

The Contribution of Environmental Assessment to Sustainable Development: Toward a Richer Empirical Understanding

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Abstract It has long been suggested that environmental assessment has the potential to contribute to sustainable development through mechanisms above and beyond informing design and consent decisions, and while theories have been proposed to explain how this might occur, few have been subjected to rigorous empirical validation. This research advances the theoretical debate by building a rich empirical understanding of environmental assessment's practical outcomes, from which its potential to contribute to sustainable development can be gauged. Three case study environmental assessment processes in England were investigated using a combination of data generated from content analysis, in-depth interviews, and a questionnaire survey. Four categories of outcomes are delineated based on the research data: learning outcomes; governance outcomes; attitudinal and value changes; and developmental outcomes. The data provide a robust critique of mainstream theory, with its focus on design and consent decisions. The article concludes with an examination of the consequences of the context-specific nature of environmental assessment practices in terms of developing theory and focusing future research.

Keywords Environmental assessment · Theory · Sustainable development · Outcomes

Introduction

It is increasingly recognised that environmental assessment—a collective term for forms of appraisal that address the environmental consequences of policies, plans, programs, and projects—is at a defining point in its development. Institutionalized within an ever-expanding range of policy arenas and encompassing a broadening scope of concerns, expectations about its contribution to sustainable development appear to be at a peak. Yet despite the relentless “colonization” of decision-making by environmental assessment (Holder 2004, p. 10), fundamental concerns about its operational effectiveness persist (Benson 2003; Flyvbjerg 1998; C. Wood and Jones 1997). Such concerns reflect not only long-running problematic practices (e.g., neglect or weak consideration of alternatives and cumulative impacts), but also questions about the ability of environmental assessment to function effectively in political, social, and scientific contexts that have changed considerably since its inception in the late 1960s (Dryzek 2005; Petts 1999). There is an emerging consensus that the limitations of environmental assessment, which historically have been attributed to real-world practices deviating from academic ideals, are consequences of its theory having been considerably outpaced by its practice (Dalal-Clayton and Sadler 2005; Lawrence 1997; Owens and Cowell 2002).

The main limitation of contemporary environmental assessment theory is that, despite more than 35 years of practice, its substantive purposes have received little detailed consideration (Bartlett and Kurian 1999; Cashmore and others 2004). The interpretation of its purpose that has underpinned most of the literature is that environmental assessment is a tool for informing decision-making through the passive provision of scientific analyses

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to stakeholders (Bisset 1984; Thompson and others 1997; G. Wood 1999). From the late 1980s onward, the dominance of sustainable development as a doctrine resulted in a subtle repositioning of environmental assessment. Increasingly, informing policy decisions was portrayed as a means to an end (sustainable development), rather than the end itself (e.g., Glasson and others 2005; Sadler 1996; Sadler and Jacobs 1989). There is little evidence, however, that this change was anything other than a superficial re-branding of environmental assessment: with limited exceptions, there has been little detailed consideration of the implications of sustainable development for its theory and practice (Gibson and others 2005). Sustainable development has been employed in environmental assessment more as a “catch phrase” than a purposeful goal.

The architect of the U.S. National Environmental Policy Act (the legislation which introduced the first mandatory system of environmental assessment) and his colleague have, for many years, argued that the prevailing view of environmental assessment substantially underestimated the sophistication and subtlety of this policy innovation (e.g., Bartlett 1986, 1988; Caldwell 1995). In relation to its practical outcomes, Bartlett (1989, p. 2) asserted, “I can think of no other initiative in our history that ... had such a fundamental impact on the way government does business.... I am qualified to characterise that process as truly a revolution in government policy and decision-making.” Such claims have been viewed with some skepticism (Holder 2004), not least given their source, but it is increasingly acknowledged that environmental assessment might have greater potential to contribute to sustainable development than originally thought.

There has, for example, been a long-held minority view that one of the most important outcomes of environmental assessment is its contribution to institutional and organisational reform. Environmental assessment, it has been suggested, can alter the character and assumptions underlying legitimate decision-making by opening up policy processes to public scrutiny (Bartlett 1990; Culhane and others 1987), recruiting science to assist policy formulation (Caldwell 1993), and raising the profile of environmental considerations (Bartlett and Kurian 1999). Thus, over a timescale of decades (Sabatier 1988), the values, norms, and actions of private and public organizations might be modified (Bartlett and Kurian 1999; Bond 2003; Owens and others 2004; Tonn and others 2000).

Others have emphasized the potential for environmental assessment to operate as a positive force for policy design, rather than as an evaluation of the potential environmental consequences of a predetermined design (Brown and Hill 1995; Dalkmann and others 2004; McDonald and Brown 1995). This role can also be extended to incorporate provisions for comprehensive environmental management

during its full life cycle (Nitz and Holland 2000). On a different level, it has been suggested that environmental assessment might contribute to multiple types of learning in various policy actors (Diduck and Sinclair 1997; Hall 1993; Schullock 1999; Webler and others 1995). While often considered an outcome linked to stakeholder participation, interest in learning also reflects an awareness that passive information provision might have outcomes other than those ascribed to it by rationalist theory (Hills 2005).

However, these ideas about the broader potential of environmental assessment to contribute to sustainable development remain fringe theories, because, despite being subjected to intense criticism (e.g., Flyvbjerg 1998; Keat and Urry 1982; Phillips 2002), rationalist and positivist ideals remain deep-rooted within this discipline. The lack of empirical research on different views of its potential influence on sustainability outcomes might also explain the apparent reluctance to engage with such theories. The theories are largely untested (or at least inadequately tested) or based on assumptions validated in empirical contexts other than environmental assessment (Lawrence 1997; Owens and others 2004). The paucity of empirical validation also reflects the historical focus of research on procedural aspects of environmental assessment (Caldwell 1993; Ensminger and McLean 1993; Lawrence 2003).

