



# Participatory Risk Assessment for Environmental Decision-Making

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## 1. Introduction

Recent research, discussion and practice in the role environmental decision-making as an integral part of a democratic society have resulted in legislation, policy and guidance that encourage, and indeed may require, greater participation. The focus of this research paper is to explore these participatory ideas in the context of environmental risk assessment. Participation methods have generic application. However, the importance of fitting method to purpose requires that different contexts and issues relative to the objectives be addressed. In relation to environmental risk assessment these issues include:

- the complexity of risk issues *per se*;
- the inherent uncertainty that dominates any risk assessment;
- the quantitative nature of many risk assessments and the difficulty of dealing with low probability-high consequence outcomes;
- the possibility of controversy in relation to decisions involving risk and thus the careful attention needed to the process and identification of participants;
- the traditional role and culture of experts in risk decisions and the challenge of reconciling this with the role of lay knowledge and the potential for the public to act as quality assurors in the risk decision process;
- the tendency for people to need reassurance when confronted with risk, even during a participation process;
- the need to acknowledge the public's ability to deal with complex technical issues and the need for information and data to respond to their questions, and
- the fact that 'risk' *per se* will often not be the only issue of public concern.

## **2. Risk Assessment in the Environment Agency**

The Environment Agency is required to address a very wide range of risk issues throughout its regulatory and supervisory work. Environmental risk assessments supporting the Agency's work generally fall into one of two categories [1, 2], with the majority of activity being associated with the latter.

- regulatory risk assessment, where the Agency *per se* undertakes the risk assessment (the design of flood defence schemes, assessment of existing production chemicals under EC legislation); and
- applicant risk assessment, where the Agency is involved in reviewing risk assessments that operators, dischargers, developers or abstractors are required to undertake to support environmental permits [2].

Agency risk assessments may apply at specific stages of the development, permitting, operation or decommissioning of an activity, or they may parallel other decision processes. Arguably, risk assessment at the strategic planning stage is most valuable in preventing adverse environmental impacts and in ensuring that appropriate risk reduction is considered early on. At the strategic level, however, the Agency is often not the primary decision-maker and seeks to influence activities through its input to, and consultation on, strategic environmental plans.

## **3. Pressures for Participation in the UK**

A summary of national and international pressures for enhanced public participation in decision-making can be found in [3]. In the legislative context, most UK requirements have been limited to consultation to gain people's opinions on already drafted plans and proposals. The concept of representative democracy has underpinned these requirements. Legislative change could be precipitated by the Aarhus Convention (and the draft EU Directive giving effect to the Convention) that stresses the need for early public participation "when all of the options are open". National guidance and advice of relevance to public participation by the Environment Agency is available in documents [4] and [5].

## 4. Participatory Risk Assessment

Recent literature [8-15] has reflected the drive to public participation and identified it as an essential aspect of risk assessment. Of particular relevance are [6,7] and [10]. These reports stress the need for direct methods to ensure that people's values, lay knowledge and understanding are articulated and taken into account alongside technical arguments. Participation is no longer being presented as an optional add-on to policy-making but as an integral part of the process.

In particular, it has been acknowledged that the risk assessment process should be open, accountable, credible and inclusive [10, 16]. Underlying the recent changes in approaches towards participation generally, and risk assessment specifically, is the need to view the process in a more holistic way [12]. Within the risk context the need to 'find a process that facilitates the involvement of all affected parties and at the same time produces a prudent and informed judgement based on expertise and knowledge' is one of the major challenges of a modern democratic society [8]. The success of such a process depends on a number of factors including time; openness of result; equal position of all parties; willingness to learn; resolution of allegedly irrational responses; and demoralisation of positions and parties. Furthermore, the practicality depends on the availability of resources, the existing degrees of freedom in the decision-making processes and the capacity for change, where needed. The concept of analytic-deliberative processes has gained increasing importance, being identified as one of the key ways to move forward with regard to participatory risk assessment [11, 17-19]. This approach to environmental decision-making suggests that to achieve a process that is both transparent and trusted requires the involvement of all parties from the outset. Experts and lay people are involved in defining and reflecting upon the pertinent issues throughout the risk assessment. This requires that both the *analysis* (the specific and more specialised processes associated with risk assessment) and the *deliberation* (the interactive means by which ideas are deliberated upon by wider stakeholders) be seen as inextricably linked and equally influential.

Some general objectives of participation [3] are identified in Table 1. All of these are relevant to participatory risk assessment. Objectives limited to satisfying regulatory requirements in isolation are unlikely to accord with the public's objectives. They may also be unlikely to provide for the most effective participatory methods in terms of optimising deliberation and discussion and opening science to public understanding and debate. Additional objectives relevant to participatory risk assessment have also been identified (Table 1) [8, 15, 17, 20].

