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## Research article

## Implementing participatory monitoring in river management: The role of stakeholders' perspectives and incentives

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## ABSTRACT

Involving local stakeholders in monitoring has the potential to stimulate learning and improve management responses. However, there is limited understanding about factors which influence implementation and success. This paper reviews local stakeholders' perceptions with respect to the construction of longitudinal dams in the Dutch river Waal, and explores their incentives to be involved in monitoring the effects of this intervention. Interviews with key stakeholders showed that concerns and (dis)trust are important incentives for participating in monitoring. Surveys of local residents, recreational anglers and boaters, and shipping professionals mapped their level of trust, attachment to the river landscape and evaluation of the effects of the longitudinal dams. Our case study shows that incentives for participation differ between stakeholder groups, and that research into their perceptions of the local environment can inform water managers on how to involve these groups in participatory monitoring.

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## 1. Introduction

Climate change and societal pressures create challenges for sustainable and multifunctional use of rivers. This has led to a transition towards collaborative and integrative approaches in water management (Emerson and Gerlak, 2014; Hill Clarvis and Engle, 2013; Pahl-Wostl, 2006) by moving away from hierarchical and top-down government structures towards less formalized governance based on networks of stakeholders (e.g. Huitema and Meijerink, 2014). In this new governance mode, stakeholders play an active role in both decision making as well as policy planning and implementation. There are several potential benefits of active participation of stakeholders, including more public support for policy decisions, higher quality of the decision-making process, and empowerment of stakeholders (Mostert, 2003; Reed, 2008; Stringer et al., 2006). Public participation has become mandatory in many water management policies, yet the level of participation and the influence of these participatory processes remain limited and require further study (Newig et al., 2014; Van der Heijden and Ten Heuvelhof, 2012; Wehn et al., 2015).

Participatory monitoring refers to the active involvement of local stakeholders in the systematic collection of information (Villaseñor et al., 2016). Several authors have illustrated the potential role participatory monitoring can play in data collection, in fields as diverse as anglers monitoring their catch (Eden, 2012), or citizens monitoring the quality of air (Snik et al., 2014), water (Buytaert et al., 2014; Fore et al., 2001) or soil (Bone et al., 2012).

Decisions made in the planning phase of a participatory monitoring project are crucial for its successful implementation and projected outcomes. One such important decision in project design is the selection of participants. Stakeholders perceive their environment and its resources differently, which in part determines how they define the focal problems and appropriate solutions. As such, it is important to take these different stakeholder perceptions into consideration (De Groot et al., 2013; Luyet et al., 2012). Successful recruitment and engagement of volunteer monitors also requires an understanding of their incentives for participating (Measham and Barnett, 2008; Wright et al., 2015). In practice, however, the amount of time and resources invested in studying public perceptions when planning participatory processes is limited (EEA, 2014). This paper addresses this gap between research and practice by studying public perceptions of a major intervention in the Dutch river landscape, and stakeholder incentives to participate in monitoring the effects of this intervention.

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### 1.1. Research aims

The aim of this paper is to investigate the perceptions of local stakeholders (i.e. citizens, recreational anglers, recreational boaters and shipping professionals) and their incentives for participating in monitoring a new engineering project in the river Waal, The Netherlands. Subsequently, we discuss the importance of these perceptions and incentives when implementing participatory monitoring. The main research questions addressed in this study are:

1. What incentives do local stakeholders have to participate in monitoring the effects of the planned engineering project?
2. How do local stakeholders perceive the planned engineering project and the expected changes to the river landscape?
3. How do local stakeholders' incentives and perceptions inform the implementation of participatory monitoring?

To provide the necessary background, we will first discuss relevant literature on participatory monitoring, incentives for participation, and the importance of landscape perceptions and trust. Next, the case study is introduced by describing the study area and the participatory process leading to a monitoring plan. The main part of the paper reviews stakeholders' incentives for their involvement in monitoring, and survey data on public perceptions. Finally, we reflect on the outcomes and highlight lessons for practitioners.