This research was designed to advance theory on the contribution of environmental assessment to sustainable development by investigating its practical outcomes. Rather than seeking to validate an individual theory, an alternative approach was employed in which data collection and analysis were designed to identify the full spectrum of practical outcomes to which environmental assessment contributed. This strategy reflects the scarcity of previous environmental assessment research focused on outcomes. Where appropriate, the observed outcomes are evaluated against pre-existing theories on environmental assessment’s contribution to sustainable development. The article concludes with an examination of the implications of this study for the environmental assessment research agenda.

Methodology

A multiple case study research design was employed to achieve the aim of advancing theory on the potential of environmental assessment to contribute to sustainable development by empirically analysing its practical outcomes. This was considered the most appropriate research design to use because the study focused on understanding (Verstehen) rather than statistical generalisations. Case study research provides a contextually rich understanding of a phenomenon (Gomm and others 2000; Mitchell 1983;

Stake 1995). It is therefore particularly suited to research in which context is thought to be influential (Yin 1993). Multiple cases were examined to facilitate the study of outcomes occurring in different contexts.

A judgment-based sampling protocol was developed to identify suitable cases to contribute to theory development. It was postulated that well-resourced environmental assessment processes were more likely to result in a broad range of outcomes than poorly resourced ones. The criteria employed in the selection process thus focused primarily on such variables as the nature of the development (environmental assessments of larger and more controversial developments tend to be better resourced [Cashmore and others 2002]) and the quality of environmental assessment documentation. Practical considerations (particularly the willingness of stakeholders to participate, which was in part related to whether a consent decision had been taken and the possibility of legal challenges) were also addressed in the sampling protocol.

Three discrete cases were selected for investigation. An overview of the nature and context of each case is provided in Table 1. The case studies are referred to simply as mines stabilization, offshore wind farm, and land remediation in order to protect the identity of the research participants; anonymity was a prerequisite to their participation in many instances.

Research data were collected using several methods. First, semistructured, in-depth interviews (Chirban 1996; McCracken 1988) were conducted with 29 research participants. The interviewees encompassed representatives from the principal categories of environmental assessment stakeholders (Glasson and others 2005), as follows: developers and their facilitators ($n = 7$), decision-makers ($n = 7$), statutory consultees ($n = 9$), and, nonstatutory consultees ($n = 6$). Second, background data on the education, experience, and worldviews of each research participant were collected using a questionnaire. Third, quantitative and qualitative content analysis (see Silverman 2001) of environmental assessment documentation was undertaken. The content analysis focused principally on the environmental statements and reports published by the decision-maker but incorporated other documentation where relevant.

The general analytical framework of Miles and Huberman (1994) was employed to structure the analysis of qualitative data, while quantitative data generated by the content analysis were analyzed statistically and/or graphically. Where data from an individual research participant are used in the analysis, a coded referencing system protects their anonymity. The abbreviations MS, OW, and LR are used to refer to research participants involved with the mines stabilization, offshore wind farm, and land remediation case, respectively.

Based on a belief that sustainable development is a sociocultural construct, the temptation to ally the research with a singular definition of this management maxim has been avoided. Instead, the analysis reflects a belief that sustainable development is a far-reaching political meta-narrative concerning ways of life that can endure in the long-term (Meadowcroft 2000; World Commission on Environment and Development 1987). It is interpreted, therefore, as a concept that has implications not only for environmental and resource management, but also for societal norms, such as civil rights, justice, and equity (O’Riordan 1993).

The significance of this research is that it provides a first comprehensive, empirical insight into the outcomes of environmental assessment. However, the results must be interpreted within the context of certain methodological limitations: the empirical data are derived from one institutional context (England) and relate to environmental assessment practices at one tier of decision-making (the project level). The outcomes observed are thus dependent on this institutional, legal, and sociopolitical context, which has been adequately described by other researchers (see Bond 2000; Jones and others 2005; Tromans and Fuller 2003; Weston 2002). Owens and others (2004) emphasize the importance of longitudinal empirical research in advancing theory on environmental assessment. While the value of this approach in developing a rich understanding of an individual case is not contested, issues of commercial confidentiality and political sensitivities precluded the use of such a methodology in this research, as stakeholders were unwilling to participate openly prior to the consent decision. The analysis therefore represents perceptions of outcomes at a particular point in time in the life of the cases. Given these methodological limitations, the research findings, while important in their own right, are primarily intended to inform future research.

Results and Discussion

Based on the coding of qualitative data, the outcomes observed in this research are divided into four categories: learning outcomes, governance outcomes, attitudinal and value changes, and developmental outcomes. The following sections examine the outcomes observed for each of these categories and the contribution of environmental assessment to the outcomes. The findings are, where relevant, analyzed against existing theories on the potential of environmental assessment to contribute to sustainable development. It should be noted that the categories include elements of overlap: a change in values in certain stakeholders (e.g., decision-makers) could be interpreted as a governance outcome in some contexts. There are also numerous linkages between the outcomes.

Table 1 Characteristics of the case studies

	Mines stabilization	Offshore wind farm	Land remediation
Developer	Public sector	Private sector	Public sector
Development characteristics	Stabilization of between 80% to 90% of an estimated 400,000 m ² mine void, primarily using foamed concrete	30 wind turbines located approximately 7 km from land. Maximum generation capacity of 108 MW Infrastructure for connection of the wind farm to the electricity distribution system	Excavation of waste from the site of a former chemical weapons establishment Construction of a landfill site (maximum capacity of 50,000 m ³) Construction of a temporary vapor containment structure and waste transfer station
Notable environmental constraints	Development falls within a UNESCO ^a World Heritage Site and affects a candidate Special Area of Conservation	In close proximity to a candidate Special Area of Conservation, a Special Protection Area, and a Special Marine Area	Existing waste disposal sites notified as “special sites” under Part IIA of the Environmental Protection Act 1990
Competent authority(ies)	Local Planning Authority	Various, but principally the Department for Trade and Industry and the Department for Environment, Food and Rural Affairs	None; developer has Crown Immunity. But essentially followed procedures for a waste management project, hence the County Council
Authorization decision	Granted, with 54 conditions, June 2003	Granted, with conditions, March 2003	Granted (see above comment), with 29 conditions, January 2005
Approximate development budget	£155 million ^b	More than £100 million ^c	£15 to £20 million ^d
Other comments	The environmental assessment was commended for featuring a high level of public involvement using a wide variety of methods ^e	Essentially a novel form of development in the UK context. Deemed to be the highest-quality documentation produced under the first round of offshore wind farm developments ^f	Environmental assessment methodology represents a good-quality example of a traditional technical approach ^f Highly unusual and high profile development

