proven to be proactive and beneficial to planning and EA processes.

- GIS has been used in the MOLAND (Monitoring Land Cover/Use Dynamics) European joint research programme. The project's main objective is the creation of a comprehensive database of detailed, up-to-date, standardised, comparable and spatially referenced information on the extent, characteristics and sustainability of the expansion (past, current

and likely future) of land use development in European cities and regions. It will help in future sustainable planning decisions and monitoring of urban expansion (McCormick *et al*, 2003).

- GIS with a participatory-base has been used for land suitability assessment in Mexico (Bojórquez-Tapia *et al*, 2001), where a set of environmental attributes was defined as spatial analysis criteria for land use planning. The method included participatory workshops where the social, environmental and economic implications of developing lands were discussed. The information generated by stakeholders was integrated in a GIS-based multi-criteria analysis and thus land uses could be allocated in a pattern that helped minimise conflicts and maximise consensus.
- A public participation GIS approach for landscape planning carried out in the UK indicates that hands-on use of GIS, with support, offers an alternative and interactive mapping approach that benefits and empowers community groups when responding to local geographic issues (Wood, 2005).
- GIS was used in an electrical transmission line routing in West Virginia, USA (Towers, 1997). Although GIS modelling improved decisions by rapidly rating thousands of potential sites, the method was criticised by citizens over the basic stages of the GIS study. Criticism related to: methods of data collection and accuracy of data; methodology as to decisions on the relative importance of the information input into GIS (which plays a large part in determining output and thus contradicts the promise of objectivity); potential political connotations of the resulting GIS maps.
- A participatory GIS was used for community forestry in Nepal (Jordan and Shrestha, 2000). The combination of quantitative objective information with qualitative subjective information allowed a better understanding of forest management priorities. It also empowered the community by involving them in the decision-making process.
- Computer models have been used in several participatory processes to assess global environmental change by means of scenario development (Siebenhüner and Barth, 2004). However, these demonstrated limited feasibility in participatory processes. Although they were generally found to be very useful by scientists and experts, the general public put an emphasis on ethical (e.g. qualitative social and cultural) issues and thus models were observed to stimulate ethical debates rather than introduce sound scientific data leading to quantitative arguments.

Although these case studies portray a generally participative process with positive outcomes, a number of issues may hinder achievement of the desired goals. First, a GIS application is considered to be interactive and participatory when 'local knowledge, community needs and specific social histories are appreciated and incorporated into the development process' (Harris *et al*, 1995). Indeed, partnership through participation and integration is not always easily achieved and technological, cultural and social structures may impede effective GIS application in public participation. Harrison and Hacklay (2002) evaluated community workshops carried

out in the UK to address issues that arise from the use of GIS as a participatory planning tool. They concluded that this relatively new practice had potential as a means of extending knowledge networks. However, there were concerns with regard to: access to technology; representativity and reliability of data; data ownership and manipulation; the responsiveness of data providers to public concerns and demands for information availability, with transparency of the decision-making process.

*Who owns the information? Who can access it? How can manipulation of information be controlled?*

Second, traditional use of GIS follows a ‘top down’ approach (Cinderby, 1999; Jordan and Shrestha, 2000) where ‘experts’ set the agenda over what information is relevant to achieve the established goals, and there is little or no consultative process with communities. The choices to be made on data collection and analysis techniques are vital to the outcome. Consequently, this dominance leads to distrust and lack of legitimacy in GIS-based studies. In a case study in West Virginia, citizens argued that GIS modelling is inherently subjective and therefore should include all concerned parties’ subjective judgements (Towers, 1997) both with regards to the relative scores of resources and to the weighting criteria applied. In other words, they called for public participation in GIS modelling studies to be enhanced so as to improve credibility. Likewise, the combination of expert and public opinion data allows for the investigation of the multiple realities of a single issue (Cinderby, 1999), enhancing the shared understanding and knowledge for a particular site or resource and providing a more explicit picture of the ‘reality’. The spatial representation of issues allows unique communication of viewpoints on a range of issues by different sectors of society, and this democratisation of spatial analysis will make more explicit some of the choices made in achieving a decision (Cinderby, 1999).

