Integration of interests and expertise in the adaptation to climate change in The Netherlands

Anna Wesselink[1]

Sustainability Research Institute
School of Earth and Environment
University of Leeds
Leeds
LS2 9JT
United Kingdom
tel. 00.44.113.3438700
fax 00.44.113.3436716
e-mail a.wesselink@see.leeds.ac.uk

Abstract

Much of The Netherlands is vulnerable to flooding and will be even more so if current predictions of climate change impacts are right. In order to prepare for such changes, preliminary investigations were carried out by the Ministry of Transport, Public Works and Water Management to explore possibilities for adjusting to increased flood discharges. In the consultations with other stakeholders, a lot of pressure was encountered to minimize the constraints imposed by flood management requirements, because these result in competition for space with other land uses. Setting priorities between these is partly a battle fought at policy level. Still, whatever the outcomes of the national debate, complexities of multiple land use demands need to be solved in specific projects where real interests are at stake and where an integration of expertise and interests is required in order to make a politically acceptable integrated assessment of the different options.

From the findings in case studies of integrated water management in the Netherlands it can be concluded that successful projects show clever interweaving of interests and expertise in concrete results such as regional spatial plans. While the need for appropriate and adaptive process management cannot be underestimated, it is also possible to point out specific input that facilitates this interweaving. The use of flexible and negotiable objectives such as sustainability, safety or landscape quality helps the search for broadly supported solutions. Functionally they are boundary objects; as result they are holistic syntheses emerging from the contributing parts.

keywords: integrated assessment, water management, climate change adaptation, boundary object, landscape quality

[1] This research was conducted while the author was employed by the University of Twente, dept. Water Engineering & Management, The Netherlands

Integrated assessment: theory and practice

In recent years the realisation that environmental and socio-economic systems are complex has gained wide acceptance both in scientific and in policy making circles. Integrated assessment is one of the answers that has been formulated to cope with this complexity. Scrase & Sheathe (2002) identify some of the many meanings given to integrated assessment, e.g. integration among assessment tools, integration of environmental concerns into governance, vertically integrated planning and management, integration of stakeholders into governance or integration of assessment into governance. In this paper I will discuss how integrated assessment is put into practice in water management in the Netherlands.

The starting point for many projects is the perception that a good decision depends on integration of information. From the point of view of the natural sciences, the construction of integrated models is a logical answer to complexity: they take account of the different factors or subsystems. More importantly, they acknowledge the relationships between subsystems, thereby potentially accounting for systems characteristics resulting from complexity (Angyal, 1939). Furthermore, authors argue that 'the need for integrated assessment and modelling has grown as the extent and severity of environmental problems [..] worsens' (Parker *et al.*, 2002, p.210). Underlying this statement is the assertion that 'models play a central role in understanding and managing complex systems' (Brugnach & Pahl-Wostl, in prep., p.1) and that 'there are demonstrably correct solutions to natural resource management problems such that we can make decisions based on unanswerable and irrefutable logic' (Walker, 2002, p.119). Parker *et al.* (2002) in their review of progress in integrated assessment modelling follow this reasoning: they consider the integration of knowledge from different scientific domains and interested actors the key feature of an integrated model. However, 'decision support has, in practice, had limited impact in many [..] resource management contexts' (Walker, 2002, p.113).

A pragmatic way to assess what an integrated assessment should provide is to consider its usefulness in the policy process. Rotmans *et al.* (1994) include the provision of useful information in their definition of integrated assessment, while Brouwer *et al.* (2003) describe the outline of a procedure to ensure that this objective is met. They are not alone in asserting that involving policy makers in the integrated assessment would 'facilitate the identification of the distribution of costs and benefits to different groups of people' and 'it may also help decision-makers and experts to identify relevant criteria to evaluate policy outcomes, planning and implementation procedures' (Brouwer *et al.*, 2003, p.175)(see also e.g. Dewulf *et al.*, 2005). Involving relevant actors should in this approach improve the usefulness and use of the integrated assessment for the decision making process. However, even these approaches essentially view the provision of information, albeit weighed and tailored according to the wishes of the relevant actors, as the key function of an integrated assessment.