^a United Nations Educational, Scientific and Cultural Organisation

^b MS#8

^c Project web site, December 2006

^d LR#2 and a confidential source

^e Confidential report produced by the Institute of Environmental Management and Assessment

^f Based on a review using the Institute of Environmental Management and Assessment review criteria (see Fuller 1999)

Learning

The first category is learning outcomes. Whereas certain authors have taken learning to constitute a change in attitude, values or actions resulting from knowledge acquisition (e.g., Argyris and Schön 1978; Hall 1993), a distinction is maintained in this research between cognition and any attitudinal changes which may result. Learning represents an important cause of attitudinal changes, but these need not occur when learning takes place (Fitzpatrick and Sinclair 2003; Huber 1990).

This research found qualitative evidence of multiple forms of learning associated with environmental assessment

activities. These were classified into three main categories: social, technical, and scientific learning.

Social learning is a term that has been used in a variety of ways. Bandura (1971, 1986) viewed it simply as learning dependent on social interaction, but in this analysis it is defined more restrictively as reflection and collective action that occurs as stakeholders seek to solve a mutual (although perhaps differently defined) problem (Keen and others 2005; Webler and others 1995). There is much evidence that social learning occurred in multiple stakeholders in the more participatory cases (mines stabilization and land remediation). The most apparent form of social learning in these cases was increased environmental

awareness, particularly in relation to public understanding of local environments. In the case of the mines stabilization project, for example, protracted debate on the need for, and cost and insurance implications of, bat habitat conservation raised local community awareness about the existence of internationally important bat populations (MS#3, #8, #9). This does not mean the bat populations were valued as a result, for they were widely viewed as an unwelcome impediment to mines stabilization (MS#3), but people were aware that a trade-off had to be made between biological conservation and social objectives. Environmental assessment also contributed to heightened community awareness about the cultural resource that would be destroyed as a consequence of the development. Both these instances also illustrate the role of environmental assessment in learning about sustainable development (see Owens and Cowell 2002).

Additional forms of social learning that were observed in the more participatory cases included: learning about ways to communicate effectively in various fora (MS#1, LR#4), the values and interests of other stakeholders (MS#9, LR#6), and human nature (MS#1); developing a sense of community solidarity (MS#1, #3, LR#2); and reflection by individuals on their personal interests and agendas (MS#5, LR#10). Yet social learning was also evident in the case of the offshore wind farm, where less stakeholder participation took place. In this instance, it occurred in some nongovernmental interest groups (e.g., fishermen and yachtsmen) who concluded that aspects of the approach adopted by the developer or decision-makers fell short of standards linked to their moral beliefs (OW#9, #11).

Second, several forms of what was classified as technical learning were identified, and in a range of stakeholder groups. This category of learning was defined by the research team as knowledge concerning, or derived from, applied scientific, engineering, and management practices. One form of technical learning observed related to the collection or processing of survey data on environmental conditions, as it often produced more detailed, systematic, and/or up-to-date information on environmental conditions. This is classified as technical, rather than scientific, learning as it involved the acquisition of data, rather than its use in explanation. The most vivid illustration of this related to the offshore wind farm case, where baseline data showed that the regional population of a particular bird (the common scoter) was approximately 100 times larger than previously thought (OW#4). This led to the population being classified as internationally important.

Technical learning also occurred in the form of experiential learning of technical methods and skills (e.g., MS#1, #4, LR#6, #10). While usually observed in the stakeholders who participated most actively in technical design and

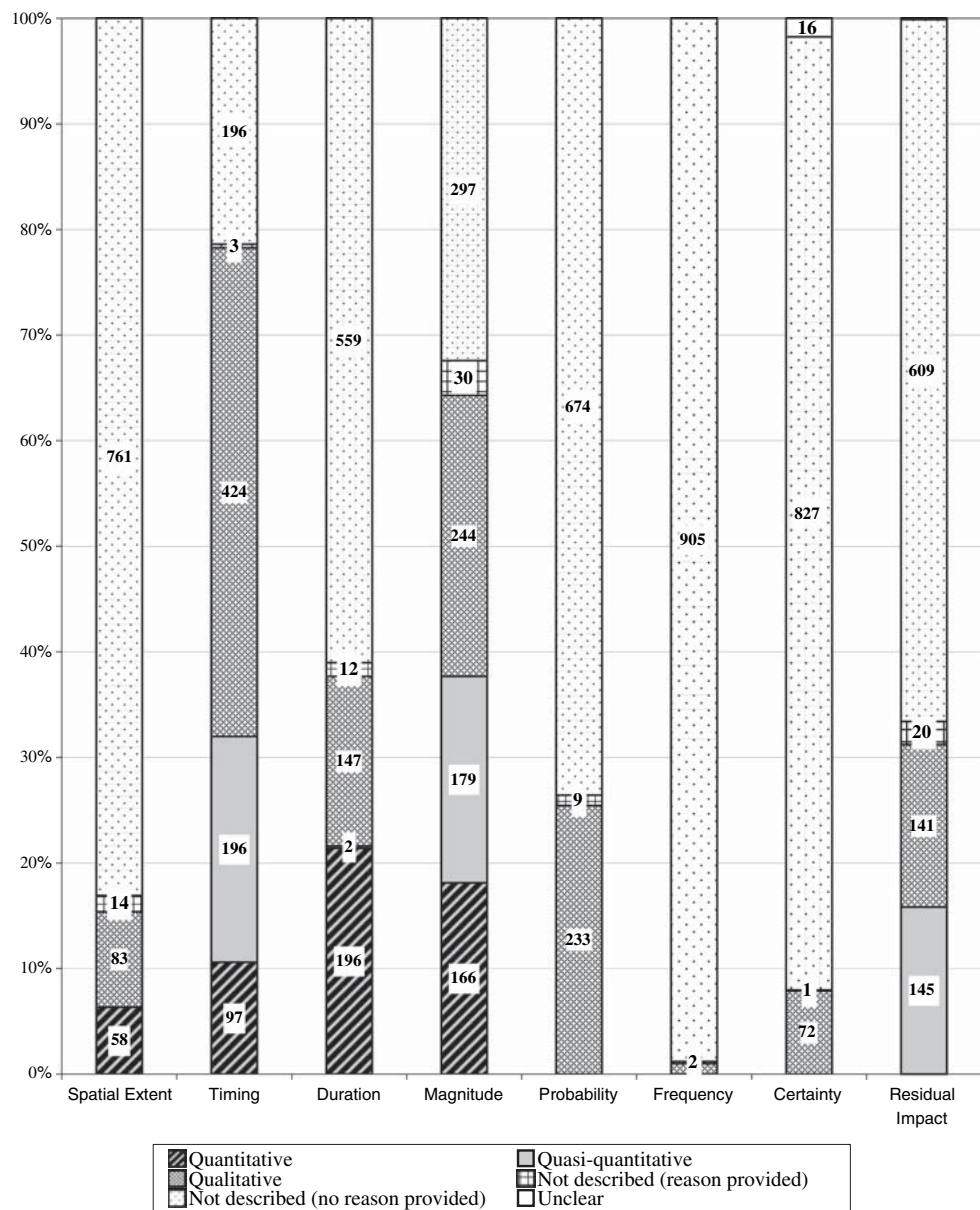
analysis activities (i.e., developers, their consultants, and regulators), it was also recorded in others groups. A member of the public and a representative of a nongovernmental organisation believed that, in order to be taken seriously, and thereby potentially exert an influence on decision-making, they needed to be proficient in standard environmental assessment methods (OW#2, #9). They had thus learned to use certain technical methodologies.

