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# Tensions bows as a tool to assess the impacts of institutional change: an example from Dutch floodplain management

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## Abstract

In this paper we provide a method to assess the impact of organisational change on institutional functioning. Based on insights from floodplain restoration activities in the Netherlands, barriers to improved ecosystem based management deriving from institutional functioning are identified. Several potential options for change to a more ecosystem based or adaptive river management system are explored. These include altering co-operative arrangements and the founding of a river organization based on the bio-geomorphological requirements of rivers rather than on historical power relations. However, such changes will not solve all of the existing problems and may even cause new difficulties to arise. The potential effects on institutional functioning are described and then the differences in impacts of pairs of options are compared by visualizing them in tension bows. The impacts assessed include issues such as competency levels, whether trade-offs occur internally or externally to the institution under consideration, and the degree of fit with scale demands of the bio-physical system. Tension bows can aid impact assessors in presenting their findings and so support decision-making processes dealing with complex qualitative data.

## 1. Conditions for applying ecosystem based approaches in river management

Ecosystem based management approaches are gaining ground in both European and national water policies (e.g. ICES 2005, PKB Ruimte voor de Rivier 2007). The phrase 'Ecosystem Approach' was first coined in the early 1980s, but found formal acceptance at the Earth Summit in Rio in 1992 where it became an underpinning concept of the Convention on Biological Diversity, and was described as 'a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.'

Within ecosystem based approaches the focus is on preserving and enhancing natural functioning of the water system. A consequence of, and condition for, applying an ecosystem-based approach is that the institutional arrangements should be compatible with the demands of such an approach. However, improving this compatibility impacts upon other aspects of institutional structure and functioning.

In this paper we discuss the impacts of four proposed adaptations to institutional arrangements designed to facilitate the application of an ecosystem-based concept to a floodplain along the Waal River in the Netherlands. These impacts are visualized using a technique known as tension bows (see box 1), originally developed by van Twist and Edelenbos (1997) and further developed and used by Karstens. (2008 forthcoming). They enable us to display a selection of the potential tensions between the proposed new situation and the existing situation. Accordingly, they provide a method of comparing the impacts of different alternatives on institutional structure and functioning.

#### **Tension Bows**

Karstens (2008 forthcoming) first used tension bows in a post-impact assessment of scale choices for the Long Term Vision study for the Scheldt Estuary. In principle, tension bows are a means of visualising trade-offs between different policy alternatives. These alternatives can cover a broad range from proposed measures in the field to complete institutional changes. Here they are applied to the latter situation, first to explore the tensions deriving from proposed institutional adaptations in Dutch river management, and second to expand our understanding of the tension bows as a tool in impact assessment.

In tension bow visualizations, alternative policy options are compared with each other. These can be two 'new' options, or the zero alternative (status quo) and another option. On one side of the image major impacts of option 1 on pre-defined criteria are depicted, whereas on the other side the major impacts or implications of option 2 on the same criteria are depicted. The impacts related to the same criterion are then connected. This forms the tension bow.

*Box 1: tension bows*

## **2. Alternative institutional arrangements for Dutch floodplain management**

Floodplains in the Netherlands are undergoing many innovations and land use changes. The most evident change comprises the transition from agriculture to nature management including the removal of obstacles that induce hydraulic resistance or the digging of side channels. Both developments have as their objective increasing the ecological value and flood protection levels. These new developments lead to new river management questions, including questions about who should perform the tasks of planning and maintenance. Clearly, when combining hydraulic and ecological perspectives, the questions cannot be answered only at the floodplain level, but need to accommodate the larger geographical and temporal scale patterns traced by the river itself (see Geerling *et al.* 2006). However, existing scale uses impose boundaries that are generally difficult to cross. Scales derive from different disciplinary backgrounds, divide tasks between organisations, co-evolve with habits, represent historical developments and the need of the human mind to organise systems in scales (see Vreugdenhil *et al.* 2008).

The proposed institutional adaptations can be viewed against the background of the existing institutions. North (1990) defines institutions as 'the rules of the game in society or, more formally, are the humanly devised constraints that shape human interaction'. They guide societal and social behaviour. Institutions can be formal and informal, can be created or evolve over time. For the purpose of this paper, institutions are mainly considered as the social construct of organisations, practices and rules.