In this paper I explore integrated assessment from the very different perspective of the experience of concrete water management projects. I believe that understanding the ways in which integrates assessment is implemented in these projects will help to further refine the methods that are developed to support the policy process. For 3 years I have been a participatory observer in the Integrated Assessment of the river Meuse project where experts, administrators and politicians together searched for a method to perform this integrated assessment. This constitutes an ethnographic study of the decision making process and the analysis of its history (preceding projects) and its context (concurrent projects, policy). Additionally, I have organised and/or attended an number of expert meetings where other projects were examined in order to broaden my understanding of the subject. Following other authors who studied decision making processes, I conceptualise decision making as the interweaving of two aspects. While Hoppe (1983) speaks of instigation and design, Edelenbos *et al*. (2000) consider process and contents, I choose to express the choices facing the participants in the decision making process as a need to interweave expertise and interests. Fundamentally these three approaches refer to the same basic dualism between facts and values.

After a brief description of my methodological tenets I first sketch the Dutch flood management system and the challenges it faces due to climate change. The Integrated Assessment of the river Meuse (in Dutch: IVM, Integrale Verkenning Maas) was one of the projects exploring the possibilities of adapting to climate change impacts. From the project's search for a justifiable way to select the preferred solution I show how the integration of expertise and interests progressed. I focus on occasions where interests and expertise were integrated simultaneously in concrete results in order to develop a conceptual understanding of integration in decision making as interweaving of facts and values, and of the different varieties of integration. I conclude that values are integrated in the result to a much larger extent than the cited scientific literature would suggest. My understanding of integration as interweaving of facts and values was corroborated by the way practitioners from other projects described successful integrated projects. They also indicated that this integration is a way to deal with complexity. Importantly, like the practitioners I consulted I do not assert that integration should always be aimed for: this depends on the situation at hand.

Integrated assessment explored through ethnography

Following Jasanoff *et al.* (1995) I have chosen for an ethnographical approach to study the context in which integrated assessment is employed in decision making. This means amongst other things that no *a priori* assumptions are made as to what 'good decision making' or 'appropriate use of (scientific) knowledge' implies. Instead, 'the actors are followed' (Latour & Woolgar, 1987). According to Bijker (p.19, 1990): 'It is used as a slogan to express the methodological claim that it is more fruitful to follow the actors and see how they construct the various distinctions differently under different circumstances, than to start with one's own distinctions *a priori* and apply those to the empirical material.'

While my use of term 'interests' will not raise many questions, my use of the term 'expertise' requires some explanation. Expertise means knowledge but also includes being able to generate this knowledge and being able to use it in a specific context. Employing 'expertise' instead of 'knowledge' has two main advantages. First, it emphasises that knowledge is used in certain ways and that choices have to be made on how to use it: the integration of knowledge is not neutral but ultimately depends on the user's purpose and perception. Second, the use of 'expertise' highlights the variety of skills needed in a decision making process. After Leeuwis & Van den Ban (2005) I distinguish three types of expertise: substantive expertise, dealing with technical knowledge (scientific or other); political expertise, dealing with power relations between relevant social groups; and process expertise, dealing with project planning and facilitation of meetings.

Flood management in The Netherlands

Most of The Netherlands is protected from flooding by dikes along the major rivers – Rhine and Meuse – and by dunes along the North Sea coast. At present, the required height of river dikes is calculated from the design discharge using standards that are legally binding. By law, the return period T of the design discharge is between 4000 and 1250 year, depending on location[2]. This system of flood protection has developed over the last millennium (e.g. Bijker, 1993; Bijker, 2002; TeBrake, 2002). An exception to this system of protection is found in the southern part of the Meuse, where from the border with Belgium no dikes are present along the first 150 km. Only recently (after 1995) low embankments were constructed here to protect the population centres from flooding; historically the river had free access to the floodplain. The project Maaswerken is being implemented at present to achieve a return period of 250 year for these embankments. Further upstream in Belgium and France, a return period of 100 year is more usual as flood protection standard (Figure 1).

[2] The return period is a statistical parameter derived from observed flows. The reverse is the frequency 1/T or chance of the design discharge occurring in any given year.

The Netherlands is the most densely populated country in the European Community. Pressure on available space is correspondingly high, and increasing with economic growth. In spite of recent peak water levels (1993 and 1995), to some politicians and developers flood plains seem nice empty spaces waiting to be built on. In an effort to control developments, planning regulations are strict. Only minor constructions are allowed in flood plains, and any increase in resistance to river flow has to be compensated for e.g. by excavations elsewhere. In this way, the Ministry of Transport, Public Works and Water Management ensures that the design discharge will still fit between the dikes.