A further form of technical learning related to the development of an improved understanding of legal provisions for environmental governance. An example of this was a member of the public in the mines stabilization case (MS#9) who developed a comprehensive knowledge of EU environmental legislation in order to scrutinize the actions of the developer and regulators. They estimated having spent in the region of 30 h a week conducting research related to the project. They had also entered into correspondence with various EU politicians and bureaucrats. The knowledge they gained was subsequently used to dispute a screening decision for an unrelated project. This demonstrates that, in this instance, learning had consequences beyond the immediate project.

Scientific learning was the third form of learning identified. Given the existence and legitimacy of multiple philosophies of science, this was broadly defined as knowledge gained through the application of scientific methods and used for explanation. It was the *potential* for, rather than *actual*, scientific learning that was observed in this study. The generation of technical knowledge about local environments, through either the collection of new data or the consolidation of existing sources (MS#1), has potential scientific application. This is particularly true of the offshore wind farm because such developments are taking place in an environment that is considerably less studied than terrestrial or freshwater systems (Department for Environment Food and Rural Affairs 2001). As one interviewee commented, “There’s a lot of [biophysical] information we don’t know and some of these offshore developments are providing some first clues. No-one had been able to pay for these data to be collected before” (OW#4). It is intended that many of these data will be publicly available and they have obvious potential to contribute to scientific progress.

It is conceivable that impact assessment (i.e., the component of impact prediction involving the forecasting of impact characteristics) and impact auditing (i.e., evaluating the accuracy of forecasts) activities could contribute to scientific understanding of environmental responses to human perturbations (Cashmore and others 2004; Morrissey 1993; Smith 1991). However, an analysis of relevant indicators—such as the comprehensiveness of descriptions of impact characteristics, quantification of impact characteristics, and the methods employed to analyze

Fig. 1 Expression of impact characteristics



impacts—demonstrated that what might be considered to constitute rigorous scientific approaches (see Smith 1991; Underwood 1990) were infrequently employed (see Fig. 1). While there is potential for scientific learning to occur where auditing takes place, it was not possible to examine this, as construction had not commenced in any of the case studies.

The empirical insight this research provided into learning associated with environmental assessment indicates that the outcomes can be both broad-ranging and far-reaching, although the significance of such outcomes in the context of sustainable development is uncertain. There is clearly a need for further research to advance understanding in this area. The research data also indicate that there is

a need for investigations that extend beyond learning associated solely with participatory elements of environmental assessment. As the conclusions reached in the following section illustrate, however, the contribution to learning directly attributable to environmental assessment may be limited, particularly in the case of social learning. Contextual variables appear more influential.

Governance

The second category elaborated in this research is governance outcomes. Many components of environmental assessment that have typically been viewed as procedural means-to-an-end (such as stakeholder involvement or

Table 2 Volume of environmental assessment documentation

	Mines stabilization	Offshore wind farm	Land remediation
Volumes	5 ^a	2	4 ^b
Number of pages ^c			
Main document	338	463	164 (A3)
All volumes	876 ^a	479	851 (A4 and A3) ^b
Number of impact predictions	476	289	151

^a Excludes the detailed design report but includes an addendum to the environmental assessment report

^b Excludes the planning report

^c Size A4, unless otherwise stated

provisions for judicial review) also constitute governance outcomes in their own rights. This is important in the context of sustainable development, for as Gibson (2001, p. 19) states, “Better governance is a prerequisite and probably also a product of steps towards sustainability.” It is also a category that takes on particular significance for proponents of decision theories that encompass notions of power and agency (e.g., Flyvbjerg 1998; Sabatier 1988).

Environmental assessment resulted in large quantities of environmental information being placed in the public domain in all the case studies (see Table 2) and thereby potentially enhanced public access to data. There are obvious reasons why the objectivity and validity of the published information should be viewed cautiously, but, irrespective of quality, it increased transparency and accountability in decision-making. One mechanism by which this occurred was that the information provided documented statements of developers’ beliefs, assumptions, and justifications to which they could be held accountable in public arenas (OW#9). Enhanced data availability was also felt by some research participants to raise the profile of environmental considerations in decision-making (LR#3, MS#3).