General objectives	Additional objectives for risk assessment
To satisfy regulatory requirements To resolve conflicting views To increase transparency and defensibility (of professional judgements and decisions) To change people's views To improve services To determine needs and desires To empower citizens to take action To enable social learning To optimise trust and credibility To elicit values relevant to the decision	To ensure: <ul style="list-style-type: none"> <li>- problem scoping is comprehensive and in-line with public and stakeholder concerns;</li> <li>- that hazards of concern to the public are scoped into the assessment;</li> <li>- that 'local' information and understanding of environmental conditions, exposure patterns, etc is included;</li> <li>- development of stakeholder and public understanding and technical capability;</li> <li>- that uncertainty is discussed and understood;</li> <li>- that alternatives and risk reduction options are discussed and the interests and concerns of the public incorporated; and</li> <li>- the public can act as a quality assurance mechanism in the risk assessment process.</li> </ul> To assist in identification of appropriate standards and criteria by which risks will be evaluated To provide for public challenge of assumptions and scenarios considered relevant to the hazard assessment and risk estimation

Table 1 Objectives of public participation applied to environmental risk assessment

There are also some important issues that need to be considered at the outset. For example: (i) assessing the attitude of the convenor; (ii) evaluating potential alternatives to a participatory process; (iii) determining whether the decision has already been made (in which case, participation beyond information provision will not be relevant); and (iv) identifying potential stakeholders and public with an interest.

## 5. Challenges for Participatory Risk Assessment

Risk management decisions are often enormously complex, replete with technical uncertainties and perplexing value tradeoffs. Making and implementing wise policy choices is *difficult*, even for risk management experts. Given this, 'how can members of the interested lay public hope to understand and play a meaningful role in making such complex, high stakes choices?' [19]. One solution could be to engage different people at different stages – informed stakeholders in the more technical elements, the lay public in problem definition and risk evaluation – while not losing sight of the need to inform people in general throughout. Whilst it is important that consultation forms a 'level playing field' it is also important not to ask too much of participants. A further concern is that in focusing so heavily on issues of deliberation and 'smoothing out differences' between stakeholders, technical issues can become neglected or inadvertently left alone to experts [21].

At a most basic level, experts often have a different language to other stakeholders to describe risk. Three different 'types' of risk language have been identified: colloquial, technical and insurance [22]. It has been suggested that the colloquial view of risk is that of danger, venture and opportunity; the technical view one of hazard, probability and consequence; and the insurance view one of chance and uncertainty. Proceduralised risk assessment frameworks [10] used by regulators run a potential danger of implicitly assuming that the technical view is somehow pre-eminent. In many regulatory settings, there is a potential disparity between the need to define operational procedures for regulation and a desire to engage the public in risk decisions where 'technical' language will compete with the colloquial language of the public; hence the initiation of our study. Some commentators have expressed this in terms of a 'deficit model' whereby the expert 'elite' tend to view 'the public' as starting from a position of ignorance and the expert from 'the correct position' [23-25]. Whilst experts and lay people are likely to construct a risk issue differently, this does not mean that one kind of knowledge is more or less valid. Instead, it should be the case that both parties have the opportunity to contribute. As noted in much of the research on risk and democracy, the analysis that takes place is conducted by experts in various scientific disciplines each operating within a defined scientific culture [26]. This project does not suggest that this could be otherwise: risk assessment undoubtedly needs input from specialist advisors and a clear reference to the legislative setting - indeed, it has been observed that the public welcome advice from experts [23, 27]. What needs to be considered is the part that lay knowledge, understandings and perceptions can play in defining the agenda for risk assessment; provision of feedback into the analytical process and in interaction with the experts conducting the analysis early on in the process.

Uncertainty is critical to risk characterisation [11] and a problematic area with respect to increased public participation in risk assessment. It is clear that people do not respond well to uncertainty and that it frequently increases confusion and anxiety. Indeed, in a recent study on risk literacy, i.e. trying to ascertain what it is about an issue that either increases or decreases people's propensity to learn about it, it was found that uncertainty can have a negative impact upon knowledge acquisition [27]. However, there is also evidence that when people are faced with issues of uncertainty in participatory processes they are able to recognise and deal with it, if they are provided with opportunities to understand the reasons for the uncertainty and to question different expert views [17].

A major problem with regard to managing the concept of uncertainty is whether or not it is acknowledged explicitly in the risk assessment process. It is frequently the case that various stakeholders tend to suppress or push aside the information on uncertainty in order to maintain the guise of trust and authority. The sometimes covert nature of uncertainty therefore makes it all the more difficult to deal with and increases public alienation [28]. Uncertainty needs, therefore, to be presented as something that has pragmatic ramifications as opposed to being something that is abstract and theoretical. This might require considerable effort and imagination on

the part of the convenor of the decision-making / participatory process but could result in a more successful and fulfilling outcome for all parties.