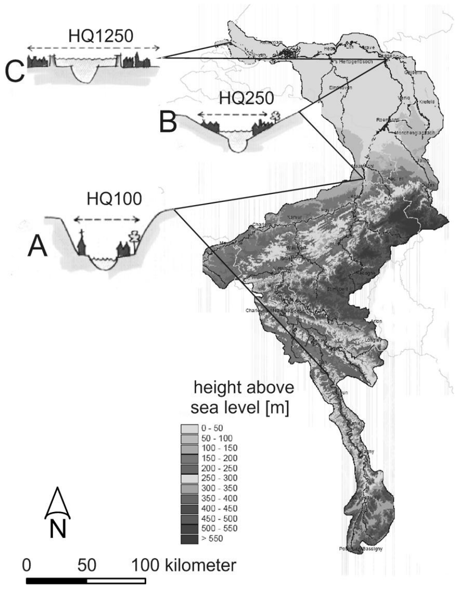


Figure 1 Catchment area of the river Meuse with tributaries, topography and typical cross sections. Design return periods are indicated with HQ.

By law design discharges are recalculated every 5 years, after which adjustments are made to dike levels and/or flood plain to guarantee the same protection level. Since the 1990's national policy aims to accommodate any increased discharge by spatial measures in the flood plain instead of dike enlargement; this principle was named 'Room for the River' (De Bruijn & Klijn, 2001; Reuss, 2002). Suitable measures are e.g. retention reservoirs, parallel rivers, deepening or widening of the river bed and/or flood plain, removal of obstacles or relocation of dikes and levees (Figure 2).

Adaptation to climate change in the Meuse valley

In the second half of the 1990's climate change predictions triggered the Ministry for Transport, Public Works and Water Management to investigate the possibilities of how to handle increased maximum flows within the existing flood protection system. The project Integrated Assessment of the river Meuse is the second national study following a similar investigation for the Rhine and its branches (Kors, 2004). Its objective was the selection of a politically acceptable set of flood management measures that would ensure the legal level of flood protection[3]. The required space for the selected measures would have to be set aside and protected from future investments. From the formulation of this objective the need for integration of expertise and interests becomes apparent: politics represent interests and flood protection levels represent expertise. The course of the IVM project can be conceived as a search for a way to ensure that this integration is sufficient.

[3] The flod protection level is calculated from the design discharge, which has a return period of T=1250 in the downstream part and T=250 in the upstream part of the Dutch part of the Meuse river.

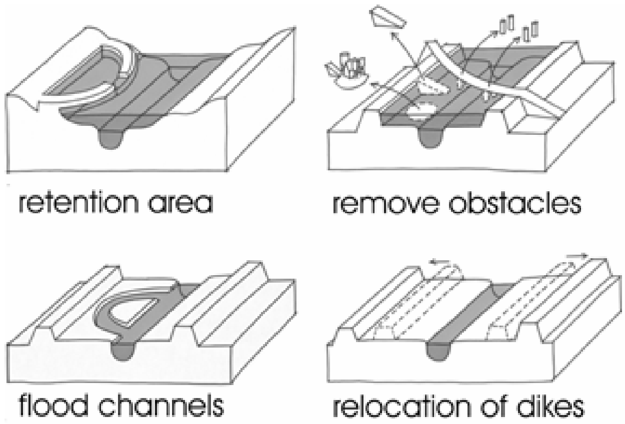


Figure 2 Sketches of example Room for the River measures along the river

Ensuring that the relevant actors are involved is one part of this task. Relevant social groups in IVM include national, regional and local politicians, who hold the ultimate decision making power, civil servants working for national, regional and local administrations, who search for a middle way between political wishes and technical possibilities, experts working for ministries and research institutes, who look at the issues mostly from a technical point of view, and employees of environmental and other NGOs who represent their organisation's vision. Following the definition of 'relevant social groups' (Bijker, 1995) the participants in IVM identified who should be included. Since participation of the general public was not considered relevant, public participation as it is commonly understood was not an issue in IVM. The relevant social groups worked together in various settings in IVM: the (political) steering group, the (administrative) project group, the (topical expert) working groups. Through the discussions in the project group and the working groups, civil servants working for local and regional administrations were kept informed of experts' investigations. To some extent they influenced the choices that were made, but mostly they followed the proposals made by the experts.