*Could a ‘bottom up’ approach improve participatory GIS processes?*

Third, case studies indicate that GIS has the potential for improving the information available to the public and improving spatial analysis of combined quantitative and qualitative data. However, it has been observed that because of the technological and managerial demands, the cost and time required for setting up a GIS, compiling the necessary and reliable data, and analysing the systems outputs (Joao and Fonseca, 1996), together with inequalities in access to information, ‘plans for their use must be financially, institutionally and politically realistic’ (Rakodi, 2002). In terms of public participation, without equity to the information and technology of GIS, small or less wealthy groups (both financially and technologically) have been disadvantaged in their availability to fully engage in the process by which decisions utilising spatial analysis have been made (Harris *et al*, 1995). Similarly, Kyem (2002) states that the goals of many community-based projects are rarely attained, as the filtering of spatial information through foreign (i.e. lacking local knowledge) GIS experts obscures the meaning and understanding of the needs and concerns of the unprivileged groups.

*How can we ensure representativeness of inputs and accountability of outcomes?*

Last, data accuracy and reliability have been documented as issues in applying GIS to EIA (Joao and Fonseca, 1996). Current improvements in GIS data collection and proposals for an infrastructure for spatial information in Europe (INSPIRE<sup>2</sup>, 2002; CEC, 2005) have

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<sup>2</sup> Infrastructure for Spatial Information in Europe.

significantly improved the GIS data scene. Major agencies and local authorities of EU Member States currently have a GIS repository. A centralised and regulated repository can feed information into the SEA process although this may entail issues regarding data ownership and manipulation (Siebenhüner and Barth, 2004). Data layers (such as the Digital Terrain Model) need to be accurate to avoid significant errors in environmental models, but low quality data can augment the database and be used to prevent the error of overlooking a major environmental component (Hacklay *et al*, 1998). Jordan and Shrestha (2000) argue that technical performance of GIS, spatial accuracy and quality of output are all secondary to the need for a participatory approach. However, data accuracy and reliability cannot be overlooked as system inputs will impinge on accuracy of assessment outputs.

*How can be addressed the issue of data availability and accuracy?*

### **GISEA: An Interactive Tool to Assist SEA Process**

The development of GISEA, a GIS-based systematic and holistic approach to assist the various stages in SEA, is the major theme of our current research study. The main objective is to define and develop a methodology based on existing representative SEA methods and GIS technology for the integrated evaluation of economic, social, and environmental factors in a georeferenced manner that will act as an environmental decision-support tool.

The computerised GISEA model seeks to evaluate the relative importance of key environmental and socio-economic factors in a transparent manner using specific weighting criteria (which take account of public perception) and multi-criteria analysis of inputs. The results of the evaluation will be graphically presented, allowing the rapid identification of areas of concern and most viable/sustainable alternatives and thus informing the decision-making process. The method should have the predicted flexibility to allow adjustment of values, assessment factors and weighting criteria and thus the ability to be adapted to the variety of socio-political contexts and values within the EU.

### **GISEA and Public Participation Processes**

Citizen Value Assessment (CVA) is conceived as an instrument that provides an inventory of the importance people attach to particular environmental attributes (Stolp *et al*, 2004). It combines a 'normative approach' using subjective value judgements of individuals and the meaning they attach to the qualities of the living environment, with a 'technocratic approach' using scientifically rigorous and technically sound data. On the other hand, Public Participation GIS (PPGIS) is a research field that, among other things, focuses on the use of GIS by non-experts and occasional users and calls for a user-centred design approach to PPGIS projects (NCGIA, 1997; Haklay and Tobón, 2003). These pragmatic concepts of contemporary research arenas are being taken into consideration when developing the participatory tool of the GISEA model. The system thus implies that evaluation is oriented to the general public in an attempt to ensure that value judgements are explicit and do not come exclusively from experts. It is structured and, as in CVA practice, it only addresses 'neutral' information (i.e. public values rather than opinions about alternatives). The tool of the GISEA model to be used during public participation processes is simple, interactive, accessible and user-friendly. It will be used to



inform participants, stimulate discussions and transform qualitative judgements into spatially-specific quantitative values, helping to ensure legitimacy and avoid misuse of information.