A related problem is that of data availability, both in terms of 'does it exist' and 'can it be made available'. Most risk controversies are distinguished by information scarcity, with some data, regarded as indispensable by at least one stakeholder, usually not available [29]. The essential trade-offs that are necessary in the face of such data unavailability require that these are conducted in as open a manner as possible. This forces people to confront their assumptions and to seek common ground [17, 30]. Both published and unpublished may need to be revealed. For some issues, data may be evolving. Participants need time to become equated with technical information and an opportunity to understand what is still not known and then weigh up alternatives [17]. This requires that people can access the base data, not just summaries or overviews. Confidentiality, or perceived commercial confidentiality by private sector developers/proponents can also have a significant impact on public involvement. Legislative requirements for public consultation are relatively limited and have been time-limited once proposals are made public. To encourage public participation in assessment processes requires a willingness to engage with people while proposals are developing and assessment is underway. At the current time it seems more likely that participatory processes will be able to be used where public sector development or regulatory functions are also involved.

## **6. Criteria for Effective Participatory Risk Assessment**

General criteria for increasing effective participation in environmental decision-making processes within the Environment Agency are presented in [3]. These include issues such as clarity of objectives, the clarity of the legal process, representativeness, inclusivity and transparency. Often effectiveness has been defined in terms of the outcome – particularly the legitimization of the decision. However, constructs of 'discursive' and 'deliberative' democracy demand a broader definition of effectiveness which, rather than focussing on working to ensure that everyone will be happy with the outcome (unrealistic), concentrate on matching the 'right science' with the 'right participation' [11]. 'Fairness' and 'competency' criteria [31, 32] have underpinned many international evaluations of participatory processes. Also evident is the importance of ethical and value-based dimensions [33] including the extent to which a process is honest, equitable, impartial and respectful.

In practice, multiple methods of information provision, consultation and also deliberation may be required if the overall effectiveness of a programme of participation is to be considered. Matching methods to overall objectives, and the adaptation of methods to meet local conditions or to enable a less costly method to be used is likely to improve effectiveness.

It is suggested that participatory risk assessment might provide for:

- Stakeholder and public engagement in the problem definition and framing stage, including the identification of hazards, identification of information needs, and definition of criteria relevant to the risk characterisation.
- Stakeholder, at least, (and possibly the public where local issues are important) engagement in the hazard identification and risk estimation stages to allow for questioning of technical assumptions, model use, and uncertainty management and to ensure that all relevant information is available to the assessment process or commissioned where missing.
- Stakeholder and public engagement in the risk characterisation stage.
- Open access to information relevant to the risk assessment process.
- Participation to act as a quality assurance mechanism in the risk assessment process.
- Integration of the risk assessment with other assessments and with the decision process (i.e. not just participatory risk assessment but a participatory decision process).

A distinction is made here between stakeholders who may represent particular interests (industrial, regulatory, conservation, etc) and the public who may be representative of particular interests within a community, but who would not take part in a participatory process as a representative of these interests, but as individuals. The distinction is drawn to ensure that the right people are asked to participate to meet the objectives. The stress is placed on the importance of early engagement, in the problem definition stage. Given the objectives of participatory risk assessment, it is not evident that radically different criteria of effective participation are appropriate, rather it is necessary to consider whether any additional criteria need to be included to ensure that the staged process of participation suggested is effectively managed.

From our initial work, some specific criteria in relation to the risk assessment process have also been identified as the following:

- Is there opportunity for participants to engage in the problem scoping – including agreement on the definition of the problem and the issues which will need to be addressed?
- Is there opportunity for participants to discuss likely data and information deficiencies in the assessment process and to agree how these will be rectified?
- Is a formal process involved that allows for the concerns and values of participants to be captured and recorded such that the criteria that will be relevant to the risk evaluation are agreed?
- Are the technical experts involved able to communicate and explain complex science and risk data, and willing to be open about limitations in current knowledge?
- Does the process make a difference to participants in terms of their understanding of the issue and knowledge gained, in particular their understanding of the risk assessment process and its role in decisions?

- If the process leads to challenge to existing Agency risk assessment methods and/or decision criteria is the Agency prepared to revisit these?
- Does the process lead to an enhancement of the Agency's credibility as an environmental regulator and promote trust in its risk decisions?

## 7. Conclusions

The contributions to the risk debate from the social sciences are having considerable influence on the practice of environmental decision-making. Calls for increased stakeholder involvement [6,7,28,34] in risk decisions are requiring greater access to and engagement with environmental risk assessments. Mechanisms for this level of involvement, however, are not well defined. For these aspirational calls to be realised in practice, decision-makers need to work alongside other stakeholders to establish at what stages, and in what ways involvement can be meaningfully incorporated. Future outputs from this work will help establish the practical applicability of these mechanisms for the Environment Agency.

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