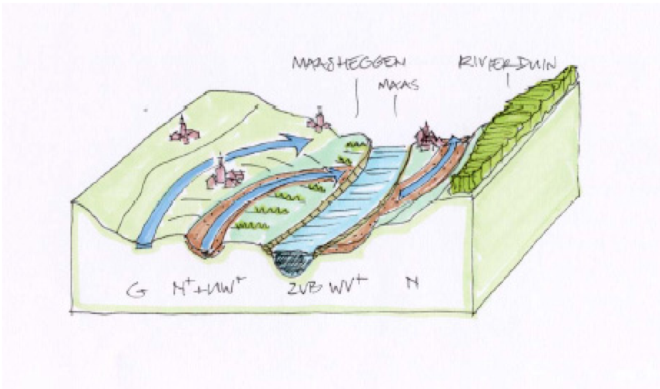
As a preliminary to the IVM project, the increased design discharges for different return periods were estimated and possible measures to accommodate the increased flows were investigated, respecting the Room for the River principle. A total of 160 individual measures was identified on the 230 km stretch of the Dutch Meuse. (Reuber *et al.*, 2005). A hydraulic model was established and it was calculated that these measures together would more than compensate the expected water level rise. A selection would therefore have to be made. Several selection methods were employed during the course of IVM, each with their own merits and with a different type of integration. The project can therefore also be conceived as a search for a politically acceptable approach to implement the project's title 'integrated assessment'. The flood reduction objective was not included in the assessment but set as external condition for the any set of measures that would be selected.

Multi-criteria analysis

In the first phase of the project (IVM1) factual studies into the effect of climate change on different interests were prepared. It was implicitly assumed that these would provide sufficient information for the steering group to formulate a solution: in this way expertise and interests were kept almost separate. The project set out to do a multi-criteria analysis (MCA). A 'wish lists' for future development were identified for the main spatial demands in the region (agriculture, housing, industry, recreation, ecology). All individual measures were scored qualitatively for their effect on these functions. It would then have been possible to choose a set of measures that fulfilled the flood protection criterion and scored best on the individual ratings for spatial demands. If necessary, weights could be applied if one aspect was considered more important than another. However, the advisory board felt that this approach did not do justice the need to provide an integrated solution: they felt it was impossible to compare the different entities in the MCA. The experts proposed to look at the landscape as unifying concept that could be used to assess whether integration had been achieved.

Landscape quality framework

In the mean time the concept of landscape quality had become accepted in Dutch policy and scientific circles as an important objective for any spatial plan. Using this concept, the objective of IVM2 was reformulated as follows: to assess in which ways flood management objectives can be achieved in future in the Dutch Meuse valley, while maintaining or enhancing the quality of the landscape. So the landscape experts produced a description of the spatial qualities of the Dutch Meuse valley, identifying eight sections with distinctly different characteristics. Figure 3 shows one example of the use of the description of landscape quality during the IVM project: images and texts are used concurrently.



'The geomorphological underground indicates a 'slow', sustainable development of the untouched rural landscape in the Venloslenk should be aimed for.'

Figure 3 Sketch and desired future of the landscape in Meuse section 'Venloslenk'

In consultation with the project group they then defined three possible strategies for future development:

- concentration (with two varieties): Meuse as efficient discharge channel, big spatial units;
- mosaic: a patchy collection of special places along the Meuse;
- network (with two varieties): searching for connections in the landscape, e.g. by using the Meuse as a link.

Finally they selected the measures that fitted into these strategies while making sure the target water level was obtained. However, one problem still remained: which of these strategies would be preferable? Scoring them using the multi-criteria approach did not help (Table 1): again, the entities were not comparable. The supervisory board decided that the results should be seen as an exploration of the range of possibilities, and that further work was necessary to be able to choose. Notably it felt that there was a need to include local and regional interests. Hence, in the second phase of the project (IVM2) an intensive round of consultation with regional and local actors was carried out in order to arrive at a politically justifiable choice.