Stakeholders were regularly involved throughout the environmental assessment process in the mines stabilization and land remediation cases. The methods employed included participatory approaches and one instance of a modest element of delegated power (Table 3) (see Petts [1999] for a discussion of the differences among consultation, participation, and delegated power). This, in turn, contributed to local autonomy and local democracy (e.g., by facilitating the incorporation of local identity into decisions and improving democratic skills at the local level [Pratchett 2004]), as well as making an important contribution to transparency and accountability (European Commission 2003). Stakeholder involvement in the wind farm case consisted of a limited number of opportunities

for consultation, although a broad range of stakeholders was reportedly consulted. Each case therefore contributed, albeit in different ways and to varying degrees, to promoting more inclusive decision-making. Environmental assessment might also have influenced the timing of stakeholder involvement, resulting in their earlier inclusion (LR#2).

Contemporary conceptions of governance often emphasize the importance of horizontal networks in a world of “governance without government” (Schout and Jordan 2005, p. 206). Environmental assessment contributed to the formation and dynamics of networks in a variety of ways. The contribution, in some instances, was direct and purposeful: for example, the establishment of working groups promoted greater interaction within a fragmented government bureaucracy and led to the development of relationships with the potential for joint problem solving in the future (LR#2). In other instances, the contribution was essentially passive. Opposition to individual onshore wind farms in England and Wales has resulted in the development of a loose alliance of like-minded individuals (“Country Guardian”) who exchange information and share expertise on an ad hoc basis. The precise degree to which environmental assessment is responsible for the development of this amorphous network is uncertain, but the strategy employed by some of its members to oppose wind farm developments relies extensively on the improved access to information and decision-making that environmental assessment produces. Finally, examples were also observed of the development of networks for commercial reasons. Offshore wind farm developers formed a loose confederation (the East Irish Sea Developers Group) to share monitoring (and other) data (OW#4).

The results illustrate the variety of contributions environmental assessment can make to governance objectives. These include stakeholder access to information (in terms of nature [e.g., comprehensiveness] and amount), stakeholder involvement (in terms of timing, form, amount, and inclusiveness), accountability, transparency, and local autonomy. Yet a critical question in this research is, to what degree were the outcomes observed a result (directly or indirectly) of environmental assessment? There is no unequivocal basis for evaluating such questions in much social research, as it is not possible to apply an experimental logic (Tonn and others 2000). The analysis must rely instead on indicators.

Stakeholders’ perceptions are one indicator. It is evident that many research participants believed that environmental assessment made a sizable contribution to the observed governance outcomes (e.g., LR#2, MS#1, #6). However, the project manager for the mines stabilization scheme expressed a view that such governance outcomes would have occurred irrespective of the need for environmental

Table 3 Stakeholder involvement methods employed in the case studies and number of consultees listed in environmental assessment documentation

	Mines stabilization	Offshore wind farm	Land remediation
Stakeholder involvement methods employed ^{a,b} Information provision	Newsletters (13)		Press releases
	Fact sheets (1)		Media interviews
	Exhibitions (7)		
	Press releases		
	Media interviews		
	Website		
	“Drop-in” center		
	Briefings with councillors and local MP		
	Public talks (5; various issues)		
	Outreach events to publicize exhibitions and road closures		
Consultation	Public meetings (4)	Scoping report (1)	Scoping report (1)
	Consultation on methods (1)	Consultation on alternatives	Exhibitions
	Exhibitions (18) and accompanying comment form	Exhibitions (3) and accompanying questionnaire	Ad hoc consultation
	Questionnaire survey (1)		
Participation	One-to-one surgeries (56)		
	Workshops (6) Community association meetings		Working Group meetings (5) Workshops (3)
Delegated decision-making			Single Issues Working Group meetings
Number of consultees listed in environmental assessment documentation	51 ^c	124	50

^a Categories of stakeholder involvement are based on the work of Arnstein (1969). Stakeholder involvement methods were divided into Arnstein’s four categories in advance of the case study analyses

^b The number of times a particular method was employed is cited in parentheses where known

^c Excludes the public, but all 3500 residents of the local ward were sent a questionnaire

assessment. This is plausible given the context surrounding the mines stabilization case. A previous attempt (during the early 1990s) to gain development consent for a stabilization scheme was accompanied by virtually no public involvement prior to the submission of the planning application. This contributed to overwhelming community opposition to the planning application (MS#1, #9), which in turn resulted in the application being abandoned. The decision to adopt a high level of stakeholder involvement thus principally reflects an historical failure to involve the affected community and the dissatisfaction this generated. It was also probably influenced by a legal requirement to obtain the written consent of all landowners above the mines to the stabilization works and a need to gain development consent within a fixed window of opportunity for funding.

Similarly, a detailed analysis of the land remediation case indicated that the high level of stakeholder

involvement was also probably a result of contextual variables other than environmental assessment. The main methods employed were more closely aligned with the project design process than legislatively mandated environmental assessment procedures. Stakeholder involvement was driven primarily by what appears to have been a large change in the attitude of parts of the military bureaucracy, the input and attitudes of a local councillor, and media coverage at the time of Iraq’s alleged weapons of mass destruction capability. It was these contextual variables that converged to result in a comparatively high level of participation.

Limitations in the design of participatory methods also constrained the contribution environmental assessment made to governance outcomes. In the mines stabilization case, the community association’s objective—“to allow the community to speak with one voice” (MS#3)—was not

congenial to democratic goals, as it may have stifled the articulation of differences. Indeed, the developer viewed the community association as a means of preventing a minority of individuals opposed to the development appearing to have broad community support (MS#8). An example of a minority view was that bat populations, protected under EU legislation, were important considerations (MS#3, #8, #9). Furthermore, the community association received its funding from the developer and relied, in part, on the developer's newsletter to disseminate its work to the local community. This meant that it could not afford to be overly critical of the developer (MS#9). The community association thus appears to have limited public access to decision-making and probably stifled debate, while maintaining a veneer of democratic respectability.