### 1.2. Participatory monitoring in practice

The importance of public involvement in local monitoring was first recognized in developing countries, with the aim to empower local communities and improve management of natural resources (Danielsen et al., 2005; Estrella and Gaventa, 2000). In recent years, participatory monitoring has been increasingly adopted in Europe and North America, which entails a broader vision regarding involvement of citizens in monitoring. For example, Fernandez-Gimenez et al. (2008) define collaborative or participatory monitoring as “involv[ing] multiple individuals or organizations with different interests and forms of expertise in the design and implementation of monitoring” (p. 1). Literature on participatory monitoring has described a diverse range of case studies which differ in scale, aims and level of participation (Danielsen et al., 2009; Villaseñor et al., 2016). This includes local projects mostly aimed at building trust and relations between stakeholders, and large-scale projects with an emphasis on substantial data collection. Villaseñor et al. (2016) distinguished between participatory monitoring projects aimed at collaborative learning, and more evidence-based approaches that are used to improve management efficiency, although these can sometimes overlap. Alender (2016) and Gouveia et al. (2004) have also noted that participatory monitoring may serve both scientific and management goals while also providing opportunities for learning and collaboration among the involved stakeholders. For instance, Overdevest et al. (2004) showed how participation in volunteer stream monitoring increased citizens' social capital, which in turn could increase participation in combating local environmental problems. While there is increasing recognition that involving local stakeholders in monitoring enhances management responses, we still have a limited understanding about the factors that influence implementation and success.

### 1.3. Incentives for taking part in participatory monitoring

Incentives for stakeholders to engage in participatory

monitoring are diverse and range from value-oriented incentives, such as protecting the local environment, to social incentives, such as working together in a group. A number of studies have looked at the incentives for environmental volunteers to take part in participatory monitoring. For instance, Gooch (2005) found in her study of catchment volunteers that stewardship of the catchment was an important incentive, but so were the social opportunities and the chance to be empowered in resource management. In the field of citizen science most work has focused on biodiversity recorders; for instance, Hobbs and White (2012) found that an existing interest in wildlife and an opportunity to contribute to its conservation were the main incentives to get involved in biological monitoring, while Bell et al. (2008) showed the importance of bonding with like-minded people. Since there is limited empirical data on incentives for joining river-based participatory monitoring, one aim of this paper is to gain more insight into why different stakeholders might participate in monitoring the effects of a planned river engineering project.

### 1.4. The role of landscape perceptions

An important aspect when dealing with landscape change is sense of place, or the way people perceive and bond with places and the local environment (Cheng et al., 2003; Davenport and Anderson, 2005; Vorkinn and Riese, 2001). Not only does attachment to nature and place play a role in evaluating landscape change (e.g. Jacobs and Buijs, 2011), it may also motivate people to take part in citizen science (Haywood, 2014). Farnum et al. (2005) note that “when people with a strong investment in a place feel the area is jeopardized or is endangered, these feelings of dissatisfaction may catalyze people into action” (p. 26–27). This argument resonates with other authors who have empirically demonstrated correlations between sense of place dimensions and engagement in different place-oriented civic actions, from donations and volunteer work to oppositional behavior such as protesting place change (Anton and Lawrence, 2016; Devine-Wright and Howes, 2010; Payton et al., 2005; Walker and Ryan, 2008). In addition, participatory monitoring has the potential to further strengthen the bond between participants and their physical and natural environment (Haywood et al., 2016). For instance, Jones (2013) reported improvements in long-term citizen science participants regarding their connection to nature and valuation of local green spaces.

### 1.5. The role of trust

Like other participatory processes, participatory monitoring requires a certain level of trust among the participating citizens, researchers and institutions (De Vente et al., 2016). Haklay (2013) has argued that citizens are often “as capable as the best researchers” (p. 115), but he also noted that, despite evidence to the contrary, data collected by citizen scientists are not always considered trustworthy. Resnik et al. (2015) extend this importance of trust to personal and organizational trust: it is vital to prevent both citizen scientists and data users from feeling like they are being taken advantage of. As such, gaining more insights into the level of trust between citizens and institutions is also an important step for facilitating civic action (Payton et al., 2005).

## 2. Case study: longitudinal training dams in the waal river

Our case study concerns the construction of longitudinal training dams on a 10 km stretch of the Dutch river Waal between Tiel and Ophemert (Fig. 1A and B). In this pilot engineering project, the traditional groynes (which are placed perpendicular to the river) are partly substituted by three dams situated parallel to the

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