To understand the proposed changes, the existing institutional structure concerning river management in the Netherlands first needs to be understood. In general, the Ministry of Transport, Public Works and Water Management develops strategic level water policy programs, thereby integrating and translating European directives into policy plans (e.g. Water Act). The

Ministry of Agriculture, Nature and Food Quality has a comparable task for nature plans (e.g. Natura 2000). The daily management of the rivers lies with the operational arm of the Ministry of Transport, Public Works and Water Management (Rijkswaterstaat). Their main tasks are safeguarding and improving flood defence levels and navigation. However, their influence stops at the dikes. Public water boards manage both the dikes and the water landward of the dikes. In addition, land use planning for the floodplains falls under the local planning authority of municipalities and the regional planning authority of provinces. Land ownership is often highly diverse, comprising farmers and different governmental and non-governmental organisations. The primary responsibility for maintenance and management of the floodplains resides with the landowners. It is assumed that in the future the state forestry service will be the major land owner. On this basis the following adaptations are proposed:

0. Maintain the existing institutions, but adapt the working methods to be able to meet the emerging demands arising from societal developments, innovations, new problems and changing political attitudes
1. Expand the power of the water boards, which are generally regionally based. The regional planning of floodplain management becomes their responsibility
2. Representatives of national, regional and sectoral actors participate in a project bureau that cooperates with the landowners. The cooperative organisation gives existing institutions time to learn how to act in the new situation and integrate Natura 2000 and Water Act objectives into regional management plans for each river branch. A regional plan is developed for river branches
3. The development of a 'stewardship council', which is a (financially) independent floodplain organisation with a more permanent character. This idea was first proposed by de Bruijn et al (1987), but the idea has not been developed further. A stewardship council ('*waardschap*' in Dutch) would be an organisation that manages and maintains the entire floodplain within a river section, thereby reaching beyond local boundaries and short time spans. Natura 2000 and Water Act objectives would be integrated and a regional plan developed for the different river branches
4. A new regional government. Policies concerning floodplains are developed here and no longer in the national ministries. Policy makers are elected and policies are funded through a tax system. National nature objectives are decentralized to this new regional government. Regional policy plans for each river branch are developed.

### **3. Visualising the impacts using tension bows**

The criteria upon which the analysis of the impacts was based included three broad criteria on 'good' institutional functioning mentioned by practitioners within river management. These included the river engineers, environmental managers and policy advisors interviewed and consulted during their project involvement in the period 2005-2008. The criteria were categorized as follows: the ability to comply with regulation and policies, economic aspects, and flexibility and decisiveness. A fourth criterion represents the effort needed to reach the new state. Within these broad criteria, several sub-criteria were identified. The impacts were then assessed by combining insights derived from these practitioners with insights derived from literature on institutions, governance and multi-actor systems (e.g. North 1990, Klijn 1997, Enserink and Mayer 2001). The institutional impact assessment scorecard is depicted in table 1.

	Existing institutions	Expanding Water boards	Project bureau	Stewardship council	New regional government
<b>- Comply with existing regulations and acts</b>					
<b>Emphasis on safeguarding ecology &amp; safety</b>	Safety dominant	Safety dominant, Ecology future trend and nice add-on	In broader institutional context safety dominant, within bureau balance with Ecosystem Approach	Full Ecosystem Approach	Full Ecosystem Approach
<b>Level of integration ecology &amp; safety (floodplain) scale</b>	Integration national policy objectives on regional scale	Integration national policy objectives on regional scale.	Integration national policy objectives on regional scale	Integration national policy objectives on regional scale	Regional policy objectives integrate on regional scale
<b>- Decisiveness, flexibility</b>					
<b>Integrated management</b>	Dependent on individuals, Ad hoc	Streamlined	Co-production	Institutionalized	Institutionalized
<b>Locus of responsibility for daily management (land ownership)</b>	External	External	Internalized	Internalized	Internalized
<b>Decision making style</b>	Transparent, controller-developer relation	Transparent, controller-developer relation	Early conflict management - internal trade-offs	Early conflict management - internal trade-offs	Early conflict management - internal trade-offs
<b>Fit with physical system scales (mental boundaries)</b>	No. Scale based on engineering practices historical developments . Physical scale-crossing depends on individual	Almost. Regional scale related to intra-regional water management	Yes. Organisational scale determined by interregional water management issues	Yes. Organisational scale determined by interregional water management issues	Yes. Organisational scale determined by interregional water management issues
<b>- Economic aspects</b>					
<b>Financing</b>	State financed	Direct taxes	Financed by represented parties	Independent (e.g. public-private-cooperation)	Independent (e.g. public-private-cooperation)
<b>- 'Transition energy'</b>					
<b>Fit with current institutional scale</b>	Good. No institutional change needed	Moderate to good. Extending responsibilities and streamlining competences, legislation and knowledge	Good, niche position created. Streamlining competences, legislation and knowledge	Moderate. Large changes in competences, legislation and knowledge	No. Fundamental changes in competences, legislation and knowledge
<b>Capacity</b>	People qualified for current tasks	New tasks ask for new qualifications and knowledge	People qualified for tasks	New tasks ask for new qualifications and knowledge	New tasks ask for new qualifications and knowledge