'Green-orange-red' assessment of measures

In the workshops with regional and local actors, they were asked to 'given their opinion' about all potential flood management measures using a classification in three categories: green = with potential, orange = ok with provisions, red = undesirable or impossible. When mapped the results look like Figure 3. The participants were allowed to mention any reason for their assessment: physical obstructions, the existence of a Natura 2000 site, actual land use, hydraulic and cost effectiveness of the measure, etc. The substantive expertise held by local participant proved to be essential for this detailed assessment of flood measures, reducing the available options substantially compared to the potential measures that were identified in IVM1.

IVM1 assessment of flood management strategies						
		strategy				
		concentration		***mosaic***	***network***	
criterion		***I***	***II***		***I***	***II***
spatial quality	**upstream**	**0/-**	**0/-**	+	+	+
	downstream	+	+	**0**	+	+
robustness		**-**	**-**	**--**	++	+
costs (M€)		**7-10**		**6-9**	**3-7**	
landscape		**-**	**-**	**-**	+	+
nature		++	+	+	+	**0**
agriculture		**--**	**--**	**-/--**	**-**	**-**
recreation		**--**	**--**	+	+	+

Table 1 **IVM1 score of three flood management strategies**

In this classification ‘green-orange-red’ political wishes and local interests were integrated with substantive expertise because the reasons for the score included political desirability, the existence of development plans, or cherished landscapes. Interestingly, both the project group and the steering group considered this assessment to be ‘subjective’ and therefore less important than the expert information gathered earlier, even though it was the result of extensive and multiple discussions. The project leadership worked around this problem by classifying the arguments for the assessment in a multi-criteria table, making it look more objective and thereby acceptable. Even though the table might look like a multi-criteria analysis, there are two important differences with the classical MCA:

- the type of arguments used depends on the measure;
- the weights assigned (implicitly) to each argument depends on the measure.

It is because of this local tailoring of the arguments used and the relative weights they receive that this procedure is more appropriate in a negotiation setting such as the IVM project than a classical MCA. In this way, interests can be integrated into the result of the assessment, which is essential for ensuring the political acceptability of the results.

The result of IVM

After the detailed assessment of the measures was carried out in the workshops, it appeared that there were barely enough ‘green’ and ‘orange’ possibilities left to fulfil the flood protection criteria. In the downstream part of the river, even a few ‘red’ retention areas were necessary to accommodate increased discharges. This met with insurmountable objections from regional and local politicians. The project then decided to implement several refinements to the hydraulic model in order to check that inclusion of these ‘red’ measures was indeed necessary, but to no avail: they had to be selected if the flood protection criterion should be met. Although on the surface it seems that the integrated assessment ‘green-orange-red’ was almost irrelevant for the final result, the fact that this assessment had been done and results had been taken into account was important for the political justification in the final advice.