The main participatory mechanism employed in the land remediation case (working groups) also restricted the inclusiveness of decision-making. The two working groups that were created comprised primarily of representatives of government agencies and nongovernmental organisations. Local community representation was, based on the minutes of the meetings, limited and ephemeral, although this is not because they were deliberately excluded. While representation by special interest groups was more consistent, they are not a legitimate surrogate for public involvement, as they do not necessarily reflect the interests and opinions of local communities (Petts 1999). Here again, lessons from research on participation had not filtered through into practice, or were being deliberately ignored, for such problems are largely surmountable given the political will and financial resources.

The contribution environmental assessment made to governance outcomes in the offshore wind farm case was limited. It has been noted that stakeholder involvement was restricted in amount and form (i.e., to consultative methods). Yet of equal significance was that the institutional arrangements for decision-making were highly opaque in this case; the decision was made by national government departments, rather than at the local level, and public access to this process was constrained. The potential for environmental assessment to contribute to governance outcomes was thus inherently restricted by the broader institutional context. This is significant given that lay and expert knowledge conflicted on several matters in this case (OW#11).

The analysis indicates that environmental assessment can result in a range of governance outcomes, but the contribution directly attributable to its ideology was considerably more limited in practice than a superficial evaluation suggested. The principal direct contribution of environmental assessment appeared in all cases to have been an increase in publicly available data. This represents an elitist governance mechanism, for it invariably favors

sectors of society with a scientific education. These findings support Pett's (1999) assertion that high levels of participatory stakeholder involvement in environmental assessment are limited to atypical cases; they appear to be a result of contextual variables, rather than environmental assessment ideology.

Attitudinal and Value Changes

The third category of outcomes is attitudinal and value changes. This category incorporates theories that environmental assessment can produce institutional reform in the government bureaucracy and the private sector (Bartlett and Kurian 1999; Taylor 1984; Tonn and others 2000), for this is achieved—directly or indirectly—through value transformation (Bartlett 1990). Nevertheless, it goes further than models of institutional and organizational reform, from the perspective of outcomes, in that value changes are deemed relevant to the full breadth of environmental assessment stakeholders. It is also broader in that it includes less profound (and hence potentially more transient) changes in attitudes, such as confidence and trust among various stakeholders, and community spirit and cohesion.

The greatest evidence of attitudinal and value changes (in terms of amount and diversity of outcomes) was observed in the mines stabilization case. The formation of a mines heritage group in 2004, with about 100 members, indicates that a reasonably widespread change in the value attributed to cultural resources had taken place. This is probably a result of increased community awareness, first, about the cultural heritage and, second, that most of it would be destroyed, although only part of this awareness was directly a result of environmental assessment. The environmental assessment also appeared to influence the attitudes of the public toward the development by reassuring them that their concerns had been addressed (MS#1, #3, #6, #8). Some research participants believed that public trust in the council had improved as a consequence (MS#1, #5). Conversely, it was also evident that certain stakeholders' experiences of what was perceived to be poor or mismanagement by the council resulted in an erosion of confidence and trust. Such attitudinal changes, as would be expected, were intimately related to individuals' expectations and experiences.

The generally positive experience of stakeholders in the mines stabilization case also influenced the attitude of certain individuals to environmental assessment. For example, two research participants who had been local councillors at the time the consent decision was taken commented that they would be more likely to advocate the use of environmental assessment for future developments, irrespective of whether or not it was legally required. It was also reported that environmental assessment promoted

greater community cohesion. The “warring community” (MS#5, #8) that resulted from the planning application submitted in the early 1990s was viewed as unified in its support for the current stabilization scheme (MS#1, #3). This view was not shared by all members of the local community (MS#6, #9), but it is certainly the case that there were no significant public objections to the scheme during consultation associated with the consent decision (MS#2, #8). What appears to have been significant is that the proposed stabilization method was viewed by the public as a better option than the “nightmare scenario” (MS#5) of the previous proposal. Whether environmental assessment can affect community attitudes as positively in a different context is uncertain.

There was also evidence of changes in community attitudes in the land remediation case. The participatory approach adopted by the developer persuaded certain nonstatutory stakeholders that the issues were being dealt with openly and honestly. That this resulted in greater trust—in either the process or the developer—is illustrated by the change in attitude of a nongovernmental organization with a moderately militant reputation (Surfers Against Sewage). Based on their experience of the working group meetings, this organization decided that it was unnecessary for them to be represented at every meeting because they were satisfied with the approach being taken. It was also stated that whereas the public had initially completely distrusted the military bureaucracy, they had grown to believe its representatives were telling them the truth (LR#2). This might appear to constitute a modest attitudinal change until consideration is given to the history of secrecy surrounding the former chemical weapons establishment (and of military activities in the region more generally), the resentment this generated, and the belief the establishment had harmed local people. Nevertheless, given the earlier conclusion concerning stakeholder involvement, environmental assessment made only a limited direct contribution to this outcome.

The lack of evidence of attitudinal or value changes in the offshore wind farm case is unsurprising given the opacity of the decision process and the apparent public ambivalence to the development, at least at the time it was proposed. Nevertheless, it is conceivable that environmental assessment influenced stakeholder values by altering their expectations about the public availability of information. The developer’s failure to meet these expectations after the consent decision might be a contributory factor in the loss of trust in, and an increasing feeling of resentment toward, them reported by certain sectors of the community (OW#11). An alternative explanation could be that stakeholder interest in the development had increased as the consequences for certain groups became cumula-

tively more significant due to proposals for additional wind farms in the area.

It has been suggested in the literature that the institutionalization of values inherent in environmental assessment could make a significant contribution to societal transformation. Bartlett (1990, p. 82) talks of its potential to “transmogrify the administrative state from within—gradually and not entirely predictably.” Validation of such value changes is problematic, for they are likely to be subtle, long-term, and multifactorial. Nevertheless, this research generated little evidence that value changes in the U.K. bureaucracy could be considered to constitute anything approaching a transmogrification.