Table 1: Scorecard institutional impacts

Generally, a scorecard is useful in comparing alternatives and so helping decision makers make trade offs. However, because of the qualitative and complex nature of these data, direct comparison of alternatives remains difficult. This is where the tension bows come in. Within the tension bows, only the impacts that are different across individual alternatives and are expected to form major barriers are included. In figure 1 we provide two out of the ten tension bows that could be derived from the impact assessment, namely the existing institutions versus project bureau and existing institutions versus stewardship council. These two were chosen, because they seem most promising on the basis of the scorecard in terms of ecosystem management and yet feasible in terms of the institutional change needed. The tension bows indicate that the project bureau does have a better fit with the physical system, but at the same time requires streamlining of competences, knowledge and legislation. As for the stewardship council, a good fit with the physical system is expected. The ecosystem approach can be applied fully, whereas the expected changes required in other institutional aspects are relatively large and there is a need for new or different qualifications.

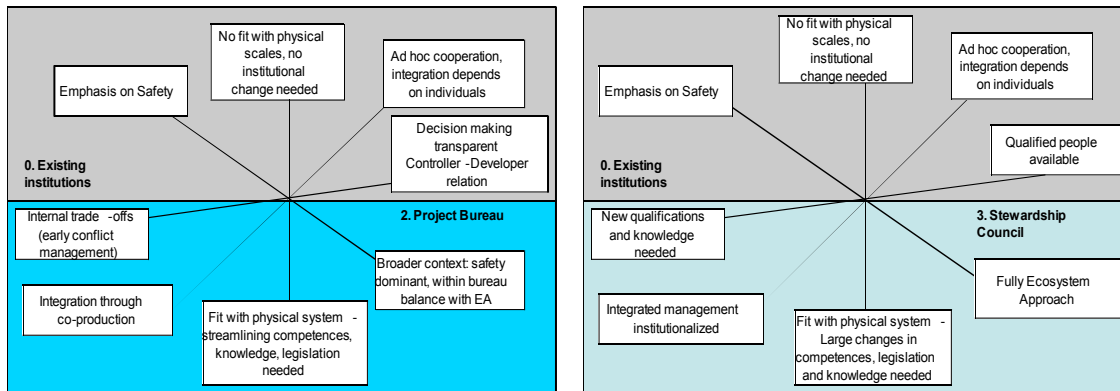


Figure 1: tension bows 'existing structure – project bureau' and 'existing structure –stewardship council'

#### 4. Discussion and conclusions

Tension bows are useful tools for visualizing complex qualitative data that can result from impact analyses, while comparing different policy options. They can help decision-makers in making more informed choices between different options and can help impact assessors in presenting their findings. The impact assessment and tension bows can emphasize that every proposed institutional change brings both advantages and disadvantages and as a next step arrangements could be developed to deal with these. In terms of the institutionalization of ecosystem based floodplain management in the Netherlands, the impact scorecard indicates that the project bureau and stewardship council alternatives could be of interest. The tension bows were employed to emphasize the major impacts of these alternatives.

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