The basic steps of the methodology described below derive from existing public participation methods and principles (Schroeder, 1997; Cinderby, 1999; Jordan and Shrestha, 2000; Siebenhüner and Barth, 2004, Stolp *et al*, 2004) combined with tools derived from geomatics technology.

The GISEA software contains an interactive user-friendly public consultation tool that can be distributed through the internet or used at public displays. This systematically queries, gathers and processes submitted public values, together with comments, proposals and complaints related to the proposed actions, plans or programmes. The software derives results from statistical analysis of these inputs. The outcomes of public consultation are then added as a value factor to the spatial (and temporal) analysis of environmental, social and economic features relevant to the SEA. Thus, the systematic evaluation of environmental and socio-economic factors includes a thematic layer in the GISEA model that consists of weighting criteria derived from the results of public participation workshops carried out in a timely manner (see below) with relevant stakeholders and the general public.

The GISEA model will evaluate the vulnerability of relevant environmental resources, each of which will be represented as a thematic layer (i.e. spatially specific graphic data layer) with a vulnerability value derived from existing indicators. The software will be programmed to automatically detect the degree of overlap of these thematic layers and thus identify potential vulnerability zones. The results of the participatory workshops will then be added as a new thematic layer that represents the qualitative (i.e. subjective and potentially inaccurate but nonetheless valuable) data. The layer will comprise a ‘tolerability factor’ indicating public perceptions associated to the different areas and environmental resources. The public perception can be negative, neutral or positive, and thus the value factor will range from 0.5 to 1.5. The computer model will then re-evaluate data and will indicate the total impact potential as a percentage reduction or increase in confidence limits (Figure 1). This allows inclusion of socio-economical aspects into the assessment. Results will be colour-coded according to sensitivity of the areas to a potential impact so as to facilitate identification of conflict zones and thus aid decision-making.

$$\text{Total Impact Potential} = \text{Vulnerability to Impact (Overlying of factors)} \times \text{Tolerability Factor (Public perception)}$$

Figure 1: Formula for incorporation of public perceptions into environmental assessment.

Application of the GISEA model implies public participation workshops. A number of workshops need to be carried out through SEA to ensure that the process is constructive. Although the exact methodology of this multi-step procedure may vary on a case-by-case basis,



a general approach is proposed. The version presented in Figure 2 has been designed as a systematic and participatory method for SEA of county development plans in Ireland.