A significant number of individuals across the U.K. bureaucracy are routinely involved in environmental assessment (Bond 2003), but this responsibility had not significantly influenced recruitment or professional development strategies in the cases examined in this research. Staff involved with environmental assessment had received little formal training; they had, by default, been expected to learn through experience (see Table 4). Where attitudinal and value changes occurred, they were thus linked to an individual’s experiences of particular environmental assessments. There was no evidence of value changes resulting from the environmental capacity development gains some individuals (e.g., Cashmore and others 2004) believe are necessary for effective implementation of environmental assessment legislation. This is significant, as it is capacity development in environmental management and sustainable development that will probably make the greatest contribution to institutional reform.

The scarcity of evidence of attitudinal and value change in government institutions may result from the minimalist approach to environmental assessment adopted by successive U.K. governments. It also reflects agendas within the government bureaucracy. An employee of English Nature, who had been contracted specifically to address ecological issues arising from the development of offshore wind farms, acknowledged that the organization had limited engagement with environmental assessment procedures (OW#4). Given its focus on designated sites, other legislation was interpreted as providing the organisation with the necessary powers to fulfil its legal responsibilities. Thus, as Clemente-Fenández (2005) concludes, based on an analysis of environmental capacity in the Spanish bureaucracy, while value transformation is in theory a plausible way in which environmental assessment might contribute to sustainable development, in practice a causal mechanism above and beyond the introduction of legislation and processing of reports is required if its potential is to be realized.

Complicating factors influencing the occurrence of attitudinal and value change in government institutions were apparent in all the cases. The issue of staff turnover appeared particularly significant. The difficulties in institutionalizing the experiences of individuals were also emphasized. Thus, when asked whether the council had learned from their experiences (as both proponent and regulator) of the environmental assessment and/or altered their approach to project management, a council employee replied bluntly: “I don’t know that this is the case. I’ve watched a couple of other projects drop themselves right in it in the last few months” (MS#8).

Nonetheless, institutional reform through value transformation was observed, but in the so-called third sector. A nongovernmental organization decided that in order to be taken seriously in decision-making they had to adopt the rationalist philosophy on which environmental assessment is predicated. This had consequences for recruitment and organisational culture, in a transformation described as the ‘‘professionalization’’ of the organization (OW#2). It was recognized, however, that environmental assessment was only one of a number of factors that had contributed to this transformation. It also partly reflected the recruitment of staff with a technical background. In this respect, professionalization was self-perpetuating.

It is important to note that the methodology employed in this research was not designed to identify medium- or long-

term (i.e., 10+ years) trends in values. The focus on individual cases and a short-term time horizon (≤ 5 years) provides a potential explanation for the observation of many attitudinal, but few value changes (see also Hills 2005). This is clearly an area where further research is warranted. Nevertheless, the results of this research indicate that the more extravagant claims of proponents of institutionalist theory should be treated with caution.

Developmental Outcomes

The final category of outcomes identified in this research is developmental outcomes. This category encompasses mainstream theory on the purposes of environmental assessment in that it includes its contribution to design and consent decisions.

In the case of design outcomes, limited consideration of alternatives is a recognized problem in the U.K. and elsewhere (Steinemann 2001; C. Wood 2003). The extensive documentation on alternatives in each of the case studies indicates that a broad array of options was evaluated (see Table 5), yet these assessments had little influence on design outcomes. As reported elsewhere (e.g., Steinemann 2001), some alternatives were entirely unrealistic, while in other cases, the comparative assessments were documented justifications of decisions that had already been made. For example, the environmental assessment manager in the

Table 4 Practical experience and training in environmental assessment within the bureaucracy

Stakeholder	Practical experience of environmental assessment (no. involved with)	Training in environmental assessment ^a
Planning officer	>20	Continual Professional Development training courses; self-taught
Planning officer	6–10	None
Planning officer	11–20	Attendance of seminars; Guidance from colleagues
Planning officer	2–5	None
Planning officer	11–20	Self-taught
Local councilor	1	Council training
Local councilor	1	None
Local councilor	1	Informal training from a planning officer and the Environment Agency
Archaeological officer	>20	None
Ecologist	Not specified	Training course run by English Nature in 1993
Ecologist	0	None
Public health specialist	2–5	Health impact assessment course introduced environmental assessment
Hydrologist	>20	1-day training seminar in 1998
Centre for Environment, Fisheries and Aquaculture Science	>20	Training as part of undergraduate education; attendance of conferences and workshops

^a This column lists responses made by stakeholders to a question about what, if any, formal or informal environmental assessment training they had undertaken. These data were collected in a questionnaire using an ‘‘open’’ response format (i.e., no predefined categories were used). The responses thus reflect the stakeholders’ interpretations of training

mines stabilization case acknowledged that they had identified their preferred stabilization method prior to tendering for the work (MS#1). Although this arguably conflicts with the expectations of conventional environmental assessment theory, it is an unremarkable finding. What would be more surprising was if an engineering company bid for design work which they had no idea how to achieve. The inclusion of a detailed evaluation of alternatives, it was implied, was necessary to publicly justify the experts' choice and satisfy quality criteria set by the U.K. Institute of Environmental Management and Assessment.

In contrast, an issue with the offshore wind farm was that many of the design decisions (e.g., the choice of the turbine foundation and installation method) were left to the discretion of the engineering company subsequently contracted to build the development.

This does not mean that environmental assessment had no influence on design in the case studies, but its contribution tended to represent relatively modest "fine-tuning," rather than influencing the selection of strategic alternatives. For example, while the choice of social and engineering solutions appears to have been curtailed in the mines stabilization case, the design and environmental assessment teams met regularly to discuss detailed design considerations, such as which cultural resources should be protected, habitat replacement options for the bats, and engineering protocols for reducing environmental impacts (MS#1). The emphasis, in all cases, was firmly on the selection of mitigation measures.