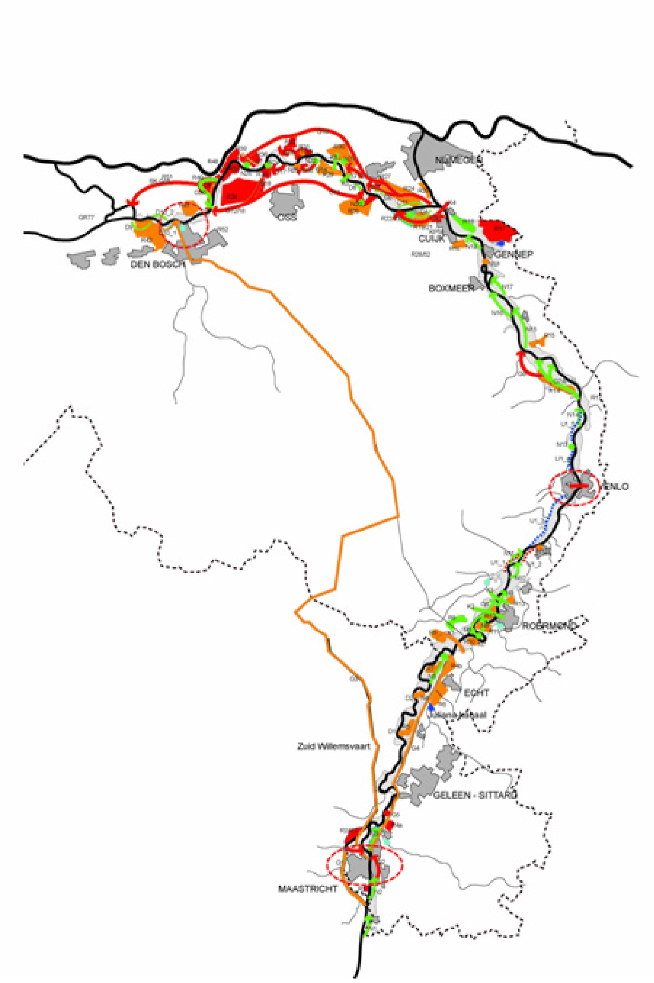


Figure 4 Map of classified potential measures

When this final advise had to be formulated the contradictions between the regional/local level objectives and the national objectives became too obvious to ignore. Politicians at the regional/local level have to take account of many interests. For them, flood management is only one amongst many, with a diminishing importance when flooding disappears from public memory (Wesselink *et al.*, 2007). The Ministry of Transport, Public Works and Water Management in this project has only a single-purpose objective: to apply the flood protection law and the Room for the River policy. In this project a compromise between these two groups was found in the formulation of the following conclusion: the results of the investigations are noted by all parties but no action is undertaken (i.e. the reservation of land for flood management) until proof of increasing discharges is available.

My exploration of other recent projects where multiple interests had to be integrated in order to make a spatial plan have shown that this tension between the national instigator and the regional actors is common and often results in a stalemate. While in the case of IVM no solution was found amongst the regional actors, in many projects a regional compromise was achieved by 'embracing complexity', only to be rejected on the national level because the result incorporated more that the original question. The following analysis of IVM explains why the simultaneous integration of expertise and interests is important when a politically acceptable result is desired. It also shows how embracing complexity relates to the integration of expertise and interests.

Interweaving expertise and interests

From the description of the integration of expertise and interests in IVM2 it is clear that these are always present concurrently in the process. However, one or the other usually dominates in one particular activity. It is important to note that the presence of both aspects at the same time in an activity does not yet imply that expertise and interests are integrated in the concrete result of that activity. This means that the process and the result of integration have to be analysed separately to understand the character of a truly integrated assessment. In order to be able to describe both, I am now introducing the following definitions.

Integration of expertise and interests in the process can be partial or full: partial when either interests or expertise are integrated predominantly separately, full when they are both integrated at the same time. Examples in IVM of these are:

– partial integration of expertise in the process: the IVM1 multi-criteria table of effects, the IVM1 framework for landscape quality assessment;
– partial integration of interests in the process: the predominance of political reasoning when the IVM2 conclusions are written;
– full integration of expertise and interests in the process: the classification of measures using green-orange-red in the IVM2 workshops.

Concrete results of an process can be either integrated or not integrated. The distinction between integrated and not integrated results depends on the relationship between the original input and the result. If the contributing information is still recognisable in the end result, as is the case in the IVM1 multi-criteria assessment table, the result is an aggregation and not an integration. If, on the contrary, the result is 'original, new, on a different level and enriching' (Hoppe, 1983), if it comprises 'a synergy of the contributing parts that are not visible any more' (Angyal, 1939) it is an integrated whole. Its characteristics result form the interactions between the parts, and are emergent from the contributing input (Ablowitz, 1939). The emergence of new characteristics is of course a phenomenon notes also for complex systems (Holland, 1998).

Interestingly and importantly, the IVM proceedings show that full integration of expertise and interests in the process leading to a result is not necessary for an integrated result. The IVM1 framework for assessing landscape quality was formulated by experts, thereby excluding the interests of other relevant social groups. However, the result is still integrated because the contributing input is not visible in the end formulation: this indicates that partial integration of expertise can also lead to integrated results. To understand how this can occur, I return to the basic dualism between facts and values introduced at the beginning of this text. I assert that integrated results are distinguished from non-integrated results by the fact that they were created by integrating facts and values. Integration of facts and values can therefore be achieved through a process of full integration of expertise and interests, it can also be done in a process where experts use their ethical and/or esthetical judgement, as in the construction of the landscape quality framework.