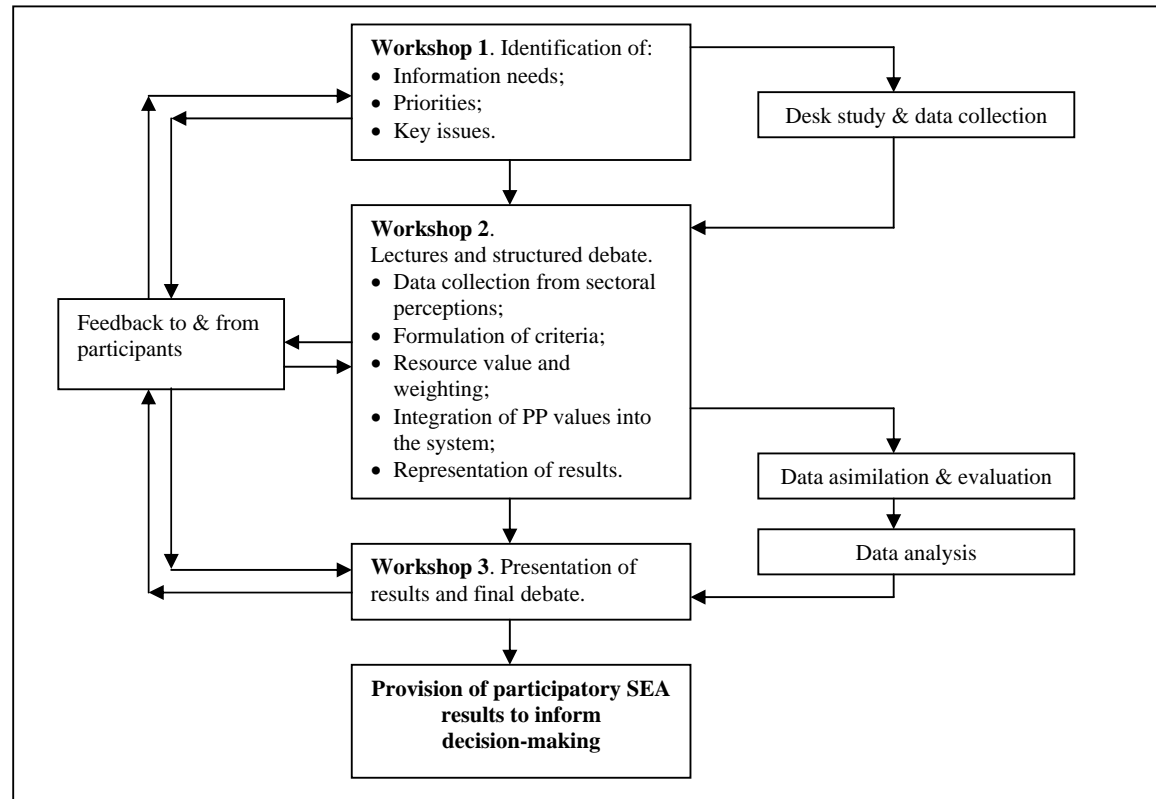


Figure 2: Outline of a GIS-based systematic and participatory methodology, designed as part of a GISEA model for county development plans in Ireland.

**Workshop 1.** Representatives of competent authorities, community groups, interested and/or affected parties and academics will be identified and formally invited to the participatory workshop. A public notice or newspaper advertisement will inform the general public of the venue and dates of the open-workshops. The ideal is to achieve a representative number of all social groups to avoid excluding valuable information from the GIS system and to ensure equity of decisions.

At an early stage in the SEA process, representatives are gathered to discuss stakeholder information needs, priorities and key issues with no formal constraints in expressing their opinion. Outcomes of these workshops are used to identify practical constraints and to determine the data to be collected. These will be verified by participants. The SEA team then proceeds to data collection of the environmental, social and economic factors identified as relevant to the assessment.

**Workshop 2.** Once the data have been adequately collected, digitised into the GISEA model and a desk research of potential key issues completed, a second workshop will be carried out which includes expert knowledge. This will have the following structure:

1. Workshop participants (representatives of competent authorities, community groups, interested and/or affected parties and academics previously identified) will be divided into four sections: stakeholders, authorities, interested parties and general public. This facilitates consensus amongst groups, avoid *in-situ* conflict of interests and simplifies the analysis. For evaluation purposes, viewpoints of the different groups are given equal weight.
2. An initial lecture will be given to all representatives that provides background on the proposed key actions of the plan/programme, presents the dynamics of the workshops and responds to preliminary comments and queries.
3. An interactive group discussion session involving the four defined groups of participants is carried out with hands-on GIS. A moderator, who is acquainted with the model and the methodology and will stimulate discussions in an unbiased manner, will facilitate and structure the debate.
4. A standard, computerised thematic and graphic questionnaire will be presented for the consultation exercise. This allows the qualitative information expressed by the public to be transformed into semi-quantitative information by connecting the expressed values and opinions to certain locations, weighting these values in a structured way and integrating this in the form of an evaluative and indicative score map.
5. Based on the computer model, participants will be asked to draw perceptions in the physical graphic questionnaire and formulate criteria in a spatially referenced format (perceptual maps or ‘mental’ maps) with regards to:
  - Features of interest in the area (environmental, economic and social);
  - A hierarchy of values according to the vulnerability (or importance as appropriate) of the environmental, economic and social factors in the area;
  - A weighting ratio for each of the relevant factors.
6. Finally, the moderator will input the information gathered in the public consultation process into the GISEA model that already stores the ‘expert’ information in relation to environmental resources associated with the area. This allows the overlay of social, economic and natural resource thematic layers on those associated with the proposed actions of the plan and programme, allowing relationship between the layers to be examined.
7. The results of public participation will thus be visually depicted on screen with the aim of facilitating further discussion and maximising consensus. Although qualitative information derived from public consultation cannot always be easily entered into a GIS, the task is to ‘organise and present pertinent information that was not previously available using the technological capability of GIS’ (Jordan and Shrestha, 2000) to assist and improve the assessment and the decision-making processes.

**Workshop 3.** The outcomes of workshop 2 will be evaluated by GIS experts and scrutinised by the SEA team before being presented to the decision-makers. The GISEA model will automatically calculate the total potential for environmental impact of the different areas by means of incorporating the public perception or ‘tolerability’ factor with the environmental vulnerability and the potential economic benefits of the proposed plan or programme (Figure 1). The tolerability factor will range between 0.5 and 1.5, thus indicating the negative, neutral or positive perception of the public.

Prior to drawing final recommendations to be fed into decision-making, results of the GISEA process multi-criteria data analysis (Gonzalez *et al*, 2005) will be presented and discussed at a final workshop. There participants are encouraged to express their overall opinions and are provided with responses to any final concerns and queries. Feedback to and from participants aims to enhance the credibility of the assessment process and facilitate consensus.

The novelty of the GISEA application lies in the integration of the public perception or ‘tolerability’ factor with environmental thematic layers in the GIS system by means of a value factor. Furthermore, although GIS has been widely applied to EIA, this appears be the first attempt to develop a computerised, holistic and systematic SEA method to be tested within the EU since the introduction of Directive 2001/42/EC.

## **Conclusion**

Despite the apparently common goals and foundations of SEA processes, no two SEAs have been identical because of differences in the structures between the socio-economic, planning and political systems concerned. However, it is considered that a ‘standardised but flexible’ (i.e. consistent but adaptable) methodology should provide a tool geared to improve decision-making processes. By introducing systematically both the public perceptions and the environmental implications relevant to proposed actions, whilst allowing enough flexibility to adjust inputs into the system, understanding of the process will be enhanced and the credibility and legitimacy of the decision promoted.

As broadly agreed (Harris *et al*, 1995; Cinderby, 1999; Jordan and Shrestha, 2000; Kingston *et al*, 2000; Bojórdez-Tapia *et al*, 2001; Stolp *et al*, 2004) the combination of existing environmental, land use and resource information with that obtained from citizen consultation processes has the potential to provide a better understanding of the limitations and opportunities for local use and planning of resources. Public perception maps can contain information on social issues for resource use otherwise unaddressed by environmental and land use data. A ‘bottom-up’ approach in GIS applied to SEA, based on transparent and participatory processes, should lead to greater social integration and justice, public confidence in the system, minimisation of conflicts, and enhancement of the assessment.

The GISEA methodology described in this paper aims to facilitate a systematic and holistic SEA process by providing a transparent decision-support tool that effectively integrates public

participation into decision-making. In all cases, the GISEA tool should be used to inform and structure debates and promote partnership for achieving workable outcomes; rather than being expected to provide a solution to complex environmental and social problems. Further evaluation of its use is necessary before drawing conclusions on the effectiveness and replicability of the tool, on the sustainability of the outcomes and on its potential for informing environmental decision-making.