As regards consent decision outcomes, many planning officers and decision makers claimed to place a high value on the information provided by environmental assessment (e.g., MS#2, #6, NR#1, #8). However, and as studies of other policy tools have reported (e.g., Hills 2005; Schulock 1999), it was difficult to establish an instrumental role in consent decisions for this information. Planning officers freely acknowledged that they did not have the time to read all the environmental assessment documentation (MS#2, LR#1, #8). Considerable reliance was placed instead on the statutory consultees to highlight potential technical and environmental problems, a finding also reported by C. Wood and Jones (1997). Local councilors, where they were involved as decision-makers, emphasized that, as community representatives, public opinion was their primary concern (e.g., MS#6). Information generated by environmental assessment also appeared to play a restricted role in the setting of consent conditions.

Rather than informing design and consent decisions, the developmental outcomes of environmental assessment in practice were linked more to the appeasement of influential stakeholders by creating a perception of due diligence and through provision for impact mitigation. This is a clear example of an intended outcome that goes beyond passive information provision. In the cases studied, environmental assessment effectively became an advocacy tool in a political process of conciliation designed to gain support for the development amongst influential stakeholders. In this respect, it was evident that environmental assessment practices had the potential to significantly influence con-

Table 5 The contribution of environmental assessment to design outcomes

	Mines stabilization	Offshore wind farm	Land remediation
Type of alternative (number of options evaluated)	1. Strategic solutions (e.g., controlled collapse versus infill) (7) 2. Infill options (4) 3. Location of worksite (13) 4. Transport of infill material (2) 5. Do-nothing	1. Site choice (2) 2. Site layout (1) 3. Turbine choice (n/a) ^a 4. Foundation design (5) 5. Electricity connection point (7) 6. Landfall and onshore cable route (6) 7. Do nothing	1. General waste disposal method (7) 2. Treatment method for specific waste streams (17) 3. Landfill location (14) ^b
Number of mitigation measures proposed	217	145	91
Average number of mitigation measures per impact prediction ^c	4.8	1.6	2.4

^a It was concluded in the environmental assessment documentation that the developer would opt for the turbines with the largest generation capacity available at the time

^b The do-nothing option was not considered in this case, as the owner of the site was legally required to remediate the land

^c These calculations take into account the fact that single mitigation measures are sometimes applied to multiple impacts

sent decisions. In the land remediation case, an effective participation program, combined with a willingness to amend the proposals, overcame virtually all stakeholder opposition to the development. The same is true of public opinion (but not, initially, that of statutory consultees) in the mines stabilization case. In the absence of significant opposition, local politicians may have believed they had no mandate to object to the developments. As was noted in the section on governance, stakeholder involvement in both these cases was primarily a result of contextual factors other than environmental assessment ideology, but the implications are self-evident.

Conclusions

This research provided further evidence of the divergence between normative theory on the contribution of environmental assessment to consent and design decisions and actual practices. It is apparent that more than 35 years' worth of deliberation focused on procedures and technical precision has failed to achieve rationalist goals in England (see also Weston 2002) and various other jurisdictions (Deelstra and others 2003; Flyvbjerg 1998). However, the research results provide important empirical evidence to support theories that environmental assessment has the potential to contribute to sustainable development through mechanisms above and beyond its developmental outcomes. This is a conclusion which applies at multiple levels: for example, passive information provision has roles in addition to those ascribed to it under rational decision theory (Hills 2005), and outcomes occur through mechanisms other than the use of environmental assessment for problem-solving (Schullock 1999).

There is a need to replicate this research in different empirical settings, both to validate the recorded outcomes and to investigate differences in other institutional, legal, and sociopolitical contexts. Yet in combination with research from other policy arenas, the findings provide a robust case for revising environmental assessment theory. Reformation of theory is important because many of the observed outcomes were un- or undervalued by-products of a process designed to achieve alternative goals. A logical suggestion is that effectiveness could be enhanced if theory incorporated (and hence valued) the full breadth of potential sustainability outcomes, and if these were addressed in environmental assessment design principles. A detailed causal understanding of potential sustainability outcomes is, therefore, a priority for future research.

The findings of this study indicate that no single theory of causation adequately describes the contribution of environ-

mental assessment to sustainable development. The importance of a holistic outlook is reinforced by the interlinkages that were observed to exist between outcomes, both within (e.g., information provision and transparency) and between (e.g., governance and learning, and learning and attitudinal and value changes) categories. The emerging comprehensive (and in some senses integrated) conceptualization of environmental assessment's contribution to sustainable development must not be neglected in future work.

The influence of context on environmental assessment's contribution to sustainable development was also apparent in all the cases examined. Contextual variables frequently influenced outcomes; indeed, in several instances (e.g., the design of stakeholder involvement programs), contextual variables were considerably more influential than environmental assessment ideology or procedures. This finding is important in part because environmental assessment research, in reflecting its rationalist heritage, has tended to neglect contextual factors—with only limited exceptions (e.g., Boyle 1998; Goldman 2001; Hilding-Rydevik and Bjarnadóttir 2007; Scott and Oelofse 2005), environmental assessment has been implicitly assumed to operate within an institutional, sociocultural, and political vacuum (Cashmore and others 2004). Future research in this field must be considerably more attuned to context. It should also be undertaken within a framework that focuses on generating reflexive understanding of environmental assessment's contextual operation (Jasanoff 2004).

Not only is an awareness of context important in understanding the nature and magnitude of environmental assessment's contribution to sustainable development, but it should also inform the (re-)design of environmental assessment systems (Boyle 1998). Varying sociocultural conditions require different emphasis to be placed on the role and significance of individual sustainability outcomes spatially and temporally (O'Riordan 2001). Thus, operational procedures can and should vary, not only between major geopolitical zones (e.g., North-South, East-West), but also at a finer scale of geographical resolution. As Martello and Jasanoff (2004) observe, it is no coincidence that implementation of the global environmental agenda has remarkably rapidly led to a rediscovery of the local. The development of multifactorial, culturally sensitive conceptions of environmental assessment is a development inherently required by the concept of sustainable development and, hence, long overdue.

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