Error! Reference source not found. summarises this conceptual understanding of integration in process and results. An analysis of the partial integration of interests is omitted here as this will be the subject of another paper. Although such a table gives the impression that distinctions between categories are clear-cut, in reality this is not the case. However, this classification can help in concrete cases to further the understanding of complex problems. If project leaders are able to interpret the situation they face with the use of the table, they may be able to make appropriate decisions on the next step to take: whether to ask experts for facts, to leave politicians to decide, or to aim for the integration of both. The example of IVM has shown clearly that it is not always necessary to aim for complete integration; conversely complete integration is sometime necessary where experts would think they should only provide the facts (see the previous discussion in this paper 'Integrated assessment: theory and practice').

		result	
		not integrated	*integrated*
process	*partial integration of expertise*	calculation	experts interpret & combine disciplines using ethics and aesthetics
	full integration	policy on single issue	negotiated solution on multi-issue problem

Table 2 General classification of integration: process and results

This understanding of integration as interweaving of facts and values was corroborated by the way practitioners from other projects described successful integrated projects[4]. They also believed that integration can only be achieved in concrete results. Put differently: the test of successful integration is the implementation of the negotiated results. In water management these results are often spatial, because decisions on the use of limited space need to integrate both interests and expertise. Unexpected results emerge where creativity leads to innovative solutions shared with enthusiasm by project participants. The practitioners also indicated that integration is a way to deal with complexity. From their combined experience the participants concluded that in many settings complexity had to be embraced by enlarging the project scope in order to achieve any results at all. A unilateral focus on water management goals is untenable if parties need to find a shared agreement: objectives need to be 'stretched' to include other actors' ambitions. However, if a simple solution could be found it was inefficient to try to find an integrated solution. Here, too, integration is not a goal that should be pursued irrespectively.

According to these water professionals, the type of problem determines whether a project merits an integrated approach. I think that the literature on 'wicked problems' can provide guidance here, particularly since this literature explicitly links wickedness with the complexity that was identified as the reason to aim for integration (Rittel & Webber, 1973; Funtowicz & Ravetz, 1993). Wicked problems are problems where uncertainty about facts is important and consensus on desirable solutions is lacking. Where one or both are the case an integrated approach would be appropriate because facts and values will then have to be integrated in order to reach acceptable results.

Conclusion

From the analysis of the IVM project and discussions about similar projects it appears that the separation of expertise and interests advocated by a classical decision making procedure is not productive (e.g. Miser & Quade, 1985; Majone, 1989). This is by no means a new conclusion, although in the first phases of IVM it was the implicit model used for the set-up of the project. Edelenbos *et al.* (2000) already concluded that 'the breach between contents and process has to be mended'. In my analysis I have explored how this mending can happen. While expertise (or: contents) and interests (or: process) can always be distinguished as separate entities during a decision making process, I have shown that it is possible and often advantageous to achieve concrete results where they are truly integrated. Fundamentally, this means that facts and values are integrated, leading to emergent results that are 'original, new, on a different level and enriching' (Hoppe, 1983).

[4] It is important to note that the discussions between practitioners on which these conclusions are based were not prompted by a presupposed conceptual framework: they came up with the analyses described here of their own accord.

With this analysis, I indicate the importance of attention to detail and concrete results. I thereby question the applicability of integrated assessment models – even when information or preferences provided by relevant social groups are included: integrated results are location and time dependent.

Implications for practice

If an integrated result is to be achieved the intelligent choice of the project objective is a good start. Because of the negotiations involved in achieving integration, the objective should allow for flexibility and enthuse a variety of relevant social groups. Therefore it should ideally:

- be a societal objective, as opposed to a single issue;
- enable the search for an integrated result or an emergent synthesis;
- be a boundary object.

A boundary object is by its definition suitable for the integration of expertise and interests, for it is 'an analytic concept of those scientific objects which both inhabit several intersecting social worlds [..] and satisfy the informational requirements of each of them. [..] They are weakly structured in common use, and become strongly structured in individual-site use. [..] They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation' (Star & Griesemer, 1989). Negotiation is the way in which this translation takes place in the setting of decision making project such as IVM.

Landscape quality qualifies on all three accounts, which makes it a very suitable objective for integrated water management projects where (multiple) use of space has to be re-negotiated. Other examples of such objectives which are societal, boundary objects and allow synthesis are sustainability, safety, social justice, or resilience. Turnhout *et al.* (2007) have shown that even a seemingly non-integrated concept like ecological indicators often plays a role as boundary object in practical settings where the implementation of ecological goals has to be negotiated with the relevant social groups. Flexibility therefore seems to be the key to a successful integration of expertise and interests.

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