**Note**

*The authors take the opportunity to thank all those who have responded to the attached questionnaire (all responses will be taken into consideration when further defining the methodology) and wish to provide those who were not previously involved the opportunity to do so.*

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# Questionnaire

## Systematic GIS Application to Public Participation

*The information derived from this questionnaire will be used in an ongoing research project on the design of a computerised model to assist SEA stages. The individual responses will be kept confidential. Evaluation of the responses gathered in the questionnaire will, however, be published in a position paper and in the final research document.*

*The questionnaire will take approximately 10 minutes to complete. We thank you for your collaboration.*

**Name:** .....

**Job Title:** .....

**Country:** ..... **E-mail:** .....

### Public Participation (PP)

1.- Do you consider PP common practice in EIA/SEA processes in your country?

☐ Yes

☐ No

Comments .....

2.- Does the lack of guidance and the deficiencies identified in EIA process hamper PP performance in SEA?

☐ Yes

☐ No

Comments .....

3.- Do you generally perceive PP processes as effective in EIA/SEA practice?

Yes ☐ ☐ ☐ ☐ Maybe ☐ ☐ ☐ ☐ No

Comments .....

4.- Do you consider that consensus in PP is likely to lead to non-sustainable outcomes?

Yes ☐ ☐ ☐ ☐ Maybe ☐ ☐ ☐ ☐ No

Comments .....

5.- Does PP have the potential to impede a development?

Yes ☐ ☐ ☐ ☐ Maybe ☐ ☐ ☐ ☐ No

Comments .....

### Public Participation Methods

6.- Can effective and collaborative PP methods overcome conflict and enhance empowerment and minority involvement issues?

Yes ☐ ☐ ☐ ☐ Maybe ☐ ☐ ☐ ☐ No

If yes, how?.....



7.- Do PP methods have to follow a case-by-case approach or can these be replicated?

- ☐ Yes  
☐ No

Comments .....

8.- Do you consider that distribution of information and public involvement through IT can reach the majority of social and educational levels?

- ☐ Yes  
☐ No

Comments .....

9.- If not, can the gap between e-literate and non-e-literate be bridged in the short-term?

- ☐ Yes  
☐ No

If yes, how? .....

10.- Can PP overcome resources, time and budget constraints?

- ☐ Yes  
☐ No

If yes, how?.....

11.- Can environmental and economic decisions be balanced with other public interests?

- ☐ Yes  
☐ No

If yes, how?.....

### **GIS in Public Participation**

12.- As a step further ahead from commonly known IT technologies, could GIS provide the missing link between technology, development and human perception of the reality?

- ☐ Yes  
☐ No

If yes, how?.....

13.-What measures could help making GIS feasible and available to the general public?

Comments .....  
.....  
.....

14.- Could a 'bottom up' approach improve participatory GIS processes?

- ☐ Yes  
☐ No

If yes, why?.....

15.- Who owns the information? Who can access it? How can manipulation of information be controlled?

Comments .....

Why? .....

.....

16.- Can we ensure representativeness (i.e. realism) and accuracy of inputs (i.e. reliability) and accountability (i.e. validity) of outcomes using GIS ?

☐ Yes

☐ No

If yes, how?.....

17.- How can the issue of data availability and accuracy be addressed?

Comments .....

.....

.....

18.- If you have had the chance to read the proposed GISEA method:

What steps, if any, of the proposed PP method as part of the GISEA model do you consider less appropriate or not procedurally sound?.....

Why? .....

.....

19.- Can you identify any PP method that has proven to be inclusive and effective in your opinion?

Method or Case Study Details

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20.- What recommendations will you make to improve current PP methods?

Recommendations

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Thank you again for your time and collaboration.

*Ainhoa Gonzalez*

*Alan Gilmer*

*John Fry*

*Ronan Foley*

*John Sweeney*

Do you wish to receive the results of the evaluation of this questionnaire? Yes ☐ No ☐

Contact: agonzalez@bicerrilan.com